

A Leadership Agenda for G20 Governments

Advancing Human-Centred Economic Progress in the Fourth Industrial Revolution

G20/T20 Policy Brief – May 2017



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Abstract: This paper outlines a narrative vision and policy agenda aimed at ensuring that the technological progress of the 21st century augments rather than substitutes for human potential and employment. It proposes a three-part programme to reorient the growth models of G20 economies towards this objective by designing social inclusion deliberately into their innovation ecosystems and economic policies in order to diffuse as widely as possible the overall gains in opportunity and prosperity enabled by technology and international economic integration.

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Challenge: The Need for a New Leadership Agenda

Connected to the world, yet increasingly disassociated from and stratified within one's local community and national society. Wealthier than ever, yet less secure. Politically conscious, yet disaffected and sceptical of government's efficacy.

These contradictions are felt by many citizens in G20 economies and across the globe. In often polarized political environments, they struggle to make sense of the competing narratives advanced by their political and economic leaders, many of whom are viewed as being disconnected from the daily challenges they experience. Leaders are often perceived as agents of vested interests and the status quo, unable either to grasp the significance of the disruptive forces at play in the economy or to articulate a credible strategy for harnessing them for the good of society as a whole.

On the surface, these paradoxes are puzzling. Based on GDP and other measures of well-being, humanity has never been better off. The number of people living in absolute poverty has been reduced by 60% since 1980, even as the population of the world has increased by the same proportion.¹ The world is also safer than ever: fewer people die from violence or conflict than at any prior era. Today's populations enjoy longer lifespans, and more comfortable lives than any prior generation.

The world is also more technology-enabled than ever before. More than 4.5 billion people are estimated to regularly use a mobile telephone.² In the decade since the launch of the iPhone, smartphones have become both the primary channel for (digital) retail commerce in China and the constant companion of more than 60% of adults in Organisation for Economic Co-operation and Development (OECD) countries.³ The combination of enhanced connectivity and falling costs of digital processing and storage is enabling the emergence of new systems and capabilities of such significant potential that they herald a Fourth Industrial Revolution.

Yet these historic advantages are being matched by a range of challenges that are keenly felt by large proportions of G20 citizens.

First among these challenges is rising incidence and awareness of economic inequality within countries, which has been detailed by previous T20/G20 policy briefs. Inequality in the majority of G20 countries is rising, and in some cases is at historic highs.⁴

In advanced countries, incomes are stagnating or declining for members of the middle class, and the share of national income accruing to labour has fallen as productivity has risen faster than real wages.

Trust in the main social institutions that have shaped this unprecedented progress is again falling, after a short period of recovery following the global financial crisis. The 2017 Edelman Trust Barometer indicates that, globally, 47% of people tend to distrust businesses while 59% tend to distrust governments.⁵ Non-governmental organizations and the media have also suffered declines, and the data are broadly consistent across G20 economies.

Even more marked than overall perceptions of trust is an increasing division in levels of trust between "the informed public" and "mass population" – which has grown from nine percentage points in 2012 to 15 percentage points in 2017, with the largest gaps occurring in the United States, the United Kingdom and France.

The trend of people losing trust in their governing institutions is matched by governments losing trust in their populations, particularly in regard to civil society organizations, citizen activism and the protections afforded by human rights. Of the 104 countries for which CIVICUS has verified ratings on civic space, two-thirds currently are classified as closed, repressed or obstructed environments for civil society; almost half of the G20 economies fall into these categories, with Germany being the sole economy judged "open".⁶ Data from the International Center for Not-for-Profit Law indicate that between January 2015 and September 2016 alone, more than 64 regulations worldwide were introduced to make it more difficult, a criminal offence or dangerous to form associations, uncover corruption, or even to simply undertake citizen science.⁷

Both ethnographic and survey-based research seeking to understand the drivers behind the global loss of trust in existing systems and rising social and political polarization reveal a complex web of factors. However, at their heart lies a dissatisfaction regarding the extent to which today's political and business leaders appreciate the economic uncertainty and cultural upheaval affecting communities across both developed and emerging economies. There has been a certain complacency in leadership circles about the human impact of the technological disruption, international economic integration, domestic deregulation and migration of recent decades.

Now, as a Fourth Industrial Revolution dawns, the world may be approaching an inflection point of human development. This new context appears very likely to accelerate the pace of change and test social cohesion still further, absent a bold policy agenda across three interrelated areas – innovation, economic policy and work – embedded in a visionary narrative about the improvements in everyday life that such a future can bring to households, countries and humanity at large.

The context for sustainable wealth creation – including environmental limits, geopolitical and economic relationships, social contracts and technological disruption – is shifting substantially. The policies upon which leaders traditionally have relied to advance socio-economic progress must shift as well.

To this end, this policy brief outlines a new *human-centred economic growth model* aimed at ensuring that the technological progress of the 21st century *augments human potential and employment around the world rather than substitutes for them*. The concepts discussed herein draw from a recent series of multistakeholder dialogues facilitated by the World Economic Forum in cooperation with the Think Tank 20 process during the 2017 German G20 presidency as well as from a number of relevant Forum System Initiatives and projects, including those relating to the Fourth Industrial Revolution;⁸ Inclusive Growth and Development;⁹ and Education, Gender and Work.¹⁰

Proposal: Toward a Human-Centred Model of Economic Growth

Since the First Industrial Revolution, the development and wide adoption of new technologies have been the most significant contributors to both economic growth rates and increases in living standards. Prior to 1800, the average annual per capita growth rate in European countries was volatile, but for centuries amounted very close to zero.¹¹

As countries began to embrace forms of mechanization, automation and specialization (and the institutional changes that supported them, including intellectual property regimes, labour laws and more open trade), average growth rates per capita in countries such as the United Kingdom, the United States and France for the period 1800 to 1900 became both positive and significant, while periods of sustained, rapid growth became more common and lasted longer.¹² Since 1800, real income per person in OECD economies has risen by a factor of 30 – an increase of around 2,900%.¹³

However, data show that today advanced economies in particular are failing to maintain the rate of increase in living standards for citizens. Annual median incomes declined by 2.4% in advanced economies over the last five years, while a number of populations are for the first time recording reductions in life expectancy.¹⁴ As the OECD has detailed, inequality within the majority of G20 countries is increasing, and the share of national income going to labour is falling.

Indeed, there is evidence that the world is at the beginning of a Fourth Industrial Revolution, which is being driven by a range of converging technologies (see *Box: Defining the Fourth Industrial Revolution*). Building on the digital infrastructure and systems developed in the Third Industrial Revolution, these technologies are combining to disrupt and recreate how value is created, exchanged and distributed across society. As occurred in previous revolutions, the advent of emerging technologies and the diffusion of digital capabilities around the world are changing the relationships and power dynamics between governments, companies, communities and citizens as they affect labour markets, trade, fiscal policy and much else besides.

Defining the Fourth Industrial Revolution

The Fourth Industrial Revolution is a “mental model” for understanding and influencing the way in which emerging technologies are changing how value is created, exchanged and distributed across economic and social systems.

