

Global Agenda

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# Annual Meeting of the New Champions 2017

## Achieving Inclusive Growth in the Fourth Industrial Revolution

Dalian, People's Republic of China 27-29 June

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**Book Preview: Shaping the Fourth Industrial Revolution**  
We would like to invite all participants of the Annual Meeting of the New Champions 2017 to review an early draft of the forthcoming book Shaping the Fourth Industrial Revolution. Read more about the book, download an embargoed, protected copy of the draft, and provide your feedback on TopLink here: <https://toplink.weforum.org/project/book-preview-shaping-fourth-industrial-revolution>

Preface



**W. Lee Howell**  
Head of Global Programming  
Member of the Managing Board



**David Aikman**  
Chief Representative Officer, China  
Member of the Executive Committee

Technology should empower people rather than replace them, and serve society rather than disrupt it. Yet, in many instances, leaders have been complacent about the human impact of technological advances and their subsequent economic integration. As we find ourselves in an era of disruptive change, the relevance of convening business leaders, experts and policy-makers for a global summit on innovation, entrepreneurship, science and technology – the Annual Meeting of the New Champions – has never been greater.

A truly human-centred model of economic growth should be guided by shared moral and ethical considerations. If not, the Fourth Industrial Revolution puts us at risk of increasing social marginalization and economic inequality, and undermining the fundamental relationships that define us as human.

For this reason, more than 2,000 participants from over 80 countries came together in Dalian for three days to explore how we can achieve inclusive growth in the Fourth Industrial Revolution and create new opportunities for economic, social and personal development. The meeting programme, built around four sub-themes, asked participants to consider the following questions: How do we design and scale up human-centred products and services? How can leaders recognize adaptive challenges to their organizations and build resilience? How do they seize the new opportunities and create sustainable systems across such areas as energy, mobility, production, health, education, gender and work? And, how can communities, companies and countries prepare for the coming economic and geopolitical changes?

To tackle these and other questions, participants took part in collaborative sessions, debates, workshops and experiences that challenged them to think differently about dilemmas in science, technology and innovation and to create a shared vision of this unfolding future. They explored the issues through data visualization and high-resolution time-lapse satellite images, and through hands-on interaction with some of the cutting-edge research that is forcing us to consider evolving ethics as we face the future.

Between sessions, participants had the opportunity to see some of the newest technologies for themselves, including new organs that could resolve millennia-old health issues and drones that can carry humans, or to build their own robot and consider how to incorporate androids into daily life. In the various hubs, conversations ranged from discussions about the applicability of brain-machine interfaces, supercomputing and blockchain, to debates about countering terrorism in the digital age and addressing environmental challenges like pollution through emerging technologies.

The programme was designed to be a transformative learning experience. With over 200 sessions, it featured a wide range of interactive debates, thought-provoking installations and collaborative formats to expand thinking and help participants drive progress towards achieving inclusive growth in the Fourth Industrial Revolution.

The World Economic Forum is grateful to its members and constituents for their continued commitment and active participation in the Annual Meeting of the New Champions. We look forward to welcoming you to next year’s gathering in Tianjin.



# Co-Chairs

The following Co-Chairs of the Annual Meeting of the New Champions 2017 took on a formative role in shaping the discussion as leaders in innovation, science and technology.



**Jean Liu**  
President, Xiaoju Science and Technology  
Hong Kong SAR; Young Global Leader



**Alex Molinaroli**  
Chairman and Chief Executive Officer,  
Johnson Controls, USA



**Shu Yinbiao**  
Chairman, State Grid Corporation of China,  
People's Republic of China



**Vishal Sikka**  
Chief Executive Officer, Infosys, USA



**Maria-Elena Torres-Padilla**  
Director, Institute of Epigenetics and Stem  
Cells, Helmholtz Zentrum München, Germany;  
Young Scientist



**Xu Jinghong**  
Chairman, Tsinghua Holdings, People's  
Republic of China

# Meeting at a Glance

**800**  
Business  
Leaders

**200+**  
Sessions

**400**  
Women  
Leaders

**200+**  
Young Global Leaders,  
Social Entrepreneurs  
and Global Shapers

**2,000+**  
Participants  
from over  
**80**  
Countries

**50+**  
Young  
Scientists

**150+**  
Academic Leaders

**300**  
Reporting  
Press

**830**  
Participants from  
outside Greater China

**35+**  
Technology  
Pioneers

**240+**  
Forum Members



# Meeting Outcomes

China's Premier Li Keqiang and Minister of Science and Technology Wan Gang underscored the country's commitment to tackling climate change and developing clean technology. Premier Li also stressed the importance of implementing inclusive growth strategies to limit negative impacts of the Fourth Industrial Revolution, and noted that free trade and international cooperation are key to achieving these goals.

Participants in a joint event held with China's Ministry of Environmental Protection developed a public-private strategy to deploy the Fourth Industrial Revolution, sharing economy and circular economy to assist China's effort to build sustainable cities and tackle climate change.

A partnership signed between Dutch artist Daan Roosegaarde, Chinese bike-sharing firm OFO and design-firm Tezign will see thousands of air-filtering Smog Free Bicycles deployed on the streets of major cities in China. Roosegaarde is the creator of the Smog Free Tower, which pulls pollution out of the air and turns it into diamonds, and was first profiled at the Annual Meeting of the New Champions 2016.

New techniques that allow drinking water to be harvested from air, "artificial leaves" that convert CO2 into fuel, and other technologies covering medicine, artificial intelligence, quantum computing and farming feature in the Forum's annual list of top emerging technologies, published in collaboration with Scientific American. Realized at the

Annual Meeting of New Champions, the list highlights breakthrough technologies with the potential for significant societal and economic impact over the next three to five years.

The Forum released *Realizing the Potential of Blockchain*, a white paper that outlines the role blockchain could play in heralding a new era of the internet. The paper argues that for blockchain to realize its transformative potential, a more structured process of multistakeholder cooperation and stewardship is necessary, similar to the cooperation around the early stages of internet adoption.

Global GDP will be 14% higher in 2030 as a result of artificial intelligence – the equivalent of an additional \$15.7 trillion, according to a new report, *Sizing the Prize*, launched by PwC at the meeting.

The World Economic Forum and the Chinese business community announced that a new China Business Roundtable in November will explore China's vision to promote artificial intelligence, advanced manufacturing, the internet of things and innovation in the region.

The Healthy City Partnership was launched in partnership with the Union for International Cancer Control and others. The initiative aims to help cities in low- and middle-income countries strengthen healthcare infrastructure in response to the increasing burden of non-communicable diseases such as cancer, stroke and diabetes.

With demand for electric vehicles and plug-in hybrids set to double by 2020, the World Economic Forum's Global Battery Alliance advanced

plans to secure sustainability across the battery supply chain, including eliminating child labour and developing strategies to avoid massive dumping of used batteries through secondary markets for the high-quality minerals and materials of which they are composed.

To restore trust in science during a time of populist scepticism in some countries, the World Economic Forum Young Scientists Community produced a draft Universal Code of Ethics for Researchers, which outlines the core principles for researchers, including engaging with the public, pursuing the truth, maximizing benefit and minimizing harm, engaging with decision-makers, supporting diversity, being mentors and being accountable.

Chinese consumption is growing by 10% a year, faster than any other country on the planet. By 2021, China will add \$1.8 trillion in new consumption – roughly the size of Germany's consumer economy today, according to a new report launched by BCG and AliResearch at the meeting.

The World Economic Forum announced that it will convene its first Sustainable Development Impact Summit in New York on 18-19 September 2017. The summit is dedicated to accelerating progress towards the Sustainable Development Goals and the Paris climate agreement through public-private cooperation and the application of technologies of the Fourth Industrial Revolution.

For session highlights, videos and meeting-related documents, plus Forum insights, visit [TopLink](https://toplink.weforum.org/) <https://toplink.weforum.org/>



# Scaling Up Human-Centred Technology

## Preserving Humanity in the Age of AI

### From terrorism and cyberattacks to refugee crises and climate change, the world is in desperate need of international cooperation now more than ever before.

From the opening salvos of the First Opium War in 1839 and for the next 80 years, many of China's best minds wrestled with a great question: How to preserve the traditional Chinese "essence", or *ti*, by harnessing the advanced technologies of the West – its *yong* or "utility". The "Self-Strengthening Movement" best represented this effort. Committed Confucian scholars sought to save the nation with arsenals, shipyards, steam engines and modernized armed forces. They did not, ultimately, succeed.

In the 21st century, humankind faces an analogous challenge. Myriad technologies, as perilous to the life we know as they are promising, have materialized in our midst as if from some alien future – as disorienting and threatening in the early 21st century as the steamships that began prowling China's coast and estuaries in the mid-19th. How can we enlist these technologies in the service of humanity, and ensure that they won't – as many justifiably fear – degrade, or rob us of, that humanity? In the Chinese case, by this time 100 years ago, the preponderance of the intelligentsia had rounded

on Confucianism humanism and declared it incompatible with modernity. But the *ti* we defend today, the essence of our shared humanity, is not something any of us are ready to surrender.

At the dawn of an age that we already recognize will be defined and shaped by transformative technology, we look out on a landscape littered with double-edged swords. In every revolutionary technology whose rapid development unfolds before us, we see the potential for both weal and woe, for miracle and misery.

Artificial intelligence and advanced robotics may help us make more rational decisions, free us from the dull, dirty and dangerous jobs, and solve problems that have vexed the best human minds from time immemorial. But leaving aside far-fetched sci-fi scenarios of sentient super-intelligent robots with sinister designs, the near-term threats are ample and serious enough.

The massive computational power and oceanic volumes of data needed to power deep learning systems are not available to all

nations, or to all companies, let alone to all people. Artificial intelligence will almost inevitably exacerbate existing inequalities, and create an "AI divide" between AI haves and have-nots.

Deep learning systems already outperform humans in pattern recognition, and this lead will only widen. Radiology jobs will be decimated by machines better at identifying tumours and other anomalies. Actuaries, paralegals, travel agents and many others will be similarly affected – not to mention the half-billion people who make a living driving a vehicle whose livelihoods may be upended as AI-powered autonomous vehicles come online.

It's understandably difficult for many to see a way to make this technology human-centred, when it threatens to strip so many of us of the dignity that has traditionally come from work. A universal basic income, championed by many proponents of AI as necessary as jobs disappear, might forestall hunger. But, in a world that has equated work with self-worth for so long, would it preserve dignity?



**"China has shown its capability to become a leader in the Fourth Industrial Revolution. The key to success in this new economy is innovation and mass entrepreneurship."**

**Klaus Schwab**  
Founder and Executive Chairman  
World Economic Forum

Reskilling our workforces and reinventing our educational institutions might be necessities on which we can all agree, but we can also agree what a daunting task this will be – especially when it's impossible to identify what skills to teach, and how the young can be educated optimally for this new world. Surely, we can't all be coders and data scientists. What will the rest of us do?

