ITU News MAGAZINE

No. 3, 2019

AI for Good: Paths forward

Progress through innovation

ITUEvents

AI for Good Global Summit

Accelerating progress towards the SDGs

28-31 May 2019
Geneva, Switzerland

#AIforGood

In partnership with

XPRIZE

acm

Organized by

ITU

Register NOW!

You can register to participate on-site

or

You can register to participate remotely

Here's how

New opportunities, new challenges for AI

Houlin Zhao

ITU Secretary-General

Artificial intelligence (AI) will transform our lives. The question is: will it be for better or for worse? At ITU, we are working hard with partners across the world to ensure the trusted, safe and inclusive development of AI technologies – and equitable access to their benefits.

That is why we organize the annual AI for Good Global Summit, the leading United Nations summit on how to harness the power of AI to improve lives worldwide.

The Summit connects AI innovators with those seeking solutions to the world's greatest challenges so as to identify practical applications of AI that can accelerate progress towards the UN Sustainable Development Goals.

This year's Summit is organized into five "Breakthrough Tracks": AI and Health; AI and Education; AI and Human Dignity and Equality; Scaling AI and AI for Space. There will also be sessions on the future of Smart Mobility, AI and agriculture, AI's role in arts and culture, the unintended consequences of AI – and much more.

In addition, the Summit will showcase the latest in AI technologies – from drones, exoskeletons, and robotics to avatars, autonomous cars, and AI-powered health solutions.

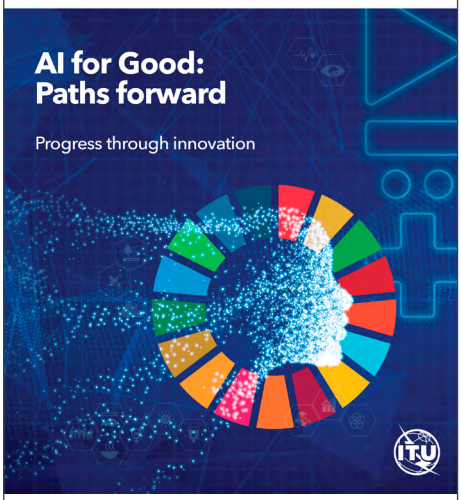
In this edition of ITU News, you will find key insights from a diverse range of experts and leaders in AI, many of whom will be speaking at the Summit. We hope you find these insights useful.

> *"At ITU, we are working hard with partners across the world to ensure the trusted, safe and inclusive development of AI technologies."*
>
> Houlin Zhao

AI for Good: Paths forward

Progress through innovation

ITU News MAGAZINE
No. 3, 2019



Cover photo: Shutterstock

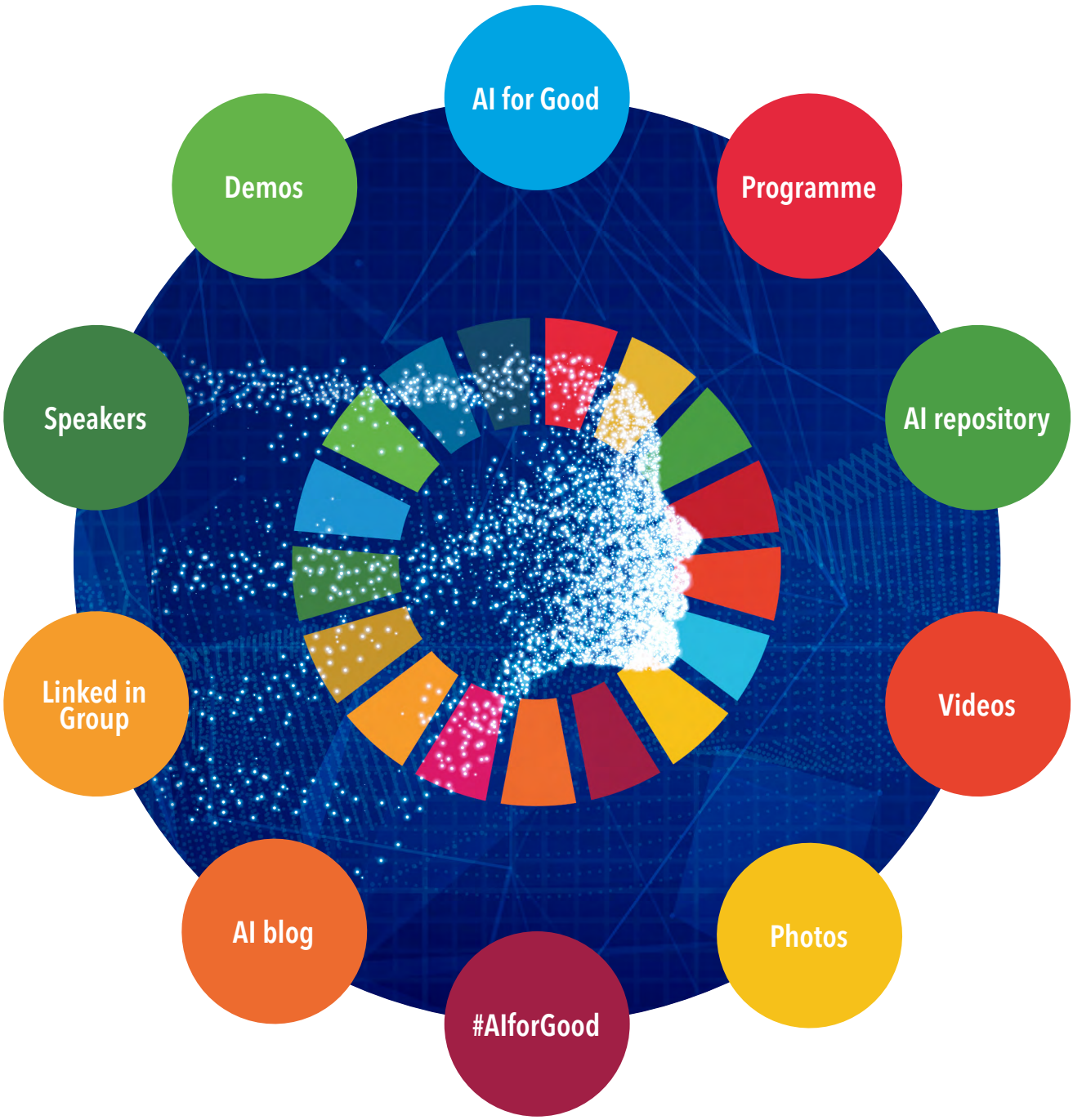
ISSN 1020–4148
itunews.itu.int
Six issues per year

Editor-in-Chief: Matthew Clark
Art Editor: Christine Vanoli
Editorial Assistant: Angela Smith

Editorial office/Advertising information:
Tel.: +41 22 730 5234/6303
Fax: +41 22 730 5935
E-mail: itunews@itu.int

Mailing address:
International Telecommunication Union
Place des Nations
CH–1211 Geneva 20 (Switzerland)

Follow us at the AI for Good Global Summit



How will AI accelerate sustainable development? Find out at the AI for Good Global Summit

Artificial Intelligence (AI) has taken giant leaps forward in recent years, inspiring growing confidence in AI's ability to assist in solving some of humanity's greatest challenges. Leaders in AI and humanitarian action are convening on the neutral platform offered by the United Nations to work towards AI improving the quality and sustainability of life on our planet.

Organized by the International Telecommunication Union (ITU) – the United Nations specialized agency for information and communication technology (ICT) – in partnership with the XPRIZE Foundation, the Association for Computing Machinery (ACM) and 37 United Nations agencies, the 3rd annual AI for Good Global Summit being held in Geneva, Switzerland on 28–31 May, is the leading United Nations platform for inclusive dialogue on AI.

The goal of the summit is to identify practical applications of AI to accelerate progress towards the United Nations Sustainable Development Goals.

The 2017 summit marked the beginning of global dialogue on the potential of AI to act as a force for good. The action-oriented 2018 summit gave rise to numerous "AI for Good" projects, including an "AI for Health" initiative supported by ITU and the World Health Organization (WHO). The 2019 summit will continue to connect AI innovators with public and private-sector decision-makers, building collaboration to maximize the impact of the "AI for Good" movement.

The summit is designed to generate "AI for Good" projects able to be enacted in the near term, guided by the summit's multi-stakeholder and inter-disciplinary audience. It also formulates supporting strategies to ensure trusted, safe and inclusive development of AI technologies and equitable access to their benefits.

The 2019 summit will highlight AI's value in advancing education, health care and well-being, social and economic equality, space research, and smart and safe mobility. It will propose actions to assist high-potential AI solutions in achieving global scale. It will host debate around unintended consequences of AI as well as AI's relationship with art and culture. And a "learning day" will offer potential AI adopters an audience with leading AI experts and educators.

The summit will also feature an invitation only gathering of AI experts and researchers on 27 May, with the aim of furthering fundamental AI research, developing new methods that will define future of AI development.

A dynamic show floor will demonstrate innovations at the cutting edge of AI research and development, such as the IBM Watson live debater; the Fusion collaborative exoskeleton; RoboRace, the world's first self-driving electric racing car; and avatar prototypes. Summit attendees can also look forward to AI-inspired performances from world-renowned musician Jojo Mayer and beatboxer Reeps One.

Over 100 speakers have been confirmed to date, including:

- Jim Hagemann Snabe – Chairman, Siemens
- Cédric Villani – AI advisor to the President of France, and Mathematics Fields Medal Winner
- Jean-Philippe Courtois – President of Global Operations, Microsoft
- Anousheh Ansari, CEO, XPRIZE Foundation, Space Ambassador
- Yves Daccord – Director General, International Committee of the Red Cross
- Yan Huang – Director AI Innovation, Baidu
- Timnit Gebru – Head of AI Ethics, Google
- Vladimir Kramnik – World Chess Champion
- Vicki Hanson – CEO, ACM
- Lucas di Grassi – Formula E World Racing Champion, CEO of Roborace.

Confirmed speakers also include C-level and expert representatives of MasterCard, Baidu, Byton, Bosch, Philips, Intel, Nethope, Stanford University, Cambridge Quantum Computing, ICRC, Siemens, Deepmind, NVIDIA, IBM, Minecraft, Iridescent, iMerit, Bill & Melinda Gates Foundation, Dataminr, IPSoft, Ocean Protocol, Botnar Foundation, Google, Mechanica.ai, Factmata, Deloitte, PWC, DARPA, We Robotics, EPFL and University of Geneva.

Please visit the summit programme for more information on the latest speakers, breakthrough sessions and panels.

More information is available here.

Join the conversation on social media using the hashtag #AIforGood and follow @ITU for Summit News.

#AIforGood

@ITU

5 'Breakthrough' Tracks

The AI for Good Global Summit contains five "Breakthrough" tracks designed to provide focus in key areas throughout the Summit.

AI for Education

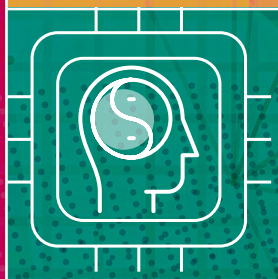
The AI for Education track aims to reimagine education using AI, responsibly.

It aims to:

- Define the current state of AI in education, and identify main stakeholders and frameworks that could impact the UN's long-term education objectives.
- Evaluate and discuss practical proposals & projects that could amplify the use of AI technologies by a broader section of society to tackle problems that are meaningful to them.
- Identify resources needed for proposed projects to be launched at the end of the Summit.

AI for Health

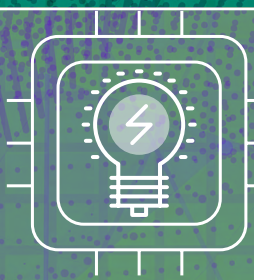
This years' health breakthrough track will expand upon last year's track, which inspired the creation of the ITU-World Health Organization Focus Group on AI for Health. The track will include opportunities for standardization of AI solutions for health – and highlight how AI and machine learning can revolutionize healthcare in the areas of clinical decision support, personalized medicine, augmented diagnosis capabilities, medical imaging interpretation, therapeutic purposes and disease prevention.



AI, Human Dignity and Inclusive Societies

This track aims to ensure that AI is deployed in ways that promote peaceful inclusive societies, protect human rights, and enhance human dignity.
Sessions will focus on the importance of "Good Digital Identity", initiatives relating to "AI, Equal Protection and Non-Discrimination" and "AI and Access to Information." The track will end with a few presentations that explore practical steps.

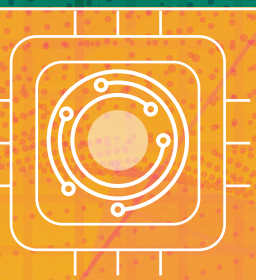
Scaling AI for Good



The Scaling AI for Good track aims to inspire participants with examples of projects that have gone through the following four key steps:

- Define the problem.
- Prototype AI solution.
- Deploy once and find product-market fit.
- Deploy N times, for impact.

The track will explore "AI for good" projects that are making their way through the four-step funnel, and will provide tools that can help at each of the steps.



AI and Space

The AI and Space track will identify projects that could be developed using AI and Space to help address issues on a local and global scale, such as predicting, preparing for, and mitigating the effects of climate change. This includes:

- Identifying areas of high potential for impact.
- Discussing barriers to deployment of AI tools – and how to overcome them.
- Finding common agreement on data requirements.
- Identify selected projects that will spin-out of the track.

What to expect on the show floor of the AI for Good Global Summit

At this year's AI for Good Global Summit, discover for yourself how we can use tomorrow's technologies today to explore new means to interact, think and live in a post-modern world.

