Artificial intelligence for global good

The promise of AI

Houlin Zhao, ITU Secretary-General

> **"** *Artificial intelligence is continuing to evolve rapidly … and has enormous potential for social good.* **"**

Artificial intelligence (AI) is continuing to evolve rapidly. It will play a key part of our everyday lives and has enormous potential for social good. If the scalable power of AI can be leveraged correctly, it can rapidly accelerate progress on the United Nations' Sustainable Development Goals (SDGs).

The transformative power of AI, however, brings with it complicated challenges, ranging from issues of trust, including security risks, to concerns of exacerbating inequalities, to the disruptive impact of AI on employment.

Navigating these challenges may be as difficult as delivering the solutions for social good — and both will require unprecedented collaboration.

This is why ITU — in partnership with **XPRIZE Foundation**, the global leader in incentivized prize competitions, the **Association for Computing Machinery** (ACM) and more than 25 sister United Nations agencies — is organizing the second "**AI for Good Global Summit**" to be held in Geneva, from 15 to 17 May.

The action-oriented 2018 summit will continue to formulate strategies to ensure trusted, safe and inclusive development of AI technologies and equitable access to their benefits.

We hope this collection of thought leadership and insight from some of AI's top minds will help frame the important issues, so that together we can unlock the great potential of AI technology to improve lives.

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Artificial intelligence for global good

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Artificial intelligence for global good

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Q&A

A global dialogue on AI's potential for good

ITU News spoke to Chaesub Lee, Director of ITU's Telecommunication Standardization Bureau, to discuss the motivations behind the AI for Good series and how AI will come to influence ITU's work.

The 2017 AI for Good Global Summit was the first event to initiate global dialogue on AI's potential to act as a force for good. While the 2017 summit sparked the first ever inclusive global dialogue on beneficial AI, the action-oriented 2018 summit will focus on impactful artificial intellingence solutions able to yield long-term benefits.

Could you give us a brief introduction to the AI for Good series of summits?

CL – The AI for Good series is the leading United Nations platform for dialogue on beneficial AI. The Summit is organized by ITU in partnership with the XPRIZE Foundation, the Association for Computing Machinery (ACM) and more than 25 sister United Nations (UN) agencies.

AI presents unprecedented opportunities to eradicate hunger, end poverty and reverse the degradation of our natural environment. The AI for Good series aims to inspire innovation by highlighting the extraordinary possibilities soon to be within reach thanks to the accelerating progress of AI.

> ❝ *The AI for Good series is the leading United Nations platform for dialogue on beneficial AI.* ❞
>
> Chaesub Lee
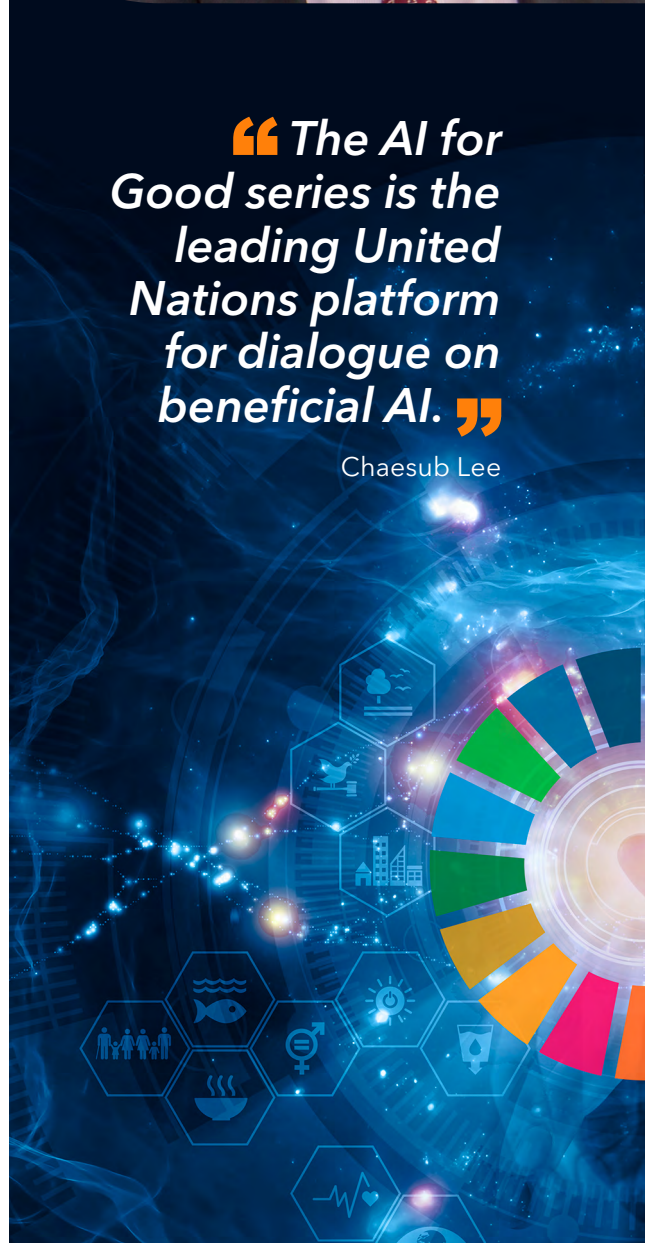
AI experts stress that discussions around AI's implications for society should not be confined to specialists. ITU agrees. This is the key motivation behind ITU's decision to launch the AI for Good series. Every government, every company, every academic institution, every civil society organization – every one of us – should consider how AI will affect today and our future.

What is the United Nations' interest in AI and what will be its main contribution to the field?

CL – The AI for Good series aims to ensure that AI accelerates progress towards the United Nations' Sustainable Development Goals (**SDGs**).

The United Nations has the ability to convene all AI stakeholders in an impartial debate. Only with strong dialogue and partnership among governments, international organizations, the private sector and academia will AI fulfill its great potential to act as a force for good.

Discussion on the UN platform will build common understanding of the capabilities of emerging AI technologies. This will build cohesion in policy approaches to AI and encourage the international community to rally around applications of AI with potential to address the greatest challenges facing humanity.

What can we expect to emerge from the 2018 summit? What are its priorities?

CL – The inaugural AI for Good Global Summit in June 2017 was the first event to launch inclusive global dialogue on the actions necessary to ensure that AI benefits humanity.

The action-oriented 2018 summit will identify applications of AI capable of improving the quality and sustainability of life on our planet. The summit will also formulate supporting strategies to ensure trusted, safe and inclusive development of AI technologies and equitable access to their benefits.

How exactly will the summit achieve this?

CL – The summit will be highly interactive and results-oriented.

'Breakthrough teams' will demonstrate the potential of AI to advance humanitarian action and sustainable development. On show will be AI's value in advancing healthcare as well as the delivery of citizen-centric services in smart cities. Teams will also investigate means to meet the data demands of AI algorithms and strategies to develop trusted, transparent and robust AI.

The summit challenges these teams to propose impactful AI strategies able to be enacted in the near term. These teams will guided in this endeavour by an expert audience of mentors representing government, industry, academia and civil society.

Strategies will be evaluated by the mentors according to their feasibility and scalability, potential to address truly global challenges, degree of supporting advocacy, and applicability to market failures beyond the scope of government and industry.

Our aim is to connect AI innovators with public and private-sector decision-makers, building collaboration to take promising strategies forward.

How do you expect that AI will factor into ITU's work in years to come?

CL – AI will gradually come to affect almost all elements of the information and communication technology (ICT) industry and its supporting standardization ecosystem. It will influence a broad scope of ITU's technical work, with prime examples found in data management, network management and orchestration, video coding, and the Internet of Things and smart cities.

Standardization experts contributing to **ITU-T** Study Groups are looking to AI to bring more automation and intelligence to network design, operation and maintenance, introducing greater efficiency with network self-optimization. Automated virtual assistants are expected to support the customization of multimedia services, and learning algorithms are playing an increasing role in the development of video compression algorithms and algorithmic tools to monitor quality of service and user experience. Cities of the future will be built on the smart use of data, with AI and machine learning delivering data-driven insight to assist social-cyber-physical

systems in adapting their behavior autonomously in the interests of efficiency.

The AI for Good series contributes to our preparations for AI's inevitable influence on ITU's technical work, providing the context for this influence from the perspectives of technology as well as business and policy.

Will we see ITU standards addressing AI in the near future?