The world may be rich with great literature and art, or with frivolous time-sucks and shallow distractions. It may teem with

creative geniuses, or with the listless, depressed and alienated. Likely, it will be all of the above.

Encouragingly, early cavalier attitudes about the development of AI and advanced robotics have softened as the likely impact comes into clearer focus. We've begun to grapple with some of the moral issues, and technologists have begun to frame their moral obligations – to ensure not only that AI does no harm to humans, but that it also serves humanity as a whole, and not just an elite demographic.

AI will inevitably pose insoluble ethical conundrums, but these pale when compared to the dilemmas that CRISPR and other gene-editing technologies will present. The promise of precise, affordable and inheritable changes to DNA, coupled with rapid advances in bionic technology and biocomputing, means it will soon be possible to transcend our very species and become, as Yuval Noah Harari puts it in his book of the same title, *Homo deus*. To an AI divide, let us add the threat of a genetic divide – with the haves extending the advantage





of wealth by culling their genetic “weaknesses” and building in cybernetic physical and cognitive enhancements – all the while living much longer than biotech have-nots.

Whether history records the political upheavals of 2016 as a harbinger of an even greater populist uprising that derailed or meaningfully slowed the march of globalization, or will look back on Brexit and Trump as temporary setbacks to the project, what is clear from the vantage point of 2017 is that leaders in both the public and private sectors have been chastened.

As we deploy the technologies that together comprise the Fourth Industrial Revolution, we know that a fundamental rethink is needed of the way we organize education, work, and even our ethics and governance. In that regard, we enjoy an important advantage this time, although the changes we must make are no less daunting for it. For better or for worse, we’re alive to the catastrophic consequences that will befall us should we fail to approach our future with humanity’s diverse interests clearly in mind.

“How do we make sure that everyone not only understands, but also gets a share of the benefits of scientific research?”



**Maria-Elena Torres-Padilla**  
Director, Institute of Epigenetics and Stem Cells, Helmholtz Zentrum München, Germany

## The Trouble with Transparency

Go in for a job interview with any large employer and there’s a good chance you’ll be asked to take a personality test. You answer questions about ideal holidays, how you might react in different situations – the usual range of questions. But how is the prospective employer – or the HR algorithm they’re using – actually scoring the test? Are certain answers disqualifying you from employment? And, is it fair that they should be? Are your answers then being shared with other prospective employers? The trouble is, you probably won’t ever know.

Our lives are governed increasingly by algorithms that we can’t see. Some are of relatively low consequence, like what ads are shown to us or what movies or TV shows are recommended on the video platforms we frequent, but some are truly life-altering: college admissions, home loans, and sometimes even prison sentences. Most of the time the processes at work are completely opaque, and assessing privileges and prejudices that may have made their way from coder to algorithm, or knowing what datasets were processed by deep-learning systems to arrive at a given decision, is nearly impossible.

Transparency – obliging those using algorithmic decision-making systems to explain to those impacted by such systems what goes into the decisions – seems a good idea. Unfortunately, it isn’t so easy. Algorithms are valuable intellectual property, and revealing the basic weighting of variables in an algorithm risks not only surrendering important competitive advantages, but also increases the likelihood that some will game the system.

Search engines, for instance, must keep their ranking algorithms as closely-guarded secrets and constantly defend against “black-hat SEO” – search engine optimization spammers. Blockchain may offer a way to disintermediate online merchants and make direct transactions secure, but it risks killing profits by making suppliers’ costs visible to buyers. And even where algorithmic transparency is possible, it’s often of little use to ordinary people not trained in the arcane arts of code.

Next May, the EU is set to implement its General Data Protection Regulation, mandating a “right to explanation” – a right, on the part of anyone affected by an algorithmic decision to an explanation of how and why that decision was made. While it’s criticized as ambiguously worded and toothless, it nevertheless represents the first attempt to introduce regulation at any scale, and holds out the only hope at present for ordinary people to gain a better grasp of the mysterious, mathematical forces controlling a fast-growing portion of their lives.



**01:** Jason Li Yat-Sen, Director, The George Institute for Global Health, People’s Republic of China; Pascale Fung, Professor, Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology, Hong Kong SAR; Lindiwe Mazibuko, Leader of the Opposition, Parliament of South Africa (2011-2014); Sanjeev Chatrath, Managing Director; Region Head, Asia, Financial and Risk, Thomson Reuters, Hong Kong SAR; Joshua Hoffman,

Chief Executive Officer, Zymergen, USA  
**02:** André Borschberg, Co-Founder, Chief Executive Officer and Pilot, SolarImpulse, Switzerland  
**03:** Stefan Löfven, Prime Minister of Sweden  
**04:** Wan Gang, Minister of Science and Technology of the People’s Republic of China  
**05:** Ann Sim, Senior Minister of State, Ministry of Culture, Community and Youth and Ministry of Trade and Industry of Singapore

**06:** Rachel Catanach, President and Senior Partner, Greater China, Fleishman-Hillard, Hong Kong SAR  
**07:** Sebastian Huber, Assistant Professor, ETH Zurich, Switzerland  
**08:** Susan Goldberg, Editorial Director, National Geographic Partners, USA







**01:** Juan Carlos Castilla-Rubio, Chairman, Space Time Ventures, Brazil  
**02:** Zhang Chi, Managing Director, China Culture Industrial Investment Fund Management Co., People's Republic of China

**03:** Wang Shuo, Managing Editor, Caixin Media, People's Republic of China; Danny Alexander, Vice-President and Corporate Secretary, Asian Infrastructure Investment Bank, Beijing; Zhang Tao, Deputy Managing Director, International Monetary Fund (IMF), Washington DC; Ann Sim, Senior Minister of State, Ministry of Culture, Community and Youth and Ministry of Trade and Industry of Singapore; Harid Peters, Senior Adviser, Asia-Pacific

Region, UPS, People's Republic of China; Ahsan Iqbal, Minister of Planning and Development of Pakistan  
**04:** Augmented Reality Space  
**05:** Penny Low, Founder, Social Innovation Park, Singapore; Alex Molinaroli, Chairman and Chief Executive Officer, Johnson Controls, USA  
**06:** Design by Doing: Build Your First Robot  
**07:** Laura Jamer Patel, Director, Global Partnerships, DIRT, USA



**01:** Geoff Cutmore, Anchor, CNBC, United Kingdom; Jin Xing, Choreographer and Founder, Jin Xing Dance Theatre Shanghai, People's Republic of China  
**02:** John Lin, Associate Professor, University of Hong Kong, Hong Kong SAR  
**03:** Lisa Jucca, Financial Columnist, Asia, Reuters Breakingviews, Hong Kong SAR; Tom Mitchell, E. Fredkin University Professor, Machine Learning Department, Carnegie Mellon University, USA; Lee Jae-Myung, Mayor of Seongnam City, Republic of Korea; Hao Jingfang, Writer, China Development Research Foundation, People's Republic of China  
**04:** Lu Lin, Vice-Mayor of Dalian, People's Republic of China  
**05:** Yoshiyuki Sankai, Chief Executive Officer and President, Cyberdyne, Japan; Zhang Yao, Founder and Chief Executive Officer, RoboTerra, USA  
**06:** Lee Jae-Myung, Mayor of Seongnam City, Republic of Korea  
**07:** Wong Poh-Kam, Director, NUS Entrepreneurship Centre, National University of Singapore, Singapore



# Leading Continuous Reinvention

## Speeding up Reinvention

**The Fourth Industrial Revolution will usher in more complex, interconnected innovations that will disrupt more businesses. The urgency to reinvent has risen as the next wave of inventions go mainstream. Governance issues will become more pressing and regulators will have to step up protection without constraining innovation.**



**“The core of the issue is whether we can stimulate vitality in the SOEs.”**

**Xu Jinghong**  
Chairman, Tsinghua Holdings,  
People's Republic of China

and, most importantly, service customer needs in a cheaper, faster manner. They demonstrate once again that the race is indeed to the swift and not necessarily the biggest, putting the incumbents on short notice that they have little choice but to reinvent themselves.

The urgency to do so is felt across swathes of industries; no less because the future can only get more complex as many emerging technologies of the Fourth Industrial Revolution – such as artificial intelligence, the internet of things, autonomous vehicles, blockchain, 3D printing and quantum computing – go mainstream.

As Mark MacGann, Group Chief Corporate and Public Affairs Officer, and Member of the Group Executive Committee at Veon, Netherlands, noted: “When you have invested billions of dollars in infrastructure, in spectrum, in operations and people, and Silicon Valley says okay, that’s lovely, but you’ll have to give it out for free, you’d better hurry up and reinvent yourself.”

Many established businesses have begun the process of re-examining, recalibrating and, in many cases, revamping their core capabilities to find new, significant and sustainable sources of revenue. The imperative to change mindset if not business models has never been more pressing. Emulating the success of the start-ups, companies are making efforts to better connect with their customers and deepening these relationships using data, analytics and software capabilities.

Bill Gates once said, “Banking is necessary; banks are not.” Two decades later, proving how prescient the Microsoft founder was, China’s fintech companies are shaking up the country’s state-owned banks with their

established business models, and turning a whole industry on its head.

China is far and away the world’s biggest market for mobile payments with an estimated \$8.6 trillion of transactions, up fourfold in a year. Online players like AliPay and TenPay have signed up hundreds of millions of users in the last three years, capturing the lion’s share of consumer finance and leaving the country’s largest banks scrambling to catch up.

Catching up may not be easy. Ant Financial, despite its name, is already a giant in wealth management. The Alibaba Group affiliate offers everything from online payments to asset management, insurance, lending and credit assessment, and is reportedly bigger than UBS with a market value of \$60 billion.

These Chinese “unicorns” have joined Uber and Airbnb as the poster children for disruption, exploiting exponential increases in computing power and data to lower costs, drive efficiencies







**“Start-ups fail a lot, but that’s okay. They’re young in our industry and they know what’s going on.”**

**Vishal Sikka**  
Chief Executive Officer, Infosys, USA

Internally, big businesses are also revamping organizational structures, leadership training, and talent acquisition and retention. Many are hiring younger people and empowering them to take risks. Young people, as André Kudelski, Chairman of the Board and Chief Executive Officer of Kudelski Group, and Chief Innovation Officer for Switzerland, pointed out, “don’t know the consequences of failure,” making them more willing to experiment.

