White Paper

Globalization 4.0
Shaping a New Global Architecture in the Age of the Fourth Industrial Revolution

A Call for Engagement

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Preface

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As the World Economic Forum's communities gathered for its Annual Meeting 2019 in Davos-Klosters, there was a widespread sense that international relations and the world economy are at a turning point. This was reflected in the theme of the meeting – Globalization 4.0: Shaping a New Global Architecture in the Age of the Fourth Industrial Revolution – which was explained in a recent opinion piece and *Foreign Affairs* article authored by the Forum's Founder and Executive Chairman, Klaus Schwab.[1]

The essential thesis is that major shifts underway in technology, geopolitics, environment and society are combining to give birth to a new phase of globalization – Globalization 4.0 – whose trajectory will depend in large measure on how well governance at multiple levels – governmental, corporate and international – adapts to these changes. Strengthening our governance architecture to ensure its effectiveness in this new era will require deeper engagement and heightened imagination by all stakeholders, beginning with robust and sustained dialogue among them.

This white paper is intended to help concretize such a call for engagement and place it in a systemic context. The introductory section describes how the interplay of technological progress, business strategy and international economic policy shaped previous phases of globalization and has begun to do so again. It highlights the crucial role the multilateral system has played in human progress and argues for strengthening and anchoring it in a wider geometry of cooperative arrangements and norms.

The second section argues that the transformations driving Globalization 4.0 require an "operating system upgrade" for global cooperation and domestic governance and presents a blueprint of eight general design parameters for strengthening and adapting them to this new context.

The paper's third section highlights many existing initiatives and proposals that, with sufficient support, would go a long way towards modernizing our cooperative architecture and policy models in line with these design specifications. This is an actionable roadmap of practical opportunities for governments, companies, civil society institutions and other actors to work together to address many of the most pressing challenges our societies are facing. These ripe opportunities for governance reform and innovation are presented first in three traditional domains of global governance: trade, finance and global public goods, including climate change and the environment; second, in the relatively new areas of technology and cybersecurity governance, which require a stronger international and domestic response; third, in two critical areas of domestic governance and institutional strength, workforce and human capital development as well as corporate governance; and, finally, in the overarching area of geopolitical and geo-economic cooperation.

Our aim in publishing this white paper is to encourage everyone to consider more seriously how they and their organizations could contribute concretely to the policy and enabling architecture improvements needed in this new era by engaging in one or more of these worthy initiatives or by bringing others to the table. As the 75th anniversary of the United Nations and Bretton Woods institutions approaches in 2020, the Forum plans to encourage such a global multistakeholder mobilization to strengthen the multilateral system and modernize our governance architecture by facilitating a year-long process of dialogue in cooperation with international organizations and other institutions.

The paper has been compiled through consultation with members of a number of World Economic Forum communities, including many of its Global Future Councils, System Initiatives and Centres, as well as several international organizations. It does not aspire to be exhaustive or prescriptive. Nor does it represent an institutional position of the Forum or its members, partners, communities or constituents. Thanks are due to all of those who have made suggestions and contributions, including the heads of many of the Forum's Centres and System Initiatives, as well as my colleagues Nicholas Davis and Thomas Philbeck.

Introduction

A strengthened framework of global cooperation is needed to accelerate progress on shared challenges and lessen tensions among and within countries. After the Second World War, leaders worked together to develop new institutional structures and governance frameworks to help build a more stable and prosperous future. The world has changed dramatically since then, and in response to the vital challenges of the 21st century we need to engage in such a process again.

We must begin by understanding how profoundly the context for governance and cooperation is changing due to the Fourth Industrial Revolution. Economies, businesses, societies and politics are being transformed by technological advances in such areas as artificial intelligence and machine learning, the internet of things, autonomous vehicles, drones, precision medicine and genomics, advanced materials, smart grids, robotics and big data.

This technological transformation is posing a fundamental challenge to the way economies and societies organize themselves in domestic policy and how the international community cooperates through institutions and arrangements. New policy models and cooperative arrangements are needed to help societies maximize the benefits and mitigate the risk[2] of these advances, which are fuelling the wholesale disruption and recombination of industries; the dematerialization of value creation; a shift in the nature of competition in domestic product, capital and labour markets as well as countries' international trade and investment strategies; growing questions about corporate and government stewardship of personal data as they become ever more central to economic activity and the exercise of citizenship; and rising concern that all of these changes could further exacerbate inequality and generate worker and community dislocation at a disorderly pace and scale.

This wave of technological disruption is coinciding and interacting with three other, equally epochal, transformations in the global economic and political context:

- An increasingly urgent set of ecological imperatives, including but not limited to global warming

- The growing multipolarity of international relations and plurilateralization of the world economy

- Rising social discontent within many countries regarding the inequity of socioeconomic outcomes from economic growth

These four transformations are combining to give birth to a new phase of globalization – Globalization 4.0 – whose trajectory will depend in large measure on how well governance at multiple levels – governmental, corporate and international – adapts to these changes. Modernizing our governance architecture to enhance its effectiveness in this new era will require wider engagement and heightened imagination of all stakeholders. Engagement in direct, open dialogue will be crucial, as will the imagination to think systemically, which is to say beyond one's own short-term institutional considerations.

The purpose of this White Paper is to issue such a call for engagement by governments, companies, civil society institutions and citizens to strengthen and adapt international cooperation and domestic governance to these concurrent transformations.
It provides an overview of some of the key weaknesses in the world economy's cooperative architecture that have been exposed by the profound changes occurring in its operating context. And it spotlights some of the most promising practical opportunities available to address these weaknesses that merit greater consideration and commitment by government, business and other leaders.

A top priority of this endeavour must be to preserve and reinforce the rule of law and existing multilateral system. Much of the remarkable progress humanity has experienced since the Second World War has been constructed on the foundation of international norms and shared policy and action agendas organized through the United Nations system and Bretton Woods institutions (see Box). We need to strengthen and modernize this precious institutional infrastructure, while anchoring it in a wider, multidimensional geometry of cooperative arrangements that advance its common objectives even further.

Globalization 4.0 and its antecedents

Broadly speaking, there have been three phases of global economic integration in modern times. The first was the period leading up to 1914, when immigration and cross-border capital and trade flows were quite large even by contemporary standards,[3] but the global institutional architecture was extremely limited. People were free to travel from one country to another without passports; immigration policy was effectively free of governmental limitation; and only a handful of international economic agreements and institutions existed, e.g. the International Telegraph Union (1865), Universal Postal Union (1874), International Association of Railway Congresses (1884) and International Sanitary Convention (1892).

Globalization's second phase was the period extending from the Second World War to the late 1990s in which much of the modern international economic enabling architecture was established (trade, financial and development institutions and agreements) and multinational corporations greatly expanded their operations across the globe, aided by not only policy liberalization, but also improved communications. By some measures, trade and capital flows took nearly this long to reach the level of cross-border integration attained just before the First World War.

The third phase ran from the late 1990s until very recently and was characterized by the advent of the internet, the establishment of the World Trade Organization (WTO) and the formal entry of China into the trading system through its accession to that institution. There were also critical improvements in information and communications technology during these decades. Critical improvements in information and communications technology as well as financial risk management tools combined with continued trade and capital liberalization – particularly through regional free trade agreements and bilateral investment treaties – brought the integration of markets and cross-border expansion of value chains to a new plateau. Trade as a proportion of world GDP has risen by half since the mid-1990s.[4]

Globalization 4.0 is only now taking shape. However, Brexit, the Trump administration's shifts in US policy, and developments surrounding such issues as immigration, data privacy and security, China's Belt and Road Initiative, multi-speed European integration, and automation's impact on the future of work and economic development strongly suggest that we have entered a distinctly new era in which many of the assumptions of prior periods no longer hold.

Like its precursors, Globalization 4.0 will be shaped by a combination of governance decisions and technological developments. As emerging technologies transform our systems of health, transportation, communication, production, distribution and energy, to name just a few, we will need to construct a new synergy between public policy and institutions on the one hand, and corporate behaviour and norms on the other, which enables humanity to rise above the false choices that are sometimes posed.

We do not face a stark choice between free trade and protectionism, technology and jobs, immigration and national identity or economic growth and social equity. These are false dichotomies. However, the prominence of these polemics in contemporary political discourse illustrates how underprepared we are for Globalization 4.0. More imaginative approaches are urgently needed to transcend them and assure an often sceptical public that global integration and technical change do not inherently pit countries against each other in a zero sum game or, worse yet, a race to the bottom.

Because the changes underway today are not isolated to a particular country, industry or issue, they would benefit from a global approach and systemic perspective. Indeed, the very universality of this governance challenge creates an important opportunity for international relations. It could provide the basis for a common project at a time when the international community has been fracturing along multiple lines. Cooperation on this shared imperative could help to build trust among countries and other stakeholders in ways that spill over positively into other areas of their affairs.

In approaching this challenge, the international community might usefully draw inspiration from Dumbarton Oaks and Bretton Woods, the two processes of international reflection and dialogue that gave birth to the United Nations system and Bretton Woods institutions, respectively, at the end of the Second World War. These extended discussions created the necessary space for their participants to draw practical lessons from the recent past and translate them into a shared view of the governance architecture needed to enable a better future.

What is needed today is an analogous but more inclusive and sustained process of reflection and dialogue about the meaning of the Fourth Industrial Revolution and the big ecological, geopolitical and social changes of our time for the modernization of international cooperation and domestic governance. How are these four simultaneous transformations influencing the effectiveness of our governance architecture, and what corresponding modifications to it are needed?

The World Economic Forum is dedicating its activities over the next year to furthering such reflection and dialogue on a global, multistakeholder basis, building on the discussions under this theme in its recent Annual Meeting. This white paper has been prepared to help concretize this dialogue and place it in systemic context. It is organized as follows:

– **General design parameters** – A series of observations regarding what these four transformations imply for the general design specifications of effective international cooperative architecture and two key aspects of domestic governance in the age of the Fourth Industrial Revolution

– **Specific architectural innovations** – an illustrative set of promising existing initiatives and proposals to improve the performance of international institutions and arrangements as well as domestic corporate governance and labour market policy, in part by embodying one or more of these design features

These general design parameters and specific architectural innovations are presented for the purpose of raising the ambition of discussions about the need to strengthen the multilateral system and global cooperation by grounding them in a better understanding of the very practical and promising opportunities for progress that are already available and mainly awaiting deeper engagement and wider support. Nearly 60 multilateral and intergovernmental governance initiatives are highlighted, including over 20 led by the UN and 15 by the Bretton Woods institutions, OECD and WTO. In addition, 45 multistakeholder initiatives to strengthen global governance and cooperation are spotlighted, including 25 that are facilitated by or linked to the World Economic Forum's platform.

Accordingly, the paper should not be read as a general treatise or comprehensive overview of global governance but rather as a set of architectural blueprints for helping public and private institutions to remain "up to code" in Globalization 4.0, as well as a practical "users guide" immediate opportunities to do so for all stakeholders.

The white paper has been compiled through consultation with members of a number of Forum communities, including its Global Future Councils, System Initiatives and Centres. It does not seek to be exhaustive or prescriptive but rather illustrative and suggestive. Nor does it represent a formal position of the World Economic Forum or its members, partners or communities.

The aim instead is to inspire everyone to think more seriously about how they and their organizations might best contribute to shaping the enabling architecture improvements needed in this new era. This includes business leaders, who have an active role to play in regaining a positive narrative for the next phase of globalization, proving its benefits and reducing its perceived negative consequences.

As the International Organization for Public-Private Cooperation, the Forum plans to use its platform to advance such thinking and collective action through multistakeholder dialogue. This bottom-up or inductive approach involving national governmental as well as non-state and subnational actors can help accelerate the pace of governance innovations needed in the 21st century as well as enhance the legitimacy and degree of public trust in it.

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The Multilateral System Has Underpinned Decades of Remarkable Human Progress

In 1950, two-thirds of humanity lived in extreme poverty. This rate declined to 42% by 1980 and 10% by 2015. Since 1990, an average of more than 130,000 people per day have exited extreme poverty. The global middle class has expanded from 1 billion people around 1985 to about 2 billion in 2006 and 3.2 billion today. It is projected to grow by another billion inside the next decade and potentially to 5 billion before 2030.[5]

Similarly, the absolute number of war deaths has been declining since 1946. In some years of the early post-war era, around half a million people died through direct violence in wars; in contrast, in 2016, the number of all battle-related deaths in conflicts involving at least one state was 87,432.[6] Excluding the Syria conflict of recent years, the number is less than half of this amount, a level that has roughly prevailed for the past three decades.

These and other remarkable dimensions of human progress over the past three-quarters of a century have been underpinned by the normative frameworks and material assistance organized through multilateral cooperation. For example:

Development: The International Development Association (IDA) — the World Bank's fund for the poorest — is one of the world's largest sources of aid, providing support for health and education, infrastructure and agriculture, and economic and institutional development. Since the beginning of this decade alone, as a result of its concessional assistance, approximately 274 million children were immunized, 657 million people received essential health services, 140,000 kilometres of road were constructed, rehabilitated or upgraded, 86 million people received access to better water services, and 8.5 million teachers were recruited or trained.

Macroeconomic stability: Since the 1950s, each year an average of about 30% of the International Monetary Fund's member countries (currently totalling 189) participated in an IMF support programme to contend with a balance-of-payment or debt crisis, including about 10% of developed countries from the 1950s to 1970s and again since the 2008-2009 financial crisis.[7]

Trade expansion: Trade as a share of global GDP rose from about 7% to 8% from the 1950s to 1970s to about 25% today,[8] driven in significant part by the principles of non-discrimination (Most Favoured Nation) and national treatment, as well as uniform customs regulations enshrined in the General Agreements on Tariffs and Trade (GATT). In seven GATT multilateral negotiating rounds between 1947 and 1993, average tariffs on industrial goods in major economies declined from 22% to less than 5%.[9] For a significant number of products, it is zero. The WTO has extended the benefits of this rules-based system through important agreements on information technology, agriculture and health-related intellectual property as well the establishment of a formal Dispute Settlement Body.

Intellectual Property: The World Intellectual Property Organization (WIPO) is a self-funding agency of the United Nations that administers 26 international treaties, including those pertaining to the registration and adjudication of disputes concerning patents, trademarks, designs and geographical indicators. Its plays an increasingly important role in today's more knowledge intensive economy by enabling national patent offices to securely share search and examination documentation related to patent applications for a more efficient international examination process. Its databases holds over 74 million patent records and facilitate trademark and industrial design searches, allowing users to search data collections simultaneously via a single interface.

Child and maternal health: Supported by UNICEF and WHO and elevated as a priority by the UN Millennium Development Goals initiated by UNDP, child mortality declined by half between 1990 and 2017, dropping by two-thirds in India and 83% in China.[10] Maternal mortality dropped 43% from 1990 to 2015.[11] The number of children dying from preventable causes of poverty, hunger and diseases has dropped by half since 1990.

Environment: Under the terms of the 1987 Montreal Protocol negotiated under the auspices of the UN Environment Programme, the world has phased out 98% of the ozone-depleting substances contained in nearly 100 hazardous chemicals worldwide. Every country is in compliance with stringent obligations. The protocol has achieved the status of the first global regime with universal ratification; even the newest member state, South Sudan, ratified in 2013. As a result, climate projections indicate that the ozone layer will return to 1980 levels between 2050 and 2070.

Infectious diseases: Enabled by a global strategy coordinated by UNAIDS, between 2000 and 2014, the annual number of people acquiring HIV was reduced from 3.1 million to 2.0 million and the number of children acquiring HIV fell by 58% to 220,000 per year. In 85 countries, new HIV infections among children were virtually eliminated, with fewer than 50 children acquiring HIV per year. The target of 15 million people receiving HIV treatment by 2015 was reached nine months early. While total resources for the response rose by 11% from 2011 to 2014, the number of people receiving antiretroviral therapy increased by 58% during the same period.[12] Also, in 1979, WHO declared that smallpox had been eradicated after a 13-year effort, the first disease in history to have been eliminated by human effort. It also has been a leader in the crucial and largely successful fights against polio, malaria, SARS and Ebola.

Hunger and natural disasters: The UN World Food Programme is the largest humanitarian aid provider. It delivers food to an average of 90 million people in dire circumstances per year, of whom 58 million are children.[13] In addition to helping to lead the fight against chronic hunger, the Food and Agriculture Organization (FAO) has created crucial norms that protect the world's food supply from key threats. It created the International Plant Protection Convention in 1952 to prevent the international spread of pests and plant diseases in both cultivated and wild plants. And, in 1961, in cooperation with WHO, it established the Codex Alimentarius Commission, which has developed food standards, guidelines and texts to protect consumer health and promote the coordination of all food standards work undertaken by intergovernmental and non-governmental organizations.