CL – My view is that, in the near term, ITU standardization's key contribution to the success of AI will be in the field of data management. In our knowledge-driven modern economies, data is quickly becoming our most valuable natural resource. Data is essential to AI, but significant challenges continue to surround the availability and quality of the data required to develop and train AI algorithms.

We have an ITU Focus Group to pinpoint the aspects of data processing and management to benefit from ITU standardization. The work of this Focus Group will be a contribution to smart governance, data-driven business, and all forms of sustainable development.

Another ITU Focus Group is working to determine how machine learning will contribute to the efficiency of emerging 5G systems. The group will define the requirements of machine learning as they relate to technology, network architectures and data formats. Key to this work will be the definition of required data formats and associated mechanisms to safeguard security and privacy.

Participation in ITU Focus Groups is free of charge and open to all. We have four Focus Groups currently in operation, looking at data processing and management; machine learning for 5G; distributed ledger technology such as blockchain; and digital currency, with a focus on digital fiat currency. **Learn more** about these Focus Groups.

Where can we learn more about AI's contribution to networking?

CL — The new **ITU Journal:** *ICT Discoveries* is ITU's latest effort to expand our collaboration with the research community. Its first special issue forecasts AI's impact on ICT networks and services.

The new ITU Journal looks at both technical and social aspects of ICTs' influence on business, governance and society. The first special issue of the ITU Journal demonstrates the interdisciplinary scope of this publication.

The issue highlights the potential of Artificial Intelligence to support communications networks and services in fields including cognitive radio, automated driving and the monitoring of our environment. It also explores design principles for AI systems sensitive to human values as well as the ethical implications of advancing AI capabilities as they relate to data security.

We also look forward to Kaleidoscope, ITU's flagship academic event, which this year turns its attention to machine learning. **Kaleidoscope 2018**: Machine Learning for a 5G future is calling for original scientific papers addressing how AI and machine learning will drive the smarter use of network-generated data, enabling ICT network operators and service providers to adapt to changes in traffic patterns, security risks and user behaviour. The conference will convene in Santa Fe, Argentina, 26–28 November 2018.

ITU Journal
ICT Discoveries

First special issue on

The impact of
Artificial Intelligence
on communication networks and services
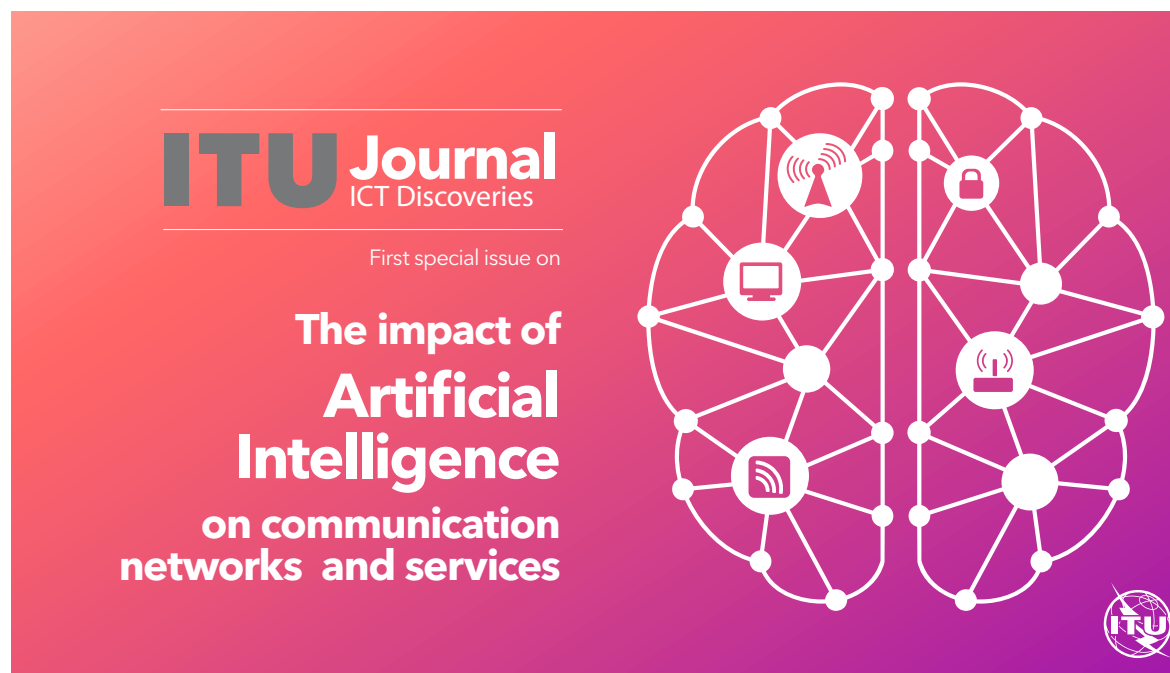
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26-28 November
Santa Fe, Argentina

*Machine learning
for a 5G future*

Organized by

Tech for good –
A novel approach

Maurizio Vecchione

Executive Vice President, Global Good
and Research, **Intellectual Ventures**

The **Global Good Fund** invents technology to address the most difficult challenges faced by the world's poorest populations. It is the result of the collaboration between Bill Gates and Intellectual Ventures, stemming from a vision to address gaps in technology and science research addressing specifically problems of the poorest billion people on the planet – those globally at the base of the economic pyramid.

We focus on technologies that have the power to catalyze at-scale impacts, very much like those impacts that technology has been able to do in high-income countries. To be successful in inventing for impact, we have to have a deep understanding of the problems before attempting to solve them through technology. This has meant a commitment to "reverse innovation" where we study problems from the prospective of those in low-income countries, and try to identify the gaps that science and technology can address. When we succeed, the resulting inventions can have population-scale impact and be "catalytic" to societal change.

To adequately understand big problems, and to identify the technology gaps and the scientific breakthroughs, with the potential of being catalytic, is very complex and has required a novel process of invention.

> **❝** *Global Good is working on AI-based ultrasound imaging, in which a deep-learning ultrasound machine can automatically detect the onslaught of pneumonia, and its progression, or response to treatment…* **❞**
>
> Maurizio Vecchione

The essentials for success

When thinking about the needs of the base of the economic pyramid, most people assume that the approach is generally to copy what works in high-income countries, and then to reduce its cost.

"Affordability" is certainly one of the factors in this kind of work. However, "appropriateness", whether the invention will truly address the problem in the context in which it is intended to be used, and "accessibility", or the ability for the intended users to use and scale the invention, are the other essential strategies. We consider these the essential three "As" for success in our work.

If an invention achieves these three "As" in the context of a "big" problem, it is likely to scale-up to population-scale impacts. At times, these inventions turn out to be superior solutions for everyone, regardless of income level. While initially focused on the needs of low-income populations, some of these "reverse innovation" inventions can have the effect of technological leapfrogging an entire industry.

We saw an example of this with mobile payments systems, which developed quickly to serve the needs of "unbankable" populations, and are now emerging from countries like Kenya into global solutions providing revolutionary financial services for everyone, everywhere.

In health care, as countries with more limited healthcare resources attempt to solve urgent medical problems while expanding access and quality of their health care, we are seeing tremendous opportunities to leapfrog existing models of healthcare delivery and use technology to improve healthcare outcomes, while reducing costs for everyone.

In this way Global Good tries to be the world's quintessential reverse innovator – that is, creating technology specifically designed for the needs of the base of the economic pyramid, while enabling those technologies to 'boomerang' back to the developed world.

Achieving population-scale impact takes many partners across businesses, academic research institutions, governments and non-profits to make it work. The role of the private sector is essential for scaling up this kind of innovation. Novel models of private-public and philanthropy are needed to incubate, develop and ultimately scale up this type of innovation. But by leveraging the opportunity that reverse innovation provides to innovate globally while solving base-of-the-pyramid problems, there is a realistic opportunity for those companies in the private sector to disrupt and leapfrog in their market everywhere, be sustainable in emerging markets, and successful globally.

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The importance of good data

Much of the future of tech for good depends on good data. Whether for AI-based algorithms or to inform public policy, data is essential in understanding the problems and the possible impacts of technology-based innovation.

As an example, Global Good made a significant investment in creating and operating the **Institute for Disease Modeling**, which is one of the leading epidemiological modeling groups in the world. With predictive models based on stochastic methods, we can estimate the probability of certain outcomes and weigh the likely outcome of certain innovations vs. others to optimize impact and target product profiles as well as optimize implementation. These activities are proving fundamental to select and understand problems and identify the best possible solutions.