- Curious about having an extra pair of hands to help you in your chores? Fusion, a full body collaborative telepresence system uses robotics, AI and VR to create the sensation of having four arms at your disposal.
- Experience an exhilarating live debate between man and machine on real-world issues! IBM's Project Debater is the first AI system that can debate humans on complex topics.
- How fast can a self-driving car go? Find out how RoboRace tests the limits of speed and performance when their world's first autonomous race car arrives on the exhibition floor.

The future awaits – it's time to come onboard.
Explore tomorrow's AI applications at the Summit on 28–31 May 2019 at CICG.

AIRA

AI powered remote assistance for the blind.

FUSION

Full body surrogacy for collaborative communication clients.

ROBORACE

The world's first autonomous, electric high performance racing car.

PROJECT DEBATER

The first AI system that can debate humans on complex topics.

ROBOT BARTENDER YANU

Fully autonomous AI and robot empowered bartending unit.

AI in 2019: Where are we and what's next?

ITU News asked Chaesub Lee, Director of ITU's Telecommunication Standardization Bureau about the top use cases of AI now – and in the coming years.

In mid 2019, where do you think we are in AI's journey, and how much greater is the general sense of understanding amongst leaders than it was at this time last year?

Given AI's enormous potential, the community supporting the AI for Good Global Summit believes that it is important to demystify what AI is all about. We are at a critical point in our efforts to understand the role that AI could play in society and how we approach these efforts is certain to affect how AI-based applications will impact our lives moving forward.

A range of technical foundations first had to be established for AI to become viable. From an operational standpoint, it required the emergence of big data, broadband and the information economy to derive analytics. It also needed the raw computational power able to process data at scale. Advances in information and communication technology (ICT) gave rise to AI applications able to generate results with the speed necessary to communicate such results to end-users almost instantly, making applications such as image recognition and virtual smart assistants easily available to almost anyone with a mobile phone.

But advances in AI have also led to challenges.

> *"The capabilities underlying these solutions are scalable — they can benefit almost everyone."*
>
> Chaesub Lee

Many of these challenges are not inherent to AI but rather a consequence of our rapid adoption of the technology. Concerns around data ownership and privacy, cybersecurity, software control and algorithmic bias are not new – the Internet has long suffered these challenges as a result of its nature as an information and communication platform. AI's capacity for operations at scale has the potential to enflame challenges such as systemic bias in image recognition software or misrepresentative data sets, for example.

Businesses and other AI stakeholders understand these challenges more clearly this year. We are in the early stages of developing better processes to ensure that emerging AI applications fulfill their potential, and much remains to be done to mitigate the risks introduced by AI and its associated technologies.

What, in your experience, are the best/most successful examples of AI applications?

AI can support smarter business and policy decisions. For example, deep learning has been used to predict the amount of energy to be generated by wind turbines, with better predictions leading to better business decisions when it comes to scheduling the delivery of energy to the grid. AI is also assisting us in mapping ocean wealth, including marine biodiversity, carbon storage and the effects of fishing activity, information of clear value to industry, academia and government. And making an example of a seemingly basic AI application, a chatbot can communicate personalized recommendations and reminders about medication dosage and health checkups.

We make examples of these solutions because the workflow to develop them can be applied to different problems. The capabilities underlying these solutions are scalable – they can benefit almost everyone.

One of the potentially most groundbreaking domains for the application AI is in health. The vast majority of economies today are dealing with very rapid increases in the cost of health care. At the same time, the promise of Universal Health Coverage has not yet been achieved.

AI-based solutions can help provide early stage diagnosis of medical conditions, which is often associated with significantly lower costs of treatment, as well as improved treatment outcomes.

Additionally, having diagnostics with a margin cost that is in orders of magnitude lower than today, can help bring diagnostics to people that cannot reach this, either physically or financially.

AI REPOSITORY

Already 150+ Projects!

Contribute key information about how to leverage AI to help solve humanity's greatest challenges.

MORE

To this end, at last year's AI for Good Global Summit, the World Health Organization and ITU partnered to create the Focus Group on AI for Health. This group is creating benchmarking systems, which can score the accuracy of AI-based health diagnostic solutions and has 14 collected use cases so far.

One use case is on Tumor Infiltrating Lymphocytes (TIL). In this case, an AI model, can label each tumor cell, and each TIL in a tissue sample. This is something that traditionally is only eyeballed, but is highly important in treatment decisions.

Another use case is on dermatology. Skin cancer, including melanoma can progress very rapidly. Having a quick, non-invasive method of analysis can dramatically improve the amount of cases that are caught in time.

Finally, there is a use case on radiotherapy. Traditionally, medical doctors look at slice after slice of imagery, and try to form a holistic image. A computer can analyse this 3D representation directly. Furthermore, this use case uses reinforcement learning in order to decrease the dependency on (privacy sensitive) data.

Can AI ever be the 'silver bullet'?

AI and its associated technologies will help us to do our work more efficiently and effectively through data-driven, automated semantic decision-making. We would argue that the success of AI will depend to a large extent on how it is applied.

What AI developments are on the near horizon for the information and communication technology sector? What can we expect in, say, five years?

AI is impacting ITU's technical work in fields such as security, coding algorithms, data processing and management, and network management and orchestration. We expect that this trend will continue.

AI is also increasing the efficiency of other technologies. Networking technologies form a prime example.

Machine learning is supporting the increasing automation of network management and orchestration, ultimately enabling ICT networks to deliver higher quality services. This concept of network "self-optimization" is very much part of the discussion when it comes to emerging 5G and the Internet of Things (IoT) networks.

LINKEDIN GROUP

Join the LinkedIn Group!

Continue the conversation with +2000 Members of the ITU #AIforGood LinkedIn Group.

MORE

That's why ITU started a "Focus Group on Machine Learning for Future Networks, including 5G" that drafts technical reports and specifications for machine learning for future networks, including interfaces, network architectures, protocols, algorithms and data formats.

Additionally, telecommunications operators have arguably some of the most valuable data in the world. They are also one of the most trusted and regulated custodians of data when it comes to using and sharing customer data. In fact, some operators won't even share customer data internally between the business units and the R&D departments.

AI-powered analytics of operator data in combination with health, weather and social media data can be effective in helping to predict the outbreak of epidemics before they happen, or predict the spread of a disease. We have recently seen a willingness from some operators to make sanitized, anonymized operator-hosted datasets available to 3rd-party models under a data-sharing framework developed by ITU.

What advice would you give to leaders looking to use AI as part of their strategy?

Expanding our knowledge of the field is one of the key aims of the AI for Good Global Summit. The summit is helping decision-makers in the public and private sector to improve their understanding of AI's relevance to their work and how they could apply AI to their benefit.

> *"Every government, every company, every academic institution, every civil society organization and every one of us should consider how AI will affect our future."*
>
> Chaesub Lee

The implementation of AI into strategy and applications requires a human-centered design approach based on quantifiable needs and metrics. This is important in developing applications that are practical and meaningful to the intended user of an AI-based application.

It is also critical to be pragmatic about the limitations of the model and dataset being used. Monitoring the data is important in protecting against incomplete semantics such as incorrect labels/values, non-inclusive sampling for data, and data bias.

Finally, AI experts stress that discussions around AI's implications for society should not be confined to specialists. Every government, every company, every academic institution, every civil society organization and every one of us should consider how AI will affect our future. As such, it is critical to develop strong multi-stakeholder partnerships and projects to examine AI's contribution to society.

XPRIZE

BE A PART OF THE NEXT BREAKTHROUGH

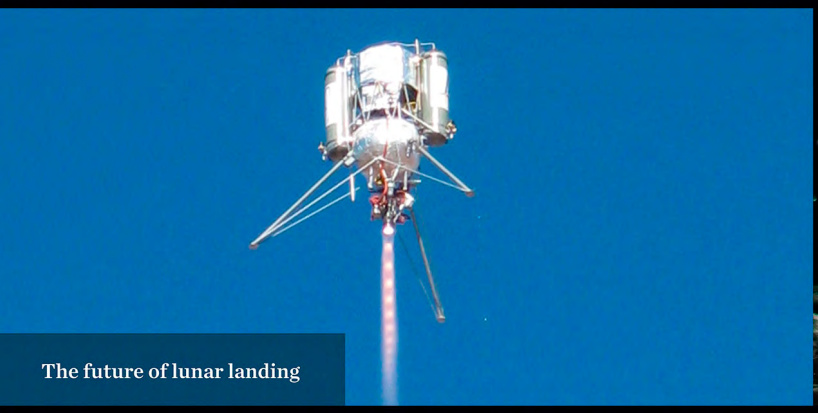
Scan me

Launching a new space industry

Empowering children to take control of their own learning

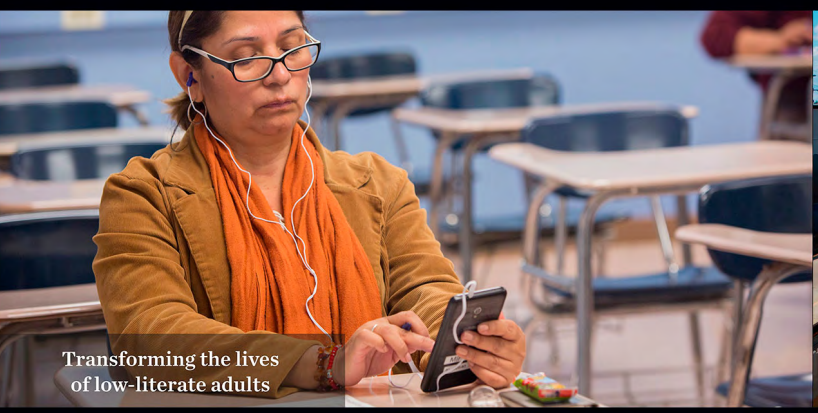
Using AI to solve the world's challenges

Recycling CO_2 into valuable products

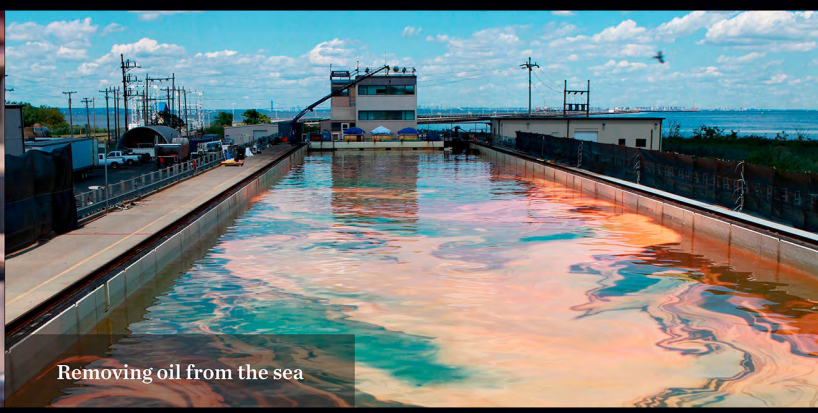


The future of lunar landing

Creating water from thin air



Transforming the lives of low-literate adults



Removing oil from the sea

XPRIZE

BE A PART OF THE NEXT BREAKTHROUGH

Scan me

How 'responsible AI' can boost sustainable development

Dr Anand S. Rao

Global AI Lead, PwC

The potential value from artificial intelligence (AI) is enormous: some USD16 trillion by 2030, according to a PwC study. But what are the costs of AI when not done properly – and what are some of the risks?

What does it really mean to be doing AI "responsibly"? Can you really do Responsible AI without worrying about the social consequences? How can you apply the principles of responsible AI more broadly towards achieving the Sustainable Development Goals?

AI is being applied in most industry sectors – ranging from agriculture to aerospace – and across functional areas, from strategy to support. Increasingly, countries in varying stages of economic advancement are making plans to apply AI too.

While this can increase the profits of companies and gross domestic product (GDP) of countries in the short term, if not done responsibly, it could help create greater inequity within each country, greater inequity among countries, increased use and depletion of natural resources to fuel the AI-led growth of economies, further decreases in biodiversity and ill treatment of other species, and adverse effects on the climate.

> *"What does it really mean to be doing AI 'responsibly'?"*
>
> Dr Anand S. Rao

A 'holistic discipline'

PwC's Responsible AI is a holistic discipline: It is not just about what you build, but why and how you build it – as well as the long-term implications of the use of AI for your customers, staff, and society at large. It is not just about the technology itself. It is about the governance of AI, its impact on people, and the process of designing, building, and maintaining it.

The overarching principles that govern these dimensions are rooted in society's ethics and values. The governance of AI and algorithms – especially the monetary value AI brings and the accompanying risks that need to be mitigated – are Board and executive management decisions.

The process of designing, building, running, and maintaining AI should be embedded within the broader context of how a company operates. In addition to all these, it is about how PwC's AI models are built – specifically, addressing issues such as fairness, transparency, interpretability, explainability, safety, security, ethics, values, and accountability.

Addressing the SDGs

Responsible AI in the corporate context addresses four of the United Nations (UN)'s seventeen Sustainable Development Goals, namely gender equality, decent work and economic growth for all, industry innovation and infrastructure, and generally reducing societal inequality.

Primarily, responsible AI is concerned about fairness and equality of gender, race, or similar protected attributes.

> *"The process of designing, building, running, and maintaining AI should be embedded within the broader context of how a company operates."*
>
> Dr Anand S. Rao

Acting responsibly in the corporate context may or may not (depending on the purpose and vision of the company) take into account the broader topics of human rights, the well-being of humanity and other species, and protecting and nurturing our planet's biodiversity and natural resources. In other words, responsible AI in the corporate context takes into account some of the people- and policy-related goals, while not always addressing those related to the planet and human condition.

'Fourth Social Revolution'?

As has been argued at the World Economic Forum, the Fourth Industrial Revolution should be accompanied by the Fourth Social Revolution.

Individuals, corporate entities, nations, and other supra-national bodies should include metrics that are broader than revenues and profits.

