

# Scaling #AforGood



# AI for Good – broadening horizons

By Houlin Zhao, *ITU Secretary-General*

Now in its fifth year, the AI for Good engagement platform hosted by the International Telecommunication Union (ITU) has adapted to the times, becoming fully virtual.

In the last two years, the pandemic has contributed to AI for Good's evolution into more than a summit. Rather than an annual event, it has become a digital platform where innovators and solution seekers learn, build, and connect year-round to help identify practical artificial intelligence (AI) solutions to advance sustainable development worldwide.

ITU's work related to AI and machine learning has expanded lately to include road safety, data commons applications, and other new initiatives.

ITU focus groups are using AI to find solutions and set standards for better health care, autonomous and assisted driving, environmental efficiency, environmental disaster management, and most recently, agriculture.

The 2nd AI/ML in 5G Challenge, a global AI for Good competition, this year attracted participants from 82 countries, with a Grand Challenge Finale scheduled for 14 December.

This latest edition of the *ITU News Magazine* brings expert insights from ITU and external voices on a range of topics that encompass AI and machine learning in the service of the United Nations Sustainable Development Goals (SDGs) for 2030.

Read on to see how ITU's activities in this domain have grown, what we can expect from ITU and its partners' AI activities in 2022, and how you can get involved.



*ITU's work related to AI and machine learning has expanded lately to include road safety, data commons applications, and other new initiatives.* ”

Houlin Zhao

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## AI for Good

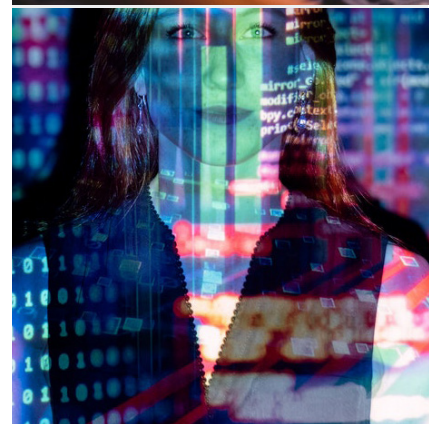
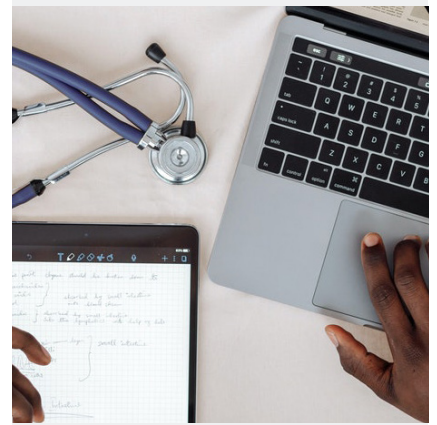
This edition of the *ITU News Magazine* draws on discussions at the AI for Good all-year online platform:

- ▶ Learning
- ▶ Building
- ▶ Connecting

to identify practical AI solutions to advance sustainable development.



Visit the AI for Good [website](#), and the YouTube [webinar playlist](#).





# Standardization at work: Mainstreaming AI and machine learning

By **Chaesub Lee**, Director,  
ITU Telecommunication Standardization Bureau

Artificial intelligence (AI) and machine learning (ML) are finding some highly practical applications across multiple industries and sectors – applications with considerable potential to serve as a force for good.

The growing influence of AI and ML is apparent in the standardization work done by the International Telecommunication Union (ITU), particularly in relation to network orchestration and management, multimedia coding, service quality assessment, and environmental efficiency. We also see it in our standardization work for digital health, digital finance, smart mobility, smart energy, digital agriculture, and smart cities.

Everyone must participate in the conversations to decide how AI should factor into our future. Recognizing this is at the core of ITU's approach.

Before long, AI could influence practically every aspect of social and economic activity around the world. Given this prospect, how do we plan to live together harmoniously as an interconnected global society? All of us must grapple with such questions – whether at the level of governments, companies, academic institutions, or wider communities.

The debate around AI extends far beyond the scope of any single organization. This is why ITU has called for an inclusive global dialogue on the implications of AI for the future of our society – a dialogue driven by the promotion of AI for Good.



“The growing influence of AI and ML is apparent in the standardization work done by ITU.”

Chaesub Lee

Director, ITU  
Telecommunication  
Standardization Bureau

“The debate around AI extends far beyond the scope of any single organization.”

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## Channelling tech for sustainable development

As the primary United Nations platform dedicated to AI-related topics, ITU's AI for Good initiative takes constant inspiration and guidance from the (United Nations) UN Sustainable Development Goals. The initiative and its year-round online engagement platform bring a wide array of stakeholders together, aiming to channel ongoing AI breakthroughs to help address the greatest challenges facing humanity.

Thanks to this updated, flexible platform, AI for Good has marched on steadily amid the challenges brought on by the COVID-19 pandemic. Our momentum has grown stronger, with the initiative become even more inclusive and scalable in its push for positive global impact.

New and expanding partnerships reflect growing confidence in AI. In parallel, the online platform nurtures a fast-growing and ever more diverse global AI for Good community.

Increasingly, experts from different fields are coming together to tackle key problems and align on incentives for innovation with AI. Connections are forming among AI specialists, AI users, data owners and experts in multiple other domains where AI could contribute decisively to sustainable development.

While information and communication technologies (ICTs) are transforming all aspects of industry and production, the growing need for highly specialized enabling technologies has added to the need for specific standards, either devised from scratch or adapted to the requirements of a certain market. Few fields are as emblematic of this trend as AI.

Conversations driven by the AI for Good initiative have helped to identify demand for new ITU standardization work, and we continue to welcome new expert communities to ITU to drive this work.