The power of AI: Better clinical decisions at lower cost

Some of the most transformative opportunities for medicine in our space lay at the intersection of medical diagnostics and artificial intelligence (AI).

A key gap in clinical care in low-income countries is the lack of specialists and clinical laboratory infrastructure. AI, combined with new developments in imaging, immunohistochemistry, materials science and genomics can deliver revolutionary clinical decision support systems that can make non-specialist clinicians, achieve or surpass the clinical effectiveness of the best specialists.

This is fundamentally important for low-income countries, where there are few specialists and almost no clinical laboratories. This is potentially also revolutionary for high-income countries because it can move medicine out of expensive tertiary care and into primary care, or in some cases the home, driving down costs, while improving clinical outcomes.

When innovation is approached in a multi-disciplinary way, there are significant opportunities to leapfrog to the state-of-the-art. Faced with a lack of clinical laboratories in low-income countries, we have found opportunities to transform diagnostic technologies using the latest developments in material science, genomics and imaging to provide point-of-care technologies that move the decision from central labs to the point of care. These innovations have the potential to even empower patients to monitor themselves at home, potentially changing the healthcare delivery model in some areas.

As an example, Global Good is working on AI-based ultrasound imaging, in which a deep-learning ultrasound machine can automatically detect the onslaught of pneumonia, and its progression, or response to treatment, with better predictive value than current standards of care involving X-rays and human specialist interpretation.

Other examples include AI-based automations in pathology, hematology, parasitology and microscopy as seen with the Global Good-developed **EasyScan_GO** microscope that we've introduced to the market with Chinese microscope company, Motic (see video below).

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Understanding the limits of AI and Big Data

There are some warning flags, however. Big data availability can lead us to believe that simply applying AI to any data set can solve any problem. Unfortunately, in medicine, sometimes a statistical correlation does not mean causation.

It is important that we recognize that much of what we call artificial intelligence today is actually statistical intelligence, and therefore better applied to problems that can benefit from probabilistic solutions.

It is also important that data training sets and ground truths be carefully developed with clinical validations. Understanding the limitations of the technology is key in developing useful products with the right clinical safety profile and predictive value.

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The future of automated quality diagnosis begins now.

Global good and motic introduce a breakthrough AI-powered microscope to fight drug-resistant malaria.

EasyScan GO Project Launch

Time to put artificial intelligence to work for the Earth

Dr Celine Herweijer

Innovation and Sustainability Leader, **PwC**

I n 2018 everyone is starting to see the business value of artificial intelligence (AI). It is being added to more and more things every year, and AI is getting smarter and smarter – accelerating human productivity and discovery. But as AI becomes more powerful and broader in its use and impact across industry, the unresolved issue of AI safety is paramount. The challenge, however, goes beyond guiding "human friendly AI" to ensuring "Earth friendly AI".

Over the last 70 years human pressures on our planet have grown exponentially, placing our climate, water, air, biodiversity, forests and oceans under mounting strain. **Scientists** have identified nine critical 'Planetary Boundaries' – limits to things like ocean acidification, freshwater use, air pollution, biodiversity loss and climate change – which we must stay within if we are to continue to survive and thrive. Apparently we have already exceeded four out of the nine.

Against this backdrop, how can we harness the intelligence and productivity gains of the AI revolution to create the sustainability revolution we so urgently need?

> **" Our Earth needs radical solutions: the good news is that we can now direct AI – one of the most powerful technologies that humans have ever created – towards these challenges. "**
>
> Dr Celine Herweijer

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The Fourth Industrial Revolution and the Earth – PwC findings

In our **recent research** over 80 applications of AI were identified that tackled climate change, bio-diversity and conservation, ocean health, water security, clean air and disaster risk. Here we out-line a selection of some of the identified "game changer" AI applications for Earth challenges:

- **Autonomous and connected electric vehicles.** AI guided autonomous vehicles (AVs) will enable a transition to mobility as a service over the coming years and decades. Substantial greenhouse gas reductions for urban transport can be unlocked through route and traffic optimisation, eco-driving algorithms, programmed "platooning" of cars to traffic, and autonomous ride-sharing services. Electric AV fleets will be critical to deliver real **gains**.

- **Distributed energy grids.** AI can enhance the predictability of demand and supply for renewables across distributed grids and improve energy storage, efficiency. It can also support load management, assist in the integration and reliability of renewables and enable dynamic pricing and trading, creating market incentives.

- **Smart agriculture and food systems.** AI augmented agriculture involves automated data collection, decision-making and corrective actions via robotics to allow early detection of crop diseases and issues, provide timed nutrition to livestock, and generally optimize agricultural inputs and returns based on supply and demand.

This promises to increase the resource efficiency of the agriculture industry, lowering the use of water, fertilisers and pesticides which cause damage to important ecosystems, and increase resilience to climate extremes.

- **Weather and climate science and forecasting.** A new field of "Climate Informatics" is blossoming that uses AI to fundamentally transform weather forecasting and improve our understanding of the effects of climate change. This field traditionally requires high performance energy-intensive computing, but deep-learning networks can allow computers to run much faster and incorporate more complexity of the 'real-world' system into the calculations. In just over a decade computational power and advances in AI will enable home computers to have as much power as today's supercomputers, lowering the cost of research, boosting scientific productivity and accelerating discoveries.

- **Smart disaster response.** AI can analyse simulations and real time data (incl. social media data) of weather events and disasters in a region enhance disaster preparation, provide early warning, and prioritise response through coordination of emergency information capabilities. Deep reinforcement learning may one day be integrated into disaster simulations to determine optimal response strategies, similar to the way AI is currently being used to identify the best move in games like Go.

■ **AI-designed intelligent, connected and livable cities.** AI could also be used to simulate and automate the generation of zoning laws, building ordinances and floodplains, combined with augmented and virtual reality (AR and VR). Real-time city-wide data on energy, water consumption and availability, traffic flows, people flows, and weather could create an "urban dashboard" to optimize urban sustainability.

■ **A transparent digital Earth.** A real-time, open-architecture, AI-infused digital geospatial dashboard for the planet would enable the monitoring, modelling and management of environmental systems at a scale and speed never before possible — from tackling illegal deforestation, water extraction, biodiversity loss, and air pollution, to informing smart agriculture and natural disaster response. We have the AI methods to do this, but we need collaboration for open source data and APIs, and ultimately a public good digital platform.

■ **Reinforcement learning for Earth sciences breakthroughs.** Evolution of nascent AI technique — which requires no input data, substantially less computing power, and where evolutionary-like AI learns from itself — could help tackle real-world problems in the natural sciences. Collaboration between AI pioneers with Earth scientists and engineers to identify the systems — from climate physics, materials science, biology, and other areas — which can then be codified to apply reinforcement learning for scientific progress and discovery is vital.

For example, DeepMind co-founder, Demis Hassabis, has suggested that deep reinforcement learning could be used to search for a room temperature superconductor — a hypothetical substance that allows electrical current to flow with zero lost energy, allowing for incredibly efficient power systems.

More broadly, innovations that enhance computational power, such as deep learning chips, distributed computing and quantum computing, will further scale and transform the opportunity to harness AI for the Earth. While classical computers cannot compute things the way nature does, advances in quantum computing will increasingly open doors for new scientific discoveries. They can be applied to quantum problems as they exist in nature and identify ways in which the Earth system really works, potentially leading to the discovery of new advanced materials for clean energy systems, or breakthroughs in climate and weather prediction.

Opportunities through collaboration

Harnessing the full opportunity of AI for the Earth will require decisive action and collaboration. As the pressing fields of AI safety, ethics, impact, and governance progress over coming years, sustainability considerations must be a core component. Industry groups including the Partnership on AI will have an important role to play, alongside AI research labs, governments and international bodies like the United Nations.

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Collaboration between AI experts, domain specialists in industry and academia, and authorities as well as philosophers and non-profits will also be key to helping us apply AI successfully to Earth challenges. As an example, the "**4IR for the Earth**" initiative – a collaboration between the WEF, PwC, and Stanford University – provides a platform to accelerate partnerships and projects between technologists, scientists, industry and governments that put AI to work for the planet.

Our Earth needs radical solutions: the good news is that we can now direct AI – one of the most powerful technologies that humans have ever created – towards these challenges.