Since 1750, when mechanization first transformed the textile industry in Britain before spreading to other industries and countries, three major and disruptive periods of technological advancement have changed our methods of production, communication, transport, agriculture and our social systems. The First Industrial Revolution saw the widespread use of steam, the introduction of the factory system, the development of the railroad and huge advances in metallurgy and chemistry.

The Second Industrial Revolution, which took place roughly between 1870 and 1914, led to the development of electricity networks, the telephone, the automobile, the gas turbine, artificial fertilizer and other technologies that once again changed how people moved, communicated, consumed and saw the world.

The Third Industrial Revolution took off in earnest in the 1960s and its major components were mature by the early 2000s with the spread of the internet and mobile telephony. Based around advances in information theory, the production of silicon, the integrated circuit, microprocessor and digital telecommunications, this Revolution again completely changed the world.

Each Industrial Revolution has built on the last – it is impossible to imagine electricity networks without the prior advances in power production, nor digital communications without reliable forms of electricity generation and storage. The Fourth Industrial Revolution is enabled by the digital technologies of the third, and is represented by breakthroughs in fields as diverse as:

- Artificial intelligence and machine learning
- Advanced robotics and drones
- Virtual, augmented and mixed reality systems
- Biotechnologies and precision medicine
- Multidimensional printing
- New materials
- Neurotechnologies
- New approaches to energy generation and storage.

These, and others to come, are combining in ways that will once again transform the manner in which human beings communicate, produce things, transport people and goods, and interact.

Each Industrial Revolution is also, to different extents, still ongoing in terms of how economies and communities are able to participate and grasp the benefits of technological systems. There are 4.2 billion people who have yet to enjoy full access and use of the internet, 2.4 billion people without reliable access to clean drinking and sanitation, 1.2 billion people without access to electricity, and around 600 million smallholder farmers who haven't yet seen the benefits of the First Industrial Revolution.

Source: World Economic Forum

During the Third Industrial Revolution between the 1960s and 2000s, the rapid improvement and diffusion of information and communications technology, widespread deregulation of domestic product and services markets, liberalization of international trade and investment and effective doubling of the global economy's workforce as a result of the integration of China and other economies created a large positive supply-side shock to the world economy. Together, these transformative forces greatly increased economies of scale for competitive firms and nations by lowering the cost and increasing the productivity of capital and labour, on the one hand, and expanding the universe of potential customers for their products and services, on the other.

A considerable number of developing countries capitalized upon this benign environment and achieved rapid rates of economic growth and poverty reduction, substantially closing the gap with advanced countries in terms of national income, productive capacity and, in some cases, technological sophistication. As a result, the world witnessed the fastest decline in absolute poverty in history during this period, an accomplishment in which all of humanity can take pride.

The living standards of advanced countries also advanced, albeit more slowly and in ways not necessarily captured by conventional economic statistics (e.g. higher quality and larger selection of goods and services at lower cost; new and better conveniences at low and often falling cost; improvements in health, safety and the environment, etc.). However, in most advanced economies, the accelerated drive by firms to capture efficiencies and economies of scale in response to this heightened competitive environment contributed to a shift in the composition of national income. Lower labour and capital costs and easier access to markets helped to boost capital's share of national income, while an increase in dislocation, skills mismatches, long-term unemployment and pressure on wages and benefits helped to lower labour's share in parallel.

Most advanced countries have yet to mobilize an effective response to the secular dispersion of incomes within their societies driven by the Third Industrial Revolution and recent phase of global economic integration, a trend that was exacerbated by the 2008-2009 financial crisis. Social and political cohesion are under increasing strain, leading to fears that the populist political brush fire sweeping the West could consume the liberal international order,¹⁵ placing into jeopardy the considerable gains in human security and advancement since World War II and the Great Depression.

Public concern about inequality, insecurity and the prospects of younger and future generations is now a top preoccupation of political, business and other leaders in many countries. But while this new sense of urgency is something to build on, there is little time to waste. The Fourth Industrial Revolution threatens to exacerbate these trends in the absence of a clear, countervailing strategy. People sense this instinctively in both advanced and emerging economies as they witness robots being installed in factories and homes; platform, ecommerce, on-demand and sharing economy companies reordering a succession of services industries; and artificial intelligence applications beginning to disrupt a succession of large, mainstream job classifications.

On the other hand, these new technologies and business models also create exciting new opportunities for societies to enhance employment opportunity, productivity and quality of life. The disintermediation of traditional tasks and firms at intermediary stages of value chains, including through e-commerce, is lowering barriers to entry for small and medium-sized businesses in many sectors, potentially creating a new cadre of entrepreneurs with greater personal wealth and lifestyle flexibility than traditional salaried employees. Indeed, substantial increases in economic value created per unit of labour may occur not only in countries with relatively low productivity levels but also in those in which people have already begun to value leisure and non-pecuniary pursuits more than the incremental income generated by working longer hours. In other words, the Fourth Industrial Revolution may bring

new levels of affluence as traditionally measured to some countries and an enhanced quality of life in the form of a shorter work week and increased family time to others.

Quality of life is likely to improve in many other ways. For example, applying machine learning algorithms to the detection, prevention and treatment of cancer is both very well-funded and intensely competitive, with extremely promising advances being made in a range of areas.¹⁶ A Norwegian study calculated that the incidence of cancer reduces life expectancy for their citizens by approximately three years,¹⁷ meaning that advances in this area could add significant lifestyle and economic value to G20 citizens and economies. Automated vehicles could reduce traffic fatalities by 90% by 2050,¹⁸ saving 10 million lives per decade if implemented worldwide, and allowing commuters to reclaim an estimated 50 minutes per day for other activities.¹⁹ Breakthroughs in energy storage systems and battery density would dramatically increase the value of intermittent renewable energy systems such as wind and solar, allowing for the rapid decarbonization of electricity systems and accelerating a widespread shift to electric vehicles, both of which would reduce air pollution and associated human health and environmental impacts.

Thus, the challenge for economic policy-makers in this new era is not only to make up for lost time in responding to the centrifugal social forces unleashed by the Third Industrial Revolution and globalization of the late 20th century, but also to proactively engage the future by seeking to mitigate the risks and capitalize on the opportunities that the Fourth Industrial Revolution is likely to bring to life in the 21st century.

A constructive first step would be to recognize that the three primary strategies G20 countries have employed to advance their economic prospects in recent decades – management of aggregate demand through macroeconomic policy; export-led growth through trade and industrial policy; and regional integration combined with domestic deregulation – are essentially tangential to the task of improving labour's share of national income and inspiring public confidence that new technologies will augment human potential and employment opportunity rather than substitute for them. Fine-tuning fiscal and monetary policy, extracting rents in the international trading system, and increasing industrial efficiencies and economies of scale, respectively, have relatively little bearing on the challenge of broadening progress in living standards in the context of wealth-concentrating technological disruption.

An alternative, human-centred economic growth model is required in which social inclusion is consciously “designed into” multiple relevant aspects of economic policy in a concerted effort to broaden the base and strengthen the resilience of growth by diffusing more widely among workers, families and communities the net increase in prosperity and opportunity that technology and globalization enable.

Such an explicit strategy to place people and their living standards at the centre of economic policy would constitute an agenda to engage and shape the future rather than resist or hide from it through short-term palliatives (e.g. macroeconomic stimulus or mercantilist trade measures), public misdirection (e.g. scapegoating minorities and immigrants or idealizing a bygone era) or mistaking means for ends (e.g. insisting on the benefits of globalization without making appropriate domestic investments and reforms).