Education: The number of primary-school-aged children out of school has declined by 44% since 1990,[14] driven in significant part by the strategy set in the Millennium Development Goals and global monitoring process coordinated by UNESCO.

Labour rights: Child labour declined by 40% from 2000 to 2016,[15] driven in major part by the consensus and resources mobilized by the 1998 ILO Declaration of Fundamental Principles and Rights at Work, 1999 Convention on Worst Forms of Child Labour and 1992 establishment of the International Programme on the Elimination of Child Labour. The ILO won the 1969 Nobel Peace Prize and marks its 100th anniversary this year. In all, it has passed and ratified nearly 200 conventions, many of which are a critical guarantor of the rights, dignity and safety of people in the workplace.

Peace and security: The UN has negotiated approximately 175 peace settlements that have ended regional conflicts and is credited with participation in more than 300 international treaties on topics as varied as human rights conventions to agreements on the use of outer space and the oceans. UN Peacekeeping has played a critical role in establishing and maintaining peace in places as diverse as Cambodia, El Salvador, Guatemala, Mozambique, Namibia, Tajikistan, Sierra Leone, Burundi, Côte d'Ivoire, Timor-Leste, Liberia, Haiti and Kosovo. The General Assembly approved the landmark Treaty on the Non-Proliferation of Nuclear Weapon in 1968 and Comprehensive Test Ban Treaty in 1996.

Refugees: More than 30 million refugees fleeing war, persecution or famine have received aid from the UN High Commissioner for Refugees, which won the 1954 and 1981 Nobel Peace Prizes.

Human rights: The UN has also made great strides in raising the consciousness of human rights beginning with the Universal Declaration of Human Rights adopted by the General Assembly in 1948. The UN Commission on Human Rights through its investigations and technical assistance in promoting free and fair elections has helped many countries in the transition to democracy. The UN's intense attention to specific human-rights abuses helped end apartheid in South Africa. The International Court of Justice has helped settle numerous international disputes involving territorial issues, hostage-taking and economic rights.

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Towards an Operating System Upgrade for Global Cooperation and Domestic Governance

General Design Parameters

The transformations described above have exposed significant weaknesses in cooperative institutions and policy models in virtually every domain. To remain fully effective in this new era, they will need to adopt at least some of the following design characteristics. Together, these begin to describe the enhanced operating system for global cooperation and national policy that Globalization 4.0 requires. And they offer a framework for thinking about how the international community can modernize and strengthen the indispensable multilateral institutions at the core of the international system.

Indeed, all international organizations and cooperative arrangements, whether multilateral or not, would do well to evaluate themselves in relation to the questions posed below, as the design features they highlight are likely to help them function more effectively in our more technologically dynamic, politically multipolar and environmentally stressed world in which public trust is an increasingly precious resource:

– **Outcome-oriented.** Is the policy framework or institution in question focused sufficiently on producing results as opposed to administering processes? Process is important, but it is a means to accomplish actual improvements in policy or cooperation, and producing tangible outcomes is ultimately as important a determinant of an institution's legitimacy as proper processes.

– **Multidimensional.** Is the cooperative institution or arrangement in question mobilizing all of the most relevant expertise and resources available to help achieve its intended outcomes, even if they are outside its formal thematic or stakeholder remit? In order to achieve the scale, efficiency or innovation needed to produce such outcomes, governance mechanisms increasingly need to engage multiple dimensions of cooperation, including, but going well beyond, intergovernmental cooperation. To be effective, they will often need to engage private actors, whether from companies, academia or civil society, as well as operate in ecosystems and value chains, as opposed to isolated thematic domains or sectors. Subnational governments are also critical actors. In other words, an effective governance mechanism often needs to be focused as much on the orchestration of an entire system of cooperation as it is on delivering the desired result through its own devices. In a world of complex interdependence, this concept of multidimensional cooperation, which includes but extends beyond multilateral (inter-state) cooperation, is increasingly essential for effective governance.[16]

– **Agile.** Is the policy model or institution paying sufficient heed to the spectrum of governance tools available to address a given challenge, ranging from formal legally binding norms (treaties, laws and regulations) to "soft law" standards, guidelines, principles and methodologies to improvements in the alignment of metrics, disclosure and benchmarking practices? All of these have the potential to influence behaviour, but some will be more appropriate than others depending upon the circumstances. Indeed, some of the informal or "soft law" approaches may be useful stepping stones to more formal rules insofar as they allow for the experimentation, feedback loops and iterative refinement that are the hallmarks of agile governance, an increasingly important feature of effective policy-making, particularly when technology is a factor.

– **Interoperable.** Will the policy or institutional approach under consideration work adequately in different governance systems or has it been built with only one model of economic or political governance in mind? We live in a multiconceptual as well as a multipolar world in the sense that the international community consists of a number of different economic and political systems. These differences can have an important effect on the consistency and effectiveness by which a policy decision is implemented and thus on the long-term integrity of the political consensus on which it has been built. Henceforth, interoperability must be an increasingly explicit design consideration in international governance.

– **Resilient and sustainable.** Has the policy or institutional approach been tested against known risks and long-term trends in the design phase as well as on a periodic basis thereafter? This kind of stress-testing and reality-checking is important for assuring robustness over time and inculcating a culture of intergenerational responsibility and continuous improvement. Nowhere is this more vital than with respect to the growing set of environmental imperatives that our planet is facing.[17] In particular, given the urgency of global warming, governance in all domains, not least corporate governance, needs to ensure that it is "climate-proof" or at least "climate conscious".

– **Human-centred and trust-enhancing.** Has the policy or other governance mechanism properly weighed the human implications of the change it seeks to set in motion? One of the serious shortcomings of global economic governance in recent decades has been a systematic failure to appreciate and anticipate the impact of economic liberalization on people. This has resulted in greater dislocation and marginalization than might have been the case with a more careful and inclusive design and implementation plan. Public trust is the sine qua non of good governance. Once lost, it is very difficult to rebuild. For this reason, policies and institutions also need to be tested against and designed around their likely human consequences and implications for equity and fairness.

This can only be done effectively by incorporating civil society and other perspectives able to provide direct insight into this critical dimension of decision-making, as well as by considering human rights, democracy and the rule of law, without which globalization is likely to deliver poor outcomes for the majority.

–   **Technologically robust.** Does the policy or institutional approach function allow for the possibility of substantial shifts in the technology landscape, even within the short to medium term (e.g. one to three years)? Technology is advancing so rapidly that governance decisions need to be stress-tested against different technology scenarios, doing what is feasible to ensure that they do not become captive of fixed assumptions and "stranded" by changes in the market. Such conscious efforts at technology-proofing are also important for shaping the choice of governance instrument (see Agility above).

–   **Integrated and anchored.** Is the policy or cooperative arrangement in question sufficiently integrated into a larger strategy around which the wider (multistakeholder and interdisciplinary) environment of relevant actors and governance instruments has been mobilized? In other words, is it part of a coherent change agenda, which in many cases could be anchored in a corresponding multilateral organization which recognizes that, by virtue of its normative role and broad membership, one of its most important contributions in this new era may be to enable this kind of systemic overview and connectivity among actors? Such system integration and leadership is increasingly essential to producing results when the efforts of many diverse actors are necessary to achieve ambitious outcomes such as those enshrined in the 2030 Agenda's Global Goals.

These eight design parameters begin to provide blueprint for the "operating system upgrade" that many of our governance processes and institutions will require in order to be effective in the new economic and political context. They may offer a useful mirror to hold up to a given policy domain or institutional arrangement as it begins to reflect on how it can improve its performance and prepare its future in the Fourth Industrial Revolution.

If the post-war governance architecture of Globalization 2.0 and 3.0 was mainly designed to mediate national interests through formal norms negotiated by states, the enabling architecture of Globalization 4.0 must marshal a much wider geometry of actors and governance arrangements to accelerate action on shared challenges, some of which are truly planetary in scope. One of the benefits of this more multidimensional and agile conception of global cooperation is that it expands the range of opportunities for states and other actors to locate their common interests and give them practical expression in our increasingly multipolar and multiconceptual world. Such calibrated, consensual steps can help to build the trust necessaryto expand the ambition of collective action and multilateral norms in subsequent stages.
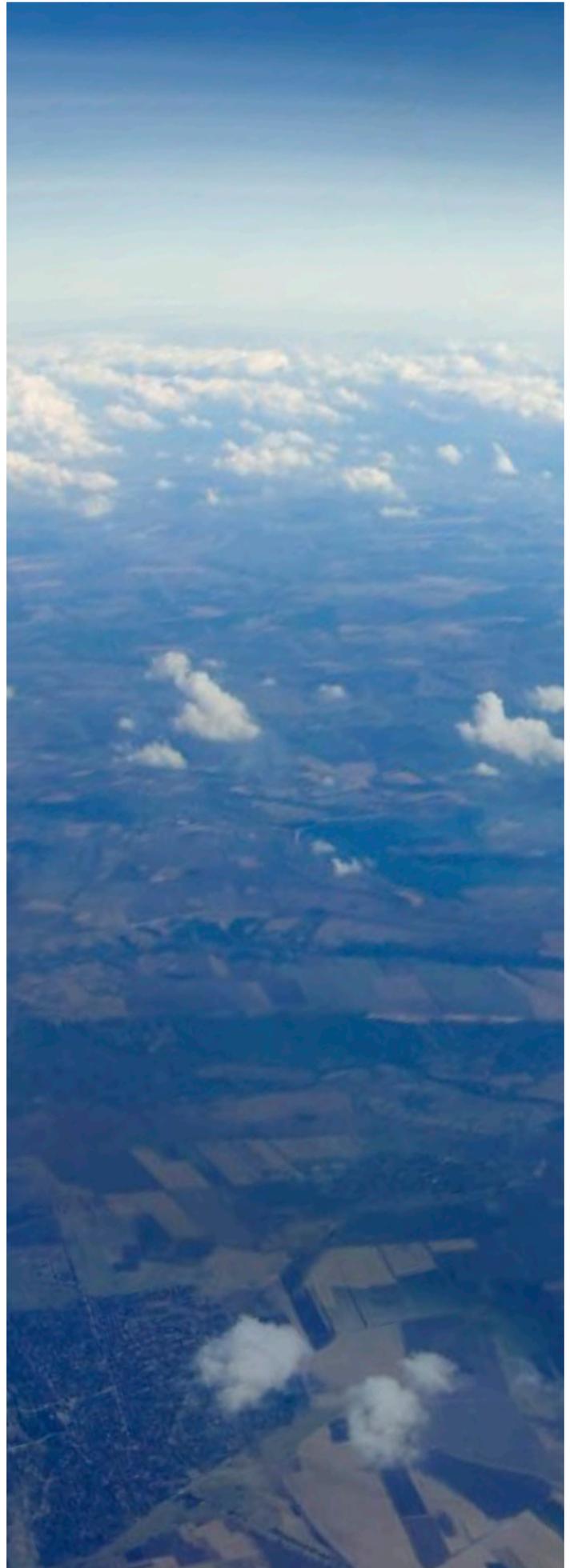
Specific Architectural Innovations and Improvements

The design specifications for modernizing our global architecture outlined above are not theoretical. Some of them are already being adopted by existing institutions and policy frameworks in multilateral organizations. Still others are embodied in important reform proposals and initiatives that deserve wider engagement and support. Following is a selection of some of the most strategically significant such proposals and initiatives. Links are provided in the text to enable readers to learn more about or, better yet, support such efforts.

Trade and investment

Perhaps no other area of international governance has been more affected by the global transformations highlighted above than international trade and investment. And no aspect of this governance system has been more challenged than the WTO, its multilateral core.

Multilateral rule-making has slowed to a crawl, with the last major agreement – including the creation of the WTO itself – having been negotiated one-quarter of a century ago. The process has been unable to produce a consensus on further liberalization except in a few notable cases (farm export subsidies, trade facilitation and information technology products). And trade restrictions and derogations from the letter or spirit of the multilateral rulebook have proliferated,[18] particularly since the financial crisis. At the same time, rule-making has shifted to the regional, plurilateral and bilateral level, creating increased opportunity as well as complexity for firms operating internationally. There are now over 400 preferential trade agreements and over 3,000 investment treaties around the globe.

The trading system is at a crossroads. On the one hand, there continues to be very significant progress through the negotiation of new or updated regional agreements. Recent examples include the US-Mexico-Canada Agreement (USMCA), Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), EU-Canada Comprehensive Trade Agreement (CETA), EU-Japan Economic Partnership Agreement and African Continental Free Trade Area (CFTA). On the other hand, the multilateral system is under severe strain, as evidenced by the recent imposition of tariffs by the US and China on each other's products, the stalemate over the appointment of Dispute Settlement Body appellate judges and calls by Presidents Macron and Trump and other heads of government in the recent G20 Leaders Communique for the WTO to be reformed.[19]

These recent tensions are symptoms of more fundamental differences, many of which are unlikely to be resolved through traditional WTO negotiations alone. Two recent global expert reports have developed extensive proposals for reform of the WTO and the wider trade and investment system, respectively.[20,21] Drawing on these and other efforts, the following are two promising avenues by which some of these tensions could be overcome and the global trade architecture modernized, particularly if they were pursued in parallel:

1) Flexible global agreements

Most of the plurilateral liberalization that has occurred in recent decades has been in specific regions through free trade agreements that cover most economic sectors. And yet there is a growing appetite among groups of countries spanning different regions to align their policies within specific economic sectors, particularly in relatively new areas as far as the coverage of multilateral rules is concerned. This is a much more likely pathway to progress towards rules in critical new areas of the economy, such as services, digital trade and environmentally sensitive sectors than a formal global negotiation among all WTO members.

These initiatives deserve wider support, not only because each has the potential to produce win-win gains for developed and developing economies but also because such wider support would increase the chances that the benefits of these initiatives could be extended by their participants on a non-discriminatory basis to all countries, thereby satisfying WTO requirements for agreements to be registered with and overseen by that institution. Universally open plurilateral agreements of this nature are the most promising way available to update the trade rulebook without further fragmenting the world economy and weakening its crucial multilateral foundation.

A critical way to create greater political support for such variable geometry would be to combine it with the kind of flexibility and material support for developing countries that was built into the recent WTO Trade Facilitation Agreement (TFA).[22] The TFA broke new ground by recognizing that liberalization is often a journey, particularly for developing countries with relatively weak institutions and limited administrative resources, and that the appetite to undertake this journey can be enhanced by building in flexibility in implementation linked to meaningful capacity-building assistance. The TFA is a formal multilateral agreement; however, its flexible approach could just as well be applied to plurilateral undertakings in order to help them reach a critical mass of participation in one form or another.

Following are four "new" trade issues where taking a flexible, global plurilateral approach could increase the odds of broad participation:

a) **E-commerce and digital trade**. In 2017, 70 countries agreed to participate in preliminary WTO discussions about e-commerce.[23] Many of these and others are parties to regional free trade agreements that incorporate chapters on e-commerce. An agenda to create and align core principles and the best-practice policy guidelines for important aspects of the enabling environment for e-commerce (customs, logistics, documentation, consumer protection, liability, electronic documents and payments, etc.) would have a greater likelihood of participation by developing countries if such commitments were linked to technical and administrative

capacity-building assistance – that is, to a significant parallel commitment of development cooperation. The same might also be true with respect to a chapter on the cross-border treatment of certain data flows. Defining common principles and best practice policy guidelines for the treatment of data might take longer than for e-commerce; however, it is a critical part of 21st-century trade, and progress on it could be advanced by taking a similarly flexible and even modular approach, with significant technical and capacity-building assistance for developing countries. Both of these tracks would also benefit from a linked or supporting process of multistakeholder consultation and technical input, as these will be critical to development of an appropriately balanced hard- and soft-law cooperative agenda. The Enabling E-Commerce Initiative, a partnership of the Forum's multistakeholder System Initiative on Shaping the Future of International Trade and Investment, the WTO secretariat and the Electronic World Trade Platform (eWTP),[24] is a potential resource for the international community in this regard.

b) **Fisheries subsidies**. The Food and Agriculture Organization (FAO) has estimated that about 30% of global fish stocks are overexploited and 60% are fully exploited, with a very significant proportion of the catch being illegal, unreported or unregulated (IUU) fishing that generates revenues of $10 billion to $20 billion annually. At the same time, worldwide fishing subsidies amount to about $35 billion, of which around $20 billion supports fishing capacity. SDG target 14.6 sets a deadline of 2020 for prohibiting subsidies contributing to overfishing and overcapacity, including the elimination of subsidies for IUU fishing. WTO negotiations on this topic have been underway for well over a decade. More recently, 15 countries have been negotiating a plurilateral agreement, building on the fisheries subsidies rules recently included in the CPTPP agreement.[25] Like e-commerce, this domain is ripe for a creative combination of core multilateral hard-law principles (such as the prohibition of subsidies for IUU fishing and overfished stocks) and flexible plurilaterally designed soft-law policy guidelines and commitments that are accompanied by the formal integration of significant development cooperation assistance to developing countries that need such support to be fully part of the solution to this global crisis.

c) **Investment facilitation**. The 2017 WTO ministerial meeting in Buenos Aires also produced an agreement among a coalition of 70 countries to launch structured discussions on the creation of a multilateral framework on investment facilitation.[26] Such a framework could similarly involve a hybrid of a core set of binding multilateral principles or rules and a more flexible framework of soft-law guidelines and effective commitments supported by substantial technical and capacity-building assistance. This topic is of crucial relevance for the financing of the SDGs and Agenda 2030. According to the United Nations Conference on Trade and Development (UNCTAD), more than 40% of the world's nearly $1.75 trillion annual foreign direct investment is directed to developing countries, many

of which receive more in foreign direct investment than Official Development Assistance (ODA), remittances or portfolio flows. However, these flows are concentrated in a limited number of countries.

d) **Services**. Services now account for about three-quarters of economic activity in advanced countries such as the EU and US. They also account for nearly half of global trade. The Trade in Services Agreement (TiSA) negotiations involving 23 governments started in 2013 but remain,[27] like their WTO Doha Round counterpart negotiation on services, stalled and needing an infusion of fresh approaches, perhaps similar to those suggested above.