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Fourth Industrial Revolution for the Earth
Harnessing Artificial Intelligence for the Earth
January 2018

pwc
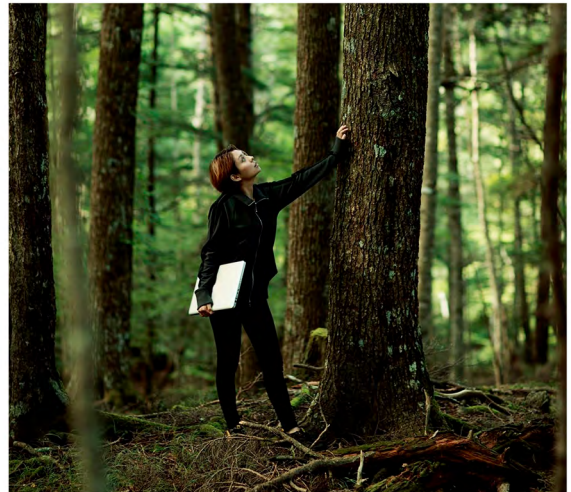
See pwc's full report on the Fourth Industrial Revolution and the Earth.

AI can help to bridge the digital divide and create an inclusive society

Uyi Stewart

Director of Strategy, Data & Analytics,
Bill & Melinda Gates Foundation

Globally, there are large disparities in access to health, education, etc. and the UN's Sustainable Development Goal No. 10 is aimed at reducing inequalities for the world's most vulnerable. For example, according to global association of mobile operators (GSMA), although eighty percent of the population in developing countries owns a mobile phone, still more than 1.7 billion women do not own one, according to a **recent report** on the subject.

Anecdotally, there are more mobile phones in the developing world than adults. We see an increasing number of apps and services that are now being offered digitally. For example, mobile banking through M-PESA in Kenya, Go-Jek's ride-sharing platform in Indonesia, etc. Moreover, cheap alternatives to text messaging and social networking platforms have enabled more people to communicate information with each other in the last decade than anything has in over a century since the discovery of the telephone. **Two hundred million people actively use WhatsApp in India**, while **16 million Nigerians visit Facebook every month**.

"AI applications offer enormous opportunities for the developing world to bridge the digital divide and create a more inclusive society."

Uyi Stewart

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AI solutions to global challenges

This widespread digitization of human activity generates the truly massive data sets necessary for Artificial Intelligence (AI) applications and solutions. AI – an area of computer science that is thriving due to the abundance of data – is focused on enabling computers to perform functions normally associated with human cognitive behaviour.

The confluence of computing power and big data are enabling data scientists and engineers to develop AI applications and solutions which can handle increasingly complex problems, many of which are helping to bridge the digital divide and create an inclusive society. For example, **disaster maps**, have enabled relief organizations to better target emergency response and governments to allocate resources where it is needed the most.

The SDGs need a boost.

ICTs can help us do more – **faster**.

Join the #ICT4SDG campaign

10 REDUCED INEQUALITIES

▸ Stay current with fresh examples of how tech is boosting the SDGs
▸ Share your successes globally
▸ Use our communications tools

fast forward together **#ICT4SDG**

In fighting Ebola in Sierra Leone in 2014, **IBM Research-Africa implemented a crowdsourcing platform** for locals to communicate their experiences with government officials. Using natural language processing, the platform teased out cultural beliefs behind people's willingness to adopt a public health measure and allowed governments to redesign more targeted, effective campaigns.

In Rwanda, researchers **used anonymized metadata from cellphone networks to develop high-resolution maps of the geographic distribution of wealth**, a method that can be useful in contexts where recent census or household survey data are unavailable – allowing aid organizations to take their programs where we did not even know needs existed.

Accenture's Responsible AI is partnering with National Association for the Blind in India to **develop workforce accessibility solutions**, while Google.org is working with Pratham to **use its internal artificial intelligence API to expand the number of e-books available to children in their mother tongues**.

Integrating human ability into AI solutions

The biggest and largely unexplored opportunity for AI to help bridge the digital divide is to integrate human ability into its solutions. The UN Food and Agriculture Organization recommends one agricultural **extension** worker per 400 farmers. However, in Africa, on average, there is one extension worker per 3000 farmers. Extension workers were critical to the agriculture transformation in the US and can have similar impact in the developing world.

Therefore, in Africa, since the number of extension workers is unlikely to increase in a short time, augmenting human capacity with the power of AI can enable them to support more farmers to achieve better productivity outcomes.

AI to address the skills deficit in health care

Similarly, in health care, the percentage of skilled workers in the developing world to address the societal needs is daunting. British Medical Journal reports that less than 3% of global supply of trained medical professionals are present in Sub-Saharan Africa despite weathering 24% of the world's disease burden.

In South Asia, there is 0.7 trained doctors per 1000 people, most of whom are concentrated in urban and town areas. The World Health Organization (**WHO**) estimated that 57 countries worldwide have a critical shortage of health workers, equivalent to a global deficit of 2.4 million doctors and nurses. Based on AI-powered advancements in telemedicine, mobile doctors, and virtual classrooms, it stands to reason that AI can help address the skills deficit in healthcare and create an inclusive society.

The importance of ethics when implementing AI technologies

Working with the world's most vulnerable population puts an enormous responsibility on AI practitioners to be ethical, transparent, and intentional in how we implement AI technologies. We need to pay attention to practical challenges on the ground in executing on the promise of AI. For example:

■ Data protection laws are still **formulating** in most parts of Asia, Africa and Latin America. Government officials must develop capacity to understand and question all aspects of the data value chain. AI practitioners must be careful to inform people on what data they are using, how they are analysing it, and the underlying assumptions for the insights generated from the data.

■ Regarding gender equality, if we don't pay attention to the data itself, we will further widen the gap in many communities where they exist. In many systems, human engineers select the data features around which algorithms build their models. So, while a machine is not inherently biased, its code may include assumptions that reflect the implicit, unconscious biases of its human creators. Thus, if we only take AI on its face value (without intentional scrutiny by AI practitioners), we will extend the growing digital divide and hurt the most vulnerable in these societies.

■ When AI generates the powerful insights, how will communities in the rural parts of the developing world consume them? A 2016 United Nations Educational, Scientific and Cultural Organization (UNESCO) **report** estimated that there are 758 million illiterate adults in the world, roughly two-third of whom are female. AI practitioners need to be cognizant of including everyone in AI innovation, and press harder to include under-resourced languages for a more diverse dissemination of insights.

Despite these limitations, AI applications offer enormous opportunities for the developing world to bridge the digital divide and create a more inclusive society. Most importantly, as sci-entists and practitioners, we must hold ourselves accountable to ethics and intentional scrutiny of AI applications to ensure tomorrow is better than today.

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Why 'AI for Good' is gaining ground

Stephen Ibaraki

Managing partner, **REDDS** Venture Investment Partners

The 4th Industrial Revolution continues to demonstrate what I call exponential "**A Triple C**":

- accelerating *Automation*;
- time *Compression* in new innovations;
- *Convergence* in physical and digital existences;
- ubiquitous *Connectivity*.

Perhaps nowhere is this "A Triple C" dynamic more on display than in the realm of artificial intelligence (AI), which is expected to underpin many of the key emerging technologies and power business growth across industries.

It's clear that AI is becoming the new electricity, and its rapid proliferation has happened in a very short span of three years — with a large leap in the past 12 months. But what's really exciting is AI's potential to improve lives at a pace and scale not seen before.

Aiding this potential is a significant business and investment shift toward a greater focus on social good. Taken together, these dynamics are now resulting in a rising number of use cases for the application of AI to accelerate progress on the United Nations' Sustainable Development Goals (**SDGs**).

> **❝ *What's really exciting is AI's potential to improve lives at a pace and scale not seen before.* ❞**
>
> Stephen Ibaraki

Let's examine the elements of this progress along multiple dimensions.

Sea-change in global business sentiment

"Society is demanding that companies, both public and private, serve a social purpose," wrote **Laurence Fink**, founder and CEO of the world's largest investment firm **BlackRock**, recently in widely publicized **letter to CEOs**. "To prosper over time, every company must not only deliver financial performance, but also show how it makes a positive contribution to society."

It's truly significant for the leader of an investment firm managing more than 6 trillion USD in investments to take this position across its portfolio of investment in 2018. And it's indicative of a broader business focus on social good.