One industry that is pulling up its bootstraps even as technology lures its customers away to e-commerce is bricks-and-mortar retail. It is fighting back with even more advanced technology. Augmented reality promises to liven up the shoppers’ experience by allowing them to browse catalogues, check forthcoming offers, try on clothing, etc. by tapping on holographic screens that fuse their physical world with the virtual. Big data is also enabling marketers to offer content marketing and personalized offerings based on previous consumption patterns. The demand for personalized interaction at all points of the customer experience and “always-on” customer service level will rise even as customized AR-based experiences help

brands to reach more people when shared on social media.

And it will not be long before other innovations, including flying cars and drones, go mainstream to dazzle the masses. The world’s first flying car is expected to hit the markets next year, while engineers and scientists are now packing more AI processing into drones to make them lighter and more intelligent.

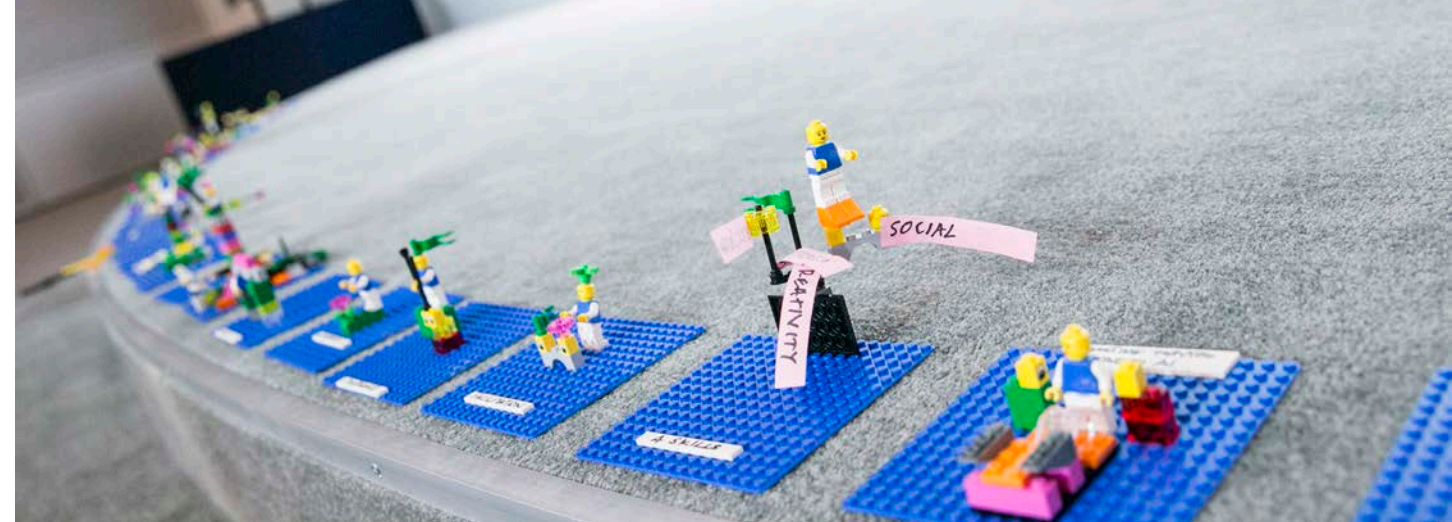
With technology marching inexorably forward and innovations becoming more complex, more interconnected and fast-paced, the call to understand and manage the risks has also grown louder. There is fear that, with so much interdependency built into the system, a series of small consequential failures could cascade into a major catastrophe. Regulators and risk managers find themselves ill-prepared, and this is even before we enter the era when a multiplicity of devices is connected to the internet of things on a daily basis.

To be sure, the issue of governance, including questions about the functioning of technology, and its current and potential applications, will have to be tackled in a coherent and

coordinated manner – both nationally and internationally – if public trust is not to be eroded as a result of a catastrophe.

Many of the potential hazards can be predicted. The 3D printer that can print a survival whistle can also churn out a gun, while the drone that drops supplies to disaster areas can easily be turned into a weapon of mass destruction in the hands of a terrorist. Data theft, unauthorized access to proprietary information, risks to business continuity, etc. are inevitable with the proliferation of cloud computing.

The WannaCry ransomware cyberattack earlier in the year and another similar one in June 2017 show how quickly a super virus can cripple computer networks around the world and shut down hospitals, ports, government systems and railroad operations, just to name a few of the services targeted. Indeed, regulators have their work cut out for them. They have to balance innovation with protection, not constrain the former, while ensuring that the social benefits of the Fourth Industrial Revolution are maximized without harm to consumers and the smooth workings of society and nature.



## Leadership Lessons for the Fourth Industrial Revolution

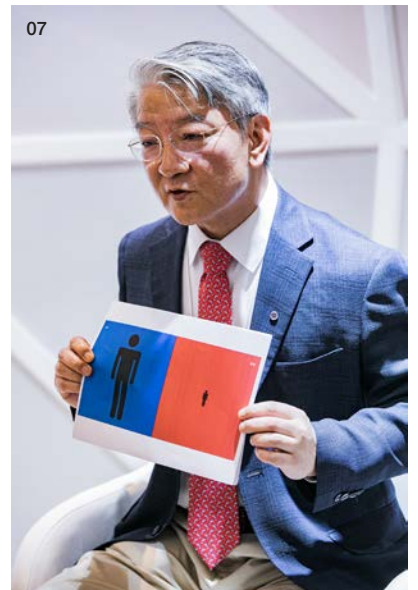
Discussions at the meeting highlighted the following considerations as we enter the era of the Fourth Industrial Revolution:

1. **We need empathy:** As robots, smart devices and artificial intelligence transform jobs, we must rethink ethics, explore the boundaries between human touch and technology, and define what makes us fundamentally human.
2. **We need life-long learners and makers:** How can a country such as the US have full employment and yet harbour profound socioeconomic discontent? Pelu Tran, Co-Founder and President of Augmendix, and a Forum Technology Pioneer, explores this dilemma in his blog and offers a solution: human dignity. He emphasizes that any approach to this issue needs to be linked to a real education and learning revolution to shape life-long learners and makers. Read his blog here: <https://www.weforum.org/agenda/2017/06/how-new-technologies-can-create-huge-numbers-of-meaningful-jobs/>
3. **We need creativity and critical thinking:** Design thinking and new learning programmes that nurture creativity and critical thinking on complex challenges offer opportunities to develop core skills for the workplace of the future. At the meeting, we tested how immersive experiences and learning through play can foster the skills needed to thrive and succeed in a challenging world through two sessions held in collaboration with LEGO Foundation: *Learn to Code* and *Building Skills for Life through Creativity*. Watch an interview with John Goodwin, Chief Executive Officer of LEGO Foundation: <https://vimeo.com/223445961>
4. **We need to future-proof social safety nets:** Could revenues from a robot tax be reallocated to assist displaced workers in the Fourth Industrial Revolution, and provide them with training and subsidies? Data analysis on the outcomes of universal basic income shows a clear drop in unemployment rates. Could this help address inequality in this new era? These ideas were floated in the session, *Social Safety Net 4.0*, with calls for further research, collaboration and sharing of results of basic income projects at scale. More about the session on TopLink: <https://toplink.weforum.org/session/annual-meeting-new-champions-2017/social-safety-net-40>





**01:** Wilfred Madius Tangau, Minister of Science, Technology and Innovation of Malaysia  
**02:** Juha Sipilä, Prime Minister of Finland  
**03:** Mehdi Ghadyanloo, Artist, Painter and Public Artist, Islamic Republic of Iran  
**04:** Dan Buettner, Founder, Blue Zones, USA  
**05:** Kathryn Shih, President, Asia-Pacific; Member of the Group Executive Board, UBS, Hong Kong SAR  
**06:** Lisa Jucca, Financial Columnist, Asia, Reuters Breakingviews, Hong Kong SAR; Zhu Ning, Professor, PBC School of Finance; Associate Dean, National Institute of Financial Research, Tsinghua University, People's Republic of China; Bernhard Kotanko, Managing Partner, Asia-Pacific, Oliver Wyman (MMC), Hong Kong SAR; Axel P. Lehmann, Group Chief Operating Officer and Member of the Group Executive Board, UBS Group, Switzerland; Anand S. Rao, Principal, US Advisory; Global Leader, Artificial Intelligence, PwC, USA  
**07:** Min Zhu, President, National Institute of Financial Research, People's Republic of China  
**08:** Huawei Air Hockey



**01:** J. Andrew Pospisilik, Group Leader, Max Planck Institute of Immunobiology and Epigenetics, Germany  
**02:** Rethinking Economics for a Thriving 21st Century  
**03:** Park Yuhyun, Founder and Chief Citizenship Officer, DQ Institute, Republic of Korea  
**04:** Stephen Ho, Chief Executive Officer, Greater China, Marriott International, Hong Kong SAR  
**05:** David Rowan, Editor-at-Large, Wired, United Kingdom; Zhang Yao, Founder and Chief Executive Officer, RoboTerra, USA; André Kudelski, Chairman of the Board and Chief Executive Officer, Kudelski Group, Switzerland; Mark MacGann, Group Chief Corporate and Public Affairs Officer; Member of the Group Executive Committee, Veon, Netherlands  
**06:** Drone prototype  
**07:** Lee Sang-Yup, Distinguished Professor and Dean, Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea



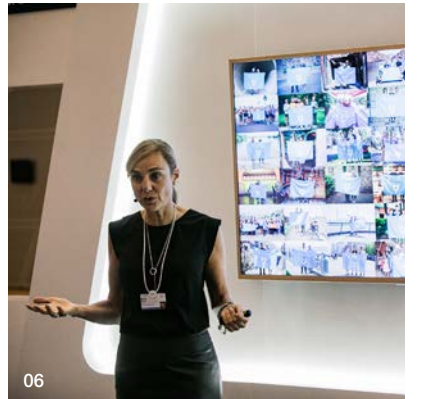
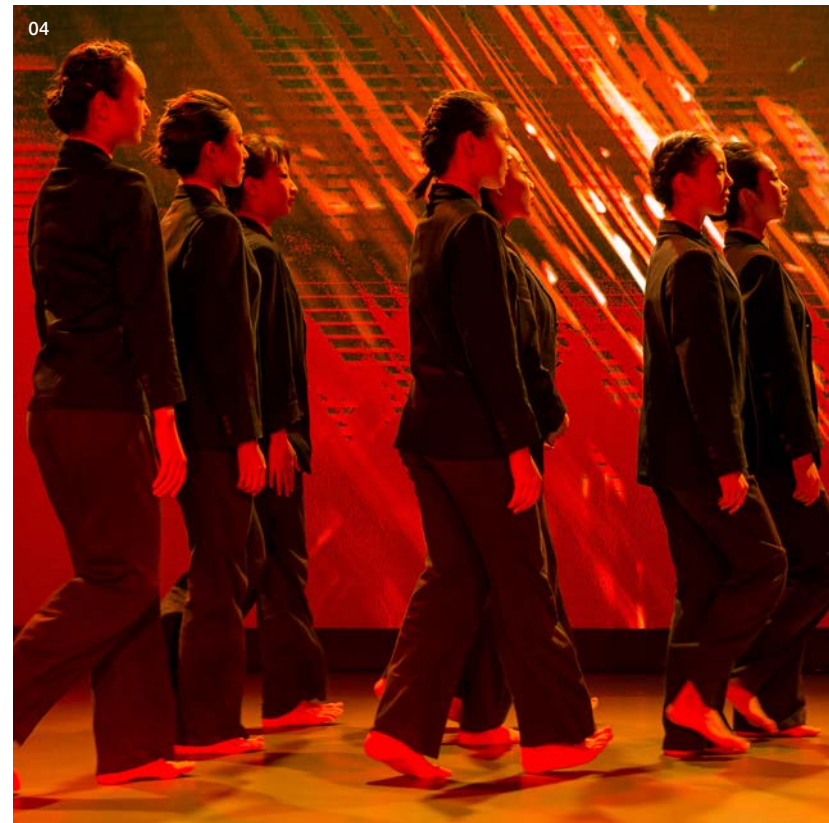