2) Refreshing the WTO's mandate

Per the preceding discussion, one of the most important ways in which the multilateral system and its core institution, the WTO, could be revitalized would be to take a more agile and multidimensional approach to important "new" issues that reflect changes in the world economy and global agenda over the past two decades (e.g. services, value chains, e-commerce and cross-border data flows, sustainable development, financing for development). This could be achieved by taking an expanded view of the trade liberalization and coordination toolkit (i.e. binding rules, soft-law effective commitments, and parallel commitments of capacity-building development assistance) and deploying these different elements in combinations that best suit the politics and economics of the challenge in question. Such an increasingly integrated and results-oriented approach has the potential to command wider support within the WTO's membership because it is more politically flexible than the traditional single undertaking of previous WTO/General Agreement on Tariffs and Trade (GATT) negotiating rounds and it includes a results-oriented facilitative rather than solely normative dimension.

Nevertheless, there remain a number of "old" issues, some of which are embedded in the WTO's existing architecture, that, if anything, have become more contentious in recent years. These tensions pose a very real risk of unravelling the institution and its rulebook. There are two fundamental drivers of these tensions. First is a discontinuity of economic systems with regard to the use of different aspects of industrial policy, including subsidies, state-owned enterprises, investment restrictions and performance requirements, intellectual property rights and trade remedies. Second is dissatisfaction and stalemate over the structure of tariff schedules in two respects. The first is the view, held particularly by the United States for over a decade, that there should be greater tariff reciprocity on the part of major emerging economies that are now fully competitive in global markets in a wide range of industries. The second is the view of many developing countries that prior liberalization has effectively been skewed in favour of developed countries; in particular, tariff escalation (the imposition of higher tariffs on value-added products than on their underlying commodities or components) and stubbornly high levels of domestic agricultural protection are creating a structural barrier to economic development through trade in poor countries.

These disagreements, as well as another over the Dispute Settlement Body, highlight fundamental questions about the fairness and thus legitimacy and political sustainability of the WTO. The world economy has become much more multipolar and multiconceptual in the 25 years since its establishment and in the 70 years since the GATT, its predecessor, was born. This changed economic and political context has triggered the re-emergence of a debate about first principles and assumptions, particularly regarding how the concepts of reciprocity, sustainable development, and special and differential treatment apply to trade in Globalization 4.0. Indeed, in the absence of reforms to re-establish the functionality of the WTO's dispute settlement process and reinforce its monitoring function, the flexible global agreements recommended above risk being less effective and durable.

Trust and common ground need to be rebuilt: first through sustained dialogue, both informal and formal; and then through the application of imaginative statecraft, born of an understanding of how interdependent the world economy has become. The October 2018 Ottawa Ministerial on WTO Reform is a promising step in this direction, as are the US-EU-Japan trilateral and EU-China bilateral discussions. Since every country has a vital interest in the WTO's successful adaptation to this new era, the Forum is making its informal, multistakeholder platform available to support such dialogue, starting with a series of sessions at the Annual Meeting 2019 and continuing through its System Initiative on Shaping the Future of International Trade and Investment.[28]

Financial and monetary system

The financial crisis a decade ago inspired a number of important improvements in the global financial architecture relating to financial stability, as summarized in the most recent Financial Stability Board Annual Report on the Implementation and Effects of the G20 Financial Regulatory Reforms.[29] Following are four further opportunities to modernize and strengthen it in this area as well as in three others.

1) Systemic risk

The recent report of the G20 Eminent Persons Group on Global Financial Governance proposes two particularly important further improvements in the risk resilience of the international financial system.[30] The first would integrate the surveillance efforts of the International Monetary Fund (IMF), Financial Stability Board (FSB) and Bank for International Settlements (BIS) in a coherent global risk map; however, it would be important to reconcile this with the specific mandates of each institution. The second proposes improving the financial depth and coherence of available "global financial safety net" resources by: a) boosting the IMF's quota and New Arrangements to Borrow (NAB) resources for which a proposal is pending before the institution's membership; b) creating a standing IMF temporary liquidity facility; and c) strengthening coordination of these elements with regional financial arrangements and bilateral central bank swap agreements. During the financial crisis post-2008, the US Federal Reserve provided half a trillion dollars in liquidity to other central banks through bilateral swaps, and the IMF organized supplementary bilateral borrowings of an additional $450 billion. The Eminent Persons Group warns that we should not assume that the Fed will provide the same degree of international support in a future crisis. Moreover, the fund's supplemental bilateral borrowings are due to expire in 2020. Therefore, it is crucial in preparing for the next financial crisis that the fund's quota and NAB resources be increased to at least the level needed to replace its expiring borrowings, and that some sort of a new temporary liquidity facility be created, in part to insure against undue reliance on the Federal Reserve. At the same time, it would be important to develop clear operating protocols for the coordinated deployment of these core global resources with those of the major regional financial arrangements, which have recently become a very substantial part of the world's financial safety net but have not yet been fully tested in the heat of a crisis as part of a global response.

2) Shifting and better coordinating the business models of multilateral development banks

Perhaps the biggest obstacle to achieving the SDGs, including the targets set by the Paris climate agreement, is the scale of the required financing. This requirement can be met only by mobilizing substantially increased amounts of domestic and international private-sector financing, particularly for the estimated additional $1 trillion per year needed for development and climate-related infrastructure. The G20 Eminent Persons Group, Blended Finance Task Force and earlier Organisation for Economic Cooperation and Development (OECD) and Forum reports have concluded that a basic shift in the orientation of multilateral development banks (MDBs) and bilateral development finance institutions from primarily direct lenders to risk mitigators of private investment will be crucial to jump-starting the needed boost in private financing for SDG-related infrastructure and industry.[31,32,33]

To this end, a multistakeholder coalition of over 40 governments, private institutional investors and banks as well as development banks are working together in the Sustainable Development Investment Partnership,[34] hosted by the OECD and the World Economic Forum, to expand the application of so-called blended development and climate finance in Africa and South-East Asia in particular. In addition, a number of governments, including those in Canada and the US, are creating and expanding their own bilateral development finance institutions with this objective in mind. And pursuant to the G20's Hamburg Principles and MDB Ambitions for Crowding in Private Finance,[35] MDBs have committed to increasing overall private-sector mobilization by 25% to 35% over three years. The Eminent Persons Group has added a set of potentially game-changing proposals that deserve the support of MDB shareholders governments. These include, in particular, the creation of a *G20-led group to lead a coordinated shift in MDB business models over the next three years*, encompassing a scaling of risk mitigation, the standardization and system-wide expansion of political risk insurance and reinsurance anchored in an expanded Multilateral Investment Guarantee Agency (MIGA), establishment of infrastructure as an investable asset class attractive to institutional investors, and refinement of MDB capital requirements.[36]

The foregoing set of initiatives and proposals represent the world's best chance to encourage a breakthrough in the financing of many of the SDGs and particularly those relating to the implementation of the Paris climate accord, which require an enormous increase in low-carbon power, transport and water infrastructure investment over the next 10 to 20 years. This critically important outcome will be achieved only if government shareholders of the international financial institutions decide to drive it, engaging with these institutions and the management to help them become the catalyst and ongoing anchor of a system-wide transformation of capital allocation in the world economy. The proposed three-year task force led by G20 governments is precisely the type of vehicle that could make this happen. As such, it merits the active support of all governments and other stakeholders committed to poverty eradication and Paris agreement implementation.

3) Fintech

The rapid growth of "fintech", the provision of credit and other financial services through electronic platforms including those that enable peer lending, represents a significant potential new challenge for the global financial architecture. Such activity is growing rapidly, posing opportunities as well as risks for the financial system. The international community is moving to improve cooperation in both respects, most recently through the launch of

the Bali Fintech Agenda by the IMF and World Bank at their October 2018 Annual Meetings in Indonesia.[37] The Bali Fintech Agenda outlines a framework of 12 issues, including fintech's potential effect on the stability of domestic monetary and financial systems, financial inclusion and the efficiency of cross-border payments and remittances. It is intended to serve as a vehicle to gather information from and exchange experience among countries on their needs, objectives and views concerning such issues at fintech's relationship to money laundering and terrorism financing, market integrity and consumer protection.

For its part, the FSB has been analysing the potential financial stability implications of fintech and has identified ten such issues, of which the following three are seen as priorities for international collaboration[38]:

– the need to manage operational risk from third-party service providers

– mitigating cyber-risks

– monitoring macrofinancial risks that could emerge as fintech activities increase

The Bali Agenda and FSB analysis emphasize the need to close gaps particularly in those areas where international cooperation involving all stakeholders, including fintech actors, are both strikingly absent and urgently needed. Among potential concerns are:

– Price volatility of traded crypto-assets

– Rapid growth of fintech firms with unprecedented scale of operations and network effects, which may lead to rethinking competition policies to prevent excessive market concentration and new forms of systemic risk

– Impact of fintech innovations on potentially volatile cross-border savings and transactions; this poses new challenges to systemic risk surveillance through the need to identify, monitor and assess changes to the nature, magnitude and structure of resulting capital flows; fintech services could potentially amplify financial interconnectedness and cross-border spillovers

With respect to cyber-risks, a group of major financial services firms and fintech leaders are working together in the Cybersecurity Consortium FinTech Working Group of the Forum's System Initiative on Shaping the Future of Global Financial and Monetary Systems to develop cybersecurity common principles for the fintech sector.[39] Given the proliferation of cybersecurity frameworks and regulations, fintech actors find it challenging to evaluate and improve their cybersecurity readiness. This also affects incumbents, who may want to partner with them. All major stakeholders in the financial environment – incumbents, fintechs, regulators and customers – stand to benefit from an agile global framework that ensures system integrity while enabling further innovation. Financial regulators have an important stake in ensuring the quality and consistent uptake of such guidelines.

Important on its own, the safeguarding of customer information is also an important building block of the broader need for stakeholders to align on principles governing the collection, use and sharing of customer data. Whether it is data breaches at large organizations crucial to the provision of credit, disclosures of controversial data-sharing practices at social media firms offering payment services, practices at social media firms offering payment services, or exchanges of customer and transaction data between banks and tech firms, the accelerating data-fuelled transformation of financial services is generating uncertainty about what it means to use customer data appropriately.[40]

This is particularly true as some jurisdictions move to a "open banking" framework that enables wider access by entrepreneurial fintech firms to customer bank data. Ultimately, the absence of principles and resulting inappropriate – or even unethical – use of customer data could cause a loss of trust that could lead to instability in the financial system. The Forum's System Initiative is developing a work programme in this area of fintech governance as well.

4) Money laundering and financial crime

Money laundering and financial crime represent an enormous deadweight loss for economies and societies. Based on a recent survey, nearly 2,400 major firms around the world reported that they lose the equivalent of 3.5% of turnover, or $1.45 trillion annually, from various types of financial crime in addition to spending 3.1% of turnover or $1.28 trillion combating the risk of such crime.[41] Enforcement efforts are highly inefficient. For example, Europol reports that an average of only 0.5% of all transactions reviewed by the huge number of compliance officers in the banking sector in the EU ever lead to a criminal investigation, with only 1% of all criminal proceeds confiscated. The fiscal drain on national treasuries (money laundering alone costs these firms over $250 billion annually) and human cost in terms of uncompensated losses to individuals and the human trafficking supported by illicit financial flows are enormous. Improved financial architecture is needed to push back against this large and growing scourge, as financial cybercrime is already estimated by these firms to account for an additional $250 billion in losses. To that end, a multistakeholder coalition has been formed to build on the important work of the intergovernmental Financial Action Task Force and create a global standard of cooperation to strengthen and lend coherence to national and regional safeguards.[42] Representing different parts of the anti-financial crime system, the Coalition to Fight Financial Crime, which is supported by the Forum, aims to deploy its collective expertise to create and promote the most effective approaches to financial crime management, risk intelligence, law enforcement capabilities and public-private information sharing.[43]

In addition, regulatory technology (regtech and suptech) solutions could also strengthen AML/CFT compliance through several channels:

– Identity verification technology (including biometrics) may provide effective and secure ways to confirm identity

– Blockchain applications may be used to build a know-your-customer (KYC) repository accessible to multiple users

– Data analytics tools can support continuous risk monitoring and the identification of suspicious transactions patterns

Global public goods and the environment

Population growth, accelerated but uneven economic development, unabated burning of fossil fuels, and increased human connectivity have combined to present humanity with a new set of shared, interrelated risks. These include increasingly dire levels of environmental pollution, growing threats to food security, rising humanitarian and economic migration and elevated risk of the spread of virulent human pathogens. Many of these risks found expression in the 2030 Agenda's Global Goals. However, it has become increasingly clear in the three years since the SDGs were adopted that realizing these shared aspirations will require vast improvement and innovation in international cooperation.

1) Climate change

Nowhere is the challenge to the world's existing cooperative architecture more pressing than with respect to climate change. The UN Paris Climate Accord has laid the crucial foundation for the international cooperation needed to combat global warming, including through the recent agreement reached in COP24 on measurement, reporting and other implementation rules.[44] It creates a universal framework for the setting of voluntary emissions targets and implementation plans by all national governments. But the structuring and activation of these so-called Nationally Determined Contributions (NDCs) has been slow and uneven. So much so that even if they were implemented, humanity would miss by a wide margin the 2°C goal set in the Paris accord, let alone the 1.5°C target whose importance the UN Intergovernmental Panel on Climate Change recently underscored.[45] Scientists estimate that we are actually on course for a 3°C or more increase compared to the levels prevailing before the first industrial revolution, with likely catastrophic consequences in terms of extensive coastal inundation, drought, fires, crop failure and environmentally forced migration during the lifetimes of our children and grandchildren.[46]

Implementing the Paris accord will therefore require us to think beyond, and build upon, it. The necessary architectural additions to international cooperation are beginning to come into view, but they need to be shaped over the next few years with a fresh round of innovative thinking and institutional leadership on the part of state and non-state actors alike. These include a new results-oriented focus on creating the conditions for accelerated action in the industrial sectors and countries that emit the most emissions, which therefore must play a central role in any strategy to stabilize and decrease global emissions within the next several years, as urgently recommended by the scientific community.

The multistakeholder Energy Transitions Commission recently concluded that reaching net-zero carbon emissions from heavy industry and heavy-duty transport sectors is technically and financially possible by 2060 – earlier in developed economies – and could cost less than 0.5% of global GDP.[47] It outlined the possible technical routes and supporting policy approaches needed to fully decarbonize cement, steel, plastics, trucking, shipping and aviation –

which together represent 30% of energy emissions today and could increase to 60% by mid-century as other sectors lower their emissions. International alliances of major firms in each of these specific industrial sectors and others could speed progress. One existing example is the Oil and Gas Climate Initiative, a group of 13 major oil and gas firms representing 30% of worldwide production, which is committed to reducing their collective methane emissions by more than one-third – approximately 600,000 tonnes of methane annually – by the end of 2025, and is working to achieve zero methane emissions from the full gas value chain, including downstream transport and distribution to final customers.[48] An approach that is similar but engages multiple industries across entire value chains is the Tropical Forest Alliance 2020 (TFA 2020). Natural carbon sinks have a critical role to play; it is estimated that natural climate solutions could deliver 37% of the emissions reductions needed by 2030.[49] TFA 2020 is a multistakeholder and cross-industry global alliance working to reduce tropical deforestation related to important global commodities by 2020, starting with soy, beef, palm oil, and paper and pulp.