## Open initiatives and new partners

Study Groups within ITU's Telecommunication Standardization Sector (ITU-T) are where ITU members work together to develop international standards. Additionally, [ITU-T Focus Groups](#) offer a flexible structure to focus on specific, timely themes for shorter periods, typically a year or two. These help to step up pre-standardization studies in fields of rapidly growing relevance to ITU's global membership of countries, companies, universities, and international and regional organizations.



*Increasingly, experts from different fields are coming together to tackle key problems and align on incentives for innovation with AI. ”*

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Open to all interested parties, these groups prepare the basis for related standardization work within ITU-T Study Groups. As open platforms, they also strengthen the AI for Good movement by bringing together experts from different domains.

A new ITU-T Focus Group established two months ago, dedicated to “[AI and Internet of Things for Digital Agriculture](#)”, will help farmers and cultivators worldwide to improve the precision and sustainability of farming techniques. The UN Food and Agricultural Organization supports the group in partnership with ITU.

At the same time, a new [AI for Road Safety initiative](#) aims to mobilize the public and private sectors to improve safety for all road users, whether travelling by automobile, motorcycle, bicycle, foot, or other emerging modes of transport. ITU supports this initiative together with key UN offices on road safety and technology.

AI for Road Safety will also build on the results from ITU’s “AI for Autonomous and Assisted Driving” Focus Group, working towards the establishment of international standards to monitor and assess AI “driver” behavioural performance in automated vehicles.

## Partnerships across the UN

Another ITU Focus Group, on “AI for natural disaster management”, supports global efforts to understand and model natural hazards and disasters. By distilling good practices from around the world, the group – backed by ITU, the UN Environment Programme and the World Meteorological Organization – aims to lay out a roadmap for international action on AI for natural disaster management.

The ITU Focus Group on “Environmental Efficiency for AI and other Emerging Technologies” will benchmark best practices and describe pathways towards a standardized framework to assess environmental aspects of the adoption of emerging technologies. The ITU Focus Group on “AI for Health”, which we support together with the World Health Organization, will establish a framework and associated processes for the performance benchmarking of AI health solutions.

Finally, the global “AI and Data Commons” initiative aims to help ramp up AI for Good projects to global scale. For projects aligned with SDGs, the initiative can help to assemble vital resources to launch and scale up fast.



*A new ITU-T Focus Group established two months ago, dedicated to “AI and Internet of Things for Digital Agriculture”, will help farmers and cultivators worldwide to improve the precision and sustainability of farming techniques. ”*

Chaesub Lee



## Providing a trusted foundation

Alongside the drive for standards attuned to specific AI application domains, new ITU standards provide a trusted foundation for AI to enhance ICT networks at scale.

AI and ML play an important role in multimedia coding, an area where our video-compression standards have garnered two Primetime Emmy awards for ITU, ISO and IEC. AI and ML – reinforced by ITU standards – also support intelligent network diagnostics and models to assess the quality of speech, audio, and video.

Other ITU standards specify how Big Data and AI technology can improve datacentre energy efficiency and the support that AI can offer to IMT-2020/5G networking. They provide frameworks for AI-enhanced telecom operation and management and AI-assisted premium cable network platforms. And they address the use of AI in flight control for civilian unmanned aerial vehicles (drones), intelligent transport systems, and the management of smart city services.

ICT network operators have turned to AI and ML as key innovations to optimize network operations and increase energy and cost efficiency. The Y.317x series of ITU standards provides the necessary toolkit. With a strong focus on the future, it will enable the integration of ML into 5G and future networks, accounting for expanding ML capabilities as well as the evolution of communications networks.

## Grand Challenge Finale

The same toolkit guides contributions to the ITU's global AI/ML in 5G challenge. Last year, the ground-breaking first edition enabled over 1300 participants from 62 countries to connect with new partners in industry and academia – and new tools and data resources – to achieve goals set out by problem statements contributed by industry and academia from Brazil, China, India, Ireland, Japan, Russia, Spain, Turkey, and the United States.

Now, the [second edition of the AI/ML in 5G Challenge](#) has brought together partners, hosts and participants to collaborate on new problem statements, datasets and solutions. Their discussions have underpinned an [AI for Good webinar series](#) en route to the Grand Challenge Finale and Prize Ceremony.



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Chesub Lee



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Chesub Lee

# AI-related focus groups and initiatives

**AI:+**

**AI for Health**

ITU-WHO Focus Group  
[Learn more.](#)



**AI:⊕**

**AI for Autonomous and Assisted Driving**

ITU Focus Group  
[Learn more.](#)



**AI:☀**

**AI for Environmental Efficiency**

ITU Focus Group  
[Learn more.](#)



**AI:🌐**

**AI and Internet of Things for Digital Agriculture**

ITU Focus Group  
[Learn more.](#)



**Just launched!**

**AI:⚡**

**AI for Natural Disaster Management**

ITU Focus Group  
[Learn more.](#)



**AI:📶**

**Machine Learning and 5G**

ITU Focus Group  
[Learn more.](#)



**AI:🌐**

**AI and Data Commons**

Global Initiative  
[Learn more.](#)



**AI:🚦**

**AI for Road Safety**

Global Initiative  
[Learn more.](#)



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Thirdman via Pixels

## Here's how we can avoid an AI divide in health care

Even before the world began to grapple with COVID-19, many turned to Artificial Intelligence (AI) to fast-track solutions for health-care challenges confronting patients, health workers, institutions and governments.

Yet, as AI-driven applications are being tested and deployed, a call to ensure these endeavours do not deepen existing inequalities between developed and developing countries grows louder.

Low- to middle-income countries, which account for 85 per cent of the global population, bear 92 per cent of the global burden of disease, according to [pre-COVID-19 statistics](#) from the World Health Organization (WHO).

Digital health tools [are seen as](#) avenues for improved access to services that can in turn enhance health and wellbeing, but several factors must be taken into account to ensure digital divides are not replicated or intensified.