In addition, more companies are looking at ways to leverage AI for social good. Some of the world's top companies in market value (Apple, Google, Microsoft, Amazon, Facebook) are involved in the **Partnership on AI** to Benefit People and Society, taking a forwarding-thinking, sustainable position on AI.

AI, the new electricity

Former head of AI for the Chinese Internet giant Baidu, Andrew Ng, recently announced a $175 million fund for AI startups focused on human life improvements. This also aligns with the trend towards social good.

"In the early days of electricity, much of the innovation centred around slightly different improvements in lighting. While this was an important foundation, the really transformative applications, in which electric power spurred massive redesigns in multiple industries, took longer to be grasped," said Ng. "AI is the new electricity, and is at a similar inflection point."

Google CEO Sundar Pichai also recently said: "AI is probably the most important thing humanity has ever worked on. I think of it as something more profound than electricity or fire."

AI for the SDGs

The United Nations and its UN agencies and organizations are facilitating the global AI trend as it applies to driving the **17 SDGs**.

In 2016, use cases of AI for SDGs were hard to find. Now into 2018, there is a proliferation of AI applications for SDGs.

Here are just a few examples:

SDG 1: No poverty
AI will provide real-time resource allocation through satellite mapping and data analysis of poverty.

SDG 3: Good health and well-being
Preventative healthcare programs and diagnostics are significantly improved through AI, leading to new scientific breakthroughs. For example, eight billion mobile devices with smartphone cameras are being used to diagnose heart, eye and blood disorders.

SDG 9: Industry innovation and infrastructure
New hybrid manufacturing incorporating AI, IoT sensors, and 4D printing is reshaping industries and yielding exponential innovation.

SDG 17: Partnerships for goals
The UN is beginning to play a key role in bringing together governments, industry, academia and civil society to explore the responsible development of human-centric AI in solving humanity's challenges.

AI for Good

Capturing these sentiments is the 2nd AI for Good Global Summit hosted in 2018 by ITU in partnership with the ACM (the largest computer science research, educational, innovation organization), XPRIZE Foundation (the global leader in incentivized prize competitions) and more than 20 UN organizations.

The Summit, which will be held at the ITU Headquarters in Geneva from 15–17 May 2018, will build on the success of the last year's event and spur action to ensure that AI accelerates progress towards the SDGs.

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Information poverty and algorithmic equity: Bringing advances in AI to the most vulnerable

Naroa Zurutuza

Applied AI Lead, **UNICEF Innovation**

Which route should I take this morning when I drive my child to school? I check Google Maps and it tells me to avoid the main road due to heavy traffic. It's good that I checked because I'm in a rush and I can't be late to my next appointment at work. On the way there, my daughter tells me about her homework for the day: she has been paired with a student in Finland and she needs to write a letter for him. "How do you understand each other?" I ask her. "We use our tablets to translate," she replies with no surprise. We finally reach school. I drop her off and I keep listening to the news on the radio while I order groceries online using the personal assistant on my phone.

This is a familiar life to many of us. In wealthy countries, AI and machine learning are becoming part of our everyday lives. If you live in a connected place, you'll have access to the information necessary to survive; you'll also have access to good quality education and health care. However, these advances don't reach many of the world's most disconnected people, and AI and machine learning are threatening to leave them behind.

❝ *We also need to make sure that AI solutions reach the most vulnerable.* **❞**

Naroa Zurutuza

A digital gap that we need to bridge

Inequitable distribution of information sources and content leads to a generation of children who are not able to access the ideal mix of information necessary for them to be successful in life. These systemic challenges stem from a lack of infrastructure (there are not enough mobile phone towers in a community); lack of appropriate content (children in the Amazon don't have 'apples' so they're not a helpful learning object); as well as biases of ethnicity, belief, and culture.

According to ITU, by 2020, 2 billion people will still be excluded from the Internet and thus, left behind the AI revolution. But how can we bridge this gap? How can we create an inclusive society where every child has equitable access to opportunity and choice?

How can we use new sources of data such as satellite imagery — and combine them with AI models that take advantage of underlying patterns — to map every school in the world? How can we optimize the delivery of educational content to ensure that children are prepared for the jobs of the future? How can we look at advances in facial recognition to understand a child's nutritional status from a photograph? How can **predictive models** help us prevent the spread of a disease?

The school mapping example

Let's take a closer look at the school mapping example. Having accurate data around schools is essential for organizations to provide quality education, promote lifelong learning (United Nations (UN) Sustainable Development Goal 4 (**SDG4**)), ensure equal access to opportunity (UN **SDG10**) and eventually, reduce poverty (UN **SDG1**).

But this is a challenging task, where records around educational facilities are often inaccurate, incomplete or non-existent. To solve this problem, UNICEF Innovation is working with academic and private sector partners to explore the potential of Convolutional Neural Network (CNN) based algorithms — taking advantage of underlying patterns recognized from very high-resolution satellite imagery to automatically map schools — mapping the unmapped, and making visible the invisible.

UNICEF is exploring how Algorithmic Equity and Information Poverty can play key roles in the preparedness, resilience, and recovery of the human species for the changes that are to come. The challenges are many.

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MagicBox – **Information Poverty**

Making sure AI solutions reach the most vulnerable

First is the lack of quality training sets. Data around the most vulnerable populations is often scarce and inaccurate. As a collective, we need to start putting more resources towards collecting data from the ground, to validate existing records, and to debias these datasets.

But what happens once we have diverse, good quality datasets? We still need to keep working together to ensure that the data is used to build fair, inclusive algorithms. At UNICEF, we need to make sure that we are part of the conversations that are happening globally, so that we can bring the voice of children, in particular the most vulnerable, to the table.

We also need to make sure that AI solutions reach the most vulnerable. To do this, we need to set some minimum standards around the quantity and quality of information that children should have access to – and use these to identify connectivity and infrastructure gaps that we need to address in order to improve children's access to information and education.

This is a challenging task and thus, we are looking to you to help us explore the future of the space of AI and machine learning for global good.

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How can we create social good through AI?

Neil Sahota

IBM Master Inventor and World Wide Business Development Leader, **IBM Watson Group**

As a Master Inventor at IBM, I'm part of the team responsible for helping the company become the leading recipient of U.S. patents for the last quarter century. While most people think of commercialization, IBM has a strong commitment to Social Good and also focuses innovation towards the United Nations' 17 Sustainable Development Goals (**SDGs**), which aim to eradicate things like poverty, hunger, disease, and more.

These are game-changing initiatives that definitely require new ideas. That's why IBM has launched **Watson for Social Good** to help organizations leverage Artificial Intelligence (AI) for the betterment of the world.

The AI capabilities of InvestEd

A great example is **InvestEd**, of which I am a team member, and ITU is a global partner. They started off by realizing they could commercialize and create social good at the same time by enabling financial education and facilitating microloans for small businesses in emerging markets.

> **" These are a just a few initiatives for Social Good. We still have plenty of opportunities out there, so I challenge you to get started. "**
>
> Neil Sahota

By helping these small businesses grow, they added more value to the small, local communities. And to make their product even better, InvestEd is adding AI capabilities to widen their offerings and provide a more innovative user experience.

InvestEd is leveraging AI to improve and personalize the story telling in its educational modules. In addition, using AI capabilities like Watson's psychographic profiling, it can facilitate better risk management practices for the banks issuing micro loans based on the need and likelihood of repayment.

As a result, InvestEd is helping to fulfill three SDGs:

SDG 1: **No poverty**
Improving financial literacy and optimizing available financial resources.

SDG 3: **Good health and well-being**
A curriculum on how to invest for healthy pregnancy and match-making services for rural health care.

SDG 8: **Decent work and economic growth**
Entrepreneurship education, best practices, how microloans work, and the fundamentals of creating a profitable business that positively impacts the local community.

Chatbots and small differences made big

Also consider chatbots: While they've become increasingly prevalent, there's a huge opportunity for social good. For instance, IBM has invested in **Chatbots** for good which provide free help in some areas of law, therapy, and quitting smoking, to name a few. The potential here is incredible. Think across all the SDGs. We could build chatbots that help build awareness, drive behaviour, and install action in people to make small differences… but small changes done right can make a huge difference!

At a micro level, it's much more difficult to recognize the impacts. For example, I stopped shaving with water to reduce my water consumption. When people hear this, they often say it doesn't 'move the needle'. In the grand scheme of things, it probably doesn't. On average, we use about 1 gallon of water to shave our face.