A plurilateral low-carbon trade and investment alliance of major economy governments could reinforce progress in such carbon-intensive industrial sectors and value chains,[50] creating in effect a low-carbon zone within the world economy that would help to scale demand for low-carbon goods and services by embedding and aligning price advantages for them through linked trade, procurement, tax and investment policies. A virtuous cycle of policy leadership, technological innovation and market forces could ensue from this new type of trade alliance, accelerating the pace of global emissions reductions where they would be most consequential for the atmosphere. And the risk of border adjustment tax disputes relating to differences among national carbon tax and cap-and-trade regimes could recede as member countries used the club as a mechanism to recognize the equivalency of effort of each other's carbon pricing policies or eventually to negotiate a common scheme at either the national level or within important industrial sectors. One potential approach is that advocated by the Climate Leadership Council, an international multistakeholder effort to promote a carbon-dividends framework as the most cost-effective, equitable and politically viable climate solution.[51]

This new plurilateral and sectoral climate architecture could be supplemented by a new universal dimension aimed at mobilizing societies from the bottom up. As featured at the September 2018 Global Climate Action Summit in San Francisco, a growing number of cities and states as well as leading companies and civil-society organizations are setting their own emission reduction targets and engaging in their own international cooperative initiatives.[52] However, the world lacks a universal framework, analogous to the one created in Paris to engage all national governments, to scale such bottom-up action across society and make it common rather than just best practice for companies, states, cities and non-profit institutions around the world. One approach would be to encourage any interested city or provincial government to develop its own informal Sub-Nationally Determined Contribution (SNDC).[53]

Companies and other civil society institutions such as a universities, religious organizations and NGOs could be invited to do the same in an Organizationally Determined Contribution (ODC). Such a universal framework to enable distributed action across society could generate a snowball effect of political, industry and citizen peer pressure and benchmarking. This could eventually establish the practice of setting of climate targets and strategies as a new 21st-century norm of good corporate, investor, municipal and non-profit organization governance. National multistakeholder alliances could be formed to lead by example and promote such practices within their countries.[54] Two such existing examples are We Are Still In in the United States and the Japan Climate Initiative.[55,56]

Each of these new dimensions of climate change cooperative architecture – industry sector, value chain, plurilateral intergovernmental and bottom-up societal – would facilitate the implementation of the NDCs registered by governments, likely strengthening the political confidence necessary to raise the ambition of such commitments in future years as foreseen by the Paris agreement. So would further breakthroughs in clean energy technology, which is the objective of Mission Innovation, a coalition of 23 governments that have committed to double and better coordinate their clean energy research and development funding over five years.[57] The UN Secretary General's climate change summit in September 2019 could be a potent platform for mobilizing widespread international engagement into this practical new multidimensional phase of global climate change cooperation.[58]

2) Oceans, fisheries and biodiversity

The oceans, an essential resource, are currently under threat from increasing resource depletion, coral bleaching due to temperature increases, and massive pollution from materials such as plastics.[59,60,61] More than 1 billion people are dependent on fish for their basic sustenance, and a quarter of marine mammals face the threat of extinction. The Agreement on Port State Measures (PSMA) under the FAO is the first binding international agreement to specifically target IUU fishing, aimed more broadly at promoting ocean conservation and health.[62] Its objective is to avert, deter and eliminate IUU fishing by preventing vessels engaged in IUU fishing from using ports and landing their catches. The agreement seeks to use big data and online tracking tools in ways that were previously inaccessible. Nevertheless, it has been ratified by only a third of the world's countries, which limits the agreement from being fully effective. Essentially, this means that IUU fishing boats often go to nearby countries that haven't yet ratified the agreement.

The Tuna 2020 Traceability Declaration is a UN-driven multistakeholder agreement to better manage commercial tuna fishing and help protect at-risk tuna populations.[63] Specifically, the group of companies and governments pledge that all tuna products in their supply chains will be fully traceable to the vessel and trip dates, and that this information will be disclosed upon request at the point

of sale either on the packaging or via an online system. The Friends of Ocean Action is a unique, informal group of leaders from international organizations, NGOs, and business, technology, science and research fields.[64] Invited by the UN Secretary General's Special Envoy for the Ocean, Peter Thomson, and the Deputy Prime Minister of Sweden, Isabella Lövin, the Friends of Ocean Action come together to build, scale up and fast track practical solutions to the most pressing challenges facing the ocean in line with SDG 14: To "conserve and sustainably use the oceans, seas and marine resources for sustainable development". The initiative is supported by the Benioff Ocean Initiative at UC Santa Barbara and convened by the World Economic Forum in collaboration with the World Resources Institute.

The Convention on Biodiversity (CBD) is also pushing forward with its Sustainable Ocean Initiative (SOI) in order to target and protect marine and coastal biodiversity.[65,66] The CBD aims to stimulate a groundswell of action from all sectors and stakeholders in support of biodiversity conservation and its sustainable use.

Ahead of the next meeting in China in 2020, the 2018 action agenda includes developing an online platform that will enable the mapping of current global efforts in order to assess impact and gaps.[67] The Earth Bank of Codes (EBC) project, another multistakeholder biodiversity project, is looking to map species using DNA and then make that knowledge available and secure through blockchain technologies, so that it is fairly accessible for economic and scientific use.[68]

Technology

The emerging technologies of the Fourth Industrial Revolution present a particular challenge for international governance and cooperation. Unlike other policy domains, there is no institutional focal point for technology governance in the international system, just as there tends not to be an integrated focal point for such policy in national governments. In addition, because the technologies are developing rapidly and being applied in constantly evolving and intersecting ways, traditional, formal rule-setting processes often may not be the most appropriate or effective approach.

Yet the economic, social and security stakes are enormous. This is perhaps nowhere better illustrated than in Japan's "Society 5.0" integrated technology vision in which people, things, and systems are connected in cyberspace with the resulting data analysed by AI and fed back into physical space in ways that bring extraordinary new value to industry and society.[69]

One study estimates that artificial intelligence (AI) could generate an additional $15.7 trillion (US) in economic value by 2030, slightly more than the current annual economic output of China and India combined, with 40% of this value likely to accrue to China and the US alone.[70] The EU estimates its digital market "could contribute €415 billion [$472 billion] per year" to the economy,[71] while projections for ASEAN digital integration are around $1 trillion (US) in gains by 2025.[72] Meanwhile, genome-editing technology CRISPR may develop a market of over $10 billion by 2027,[73] and cryptocurrency markets already register gains and losses in the billions, sometimes within a single day.[74]

But while AI is likely to generate new wealth, some analysis suggests it could make inequality worse[75] and even increase the risk of nuclear war.[76] There are also potential environmental and social costs of the technology revolution. Bitcoin, for example, requires a network with energy consumption roughly equal to Singapore,[77] producing 262 kg of CO_2 for each of its more than 250,000 transactions per day,[78] and the recent concern over "fake news" has been connected to the proliferation of "bots", automated accounts driven by algorithms.[79] As emphasized by the Stewardship Board of the Forum's Digital Economy and Society System Initiative in its recent report, Our Shared Digital Future, greater cooperation among all stakeholders is necessary to bolster trust in technology.[80]

The UN Secretary General has convened a High-Level Panel on Digital Cooperation to develop recommendations to strengthen cooperation in the digital space among governments, the private sector, civil society, international organizations, academia, the technical community and other relevant stakeholders.[81] In its report later this year, the panel is expected to raise awareness about the transformative impact of digital technologies across society and the economy, and contribute to the broader public debate on how to ensure a safe and inclusive digital future for all, taking into account relevant human rights norms.[82]

On the plurilateral front, the Digital 9 group of leading digital nations has been gathering in different configurations since its launch in the United Kingdom in 2014. Canada convened the group, which shares world-class digital practices, collaborates to solve common problems and identifies how digital government can provide the most benefit to citizens, in December 2018 as part of the follow-up activities related to its G7 presidency.

The Forum itself launched the Centre for the Fourth Industrial Revolution Network (C4IR) in 2017 to serve as a public-private platform for the collaborative development and refinement of governance frameworks and protocols that more fully anticipate the risks and accelerate the benefits for societies of advanced technologies.[83] It brings together governments, business organizations, dynamic start-ups, civil society, academia and international organizations to co-design human-centred governance protocols and policy frameworks, and pilot them with government and industry partners. The Centre Network is headquartered in San Francisco and is establishing operations in Japan, India, China and several other countries in cooperation with their governments at the highest level along with leading business, civil society and academic figures. Its programme of multistakeholder policy development and piloting is active in nine technology domains. In 2019, it is establishing leader-level global councils in six of them, composed of ministers and heads of regulatory agencies, chief executive officers, and leading technical and civil society experts, to help guide its work as well as cross-fertilize national policy experience. The aim is to help shape the global technology policy and corporate governance agenda by providing a unique place in the international system where policy dialogue, practical learning and international agenda setting can take place across stakeholders and regions on an ongoing basis.

1) Artificial intelligence

As part of the 2018 G7 process, Canada and France announced that they will create a multistakeholder International Panel on Artificial Intelligence (IPAI) that can become a global point of reference for understanding and sharing research results on AI issues and methodologies as well as convening international AI initiatives.[84] The stated mission of the panel is to support and guide the responsible adoption of AI that is human-centric and grounded in human rights, inclusion, diversity, innovation and economic growth. It aims to facilitate international collaboration among the scientific community, industry, civil society, related international organizations and governments. By relying on the expertise of important stakeholders and providing a mechanism for sharing multidisciplinary analysis, foresight and coordination capabilities, the panel plans to conduct analysis intended to guide policy development and the responsible adoption of AI.

The Institute of Electrical and Electronic Engineers' (IEEE) Global Initiative on Ethics of Autonomous and Intelligent Systems (A/IS) was launched in April 2016 to incorporate ethical aspects of human well-being that may not automatically be considered in the current design and

manufacture of A/IS technologies, and to reframe the notion of success so that human progress can include the intentional prioritization of individual, community and societal ethical values.[85] The initiative seeks to ensure that every stakeholder involved in the design and development of autonomous and intelligent systems is educated, trained and allowed to prioritize ethical considerations so that these technologies are advanced for the benefit of humanity. It has two primary outputs: the creation and iteration of a body of work known as Ethically Aligned Design: A Vision for Prioritizing Human Well-Being with Autonomous and Intelligent Systems; and the identification and recommendation of ideas for standards projects focused on prioritizing ethical considerations in A/IS. The Global Initiative has recently increased from 100 AI/ethics experts to more than 250 individuals, including new members from China, Japan, South Korea, India and Brazil.

The Forum's Centre for the Fourth Industrial Revolution AI and Machine Learning Portfolio has begun work on three artificial intelligence governance projects.[86] The first is developing a governance framework or toolkit for boards of directors to aid them in asking the right questions, understanding the key trade-offs and meeting the needs of diverse stakeholders, including how to consider approaches such as appointing a chief values officer, chief AI officer or AI ethics advisory board. It is being designed around four pillars: technical, brand, governance and organizational impacts of AI, each providing an ethical lens for creating, marketing and sustaining AI in the long term. The second is drafting a framework to guide government procurement of AI products and services. Government procurement rules and purchasing practices often have a strong influence on markets, particularly in their early stages of development. The third project is designing best practice guidelines and policy measures for the protection of children in cooperation with UNICEF. In the absence of clear guidelines, parents and caregivers are left to make decisions about toys and other AI-enabled products with incomplete information about the implications for their children's well-being and privacy. As these devices come onto the market, mechanisms will be needed to protect children while enabling the benefits of "precision education".

The Partnership on AI (PAI) is a multistakeholder organization that brings together academics, researchers, civil society organizations, companies building and using AI technology, and other groups working to better understand AI's impacts.[87] The partnership was established to study and formulate methodologies on AI technologies, to advance the public's understanding of AI, and to serve as an open platform for discussion and engagement about AI and its influences on people and society.

2) Data

The data intensity of the Fourth Industrial Revolution is posing multiple policy challenges relating to privacy, security, bias, accountability, abuse of personal data, antitrust, international trade, access to public services, etc. Most governments are still in the early stages of developing policy frameworks, and international coordination is similarly nascent.

There are over 120 different data protection and privacy laws in effect around the world, raising concerns about the compliance and transaction costs for firms navigating this patchwork quilt of regulation. A particular concern is the burden compliance may place on small and medium-sized enterprises (SMEs), which do not have the large legal departments and budgets of multinational firms.

China, the US and Europe have fundamentally different regulatory approaches to data protection and enforcement. The US and China tend to take a light regulatory approach unless or until a specific harm is identified. In addition, the US regulates data by sector and type. There is no uniform omnibus privacy law in the US, although the recent passage of the California Consumer Privacy Law has sparked renewed interest in the passage of such a law to pre-empt 50 different state laws and potentially countless local laws. While the US appears to have a less protective privacy model than Europe, comparisons of enforcement practices seem to indicate that privacy outcomes are not dramatically different.

Europe's General Data Protection Regulation (GDPR) went into effect in late May 2018. In creating a strict regulatory framework for data, Europe has set a high bar. It hopes to encourage countries to coalesce around its model, thereby setting a de facto global standard. Many countries are indeed working to achieve GDPR "adequacy", and several new laws have been adopted in countries such as China and Brazil that look very similar to GDPR. But a distinguishing feature of GDPR is the potential cost of non-compliance, which can run up to 4% of global revenue. Prior regulation included fines that had little to no deterrent effect on companies with market values in the tens and hundreds of billions of dollars.

China recently adopted a security law that requires all foreign companies to localize data about Chinese consumers within China's borders. Other rules accompanying the new security law include requirements that look very similar to GDPR, but it remains to be seen how enforcement will be carried out, including whether foreign companies will be treated differently from domestic entities.

Between the differing data localization requirements, data protection rules and approaches to data ownership and online content and expression around the world, there is a growing risk that the internet will fragment into separate, parallel systems. There is also rising concern that the centrality of data to value creation in the Fourth Industrial Revolution will serve to widen the already large digital divide in the world, particularly between the US and China (which host all 20 of the world's largest technology companies by market valuation) and other countries. The Centre for the Fourth Industrial Revolution Network's corporate, government and other partners and constituents are exploring solutions to many of these challenges.

Growing appreciation of the value of open data has led municipalities and nations to begin mandating open data laws. For example, France's Digital Republic Act requires government agencies to move to an open data orientation and to set quality standards for such data.[88]

Barcelona's Open Data BCN is just one example of a municipality administrative initiative that prioritizes the availability of public-sector data for free use by interested parties and includes statistical and public-service data.[89] At the international level, a multistakeholder set of good governance principles, A Contract for the Web, is gathering support from companies, governments and civil society groups.[90] These principles establish a set of commitments on the part of governments, companies and citizens that aim to increase the agency of citizens over their data and protect the open web as a public good and basic right for everyone.

A multistakeholder group of actors including the Forum's System Initiative on Shaping the Future of Digital Economy and Society have launched The Platform for Digital Identity, which seeks to advance global progress towards digital identities that satisfy at least five criteria: fit for purpose, inclusive, useful, secure and providing choice to individuals.[91] The ability to prove we are who we say we are will increasingly determine our opportunities to establish trust with each other and to carry out meaningful interactions in a digital economy. If approached in the right way, digital identities can enrich and support people through access to basic services and more customized digital experiences, enhanced health and well-being, improved traceability in supply chains, citizen safety etc. Yet we are still evolving policies and practices on how best to collect, process or use identity-related data in ways that support individuals without infringing on their freedoms or causing them harm. There remains significant room to improve how identity data is handled online, and how much control individuals have in the process.

3) Human gene editing

The recent controversy over the use of the CRISPR-Casp9 technique to edit the genes of twins to help make them resistant to HIV has highlighted the lack of established formal norms in this promising but potentially risky new technology domain. As a result, groups of researchers in different parts of the world have the potential to make decisions about experiments that could have global consequences, especially in the event of an error, accident or other unforeseen consequence.