**How machine learning is powering collective pandemic intelligence**



[Learn more here.](#)



## A deepening digital divide

Research has found that AI can help achieve positive results for 134 targets of the United Nations Sustainable Development Goals (SDGs), but it might also inhibit progress towards 59 targets. Alongside concerns about bias, privacy and ethics, questions about deepening the digital divide should also be pondered on when it comes to AI, says Fred Werner, Head of Strategic Engagement at the International Telecommunication Union (ITU).

“Developing countries don’t always have rich datasets,” Werner notes, calling for digitization of information to fully leverage AI.

“Finding preconditions to exchanging data for collaboration in safe and secure ways is hugely important,” he adds. Data has to be discoverable to scale related AI solutions.

Training AI consumes a lot of energy and requires a great deal of computational resources. Only wealthier countries and universities tend to have the computing power to run machine learning models, notes Reinhard Scholl, Deputy Director of ITU’s Telecommunication Standardization Bureau (TSB). This poses an obstacle for the democratization of AI and frontier technologies, he adds.

AI also requires large sets of “clean” data and connectivity. Currently, however, an estimated 37 per cent of the global population still don’t have access to the Internet, according to [ITU statistics](#).

Professor Moez Draief, Global Chief Scientist at Capgemini Invent, studied 50 organizations to understand how AI can help improve health care outcomes and experiences. While a lot of investment went into the technologies, data and human capital, Draief’s team found the challenge of using AI was in going beyond algorithms to impacting lives. “It takes about 15 months from idea to delivery in the health space,” he says.

## From lab thinking to the real world

A project Capgemini Invent has been working on in France for two years, TrauMatrix, seeks to provide decision support to doctors treating trauma patients in the first 24 hours. Using a database of road accident victims, the solution aims to parse more data than normally collected to make ultra-specific contextual decisions for emergency surgeries.

Another tool developed by Capgemini Invent aims to anticipate hospital capacity shortages amid COVID-19. Using machine learning, it forecasts impending needs for beds, equipment and personnel.



AI may influence  
the ability to meet  
all SDGs



Read the [study paper](#).



*It takes about  
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to delivery in the  
health space.*

Moez Draief

Global Chief Scientist,  
Capgemini Invent

Using a mix of traditional and modern techniques, the team discovered the possibility of creating decision-making tools that account for the future impact of scenarios such as seasonal pressure on health-care resources or dispensing vaccinations.

The challenges, Draief says, have been finding reliable data sources, understanding who gets access and finding ways to aggregate and sift through huge amounts of data.

When it comes to data sharing, it is important to move from “lab thinking” in health innovation to the “real world”, he adds. Draief underscores the importance of ethical sharing and ensuring respect and privacy, since AI solutions must also cater to all populations and not a sub-section, he adds.

### ‘High tech’ not always needed

Ulla Jasper, Policy Lead at Fondation Botnar, recognizes the new “double sidedness” of new risks and rewards stemming from digital health technologies. Nevertheless, Jasper wants to see AI improving the wellbeing of young people in low-income and developing countries.

COVID-19 has had an accelerating impact on digital transformation and these should be leveraged in low-income and developing countries, notes Jasper.

Fondation Botnar’s Afya-Tek project in Tanzania seeks to improve health care at the level of the community with the help of digital health technologies. By digitizing the flow of information and using biometric data, the project aims to stop preventable deaths of children under five years old.

Another Botnar project, DYNAMIC, equips Tanzanian community health workers with devices using software based on clinical algorithms to support their decision-making. DYNAMIC is based on a study that identified the need to reduce avoidable over prescriptions of antibiotics.

Park Soo-Jun, Assistant Vice President at Korea’s Electronics and Telecommunications Research Institute, explains how digital technologies are helping the Republic of Korea to fight the spread of COVID-19 with quicker screening and diagnoses.

But it’s not the ultra-sophisticated AI that’s been the most relevant, Park points out. Simpler tech solutions such as smart quarantine systems, self-check health and self-protection quarantine apps and chatbots have been powerful tools in their response to the pandemic, he says. Jasper agrees that it’s “not about the fanciest AI” and even simple ideas such as equipping community health workers with a mobile phone or tablet can improve clinical care.



### The Afya-Tek project is digitizing primary health care in Tanzania



See [factsheet](#).



### Join our ad-hoc group on digital health technologies

An ITU-World Health Organization ad-hoc group establishes best practices in the use of AI at each lifecycle of a public health emergency.



Learn [more](#).

## A call for technical standards

Bottlenecks in deploying solutions can also be “low-tech”, especially in contexts where devices must be tamper-proof, waterproof and resistant to high temperatures to have a higher impact. Despite the explosion of data we often read about, detailed information about marginalized communities are often missing in digital health projects, points out Jasper. This widens the scope for inequalities in health care, she adds. It is important to avoid misuse of health data.

There are also instances where the data is available but not shared due to a lack of enabling standards.

Jasper raises the key challenge of using AI in health as one of governance and underscored the need to establish robust standards.

The International Digital Health & AI Research Collaborative ([I-DAIR](#)) aims to pursue collaborative research projects in global health to ensure an “inclusive global health agenda” through responsible governance of AI and digital technologies. While Jasper acknowledges claims of hype around AI, she believes that these data-driven technologies are here to stay and require deeper understanding.

Jasper advocates for the need to go beyond pilots and one-off projects to rigorous evaluations of AI solutions’ impact on health outcomes.

The ITU-WHO Focus Group on AI for Health is an important tool in achieving this, she adds. “The whole benchmarking process will allow us to settle on a few applications we can scale up and implement systematically and on a wider basis,” Jasper points out.

The Focus Group is global, neutral and follows a model of collaboration working towards standardization. It is developing a framework and associated processes for the performance benchmarking of “AI for health” solutions. “It will be important for decision-makers,” notes Jasper.