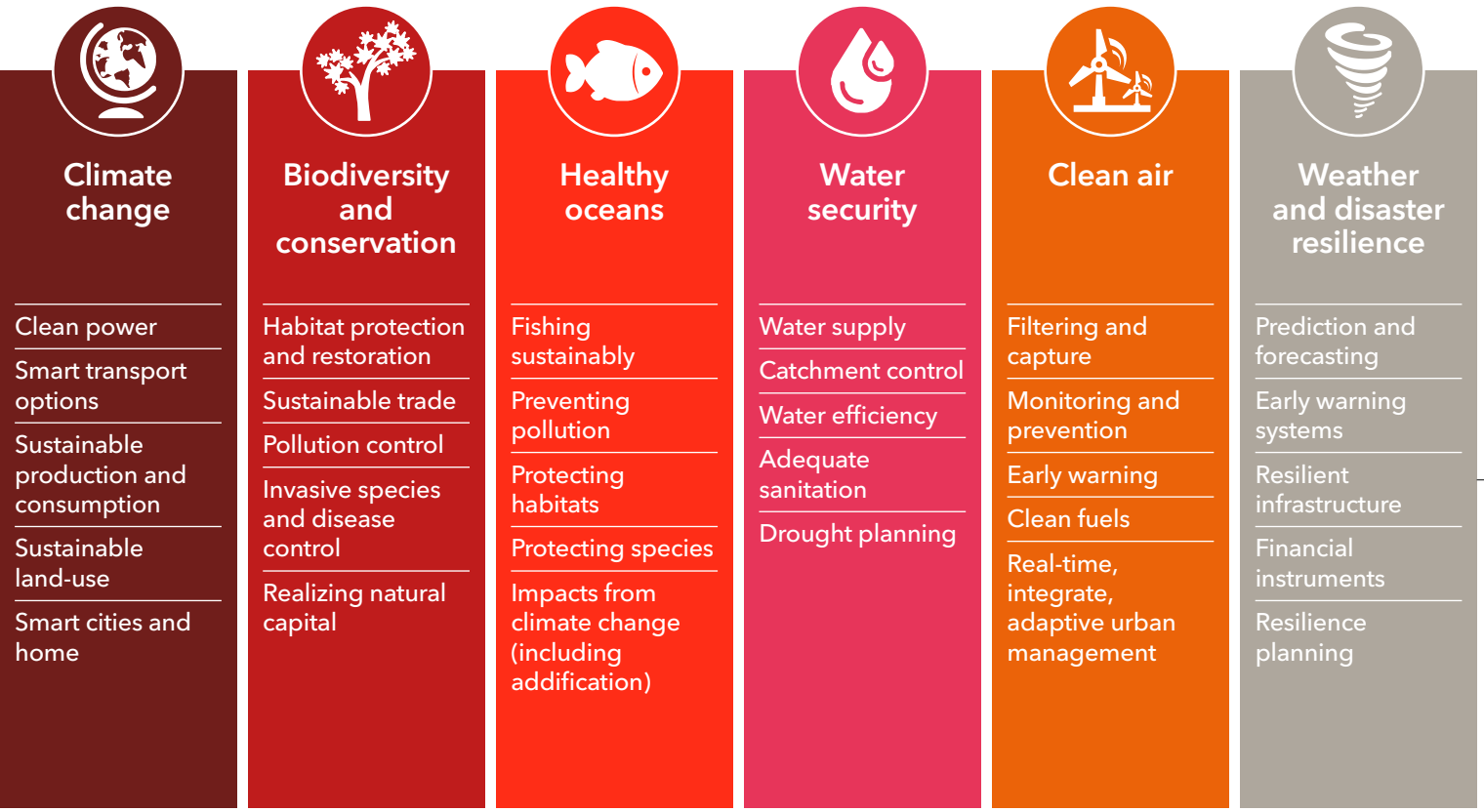
Some or all objectives outlined in the SDGs should be part of a socially responsible corporate vision, plan, and metrics.

For example, global corporations that rely heavily on air travel should commit to becoming carbon neutral; employees who travel regularly should be given data not just on the miles that they have flown, but the CO2 emissions created as a result of their travel.

Employees and corporations together can work toward offsetting emissions through initiatives to plant more trees.

Air travel booking sites could feature the Carbon Emissions Calculator from the International Civil Aviation Organization (ICAO), for example, and, based on the CO2 emissions, there could be a link to an environmental organisation such as Arbor Day or Carbonfund to offset the emissions by planting more trees.

Priority action areas for successfully addressing Earth challenges



Source: Harnessing Artificial Intelligence for the Earth (PwC).

Harnessing Artificial Intelligence for the Earth report

Harnessing AI for the Earth

As outlined in a World Economic Forum Harnessing Artificial Intelligence for the Earth report developed in partnership with PwC and the Stanford Woods Institute for the Environment, AI can play a pivotal role in addressing six key areas – specifically climate change, biodiversity and conservation, healthy oceans, water security, clean air, and weather and disaster resilience.

But these AI use cases should not be looked at as isolated programs to address the effects of economic development, but should instead be addressed holistically to help get to the root causes impacting the planet, human rights, and human well-being.

Organizations that claim to apply AI in a socially responsible manner should incorporate not just attributes like fairness, accountability, safety, and transparency, but also take into account additional factors, such as AI's impact on jobs, the human condition, biodiversity, energy, climate, and so on.

The additional criteria will vary depending on what products and services a given company offers, the impact of these factors on the environment, and what AI algorithms the company is using in the creation of these products and services.

How can AI help build a more sustainable and equitable society?

Yan Huang

Senior Director of AI Innovation and AI Health lead, Baidu

Much has been said about the ability of Artificial Intelligence (AI) to greatly enhance productivity.

Unlike the industrial revolution where productivity was improved for labour-intensive work, AI extends that power to knowledge-based work, helping humans make better, faster and more insightful decisions.

This technological advancement has great potential to address the imbalance of resources and help build a more equitable society.

For instance, AI is already having enormous impact in areas such as health care.

> *"This technological advancement has great potential to address the imbalance of resources and help build a more equitable society."*
>
> Yan Huang

How AI can improve health care

Educating and training doctors has traditionally been a time-consuming and expensive process, taking an average of more than ten years.

This long lead-time is especially problematic for developing countries where lack of resources for education can lead to doctors being undereducated, or worse, under-trained.

This can significantly affect the quality of health care provided to patients. For example, of the 40 000 ophthalmologists in China, less than 10% are able to diagnose fundus lesions in people's eyes. Fundus diseases are a major cause of blindness in the developing world if not treated properly.

AI helps solve this issue by studying large amounts of decision-making examples from medical experts, then putting that information into use by assisting doctors to make better diagnoses and treatment decisions.

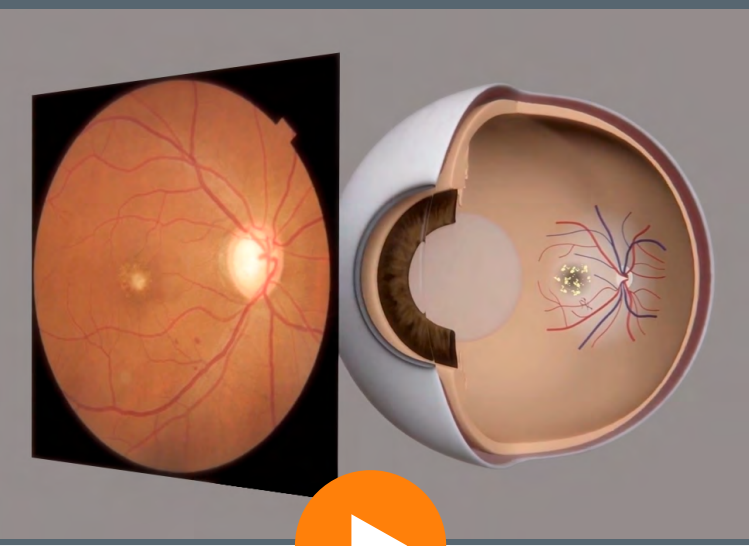
Rather than replacing the doctor, AI is there to empower them to make better decisions. The potential impact is enormous.

Take the AI Fundus Machine that Baidu developed in collaboration with Chinese hospitals as an example. By learning from abundant precisely labelled fundus images using an interpretable evidence-based architecture, the system has achieved a comparable diagnostic accuracy of a professional ophthalmologist with 10 years above experience (see video).

The screening and analysis are completed in 10 seconds.

About the Baidu AI Fundus Camera

Baidu unveiled its AI Fundus Camera that is capable of screening three types of ocular fundus diseases which are the leading causes of blindness, and announced that it would donate 500 Cameras to rural areas of China to help with early detection of ocular fundus diseases and ultimately reduce chances of blindness. The Camera is now in operation in multiple cities in Guangdong including Zhaoqing.



About the Baidu AI Fundus Camera

Shutterstock

The AI for good health track at the Summit

Yan Huang is one of our inspiring speakers for the health track sessions at the AI for Good Global Summit 2019 from 28 to 31 May 2019.

Last year's health breakthrough inspired the creation of the ITU-WHO Focus Group on AI 4 Health. This years' track will expand upon this work and beyond, looking at the role that AI can play in achieving Universal Health Coverage.

The AI Summit Health breakthrough track acts as the Focus Group on the AI for Health's (FG-AI4H) 5th Workshop.

See the full programme for more information and registration.

AI has a global ethical obligation

Health care aside, AI also has the potential to play a pivotal role in a wide range of global issues and social causes, such as addressing poverty, dealing with natural disasters, improving education, enhancing public safety, and preserving cultural heritage.

But with AI development comes responsibility – from both an ethics and a safety point of view.

As AI technologies continue to develop and AI-powered machines assume more roles, the impact of a system failure grows exponentially. That's why the industry is demanding – and rightfully so – that the standard for safe and reliable AI is higher than any other new technologies in the past.

> *"But with AI development comes responsibility — from both an ethics and a safety point of view."*
>
> Yan Huang

How we can turn online advertising data into a powerful force for good

Ingmar G. Weber

Research Director for Social Computing,
Qatar Computing Research Institute, HBKU

Online advertising is often viewed as a kind of "necessary evil" to pay for free services such as Google and Facebook; the Faustian bargain at the heart of the "if you're not paying for the product, you are the product" wisdom.

To my colleagues and me, it is also a useful data source to build models to track Internet usage gender gaps, and to monitor international migration, map poverty and more.

We believe that, when used responsibly with awareness of the limitations and risks, data from advertising platforms are an important part of the AI for Good ecosystem, helping to augment official statistics and supporting the monitoring of the United Nations' Sustainable Development Goals (SDGs).

Let me explain how.

> *"Platforms such as Facebook, Google, Snapchat and others collect data about their users and use this data to provide targeted advertising capabilities."*
>
> Ingmar G. Weber

Shutterstock

How Internet platforms collect and use data

Platforms such as Facebook, Google, Snapchat and others collect data about their users and use this data to provide targeted advertising capabilities. For example, on Facebook it is possible to selectively show an advertisement to users aged 18 and above who: a) live in Geneva, Switzerland; b) self-identify as female; and c) used to live in France.

Similar targeting capabilities exist on other platforms. As it matters for budgeting purposes, advertising platforms provide so-called "audience estimates". For instance, in the example above, Facebook estimates that 5900 users match the provided criteria (as of 23 March 2019).

By looking at how these audience estimates differ across gender and across countries, one can obtain real-time estimates of usage differences of big social networks.

In our research we find that these gender differences are highly predictive of Internet access and mobile phone gender gaps. Building regression models on top of these audience estimates allows us to fill data gender gaps. As an example, applying such a model, we predict that for every man with Internet access in India, only 0.73 women have Internet access. Visit the website for a visualization of these predictions.

These predictions are useful for monitoring progress on the Sustainable Development Goals, in this case on SDG 5. Additionally they can be used for planning and monitoring development interventions at the sub-national and even at the sub-city level.

Similarly, by looking at how the number of Facebook users who used to live in a different country varies across host countries and regions, one can obtain models that, when properly corrected for biases, come close to gold standard official statistics.

The value of non-traditional migration statistics

Such non-traditional migration statistics are of particular value when official data are outdated or of sub-optimal quality. For example, during the ongoing Venezuelan crisis and the related exodus of migrants and refugees, we are providing the Global Protection Cluster with insights on the relative spatial distribution, or "density", and the temporal trends. Triangulating these insights with other data sources can lead to better resource allocation in the field and more informed discussion with donors on the scale of the crisis. See more details of our analysis here.

In addition to shedding light on digital gender gaps, audience estimates can also help to map relative levels of poverty and wealth. In a nutshell, having access to Apple mobile devices running iOS, as opposed to Android devices, is a sign for higher disposable income.

To illustrate this, we invite the reader to interact with the data visualization of Demographic Distribution in New York City. It shows aggregate and anonymous Facebook audience estimates collected in September 2017: 83% of users living in the New York City ZIP code 10075 primarily use an iOS device.

> *"If we can figure out how to navigate these challenges and how to limit the risk of abuse of such a powerful data source, then we could start to realize the tremendous potential of using this data for good."*
>
> Ingmar G. Weber

This is in stark contrast to ZIP code 11368 where this percentage is only 42%. These two ZIP codes, which are at the extreme ends of iOS usage in New York City, are also at the extreme ends of poverty rates. 10075 is located in the Upper East Side which has a poverty rate of 7%, as opposed to 11368 located in Elmhurst and Corona with a 27% poverty rate.