In 2015, the US National Academies of Sciences and Medicine, the Royal Society and the Chinese Academy of Sciences hosted the first International Summit on Human Gene Editing. The Summit's international organizing committee of researchers issued a concluding statement calling on the four host academies to "organize an ongoing international forum to discuss potential clinical uses of gene editing; help inform decisions by national policymakers and others; formulate recommendations and guidelines; and promote coordination among nations. The forum should be inclusive among nations and engage a wide range of perspectives and expertise – including from biomedical scientists, social scientists, ethicists, health care providers, patients and their families, people

with disabilities, policy-makers, regulators, research funders, faith leaders, public interest advocates, industry representatives, and members of the general public."[92]

At the Second Summit late last year, the organizing committee concluded that "the scientific understanding and technical requirements for clinical practice remain too uncertain and the risks too great to permit clinical trials of germline editing at this time. Progress over the last three years and the discussions at the current summit, however, suggest that it is time to define a rigorous, responsible translational pathway toward such trials." Subsequently, the World Health Organization announced that it is creating a global panel to study human gene editing and related scientific, legal, social and ethical challenges so that the organization may consider establishing standards for oversight and governance.[93]

4) Other emerging policy challenges

The following are some of the other emerging gaps after technology policy and international cooperation on which C4IR Network partners are beginning to work:

Blockchain and distributed ledgers. Blockchain, an early-stage technology that enables the decentralized and secure storage and transfer of information, has the potential to be a powerful tool for tracking and transactions that can minimize friction, reduce corruption, increase trust and support users. Cryptocurrencies built on distributed ledger technologies (DLT) have emerged as potential gateways to new wealth creation and disrupters across financial markets. Other revolutionary use-cases are being explored in almost every sector, ranging from energy and shipping to media. Blockchain has the potential to upend current models of data ownership, giving users greater control over their data, granting access at a more granular level and enabling micropayments for data usage. In addition, the digital representation of real-world assets on a blockchain, as well as the emergence of new categories of crypto assets, offer new financial opportunities for stakeholders. New economic models could enhance privacy, security, inclusion and individual rights, potentially shifting control of user data from shareholders to consumers while providing access to new funding flows. In sum, DLT has the potential to upend entire systems, but it also faces important policy and cooperation challenges, including lack of interoperability, security threats and potential environmental and financial system impacts. Innovative policy mechanisms are needed to unlock this potential and manage the unforeseen consequences of these new paradigms.

The C4IR Global Network is co-designing and piloting governance protocols to ensure the interoperability and inclusivity of the myriad blockchain experiments attempting to track and manage supply chains. And it is developing approaches to balancing transparency and anonymity on blockchains as well as supporting creation of a collaborative framework within which Central Banks can responsibly explore and experiment with blockchain given its important potential financial services applications.

Drones and aerial mobility. Unmanned aircraft systems, commonly referred to as drones, are democratizing the sky and enabling new participants in aviation. Drones already have the ability to increase crop yields, make dangerous jobs safe and act as a lifeline for remote populations. In the longer term, autonomously piloted systems may revolutionize how people and goods are transported. Although drones have the potential to transform business models and tackle societal challenges around the globe, governments are struggling to find ways to encourage innovation while maintaining public safety and confidence. Large companies, as well as a growing start-up environment, are hindered in their ability to invest and expand. Enabling millions of manned and unmanned aircraft to fly concurrently will also require new types of airspace management, physical infrastructure, and privacy and data ownership policies. Laying the right policy foundation and platforms for industry cooperation today, through both smart government regulation and industry-driven standards, will accelerate the adoption of new use-cases and business models once the enabling technology and infrastructure are mature.

The C4IR Global Network has co-designed a new paradigm for performance-based drone regulations that safely enables these new use cases, which have been piloted in Rwanda and is now being adopted throughout Africa and beyond through collaboration with the World Bank.

Internet of things and connected devices. There are more connected devices in the world today than humans. These devices, commonly known as the internet of things (IoT), come in infinite forms, from smart building technologies that monitor and manage energy usage to connected vehicles that help anticipate and avoid potential collisions. By 2020, the number of IoT devices is projected to exceed 20 billion, and as they spread to all aspects of day-to-day life, and even become embedded in the human body, questions about data ownership, accuracy and privacy protection take on greater importance. Similarly, in an interconnected world where electric grids, public infrastructure, vehicles, homes and workplaces are capable of being accessed and controlled remotely, the vulnerability to cyber-attacks and the potential for these security breaches to cause serious harm are unprecedented. The C4IR Global Network has co-design an Industrial IOT Security protocol with diverse stakeholders that is now being piloting in various industries. And as new voice-enabled speakers, smart home systems and wearables enter the consumer market, the C4IR Global Network is exploring the possibility of standardized labels or disclosures about public safety risks. Efforts are needed to align the private sector, government and civil society on common approaches to inform, educate and build trust among consumers on topics such as privacy and security. Finally, a very small amount of data (less than 1% according to some studies) is actually used to drive decisions and add value. To unlock data silos and unleash the full potential of the IoT, the C4IR Global Network is developing new models of data sharing within and across the public and private sectors that will be critical to enable cities and rural communities to maximize the cross-cutting value of IoT data and enable more sustainable business models.

Cybersecurity

Cyber-risks are increasing rapidly as the digital domain expands, creating a larger surface of attack vulnerable to infiltration, and producing a need for new building blocks in the global architecture to ensure cybersecurity and build more robust cyber resilience. The number of people using the internet around the world has risen almost 1,000% since 2000,[94] and between 2018 and 2020 another 300 million users will likely be added.[95] In addition, the number of devices being connected to the internet is exploding: An estimated 20 billion phones, computers, sensors and other devices were linked to global digital networks in 2017, with information provider IHS Markit projecting another 10 billion will be added by 2020. As more people use digital systems more intensively, the amount of data in digital form produced, processed and communicated will rise exponentially. In fact, market intelligence firm IDC predicts a tenfold increase in "the global datasphere" between 2017 and 2025, a 30% yearly growth rate.[96] These significant increases in network use and connectivity represent significant opportunities for growth and prosperity. However, these opportunities stemming from the Fourth Industrial Revolution are completely inaccessible without cybersecurity. Economic loss due to cybercrime is predicted to reach $3 trillion by 2020, and 74% of the world's businesses can expect to be hacked in the coming year. More users, more objects and more data result in greater reliance on digital systems. Indeed, as IDC puts it, digital data and operations are rapidly moving from becoming background issues to "life-critical … essential to our society and our individual lives". Ensuring that these systems perform their functions in the way they were intended is therefore a task of both rising importance and increasing difficulty.

The most commonly discussed current cyber-risk is maintaining privacy and confidentiality. The recent Marriott breach shows the reputational, legal and business risks of leaking large amounts of customer information.[97] However, in a world reliant on digital systems, the risk of compromised data availability and attacks on data integrity will be even more important. As a leading expert has observed, a hacker changing a patient's blood type in a hospital context could pose a far greater individual danger than the loss of that patient's data.[98] In the near future, even these significant

information technology risks will likely be eclipsed by the systemic and physical risk from attacks on operational technology, from the internet of things to smart cities.

In order to surmount these risks, governments, businesses, and civil society must cooperate in new and dynamic ways. Unfortunately, the need for collaboration and interconnectedness across organizations, sectors and geographies is not currently being met. Existing initiatives tend to focus on too small a subset of problems, stakeholders or regions.

The global need for robust, global, multistakeholder initiatives led to the World Economic Forum Centre for Cybersecurity being established in 2018.[99] The Centre

has three pillars to its approach. First is to reduce global cyber-attacks by developing global security standards, policies and practices, and by promoting and implementing security by design. Second is to contain current and future cyber-attacks through intensified global cooperation and information sharing. Third is to deter cybercrime by heightening the risks associated with participating in illegal cyber activities by means of reinforced collaboration between public and private partners. A cross-cutting element along these pillars is the need for developing the skills and capacities to address these challenges at multiple levels – national, organizational, and individual.

1) Reducing the global cyber-attack surface

A number of initiatives bring together businesses, and at times governments, to build trust and promote solutions for a more secure cyberspace. These include the Paris Call for Trust and Security in Cyberspace, a set of principles and a call for united action to secure cyberspace, launched by the French President Emmanuel Macron.[100] The call is the first government, industry and civil society-endorsed effort at a global scale which recognizes that states must work together but also collaborate with private-sector partners, the world of research and civil society to protect the important global public goods of trust and security in cyberspace. The Cybersecurity Tech Accord is a public commitment by more than 60 global companies to protect and support civilians online and to improve the security, stability and resilience of cyberspace.[101] By combining the resources and expertise of the global technology industry, the Cybersecurity Tech Accord creates a starting point for dialogue, discovery and decisive action.

The Charter of Trust for a secure digital world is an initiative created by leading companies across industries that calls for binding rules and standards to build trust in cybersecurity and further advance digitalization.[102] Its members commit to their future products being designed and implemented according to ambitious cybersecurity principles. The Global Cyber Alliance is an international, cross-sector effort dedicated to eradicating malicious cyber-risks by building concrete solutions that are made available freely for any organization or individual to use. It was founded in 2015 by the City of London Police, the New York County District Attorney and the Center for Internet Security (CIS).[103]

2) Containing global cyber-attacks

Improved sectorial and global cooperation, including through information sharing, is critical in limiting the impact of global cyber-attacks. One example is the Forum of Incident Response and Security Teams (FIRST), an initiative that brings together a variety of computer security incident response teams from government, commercial and educational organizations. It has more than 400 members and aims to encourage cooperation and coordination in incident prevention, to stimulate rapid reaction to incidents, and to promote information sharing among members and the community at large.[104]

Sector-specific Information Sharing and Analysis Centers (ISACs) were originally created in the USA mainly as non-profit organizations that provide a central resource for gathering

information on cyber threats and which also facilitate the two-way sharing of information between the private and the public sectors. A prominent example is the Financial Services Information Sharing and Analysis Center (FS-ISAC), which is the global financial industry's resource for cyber and physical threat intelligence analysis and sharing.[105]

The Cyber Threat Alliance brings together leading cybersecurity companies that have agreed to share timely, achievable, contextualized and campaign-based intelligence, which can be used to improve their products and services to better protect their customers, more systematically thwart adversaries, and improve the security of the digital environment.[106] The Cyber Defense Alliance is a consortium of mainly European banks set up to enable them to share information and experience with each other about tactics employed by cybercrime groups to target the financial sector and to collaborate in fighting, detecting or preventing cyber-attacks on financial organizations.

3) Restraining cyber-attackers

Restraining cyber-attackers entails, inter alia, initiatives to define responsible behaviour in cyberspace as well as efforts towards harmonization of cybercrime legislation for improved international criminal justice cooperation. Many global activities in this field are multilateral in nature, such as the UN's Group of Governmental Experts on Developments in the Field of Information and Telecommunications in the Context of International Security (UN GGE).[107] This was first convened in 2004 and has been the main vehicle for nation-led discussions about international security and stability in cyberspace, touching upon the application of existing international law in cyberspace and the relevant definition of norms, rules and principles of responsible state behaviour. It also covers the development of practical steps, known as confidence-building measures (CBMs), for increasing transparency and predictability in cyberspace and reducing the risks of conflict stemming from the use of ICTs. To date, the most notable progress on CBMs has been made in the framework of the Organization of Security and Cooperation in Europe,[108] which has adopted a set of 16 voluntary measures.[109] In December 2018, further to the continuation of the work of the UN GGE, which had failed to come up with a consensus report in 2017, the UN General Assembly adopted a resolution that would create in 2019 an open-ended working group in this field.[110]

Another example is the Convention on Cybercrime of the Council of Europe, known as the "Budapest Convention", which was adopted in 2001 and currently has 62 state parties. It serves as a global standard for criminalizing offences against, and by means of, computers in domestic law; identifying procedural powers to secure electronic evidence in relation to any crime within the rule of law; and providing for an international cooperation mechanism among law enforcement and judiciary authorities. Even though it is open for accession by any country, its global aspirations are contested by some countries, which point to the fact that it was not negotiated at the UN level.

An open-ended Intergovernmental Expert Group on Cybercrime (IEG) was established by the UN Congress on Crime Prevention and Criminal Justice (CCPCJ) in 2010, with the task of conducting a comprehensive study of the problem of cybercrime and responses to it. The IEG holds periodic meetings, scheduled through to 2021, and functions as a platform for nation-led exchanges on national legislation, best practices, technical assistance and international cooperation concerning cybercrime.

4) Capacity-building in cybersecurity

A horizontal dimension, cutting across all of these efforts, is the need to invest in capacity-building to create and encourage the capabilities and skills that nations, organizations and individuals require to address the risks and challenges associated with our increased reliance on cyberspace. Over time, cyber capacity-building has evolved not only as a priority but also as a consensus area of the policy discourse across the complex global cyber architecture.

International and regional organizations such as the International Telecommunications Union, the United Nations Office on Drugs and Crime, the World Bank, Interpol, the European Union, the Council of Europe, the Organization of American States, and the Commonwealth Telecommunications Organisation, among others, have dedicated capacity-building programmes to support countries in improving their cyber resilience and their capacity to address cybercrime.[111,112,113,114,115,116,117,118] The Global Forum on Cyber Expertise (GFCE) was launched at the 2015 Global Conference on Cyberspace (GCCS) as a worldwide platform for countries, international organizations and private companies to exchange best practices and expertise on cyber capacity-building and, together with partners from civil society, the tech community and academia, develop practical cyber capacity-building initiatives and projects.[119]

At the national level, a few examples of multistakeholder capacity-building initiatives include the Beersheeba/Cyberpark in Israel, where government, private sector and academia have come to build a cybersecurity centre of excellence in the desert.[120] Similarly, the Cyber NYC initiative seeks to transform New York into a cyber capital, with the plan to create 10,000 cybersecurity jobs in the city through collaboration between local government, a range of academic institutions and the private sector.[121]

New social contract: the future of work and human capital

Globalization 3.0 has spawned widespread social discontent about the inequity of outcomes from economic growth and integration in terms of both employment opportunity and income. While it has contributed immensely to poverty reduction and other progress in living standards over the past generation, it has also significantly increased inequality and economic insecurity in a wide range of countries. **There has been a systematic underappreciation of the human impact of rapid economic change, whether due to technology or policy liberalization, in the priorities of national economic policy and the corresponding international institutional architecture.** This domestic governance failing is adding fuel to the fire of political polarization and upheaval around the globe.

The Fourth Industrial Revolution is putting further pressure on labour markets, as advanced technologies introduce new ways to create value and disrupt current industries and organizational models. According to the Future of Jobs Report 2018 of the Forum's Centre for the New Economy and Society,[122] while 75 million jobs are expected to be displaced in the next five years, another 133 million are expected to be created across 20 key developed and emerging economies. Neither these projections, nor those made using different assumptions, are foregone conclusions. But it is clear that even if the net results are positive, large-scale displacement will require a wholly new approach to job transitions. Many other jobs that are not outright displaced will change dramatically due to automation, requiring major worker retraining and adjustment. Our estimates suggest that at least 54% of all employees will require reskilling and upskilling by 2022. Of these, over a third will require more than six months of additional training. However, only around 30% of employees in the jobs most exposed to technological disruption received any kind of training in the past year, and most companies say they intend to target retraining programmes towards high-performing employees. This implies that the employees most at risk of job or skill disruption are also far less likely to be provided with retraining to cope, potentially increasing inequality.

If national and global actors, including multinationals as well as the education sector and policy-makers, fail to support workers attaining and upgrading skills, the outcome could be a true "lose-lose" scenario – rapid technological change accompanied by talent shortages, mass unemployment and growing inequality. Yet that's a plausible outcome, particularly given the existing shortfall of skills essential for a tech-driven future reported by enterprises around the world.

The dramatic transformations in the way in which we work are also driving many new opportunities for direct job creation and more flexible modes of work. As production techniques, technology and business models evolve, more agile systems are emerging that draw on diverse pools of talent and specialized skills from around the world. Today, approximately 20–30% of the working-age population in the United States and the EU-15 engage in independent work. This number is expected to continue to grow globally

as more independent and on-demand work through platforms creates vast opportunities for individuals to access new labour and consumer markets.

Nevertheless, this reorganization of work is presenting challenges and uncertainties for many workers, such as wage and employment insecurity and reduced access to social protection. To make the most of these growing opportunities while addressing the emerging challenges, greater collaboration is needed to reform and create institutions and enabling environments to maximize flexible, high-quality job creation while supporting workers with talent development, career transitions and access to suitable social safety nets.

The decisions we take today will shape whether technological progress is harnessed to create more equitable economies. Economic, labour and education policy will need to become much more human-centred in the Fourth Industrial Revolution.[123] This will necessitate an integrated, multidimensional effort encompassing all segments of society, including governments at multiple levels, companies, worker representatives and the educational establishment.

In preparation for the 100th anniversary of its founding, the International Labour Organization (ILO) assembled a multistakeholder Global Commission on the Future of Work,[124] chaired by South African President Cyril Ramaphosa and Swedish Prime Minister Stefan Löfven. The commission's report was released in January 2019 and is intended to inform the organization's agenda, which will be the focus of its high-level centenary meeting in June. **The commission concluded that there are three practical steps countries can take to simultaneously improve social justice and economic growth. They all involve raising the level of investment in people across the public and private sectors.** This is the crux of what it means for a country to strengthen its social contract in the world economy of the 21st century. It also represents a new, human-centred growth and development model that may be the best hope for sustaining the world economy's momentum as the two growth engines on which many countries have been relying – extraordinary macroeconomic stimulus and export-led production – continue to lose steam.