This performance benchmarking of AI solutions can be compared to the studies of the efficacy and safety of pharmaceuticals that support national health regulators in deciding whether to approve pharmaceuticals’ entrance to the market.

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*The whole benchmarking process will allow us to settle on a few applications we can scale up and implement systematically and on a wider basis.*

Ulla Jasper

Policy Lead,  
Fondation Botnar







Goalkeeper Iker Casillas (C) grabs the ball during the Portuguese League football match between Sporting CP and FC Porto at the Jose Alvalade stadium in Lisbon on January 12, 2019.

## Footballer Casillas adopts AI to monitor heart health

A heart attack during a training session led former Real Madrid (Spanish professional football club) goalkeeper Iker Casillas on a quest to better understand his cardiovascular health – and to championing artificial intelligence (AI) to help others like him.

Casillas is backing [IDOVEN](#), a health technology start-up that uses cloud data analysis and AI-powered algorithms to diagnose cardiac ailments.

Cardiovascular diseases are the [leading cause of deaths globally](#), with low- and middle-income countries being particularly vulnerable to these ailments and their impact on lives and livelihoods.

Early detection, monitoring and management are three ways to help avoid premature deaths due to cardiovascular diseases.



Read [full article](#).



### Technology for early stage detection

IDOVEN is a start-up that seeks to detect heart problems at early stages by combining AI algorithms in the cloud with wearable technology.



More [here](#).

# AI for Good Discovery

## Meet the researchers

The AI for Good Discovery Channel digs deep into areas transformed by artificial intelligence and machine learning, along with current AI/ML technological challenges.

Each "Discovery" episode dedicates one hour to a researcher to present their latest findings in one of the topic areas.

### AI/ML in 5G

Many stakeholders in the information and communication technology domain are exploring how to make best use of AI/ML. But applying AI/ML in communication networks poses different challenges than ML applications in image recognition or natural language processing.



**Vishnu Ram OV**  
Independent  
Research Consultant

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### Trustworthy AI

AI systems have steadily grown in complexity, gaining predictivity often at the expense of interpretability, robustness and trustworthiness. This expert talk series discusses the challenges of current AI technology and presents new research aimed at overcoming limitations and developing certifiably trustworthy, robust AI systems.



**Wojciech Samek**  
Head of Department  
of Artificial  
Intelligence,  
Fraunhofer Heinrich  
Hertz Institute

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### AI and health

Many investigators from the machine learning community hope to apply their methodological tool kits to improve patient care. ITU and the World Health Organization established the [ITU/WHO Focus Group on "AI for Health"](#) to clarify responsibilities and build trust among AI developers, AI regulators and AI users.



**Isaac Kohane**  
Chair of the  
Department  
of Biomedical  
Informatics, Harvard  
Medical School

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### AI and climate science

For many years climate scientists have used comparatively simple statistical approaches to try and discern subtle changes in observational datasets, or to interpret abundant climate model data output. Climate science now has the opportunity to use ML to answer some of the most pressing challenges of our time.

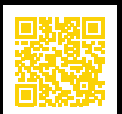


**Philip Stier**  
Head of Atmospheric,  
Oceanic and  
Planetary Physics,  
University of Oxford

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[Browse the AI for Good Discovery webpage.](#)



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## Self-driving cars: Can AI make the 'right' decisions on the road?

Roads must be safe and accessible for everyone. But according to the World Health Organization (WHO), [approximately 1.3 million people die each year in road accidents](#). Traffic injuries are the leading cause of death among those aged between five and 29 years.

During a global ministerial conference in 2020, [The Stockholm Declaration](#) set a new target – to halve the number of deaths and injuries from road crashes by 2030.

Self-driving cars have been put forth as a solution that can make mobility safe, secure, affordable, sustainable and accessible for everyone. But can autonomous driving systems be relied on to make life-or-death decisions in real time? And is the world ready to be driven around in these vehicles?

These burning questions were tackled in a [panel discussion](#) during the AI for Good Global Summit 2020.

## Technology driving the focus

The automotive industry has long touted self-driving features to customers for safety and comfort on the road.

While technology holds promise in averting crashes caused by human error, there are concerns on whether self-driving cars are built to adapt to evolving traffic conditions.

"A lot of the focus now is on technology and there's not enough on the user and their traffic environments," said Luciana Iorio, chair of the United Nations Economic Commission for Europe (UNECE) Global Forum for Road Traffic Safety (Working Party 1), custodians of the road safety conventions.

A technology-driven approach does not always take into account that more than half of all road traffic deaths are pedestrians, cyclists and motorcyclists. Well-designed cities and infrastructure are needed to protect these vulnerable road users.

"Self-driving technology should not create a digital divide and must be a transformational opportunity for everyone around the world," Iorio added.

Danger also arises when car manufacturers oversell their technology as being more autonomous than it actually is. Liza Dixon, PhD candidate in researching human-machine interaction in automated driving at Bosch, coined the term "autonowashing" to describe this phenomenon.

SAE International defines vehicles as having six levels of automation depending upon the amount of attention required from a human driver. In levels zero through two, humans drive and monitor the traffic environment; in levels three through five, the automated systems drive and monitor the environment.

## Reality versus hype

The advanced driver assistance systems (ADAS) in cars today exhibit SAE Level 2 partial automation. Many consider SAE Level 5, where the automated driving system can operate under all traffic and weather conditions as being out of reach, so for now the industry is focused on SAE Level 4 with restricted driving conditions, such as small geographical areas and good weather.

Consumers may be unaware of these distinctions. Videos showing people sleeping or watching movies in their cars are creating a dangerous, misguided impression about the technology, Dixon said.