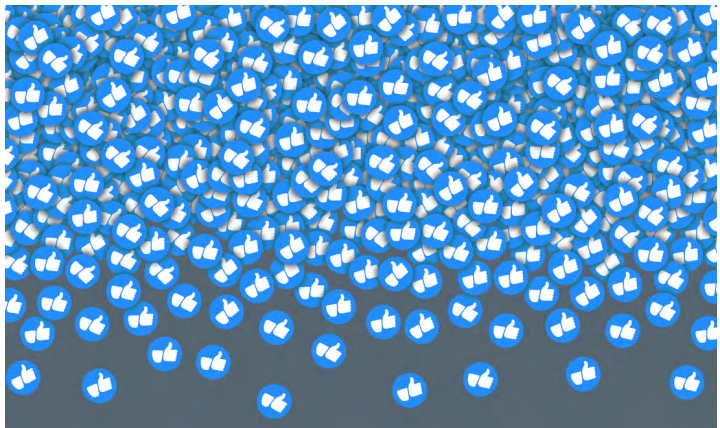
In our research, we find that this approach to map relative poverty rates by looking at the device types used to access Facebook also works in other countries.

The limitations when using data

All of the insights above can be obtained from anonymous and aggregate data that is provided free of charge and are available to everyone who registers as advertiser. Despite the availability and ease of use, there are important limitations when using such data:

- All platforms include fake accounts and different users can share a single account, leading to data quality challenges.
- Usage patterns and the platforms' black box algorithms for inferring attributes change over time, potentially breaking the applicability of prediction models trained on past data.
- People without a digital footprint on the platforms do not directly contribute to the data, requiring care for how to incorporate data on non-usage and service penetration in the models.

If we can figure out how to navigate these challenges and how to limit the risk of abuse of such a powerful data source, then we could start to realize the tremendous potential of using this data for good.



Using Facebook ad data to track the global digital gender gap

Highlights

- Gender gaps in Internet and mobile phone access are difficult to measure due to data gaps, especially in low-income countries.
- We use data from Facebook on users by age and gender to predict digital gender gaps for 150+ countries.
- Facebook data are highly correlated with available official data on digital gender gaps.
- Predictive power of Facebook data is improved when combined with country-level development and gender gap indicators.
- Our approach shows how web data can be used to expand coverage for an important development indicator, with biggest gains for low-income countries.

Source: ScienceDirect

How can AI improve education?

Tara Chklovski

CEO and Founder, Iridescent and chair of the education track at the AI for Good Global Summit

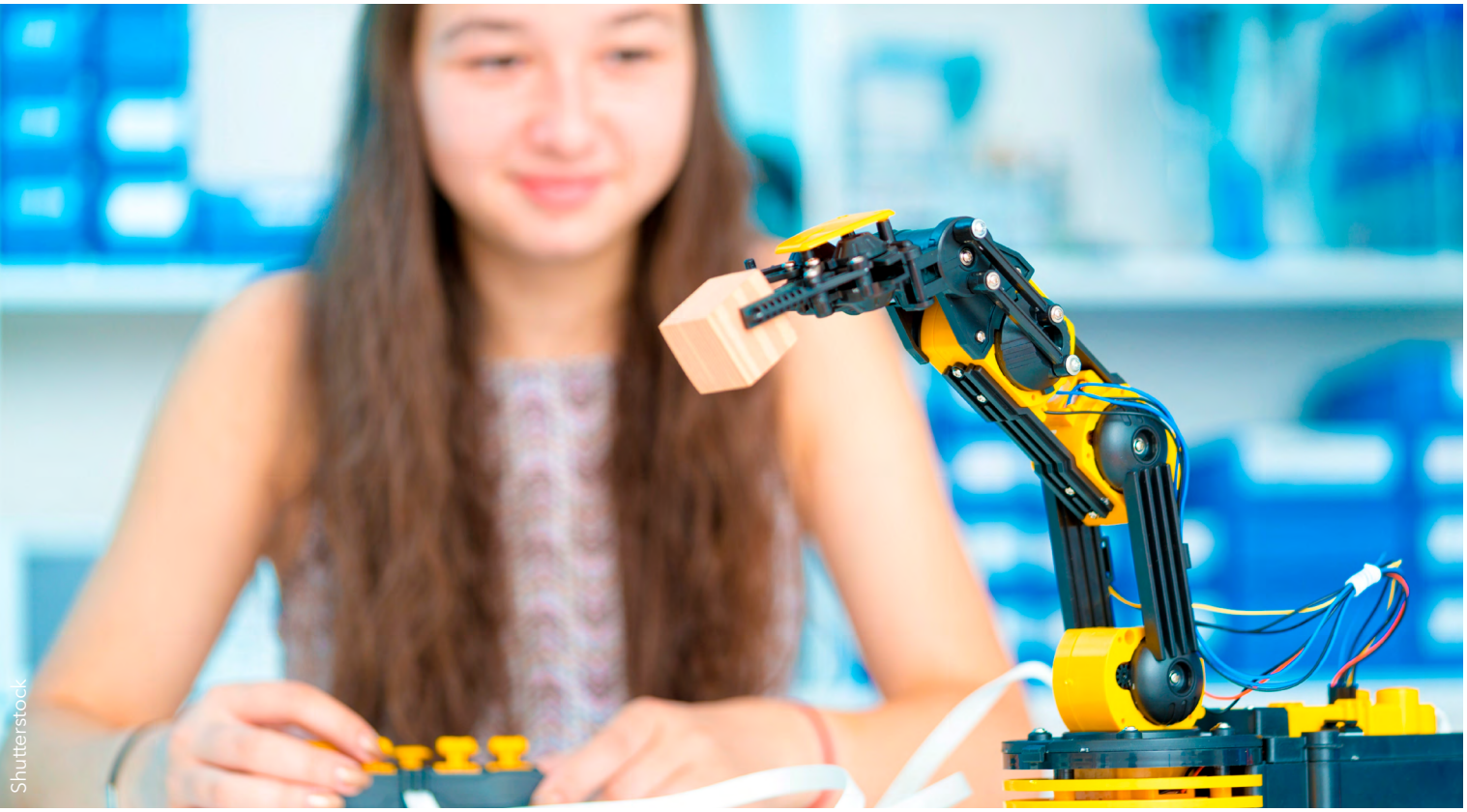
Technologies such as artificial intelligence (AI) are powerful tools that can unlock an individual's potential and amplify a sense of agency and purpose. But we need to understand how to use AI responsibly, and learn how we can improve AI technologies to create the world we wish to live in.

To accomplish this, we must reimagine our approach to education.

Education needs to be seen as a lifelong journey that everyone has the opportunity to pursue, and through which everyone can develop the skills needed to thrive tomorrow.

There is a need for grass-roots work with adults and children in the most vulnerable and under-served groups to help them understand how their worlds are changing, what AI is, how some of these technologies work, and what role they can play, now and in the future.

> *"To accomplish this, we must reimagine our approach to education."*
>
> Tara Chklovski


Shutterstock

There is a need for innovative, thoughtful, multi-generational programs that foster life-long learning and knowledge sharing between local communities and AI experts from industry and academia.

There is a need for AI experts to work closely with media and journalists to help them demystify AI for the broader public. We need to move beyond inflammatory terms towards informed and critical debate that advances our understanding of AI's impact on society and what needs to improve and how.

Finally, we need innovative programs and resources that help us understand the impact of AI technologies on ourselves, our brains, and our behaviours. This is where we need partnerships between bold, self-aware industry partners and neuroscientists, cognitive scientists, psychologists and educators, who can work together to design technology that is not only addictive, viral and lucrative, but also brings out the best of what humans are capable of.

Iridescent, a global tech education non-profit, invited organizations to join in efforts to fill important gaps in access, knowledge, agency and skills by submitting a proposal for consideration to be presented during the education track at the AI for Good Global Summit on 29 May in Geneva. Selected participants will be part of the working group developing the final projects launching at the end of the Summit. Participating organizations were invited to reflect on topics and answer related questions by 15 April.

Submitting organizations have already been notified of their selection.

> *"There is a need for innovative, thoughtful, multi-generational programs that foster lifelong learning."*
>
> Tara Chklovski

What can we expect during the education track?

Participants in the education track at the AI for Good Global Summit will explore ways that we can collectively use and apply AI to improve education in an impactful, sustainable, and ethical way.

Education organizations have a critical and increasingly important role to play in filling gaps in access, knowledge, agency and skills.

To keep pace with the breathtaking advances in technology, education organizations need to partner creatively across industry, academia, media and government to make the deepest impact.

Participants in the AI for education track will discuss how we can work together to reimagine education for adults and youth of all backgrounds and cultures using the transformative power of AI responsibly.

The AI in education track will be broken into three key sessions:

Session 1: State of Play. What is Working and What do we Know Today?
Participants at this session will attempt to answer questions such as: What is AI? How is Machine Learning different? What is the current state of AI technology? What lies ahead? It will also include lessons from deploying the AI Family Challenge with 7500 children and parents across 13 countries, and also lessons from implementing the world's largest robotics program – FIRST Robotics.

Session 2: Strategy Labs
In this session participants will evaluate and discuss practical proposals and projects that could amplify the use of AI technologies by a broader section of society to tackle problems that are meaningful to them.

Participants will be invited to join one of five, education-focused, labs to discuss:

- AI in your community
- AI literacy in the workplace
- Demystifying AI through media
- Our brains on AI-powered devices and games
- AI for lifelong learning and creating capabilities.

At the end of the day, the group will decide which projects are ready to launch. These projects will be presented to all the Summit attendees the following day.

Session 3: Launch Labs
Building off the work in session 2, participants will identify resources and practical next steps needed for proposed projects to be launched at the end of the Summit. Groups will identify which projects to share at the breakthrough pitch session on 30 May.

Learn more about the education track at the AI for Good Global Summit.

Key ways to prepare for the AI revolution

Kevin Castle

Managing Partner, Technossus

As we know, the iMac came out in 1998. Apple's slogan at the time – "think different" – represented both the company's cornerstone message and its rallying cry as it rapidly innovated, finding ways to disrupt traditional industries.

Whether it be the music or phone sector, Apple transformed spaces, dramatically influencing people's thinking and their behaviour.

Recognizing we are at a similar crossroads in which disruptive, transformative thinking is required, my company Technossus, recently interviewed two thought leaders about what it takes to be competitive in today's economy: Sara Branch, our very own knowledgeable director with nearly 20 years' project management experience and Neil Sahota, co-author of Own the A.I. Revolution: Unlock Your Artificial Intelligence Strategy to Disrupt Your Competition and Technossus' Emerging Tech Principal, who works with mid- to large-sized enterprises on developing and utilizing tech for customer needs and operations.

> *"The most successful groups and individuals today are busy finding ways to solve smaller, simpler challenges via AI, leading to dynamic results."*
>
> Kevin Castle

Shutterstock

Knowing Branch and Sahota to also be advocates of thinking differently – so as to not be one of those disrupted by the so-called 4th Industrial Revolution, but rather one of its disruptors – we discussed what else is needed to thrive.

What follows are their three key suggestions to compete in these unprecedented times:

Modify your mindset

According to a recent article in the Guardian, among other reports, a host of previously viable professions are under threat of disappearing in the coming years. Importantly, many of the listed occupations don't fall under blue collar work, such as truck drivers, or retail jobs long considered susceptible to automation. For instance, there is a 98% likelihood that loan officer roles will be replaced by bots, and a 94% chance that today's paralegal work will soon be accomplished by computers.

In order to prepare for likelihoods such as these, as well as the prospect of entire businesses or industries becoming irrelevant, we must mentally prepare in more ways than one.

"It begins and ends with your thinking," says Branch. "Many people adopt a head-in-the-sand approach when it comes to anything technological. Fortunately, we work with individuals who value creative disruption, especially when they see a clear path to better business outcomes. Unfortunately, individuals who struggle with this way of thinking may be the most vulnerable to disruption. In order to avoid so many of the threats we hear about daily, we must cultivate a new paradigm; one that takes into consideration this question: How might I provide value to others, in light of this new technology, so I can stay in demand?"

> *"If we want to stay competitive, if we want to stay ahead of what's coming, we truly must transform our thinking."*
>
> Kevin Castle

To this end, Branch recommends investing in education once you have embraced this new mindset. Cognizant of the speed of transformation, she advises individuals and companies alike to seek out the latest research, books, articles, podcasts, and other forms of content to stay informed.

"Yes, never before has the world changed so quickly before our eyes, and never before have there been so many ways to acquire knowledge," says Branch. "It's a good idea to take as many courses as you can online. You really can empower yourself with all of the competitive intelligence at your fingertips."

Go small – to win big

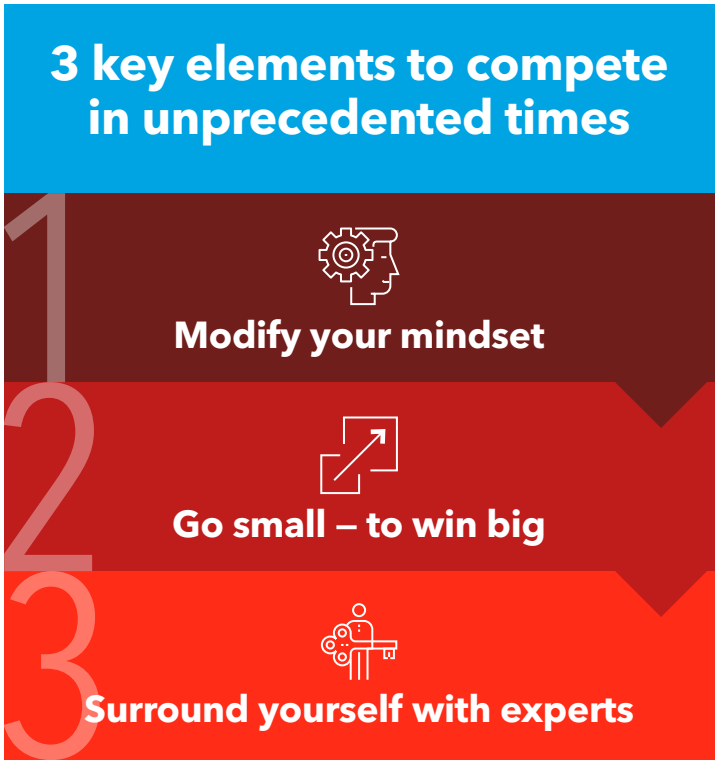
"Businesses exist to solve problems," says Sahota. "What people don't yet understand is that AI applications don't have to be earth-shattering to be effective – and therefore profitable."