Governments need to move beyond the efficiency-enhancing and short-term-optimizing growth model of recent decades to a new one in which they enhance technological progress by working proactively and flexibly with stakeholders to socially de-risk it, and they strengthen growth and inclusion simultaneously by reconceptualising structural reform as a systematic, multidisciplinary strategy to capture the unexploited synergies in an economy between the two.

Specifically, G20 governments should work individually and collectively to design social inclusion into: a) the normative context within which advanced technologies develop and diffuse; and b) the central logic of national economic policy and international economic cooperation, especially (but by no means only) with respect to modernizing and increasing investment in human capital formation and labour markets.

Such narrative signalling and practical action is what is required to inspire greater public confidence in the capacity of market economies to create positive synergy between humans and machines in the workplace in the decades to come. It is the new leadership agenda that is also required to restore faith in the capacity of the liberal international economic order to generate mutually reinforcing increases in living standards across developed and developing countries as they integrate.

Designing Social Inclusion into Advanced Technological Systems

The Fourth Industrial Revolution is a narrative framework for understanding and influencing the way in which emerging technologies are changing how value is created, exchanged and distributed across economic and social systems. It is neither an exercise in technology foresight and prediction nor a techno-optimist vision of the future.

At the heart of the Fourth Industrial Revolution is the idea that technological systems should serve human beings in sustainable and inclusive ways. This framing incorporates both the concept of inclusive growth, which is discussed in the following section, and the idea that technological systems must be designed to reflect and reinforce principles of social and economic inclusion for all generations, particularly as technology's power and ubiquity increase.

The nature of certain new technologies (such as those related to artificial intelligence, biotechnology and neurotechnologies) means that they are able to have significant influence over the way people behave and think. For the Fourth Industrial Revolution to be “human-centred”, such influence must be transparent, and organizations that employ such means must be held accountable accordingly. For example, a number of emerging technologies will have environmental and health-related externalities that must be assessed and guarded against. This is a difficult task in the context of technologies whose impact is largely encountered at a systems level, and requires adaptive forms of governance rather than a phased approach. Systems changes inevitably have differential effects across industries and demographic groups, and affect populations at different rates. Governments should invest in building processes into their innovation ecosystems that proactively explore how and to what extent different groups are likely to be affected by the rapid adoption of emerging technologies as well as what strategies could be developed in response.

A good place to begin is three broad “universal values” that were identified by the World Economic Forum Global Agenda Council on Values in 2013 in its “New Social Covenant”.²⁰ These are the dignity of the human person – whatever their race, gender, background or belief; the importance of a common good that transcends individual interests; and the need for stewardship of resources and the environment on behalf of future generations.

Based on these values, as a narrative promoting the importance of inclusion, the Fourth Industrial Revolution espouses four key principles for framing discussions and making policy around emerging technologies:

- a. Focus on the impact on systems, rather than simply the capability of technologies
- b. Find ways to empower citizens and stakeholders, rather than controlling them
- c. Be conscious of design principles at the heart of evolving systems, and shift these to being more human-centred
- d. Make positive values a feature of technological systems, rather than viewing ethical issues as matters of compliance, cost or mere “unintended consequences”

Practically employing these principles implies acknowledging and emphasizing through G20 innovation policies that technologies, and technological systems, are not “mere tools”, but rather in many different ways (e.g. through their purpose, features, context, price, etc.) reflect and influence the values and principles of their designers, investors, etc. This is important because it highlights that all stakeholders along the value chain of new technologies bear responsibility for their impact on society.

It also means appreciating that the values and principles of technological systems can, by design or by accident, conflict with the values and objectives of citizens and political systems.

In particular, technologies can undermine individual and group agency, exacerbate existing inequalities and create new ones by:

- a. Excluding individuals and groups from their benefits
- b. Reflecting and reinforce bias and discrimination
- c. Influencing people’s thinking and behaviour in overt and subtle ways
- d. Creating significant externalities, including on human health and the environment

An inclusion-focused perspective on innovation requires policy-makers to accept that there are significant and valid social concerns related to the development and diffusion of emerging technologies among populations, which include but are not limited to:

- a. Fears that emerging technological systems will greatly exacerbate inequalities or create new ones as the benefits are increasingly privatized and concentrated, costs are socialized and access is limited
- b. Existential concerns linked to the potential threats posed by artificially intelligent systems, weapons of mass destruction and irrevocable changes to the environment

- c. Fears that human decision-making is being undermined by both the subtle influence of technology on human agency and behaviour, and the prospect of widespread use of artificially intelligent systems to replace human judgement (particularly in justice systems, social security systems and military contexts)
- d. Concerns that social systems are becoming more fragile as technologies alter the way in which people receive, contextualize and make sense of information, and in turn change the way people perceive and relate to other individuals and groups
- e. The widespread disruption of jobs and skills, including service-sector jobs, as a result of the rapid development and diffusion of artificially intelligent systems combined with advanced robotics
- f. Concerns that government reactions to emerging technologies, via new regulations, taxes or trade-related responses, will stifle innovation in a way that significantly reduces their benefit without offsetting any corresponding risks

Finally, inclusive policies mean embracing the fact that technologies exist and develop within social contexts, and that the general public – rather than “experts”, business leaders, politicians or technocrats – has both the ability and responsibility to shape and guide policy in regard to the diffusion and use of emerging technologies.

Governments seeking to design or “hardwire” social inclusion into their innovation ecosystems can apply these values and guidelines through greater use of agile, often informal, governance processes of multistakeholder dialogue and feedback. Such mechanisms can provide useful signals from society to engineers and business executives well before a technology has been introduced into the market, helping to risk-proof its development. They can also help regulators and legislators keep abreast of pertinent scientific and business activity in the fast-moving Fourth Industrial Revolution, giving such policy-makers a better sense of whether and when regulation is likely to be appropriate. Public-private dialogue can cultivate a better appreciation by all parties of the full spectrum of potentially appropriate normative approaches, from voluntary multistakeholder principles, practices, protocols or standards that can be adapted relatively easily as technologies evolve, to regulatory “sandbox” pilot programmes, to formal rules and regulations established by individual governments or plurilateral groups thereof, to full-scale multilateral agreements.

Earlier this year, the World Economic Forum established a Center for the Fourth Industrial Revolution in San Francisco, California to serve as a platform for international multistakeholder dialogue and informal governance cooperation on advanced technological systems. The Center is engaging interested governments, international organizations, businesses, the scientific and technical community, civil society organizations and others in processes of dialogue and partnership on specific emerging technologies for the purpose of facilitating their development in the service of humanity.

Designing Social Inclusion into National and International Economic Policy

In his speech at the World Economic Forum Annual Meeting 2017 in Davos-Klosters in January, Chinese President Xi Jinping stated:

We should strike a balance between efficiency and equity to ensure that different countries, different social strata and different groups of people all share in the benefits of economic globalization. The people of all countries expect nothing less from us, and this is our unshirkable responsibility as leaders of our times [...]