First, they should **increase public and private investment in their people's capabilities**, which is to say in their economy's rate of labour productivity growth. Some countries have chronically underinvested in the equity of access to quality education and skilling. All countries need to step up their game as populations age and automation disrupts the manufacturing sectors on which developing countries have traditionally relied to industrialize and the service sectors in which much of advanced country employment is concentrated. The commission called on countries to build a universal framework to support life-long learning, including stronger and better financed active labour market training and adjustment policies, as well as expanded public employment services and a social protection floor. It also suggested changing the accounting treatment by businesses of training expenses so that, like capital investments, they are charged against earnings over a number of years.

Second, countries should **increase investment in the institutions and rules relating to work**, which is to say in the equitable diffusion of income and purchasing power and thus level of domestic demand within their economies. Specifically, the commission called for a Universal Labour Guarantee in which all workers, regardless of their contractual arrangement or employment status, should enjoy fundamental workers' rights, an "adequate living wage" as defined in the ILO's founding constitution 100 years ago this year, maximum limits on working hours and protection of safety and health at work. The collective representation of workers and employers through social dialogue should be ensured as a public good and actively promoted through public policies. And, from parental leave to investment in public care services, policies need to foster the sharing of unpaid care work in the home to create genuine equality of opportunity in the workplace. Strengthening women's voice and leadership, eliminating violence and harassment at work and implementing pay transparency policies are also preconditions for gender equality.

Third, countries should work across their public and private sectors to **accelerate investment in job-intensive sectors that are poised for growth and have positive externalities for society**. These include sustainable water, energy, digital and transport infrastructure, the care economy, education and training, and the rural economy. The Business Commission for Sustainable Development has estimated that achieving the Sustainable Development Goals would open $12 trillion of market opportunities in four economic systems alone – food and agriculture, cities, energy and materials, and health and well-being – as well as create 380 million jobs by 2030. Capitalizing more proactively on these employment expansion opportunities can help countries compensate for the labour displacing and potentially demand-suppressing effects of automation and economic integration.

Investing more in people across these three dimensions represents an actionable strategy to boost both social inclusion and economic growth. All countries interested in preparing for the future of work would do well to develop a national strategy along these lines through social dialogue among key stakeholders.

The commission further recommends that the ILO be positioned and equipped to serve as the central platform in the international system for:

– Facilitating policy dialogue, experience exchange, statistical measurement and comparative policy analysis with respect to these national strategies

– Facilitating policy dialogue, experience exchange, statistical measurement and comparative policy analysis on the impact of technology on work, including the best business models and practices for applying technology in ways that augment rather than substitute for human labour

– Considering the development of new international norms, beginning with the adoption of a new core labour standard on worker safety

– Coordinating among the major international economic institutions (e.g. IMF, OECD, World Bank) the framing and joint articulation of a new "economic growth and development model" based on increased investment in people, making this a top priority of international economic assistance and central feature of their individual and collective policy guidance

1) Education, skills and training

The Closing the Skills Gap project of the Forum's Centre for the New Economy and Society seeks to strengthen private-sector leadership and public-private collaboration on education and skills provision, as well as training systems reform, at global and national levels by improving insight and knowledge on talent development and deployment, forecasts of future skills demand, and avenues to inform common agendas for action.[125] Country task forces are composed of government, civil society and education and training institutions, including a leadership group composed of ministers and CEOs. Since June 2018, the Closing the Skills Gap national action framework has been adopted in South Africa, Argentina and India, and is expected to be adopted in Oman and Australia, building a growing global network of public-private partnerships to reshape education and training systems for the future of work. In an effort to engage the private sector more deeply, the project has also set a target of assembling business commitments to skill, reskill and upskill 10 million current and future workers by 2020, a target that is a year ahead of schedule and will now be raised further.[126] New initiatives such as Generation Unlimited, launched in September 2018 by UNICEF, aim to ensure that every young person is in education, learning, training or employment by 2030.[127] And the Forum's Preparing for the Future of Work project aims to support industries in training current workers and addressing talent gaps, beginning with task forces in six industries (aviation; travel and tourism; aerospace; consumer; financial services; oil and gas) to serve as pilots for future industry actions to manage talent and prepare workers for labour markets in the Fourth Industrial Revolution.[128] And its Promise of Platform Work project provides a space for leaders from online talent platforms, labour organizations and other stakeholders to consider the appropriate balance of opportunities and risks across workers, users and platforms.

2) Social dialogue

The Global Deal for Decent Work and Inclusive Growth seeks to mobilize stakeholders in support of strategies to improve employment opportunities and working conditions.[129] Initiated by Prime Minister Stefan Löfven of Sweden, the Global Deal aims to promote better wages, better working conditions, increased gender equality and more equality for workers around the world through the wider application of social dialogue – engagement among workers, firms and governments in the search for common ground through direct ongoing dialogue. This has already helped Scandinavian countries and others to build and maintain societal trust. Workers also need protection from exploitation and unsafe practices. Every year, there are 2.3 million work-related deaths, 310 million non-lethal accidents and 160 million work-related cases of illness. The Global Slavery Index

estimated that more than 40 million people were in modern slavery in 2016, 71% of whom were female.[130] The human cost is incalculable, while the economic value at risk equates to more than $354 billion. In just a few years, the Global Deal Initiative has grown to include about 100 actors from across the world: governments, companies, trade unions and organizations. The OECD and ILO are founding supporting partners of the initiative.

Worker benefits and protections in the platform economy are also a growing area of focus, with increasing numbers of workers around the world accessing new and flexible work opportunities through online talent platforms.

3) Human capital development

The World Bank defines human capital as consisting of the knowledge, skills and health that people accumulate throughout their lives, enabling them to realize their potential as productive members of society. This requires investing in people through nutrition, healthcare, quality education, and jobs and skills. The cost of inaction on human capital development is increasing. Without human capital, countries cannot sustain economic growth, will not have a workforce that is prepared for the more highly skilled jobs of the future, and will not compete effectively in the global economy.

The World Bank's Human Capital Project aims to help countries tackle the worst barriers to human capital development, using a "whole of government" approach.[131] The project seeks to help create the political space for national leaders to prioritize transformational human capital investments. The objective is rapid progress towards a world in which all children arrive at school well-nourished and ready to learn, can expect to attain real learning in the classroom, and are able to enter the job market as healthy, skilled and productive adults. Work is underway, with the launch of its Human Capital Index in October 2018, and support has begun for over 40 countries that have expressed interest, with others expected in the coming months. In addition, a number of "Human Capital Champions" – world leaders, thought leaders, celebrities and others – have signed on to advocate for investments in the next generation.

4) Gender equality

Finally, the opportunity cost for economies and societies of gender inequality is huge. A recent report found that, if women had the same lifetime earnings as men, global wealth would increase by at least $160 trillion, or 21.7%.[132] Two main factors lead women to earn less and thereby have lower human capital wealth than men: lower labour force participation rates and fewer hours worked in the labour market; and lower pay. These factors keep many women in a productivity trap due in part to social norms relegating them to unpaid care and informal work.

At current rates of change, the Global Gender Gap Report of the Forum's Centre for the New Economy and Society estimates it will be over two centuries before the economic gender gap can be closed.[133] To accelerate the pace of change, the Centre has developed the Closing the Gender Gap project.[134] Since 2012, national task forces have sought to support and strengthen public-private collaboration to close gender gaps and hardwire gender parity in the future of work. The focus is on closing gaps in participation, remuneration and leadership, and supporting companies and countries to accelerate gender parity in the Fourth Industrial Revolution. A number of the Forum's insight products are used as guides for country-level issue identification, such as the annual Global Gender Gap Report and the Industry Gender Gap Report. Following pilots in Japan, Mexico, South Korea and Turkey, the task force model has been adopted in Chile, Argentina, Panama, Peru, Colombia, the Dominican Republic and Costa Rica in collaboration with the Inter-American Development Bank. It has also expanded to France, and the aim is to scale to 10 countries in total by 2020. The Forum is discussing the expansion of these efforts with various countries and institutions and is seeking partners interested in collaborating to establish national task forces.

Industry and corporate governance

Societal expectations of corporations are shifting, as public concerns grow about automation, trade, climate change, inequality, corporate ownership of personal data, corruption and other issues. Investor interests are evolving as well, as data breaches and ethical scandals in numerous industries and countries have wiped out billions of market value in short order. These trends and developments, on top of the legacy of the financial crisis, have produced a deficit of trust in corporations in many countries,[135] as well as a growing debate about whether they contribute sufficiently to the ultimate purpose of economies, which is to produce the broad-based gains in living standards that come from inclusive economic growth.[136] **Thus, it is not only public governance that is under pressure to modernize in the Fourth Industrial Revolution, but also corporate governance and the domestic policies in which it is grounded.**

These social pressures are likely to mount as technological change continues to increase economies of scale, disrupt industries and, other things being equal, shift the distribution of national income in the direction of owners of capital and away from labour. The OECD reports that there has been a significant such shift in the past two decades within advanced economies, although with considerable variation between countries, industries and skill cohorts of workers.[137] In the Fourth Industrial Revolution, boards need to be fully mindful that corporations are a vehicle and often potent symbol of this distributional shift and hollowing out of the middle class in many countries, which has been driven largely by technological change but sometimes also by choices of public policy and corporate strategy. This dynamic is certainly one of the factors contributing to the drop in public support for openness and the polarization of politics more generally in some countries.

In the new economy, boards of directors have a heightened fiduciary responsibility to ensure that their firms are creating long-term economic value and not just short-term financial returns. Their performance in this regard will increasingly underpin their social licence to operate, as will their response to a number of specific new fiduciary responsibilities that have grown out of the changed technological, environmental and social context of their operations. These will require more informed and disciplined oversight in order to maintain society's trust. **More specifically, in the Fourth Industrial Revolution, good corporate governance – that is, the generation of long-term economic value and maintenance of stakeholder and societal trust – will require a heightened level of stewardship by boards of their firms in three areas: their resource allocation and investments; compliance and risk management; and operating context.** The enabling architecture to modernize corporate governance practices in each is beginning to be built through a variety of public and private initiatives. For example:

1) Resources and investments

In 2017, the Forum's International Business Council created the Compact for Responsive and Responsible Leadership: A Roadmap for Sustainable Long-term Growth and Opportunity.[138] Signed by 145 major companies from 35 countries, the compact commits firms to:

– Ensuring the board oversees the definition and implementation of corporate strategies that pursue sustainable long-term value creation

– Encouraging periodic review of corporate governance, long-term objectives and strategies at the board level as well as clear communication between corporations, investors and other stakeholders about the outcomes

– Promoting meaningful engagement between the board, investors and other stakeholders that builds mutual trust and effective stewardship, and promotes the highest possible standards of corporate conduct

– Publicly supporting the adoption of the compact and implementing policies and practices within the organization that drive transformation towards the adherence to long-term strategies and sustainable growth for the benefit of all stakeholders

Work has continued on two important enablers of these commitments. First, a benchmarking database of over 400 data points from 7,000 companies has been constructed from traditional and new, web-based sources of information to provide a measurement framework for managers, boards and investors for different facets of long-term value creation, including the sources and uses of capital.[139] For example:[140]

– **Investment**: Long-term firms will invest more, and more consistently, than short-term firms. This measure is the ratio of CapEx/Depreciation. This metric is guided by McKinsey's Corporate Horizon Index.

– **Relative Earnings-Per-Share (EPS) Growth**: Long-term firms are less likely to over-index on EPS rather than true earnings and act to boost EPS (e.g. with buybacks). This measures the percentage by which EPS growth exceeds true earnings growth. This metric is guided by McKinsey's Corporate Horizon Index.

– **Ratio of Dividends Plus Buybacks to Net Income**: It is normal for businesses to return profits to shareholders. However, consistent distribution of cash equal to or in excess of net income is unsustainable.

– **Leverage**: Long-term debt divided by total equity: Leverage is sector dependent, but any ratio over 2:1 should give pause for consideration for a going concern company in a traditional economic sector.

– **Change in leverage**: A dramatic increase in leverage, particularly if driven by taking on more long-term debt, might adversely affect cash flows and business viability in the context of an external shock.

Second, Compact companies are developing through survey work and legal analysis recommended reporting and other practices for long-term oriented boards. For example, recent developments in accounting and reporting have not fully addressed the challenge of measuring and reporting the value of intangible assets. As a result, there is still a significant discrepancy between market capitalization and reported assets (around 2:1). This means that around 50% of the market capitalization is effectively unaccounted for, creating a skewed view of an organization's ability to create long-term value.[141] A central aspect of a firm's intangible capital is the talent of its people, and this has long been an area of underinvestment by companies as well as governments. The overall aim of the compact is to provide guidance for governance and investor relations practices to balance short- and long-term business practices. The Forum's System Initiative on Long-Term Investing, Infrastructure and Development supports the effort and is building a related community and body of work on Active Investor Stewardship, with the goal of building a set of tools for stronger and more long-term focused investor-corporate relationships.[142]

The Embankment Project for Inclusive Capitalism and Focusing Capital on the Long-Term are two other, independent initiatives developing important insights and tools to support long-term value creation.[143,144] The International Integrated Reporting Council and Corporate Reporting Dialogue are working to develop reporting frameworks that better capture and integrate financial and non-financial performance and strategy.[145,146]

2) Compliance and risk management

The Fourth Industrial Revolution and Globalization 4.0 are accentuating several risks that henceforth will require more explicit and proactive attention by boards. Loss of trust stemming from problems in any of them can reverse years of advances in market value and threaten a firm's very existence. These relate to the use of personal and other sensitive data; the deployment of algorithms in internal processes and external products and services; the implications of climate change; corruption and financial crime; and labour practices. Best-practice governance principles and tools have been created by Forum multistakeholder communities on Advancing Cyber Resilience: Principles and Tools for Boards, AI (forthcoming in 2019) and anti-corruption (Partnering Against Corruption Initiative).[147,148] The Financial Stability Board's Industry Task Force on Climate-Related Financial Disclosures recently established a corporate governance framework in respect of climate change that has begun to be adopted by companies and investors around the world.[149] And the United Nations Guiding Principles on Business and Human Rights provides a global standard for preventing and addressing the risk of adverse impacts on human rights linked to business activity.[150]

3) Operating context

Good corporate governance in the age of the Fourth Industrial Revolution also requires recognizing that companies have an important stake in the health of their operating context – in the functioning of the societies and economies in which they operate – and that their practices and operations can have an important effect on these, either positive or negative. **A firm's shared stewardship of its operating context includes three critical dimensions: the capacity of people in the firm's communities to absorb and manage economic change; the quality of public institutions to provide public goods on which all societal actors, including companies, depend; and the relevance of the firm's core competencies and resources to their national government's priorities in implementing the SDGs.**

First, one of the principal weaknesses, even failings, of corporate and public governance during the Third Industrial Revolution and Globalization 3.0 has been an underappreciation of, and underinvestment in, the human aspects of rapid economic change. This challenge is likely to intensify in the Fourth Industrial Revolution and Globalization 4.0 as automation spreads, global markets become more digitally interconnected and actions to decarbonize economic activity intensify. Companies will be the primary vehicles of these economic changes, which means they will face important decisions with regard to the timeline and nature of the corresponding restructuring and redeployment of their workforces. In the absence of an understanding of what constitutes a just transition for these people and a strategy to make such a transition as humane and economically orderly as possible in cooperation with workers, governments and other stakeholders, companies may inflict severe yet avoidable damage on the social fabric of the communities and countries in which they operate.[151] This could ultimately affect the political stability and economic viability of that context, limiting the company's own prospects for value creation and growth. Accordingly, **a new dimension of corporate governance requiring attention from boards is the need to identify salient just-transition risks related to automation, restructuring, climate change abatement or other plans and to ensure that management has adequate policies and practices for mitigating them.**

Second, government tax bases have come under further pressure, as digitization, deregulation, trade liberalization and global value chains have increased the economies of scale and geographical fragmentation of production as well as the corporate sector's share of national income in many countries. Long-term economic value creation requires functioning public institutions in a wide variety of domains, and these depend on adequate public finances. Thus, **companies have not only a legal obligation to pay taxes, but also a broader fiduciary responsibility stemming from their long-term value-creation mandate to ensure that they pay their fair share, which may not always be the same amount as that resulting from aggressive, multijurisdictional tax planning. Boards have a responsibility to ensure that their firms are acting**

not only legally but also in keeping with the trust society has placed in them to contribute fairly and responsibly to the long-term viability of the economy in which they operate. The OECD's Inclusive Framework on Base Erosion and Profits Shifting (BEPS) brings together over 115 countries and jurisdictions to collaborate on the implementation of the OECD/G20 Base Erosion and Profit Shifting (BEPS) Package.[152] BEPS refers to tax-planning strategies that exploit gaps and mismatches in tax rules to artificially shift profits to low- or no-tax locations where there is little or no economic activity. Although some of the schemes used are illegal, most are not. The BEPS Package provides 15 Actions that equip governments with the domestic and international instruments needed to ensure that profits are taxed where the economic activities generating the profits are performed and where value is created. These tools also give businesses greater certainty by reducing disputes over the application of international tax rules and standardizing compliance requirements.