However, what if my attitude inspired a 100 people to do the same thing? Ok…. But does 100 gallons of water per day move the needle? What if those 100 people inspire 100 people each? Does 10 000 gallons per day move the needle? At some point, it does. This is where I hope more people will use the Chatbots for Good.

If we had a little better understanding on how small changes create an impact, it would help us change our behaviour at a macro level. This really adds up across the entire population. This just won't move the needle for us; it'll help us move mountains.

Preserving life below water and life on land

Thinking about wildlife, let's consider the great work of **PAWS**, an organization that uses machine learning to predict where poachers may strike, or Dr Eric Elster, who worked with the Walter Reed National Military Medical Center to apply machine learning techniques to improve the treatment of U.S. service members injured in combat. Through their work, they're helping to fulfill **SDG No. 14**: Life Below Water, and **SDG No. 15**: Life on Land.

IBM's long-term commitment to climate action

Likewise, **IBM Green Horizons** uses cognitive computing to develop solutions in renewable energy, climate change, and traffic management. The goal is to use AI to identify sustainable opportunities to support **SDG No. 9**: Industry, Innovation, and Infrastructure, and **SDG No. 11**: Sustainable Cities and Communities, and **SDG No. 13**: Climate Action. Green Horizons is a 10-year initiative, and more importantly, it has commitment by IBM because the company recognizes that real solutions take time, commitment, and investment.

AI for social good – some helpful tips to get you started

These are just a few initiatives for Social Good. We still have plenty of opportunities out there so I challenge you to get started. To help, here are three best practices for people who want to make a difference.

First, build your understanding of what AI is and is not. Leverage great online learning, such as **Intro to Artificial Intelligence** on Udacity.

Second, forget what you know and think differently. AI is the third generation of computing and a very different computing model. Don't focus on use cases and scenarios. Think about the problem to solve. Consider the ideal scenario and the best possible solution, and then see if AI can help.

Third, set aside bias. This might include some surprising areas. For example, people seem to be more honest in sharing health or financial information with a machine than a person because they don't worry about being judged. This means that AI gets more accurate data to provide more meaningful recommendations.

Therefore, knowing that a machine might be as capable as a person (in some areas) could unlock whole new capabilities. People (or organizations) who do this create more value, and drive more innovation, because they're leveraging a great set of AI capabilities.

As you can see, when it comes to AI and recent initiatives with IBM Watson, the social good possibilities are endless.

Technology will only continue to become more advanced, creating new opportunities to fix societal problems related to health, sustainability, conservation, accessibility, and much more. If you're thinking of jumping into AI for good, just remember the most important rule: think differently.
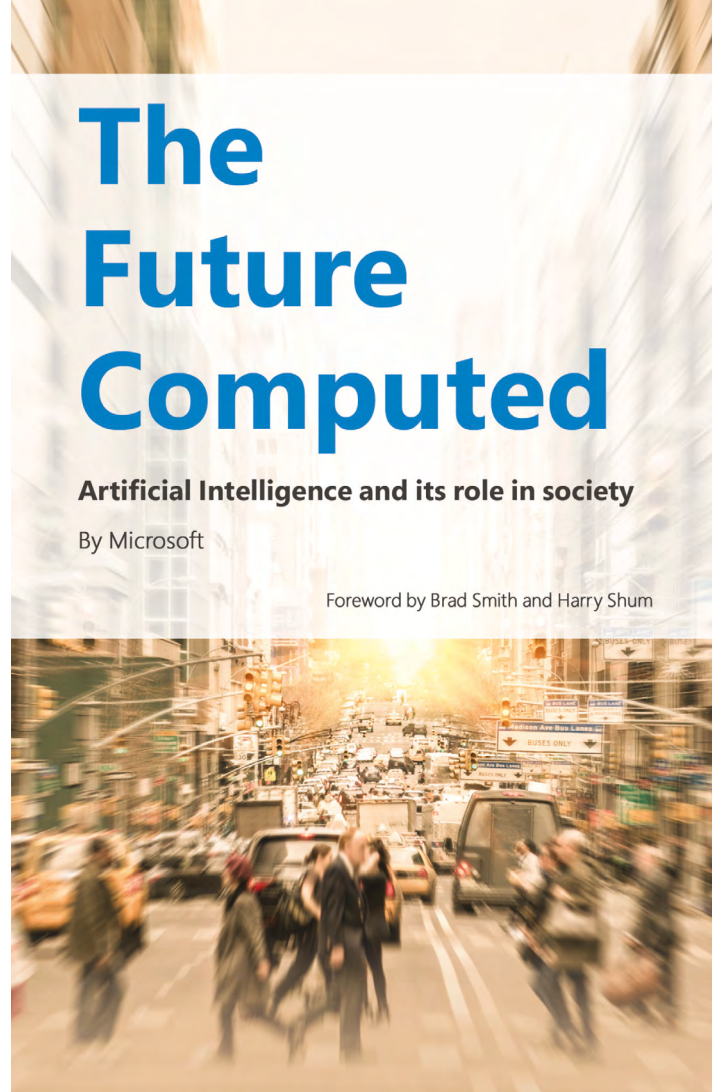
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Microsoft's take on Artificial Intelligence and its role in society

The Future Computed

Artificial Intelligence and its role in society

By Microsoft

Foreword by Brad Smith and Harry Shum

I magine personal digital assistants trained to anticipate our needs, help manage our schedule, prepare us for meetings, assist as we plan our social lives, reply to and route communications, and drive cars.

In a **recent report**, Microsoft predicts that Artificial intelligence (AI) will soon help us do much more with one of our most precious commodities: time.

Some key conclusions from the report:

- The companies and countries that will fare best in the AI era will be those that embrace these changes rapidly and effectively.

- Second, while AI will help solve big societal problems, we must look to this future with a critical eye.

- Third, we need to act with a sense of shared responsibility, because AI won't be created by the tech sector alone.

In addition, here's one of Microsoft's most important conclusions: "Skilling-up for an AI-powered world involves more than science, technology, engineering and math. As computers behave more like humans, the social sciences and humanities will become even more important."

Read more about where AI is going, and the new societal issues it has raised, in **The Future Computed**: Artificial Intelligence and its role in society.

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AI and jobs: Key steps governments can take to limit job displacement

Dr Matthew Fenech

AI Research & Advocacy Consultant,
Future Advocacy

News items about advances in artificial intelligence (AI) are coming thick and fast these days. As AI systems become better at sorting data, finding patterns, and making predictions, these algorithms are undertaking an ever-increasing range of tasks, from filtering email spam, to delivering takeaways, to tackling more sophisticated problems such as providing legal advice or deciding whether you are paid a visit by the police.

With this global focus on AI, it is perhaps unsurprising that increased attention is being paid to the impact of AI-powered automation on jobs and employment. Just as the Industrial Revolution drove automation of repetitive physical work, the 'Intelligence Revolution is predicted to have the same effect on a widening range of intellectual tasks, meaning that more jobs can potentially be performed by robots and computers.

> **" Our work suggests that automation will impact different geographic regions differently. "**
>
> Dr Matthew Fenech

A number of high-profile studies have predicted high levels of job displacement as a consequence of automation across developed economies. Most recently, the Organisation for Economic Cooperation and Development (OECD) found that 14% of jobs in 32 participating countries are at high probability of automation, with a further 32% of jobs likely to be significantly changed by automating technologies. These figures are somewhat lower than previous estimates by Oxford academics Carl Frey and Michael Osborne in 2013, or by consultancy PwC earlier this year, but are higher than the OECD's own estimates from 2016.

There is in fact great disagreement among economists both on how many jobs are likely to be displaced by AI-fuelled automation, as well as whether the work that is automated will be replaced by new (and possibly more fulfilling) alternative work. The history of the Industrial Revolution would suggest that more jobs will be created than are lost. History does not always repeat itself, however: if machines become better than humans at intellectual tasks, what will be left for humans to do? One thing that almost all economists agree on is that change is coming and that its scale and scope will be unprecedented.