[...] We should develop a new development philosophy and rise above the debate about whether there should be more fiscal stimulus or more monetary easing. We should adopt a multipronged approach to address both the symptoms and the underlying problems [...]

[...] We should adopt new policy instruments and advance structural reform to create more space for growth and sustain its momentum. We should develop new growth models and seize opportunities presented by the new round of industrial revolution and digital economy.

President Xi's remarks eloquently capture a consensus that has emerged around the globe in recent years on the need for a more socially inclusive economic growth and development model. But this consensus is mainly directional; inclusive growth remains more an aspiration than an action agenda.

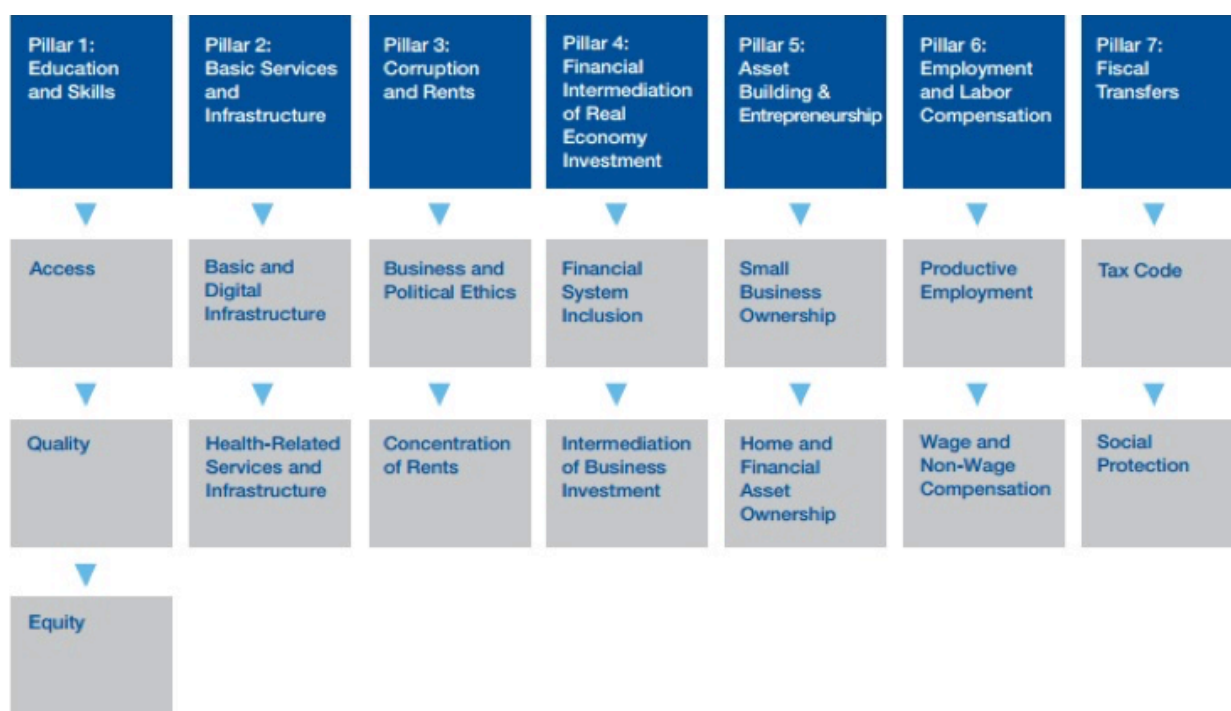
The ultimate objective of economic policy is sustained, broad-based progress in living standards, a concept that encompasses household income, employment opportunity, security and quality of life. This is the bottom-line basis on which people evaluate the economic dimension of their country's leadership, and not economic growth or industrial competitiveness, *per se*.

To borrow from a business concept, economic growth can be thought of as the top-line measure of national economic performance, with sustained progress in median living standards representing the bottom line. An inclusive growth strategy seeks to increase the extent to which the economy's top-line performance is translated into the bottom-line result society is seeking – broad expansion of economic opportunity and prosperity.

However, an economy is not a business, and history has shown that there is a feedback loop between the bottom- and top-lines in a national economy. This feedback loop can run in a positive or negative direction, creating either inclusive or unequal growth. The extent to which it is a virtuous circle is influenced by a diverse mix of structural and institutional aspects of economic policy, going well beyond the two areas most commonly featured in discussions about inequality: education and redistribution.

The Forum's *Inclusive Growth and Development Report 2017*²¹ identifies 15 areas of structural policy and institutional strength that are important potential drivers of both economic growth and social inclusion. The extent to which economic growth benefits society as a whole depends crucially on the framework of rules, incentives and institutional capacities that shape, for example, the quality and equity of human capital formation; the level and patience of real-economy investment; the pace and breadth of innovation; the effectiveness and flexibility of worker protections; the coverage and adequacy of social insurance systems; the quality and breadth of access to infrastructure and basic services; the probity of business and political ethics; and the breadth and depth of household asset-building.

Figure 1: Inclusive Growth and Development Framework



Source: World Economic Forum, *The Inclusive Growth and Development Report 2017*

The 15 policy and institutional domains of this framework (Figure 1) represent the *ecosystem* of structural policy incentives and institutions that together and *as part of the growth process* help to diffuse widely the benefits of an expanding national economy in terms of household income, opportunity, economic security and quality of life. This ecosystem constitutes the implicit income distribution system – or, more precisely, living-standards diffusion mechanism – underpinning modern market economies. When functioning properly, it operates in a self-reinforcing cycle in which economic growth and social inclusion feed each other.

In many advanced countries, this ecosystem has deteriorated or been inert over the past two decades as the forces propelling secular dispersion – technological change, global integration, domestic deregulation and increased immigration – have intensified. Many developing countries, meanwhile, have lagged in creating its basic elements as they have industrialized and integrated into the global economy, missing an opportunity to include more of their populations in their development process and rendering their economies more vulnerable to fluctuations in exports and commodity prices.

This policy framework represents an alternative way of thinking about structural economic reform and its role in the development process. Structural reform usually refers to measures aimed at boosting economic efficiency and macroeconomic stability by sharpening market signals and improving the health of public finances, often in response to a recent or looming fiscal or balance-of-payments crisis. In such circumstances, it tends to have the effect of squeezing living standards in the short term. But a systematic, sustained effort to strengthen institutions and policy incentives across the framework's 15 sub-domains – or to remedy the most glaring weaknesses therein – would also constitute an exercise in structural reform, albeit one involving both demand- and supply-side measures for the express purpose of *boosting* broad living standards while reinforcing the rate and resilience of growth.

To help governments and stakeholders assess their nations' relative strengths and weaknesses within this ecosystem, the Report contains a database of 140 statistical indicators that enables comparison at the pillar and individual indicator level within each of the 109 countries for which the relevant data are available. These Policy and Institutional Indicators (PIIs) yield a distinct profile of each country's relative institutional strength and utilization of policy space in each domain. They provide a diagnostic scan, like an X-ray, of the structural underpinnings of an economy's capacity to capture synergies between growth and social inclusion. These country data profiles are presented in four peer groups of countries based on level of economic development as measured by national income.