Sahota's larger point is that it's not necessary to employ AI to every aspect of your business to not get swallowed up by bigger players.

Similarly, it's not necessary to lose your own humanity to become as productive as today's robots. Instead, the most successful groups and individuals today are busy finding ways to solve smaller, simpler challenges via AI, leading to dynamic results.

"Today's machine learning is narrowly driven," explains Sahota. "I observed this firsthand witnessing how a translation company called Lingmo was able to zero in on one specific thing – translation – to great effect. Because it can be so hard to develop the proper training in time to go to market, I very much recommend pinpointing a problem that others face, whether it be your customer – or your boss – and then using AI to find a helpful solution."

According to Sahota, by being hyper-focused in this way, you can avoid the risk of being overwhelmed by all of the training as well as other factors that make AI adoption and implementation such a daunting challenge.



Surround yourself with experts

If the corporate cultures of Silicon Valley have taught us anything, it's that none of us is as smart as all of us. It's therefore beneficial to assemble the best possible team.

Outside support is especially ideal for companies looking to quickly adopt to changing conditions.

"I love this quote from marketing guru David Ogilvy," says Branch. "'If you ever find a [person] who is better than you are – hire [them]. If necessary, pay [them] more than you would pay yourself.' (Gender pronouns modified to be more current.) The point is, it's advisable to recognize the virtue of collaborating with others possessing talents or expertise outside your own."

Further to Branch's point is the recognition that today's companies and individuals need to embrace equally – appealing to outside experts and/or using a team can not only expedite the adoption process, it can lead to greater successes than simply acting alone.

At the end of the day, what this new era is forcing so many of us to recognize may be summed up in a quote from renowned physicist Albert Einstein: "No problem can be solved from the same level of consciousness that created it."

If we want to stay competitive, if we want to stay ahead of what's coming, we truly must transform our thinking. For once we do, a world of possibilities may open up to us in novel ways we may not yet imagine.

What do 'AI for Social Good' projects need? 7 key components

Anna Bethke

Head of AI for Social Good, Intel

At their core, "AI for social good" projects use Artificial Intelligence (AI) hardware and software technologies to positively impact the well-being of people, animals or the planet – and they span most, if not all, of the United Nations' Sustainable Development Goals (SDGs).

The range of potential projects continues to grow as the AI community advances our technology capability and better understands the problems being faced.

One of the interesting aspects about several of Intel's "AI for social good" projects is that no new or novel technology was required.

Our team of AI researchers at Intel achieved success by working with partners to understand the problems, collecting the appropriate data, retraining algorithms, and moulding them into a practical solution.

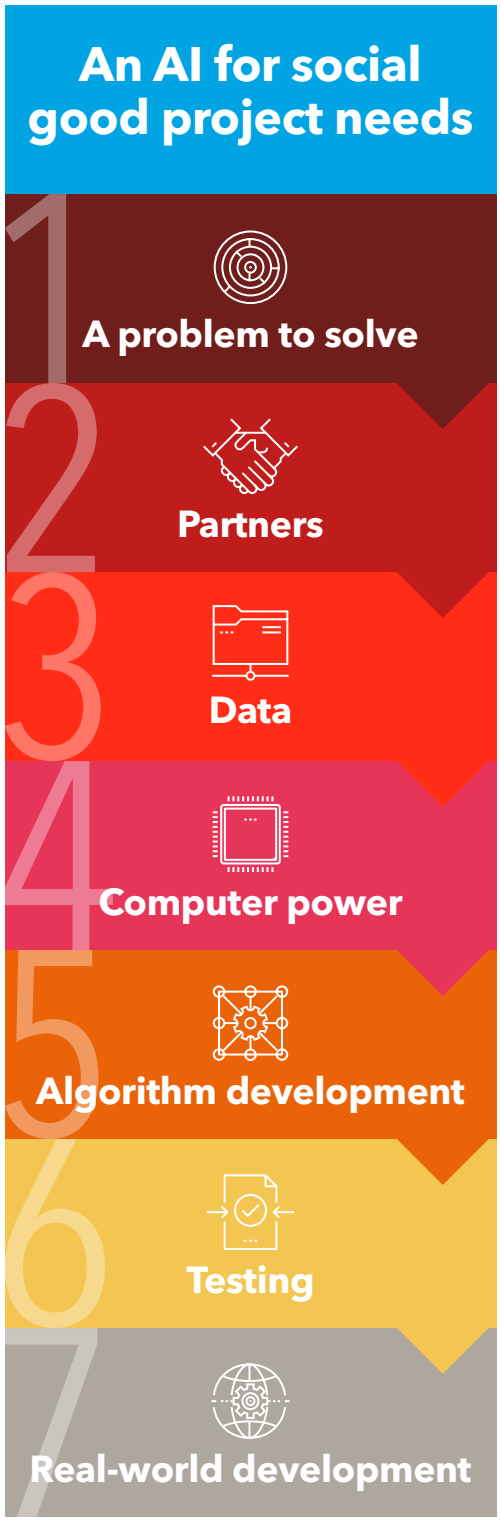
In fact, the call for proposals to be shared at upcoming AI for social good workshops held at NeurIPS and ICLR stated that submitted projects "do not necessarily need to be of outstanding theoretical novelty".

> *"The range of potential projects continues to grow as the AI community advances our technology capability and better understands the problems being faced."*
>
> Anna Bethke

Key project elements

At its core, an AI for social good project requires the following elements:

- **A problem to solve**, such as improving water quality, tracking endangered species, or diagnosing tumors.
- **Partners** to work together in defining the most complete view of the challenges and possible solutions.
- **Data** with features that represent the problem, accurately labelled, with privacy maintained.
- **Computer power** that scales for both training and inference, no matter the size and type of data, or where it lives. An example of hardware choice is at ai.intel.com/hardware.
- **Algorithm development**, which is the fun part! There are many ways to solve a problem, from a simple logistic regression algorithm to complex neural networks. Algorithms match the problem, type of data, implementation method, and more.
- **Testing** to ensure the system works in every way we think they should, like driving a car in the rain, snow, or sleet over a variety of paved and unpaved surfaces. We want to test for every scenario to prevent any unanticipated failures.
- **Real-world deployment**, which is a critical and complicated step that should be considered right from the start. Tested solutions need a scalable implementation system in the real world, or risk their benefits not seeing the light of day.



Intel's hands-on workshop at the AI for Good Global Summit

At the end of May, Intel AI travels to Geneva, Switzerland, for the AI for Good Global Summit hosted by ITU, and will speak to each of these elements in a hands-on workshop.

We will cover the basics of AI, provide examples of how it can be used, and give attendees virtual access to easy-to-use Jupyter Notebooks running Python code so they can practice the techniques we discuss throughout the day. The workshop is designed to give participants the information they need to better leverage the capabilities of AI.

Among the most powerful tools we have to affect change in our world are those to connect, innovate, and synthesize ideas, using the latest available technologies and resources.

Revitalization of global partnerships for sustainable development is one of the UN's 17 goals, and we expect to see it in force during the AI for Good Global Summit. Until then, we hope the projects shared on Intel's AI for Social Good site demonstrate the power that technology has to do great things, especially when we come together as a community to solve complex problems.

> *"The workshop is designed to give participants the information they need to better leverage the capabilities of AI."*
>
> Anna Bethke

Four key lessons from using AI to address child abuse

Joelle Casteix

Founding board member, Zero Abuse Project

Zero Abuse approached Artificial Intelligence (AI) with a big question: Could we use AI and big data to track institutional behaviour in response to perpetrators of child sexual abuse?

We learned quickly that the answer is yes.

We are developing ZeroAbuse.ai with these lofty goals. However, the business challenges we face are Herculean: how do we turn aspiration into application?

That application is a tool that uses publicly available data to discern institutional patterns of behaviour that indicate child sexual abuse and cover-up within an institution.

Until now, subject matter experts in child sexual abuse prevention have decades of data, but because it was inaccessible (or primarily on paper), subject matter experts were forced to rely on intuition and anecdote to find perpetrators and those who cover them up.

> *"Zero Abuse approached Artificial Intelligence with a big question."*
>
> Joelle Casteix

Shutterstock

Technologists had used various methods to try and track individual perpetrators for years, but without the expertise of the men and women "in the trenches" and without access to big data sources, these technologies usually failed, due to limited input and technologists' restricted understanding of the intricacies of the problem. Simply put: technologists were making self-driving cars and child sexual abuse subject matter experts were working out of spiral notebooks and static HTML.

Our challenge: how do we bring these two very different groups together in our united purpose and teach them to speak the same language?

To reach our goal of turning aspiration into application, we had to accomplish four things.

1 Understand the goal of our AI solution

We came to AI with a specific question and a specific business goal. We wanted to track perpetrators and those who cover them up. We knew that our data reflected institutional behaviour. It is fundamental for us to keep our eyes on this prize for our first phases and not get distracted with other potential uses.

2 Find the right partners

The Zero Abuse Project is not a technology company. We are a non-profit dedicated to a world where children are free from abuse. The best technology company in the world may not be the best technology partner for us. We are people of passion and heart. Our subject matter experts need to be educated from the ground up when it comes to tech.

The technologists needed an education as well – but the education they get is going to be traumatic. When we look for partners, we ask the bigger questions: Why do you do what you do? What are you willing to risk? What scares you? Are you willing to change the way you think?

A lot of companies are not ready for that leap. Our partner, Technossus, was. After sitting with us, we realized that they were ready to break free of their own technological chains and think with the passion that led us to their office doors in the first place.

3 Dive deeply into the development process before a single line of code is written

The work of uncovering institutional sexual abuse is complicated and ugly. Our data is even worse. Our partner, Technossus, rightly estimated for that. They sat with our subject matter experts for weeks, and even then, there were still questions.

Our subject matter experts had mountains of esoteric, hard copy data dating back 50 years. The rest of the document storage is encased in memory, anecdote, secret documents, and coded language. Finally, the subject matter experts had to translate a baffling institutional structure. This was a history, social work, language, and economics crash course for Technossus.

> *"Are you willing to change the way you think?"*
>
> Joelle Casteix

4 Spread the passion between the partners and the subject matter experts

Working in the world of child sexual abuse prevention is tough. The trick is to engender passion. All of us at Zero Abuse have created a world where it is impossible for us to walk away from the work we do: we love it too much. We know we are making a difference. That's the passion we spread to our partners. They know they are changing the world.

There is no greater motivation for excellence.

However, AI training requires a special type of collaboration, one that requires substantially more effort than a traditional IT project.

Advances in AI-enabled language translation hold special promise for the developing world

Vicki L. Hanson, PhD

CEO, Association for Computing Machinery

As many readers of ITU News may be aware, the Association for Computing Machinery (ACM) presents the A.M. Turing Award annually. Often referred to as the "Nobel Prize of Computing," the A.M. Turing Award is accompanied by a USD 1 million prize funded by Google.

The advent of neural machine translation

In 2018, Geoffrey Hinton, Yoshua Bengio and Yann LeCun received the award for their contributions to machine learning using deep neural networks. Deep learning is one of the most transformative technologies of Artificial Intelligence (AI) research, and has resulted in major breakthroughs in areas including computer vision, speech recognition, language processing, and robotics.

One of the most interesting advances made possible through deep learning technologies is machine translation, or the ability of computers to translate between languages.

> *"Great strides have already been made in deploying these new AI technologies in Africa."*
>
> Vicki L. Hanson


Shutterstock

Using a new process called neural machine translation, AI language algorithms have resulted in far more precise language translations than were previously thought possible. Unlike earlier approaches to AI translation (such as statistical machine translation, which translated sentence fragments), neural machine translation translates entire sentences.

These very recent advances in machine translation and speech recognition, combined with the proliferation of smartphones around the world, means that people can bridge language gaps simply by carrying their phones with them and using one of the many new language translation apps that are available.

The potential of these new capabilities is far greater than helping a tourist find their way to a museum or restaurant during a holiday. In the developing world, language barriers can significantly impede education, health care, and economic development – and even contribute to inter-communal violence.

The challenge of overcoming language barriers comes into fuller view when you realize that there are an estimated 2000 languages spoken in Africa alone.

For example, in a 2006 study, researcher Michael Levin found that in a large pediatric hospital in Cape Town, South Africa, only 6% of medical interviews with the parents of patients were conducted in their first language. In the study, parents cited language and cultural barriers as the major impediments to their effective participation in health care rendered to their children.

Another study focusing on South Africa underscored how accessing online education could enhance people's lives – if only language wasn't a barrier. Authors Jade Abbott and Laura Martinus pointed out that, while the Internet comprises 53.5% of English content, the remaining 10 official languages of South Africa comprise just 0.1% of online content.

> *"A new goal for the AI community is finding ways to develop neural machine translation for these low-resource languages."*
>
> Vicki L. Hanson

And, in the most urgent example, the non-profit organization, Translators without Borders, notes that "basic phrases can change and save lives in a humanitarian emergency, yet often communication fails because humanitarian aid workers and the people affected do not speak the same language."

Great strides have already been made in deploying these new AI technologies in Africa. Google Neural Machine Translation, which offers translation between English and 103 languages around the world, now supports translation for 13 African languages, including Igbo, Swahili, and Zulu – three of the most popular on the continent. It is hard to quantify the benefits these new translation capabilities have already fostered.