A UK study on AI and automation

In order to encourage a more sophisticated understanding of the future of work, and to increase political engagement with this topic, we applied calculations of the automatability of jobs in different industrial sectors to United Kingdom Parliamentary constituency-level employment data. Our findings are startling. Although the overall figure for the whole of the UK is that 30% of jobs are at high risk of automation by the early 2030s, when looking across the country, the proportion of jobs at high risk varies from 22% to 39%. Most significantly, the highest levels of future automation are predicted in Britain's former industrial heartlands in the Midlands and the North of England (**Figure 1**). These are areas which have already suffered from deindustrialization and many of them are already unemployment hotspots. Factors that predicted a higher proportion of high-risk jobs included a reliance on jobs in the manufacturing and transport/logistics sectors in the local economy.

Our report also included opinion poll data from our annual survey of the UK public's attitudes to AI. The poll shows that despite evidence suggesting high levels of automation are coming, only 7% of respondents said they were worried about the impact of automation on their own jobs, and only 28% were worried about jobs in their local area (**Figure 2**). It seems a deeper public debate about the future of work is urgently required.

Figure 1

'Heat map' showing how the potential impact of automation could vary across Great Britain. Each constituency is colour-coded according to the percentage of current jobs that are at high risk of automation by the early 2030s.

Geographical differences in the impacts of automation
Jobs at potential high risk of automation by parliamentary constituency

0   24 28 32 36 40%   100%

632 CONSTITUENCIES
Lowest: 21.8%, Edinburgh South
Highest: 39.3%, Hayes and Harlington

Note: Data shown excludes 'Agriculture, Forestry & Fishing' sector

Edinburgh
Glasgow

Newcastle

Leeds

Manchester
Liverpool
London

Lincoln
Norwich

Leicester
Birmingham

Cardiff
Bristol

Sources:
Data: (1) ONS Crown Copyright Reserved / from Nomis on 26.07.2017
(2) PricewaterhouseCoopers LLP (2017) All rights reserved – see main text
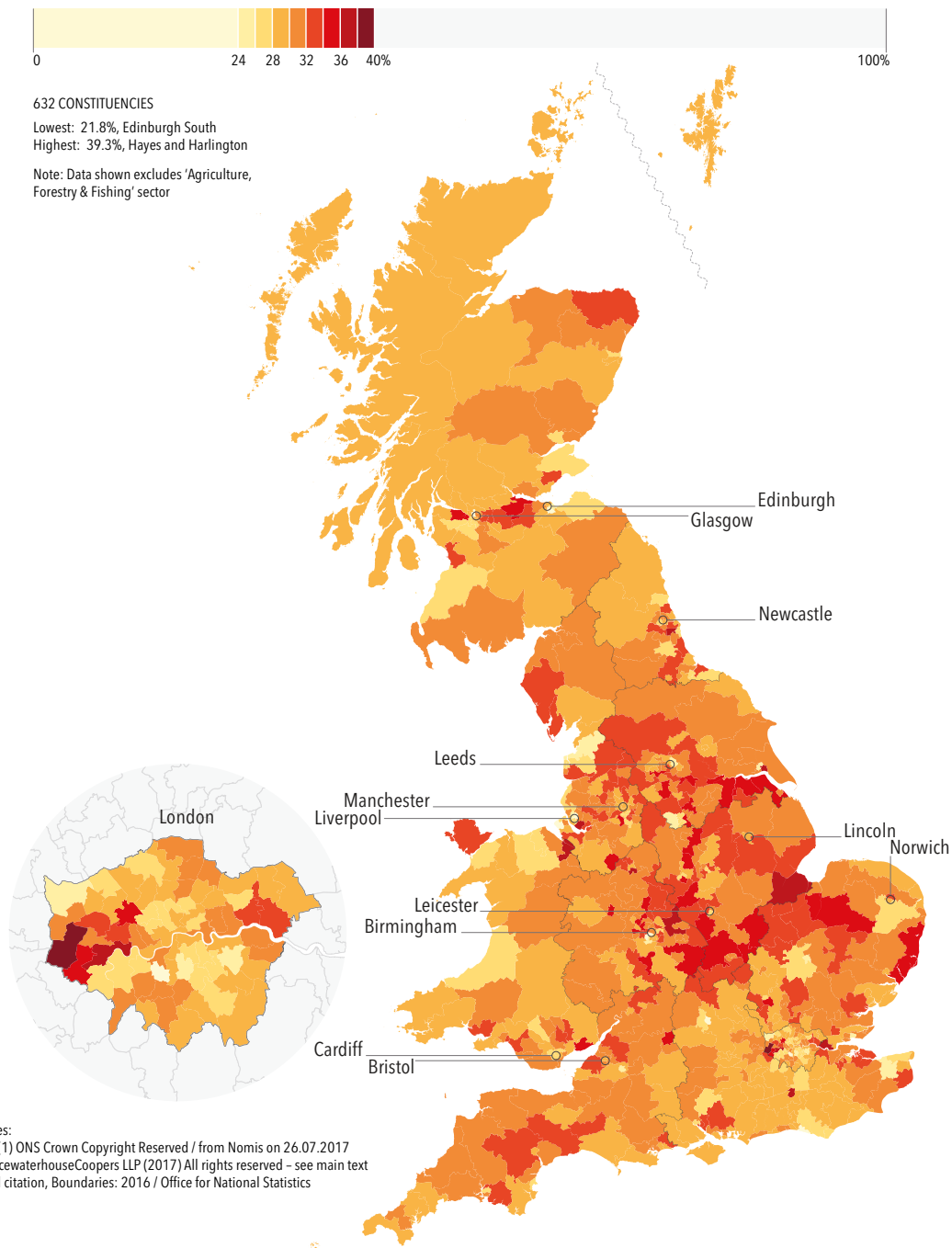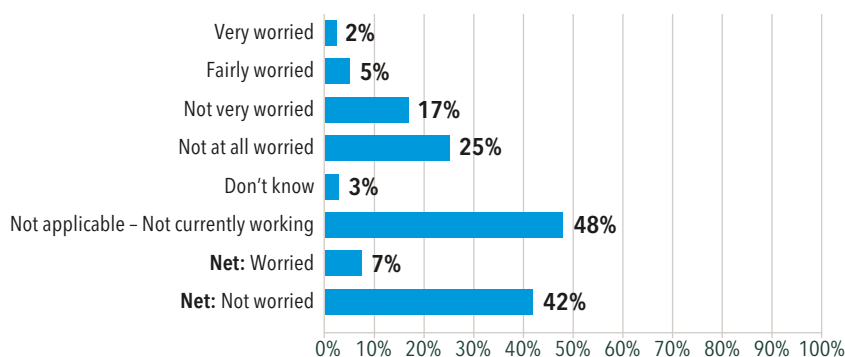for full citation, Boundaries: 2016 / Office for National Statistics

Figure 2

Results of our survey of public attitudes towards artificial intelligence (conducted by YouGov). A weighted, representative sample of UK adults was asked how worried they are about (a) their jobs and (b) jobs in their local area being replaced AI and other automating technologies.

ARTIFICIAL INTELLIGENCE: YouGov Poll 2017

FUTURE ADVOCACY

How worried, if at all, are you that your job will be replaced by AI (e.g robots, machines) in the near future?

Very worried	2%
Fairly worried	5%
Not very worried	17%
Not at all worried	25%
Don't know	3%
Not applicable – Not currently working	48%
Net: Worried	7%
Net: Not worried	42%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

British people tend not to be worried that their jobs will be replaced by Artificial Intelligence, robots, or machines in the near future

Total sample size was 2108 adults. Fieldwork was undertaken between 29th September – 2nd October 2017. The survey was carried out online. The figures have been weighted and are representative of all UK adults (aged 18+).

a) British people tend not to be worried that their jobs will be replaced by AI in the near future.

ARTIFICIAL INTELLIGENCE: YouGov Poll 2017

FUTURE ADVOCACY

How worried, if at all, are you that jobs in your local area will be replaced by Artificial Intelligence (e.g. robots, machines) in the near future?