In addition to these policy indicators, the Report includes a set of 12 National Key Performance Indicators (KPIs) of inclusive growth and development from which a global index has been derived. This Inclusive Development Index (IDI) conveys a more integrated sense of the relative level of economic development of countries – and their recent performance – than conventional global rankings based on GDP per capita alone. Significantly, 51% of the 103 countries for which these data are available saw their IDI scores decline over the past five years, attesting to the legitimacy of public concern and the challenge facing policy-makers regarding the difficulty of translating economic growth into broad social progress. In 42% of countries, the IDI decreased even as GDP per capita increased. In over 75% of economies, wealth inequality was a chief culprit, rising 6.3% on average.

Full data profiles of policy and performance indicators for all G20 economies can be accessed here: http://www3.weforum.org/docs/WEF_IIDProfiles_Merged.pdf

This reimagining of structural economic reform is what is required for governments around the world to respond more effectively to inadequate growth and rising inequality – to take seriously the social frustrations increasingly being expressed through the ballot box and on the street. Such frustrations have an essential validity. The implicit income distribution system within many countries is in fact severely underperforming or relatively underdeveloped, but this is due to an unduly narrow conception of and lack of attention to structural economic policy rather than an iron law of capitalism and technological progress.

Policy Implications

Many countries have significant unexploited potential to simultaneously increase economic growth and social equity. But activating the virtuous circle of inclusive growth more fully will require them to change their approach to structural reform, reimagining it as an ongoing process of continuous improvement within a diverse ecosystem of demand- and supply-side policies and institutions, the combined effect of which is to diffuse opportunity, income, security and quality of life as part of the growth process.

In the Fourth Industrial Revolution, the construction and maintenance of this policy and institutional ecosystem deserves equal and parallel emphasis with the traditional focus of top economic policy-makers: macroeconomic, trade and financial supervision policies. This rebalancing of priorities in national economic policy implies a profound change for many countries and indeed for the “growth model” that has been posited for a generation by much of the economic policy establishment, including key international organizations.

For many countries, a reimagined process of structural reform aimed at broadening the base and benefits of growth may also be the best hope for accelerating its rate in the current context. For example, in advanced countries experiencing diminishing returns from extraordinary monetary policy measures, limited fiscal space and unfavourable demographic trends (e.g. to various degrees Japan, the United States and the European Union), a mixture of demand- and supply-side structural reforms could boost consumption and job creation in the short term while raising the economy’s longer-term growth potential through lasting improvements in labour productivity, household finances, real-economy investment and innovation. In middle-income countries experiencing weak exports and commodity prices, monetary policy constrained by the risk of currency depreciation and capital flight, and limited fiscal space (e.g. some of the BRICS), a structural reform agenda of this nature is precisely what could rebalance their growth model towards more robust domestic consumption. Similarly, for lower-income countries with extensive social marginalization due to poor resourcing of and inequitable access to basic services, education and infrastructure, as well as weak legal, tax and investment climate institutions, a reform strategy with a sharper focus on these basic building blocks could help boost growth and social equity simultaneously.

Accordingly, **first, G20 economies should undertake a coordinated effort to boost global growth and social inclusion by identifying and implementing the demand- and supply-side structural reforms that are most needed to activate more fully the virtuous circle of inclusive growth in their economies.** Governments should examine whether, based on peer comparison, they have unutilized policy space in one or more of the framework’s 15 sub-domains and then draw upon the structural policy analyses of other international economic organizations, particularly the OECD, which has a wealth of analysis and prescriptions in these domains, as well as the World Bank, International Labour Organization and others, to develop an action agenda tailored to their circumstances. The World Economic Forum and these organizations could provide further support by facilitating public-private, interdisciplinary input into and support for the agendas that emerge. Such a global effort in 2017-2018 to lift global growth by broadening its base and strengthening its long-term foundations – making it less dependent on short-term macroeconomic measures and export demand – is precisely what the world economy needs to combat the cyclical and secular pressures weighing on both growth and inequality. The G20 Enhanced Structural Reform Agenda, launched during China’s presidency, could be adapted to serve as the basis for such a coordinated international initiative (see the G20 Enhanced Structural Reform Agenda²² and the G20-OECD paper on Structural Reform Priorities²³).

Second, G20 governments should encourage international organizations to embrace this reformulation and reprioritization of structural economic policy in their public signalling, country advice and development cooperation programmes.

By virtue of their public profile and intimate relationship with the economic ministries of governments, the major international economic organizations have a vital role to play in the establishment and scaled application of this new and more inclusive growth model.

Third, G20 governments should complement these efforts by:

- **Funding a major increase in institution-building assistance for developing countries in policy domains critical to the construction of a more socially inclusive growth and development model** (e.g. social protection, labour markets, anti-corruption, investment climate, education, etc.).
- **Reforming multilateral development banks (MDBs) and bilateral development finance institutions (DFIs) to support the scaling of blended, public-private financing of sustainable infrastructure to promote worldwide implementation of the Paris Agreement of the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change and progress towards the Sustainable Development Goals.** The infrastructure intensity of these agendas (and the employment intensity of infrastructure investment) implies that they could provide much of the impetus for global growth over the coming 10-15 years, especially if combined with a broader structural shift of economies towards inclusive growth as outlined above. Most MDB and DFI leaders recognize the need for a strategic shift in their role from direct lending (usually to sovereigns) to catalysing much larger multiples of domestic and international private investment through greatly expanded emphasis on co-investment, risk mitigation, aggregation and project development technical assistance. However, their boards and staff are not yet fully supportive of or equipped for this shift. Shareholder governments and the business community must mobilize to seize this opportunity by engaging in collective work to surmount these impediments.²⁴

- **Resetting the priorities of trade and investment cooperation** to scale trade-related small-business activity and employment; reduce barriers to trade in services (which are often labour-intensive) and investments in industrial value chains (in which relatively few developing countries participate extensively); catalyse a levelling up of social and environmental practices within such value chains so as to maximize their payoff for sustainable development in developing countries while minimizing the fear in developed countries of a global race to the bottom in social protections; and modernize and rationalize international investment and regional trade agreements in order to strengthen their collective contribution to sustainable development, simplify the conduct of business across multiple jurisdictions, and reduce discrimination, particularly against small countries that are not part of major regional agreements. (See the Synthesis Report of the E15 Initiative for detailed proposals in these and other respects.²⁵)

Modernizing and Investing in Human Capital and Labour Market Policies

In sum, a *systematic* effort to reinforce the areas of structural policy and institutional strength that are important for both social inclusion and growth deserves to be a top policy priority of G20 and other governments. This is a practical strategy for placing people, i.e. progress in median living standards, at the heart of national and international economic policy, which is an absolute imperative for countries seeking to prepare their workforces for the disruptive challenges and opportunities likely to be presented by the Fourth Industrial Revolution.

In both public policy debates and popular discussion, concern is rising that job destruction is likely to outpace job creation in the coming years, and that rapid restructuring in labour markets will impact vulnerable populations at an untenable rate in a globalized, connected world.