'Low-resource' language challenges

At the same time, significant challenges remain. For current neural machine translation approaches to work well, the machine translation program must first have access to a considerable volume of text in each of the languages (or the language pair) from which the translation will take place.

This may not be a problem when translating between English and Chinese, where countless volumes have already been translated, but it is a problem translating, for example, English and Sepedi, one of the other official languages of South Africa.

Languages that do not have considerable volumes of text available for translation are often referred to as "low-resource" languages.

These languages can be "low-resource" for a variety of reasons, including that the language is primarily oral in nature rather than written; there is a lack of standardized spelling; or because there are too many variations across different dialects.

A new goal for the AI community

So a new goal for the AI community is finding ways to develop neural machine translation for these low-resource languages.

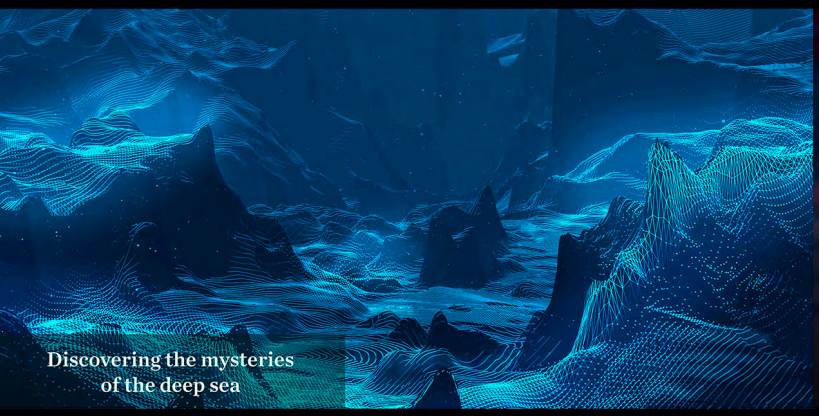
Promising approaches are being explored, and the academic community and leading tech companies are actively involved in the effort. For example, just last month, Facebook announced research grants for computer scientists who can develop robust translation algorithms for low-resource languages.

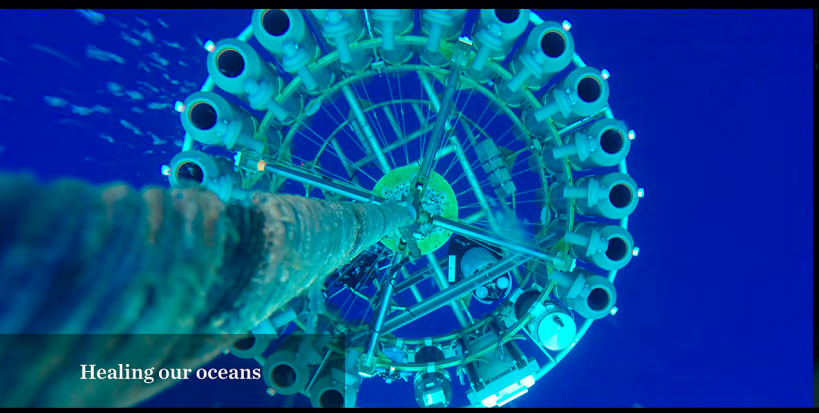
Because of the leapfrog advances that we have seen in this area of AI in just the last 15 years, the worldwide computing community is excited to see what innovations are on the horizon and how these technologies might continue to improve the human condition.

XPRIZE

BE A PART OF THE NEXT BREAKTHROUGH

Scan me





XPRIZE

BE A PART OF THE NEXT BREAKTHROUGH

Scan me

Why storytelling can help build inclusive AI

Davar Ardalan
CEO and Storyteller in Chief, IVOW

Zarmeen Pavri
Joint Managing Director, 37°C

We are witnessing a pivotal time in human history, as Artificial Intelligence (AI) is integrated into just about every new or established industry.

However, with this promise there is a global lack of understanding. What is AI and why should I care?

International aid and development agencies are investing in many aspects of AI technology and we suggest that storytelling must be one of them.

More and more, AI can be used to preserve indigenous languages and cultural heritage, which provide a core foundation in sustaining communities.

> *"International aid and development agencies are investing in many aspects of AI technology and we suggest that storytelling must be one of them."*
>
> Davar Ardalan/Zarmeen Pavri

On 28–31 May, 2019 at the AI for Good Global Summit in Geneva, AI, Culture and Storytelling will be workshopped for the first time.

About the storytelling workshops

Storytellers and AI experts alike will tackle the various challenges, roadblocks, and opportunities relating to this future and ask this question: Can the fusion of AI and storytelling be a new tool in preserving human culture and history?

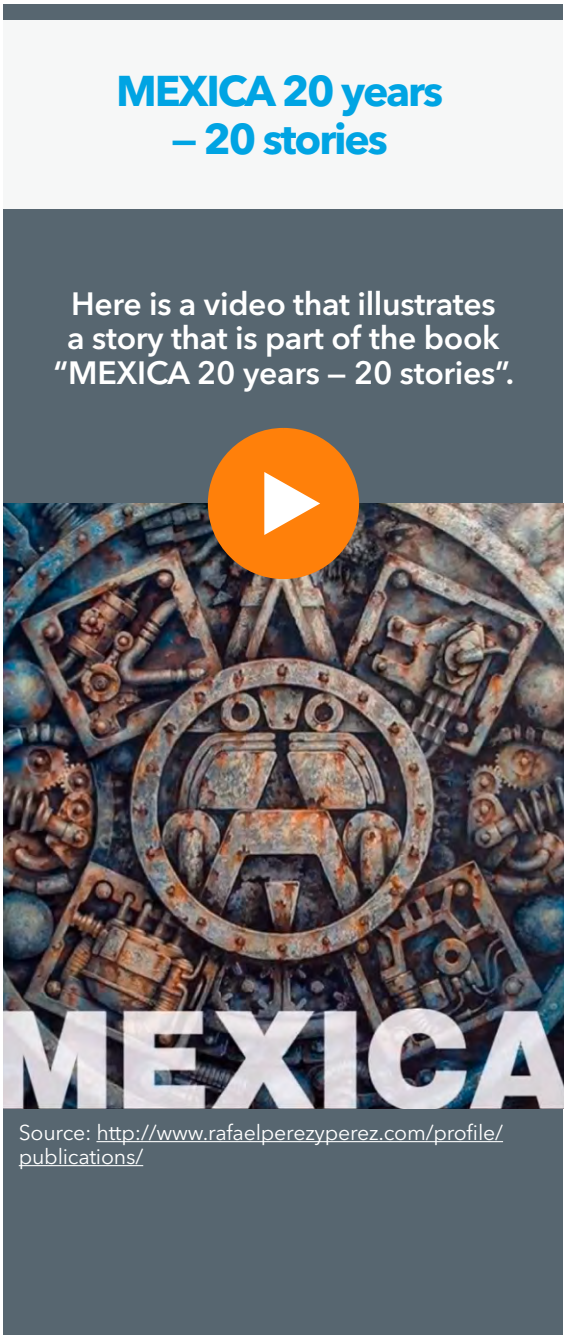
The sessions, led by AI and storytelling thought leaders, will explore pioneering research on automated storytelling and include hands-on workshops on standard methodologies and structured data collection as one of the keys to training algorithms to be more culturally aware. In addition, the workshops will delve into ethical and historical considerations as we create the foundations for deeply inclusive AI.

The ability to explore, identify, and convert latent untapped storytelling narratives and translate them into structured meaningful knowledge-sharing data and products can also attempt to address the issues around ensuring inclusiveness and diversity within the AI and digital storytelling context.

The thought leaders who will be there

AI and culture expert Rafael Pérez y Pérez is one of the thought leaders attending the summit. A professor at the *Universidad Autónoma Metropolitana* at Cuajimalpa, México City, he specializes in AI and computational creativity, particularly in automatic narrative generation.

Pérez is the author of MEXICA 20 (see story illustration video below), short narratives developed by the computer program MEXICA. Plots describe fictional situations related to the Mexicas (also known as Aztecs), ancient inhabitants of what today is Mexico City.



Source: http://www.rafaelperezyperez.com/profile/publications/

Shutterstock

> *"Storytellers and AI experts alike will tackle the various challenges... relating to this future and ask this question..."*
>
> Davar Ardalan/Zarmeen Pavri

Also at the Geneva AI Summit will be Wolfgang Victor Yarlott, a member of the Native American Crow tribe. Yarlott's pioneering research took place with the Genesis Story Understanding System at MIT's Computer Science and Artificial Intelligence Laboratory. In collaboration with his Professor Patrick Winston, Yarlott wanted to determine whether the system could understand stories from Crow folklore as well as it understood the works of Shakespeare. At first his "audience" was the program itself – he wanted to instill an understanding.

Over the course of his work, Yarlott analysed three collections of Crow literature, created a list of cultural features present in the stories, identified four as particularly important (unknowable events, medicine, differences as strengths, and uniform treatment of entities), and developed a set of five Genesis-readable stories in which those features were prominent.

This led to several new elements in the story-understanding model. With these new elements, he was able to prove that Genesis is indeed capable of understanding stories from the Crow culture, bringing it one step closer to being a universal story-understanding system.

'Graduating' learning platform

The summit will provide a "graduating" learning platform for existing storytellers and new entrants into this field. Participants will be able to enhance their technical know-how and keep up to date with the nascent landscape of inclusive AI.

We're at a critical moment where citizens, government agencies, funders, donors, and impact investors can push the learning boundaries, have a growth mindset, and invest in innovative ways to capture activities and interests of global communities.

It will become an imperative that AI and storytellers ensure they capture the authentic local community stories that showcase heritage and culture and human essence in order to build deeply inclusive AI.

Building better AI tools

An inclusive philosophy will result in building better AI tools that can be used within the digital storyteller's toolkit to improve and enhance community engagement, strengthen local value chain development, enhance inclusive markets and inclusive businesses, and create shared learnings on how we can better help improve the lives of those living in poverty in emerging and frontier economies.

Today, citizens, technologists, data scientists, developers, entrepreneurs, students, academics, non-governmental organizations (NGOs), governments, businesses, and investors have a larger role to play than ever before in leading global engagement in new and inclusive ways.

Many countries are now working towards shifting capital to be directed at scale to align with the United Nations' Sustainable Development Goals (SDGs) to create resilient economies and to prioritize human well-being, social equity and environmental protection.

With this global momentum to strengthen social capital, conserve and preserve natural capital, and work towards transforming our economies and societies, the use of AI will play a significant role to ensure that cultural heritage within communities is also preserved and protected.

The application of deeply inclusive AI coupled with digital storytelling can provide an amplification role and play the "perseverance role" in ensuring the integrity of people's history.

Concerted effort needed

We will need a concentrated effort, like the AI Commons project, with a focus on crowdsourcing and tagging intangible cultural heritage, to bring together the objectives, interests, and values among aid, trade, and business. The use of deeply inclusive AI can be beneficial in supporting, extending, and amplifying existing developmental aid and social program initiatives; but it is more important that it also be considered and incorporated into the design of new social programs.

A global call to tag datasets and shape an inclusive future for automated media is not that far-fetched. We can turn to engaged citizens, storytellers, and students to help us tag data on world cultures and traditions. Together, we can try to design the next generation of digital engagement and intelligence machines to be culturally conscious.

Hey AI, make my story count

We are launching a month-long digital campaign (20 May–13 June) asking people around the world to share their heritage stories in under :60 on video or via text, audio on social media.

The goal is to generate a new conversation around intelligent inclusion – to invite the global public to share their heritage stories – and for AI developers to engage in the promise of storytelling as a tool to make AI systems more inclusive. A closer consideration of local cultures and traditions could greatly improve the ability of non-storytelling AI to respond to people's values and interests.

AI – the music industry's newest producer

Frederic Werner

Head of Strategic Engagement,
ITU Standardization Bureau

Gone are the days of writer's block. Today's would-be songwriters now have a game-changing tool at their disposal – Artificial Intelligence (AI).

Many now view AI as a partner in music making, enhancing music, and leveling the playing field – enabling artists to experiment with music in ways that would have required working with multiple technical and musical collaborators as well as significant budgets in the past.

As a life-long drummer and student of music, I always took pride in the proverbial "10 000 hours" required to master a craft, thus creating a certain entry bar for would-be musicians.

At the same time, I probably wasted an equal amount of hours struggling with buggy recording software, expensive studios, and collaborating with a mixed bag of musicians (some amazing – some not so).

The prospect of a collaborative AI music partner has its appeals, but is using AI to make music simply cheating?

> *"Today's would-be songwriters now have a game-changing tool at their disposal — Artificial Intelligence."*
>
> Frederic Werner

Shutterstock

> *"If music creation is reduced to a mechanical process, then what is the artist's role?"*
>
> Frederic Werner

Prior to the invention of photography, realistic portraits and images of the world could only be produced by highly-skilled painters. Today, we take photography for granted and it is hard to imagine just how amazing it must have been to see a well-executed realistic painting in the 1800s. One could say that photography was one of the major triggers of the modern art movement, giving rise to creative geniuses like Vincent Van Gogh and Pablo Picasso. Without photography, perhaps modern art would never have existed.

What is the artist's role now?

Could AI-generated music create a similar catalyst for a musical revolution? And if music creation is reduced to a mechanical process, then what is the artist's role?

ALYSIA, founded by computer scientists who are also musicians, has a mission to "democratize songwriting through AI," empowering anyone to write songs.

"People who have never previously written songs are able to create original music in a matter of minutes," explains Dr Maya Ackerman, CEO/Co-founder of WaveAI, which created ALYSIA. "The process begins with the user selecting an instrumental backing track and choosing (or entering) topics that the lyrics should discuss. The AI-based lyrics assistant then proposes lyrics one line at a time, which the user can simply select from to piece together the lyrics."