Very worried	7%
Fairly worried	21%
Not very worried	37%
Not at all worried	25%
Don't know	10%
Net: Worried	28%
Net: Not worried	62%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

British people tend not to be worried that jobs in their local area will be replaced by Artificial Intelligence, robots, or machines in the near future

Total sample size was 2108 adults. Fieldwork was undertaken between 29th September – 2nd October 2017. The survey was carried out online. The figures have been weighted and are representative of all UK adults (aged 18+).
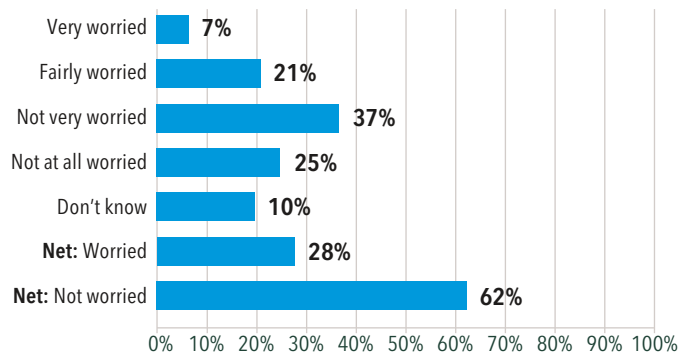
b) British people tend not to be worried that jobs in their local area will be replaced by AI in the near future.

Automation – likely to impact regions differently

Our work suggests that automation will impact different geographic regions differently. This point is also made by other researchers, including those at the OECD and PwC, who have predicted differential impacts of automation on different genders and socioeconomic classes. With these differential impacts comes the risk of exacerbating existing socioeconomic inequalities.

A recent Brookings Institution report found that although the economy has grown due to automation, the share going to worker earnings has shrunk. Unequal distribution of the proceeds of automation may have destabilizing effects on societies worldwide.

As artificial intelligence supercharges automation over the next decade, and this hits distinct groups differently, there will be profound social and political consequences. Any policy response to the challenges of the future of work must take account of how automation will impact different groups of people.

Governments – maximizing the opportunities and minimizing the risks of automation

Future Advocacy suggests that governments could take the following steps to maximize the opportunities and minimize the risks of automation:

- **Commission and support detailed research to assess which employees are most at risk of job displacement by automation in their countries.** It is essential that we better understand how impacts will differ by employment sector, geography, age group, gender, educational attainment and socio-economic group.

- **Develop smart, targeted strategies to address future job displacement, based on the results of research into the differential impact of automation by sector, region and demographic group in their countries.** The importance of targeting these interventions to those most at risk cannot be overemphasised. Such interventions could include supporting businesses to retrain employees, and providing financial and psychological support to the people impacted.

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- **Adapting the local education system to maximize the opportunities and minimize the risks created by AI.** While STEM skills will be crucial in the future world of work, education systems should not restrict themselves to focusing on these alone. They must provide forward-looking and future-proof training in creativity and interpersonal skills, which will be less automatable in the longer term. Lifelong learning, student-led learning, and the personalization of education will underpin the resilience and adaptability necessary to thrive in the workplace of the future. Lastly, educational policy must also support initiatives that encourage underrepresented sectors of society (including women and ethnic minorities) to receive training in AI development and deployment.

- **Conduct research into alternative income and taxation models that result in fairer distribution of the wealth that these technologies will create.** This could include undertaking well-designed trials of Universal Basic Income along the lines of those currently underway in Finland, Scotland and Canada. Fiscal and welfare policies must be updated to ensure that wealth is not increasingly concentrated in the hands of a few commercial entities who own robots and other automated technologies.
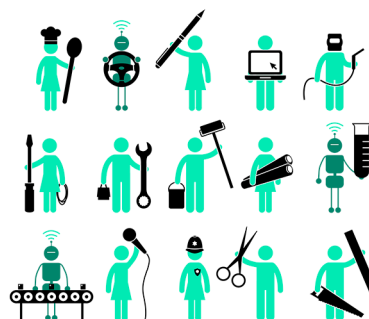
THE IMPACT OF AI IN UK CONSTITUENCIES:
Where will automation hit hardest?

See Future Advocacy's full report on The Impact of AI in UK Constituencies.

Is Blockchain a branch of AI, or is AI a branch of Blockchain?

Toufi Saliba

CEO, **Toda Algorand**, **PrivacyShell** and Chair, **ACM** Practitioners Board Conference Committee

We are extremely subjective in defining "intelligence", let alone "artificial intelligence" (AI). However, there's a general consensus around the definition of "intelligence". According to **Alex Wissner**, intelligence is a force, *F*, that acts so as to maximize future freedom of action. To most people, AI is basically robots walking around looking like humans. For most AI scientists, subjectivity still carries a huge weight in defining AI. In most cases, AI is still compared to human intelligence. However, what if we don't recognize AI when we see it?

While many used to argue that Bitcoin itself is not a branch of AI, the majority of folks agreed, that it is at least the longest-standing independent artificial life (AL) that owns itself. In a previous **article** for ITU, I wrote about a branch of AI called Multi Agent Systems (MAS).

Blockchain is an evolved version of MAS, specifically Bitcoin Blockchain is permissionless, borderless, resilient to attacks, driven by the crypto-economy and incentivizes millions of people to work on it and its evolution. Its primary set of devices compete for resources, it is byzantine fault tolerant, and has strong preventions from sybil attack.

> **❝ We should continue cooperating and ensure proper security is met while creating the most powerful instruments in the history of humanity. ❞**
>
> Toufi Saliba

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The technology continues to evolve and prevail. Certain advances in network protocols may allow it to become mainstream and efficiently scalable, while maintaining deep decentralized governance.

Can we learn from Blockchain and apply it to other autonomous AI systems?

The **AI for Good Global Summit**, which will take place from 15 to 17 May, in Geneva, Switzerland, will be one of the most influential AI summits in the world. For thousands of years, if we take a look at wars between two or more groups of people, all parties involved appeared to have "good" intentions to their own group. Yet, the "good" on one side rarely ever equals "good" across the board. How would a group of 300+ top AI scientists in Geneva ensure that "AI for Good" is in fact really good?

What if you successfully make AI good for every human being and then you pass the control of it to someone else who then changes the "good" part? What if the attack on a centrally controlled AI is initiated from within? Can you imagine the possibility that the power of AI we are building is maliciously used against the next generation of homo sapiens by other groups of homo sapiens? Or against a selected group? Could this be the most pressing issue that every human being should be worried about?

As part of the AI for Good Global Summit, the AiDecentralized Track will play a key role in introducing some of the attack vectors that most AI Practitioners are unaware of, and possibly a route towards a solution using some of the science learned from the Blockchain evolution. AiDecentralized is an ACM global initiative to bring 870 000 AI practitioners in the world together with 280 000 blockchainers and cryptographers. The intent is for folks to collaborate and increase AI security and ensure it is well thought out in advance, towards a true "good" for all homo sapiens.

Continuing to cooperate to ensure security

Autonomous Decentralized Governance is a security model, and like any security model, you are as good as your weakest link. It is not possible to have one central control system; it will be exploited eventually. If we have learned anything from history, it is the beast in each and every one of us that we should fear the most, not AI replacing our jobs. Quoting Yuval Noah Harari: "Sapiens rule the world, because we are the only animal that can cooperate flexibly in large numbers." We should continue cooperating and ensure proper security is met while creating the most powerful instruments in the history of humanity.

◤

About the 1st AI for Good Global Summit held in 2017

Here are a just a few of our expert speakers from last year's Summit.

You can view also view more than 80 AI expert videos from the Summit on the **YouTube playlist**.

> *As soon as that happens they [machines] will be able to read anything the human race has ever written.*

Stuart Russell
Professor of Computer Science,
University of California

See interview

> *We need organizations like the United Nations, governments, philanthropy, to work together towards goals that are important for the whole of humanity, and not just the typical applications that companies will look at.*

Yoshua Bengio
Head of Montreal Institute for Learning Algorithms (MILA)

See interview
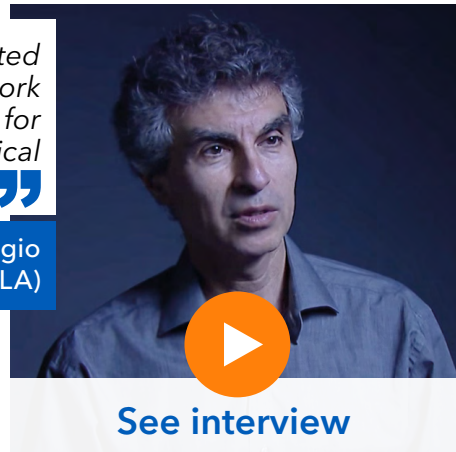
> *My mission [coming here] was to get people to think about a new model, and that new model is AI not done by corporations, not done by individual academic labs.*

Gary Marcus
Professor of Psychology and Neural Science,
Dept. of Psychology, New York University

See interview

Read the 2017 Summit Report

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