**01:** Olga Troyanskaya, Deputy Director for Genomics, Simons Foundation, USA  
**02:** Geoff Cutmore, Anchor, CNBC, United Kingdom; Hu Weiwei, Founder and President, Beijing Mobike Technology Co., People's Republic of China; Aileen Omar, Chief Executive Officer, AirAsia, Malaysia; Sergey Solonin, Chief Executive Officer, Qiwi, Russian Federation; B. G. Srinivas, Executive

Director and Group Managing Director, PCCW, Hong Kong SAR; Catherine Wood, Chief Executive Officer, ARK Investment Management, USA  
**03:** Fabrizio Pagani, Head, Office of the Minister of Economy and Finance of Italy  
**04:** Tomorrow's Clean Energy Giants  
**05:** Ahsan Iqbal, Minister of Planning and Development of Pakistan

**06:** Building Skills for Life through Creativity  
**07:** Wilfred Madius Tangau, Minister of Science, Technology and Innovation of Malaysia  
**08:** Empowering Rural Populations

**01:** Eugene Chung, Chief Executive Officer and Founder, Penrose Studios, USA  
**02:** Juliana Chan, Professor of Medicine and Therapeutics, Chinese University of Hong Kong, Hong Kong SAR  
**03:** Professor Klaus Schwab welcomes newcomers  
**04:** Jin Xing Dance Theatre  
**05:** Ilah Nourbakhsh, Professor, Robotics Institute, Carnegie Mellon University, USA  
**06:** Mina Guli, Chief Executive Officer, Thirst, People's Republic of China





Creating Sustainable Systems

# Disruption, Adaption and Innovation: Embedding Systemic Sustainability

**The reality is that we can't go on like this in perpetuity – the economic and environmental gyre simply will not hold. Indeed, we are already nearing irreversible systemic stresses as our oceans fill up with plastic, as the frequency of climate-related shocks continues to rise – as deep economic divisions hurtle us towards a looming inequality crisis.**

We are at the threshold of a new, transformative technological frontier, one where flying cars, pilotless planes and astounding biotech innovations – such as utilizing the defibrillating organs of electric eels to stabilize human hearts – no longer exist purely in the realm of science fiction or inspired imagination.

The Fourth Industrial Revolution is before us and, as we

contemplate a future that is at once both deeply exciting and somewhat unnerving, the biggest challenges of our time will be how well we can embed sustainability into economic and environmental systems; and in how effectively leaders, citizens and societies can adapt and think anew to generate innovative solutions to humanity's most pressing challenges.

As the events of the past year have shown, the fault lines of modern life appear to be deepening by the day. "Globalization and national economies just haven't played out in the way they should have," observed Tharman Shanmugaratnam, Deputy Prime Minister and Coordinating Minister for Economic and Social Policies of Singapore.



**"It's a world consensus to realize the transition to clean energy."**

**Shu Yinbiao**  
Chairman, State Grid Corporation of China,  
People's Republic of China



**"When it comes to transportation and mobility, we will be deeply influenced by the Fourth Industrial Revolution. The sharing economy promotes access, inclusivity."**

**Jean Liu**  
President, Xiaoju Science and Technology, Hong Kong SAR

Speaking at the meeting in Dalian, Minister Shanmugaratnam noted that, contrary to conventional economic theory, continued growth has significantly widened the gap between the haves and the have-nots, resulting in increasingly volatile politics and societies – dynamics that manifested during the recent US presidential election and Brexit referendum.

While there are well-founded concerns about how technology will disrupt our future, particularly around automation and job displacement, there is an overarching sense that what we need is more, not less, creativity and technological disruption.

Take fintech, for example, which has the potential to reach huge swathes of India's unbanked population, bringing millions of the previously excluded into the financial system; or how the rise of the sharing economy is providing opportunities for millions of the economically displaced in China.

Speaking of her ride-sharing company Didi Chuxing, the largest mobile transport system in the China, Jean Liu, President of Xiaoju Science and Technology, explained how 17 million drivers were able to make revenue from the platform last year, many of them workers made redundant in the coal and steel industries.

"We believe that, when it comes to transportation and mobility, we will be deeply influenced by the Fourth Industrial Revolution," noted Liu, also a Co-Chair of the meeting. "The sharing economy promotes access, inclusivity."

To bridge disparities in pay and employment opportunities between men and women – which according to a 2016 report by the World Economic Forum could take a stunning 170 years to rectify – Didi also boasts a workforce comprised of 50% women employees and executives.





# The Brave New World of Biotech

Nothing speaks more to the astonishing possibilities of what life might look like in the not-too-distant future than biotechnology. From the structures we will live in, to the provision of healthcare utilizing the innate intelligence of rattlesnakes and eels, and even the protection of endangered species, biotechnology offers awe-inspiring, mind-boggling potential.

Take the *Electrostabilis cardium*, a defibrillating organ that could prevent a heart attack. By using parts from an electric eel to discharge an electric current into a human heart when it recognizes it is on the verge of cardiac arrest, the technology returns the heart to its normal rhythm. Then there is the *Tremomucosa expulsum*, an organ that uses the strength and vibrations of rattlesnake muscles to dislodge mucus from the respiratory system of someone who suffers from cystic fibrosis, diffusing the danger by dispelling it into the body’s digestive system.

And, it doesn’t stop there. Biotechnology – utilizing biological organisms, processes, cells or cellular components to generate new technologies – continues to push the boundaries of imagination and ethics.

Blurring the lines between science fiction and reality, the new genome editing tool CRISPR means that chimera species are closer to reality than ever before. Think human-pig hybrids bred to end the global shortage of transplant organs, three-parent babies as a way to eradicate fatal genetic diseases, and even the possibility of a “dolph-human placenta”, enabling women to give birth to dolphins to save an endangered species – the brave new world of biotech is certainly upon us.

Transformative potential also lies within the future of smart cities, where technological innovation is set to deliver greener, more economically efficient urban spaces. In a string of pilot smart cities in the US, for example, smart lighting has been introduced to reduce energy consumption, a seemingly small innovation that has paved the way for other technological capabilities that measure air, traffic and water quality – and even detect gunshots.

Fusing the artistic and architectural, Dutch artist Daan Roosegaarde is pioneering a spatial revolution with his ingenious smog tower, essentially a vacuum cleaning structure that converts smog into clean air and, ultimately, jewellery.

Just like smart cities, when it comes to protecting the environment, much of the

technology exists; it is just a matter of harnessing it. Specialized aircraft equipped with remote sensors to track biodiversity and forest fires could be used to safeguard forests, while satellites have been utilized to take high-resolution pictures of vessels that fish illegally. Apps such as Google Fishing Watch and mFish also track fishing boats and help fisheries manage their sustainability.

As the brave new world awaits, we can’t “future proof” but we can get engaged in the discussion to shape the way we might live and learn in the future, suggested Alex Molinaroli, Chairman and Chief Executive Officer of Johnson Controls, USA, and a Co-Chair of the meeting.

In the field of education, digital systems could be used to enable remote or excluded communities. “Education today is a mind-set

that you are going to physically go to school, have your curriculum, do it in a traditional way,” noted Molinaroli, “But think about educating across boundaries, about education as a life-learning opportunity.”

Active social policy and insightful vision, such as China’s 2020 commitment to renewables, will be imperative to prepare citizens and societies for a brighter, more inclusive and environmentally sustainable future.

As the Fourth Industrial Revolution starts to impact all levels of life, it will be crucial to ensure that people aren’t left behind as others forge ahead, and that innovation, adaptation and sustainability run concurrent in equal measure because, as one Forum participant succinctly proffered: Science and technology are not ends in themselves – and neither is economic progress.

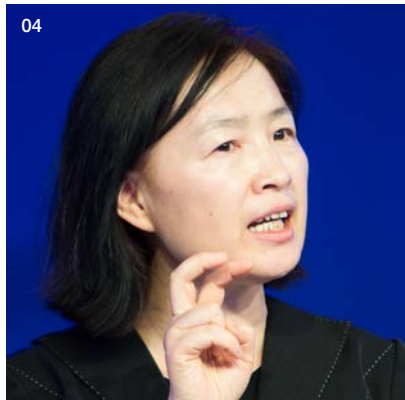


**01:** Behind the Scenes: Smog Free Tower  
**02:** Gregory Asner, Professor, Stanford University, USA  
**03:** Vanessa Wood, Professor, Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland  
**04:** Zhao Hejuan, Founder and Chief Executive Officer, TMT Post, People's Republic of China  
**05:** Carl-Henrik Heldin, Professor of Molecular Cell Biology, Uppsala University, Sweden  
**06:** Achieving Energy Access  
**07:** Kamal Sinclair, Director, New Frontier Lab Programs, Sundance Institute, USA  
**08:** Li Daokui, Dean, Schwarzman College, Tsinghua University, People's Republic of China  
**09:** Making Artificial Intelligence Safe



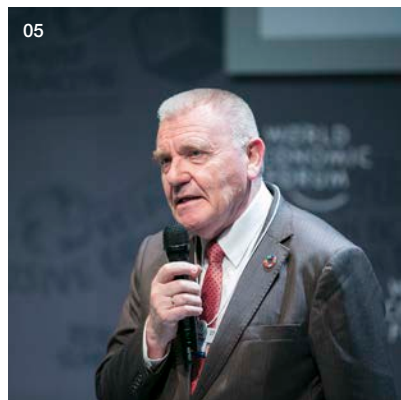
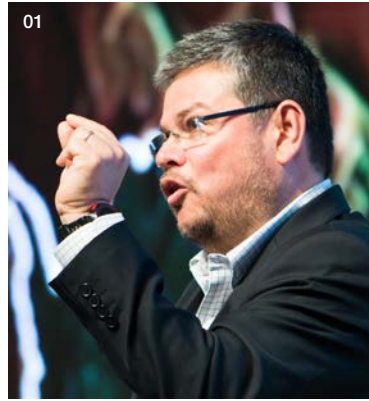