*Self-driving technology should not create a digital divide and must be a transformational opportunity for everyone around the world. ”*

Luciana Iorio

Chair, UNECE Global Forum for Road Traffic Safety, Working Party 1



*Every consumer vehicle on the road today needs the driver to be prepared to take over control at all times. ”*

Liza Dixon

PhD candidate, Bosch



“Every consumer vehicle on the road today needs the driver to be prepared to take over control at all times. It’s critical for the driver to know this is a supportive, cooperative system that augments their ability and not something that takes over their role of driving,” Dixon said.

Language and perception matter too. A [study](#) by the American Automobile Association (AAA) Foundation for Traffic Safety introduced the same driving assistance system to two sets of participants albeit with different names. One group was told about the capabilities of the “AutonoDrive” system and the other about the limitations of the “DriveAssist” system. The former was more likely to incorrectly believe in the system’s ability to detect and respond to hazards, the study found.

### Open frameworks for public safety

There are efforts afoot to fix the lack of industry-wide standards for safe self-driving.

The World Economic Forum’s (WEF’s) [Safe Drive initiative](#) wants to create new governance structures that will then inform industry safety practices and policies for self-driving cars. Their proposed framework is centred around a scenario-based safety assurance approach.

“This is predicated on the assumption that the way autonomous vehicles are managed today were piloted through exemptions and non-binding legal codes, which are not sufficient in the long term,” said Tim Dawkins, Lead of Automotive and Autonomous Mobility at WEF.

The safety of autonomous vehicles can only be dictated in the context of its environment, he added.

The [ITU Focus Group on AI for autonomous and assisted driving](#) is working towards the establishment of international standards to monitor and assess the behavioural performance of the “AI Driver” steering automated vehicles. It has proposed an [international driving permit test](#) for the AI Driver, which requires a demonstration of satisfactory behaviour on the road.



### Impact of Information on Consumer Understanding of a Partially Automated Driving System

Subtle differences in consumer information can exert powerful influence on consumer expectations and understanding of active driving assistance systems. This AAA Foundation for Traffic Safety study in 2020 highlights the importance of ensuring that materials are not only technically accurate but also balanced.



[Learn more.](#)

The UNECE's Working Party 29, responsible for the harmonization of global vehicle regulations, has said: "Automated vehicle systems, under their operational domain, shall not cause any traffic accidents resulting in injury or death that are reasonably foreseeable and preventable."

According to Bryn Balcombe, chair of the ITU Focus Group and founder of the Autonomous Drivers Alliance (ADA), terms like "reasonably foreseeable" and "preventable" still need to be defined and agreed while ensuring they match public expectations.

The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems has also been working on broad and specific safety standards across industries, ranging from health care and agriculture to autonomous driving.

"We have taken an umbrella approach to create ground rules to engender trust. We apply different considerations to different case studies and stress-test them," said Danit Gal, a member of its Executive Committee and a Technology Adviser in the Office of the UN Under-Secretary-General.

Frameworks need to consider the continuously changing nature of autonomous machines, she said, also noting the challenge of aligning international standards to national regulations.

Gal proposed an information sharing hub for different AI-enabled mobility initiatives to exchange their findings. Balcombe brought up the Global Initiative on AI and Data Commons which promotes sharing of open datasets and results. "This is to make sure that technology can be developed to deploy broadly and widely and not create and exacerbate some of the divides that we currently have," he said.

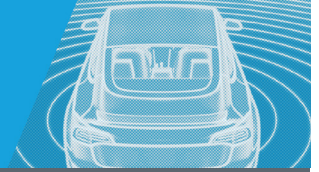
## AI and Data Commons Global Initiative

The Global Initiative on AI and Data Commons has identified collaborative approaches to support the implementation of beneficial AI-based solutions and accelerate progress on the 2020 Sustainable Development Goals.



Learn how you can [contribute](#).

# AI:



## ITU Focus Group on AI for autonomous and assisted driving

The FG-AI4AD is working on international standards to monitor the "AI Driver" steering automated vehicles.



More about its work [here](#).

# AI:



## The 'Molly problem' of ethical decisions

Public trust and intuitions about AI and its ability to explain decisions made on the road are crucial for the future of AI-enabled safe mobility, according to Matthias Uhl and Sebastian Krügel from the [Technical University of Munich](#).

Together with the ADA, Uhl and Krügel set up "The Molly Problem" survey to support the requirements-gathering phase for the ITU Focus Group.

An alternate take on "The trolley problem" thought experiment, "The Molly Problem" tackles the ethical challenges to consider when autonomous vehicle systems are unable to avoid an accident. Its premise is simple: a young girl, Molly, crosses the road and is hit by an unoccupied self-driving vehicle. There are no eyewitnesses. What the public expect should happen next is captured by a series of questions that define "The Molly Problem".

A [survey circulated ahead of the panel discussion](#) sought to collect feedback from members of the public, receiving 300 responses at the time of the event.

Uhl and Krügel found that a majority of respondents wanted the AI system to be able to store and recall information about Molly's crash. From the time and location of the crash, they also wanted to know the vehicle's speed at the time of collision, when collision risk was identified and what action was taken. Respondents also believed the software should be able to explain if and when the system detected Molly and whether she was detected as a human.

"About 73 per cent of the respondents said that even though they were very excited about the future of autonomous vehicles, they think vehicles should not be allowed to be on the road if they cannot recall this information. Only 12 per cent said these can be on the road," said Krügel.

An even bigger challenge for the industry to address is that 88 per cent of respondents believed similar data about near miss events should be stored and recalled.

The results from this survey helps identify requirements for data and metrics in shaping global regulatory frameworks and safety standards that meet public expectations about self-driving software.

## The Molly Problem

A young girl, Molly, crosses the road and is hit by an unoccupied self-driving vehicle. There are no eyewitnesses. What the public expect should happen next is captured by a series of questions that define "The Molly Problem".