In fact, evidence suggests that the rate of job creation in new industries is significantly slower than in previous decades, thanks in part to the highly-productive nature of new, digitally-driven industries. Data from the Oxford Martin School indicate that, in the 1980s, approximately 9% of new jobs created in the United States were concentrated in new industries. The equivalent figure for the 1990s was only 4.5%, while in the first decade of the new millennium it was 0.5%.²⁶

However, constructing forward-looking labour market policies for the Fourth Industrial Revolution will require thinking beyond simple calculations of the number of jobs created or destroyed. In a context of human-centred economic progress, it will be important to conceive of labour markets as consisting of more than “jobs” and “workers.” Three aspects need to be distinguished:

- The “job” as consisting not merely of a “bundle of processes” designed to create value in a particular way, but also as a “role” that is socially constructed and comes with a variety of expectations, rights and responsibilities separate from strict legal stipulations
- That set of “skills” required to effectively and efficiently perform within a role, which includes a broad range of “generic” technical and non-cognitive skills, as well as job-, organization- and industry-specific learning
- The “worker” as a person who has a specific identity and inalienable rights, and for whom economic efficiency is less important than undertaking meaningful, safe and sustainable activities that provide value to a community, and thereby convey social status and economic security

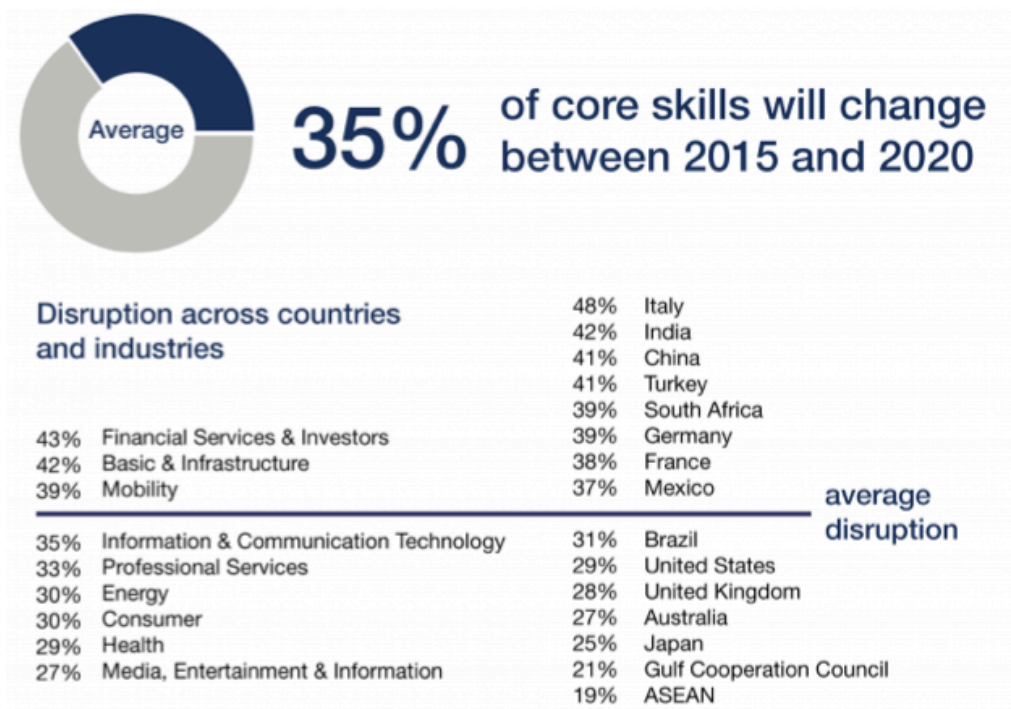
While much of the existing analysis of the impact of technology focuses on “jobs”, it is important for labour policy to focus on broader conceptualizations of both “skills” and “workers”.

In previous Industrial Revolutions, investment in increasingly sophisticated equipment tended to reduce the demand for manual, routine work. The first jobs to be replaced were those that were “dangerous, dull or dirty”. However, recent advancements in artificially intelligent systems mean that the core skills at the heart of a wider set of positions, including service economy and so-called “white collar” jobs, will be automated.

Many of these will be dull or routine knowledge work – as with the recent move by legal and professional service firms to automate document management processes. However, aspects of other roles are also under threat. Research by the Oxford Martin School indicates that 47% of all US employment is at a high risk of automation in coming decades.²⁷ Meanwhile, artificially intelligent systems are already displacing call centre jobs in many parts of the world, replacing them with chat-based systems that allow a single operator to manage multiple requests simultaneously.

It is the skills within these jobs, rather than the jobs or roles themselves, that are changing. World Economic Forum research reveals that 35% of core skills will change across industries and countries by 2020, with the greatest disruption occurring in the Financial Services and Investors, Basic and Infrastructure, and Mobility industries (Figure 2).

Figure 2: Skills Stability, 2015-2020, Industries Overall



Source: World Economic Forum, Future of Jobs Survey, *The Future of Jobs*

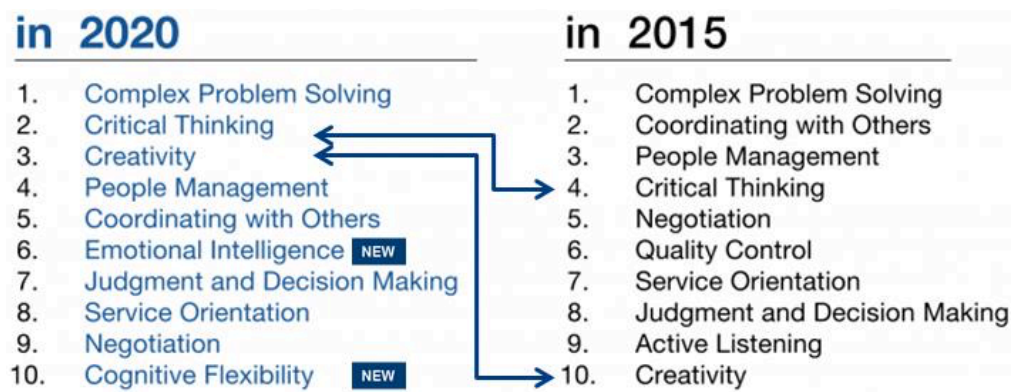
The scale and rate of expanded demand for certain skills is, in part, a function of demand creation which flows from productivity-enhancing capital investments. The introduction of automatic teller machines (ATM), while dramatically reducing demand for skills associated with routine cash withdrawals, resulted in the total expansion of demand for bank staff. This was because the nature of ATM technology enabled the lower-cost expansion of branch banking with value-added services that required staff in advisory roles linked to lending and financial management.

The Forum’s *Future of Jobs* report²⁸ indicates increasing demand for critical thinking, creativity, emotional intelligence and cognitive flexibility in 2020 when compared to 2015 (Figure 3). As a result of the

increasing technological intensity of industry, STEM skills – those related to Science, Technology, Engineering and Mathematics – are rising in demand. While total employment in Europe from 2000-2011 grew by 8%, STEM employment increased by 34% over the same period.²⁹

However, drawing on the narrative of the Fourth Industrial Revolution outline above, a human-centred view conceives of the most valuable skills not being “vocational”, but rather contextual, critical and synthetic – precisely because these are what make us human. Citizens are people who are valued beyond their capacity to contribute to productivity.