01: Exhibition: The 4IR Bio Lab  
02: Javeria Masood, Founder and Design Strategy Go-To, The Urban Practice, Pakistan  
03: John E. Scanlon, Secretary-General, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), Geneva  
04: Changhua Wu, Director, China and Asia, Office of Jeremy Rifkin, People's Republic of China  
05: Fostering Rural Innovation  
06: A Conversation with Premier Li Keqiang



01: Juan Carlos Castilla-Rubio, Chairman, Space Time Ventures, Brazil  
02: 4IR BioLab  
03: Nicholas Davis, Head of Society and Innovation, Member of the Executive Committee, World Economic Forum; Tharman Shanmugaratnam, Deputy Prime Minister and Coordinating Minister for Economic and Social Policies of Singapore; Jean Liu, President, Xiaoju Science and Technology Hong Kong SAR; Marc R. Benioff, Chairman and Chief Executive Officer, Salesforce, USA; Tyler Cowen, Professor of Economics, George Mason University, USA  
04: Xu Jinghong, Chairman, Tsinghua Holdings, People's Republic of China; Ma Teng, Deputy Editor-in-Chief, Tencent, People's Republic of China  
05: Jean-Pierre Bourguignon, President, European Research Council, Brussels

06: Zhang Yao, Founder and Chief Executive Officer, RoboTerra, USA  
07: Aileen Omar, Chief Executive Officer, AirAsia, Malaysia  
08: Jiao Xiaoping, Director-General, China Public Private Partnerships Center, People's Republic of China  
09: Victor L. L. Chu, Chairman and Chief Executive Officer, First Eastern Investment Group, Hong Kong SAR







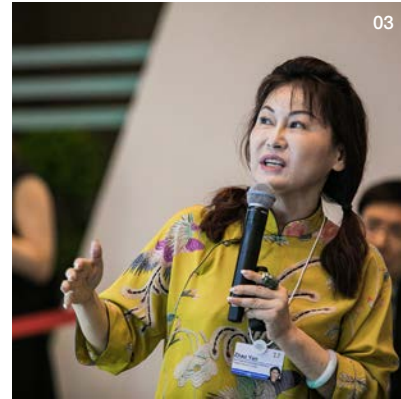
**01:** Thaddeus Arroyo, Chief Executive Officer, Business Solutions and International, AT&T, USA

**02:** Li Keqiang, Premier of the People's Republic of China; Klaus Schwab, Founder and Executive Chairman, World Economic Forum

**03:** Embracing Neurodiversity

**04:** Allison Aubrey, Correspondent, National Public Radio, USA; Suneet Varma, Global President, Asia-Pacific, Pfizer Essential Health, Greater China and Global, Pfizer, USA; Niels Lund, Vice-President, Health Advocacy, Novo Nordisk, Denmark; Katie Dain, Executive Director, NCD Alliance, United Kingdom; David Gollaher, Vice-President, Government Affairs and Policy, Gilead Sciences, USA

**05:** Allison Aubrey, Correspondent, National Public Radio, USA



**01:** Tyler Cowen, Professor of Economics, George Mason University, USA

**02:** Design by Doing: Build Your First Robot

**03:** Zhao Yan, President, Bloomage International Investment Group, People's Republic of China

**04:** Creating Critical Thinking!

**05:** David Aikman, Chief Representative Officer, Greater China, Member of the Executive Committee, World Economic Forum Beijing Representative Office; Chen Qiufa, Governor of Liaoning Province, People's Republic of China

**06:** Graham Allison, Director, Belfer Center for Science and International Affairs, USA

**07:** Sergey Solonin, Chief Executive Officer, Qiwi, Russian Federation

**08:** The Blue Zones of Happiness

**09:** Penny Low, Founder, Social Innovation Park Ltd, Singapore and Alex Molinaroli, Chairman and Chief Executive Officer, Johnson Controls, USA





# Responding to Geo-Economic Shifts

## Balancing on Shifting Global Sands

### New economic and social pitfalls face the world during a time of increased geopolitical uncertainty. How can nations and institutions prepare for the thorny path ahead?

As the balance of the world shifts between rising new powers and entrenched old powers, fresh challenges confront the global economy and political order. To rise to meet them, participants agreed at this 11th Annual Meeting of the New Champions that innovative steps need to be taken now, rather than maintaining the status quo, which is already being pulled from under our feet.

For developed countries that face slower productivity growth, the middle class is disappearing and economic advantages are stagnating, further exacerbating social inequality. “We are losing a

middle class,” said Tyler Cowen, Professor of Economics at George Mason University in the US, adding, “This is a problem in many countries.”

Meanwhile, for developing countries with fast growth rates, the danger is conversely the “middle-income trap”, wherein a threshold of wealth is reached such that the rate of growth slows and the economy plateaus, struggling to transition from an export-led economy to a consumer-driven or an innovation-driven economy. China in particular is confronting this trap, as annual growth rates decline.

But the prospects for China’s economy are far from grim, voiced participants at a Bloomberg debate on the global economic outlook. “There is continuous progress in terms of moving towards domestic demand, including consumption,” said Zhang Tao, Deputy Managing Director at the International Monetary Fund.

“A new consumer class is rising,” agreed Liu Shijin, Vice-Chairman of the China Development Research Foundation, “and it can play a very important role”. Over the next decade, Chinese customers are projected to spend up to \$56 trillion, and Chinese



**“China has an opportunity to lead, and to move from an importer of technologies to a developer of technologies for the rest of the world.”**

**Alex Molinaroli**  
Chairman and Chief Executive Officer,  
Johnson Controls, USA



**“Never before have we human beings been presented with such opportunities for development. Yet, the global economy is not yet strong. But if we are committed, we will prevail.”**

**Li Keqiang**  
Premier of the People's Republic of China

domestic consumption already accounts for one-fifth of global GDP growth.

The Belt and Road initiative is a key element of China’s trade strategy, forging economic corridors across the Eurasian landmass and through southern sea channels. Mark Wu, Assistant Professor of Law at Harvard Law School in the US, described the Belt and Road as “tying together the regions that have traditionally been on the Silk Road” in order to “achieve common ground in a changing world.”

Concerns remain over whether the Belt and Road initiative is exporting China’s geopolitical agenda along with its investment. That would be an example of geo-economics: the use of economic tools for political ends. But it can also go the other way: politics can be used to serve economic goals, for example, leveraging diplomatic relations to extract more favourable trade terms.

Running counter to the tenets of globalization and free trade, economic protectionism is a rising force. Traditional alliances and trade partnerships are in flux as political black swans have destabilized the conventional order. Meanwhile, in a post-TTP age, China is developing new trade linkages in the region,

lowering trade tariffs as another function of rising Chinese power.

At the highest stakes, this conversation is about averting war. Graham Allison, Director of the Belfer Center for Science and International Affairs in the US and author of *Destined for War*, drew on the clash between Sparta and Athens 2,500 years ago to coin the term “Thucydides’ Trap”, warning against the dynamic when a rising power threatens to displace a ruling power. China and the US are potentially on just such a collision course, especially given the unstable element of North Korea in the equation.

Yet, the long-term threats to economic growth are not flashpoints of political crisis, but rather steady trends like ageing – a demographic time-bomb that threatens China, Japan and other major economies – as well as climate change, digitalization and the technologies of the Fourth Industrial Revolution that are disrupting traditional models of growth. Before long, automation will break the current cycle where richer countries outsource production to lower-income economies.

Paradoxically, this long-term economic risk can be mitigated by more risk-taking now, in terms of innovation and forward-thinking. “Americans don’t take

enough risk right now,” warned Tyler Cowen. “The problem of not taking enough risk is common in Japan,” he added, “but it’s not a problem here in China. If you do not take risk, risk will come and get you.”

The most difficult balancing act is to strive for inclusive growth while the gap between haves and have-nots grows ever bigger. While some countries prepare for the Fourth Industrial Revolution, other countries are still waiting for the first. The top 1% of the world’s population now owns over half of the world’s wealth. Yet, by and large, participants were optimistic about prospects for economic growth.

“What we’re seeing now, fingers crossed, is the first more synchronized global cyclical recovery period since 2010,” said Helen Zhu, Managing Director and Head of China Fundamental Equities, BlackRock, Hong Kong SAR. “If we continue to see good momentum and pragmatic approaches, not making irrational decisions, then I think we can keep this virtuous feedback loop going and keep making the pie bigger; and once the pie becomes bigger, it becomes easier to share with everybody.”





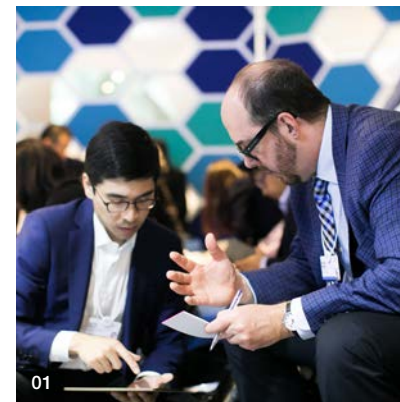
## Strengthening Cybersecurity and Internet Regulation

Of all of the threats that the world faces today, the most sudden this past year have been in the form of ones and zeros: cyber-attacks, both criminal and state-sponsored. But that's how it goes: "The truly bad crises come as big surprises," said Tyler Cowen, Professor of Economics at George Mason University, USA. "Number one, I think by far, is the risk of a cyber-attack."

In the wake of the WannaCry ransomware attacks and subsequent copycats, businesses are reeling from million-dollar payments. Policy-makers in turn scramble to regulate the internet, creating security in an environment that was designed to be open.

But that isn't so easy. Internet crimes rarely fall under a single jurisdiction, and technology moves measures faster than legislation. Cybersecurity is often a facet of national security, and continued threats could provoke a meeting of the UN National Security Council. China is ahead of the curve, enacting a new cybersecurity law last month, and this month it opened an "internet court" in Hangzhou, exclusively for cyber-related cases.