## A step towards explainable AI

Existing event data recorders focus on capturing collision information, said Balcombe. At present, there is no common approach or system capable of detecting a near-miss event, he added. "Black box" recording devices for autonomous cars only indicate if a human or a system was in control of the vehicle or whether a request to transfer control was made.

"It's about explainability. If there has been a fatality, whether in a collision or a surgery, the explanations after the event help you build trust and work towards a better future," Balcombe said.

Krügel believes that these concerns about self-driving need the input of social scientists who can work with engineers to make algorithms ethically safe for society.

Gal acknowledges that different ethical constraints and approaches pose challenging questions to promising solutions. "What happens if we find a system that caters more to a particular audience and someone else is not happy with a decision made during a collision. To what extent are they actually able to challenge it and to what extent can the machine reflect on these ethical decisions and act in a split second?" she asked.

The UN High-Level Panel on Digital Cooperation, which advances global multi-stakeholder dialogue on the use of digital technologies for human well-being, put forth this recommendation in 2019:

"We believe that autonomous intelligent systems should be designed in ways that enable their decisions to be explained and humans to be accountable for their use."

The discussions from this event would inform the UN panel's ongoing consultation process on AI.



*What happens if we find a system that caters more to a particular audience and someone else is not happy with a decision made during a collision. ”*

Danit Gal

Member, IEEE Executive Committee, Technology Adviser, UN Under-Secretary-General's Office



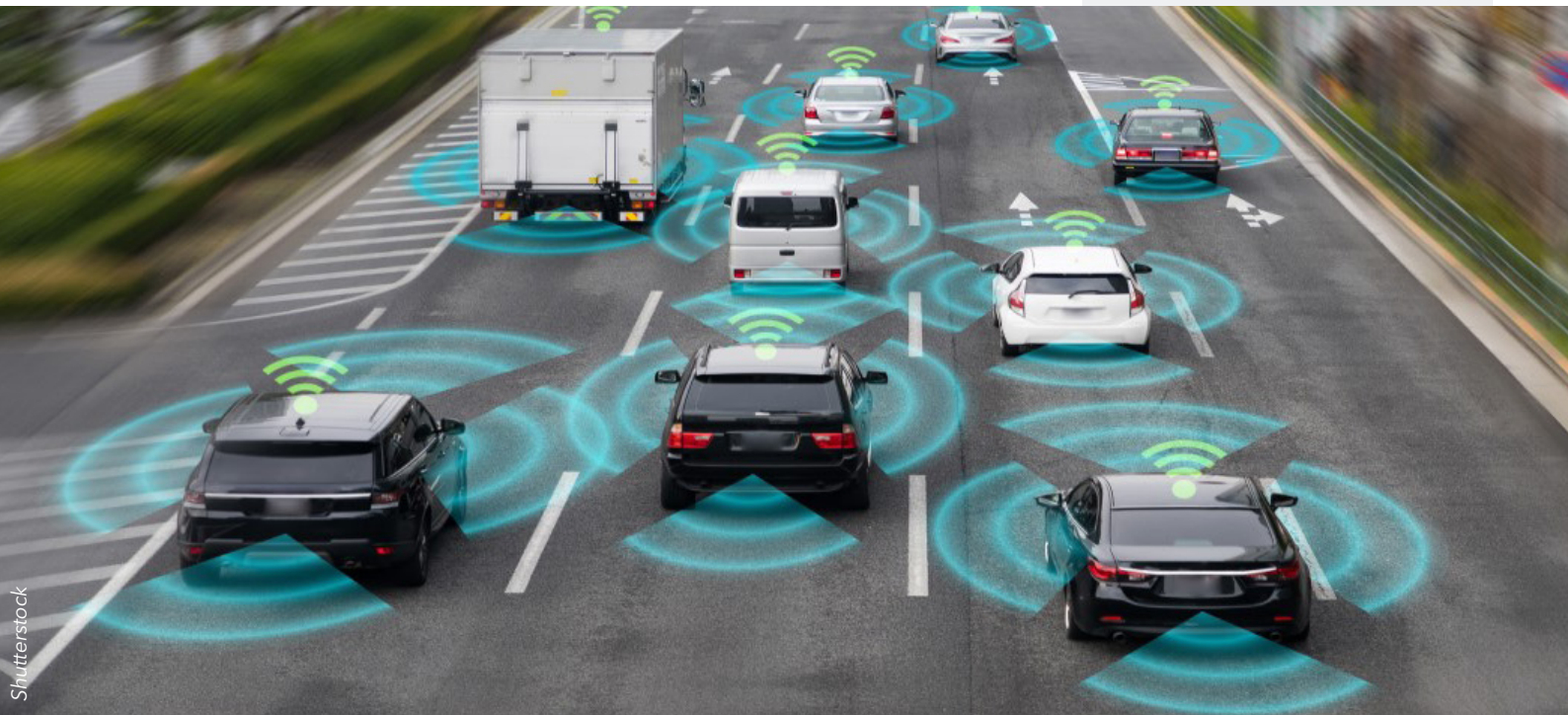
## Autonomous driving systems: A long road ahead

This year's ITU [Future Networked Car 2021](#) event proved much is happening in the connected car space.



Read the [full article](#) for three top takeaways.





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## The drive to use AI for safer roads

Aiming to halve deaths and injuries due to road crashes by 2030, partners under the United Nations (UN) banner have set out to tap into emerging technologies fuelled by artificial intelligence (AI).

The global initiative aims to harness the potential of AI to save 675 000 lives a year.

Launched in October by the International Telecommunication Union (ITU), the UN Secretary-General's Special Envoy for Road Safety, and the Office of the UN Envoy on Technology, the new [AI for Road Safety initiative](#) will promote an AI-enhanced "safe system" approach to reduce fatalities based on six pillars: road safety management, safer roads and mobility, safer vehicles, safer road users, post-crash response and speed control.

The focus is on inclusive solutions that work in low- and middle-income countries where most road fatalities occur.