Third, the SDGs established by the United Nations in 2015 are being translated by national governments into specific plans and policy priorities. The Business and Sustainable Development Commission has concluded that achieving the Global Goals would generate up to $12 trillion of opportunities in 60 different market segments within four economic systems: food and agriculture, cities, energy and materials, and health and well-being.[153] As such, the SDGs represent an enormous growth opportunity for businesses via a strengthening of their operating context. Accordingly, boards focused on long-term economic value creation should embrace the commission's recommendations to incorporate aspects of the Global Goals relevant to their firm's core competencies and markets into their company strategy, including by appointing board members and senior executives to prioritize and drive execution as well as by working with peer companies and other stakeholders to drive the enabling environment improvements and investments that can affect the necessary transformation of economic systems.

Geopolitical and geo-economic cooperation

In recent years, global power has been shifting, creating new risks and challenges for international relations as outlined in greater detail in the Forum's Global Risks Report 2019. The US has withdrawn from or sought to recast certain international agreements, while China has been building relationships with many nations through its Belt and Road Initiative. The ongoing war in Afghanistan, instability in Iraq, conflict in Ukraine, war and famine in Yemen, disputes in the South China Sea, violence in central Africa, and the Rohingya crisis represent only a smattering of current global conflicts. Furthermore, there has been a greater than 200% rise in violent deaths in the past decade,[154] due to the war in Syria and increasing regional hostilities. Unresolved North Korean negotiations, a lack of unity in working with Iran, and disagreements over arms control between Russia, the EU and the US[155] further jeopardize the gains made in keeping the world safe from nuclear weapons.

Following are a number of noteworthy challenges and initiatives in this regard:

1) Advanced technologies and international security

Steps continue to be taken towards non-proliferation of weapons of mass destruction through the Proliferation Security Initiative (PSI), a global effort endorsed by over 100 countries committed to the PSI's interdiction principles for a more coordinated effort at upholding international frameworks and legal agreements to stop trafficking.[156]

Concern over the combination of automation, AI and weaponry has also led the Convention on Certain Conventional Weapons (CCW) to create a Group of Governmental Experts (GGE) to examine lethal autonomous weapons (LAWs).[157] LAWs pose multiple threats, including the potential for them to trigger an AI arms race. The GGE released a set of possible guiding principles and will continue to assess the options for controlling them, either through banning or limiting their use, or through other courses of action at international and national levels.[158] Current negotiation outcomes were delivered in the CCW 2018 Report,[159] and the group will reconvene in 2019 to continue working towards suitable arrangements.

In 2017, a Digital Geneva Convention was proposed to commit governments to protecting civilians from nation-state cyber-attacks in times of peace.[160] Modelled on the Fourth Geneva Convention protecting civilians in time of war, such a Fifth Geneva Convention would commit governments to eschew the targeting of tech companies, private sector or critical infrastructure; assist private sector efforts to detect, contain, respond to and recover from events; report vulnerabilities to vendors rather than to stockpile, sell or exploit them; exercise restraint in developing cyber weapons and ensure that any developed are limited, precise and not reusable; commit to non-proliferation activities regarding cyberweapons; and limit offensive operations to avoid a mass event. It envisions creation of a public-private international organization that investigates and shares publicly evidence regarding nation-state cyber-attacks on civilians, analogous

to the role played by the International Atomic Energy Agency in the field of nuclear non-proliferation. And it calls on private sector technology firms to commit to assist and protect customers everywhere and not aid in attacking them anywhere. Such an initiative would build on principles recommended by a group of experts convened by the United Nations in 2015,[161] including the precept that no country should conduct or support ICT-enabled theft of intellectual property, including trade secrets or other confidential business information, with the intent of providing competitive advantages to companies or commercial sectors, which was agreed by China and the United States in 2015 and endorsed by G20 Leaders later the same year.[162]

The Earth's hemispheres are not the only place where security, the environment and economic policy require cooperation and a collective vision. Space affects security, science, health and medicine, agriculture, energy, trade and finance and affects economic growth. Though ultimately beneficial to humankind, progress in space technologies and exploration translate into competitive advantages, both economically and militarily, and national security and defence are critical concerns. For example, potential threats of anti-satellite weapons have resulted in new procurement policies in the US as part of the National Defense Authorization Act.[163] Space has also become an extended zone for cyber and electronic warfare capabilities, which have driven US discussions on the development of a military branch dedicated to the space arena. In addition, the projection of tens of thousands of new satellites in orbit by 2030 will require international coordination on space debris mitigation and guidelines for decommissioning satellites to keep from risking losses to governmental and commercial investments through orbital collisions.[164] There is, unfortunately, a lack of enforceable regulations on managing space debris.[165] Beyond these defence and environmental issues, there is a clear need for coordination of global norms for space, including methodologies, standards and behavioural guidelines.

2) Human mobility

In 2018, the United Nations delivered progress in international cooperation on the challenges for migrants and refugees. In December, 164 nations signed the Global Compact for Migration,[166] and the UN General Assembly adopted the Global Compact on Refugees to develop resources in response to the major displacement crises of the past years.[167] The Compact for Migration is an "intergovernmentally negotiated agreement … to cover all dimensions of international migration in a holistic and comprehensive manner" and is also "a commitment to improving international cooperation". The Compact on Refugees intends to spur cooperation and commitment to "safeguard refugees' access to education, livelihoods and national justice systems". In addition to working in relation to refugee needs, the framework looks to expand cooperation on resettlements and contributions to improving conditions in crisis areas.

Blockchain has bolstered public-private humanitarian collaboration by providing a path forward to protect data, secure identification, monitor supply chains and track

finances related to humanitarian needs.[168] Governments and international organizations can now cooperate in the development of a "blockchain-based information-sharing platform" that could be built on top of databases such as the OCHA's Humanitarian Data Exchange.[169] This new capability will enable organizations to aggregate data, create markets for the data, and protect the data all at the same time.

The World Economic Forum's Humanitarian Investing Initiative is also providing a platform for dialogue among stakeholders that will enable increased investment along the humanitarian journey[170] – helping people on the move from their point of displacement to cultural integration in new locations and skills development for local job markets. Providing space and support for collaboration between nations, enterprise, civil society and humanitarian groups is intended to aid in establishing a high-level route forward for a clear humanitarian need. The World Economic Forum's Regional Future Council on the Middle East is also driving its initiative, Charting New Systems of Cooperation in the Middle East, and is focusing on areas where intraregional collaboration is indispensable; these include refugees and reconstruction, human capital, infrastructure, issues of the commons and environmental risks.

3) Economic political cooperation in Asia

One of the most important exercises in geopolitical and geo-economic cooperation today concerns the building of closer political, investment, infrastructure and trade links across Asia. These alliances are a sign of a changing world.

The Belt and Road Initiative spans Asia and Europe and has African touchpoints as well. Composed of the Silk Road Economic Belt and the New Maritime Silk Road, it connects more than 60 countries that "account collectively for over 30% of global GDP, 62% of population, and 75% of known energy reserves".[171] The initiative is meant to develop infrastructure networks, enhance trade capacity and build economic ties through investment.

The Shanghai Cooperation Organisation (SCO) brings together heads of countries on the Asian continent. It added India and Pakistan to its membership in 2017.[172] Aimed at expanding economic and security cooperation, the SCO has a growing influence on global relationships, governance and economic affairs. In a similar vein, the United States' Indo-Pacific Strategy has been developed to reshape the image of "Asian-Pacific" relationships and to provide a conceptual framing of the important political ties between Pacific and Indian Ocean nations – namely India, the United States, Japan, Australia and other democratic Asian states[173] – and incorporates the Quadrilateral Security Dialogue.[174] This new alignment brings potential architecture in the areas of democratic rules, human rights, open economic markets and, especially, security cooperation.

In sum, the emerging Asian cooperative architecture is a complex one that encompasses, for example, the CPTPP and RCEP; ASEAN; APEC; ADB and AIIB; major ongoing Japanese and rising Chinese investment flows as well as India's "Act East" policy, and Russia's reinvigorated Eastern policies and Eurasian Customs Union, etc. It is full of promise as well as challenges.

Conclusion
Shaping a New Global Architecture: A Call for Engagement

The next phase of global economic development and integration has the potential to build on the successes of Globalization 3.0 and transcend the many serious challenges it leaves behind. But this will require new and improved enabling institutions, arrangements and policy models – that is to say, better cooperative architecture both international and domestic.

This White Paper has demonstrated that the world is not lacking in concrete opportunities and ideas in this regard. What is needed is a deeper level of commitment by all actors to engage in dialogue and action to bring these and other worthy initiatives to fruition.

Implementation of a substantial portion of them would amount to an "operating system upgrade" for international cooperation in particular, including for its indispensable core of multilateral institutions. By applying the blueprint of design specifications outlined in section 2, this agenda would strengthen and renovate the cooperative architecture constructed during previous phases of globalization and equip it for the new technological, geopolitical, environmental and societal operating context of Globalization 4.0.

A more integrated, interoperable and agile approach to economic governance and cooperation can help the international community transcend the technology policy dilemmas, trade policy frictions, impediments to shared value creation and financing gaps that are preventing markets and economies from growing to their full potential. At the same time, a more multidimensional, outcome-oriented and human-centred approach is needed to stabilize humanity's environmental footprint within sustainable boundaries while diffusing the benefits of technological progress and economic growth more widely through stronger broad-based progress in living standards.

Ten years ago, in the midst of he worst international financial crisis since the early 1930s, a significant new piece of international cooperative architecture was born: the G20 Leaders Summit. The April 2009 London Summit is widely regarded as the high-water mark of the G20's achievements as the self-declared premier forum for international economic cooperation. Leaders there committed to a combined $5 trillion in fiscal stimulus, $1 trillion in additional resources for the IMF and a wide-ranging programme of national and global financial regulatory reform aimed at braking the fall of the world economy and restoring confidence in financial markets. Their efforts were a resounding success.

However, a key learning from the crisis was that the international community had been far too complacent about the risks and gaps in national and global financial governance that had been accumulating due to changes in technology and the world economy. A decade later, it is evident that risks and gaps are accumulating in many other areas of governance, notwithstanding the critical ongoing work being done by our existing institutions and cooperative arrangements.

Crisis need not and should not be relied on again to be the mother of invention for the modernizing improvements in national, global and corporate governance required to adapt them to the profound technological, environmental, geopolitical and societal transformations underway in the the Fourth Industrial Revolution. The best way the international community could mark the 75th anniversary of the United Nations and Bretton Woods institutions next year would be to begin engaging now in a collaborative effort to strengthen the multilateral system, and update and upgrade international cooperative architecture more broadly to maximize the opportunities and mitigate the risks of Globalization 4.0 for humanity.

Readers are encouraged to engage in this spirit in one or more of the initiatives highlighted by this white paper to help shape the improvements in governance architecture of greatest relevance to their interests or competencies. This can be done by contacting one of the initiatives highlighted above through the links provided in the document, or engaging in the ongoing informal dialogues and projects on these topics planned on the Forum's platform in 2019-2020. Contact the heads of the relevant Forum initiatives and centres for further details.

As part of this process of dialogue and engagement, we welcome comments and suggestions in respect of this white paper. For example, what other existing initiatives and proposals to modernize international cooperation are worthy of wider consideration and support? What other design parameters will be important to bear in mind? And how might an inclusive and sustained process of dialogue aimed at building trust and common ground among countries and stakeholders be most fruitfully pursued?

International relations and the world economy are at an inflection point. Answers to questions like these will determine their ultimate trajectory in the 21st century.

Endnotes

1   https://www.project-syndicate.org/commentary/globalization-4-0-by-klaus-schwab-2018-11 (link as of 07/01/19),

2   For a discussion of some of the risks posed by advanced technologies, see the Forum's 2019 Global Risks Report).

3   See for example: https://www.nber.org/papers/w7195.pdf (link as of 18/12/18).

4   https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS (link as of 18/12/18).

5   Homi Kharas, "The Unprecedented Expansion of the Global Middle Class: An Update", The Brookings Institution, February 2017. Middle class is defined as income between $10 and $100 per day in 2005 PPP terms, which implies an annual income for a four-person household of $14,600 to $146,000.

6   https://ourworldindata.org/war-and-peace

7   Carmen M. Reinhardt and Christoph Trebesch, "The International Monetary Fund: 70 Years of Renivention," NBER Working Paper 21805, National Bureau for Economic Research, December 2015, pp. 6 - 7.

8   See https://ourworldindata.org/trade-and-globalization#trade-has-changed-the-world-economy chart derived from Michel Fouquin & Jules Hugot , 2016. "Two Centuries of Bilateral Trade and Gravity Data: 1827-2014," CEPII Working Paper 2016- 14 , May 2016 , CEPII

9   Chad P. Bown and Douglas A. Irwin, "the GATT's Starting Point Point: Tariff Levels Circa 1947," NBER Working Paper 21782, National Bureau of Economic Research, December 2015

10 https://data.unicef.org/topic/child-survival/under-five-mortality/

11 World Health Organization, "Trends in Maternal Mortality: 1990 to 2015 Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division," Executive Summary, 2015 https://apps.who.int/iris/bitstream/handle/10665/193994/WHO_RHR_15.23_eng.pdf;jsessionid=E466167FA0D76283F6C33427F4663FF9?sequence=1

12 UNAIDS, "On the Fast Track to End AIDS, 2016 to 2021 Strategy," 2015.

13 https://www1.wfp.org/overview

14 UNICEF, "PROGRESS FOR CHILDREN BEYOND AVERAGES: LEARNING FROM THE MDGS," 2015, p. 17. https://www.unicef.org/publications/files/Progress_for_Children_No._11_22June15.pdf

15 International Labor Organization. Global estimation of child labour 2016: Main results and methodology. Geneva, September 2017. See also International Labor Organization and WalkFree Foundation. Global Estimate of Modern Slavery. Geneva, September 2017.

16 See in particular pp. 23 to 32 of the Forum's Global Redesign Initiative (2010) for an elaboration of multidimensional cooperation (https://www.innovations.harvard.edu/sites/default/files/WEF_GRI_EverybodysBusiness_Report_2010.pdf) as well as two related concepts: polycentric governance, see in particular E. Ostrom (2010) https://libcatalog.cimmyt.org/Download/reprints/97171.pdf and J.A. Scholte (2004) http://wrap.warwick.ac.uk/1984/1/WRAP_Scholte_wp13004.pdf; and networked governance, see in particular A. Slaughter (2017) https://yalebooks.yale.edu/book/9780300215649/chessboard-and-web

17 https://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html (link as of 07/01/19)

18 https://www.globaltradealert.org/global_dynamics (link as of 07/01/19)

19 http://www.g20.utoronto.ca/2018/2018-leaders-declaration.html (link as of 07/01/19)

20 https://www.wto.org/english/news_e/news18_e/bertelsmann_rpt_e.pdf (link as of 07/01/19)

21 http://www3.weforum.org/docs/E15/WEF_Synthesis_Report_Strengthening_Global_Trade_Investment_System_21st_Century.pdf (link as of 07/01/19)

22 https://www.wto.org/english/tratop_e/tradfa_e/tradfatheagreement_e.htm (link as of 07/01/19)

23 https://docs.wto.org/dol2fe/Pages/FE_Search/FE_S_S009-DP.aspx?language=E&CatalogueIdList=240862,240867,240868,240870,240871,240899,240875,240874,240878,240877&CurrentCatalogueIdIndex=4&FullTextHash=371857150&HasEnglishRecord=True&HasFrenchRecord=T (link as of 07/01/19)

24 https://www.facebook.com/worldtradeorganization/videos/enabling-e-commerce/1627391320637000/ (link as of 07/01/19)

25 https://ustr.gov/sites/default/files/09142016_STATEMENT_joint_statement_fisheries_partners_FINAL.pdf (link as of 07/01/19)

26 https://docs.wto.org/dol2fe/Pages/FE_Search/FE_S_S009-DP.aspx?language=E&CatalogueIdList=240870,240871,240899,240900,240833,240841,240845,240847,240848,240853&CurrentCatalogueIdIndex=0&FullTextHash=&HasEnglishRecord=True&HasFrenchRecord=True&HasSpanishRecord=True (link as of 07/01/19)

27 http://ec.europa.eu/trade/policy/in-focus/tisa/ (link as of 07/01/19)

28 https://www.weforum.org/system-initiatives/shaping-the-future-of-international-trade-and-investment (link as of 07/01/19)

29 http://www.fsb.org/wp-content/uploads/P281118-1.pdf (link as of 07/01/19)

30 https://www.globalfinancialgovernance.org/assets/pdf/G20EPG-Full%20Report.pdf (link as of 07/01/19)

31 https://www.blendedfinance.earth/better-finance-better-world/ (link as of 07/01/19)

32 https://www.oecd.org/cgfi/forum/Blended-finance-Policy-Perspectives.pdf (link as of 07/01/19)

33 http://siteresources.worldbank.org/INTINFNETWORK/Resources/CatalysingPrivInvestment.pdf (link as of 07/01/19)

34 http://sdiponline.org/updated_members-and-partners/ (link as of 07/01/19)

35 https://www.bundesfinanzministerium.de/Content/DE/Downloads/G20-Dokumente/Hamburg_Genannte_Berichte/Joint-MDB-Statement-of-Ambitions.pdf?__blob=publicationFile&v=1 (link as of 07/01/19)

36 https://www.globalfinancialgovernance.org/assets/pdf/G20EPG-Full%20Report.pdf, see pp. 38–42 (link as of 18/12/18).