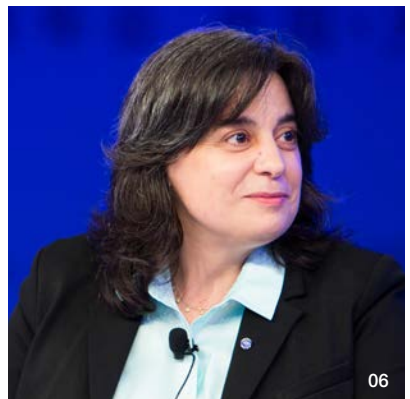
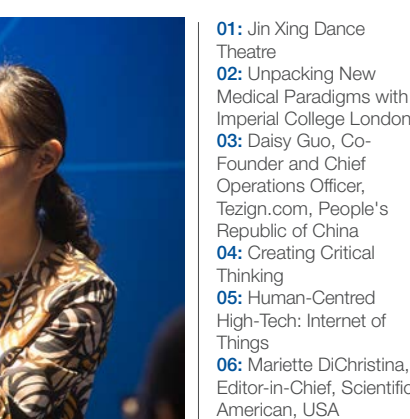
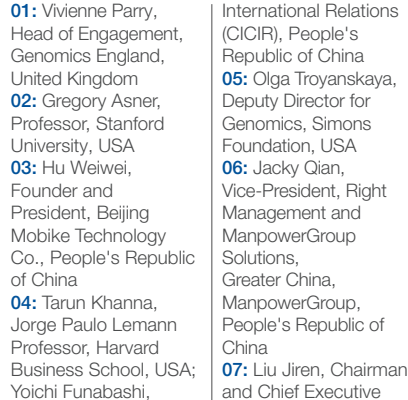
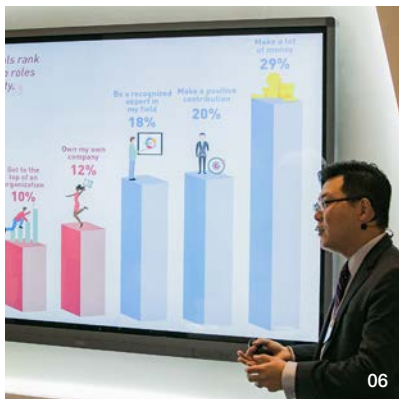
For its part, the Forum is drafting a set of "digital protocols" that will study recent cases in order to form policy suggestions for governments and regulators. It will not stem the tide of attacks, but it may help the international community craft its response.



**01:** Learn to Code  
**02:** Mycotecture Brick Wall  
**03:** Lu Bai, Professor, Medical School, Tsinghua University, People's Republic of China; Wang Yifang, Professor, Institute of High Energy Physics, Chinese Academy of Sciences, People's Republic of China; Jean-Pierre Bourguignon, President, European Research Council, Brussels; R. May Lee, Dean, School of Entrepreneurship and Management, ShanghaiTech, People's Republic of China; Wang Liming, Professor and Investigator, Zhejiang University, People's Republic of China  
**04:** Introduction to Tai Chi  
**05:** Mark H. Shaw, Director, The Global Initiative against Transnational Organized Crime, Switzerland







01: Vivienne Parry, Head of Engagement, Genomics England, United Kingdom  
 02: Gregory Asner, Professor, Stanford University, USA  
 03: Hu Weiwei, Founder and President, Beijing Mobike Technology Co., People's Republic of China  
 04: Tarun Khanna, Jorge Paulo Lemann Professor, Harvard Business School, USA; Yoichi Funabashi, Chairman, Rebuild Japan Initiative Foundation (RJIF), Japan; Ahn Duk-Geun, Professor of International Trade Law and Policy, Seoul National University, Republic of Korea; Lynn Kuok, Non-Resident Fellow, Brookings Institution, USA; Ji Zhiye, President, China Institute of Contemporary International Relations (CICIR), People's Republic of China  
 05: Olga Troyanskaya, Deputy Director for Genomics, Simons Foundation, USA  
 06: Jacky Qian, Vice-President, Right Management and ManpowerGroup Solutions, Greater China, ManpowerGroup, People's Republic of China  
 07: Liu Jiren, Chairman and Chief Executive Officer, Neusoft Corporation, People's Republic of China  
 08: Lauren Woodman, Chief Executive Officer, NetHope, USA

01: Jin Xing Dance Theatre  
 02: Unpacking New Medical Paradigms with Imperial College London  
 03: Daisy Guo, Co-Founder and Chief Operations Officer, Tezign.com, People's Republic of China  
 04: Creating Critical Thinking  
 05: Human-Centred High-Tech: Internet of Things  
 06: Mariette DiChristina, Editor-in-Chief, Scientific American, USA





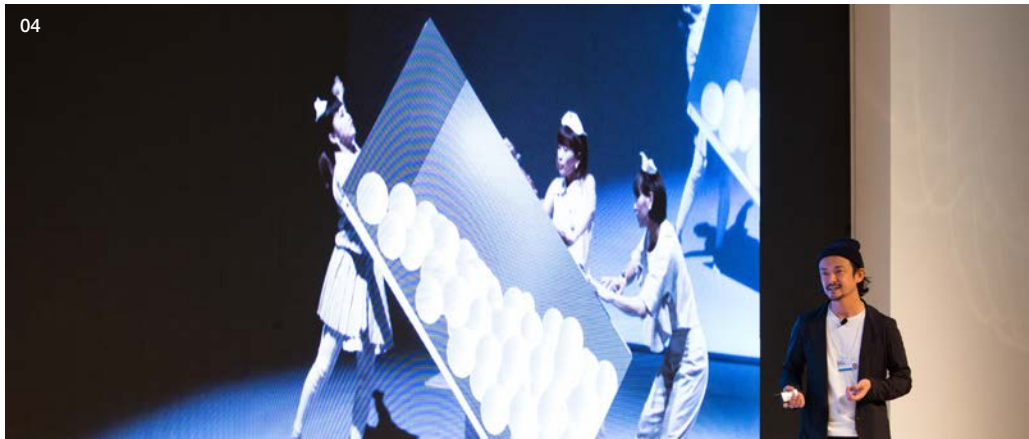
01



02



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04



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06

- 01:** Building Skills for Life through Creativity  
**02:** So-Young Kang, Catalyst, Founder and Chief Executive Officer, Gnowbe, Singapore  
**03:** Nina Trentmann, News Editor, Wall Street Journal, United Kingdom; Jodi Halpern, Professor of Bioethics and Medical Humanities, University of California, Berkeley, USA; Stephan Howeg, Chief Marketing and Communications Officer, The Adecco Group, Switzerland; Pelu Tran, Co-Founder and President, Augmedix, USA  
**04:** Daito Manabe, Media Artist, Rhizomatiks Research, Japan  
**05:** Simone Schurle, Postdoctoral Candidate, Massachusetts Institute of Technology (MIT), USA  
**06:** Joshua Hoffman, Chief Executive Officer, Zymergen, USA





## Featured Essay

# Advancing Human-Centred Economic Progress in the Fourth Industrial Revolution

**Richard Samans**, Head of Global Challenges Team, Member of the Managing Board, World Economic Forum; and  
**Nicholas Davis**, Head of Society and Innovation, Member of the Executive Committee, World Economic Forum

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. The world is also safer than ever: fewer people die from violence or conflict than in any prior era. Today's populations enjoy longer lifespans and more comfortable lives than any previous generation.

Yet, these advantages are being matched by a range of challenges felt keenly by many citizens around the world. First, in-country inequality is rising, in some cases at historic highs. In advanced countries, incomes have stagnated for the middle class, and the share of national income accruing to labour has fallen as productivity has risen faster than real wages.

Second, trust in key social institutions is falling, after a short period of recovery following the global financial crisis. Globally, 47% of people tend to distrust businesses while 59% tend to distrust governments. Non-governmental organizations and the media have also suffered declines, with the data broadly consistent across G20 economies.

Ethnographic and survey-based research into the drivers behind declining trust in institutions and rising social and political polarization reveal a complex web of factors. At the heart, however, lies dissatisfaction with complacency in leadership circles about the combined 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 change and test social cohesion further, in the absence of a bold policy agenda across three 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.

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 late-20th-century globalization, 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 new, more human-centred economic growth model must be constructed in which social inclusion is designed into multiple aspects of economic policy. This concerted effort aims 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.

A strategy that places people and their living standards at the centre of economic policy should engage and shape the future rather than resist or hide from it through short-term palliatives – macroeconomic stimulus, mercantilist trade measures, public misdirection, scapegoating minorities and immigrants, idealizing a bygone era – insisting on the benefits of globalization without making necessary domestic investments and improvements.

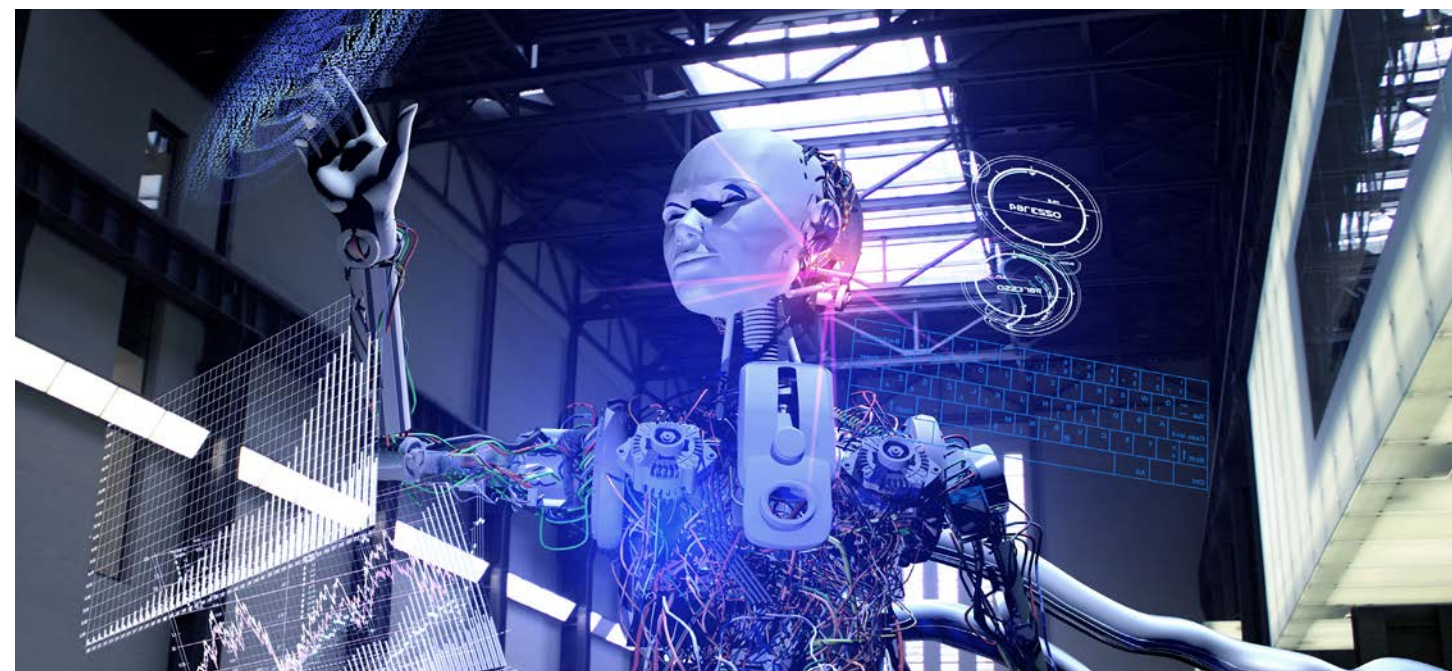
Specifically, governments need to move beyond the efficiency-enhancing and short-term-optimizing growth model of recent decades to a new one in which:

- Technological progress is enhanced by working proactively and flexibly with stakeholders to socially de-risk it, such as through the informal processes of multistakeholder dialogue and cooperation on advanced technologies.
- Economic growth and social inclusion are strengthened by reimagining structural reform as a demand- and supply-side strategy to capture the unexploited synergies in an economy between the two through ongoing investment and modernization across

diverse areas of domestic institutional strength. As described by the Forum's new Inclusive Growth and Development Framework and Inclusive Development Index, this is the implicit income distribution system underpinning modern market economies, but it has deteriorated in many advanced countries or been underemphasized in the development strategy of many developing countries over the past generation.