"More advanced users can edit ALYSIA's suggestions, or enter their own lyrical lines or melodies," says Ackerman. "Professional musicians use the platform to break out of writer's block, since the AI-based system never runs out of fresh ideas."


Rehav Segev/Modern Drummer

> *"Data is made up of ones and zeros, and our art and humanity lays in the space between one and zero."*
>
> Jojo Mayer

Google Magenta is an open-source research project started by Google Brain that uses TensorFlow technology to enhance music production. Magenta recently developed NSynth (Neural Synthesizer), a machine learning algorithm that uses a deep neural network to learn the characteristics of sounds, and then create a completely new sound based on these characteristics. NSynth is still in its prototype phase, and researchers are currently working with professional musicians to fine-tune the program.

More 'creative autonomy'?

YouTube star Taryn Southern, with over 700 million views, released the first-ever album composed and produced entirely with AI, using AIVA, Amper Music, IBM's Watson Beat, and Google's Magenta.

"The major benefit of working with AI is having control over the creative process and being able to see something from inception to completion," Southern says. "I don't have a traditional music background, so having the ability to create music on my own and in my own time is incredibly empowering."

"I start by making a series of decisions about what BPM, rhythm, key, mood, instrumentation I want – and then essentially giving the AI 'feedback' or 'notes' each time it generates a new possibility until I'm happy with the overall song," Southern explains. "I then download, arrange and mix the stems into a structure. From a creative standpoint, the process of working with AI is quite similar to the process of working with another human – both rely on each other's talents and inspiration to accomplish a given goal. AI gives me more creative autonomy in terms of what decisions I make and when a song is ready to be complete."

Is it 'cheating'?

Southern argues that using AI to make music is absolutely not cheating. "The idea that a shortcut to any creative process undermines the whole process is the very antithesis of creativity. I imagine in twenty years, 'coding' songs will be commonplace."

Should musicians feel threatened by the advent of collaborative AI musicians? World-renowned fusion drummer Jojo Mayer doesn't think so.

He has built a career by effectively reverse-engineering electronic music and using it to push his physical human limits as a drummer and create an innovative style of drumming.

"Data is made up of ones and zeros," Mayer says, "and our art and humanity lays in the space between one and zero."

It was famous jazz musician Miles Davis who said it's not how many notes you play, but rather the notes you choose not to play that makes a great performance. You can have all the data and AI-powered tools in the world at your fingertips, but choosing what not to do might just be the new "entry bar" for future artists.

Some people, with little understanding of current AI technology or music (or both), worry that AI will make musicians obsolete. I don't subscribe to this point of view.

I believe these new tools could open enormous creative opportunities for music that won't replace artists, but will rather empower them.

If this technology could one day help unlock the next Jimi Hendrix, I say bring it on.

I AM AI

About the Album

I AM AI is the first album by a solo artist composed and produced with artificial intelligence. The songs explore the future of humans and machines, asking the questions:

Who are we?
What will we become
…and are we ready?

Comprised of eight tracks, the album's first single "Break Free" currently has more than 4 million streams and landed on the Mediabase Indicator radio charts at #48 in August of 2018. The song has garnered reviews and coverage from publications like Wired, Forbes, and Fast Company.

YouTube's Creator Lab awarded Taryn a grant in 2017 to create three immersive VR videos, of which two songs on the album were written for.

I AM AI was released on 27 September 2018.

Source: https://www.tarynsouthern.com/album

About The Process

Machine learning can be used to process, compose, and produce composition or instrumentation. With rule based AI, the artist can direct parameters (i.e. BPM, rhythm, instrumentation, style.) With generative AI, the artist can input musical data, and apply deep learning to output new musical compositions based on statistical probabilities and patterns. Editorial arrangement plays a heavy part in the artist's process in either scenario.

Taryn used a combination of tools including IBM's Watson Beat, Amper, AIVA, and Google Magenta. In all cases, AI software composed the notation, and when Amper was used, the AI also produced the instrumentation.

Taryn arranged the compositions and wrote vocal melodies and lyrics, while producer Ethan Carlson handled vocal production, mixing and mastering.

What is the role of artists in AI development?

Christian Rauch

Managing Director, STATE Experience Science

Artificial Intelligence (AI) innovations have been causing quite a stir in the field of arts and culture lately. They have been creating movies, paintings, music, poetry – and much more.

One prime example was when the first piece of AI-generated art to be sold at a major auction house stunned the art market last year with a remarkable price tag nearly 45-times its high estimate.

As AI algorithms start to generate artistic works that are compared to the pinnacle of human creativity, it raises the question of what the role of artists in future development of artificial intelligence may be.

Is this the beginning of the end of human creativity and the relevance of artists? Should we rely on computers to inspire us in the future with their creative outputs?

> *"In the field of arts and culture, AI innovations have been causing quite a stir."*
>
> Christian Rauch

What value should be placed on AI-derived art?

While hardly anyone would argue today that the application of AI algorithms brings forward many new and surprising results, the issue of value is not as easily accessible.

In fact, value and meaning only make sense from a particular perspective, such as personal or societal, and have to be renegotiated continuously. Oftentimes, an absolute definition cannot be found and is dependent on subtle contexts and weak relations.

Here lies one of the great difficulties with machine creativity – and, simultaneously, the necessity of human intervention.

AI technologies offer artists and creatives a range of new tools that give birth to exciting applications in the creative sector. However, it is in the creation of contexts and the negotiation of what matters for us – as individuals and as societies – where the true meaning of the work of artists starts to emerge.

The development of AI raises a range of most important questions that will need to be answered. We need skilled facilitators who will allow us to reflect the key issues from as many angles as possible – and include in this discourse as many voices as possible. We need to identify positive visions of how AI may be used for our maximum benefit and avoid dangerous pitfalls.

Moreover, a high degree of new thinking and ingenuity is necessary in order to exploit the positive potential of AI technologies across all sectors, including the art world.

Onformative, Meandering River at STATE Studio

© Anne Freitag

AI-driven art on display

At the third AI for Good Global Summit, works of art on the topic of AI will be displayed for the first time alongside technological and scientific breakthroughs.

The works will add meaning and richness to the debate around the societal implications of AI and will enable a broader audience to connect with AI on a direct and emotional level, while inspiring participants to contemplate the bigger picture in order to commonly build future visions around the meaningful use of AI.

As content partner for the arts programme of the summit, Berlin-based art-science initiative STATE will show a selection of artists and results from the recent AI Innovationcamp *Gestaltungsmaschine*, organized together with the *Kompetenzzentrum für Kultur- und Kreativwirtschaft* for the German Federal Ministry of Economy.

Exploring the opportunities at the intersection of AI development and arts and creative industries, the event produced a range of inspiring examples of the possible impact of artists in AI development.

> *"Is this the beginning of the end of human creativity and the relevance of artists?"*
>
> Christian Rauch

Among the artwork shown in the exhibition at ITU are UNFINISHED, a creative dialogue between painter Roman Lipski and an AI developed by Birds on Mars, Christian "Mio" Loclair's work, Narciss, a robot installation that uses AI to analyse itself, seemingly reflecting on its own existence, as well as recent work from Sascha Pohflepp and team, who in collaboration the Natural History Museum in Berlin ask about the future of evolution in the anthropocene.

If you miss the opportunity to visit the exhibition in Geneva, you may still see these works and others at the art and science gallery STATE Studio in Berlin. It's one of the many new spaces around the world that focus on stimulating dialogue on scientific and technological development through the works of artists and designers, in order to facilitate a more holistic dialogue about future innovation.

'AI for Good' or scary AI?

Neil Sahota and Michael Ashley

Authors of 'Own the A.I. Revolution'

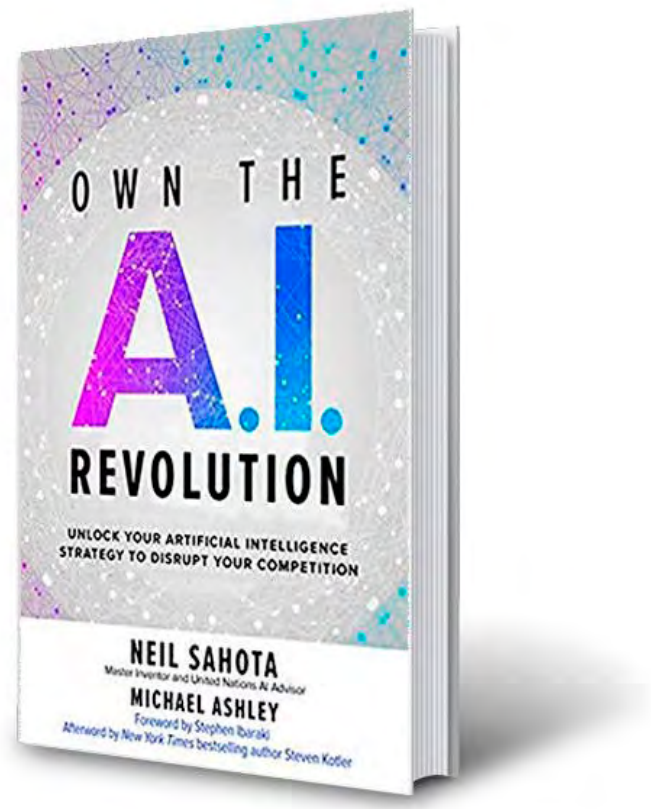
Some futurists fear Artificial Intelligence (AI), perhaps understandably. After all, AI appears in all kinds of menacing ways in popular culture, from the Terminator movie dynasty to homicidal HAL from 2001: A Space Odyssey.

Though these movies depict Artificial General Intelligence (AGI) gone awry, it's important to note some leading tech scholars, such as George Gilder (author of Life After Google), doubt that humans will ever be able to generate the sentience we humans take for granted (AGI) in our machines.

As it turns out, the predominant fear the typical person actually holds about AI pertains to Artificial Narrow Intelligence (ANI).

Specialized, ANI focuses on narrow tasks, like routing you to your destination – or maybe one day driving you there.

> *"Specialized, ANI focuses on narrow tasks, like routing you to your destination — or maybe one day driving you there."*
>
> Neil Sahota/Michael Ashley



Much of what we uncovered when cowriting our new book, Own the A.I. Revolution: Unlock Your Artificial Intelligence Strategy to Disrupt Your Competition, is that people fear narrow task-completing AIs will take their job.

"It's no secret many people worry about this type of problem," Irakli Beridze, who is a speaker at the upcoming AI for Good Global Summit and heads the Centre for Artificial Intelligence and Robotics at the United Nations Interregional Crime and Justice Research Institute, told us when interviewed for the book. "One way or another, AI-induced unemployment is a risk we cannot dismiss out of hand.

We regularly see reports predicting AI will wipe out 20 to 70 per-cent of jobs. And we're not just talking about truck drivers and factory workers, but also accountants, lawyers, doctors, and other highly-skilled professionals."

The reports Beridze mentioned are bound to cause deep concern. At first.

But what we discovered when researching the book's material, particularly interviewing thought leaders, is that there is often a flip side to everything AI-related.

Like any significant tool, from the train to the computer, AI possesses both the ability to cause havoc and help at the same time. Or as Beridze went on to say: "But then I see reports that AI will also create more jobs than it replaces. They'll just be different kinds of jobs."

Stephen Ibaraki, futurist, and one of the founders of the AI for Good Global Summit with XPRIZE Foundation echoed a similar sentiment.

"This year there is actually some data indicating that, because of enhanced capabilities and productivity, as well as a growing economy, jobs may even increase rather than decrease."

While acknowledging some jobs will be replaced, especially manual tasks, Ibaraki suggested an even greater number may be created in what's being termed the coming "Fourth Industrial Revolution" that may yield an increase in wealth of USD 16 trillion by 2030.

Potential breakthroughs

Again, providing a counterpoint to many of the concerns surrounding AI raised in public, it was refreshing to hear two ITU officials describe the breakthroughs this technology is having in key areas, such as health care.

> *"What we discovered... , is that there is often a flip side to everything AI-related."*
>
> Neil Sahota/Michael Ashley

"I see AI having a large impact on health care very quickly," says Frederic Werner, the Head of Strategic Engagement Division for ITU's Standardization Sector. "With AI, we can use mobile phones to detect conditions, like skin cancer or diabetes. There's already an app to analyse suspicious skin growth, alerting users when they should go see a dermatologist. And this isn't just for use in developing countries with a shortage of doctors. It's helpful in developed countries, like the U.K., where it can take up to a year to get an appointment with a specialist."

Likewise, Dr Reinhard Scholl, Deputy to the Director of ITU's Standardization Bureau, relates to us the progress he predicts AI will have on a formidable, long-time humanitarian challenge.

"Let us look at how AI could address the elimination of poverty," says Dr Scholl. "Step one is to discover where the poorest people actually live. It seems obvious, but it is actually a difficult task. The old way to do this was simply to go door-to-door, but this is time consuming, expensive, and often dangerous. A more modern way is to use satellite imagery relying on night-time images, but that doesn't allow you to differentiate grades of poverty.

However, recently Stanford University used machine learning to show that daytime satellite images were much better than night-time images for mapping poverty. In principle, their model can make predictions at any resolution by analysing daytime satellite images."

Hearing first-hand from experts such as these, as well as the many other deep thinkers in our book, inspired us throughout its writing. Our deepest purpose in creating the material was to not only assuage fears via pragmatic thinking: we wanted to empower readers to seize this opportunity for themselves.

Consequently, we are deeply honoured to launch our book at the upcoming AI For Good Global Summit this year. We can think of no other better way to usher in a new era of uncommon opportunity for tech-inspired positivity.