### AI:

#### AI for Road Safety initiative

This initiative will harness the value of AI in enhancing the safe system approach to road safety and will be applicable to low- and middle- income countries, where most of the road fatalities and injuries occur.



[Learn more.](#)

“The disproportionate number of road deaths in developing countries is yet another example of why the benefits of new technologies must reach everyone, everywhere,” said ITU Secretary-General Houlin Zhao.

The new initiative comes during the [UN’s Second Decade of Action for Road Safety, 2021–2030](#).

“This new decade of action is very different... due to the wealth of tools we have at our disposal now,” said Jean Todt, the UN Special Envoy for Road Safety.

### How AI can help

AI can improve the quality of crash data collection and analysis, provide insights on how to avert collisions and improve the response after crashes. The resulting insights can, in turn, help shape more effective regulatory frameworks for road safety.

Equitable access to data and ethical use of algorithms are essential across all six safe system pillars. Aside from the emergence of autonomous vehicles, AI applications already commonly underlie lane-keeping systems, emergency brakes and auto-parking systems for many cars today.

But these technologies are deployed unevenly around the world. Electronic stability control, for example, a life-saving technology, is not available globally. “It’s unforgivable that this is not a standard feature built into every car sold around the world,” Todt said.



*The disproportionate number of road deaths in developing countries is yet another example of why the benefits of new technologies must reach everyone, everywhere. ”*

Houlin Zhao

ITU Secretary-General



*This new decade of action is very different... due to the wealth of tools we have at our disposal now. ”*

Jean Todt

UN Special Envoy  
for Road Safety

### Trustworthy AI: Towards auditable AI systems

In his talk focusing on the applications of autonomous driving and biometrics, Arndt Von Twickel presents the current status of AI system auditing and future directions.



Watch the [webinar](#). Read the [article](#).  
Search the [full playlist](#): AI for Good – YouTube

Regulators and the industry ought to promote the smart vehicle safety technologies available now instead of waiting for future, fully autonomous solutions, reiterated Jessica Truong of the Towards Zero Foundation, which seeks to end road fatalities.

In addition to saving lives, AI-driven features make road travel easier. They can “optimize road and traffic management, or even provide warnings of potentially dangerous driving behaviours,” noted Maria-Francesca Spatolisano, currently heading the Office of the UN Envoy on Technology.

### Not a panacea

None of this makes AI a panacea. “From the need to ensure adequate safety standards and robust probing of AI systems themselves to the possibility of human rights and privacy violations, we must ensure that artificial intelligence systems are used in a trustworthy, secure and ethical manner,” Spatolisano said.

Developing countries turning to AI must undertake rigorous digitization as part of a massive, system-wide overhaul. “We talk about assisted driving, but there is a lack of digitization of road signs,” said Tunisia’s Minister of Transport Moez Chakchouk. 5G network development will also be key to close gaps in road safety, he said.

For low- and middle-income countries, better data is crucial.

To inch closer towards the 2030 road safety goal, companies and organizations can report their safety footprint – a numerical value of total harm in terms of death and serious injuries – throughout the transport value chain, said traffic expert Claes Tingwall.

While the World Health Organization (WHO) estimates that 1.3 million people die in road crashes each year, governments typically cite roughly half of that figure, said Nhan Tran, Head of Safety and Mobility at WHO.

Fatality reports from low-income countries skew even lower due to inadequate data infrastructure, collection and consolidation.

AI and digital applications can improve reporting and help draw linkages between data sets. “We are seeing countries and different groups experiment in terms of using mobile technology to apply crowdsourcing as a means of capturing deaths,” Nhan said.



*...We must ensure that artificial intelligence systems are used in a trustworthy, secure and ethical manner. ”*

Maria-Francesca  
Spatolisano

Head, Office of the UN  
Envoy on Technology




*We talk about assisted driving, but there is a lack of digitization of road signs. ”*

Moez Chakchouk

Minister of Transport,  
Tunisia



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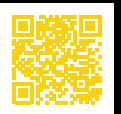
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Campotcamp.org via Wikimedia Commons

## Using AI to better understand natural hazards and disasters

As the realities of climate change take hold across the planet, the risks of natural hazards and disasters are becoming ever more familiar. Meteorologists, aiming to protect increasingly populous countries and communities, are tapping into artificial intelligence (AI) to get them the edge in early detection and disaster relief.

AI shows great potential to support data collection and monitoring, the reconstruction and forecasting of extreme events, and effective and accessible communication before and during a disaster.

This potential was in focus earlier this year at a [workshop](#) feeding into the first meeting of the ITU Telecommunication Standardization Sector (ITU-T) Focus Group on AI for Natural Disaster Management (FG-AI4NDM). The group is open to all interested parties, hosted by the International Telecommunication Union (ITU) together with the World Meteorological Organization (WMO) and UN Environment.



*AI can help us tackle disasters in development work as well as standardization work. With this new Focus Group, we will explore AI's ability to analyse large datasets, refine datasets and accelerate disaster-management interventions. ”*

Chesub Lee

Director, ITU  
Telecommunication  
Standardization Bureau



“AI can help us tackle disasters in development work as well as standardization work. With this new Focus Group, we will explore AI’s ability to analyse large datasets, refine datasets and accelerate disaster-management interventions,” said Chaesub Lee, Director of the ITU Telecommunication Standardization Bureau, in opening remarks to the workshop.

### New solutions for data gaps

“High-quality data are the foundation for understanding natural hazards and underlying mechanisms providing ground truth, calibration data and building reliable AI-based algorithms,” said Monique Kuglitsch, Innovation Manager at [Fraunhofer Heinrich-Hertz-Institut](#) and Chair of the Focus Group.

In Switzerland, the Swiss Federal Institute for Forest, Snow and Landscape Research ([WSL](#)) uses seismic sensors in combination with a supervised machine-learning algorithm to detect the tremors that precede avalanches.