Figure 3: Top 10 Skills in 2015 and 2020

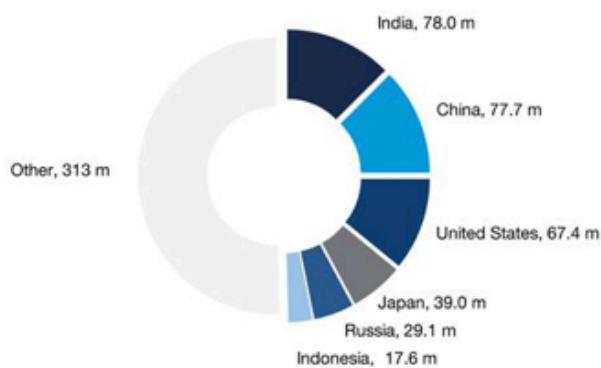


Source: World Economic Forum, *The Future of Jobs*

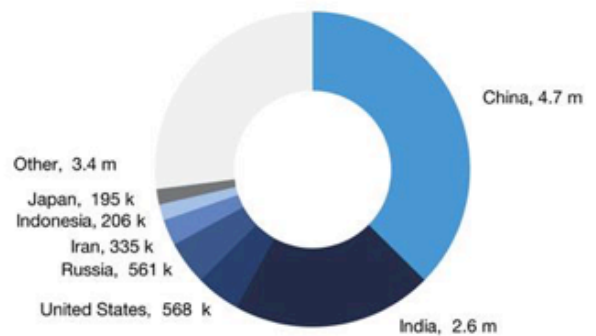
STEM graduates are not evenly distributed geographically – many advanced economies are struggling to produce enough high-quality STEM graduates to meet demand from both the public and private sectors (Figure 4). Currently, China and India together account for almost 60% of recent graduates in STEM disciplines.

Figure 4: Global Distribution of Tertiary Degree Holders and Recent STEM Graduates

Where are the world's university graduates?



Where are the world's recent STEM* graduates?



* Science, Technology, Engineering and Mathematics

Source: World Economic Forum and UNESCO, *The Human Capital Report 2016*

The debate about how countries can respond to the further job losses and concentration of wealth that may otherwise accompany the proliferation of robots, artificial intelligence and other technologies has quickly gravitated to the idea of a universal basic income. Some version of a universal basic income may form part of an appropriate policy response. But as the foregoing analysis suggests, a systemic rather than silver-bullet approach is likely to be most effective. A universal basic income policy is unlikely to be effective or feasible by itself, whether due to the fiscal burden it may create or the aspects of social inclusion it may not fully address, such as the sense of dignity and fulfilment that comes from being *part of* the growth process by having a good job or the opportunity to start a business.

Five dimensions of workforce development and security merit particular attention in industrial countries seeking to keep pace with the labour market challenges accompanying the Fourth Industrial Revolution. Available data suggest that few countries, if any, are performing well across all five (see Annex 1).

- 1) **Active labour-market policies:** As the pace of change accelerates in the economy, the enabling environment for worker adjustment and training becomes more vital. Data indicate that some countries, such as Denmark, Sweden and Finland, have kept pace thus far. Others, notably the United States, Israel and Japan, are lagging substantially behind. For example, the United States invests only 0.11% of GDP in active labour-market policies (training and job search assistance) compared with an OECD average of 0.6% and levels of 1% or more among top performers. A gap such as this predisposes countries to skills mismatches, long-term under- and unemployment, eroding labour force participation rates and persistent geographical pockets of social exclusion – that is to say, lower economic growth and social inclusion.
- 2) **Equity of access to quality basic education:** Inequitable educational opportunity is another source of avoidable under- and unemployment, and suppressed human and economic potential. Indicator data reveal large variations in country performance, suggesting that some countries can learn a considerable amount from the practices of others. Across several measures of the impact of socio-economic status on educational performance, Luxembourg, France, Belgium, the Czech Republic, Israel, the Slovak Republic, Sweden, Austria and Greece exhibit the greatest weakness, with Japan, Estonia, Finland and Canada leading the way. Laggards in this area risk locking in higher levels of inequality and social exclusion across generations.

3) Gender parity: It is generally recognized that redressing major disparities in the participation of women in the workforce can be one of the most effective ways to raise rates of economic growth and progress in broad living standards. East Asian economies have particular room for improvement in this area, with Japan and Korea having among the widest gender gap in labour participation within the OECD (i.e. female rates of less than 80% of men). However, other countries, such as Italy, Greece, Singapore, Ireland and the Czech Republic, would also benefit from greater initiative in this area. Gender gaps in income are even more pronounced – with female workers earning an estimated 60% or less of the level earned by men in the United Kingdom, Korea, Netherlands, Japan, Italy, Austria, Greece, Ireland, Israel and the Slovak Republic. Rates in top-performing countries, by contrast, are 80% or more.

4) Non-standard work benefits and protections: Almost half of the jobs created between 1995 and 2007 in OECD countries were temporary, part-time or involved self-employment.³⁰ As sharing, on-demand and care-economy jobs expand along with the digital economy, and employers seek to remain as flexible as possible in the global market, this part of the labour sector is likely to grow further. Because self-employed, temporary and/or part-time workers tend to experience weaker statutory benefits and protections in many countries, there is a risk that inequality will expand as a result of the changing nature of work. Most such rules were crafted in an earlier era, and updating them should be a priority in the Fourth Industrial Revolution. Figure 5 illustrates the gaps and variability in rules across OECD countries.

Figure 5: Statutory Benefit Differences between Non-standard and Standard Work, by Benefit, 2010^{1,2}

	Part-time ³					Temporary worker					Self-employed				
	ODS	SM	WI	UB	FB	ODS	SM	WI	UB	FB	ODS	SM	WI	UB	FB
Australia															
Austria															
Belgium															
Canada															
Chile															
Czech Republic															
Denmark															
Estonia															
Finland															
France															
Germany															
Greece															
Hungary															
Iceland															
Ireland															
Israel															
Italy															
Japan															
Korea															
Luxembourg															
Mexico															
Netherlands															
New Zealand															
Norway															
Poland															
Portugal															
Slovak Republic															
Slovenia															
Spain															
Sweden															
Switzerland															
Turkey															
United Kingdom															
United States															

1. FB: Family allowances; ODS: Old age, disability and survivors, SM: Sickness and Maternity, UB: Unemployment, WI: Work injury.

2. Colour code: “dark grey”: no benefit, “light grey”: optional enrolment, “blue”: different rules from standard workers, “white”: same rules as the general scheme.

3. Part-time workers are excluded if working less than nine hours a week.

4. In Japan, part-time workers are entitled to unemployment benefit if working more than 20 hours per week.

5. There is no unemployment benefit in Mexico. Labour law requires employers to pay dismissed employees a lump sum.

Source: Social Security Administration (2010), *Social Security Programs Throughout the World: Asia and the Pacific*, Government Printing Office; Social Security Administration. (2010), *Social Security Programs Throughout the World: Europe*, Government Printing Office; Social Security Administration (2011), *Social Security Programs Throughout the World: The Americas*, Government Printing Office.