37 https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/10/11/pp101118-bali-fintech-agenda (link as of 07/01/19)

38 http://www.fsb.org/wp-content/uploads/R270617.pdf (link as of 07/01/19)

39 https://www.americanbanker.com/news/new-wef-consortium-aims-to-tackle-the-problem-of-risky-fintech-innovations (link as of 07/01/19)

40 http://www3.weforum.org/docs/WP_Roadmap_Appropriate_Use_Customer_Data.pdf (link as of 07/01/19)

41 https://risk.thomsonreuters.com/content/dam/openweb/documents/pdf/risk/report/true-cost-of-financial-crime-global-focus.pdf (link as of 07/01/19)

42 http://www.fatf-gafi.org/about/ (link as of 07/01/19)

43 https://www.europol.europa.eu/newsroom/news/europol-thomson-reuters-and-world-economic-forum-launch-coalition-to-fight-financial-crime-and-modern-slavery (link as of 07/01/19)

44 https://cop24.gov.pl/ (link as of 07/01/19)

45 https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_High_Res.pdf (link as of 07/01/19)

46 https://climateactiontracker.org/global/temperatures/ (link as of 07/01/19)

47 http://www.energy-transitions.org/sites/default/files/ETC_MissionPossible_ReportSummary_English.pdf (link as of 07/01/19)

48 https://oilandgasclimateinitiative.com/ (link as of 07/01/19)

49 https://phys.org/news/2017-10-nature-vital-climate.html#jCp (link as of 19/12/18).

50 https://foreignpolicy.com/2018/09/26/the-paris-accord-wont-stop-global-warming-on-its-own/ (link as of 07/01/19)

51 https://www.clcouncil.org/ (link as of 07/01/19)

52 https://www.globalclimateactionsummit.org/ (link as of 07/01/19)

53 https://www.weforum.org/agenda/2018/11/how-to-make-global-climate-action-go-viral/ (link as of 07/01/19)

54 https://alliancesforclimateaction.com/ (link as of 07/01/19)

55 https://www.wearestillin.com/ (link as of 07/01/19)

56 https://japanclimate.org/english/ (link as of 07/01/19)

57 http://mission-innovation.net/ (link as of 07/01/19)

58 http://www.un.org/en/climatechange/un-climate-summit-2019.shtml (link as of 07/01/19)

59 http://www.fao.org/3/I9540EN/i9540en.pdf (link as of 07/01/19)

60 https://www.theguardian.com/environment/2018/oct/26/great-barrier-reef-forecast-warns-entire-system-at-risk-of-bleaching-and-coral-death-this-summer (link as of 07/01/19)

61 https://www.nationalgeographic.com/environment/2018/07/ocean-plastic-pollution-solutions/ (link as of 07/01/19)

62 http://www.fao.org/port-state-measures/en/ (link as of 07/01/19)

63 http://www3.weforum.org/docs/IUU_Tuna_2020_Traceability_Declaration.pdf (link as of 07/01/19)

64 https://www.weforum.org/friends-of-ocean-action (link as of 07/01/19)

65 https://www.cbd.int/ (link as of 07/01/19)

66 https://www.cbd.int/doc/c/2b0c/57ac/b2612a9aac33428f940f9d76/soi-brochure-2012-en.pdf (link as of 07/01/19)

67 https://www.cbd.int/cop/cop-14/annoucement/nature-action-agenda-egypt-to-china-en.pdf (link as of 07/01/19)

68 https://www.earthbankofcodes.org/ (link as of 07/01/19)

69 https://www8.cao.go.jp/cstp/english/society5_0/index.html (link as of 07/01/19)

70 https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf (link as of 18/12/18).

71 https://ec.europa.eu/commission/priorities/digital-single-market_en (link as of 18/12/18).

72 https://www.bain.com/contentassets/37a730c1f0494b7b8dac3002fde0a900/report_advancing_towards_ asean_digital_integration.pdf (link as of 18/12/18).

73 https://www.prnewswire.com/news-releases/global-crispr-technology-market-2018-2027-market-is-expected-to-reach-10-55-billion-300636272.html (link as of 18/12/18).

74 https://www.ccn.com/crypto-market-loses-13-billion-as-bitcoin-ripple-and-bitcoin-cash-record-6-losses/ (link as of 18/12/18).

75 https://www.nber.org/papers/w24174 (link as of 18/12/18).

76 https://www.rand.org/blog/articles/2018/04/how-artificial-intelligence-could-increase-the-risk.html (link as of 18/12/18).

77 https://digiconomist.net/bitcoin-energy-consumption (link as of 18/12/18).

78 https://www.blockchain.com/en/charts (link as of 18/12/18).

79 https://www.sciencenews.org/article/twitter-bots-fake-news-2016-election (link as of 07/01/19)

80 http://www3.weforum.org/docs/WEF_Our_Shared_Digital_Future_Report_2018.pdf (link as of 07/01/19)

81 https://digitalcooperation.org/ (link as of 07/01/19)

82 http://www.un.org/en/newtechnologies/ (link as of 07/01/19)

83   https://www.weforum.org/centre-for-the-fourth-industrial-revolution (link as of 07/01/19)

84   https://pm.gc.ca/eng/news/2018/12/06/mandate-international-panel-artificial-intelligence (link as of 07/01/19)

85   https://standards.ieee.org/industry-connections/ec/autonomous-systems.html (link as of 07/01/19)

86   https://www.weforum.org/communities/artificial-intelligence-and-machine-learning (link as of 07/01/19)

87   https://www.partnershiponai.org/ (link as of 07/01/19)

88   https://www.republique-numerique.fr/pages/in-english (link as of 18/12/18).

89   http://opendata-ajuntament.barcelona.cat/en/ (link as of 18/12/18).

90   https://contractfortheweb.org/ (link as of 07/01/19)

91   https://www.weforum.org/projects/digital-identity (link as of 07/01/19)

92   https://www.nap.edu/read/21913/chapter/1#6 (link as of 07/01/19)

93   https://www.who.int/ethics/topics/gene-editing/call-for-members/en/ (link as of 07/01/19)

94   https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/ (link as of 18/12/18).

95   https://www.emarketer.com/Report/Worldwide-Internet-Mobile-Users-eMarketers-Updated-Estimates-Fore-
      cast-20172021/2002147 (link as of 18/12/18).

96   https://doi.org/10.1080/20964471.2017.1405925 (link as of 18/12/18).

97   https://krebsonsecurity.com/2018/12/what-the-marriott-breach-says-about-security/ (link as of 18/12/18).

98   https://www.schneier.com/ (link as of 18/12/18).

99   https://www.weforum.org/centre-for-cybersecurity (link as of 18/12/18).

100   https://www.diplomatie.gouv.fr/en/french-foreign-policy/digital-diplomacy/france-and-cyber-security/article/cybersecurity-paris-call-
      of-12-november-2018-for-trust-and-security-in (link as of 07/01/19)

101   https://cybertechaccord.org/ (link as of 07/01/19)

102   https://www.siemens.com/content/dam/webassetpool/mam/tag-siemens-com/smdb/corporate-core/topic-areas/digitalization/cy-
      bersecurity/shi-13378-cot-dok-narrative-online-2018-02-13-sbi-en.pdf (link as of 07/01/19)

103   https://www.globalcyberalliance.org/ (link as of 07/01/19)

104   https://www.first.org/ (link as of 07/01/19)

105   https://www.fsisac.com/about (link as of 07/01/19)

106   https://www.cyberthreatalliance.org/ (link as of 07/01/19)

107   https://www.un.org/disarmament/topics/informationsecurity/ (link as of 07/01/19)

108   https://www.osce.org/secretariat/cyber-ict-security (link as of 07/01/19)

109   https://www.osce.org/pc/227281?download=true (link as of 07/01/19)

110   https://www.un.org/press/en/2018/ga12099.doc.htm (link as of 07/01/19)

111   https://www.itu.int/en/ITU-D/Cybersecurity/Pages/default.aspx (link as of 07/01/19)

112   https://www.unodc.org/unodc/en/cybercrime/index.html (link as of 07/01/19)

113   http://www.worldbank.org/en/programs/digital-development-partnership (link as of 07/01/19)

114   https://www.interpol.int/Crime-areas/Cybercrime/Cybercrime (link as of 07/01/19)

115   http://data.consilium.europa.eu/doc/document/ST-10496-2018-INIT/en/pdf (link as of 07/01/19)

116   https://www.coe.int/en/web/cybercrime/capacity-building-programmes (link as of 07/01/19)

117   http://www.oas.org/en/topics/cyber_security.asp (link as of 07/01/19)

118   https://cto.int/strategic-goals/cybersecurity/ (link as of 07/01/19)

119   https://www.thegfce.com/ (link as of 07/01/19)

120   https://techcrunch.com/2016/03/20/israels-desert-city-of-beersheba-is-turning-into-a-cybertech-oasis/ (link as of 07/01/19)

121   https://www.nytimes.com/2018/11/28/business/a-plan-to-turn-new-york-into-a-capital-of-cybersecurity.html (link as of 07/01/19)

122   http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf (link as of 07/01/19)

123   http://www3.weforum.org/docs/WEF_Advancing_Human_Centred_Economic_Progress_WP_2017.pdf (link as of 07/01/19)

124   https://www.ilo.org/global/topics/future-of-work/WCMS_569528/lang--en/index.htm (link as of 07/01/19)

125   https://www.weforum.org/projects/closing-the-skills-gap-regional-skills-projects (link as of 07/01/19)

126   http://www.closingtheskillsgap.org/ (link as of 07/01/19)

127   http://www.genunlimited.org/ (link as of 07/01/19)

128   https://www.weforum.org/projects/future-of-work (link as of 07/01/19)

129   http://www.theglobaldeal.com/app/uploads/2017/02/Global-Deal-In-Brief-2.0.pdf (link as of 07/01/19)

130   https://www.globalslaveryindex.org/2018/findings/highlights/ (link as of 07/01/19)

131   http://www.worldbank.org/en/publication/human-capital (link as of 07/01/19)

132   https://openknowledge.worldbank.org/handle/10986/29865 (link as of 18/12/18).

133   https://www.weforum.org/reports/the-global-gender-gap-report-2017 (link as of 07/01/19)

134 http://www3.weforum.org/docs/WEF_System_Initiative_Future_Education_Gender_Work_Closing_Gender_Gap_2-Page....pdf (link as of 07/01/19)

135 https://www.edelman.com/sites/g/files/aatuss191/files/2018-10/2018_Edelman_Trust_Barometer_State_of_Business.pdf (link as of 07/01/19)

136 https://www.weforum.org/reports/the-inclusive-development-index-2018 (link as of 07/01/19)

137 http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2018)51&docLanguage=En (link as of 18/12/18).

138 http://www3.weforum.org/docs/Media/AM17/The_Compact_for_Responsive_and_Responsible_Leadership_09.01.2017.pdf (link as of 07/01/19)

139 This tool is being developed in collaboration with Refinitiv (link as of 19/12/18).

140 Ibid.

141 https://www.ey.com/Publication/vwLUAssets/Long_term_value_white_paper_December_2016/$File/EY-LTV-white-paper-v14.pdf (link as of 18/12/18).

142 https://www.weforum.org/system-initiatives/shaping-the-future-of-long-term-investing-infrastructure-and-development (link as of 07/01/19)

143 https://www.epic-value.com/ (link as of 07/01/19)

144 https://www.fcltglobal.org/ (link as of 07/01/19)

145 http://integratedreporting.org/ (link as of 07/01/19)

146 http://integratedreporting.org/corporate-reporting-dialogue/ (link as of 07/01/19)

147 http://www3.weforum.org/docs/IP/2017/Adv_Cyber_Resilience_Principles-Tools.pdf (link as of 07/01/19)

148 https://www.weforum.org/communities/partnering-against-corruption-initiative (link as of 07/01/19)

149 https://www.fsb-tcfd.org/ (link as of 07/01/19)

150 https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf (link as of 07/01/19)

151 https://www.ituc-csi.org/just-transition-centre (link as of 07/01/19)

152 http://www.oecd.org/tax/beps/beps-actions.htm (link as of 07/01/19)

153 http://report.businesscommission.org/uploads/BetterBiz-BetterWorld_170215_012417.pdf (link as of 07/01/19)

154 https://www.dw.com/en/global-conflict-continues-to-rise-index-shows/a-44090159 (link as of 18/12/18).

155 https://www.washingtonpost.com/world/trump-administration-gives-russia-60-days-to-comply-with-inf-treaty-or-the-us-will-move-to-withdraw/2018/12/04/64c5bec2-f74a-11e8-8642-c9718a256cbd_story.html?utm_term=.aa554d6f823b (link as of 18/12/18).

156 https://www.psi-online.info/ (link as of 07/01/19)

157 https://www.unog.ch/80256EE600585943/(httpPages)/4F0DEF093B4860B4C1257180004B1B30?OpenDocument (link as of 07/01/19)

158 https://www.unog.ch/80256EDD006B8954/(httpAssets)/EB4EC9367D3B63B1C12582FD0057A9A4/$file/GGE+LAWS+August_EC,+C+and+Rs_final.pdf (link as of 07/01/19)

159 https://www.unog.ch/80256EDD006B8954/(httpAssets)/20092911F6495FA7C125830E003F9A5B/$file/CCW_GGE.1_2018_3_final.pdf (link as of 07/01/19)

160 https://blogs.microsoft.com/on-the-issues/2017/02/14/need-digital-geneva-convention/#sm.0001hkfw5aob5evwum620jqwsabzv (link as of 07/01/19)

161 http://www.un.org/ga/search/view_doc.asp?symbol=A/70/174 (link as of 07/01/19)

162 http://g20.org.tr/g20-leaders-commenced-the-antalya-summit/ (link as of 07/01/19)

163 https://www.congress.gov/bill/115th-congress/house-bill/2810 (link as of 07/01/19)

164 https://www.orbitaldebris.jsc.nasa.gov/quarterly-news/pdfs/odqnv22i3.pdf (link as of 07/01/19)

165 https://www.mdpi.com/2226-4310/5/2/55/pdf-vor (link as of 07/01/19)

166 https://refugeesmigrants.un.org/migration-compact (link as of 07/01/19)

167 https://refugeesmigrants.un.org/refugees-compact (link as of 07/01/19)

168 https://www.technologyreview.com/s/610806/inside-the-jordan-refugee-camp-that-runs-on-blockchain/ (link as of 07/01/19)

169 https://data.humdata.org/ (link as of 07/01/19)

170 http://www3.weforum.org/docs/WEF_Market-Based_Solutions_Innovative_Finance_report_2018.pdf

171 https://www.worldbank.org/en/topic/regional-integration/brief/belt-and-road-initiative (link as of 18/12/18).

172 http://eng.sectsco.org/ (link as of 07/01/19)

173 https://www.ispionline.it/it/pubblicazione/indo-pacific-strategy-background-analysis-20714 (link as of 19/12/18).

174 https://www.ispionline.it/it/pubblicazione/indo-pacific-strategy-background-analysis-20714; https://thediplomat.com/2018/06/us-japan-india-and-australia-hold-senior-official-level-quadrilateral-meeting-in-singapore/ (links as of 19/12/18).