Such narrative signalling and practical action is required to inspire public confidence in the capacity of technology to augment rather than substitute for human potential and economic opportunity. 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.

The article is also available online: [http://www.g20-insights.org/policy\\_briefs/advancing-human-centred-economic-progress-fourth-industrial-revolution-leadership-agenda-g20-governments/](http://www.g20-insights.org/policy_briefs/advancing-human-centred-economic-progress-fourth-industrial-revolution-leadership-agenda-g20-governments/)





## Featured Essay

# Are You a Leader of the Fourth Industrial Revolution?

Thomas A. Kolditz is Director of Ann and John Doerr Institute for New Leaders at Rice University, USA; Tomas Casas i Klett is Director of the China Competence Center, University of St Gallen, Switzerland; and John Strackhouse is Partner, Board and Chief Executive Officer, Practice, at Caldwell Partners, USA

As the Fourth Industrial Revolution (4IR) fuses the physical, digital, and biological worlds, complexity will drive change that makes team leadership a non-negotiable skill for 4IR leaders. Teams will become the central organizational reality, and will function to animate organizations. Leadership and teams of the 4IR are characterized as: Flat, non-hierarchical teams; multifunctional, specialized teams of leaders; teams at distributed, multi-organization workplaces; and teams as follower networks. One should not underestimate how the revolution impacts the worldview of leaders. It touches fundamental questions, from the principles that move the world to common views on ethics.

1. **Systems thinking.** The 4IR ushers the logic of the complex. That is, “dominated by dynamics that are often beyond our control.” (Probst, Bassi, 2014:3) The “dynamic interplay can lead to unexpected consequences” begging the question of where opportunity and threat lie. Leaders of the 4IR will be system thinkers able to connect the dots and interpret vast, complex and unpredictable systems.
2. **Pragmatic ethics.** Leaders must lack naïveté about deceit, malfeasance and illegality, and protect their organizations in a world increasingly tolerant of unethical behaviour – especially behaviour conveyed by digital and informational means. They

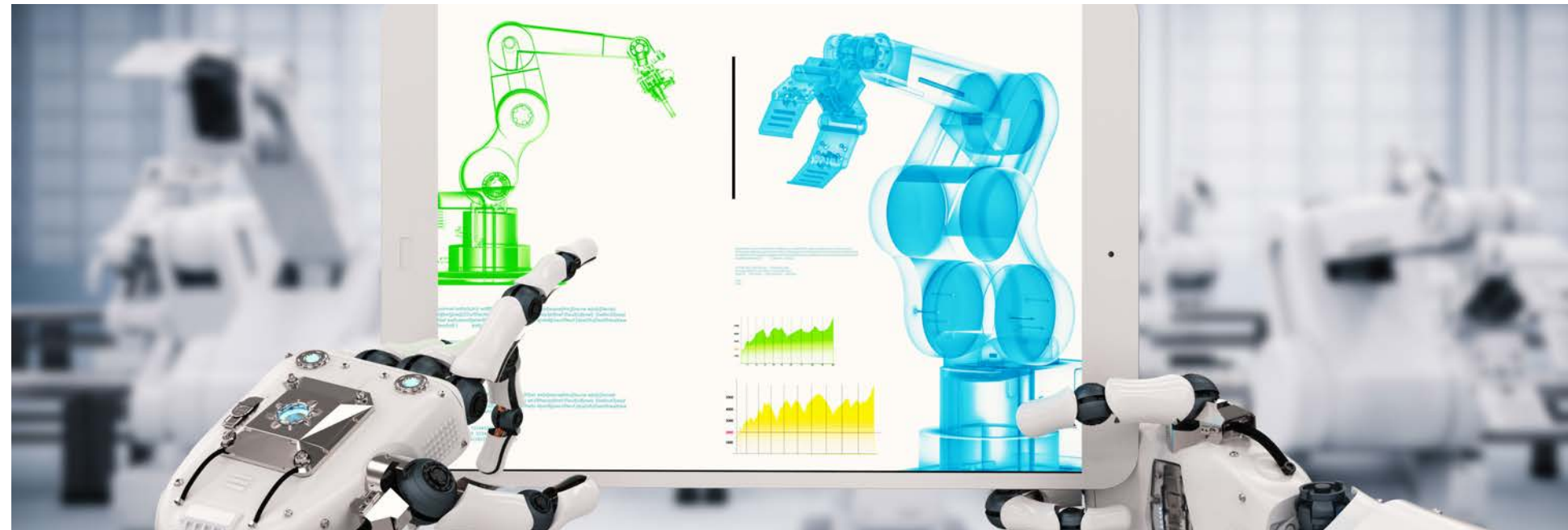
must be comfortable in the grey areas opened by technology that are ethically ambiguous, while at the same time uphold integrity.

3. **Narratives out of the paradox.** Minds are not designed to deal with contradiction and paradox; leaders of the 4IR will cut through paradox, contradiction and confusion, taking decisive actions where others would be paralysed. Their action will be structured by the unique narratives.

## Key Skills

4IR leaders possess a repertoire of key skills at which they will excel:

- **Powerful emotions.** Leaders will have strong emotions and clear subjective visions that will inspire followers. The best leaders will bridge the difficult virtual and cultural divides that will define the workspace.
- **Global intelligence.** Cultural intelligence enables leaders to develop behaviours adaptive to different social contexts and be effective across cultures. Customers, supply chains and IP will be sourced across the globe. Leaders will therefore need to understand foreign cultures, systems of thought and philosophies.
- **Creative storytellers.** As master storytellers, these leaders will craft visions and narratives that will turn into their organizations’ future.



The context of the 4IR will have an impact on the personal qualities of leaders:

- **Authentic.** Technology and speed will cause privacy to diminish, and it will be nearly impossible to manage for leaders who lack authenticity. Integrity will be a powerful signal and bring about a loyal following.
- **Agile.** The speed inherent to 4IR will place a greater demand on agility and inspired change management. By necessity, leaders will intelligently improvise and take quick action while disregarding processes and routines as they swiftly size opportunity.

- **Coward-conscious.** Leaders must be adept at recognizing and discouraging cowardice in the face of ambiguity, volatility and the consequences of risk. Leaders will need to “creatively destroy” both the inconsequential work of others and their own; that is, that they display no cowardice when critically dealing with their own interests.

## Are You a 4IR Leader?

Leaders will build unbeatable teams, will be master storytellers and inspirational value setters, and embrace uncertainty and courageous disruption.

As a 4IR leader, you will be subject to quantitatively sophisticated leader evaluation and selection **methodologies**. In the Fourth Industrial Revolution, incompetence will hurt organizations more than ever; bad leaders will not be able to hide behind general economic or industry growth. Boards will be placed into positions of greater accountability as will the leaders who run companies, non-profits and government.

As a 4IR leader, you will be **intentional** about advancing your own leader **identity** and skills, as well as those of the team. The rapid pace of transformation will

demand that leaders and their teams undergo *kaizen*-like personal development as they seek and execute new technological and business model possibilities.

The defining quality will be your **heart**; that is, the outwardly apparent manifestation of your humanity that inspires collective action.

As a 4IR leader, you will disrupt rather than be disrupted and generate shareholder value while positively contributing to the most sweeping change in society since the emergence of the First Industrial Revolution nearly two centuries ago.



## Featured Essay

# Algorithms Make the World Go Round – or Wrong

Kaiser Kuo, Official Writer  
at the Annual Meeting of the New Champions 2017

An ever-increasing number of decisions in our lives are made algorithmically. Algorithms – for our purposes, sophisticated processes governing computer decision-making – are quite possibly in play when we apply for admission to a university, or for a job, or a home loan. They're most certainly at work when Netflix decides what television shows and films to recommend to us, or when Amazon suggests purchases – or more famously, and more worryingly, when Facebook decides what stories to put in our newsfeeds in the critical weeks before an election.

Code-determined decision-making – opaque and too often unaccountable – runs the risk of inhibiting the human in our societies. Sure, algorithms can actually help to eliminate bias, can recognize patterns in data invisible to even the savviest humans, and can radically streamline cumbersome processes. But algorithms often contain biases themselves, reflecting the privileges and prejudices of the people – all too typically white males from the developed West – who coded them, or reflecting the limitations of the datasets that they process to arrive at their decisions. Thus we have Google's deep learning-driven image identification system incorrectly identifying African-Americans as gorillas, or supposedly "global" AI-based beauty pageants selecting 44 winners out of 6,000 or more

submissions and choosing only one winner who has dark skin. Machine decisions are freighted with cultural, political, and economic determination.

But stripping out that bias is extraordinarily difficult. Part of it is rooted in human behaviour itself: Facebook's algorithms, after all, are often based on what we ourselves share and like, and there's a perverse incentive intrinsic perhaps to our very psychologies as humans that privileges sharing of short, emotional, extreme and irrational ideas, stories or memes. The professional media, for all its self-conception as guardians of the rational and the dispassionate, is itself influenced by the "feral" social media out there. And when it comes to politics, establishing what are "true" as opposed to "alternative" facts is a vexing problem when the epistemological foundation itself has been undermined and made distressingly wobbly.

Efforts are underway in some quarters to try to "de-bias" online discourse by identifying ideologically programmed bots, to identify people who are apt to share extreme or false narratives and to amplify the diversity of authentic voices those individuals hear. But these efforts can't address all of the problems stemming from the opaque, black box nature of algorithms and undisclosed data training sets.



Furthermore, any push for algorithmic transparency runs immediately into the problem that algorithms are valuable intellectual property, and that those who create them are often loath to share them. They represent important barriers to entry – critical competitive advantages. Even when, whether through moral suasion or regulatory insistence, algorithms are made more transparent, the fact is that society

at large is technologically illiterate, and incapable of meaningfully interrogating these systems. Often, the creators of the algorithms themselves can't even explain how they actually work.