5) **School-to-work transition:** Many advanced economies have made great progress in raising the proportion of student population that goes on to attain a tertiary education degree. Others still have a considerable way to go in making university education broadly accessible, with Canada, Switzerland, the United Kingdom and the Slovak Republic having enrolment rates below 60%, compared with 80% or above in the top-12 OECD countries. At the same time, some advanced countries appear to be significantly underinvesting in technical, software and skilled trades. In six countries – Canada, Singapore, the Republic of Korea, Japan, Ireland and reportedly the United States (for which official data are incomplete) – fewer than one-third of secondary students enrol in vocational programmes.

A universal basic income is no substitute for these five crucial institutional underpinnings of a well-functioning labour market. It may serve as a useful complement at some point, but countries seeking to prepare their workforces for the Fourth Industrial Revolution would do well to invest in the strength of this ecosystem as a whole. **To this end, G20 countries should set a discrete national funding target and public-private implementation strategy³¹ for increasing investment in their people across these five areas, or at least those in which they have particular room for improvement.**

Conclusion

This paper has outlined a new narrative vision and practical policy agenda to advance a human-centred model of economic growth in the Fourth Industrial Revolution. Aimed at ensuring that the technological progress of the 21st century augments rather than substitutes for human potential and employment around the world, it has offered a concrete, three-part policy agenda to reorient economies towards this objective by designing social inclusion consciously into their innovation ecosystems and economic policies. This narrative and policy agenda could form the basis for a concerted effort by G20 leaders to diffuse as widely as possible among their populations and the international community at large the overall gains in opportunity and prosperity enabled by technology and international economic integration.

Such a strategy to place people and their living standards at the centre of economic policy represents an agenda to engage and shape the future rather than resist or hide from it. The concepts and suggestions in the paper are intended to help leaders chart a course beyond the efficiency-enhancing and demand-management strategies of recent years towards an opportunity- and living standards-enhancing agenda that is likely to be a more sufficient response to the intensified challenge to employment opportunity and social equity posed by the Fourth Industrial Revolution. They potentially lay the foundation for a new and more robust global growth model – one that is more inclusive, sustainable and resilient than the heavy reliance on macroeconomic stimulus and trade surpluses of recent years.

A new leadership agenda of this nature could help to instil greater optimism among citizens about the capacity of market economies to create positive synergy between humans and machines in the workplace. At the same time, it could reinforce confidence in the ability of the liberal international economic order to create a virtuous circle of mutually rising living standards among developed and developing countries within the world economy.

Annex 1

Five Dimensions of Human Capital and Labor Market Policy and Institutional Strength: Advanced Economies

By Alphabetical Order

Dimension	Active Labor Market Policies		Equity of access to quality basic education		Gender Parity		Non-standard work benefits and protections		School-to-work transition
Indicator	Active Labor Market Spending (% GDP)	Employment Rate, 25-54 years (%)	Resilient Students (% Disadvantaged)	Gap in PISA Math Score (Q4/Q1)	Labor Force Participation Rate (f/m)	Gender Gap in estimated earned income (f/m)	Temporary Employment (% Dependent Employment)	Involuntary part-timers (% Labor Force)	Vocational Program Enrolment (% Upper Secondary Students)
Australia	0.26	79.68	32.94	0.84	0.86	0.63	5.59	8.35	50.53
Austria	0.80	83.48	25.89	0.84	0.89	0.53	9.07	3.16	69.80
Belgium	0.74	79.08	27.21	0.81	0.87	0.65	9.02	2.20	59.69
Canada	0.22	81.37	38.71	0.88	0.91	0.66	13.37	4.61	7.80
Czech Republic	0.37	84.50	24.93	0.80	0.81	0.60	10.51	1.03	73.42
Denmark	1.91	82.53	27.51	0.87	0.93	0.67	8.63	3.60	42.16
Estonia	0.19	82.98	48.28	0.88	0.90	0.62	3.51	1.27	34.44
Finland	1.07	79.95	42.76	0.87	0.97	0.71	15.44	3.61	70.38
France	0.99	79.73	26.65	0.80	0.89	0.72	16.74	6.74	42.67
Germany	0.66	84.00	33.51	0.84	0.88	0.67	13.07	3.42	47.78
Greece	N/A	65.98	18.07	0.84	0.78	0.57	11.95	4.91	33.68
Iceland	N/A	89.85	17.01	0.88	0.95	0.72	12.84	3.24	34.38
Ireland	0.86	74.15	29.59	0.86	0.81	0.59	8.68	7.06	31.95
Israel	0.16	79.19	15.72	0.82	0.90	0.59	N/A	2.64	40.80
Italy	0.36	68.85	26.55	0.85	0.74	0.52	14.03	10.44	59.43
Japan	0.17	83.43	48.79	0.86	0.78	0.51	7.51	4.36	23.00
Korea, Rep.	0.45	76.11	40.36	0.84	0.73	0.45	22.28	N/A	17.71
Luxembourg	0.65	82.60	20.73	0.80	0.83	1.00	10.21	2.39	59.86
Netherlands	0.83	82.93	30.69	0.86	0.87	0.48	20.24	3.92	67.68
New Zealand	0.33	83.09	30.40	0.84	0.88	0.61	N/A	4.20	33.92
Norway	0.50	82.65	26.47	0.88	0.95	0.79	7.97	1.43	50.74
Portugal	0.57	80.20	38.07	0.82	0.91	0.71	21.97	4.21	45.99
Singapore	N/A	N/A	48.80	0.84	0.80	0.89	N/A	N/A	11.15
Slovak Republic	0.20	78.15	17.54	0.82	0.81	0.60	10.61	3.50	68.99
Slovenia	0.37	83.48	34.61	0.87	0.90	0.80	17.96	1.10	66.80
Spain	0.50	71.50	39.18	0.84	0.86	0.63	25.14	7.78	34.42
Sweden	1.34	85.95	24.65	0.84	0.95	0.78	17.17	6.48	43.72
Switzerland	0.57	87.58	29.07	0.84	0.89	0.71	13.58	2.67	65.69
United Kingdom	0.23	82.38	35.44	0.85	0.87	0.54	6.20	4.02	42.67
United States	0.11	77.93	31.62	0.83	0.86	0.65	N/A	1.44	N/A

- G20 economies appear in bold.
- The colour gradient shows the scores below the bottom twenty percentile as red and scores above the top twenty percentile as green. In the case of temporary employment and involuntary part time employment, this is reversed so that the countries which have the highest values (i.e. perform the worst) are in red and *vice versa*.
- Data for other G20 economies (non-advanced) is missing for most indicators.

By Average Ranking

Dimension	Active Labor Market Policies		Equity of access to quality basic education		Gender Parity		Non-standard work benefits and protections		School-to-work transition
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United States	0.11	77.93	31.62	0.83	0.86	0.65	N/A	1.44	N/A
Spain	0.50	71.50	39.18	0.84	0.86	0.63	25.14	7.78	34.42
Slovak Republic	0.20	78.15	17.54	0.82	0.81	0.60	10.61	3.50	68.99
Israel	0.16	79.19	15.72	0.82	0.90	0.59	N/A	2.64	40.80
Italy	0.36	68.85	26.55	0.85	0.74	0.52	14.03	10.44	59.43
Korea, Rep.	0.45	76.11	40.36	0.84	0.73	0.45	22.28	N/A	17.71
Greece	N/A	65.98	18.07	0.84	0.78	0.57	11.95	4.91	33.68

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