Can we build guidelines for trustworthy, ethical AI?

Dr Virginia Dignum

Professor of Social and Ethical Artificial Intelligence at Umeå University

Just last week, the European Union published its Guidelines for Trustworthy AI.

A few weeks earlier, the first edition of the IEEE initiative on Ethically Aligned Design (IEEE-EAD) report – A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems was presented.

The impact of these two reports, one coming from the European Union (EU) and the other from one of the leading international professional organizations of engineers is potentially very large. *(Full disclosure: I am a member of the EU high-level group on AI and of the executive committee of IEEE ethically aligned design (EAD) initiative, the bodies behind these two reports.)*

Engineers are those that ultimately will implement AI to meet ethical principles and human values, but it is policy-makers, regulators and society in general that can set and enforce the purpose.

We are all responsible.

> *"Ensuring an ethically aligned purpose is more than designing systems whose result can be trusted."*
>
> Virginia Dignum

Moving from principles to guidelines

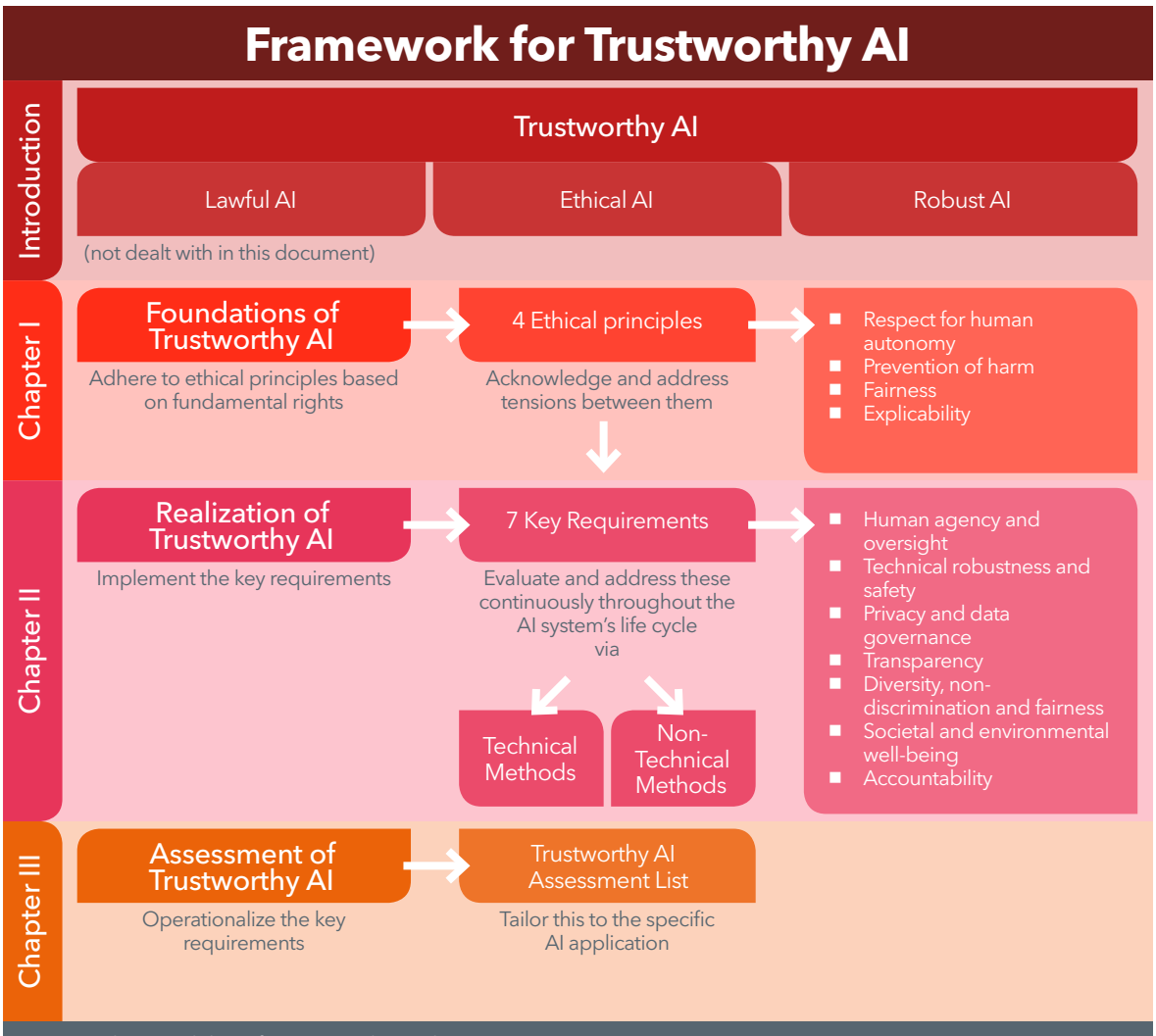
Both previously-mentioned documents go well beyond proposing a list of principles. They aim at providing concrete guidelines to the design of ethically aligned AI systems. Systems that we can trust, systems that we can rely on.

Based on the result of a public consultation process, the EU guidelines put forward seven requirements necessary (but not sufficient) to achieve trustworthy AI, together with methods to achieve them, and an assessment list to check them.

The requirements include:

- Human agency and oversight
- Technical robustness and safety
- Privacy and data governance
- Transparency
- Diversity, non-discrimination and fairness
- Societal and environmental well-being
- Accountability

The IEEE-EAD report is a truly bottom-up international effort, resulting from the collaboration of many hundreds of experts across the globe including Asia and the Global South.



Source: Ethics guidelines for trustworthy AI, the European Commission

> *"AI systems are artefacts decided, designed, implemented and used by us."*
>
> Virginia Dignum

It goes deeper and beyond a list of requirements or principles, and provides in-depth background on many different topics.

The IEEE-EAD community is already hard at work on defining standards for the future of ethical intelligent and autonomous technologies, ensuring the prioritization of human well-being.

The EU will be piloting its assessment list in the coming months, through an open call for interest.

As mathematician and philosopher Norbert Wiener wrote back in 1960: "We had better be quite sure that the purpose put into the machine is the purpose which we really desire." Moreover, we need to ensure that we put in place the social and technical constructs that ensure that the purpose remains in place when algorithms and their contexts evolve.

Ensuring an ethically aligned purpose is more than designing systems whose result can be trusted. It is about the way we design them, why we design them, and who is involved in designing them. It is a work of generations. It is a work always in progress.

Obviously, errors will be made, disasters will happen. We need to learn from mistakes and try again – try better.

It is not an option to ignore our responsibility. AI systems are artefacts decided, designed, implemented and used by us. We are responsible.

We are responsible to try again when we fail (and we will fail), to observe and denounce when we see things going wrong (and they will go wrong), to be informed and to inform, to rebuild and improve.

The principles put forward by the EU and the IEEE are the latest in a long list of sets of principles, by governments, civil organizations, private companies, think tanks and research groups (Asilomar, Barcelona, Montreal, Google, Microsoft,… just to mention a few). However, it is not just about checking that a system meets the principles on whatever is your favourite list.

These principles are not check lists, or boxes to tick once and forget. These principles are directions for action. They are codes of behaviour – for AI systems, but, most importantly, for us.

It is us who need to be fair, non-discriminatory, accountable, to ensure privacy of ourselves and others, and to aim at social and environmental well-being. The codes of ethics are for us. AI systems will follow.

There is work to be done. We, the people, are the ones who can and must do it. We are responsible.

How the 'FRR Quality Mark for Robotics and AI' aims to assess responsible robotics

Marjolein Vlaming

Senior Manager of Artificial Intelligence and Innovation, Deloitte, The Netherlands

Robots and Artificial Intelligence (AI)-powered products are increasingly used for tasks that can have a high impact on our daily lives.

AI-powered products are, for instance, changing the way hiring procedures, credit ratings, or fraud detection are being carried out.

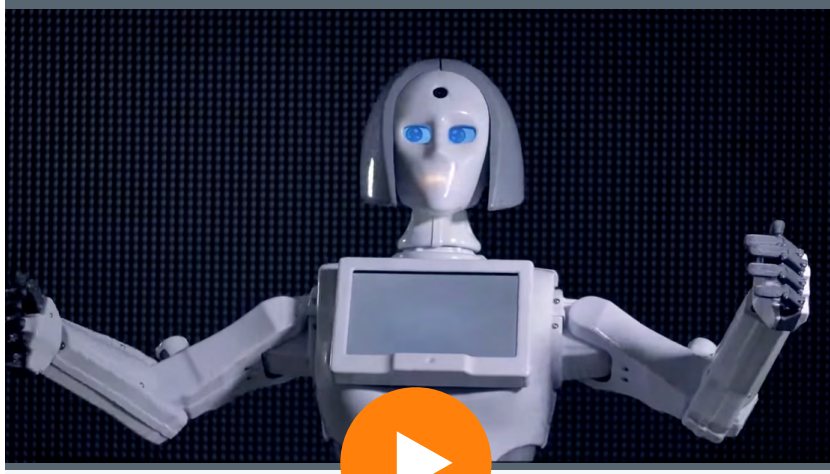
Robots are being used to support and replace humans in dull, dirty or dangerous tasks: drones for search and rescue, warehouses powered by robots, or surgical robots assisting surgeons.

While robots and AI-powered products may be working behind the scenes today, we can expect them to become a more pervasive part of our lives in the near future. But for most people it is hard, if not impossible, to understand how these products operate.

How can you, as a consumer, make sure that robots and AI-powered products are being made in a responsible manner and are doing what they are supposed to do?

> *"Robots and AI-powered products are increasingly used for tasks that can have a high impact on our daily lives."*
>
> Marjolein Vlaming

> *"We want to do for robotics what Fairtrade did for coffee."*



Watch the video

To address these questions, the Foundation for Responsible Robotics (FRR) and Deloitte are developing the FRR Quality Mark for Robotics and AI: A quality mark that ensures that robots and AI-powered products are made in a responsible way, with attention to human rights and values.

The aim is to create a recognizable quality mark for consumers, comparable with the Fairtrade quality mark for products that have been produced to Fairtrade standards.

"As a consumer, you should be able to rely on a standard," says Marc Verdonk, partner of Emerging Technology at Deloitte. "You don't have to understand all the details of the technology, you just have to know that someone with the right expertise using the right framework can ensure it is being made and used in a responsible way."

Developing a framework

FRR is a non-profit organization with a charity status that aims to create a future of robotics and AI that are responsibly designed, developed and used. The board of the FRR consists of experts in ethics, robotics and AI, under the leadership of Aimee van Wynsberghe, assistant professor in Ethics of Technology at the Delft University of Technology.

"Our aim is to create a culture of responsible development of robotics and AI, to promote public well-being for us and for the coming generations," says Van Wynsberghe. Deloitte supports FRR through the Deloitte Impact Foundation and is contributing its AI and auditing expertise to FRR to help create the FRR Quality Mark for Robotics and AI.

Although the overall scope for the FRR Quality Mark for Robotics and AI is still being discussed, an important premise of it is to ensure that human rights and societal values are dealt with throughout the entire chain of creating the product. All products using robotics or AI will be able to apply for the quality mark. "That can be a wide variety of products," explains Verdonk, "like algorithms, robots, smart devices and connected toys."

During the assessment, the FRR Quality Mark for Robotics and AI will take a close look at the product, such as the controls related to actuators, communication interface, sensors, data storage and firmware. Moreover, it will take a close look at the AI engine: How are the algorithms trained and tested? Can the algorithms be changed without authorization? The quality mark will also look at the policies and procedures used by the company that creates the product.

"In all these aspects, the principles of creating something in an ethical manner have to be safe-guarded," says Verdonk.

Ensuring security and privacy

One aspect the FRR Quality Mark for Robotics and AI will take into account is security. "If you want to promote the responsible use of robotics, AI security is very important," says Verdonk. "With large robots or drones, security should always be a priority. Or think of a doll that uses AI to interact with children. If the doll can be hacked and used for something completely different, the consequences can be disastrous."

Another aspect is privacy. "Take, for example, delivery robots," says Verdonk. "They need cameras to see the road. In theory, these cameras are able to film people who are passing by. But you can also consciously design the robots in a way that the camera is unable to film anyone above their knees, like the self-driving delivery robot of Starship Technologies. Respecting people's privacy through this design choice is an ethical choice and these are the kinds of choices we want to encourage."

Steering industry in the right direction

For consumers, the FRR Quality Mark for Robotics and AI can help them trust a technology that can be hard to understand. It can also help them to make a well-considered decision about what kinds of robotic or AI-powered products they want to buy or use.

> *"How can you, as a consumer, make sure that robots and AI-powered products are being made in a responsible manner?"*
>
> Marjolein Vlaming

For companies, the FRR Quality Mark for Robotics and AI can help to develop robots and AI in a transparent and responsible way.

"The FRR Quality Mark for Robotics and AI sets a standard that companies can adhere to," Verdonk explains. "Companies want to show their customers that they actually do care about ethics. An independent quality mark can help to demonstrate that they take ethical considerations seriously."

Verdonk is convinced that the FRR Quality Mark for Robotics and AI will help to lift the industry standards for creating robots and AI-powered products, and that it will steer the industry in the right direction.

"I do think that robotics and AI will be very impactful technologies," he says. "But in order to make that a positive impact, we need thoroughly tested products that have been developed and are being used in a responsible manner, as well as the trust of the general public. If we can create a trusted standard that ensures the responsible use of robotics and AI, we can create a future in which these technologies can have a tremendous positive impact."

ITU News WEEKLY

Stay current. Stay informed.

The weekly ITU Newsletter keeps you informed with:

- Key ICT trends worldwide
- Insights from ICT Thought Leaders
- The latest on ITU events and initiatives

Sign up today!