It's equally difficult to de-bias problematic datasets, because the source of bias often lies in the insufficient size of training sets. To de-bias such a set, one would need an even bigger dataset –

something simply not available much of the time.

Next May, the European Union is set to implement the EU GDPR – the General Data Protection Regulation. While it ostensibly mandates a "right to explanation" – a right, on the part of anyone impacted by an algorithmic decision, to an explanation of how and why that decision was made – the worry is that the actual wording

is too ambiguous, and ultimately toothless. But this is the first attempt to introduce regulation at any scale into how algorithms can be made more transparent. And while the challenges are daunting, at present regulation at some level holds out the only meaningful hope of giving ordinary people a better grasp of the mysterious, mathematical forces that control a fast-growing proportion of their lives.



## Featured Essay

# The Science behind the Headlines Needs Funding too – Here's Why

**Maria Elena Torres-Padilla** is Director of the Institute of Epigenetics and Stem Cells at the Helmholtz Zentrum München, where she leads a team that is decoding the factors necessary for successful embryo implantation following fertilization. She believes policy-makers, educators and society at large need to have a more fundamental understanding of the way science works – and the way it should be funded.

### Why is it important for society to understand the scientific process and the role of basic science?

Scientific research requires considerable investment of time and money and it is important that society is engaged and holds scientists to account for using this money responsibly. For this to be effective for both science and society, however, it is important that society understands the scientific process. Often, when members of society think about science they are looking for results, they want deliverables, they want drugs to cure diseases. This is understandable and scientists also value these outcomes. We can achieve these translational results because we are fortunate to live at a time in which we can benefit from what scientists have discovered over the last 100-200 years. To put it simply, we can generate drugs now because we know what to target – and this has come about through basic research, basic science.

In my field, basic science is devoted to understanding the fundamental mechanisms of life; but basic science is just as integral to the humanities or the study of space. It can be viewed as the foundations on which we build the translational elements of research. If the foundations are firmly set, the building on top will stand strong.

If we invest in generating more of this kind of knowledge, gain a deeper understanding of more disease mechanisms then, in the future, we'll be able to identify

more targets for the development of new disease treatments and, ultimately, cures. Appreciation of this complete scientific process shows that basic and applied research – or translational research – need to work hand-in-hand to create benefits.

Another reason that basic research is important is more related to drug discovery.

You can have a drug to treat cancer, or diabetes, but often there is the problem of secondary effects, and these are common mostly because we haven't quite figured out how the whole mechanism of disease and its progression and symptoms actually work. The only way to understand this is through basic research, and this is a very long-term and continuing process.

### The problem, then, is one of funding for basic research, which produces less immediate results?

Yes. But it comes down to how we define results. In our current situation, when we talk about results, it is interpreted as making money; and no, basic research does not make money immediately.

Ultimately, when there's a major finding – typically by the work of many people over at least 100 years or so, that allows others to say, "this is interesting" – the aim is to do something translational with that finding. It is important to appreciate, therefore, that basic and applied research are not completely

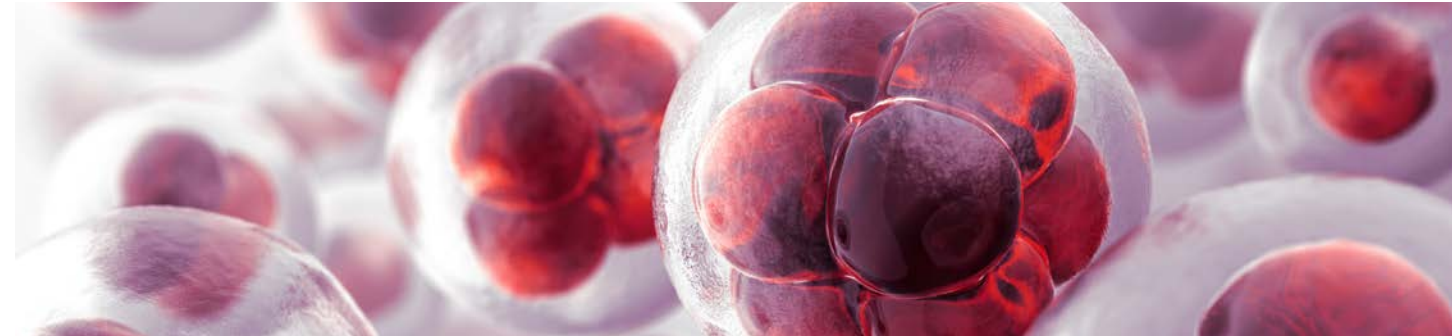
independent; there has to be room for doing something in between, to allow people to talk to each other.

Within science itself this is not a problem – difference is not a barrier, and collaboration is an everyday endeavour in science, technically and conceptually. We don't even look at what nationality others are because we just talk the same language, which is that of science.

And this is a profound thing: a global community of people working together without barriers because we communicate and share common values. This is a fantastic thing, and it is very special in science.

### So, where does funding have to come from?

Financing mostly has to come from governments and, in some countries like the UK, through charities. The problem is that when funding is driven by politicians, who operate within a four- or five-year election cycle, there is no way they can point to a result within this time frame. In addition, there is now more and more pressure in Europe and the US and some countries in Asia to fund research that has translational impact. Of course, it's good to promote this kind of research, but basic research must continue too, to ensure progress in the much longer term.



### What steps do you believe to be important to bring about change?

First, we need the personal engagement of scientists. This applies especially to people like me who are truly on the basic research side. We need to speak about facts, not opinions, so that people are aware of this challenge. We need to help scientists feel a part of the society in which they work, engaging with the public and feeling that their voice is heard.

Second, in the medium and long term, is education. We need to educate the public to be aware of what basic research can bring to society, and it is actually a really simple concept. We must involve the research and higher education institutions, as well as primary and secondary schools to expose the younger generation early on to the process of science. Some countries already have successful initiatives in place aimed at achieving this: the UK tends to do well, for example, from my experience of talking to children there. Role models that the public know can help, but, really, we need

a more profound process within education at all levels.

Third, we need scientists to have an active presence within government and an appreciation of science among policy-makers and on consulting bodies. Scientists know first-hand the importance of basic research and can advise those in power of this importance. Establishing an open dialogue between officials and scientists will ensure long-term measures are in place, free from individual political gain, and ensuring a positive impact on society now and in the future. Reducing the concern among scientists for funding will enable them to focus their energy and creativity on what they do best, their research.

I travelled to Brussels recently with four or five other scientists and we visited a senior EU official to make these points. And we were told, "Look, Europe can't give you any money. Why don't you go back to your countries and you raise money from private people, then come back and maybe we can help."

On the one hand, I believe this could be seen as a good opportunity to engage with the private sector and establish long-term partnerships which can be highly beneficial to both parties. On the other hand, however, my reaction was, we are scientists and we are good at what we are doing, I hope. And that is doing research. I shouldn't have to be raising money myself! This was a bit like a "cold shower" as we say in French, and shows the general tendency of the governments not to fund basic research. I therefore believe it is important that we should be proactive in the government and among policy-makers, but also to reach out to the private sector and engage interest from the society at large. It's vital, however, that they do not forget their research. If we neglect that, then our purpose is not served.



# Acknowledgements

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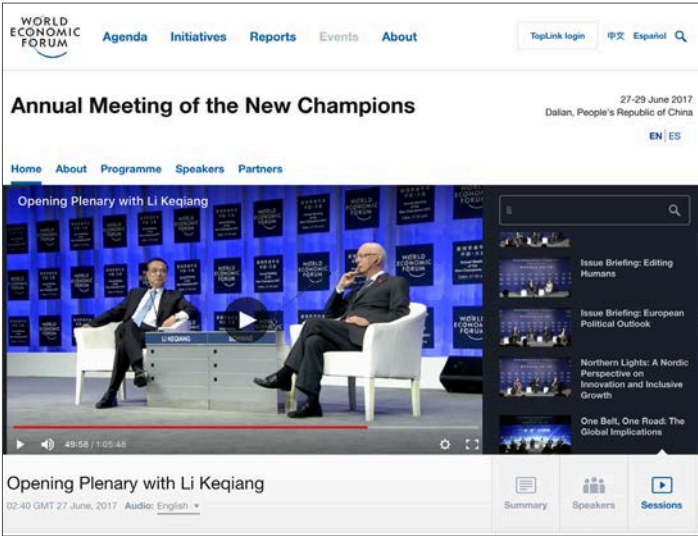
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# Digital Update



The event page of the Annual Meeting of the New Champions 2017 provides more information from the meeting, including photographs, press releases, social media and webcasts of selected sessions.

<http://wef.ch/amnc17>

# Contributors



This report is also available to download:

<http://wef.ch/amnc17report>

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## Upcoming Meetings



## Sustainable Development Impact Summit 2017

New York, USA 18-19 September

The inaugural Sustainable Development Impact Summit aims to advance both by providing a multistakeholder platform for concerted action. The Forum will work closely with leaders from government, business, academia and civil society, who will be in New York during the UN General Assembly, to: increase the impact of existing initiatives; catalyse new partnerships and alliances; and explore how the advanced technologies of the Fourth Industrial Revolution could be better leveraged for sustainable development. For more information, email: [impactsummit@weforum.org](mailto:impactsummit@weforum.org)



## India Economic Summit

New Delhi, India 4-6 October 2017

From low-cost electrocardiograph machines to a successful, yet frugal, Mars mission, Indian entrepreneurs and businesses have provided innovative and alternative solutions. At the same time, India's leadership in the Paris Agreement and International Solar Alliance and its efforts to join permanent members on the UN Security Council and the Nuclear Suppliers Group indicate a quest for a new international identity and a changing perception of its role in international politics. The 2017 India Economic Summit, held in partnership with the Confederation of Indian Industry (CII), will explore some of these issues while engaging the global multistakeholder community of the World Economic Forum for action and impact. For more information, email: [India@weforum.org](mailto:India@weforum.org)



## Annual Meeting of the Global Future Councils 2017

Dubai, United Arab Emirates 11-12 November

The meeting will bring together more than 800 members of the Network of Global Future Councils to jointly explore ways of facilitating systemic change in critical areas such as health, energy and infrastructure through breakthrough technologies related to the Fourth Industrial Revolution. This year's meeting is the second in the councils' two-year term. The meeting will draw on the work of the councils to date and allow their members develop innovative solutions for the most pressing global challenges. For more information, email: [AMGFC@weforum.org](mailto:AMGFC@weforum.org)

For a full list of upcoming meetings, visit the World Economic Forum website: [www.weforum.org](http://www.weforum.org)





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