“You record lots of signals with seismic monitoring systems,” said WSL researcher Alec van Herwijnen. “But avalanche signals have distinct characteristics that allow the algorithm to find them automatically. If you do this in continuous data, you end up with very accurate avalanche data.”

Real-time data from weather stations throughout the Swiss Alps can be turned into a new snowpack stratigraphy simulation model to monitor danger levels and predict avalanches.

### Modelling for better predictions

Comparatively rare events, like avalanches, offer limited training data for AI solutions. How models trained on historical data cope with climate change remains to be seen.

At the Pacific Northwest Seismic Network, Global Navigation Satellite System (GNSS) data is monitored in support of tsunami warnings. With traditional seismic systems proving inadequate in very large magnitude earthquakes, University of Washington research scientist Brendan Crowell wrote an algorithm, Geodetic First Approximation of Size and Timing, which estimates earthquake magnitudes within seconds of earthquakes’ time of origin.



*High-quality data are the foundation for understanding natural hazards and underlying mechanisms providing ground truth, calibration data and building reliable AI-based algorithms. ”*

Monique Kuglitsch

Innovation Manager,  
Fraunhofer  
Heinrich-Hertz-Institut



**AI and digital twins:  
Tools to tackle climate  
change**



Read the [article](#).  
Watch the [video](#).

In north-eastern Germany, the application of deep learning algorithms on waveforms produces probabilistic forecasts and helps to warn residents in affected areas. The transformer earthquake alerting model (TEAM) supports well-informed decision-making, said PhD Researcher Jannes Münchmeyer at the [GFZ](#) German Research Centre for Geosciences.

### Better data practices for a resilient future

How humans react in a disaster is also important to understand. Satellite images of Earth at night – called “night lights” – help to track the interactions between people and river resources. The dataset for Italy helps to manage water-related natural disasters, said Serena Ceola, Senior Assistant Professor at the University of Bologna.

Open data initiatives and public-private partnerships are also using AI in the hope of building a resilient future.

The ClimateNet repository promises a deep database for researchers, while the CLINT (Climate Intelligence) consortium in Europe aims to use machine learning to detect and respond to extreme events.

Some practitioners, however, are not validating their models with independent data, reinforcing perceptions of AI as a “black box”, says Carlos Gaitan, Co-founder and CTO of [Benchmark Labs](#) and a member of the American Meteorological Society Committee on AI Applications to Environmental Science. “For example, sometimes, you have only annual data for the points of observations, and that makes deep neural networks unfeasible.”



*Sometimes, you have only annual data for the points of observations, and that makes deep neural networks unfeasible. ”*

Carlos Gaitan

Co-founder and CTO,  
Benchmark Labs

### Why effective disaster management needs responsible AI

About 1.3 million lives have been lost worldwide and more than 4 billion people affected in disasters that took place between 2000 and 2019.

During a [webinar](#) held as part of this year-round AI for Good Global Summit, experts in technology and humanitarian action examined the most pressing questions emerging from the use of AI solutions to prepare for and respond to disasters.



Learn [more](#).



*To enable AI to create an environment where it can thrive, data needs to be open, available and interoperable. ”*

Anthony Rea

Director, Infrastructure Department,  
World Meteorological Organization

A lack of quality-controlled data is another obstacle in environmental sciences that continue to rely on human input. Datasets come in different formats, and high-performing computers are not available to all, Gaitan added.

### AI to power community-centred communications

Communications around disasters require high awareness of communities and their comprising connections.

“Too often when we are trying to understand the vulnerability and equity implications of our work, we are using data from the census of five or ten years ago,” said Steven Stichter, Director of the Resilient America Program at the US National Academies of Sciences, Engineering and Medicine (NASEM). “That’s not sufficient as we seek to tailor solutions and messages to communities.”



*Too often when we are trying to understand the vulnerability and equity implications of our work, we are using data from the census of five or ten years ago.”*

Steven Stichter

Director of the Resilient America Program, National Academies of Science, US

### Towards environmental efficiency in the age of AI

An ITU workshop provided a platform to discuss environmental efficiency in the age of AI, increasing automation, and smart manufacturing.

It highlighted practical tools to evaluate environmental aspects of emerging technologies and discussed the role to be played by international standardization in supporting the expansion of this toolkit.

The workshop’s discussions fed into a meeting of the ITU Focus Group on Environmental Efficiency for AI and Emerging Technologies (FG-AI4EE). The group is analysing the relationship between emerging technologies and environmental efficiency to benchmark best practices and provide a basis for new ITU standards.



*This focus group is among the first global platforms for the environmental aspects of emerging technologies.”*

Paolo Gemma

Huawei, Co-Chair, ITU Focus Group AI4EE



Learn [more](#).



A people-centered mechanism is at the core of the [Sendai Framework for Disaster Risk Reduction](#), a framework providing countries with concrete actions that they can take to protect development gains from the risk of disaster.

If AI can identify community influencers, it can help to target appropriate messages to reduce vulnerability, Stichter said.

With wider Internet access and improved data speeds, information can reach people faster, added Rakiya Babamaaji, Head of Natural Resources Management at Nigeria's National Space Research and Development Agency and Vice Chair of the Africa Science and Technology Advisory Group on Disaster Risk Reduction (Af-STAG DRR).

AI can combine Earth observation data, street-level imagery, data drawn from connected devices, and volunteered geographical details. However, technology alone cannot solve problems, Babamaaji added. People need to work together, using technology creatively to tackle problems.

With clear guidance on best practices, AI will get better and better in terms of accessibility, interoperability and reusability, said Jürg Luterbacher, Chief Scientist & Director of Science and Innovation at the World Meteorological Organization ([WMO](#)). But any AI-based framework must also consider human and ecological vulnerabilities. "We also have to identify data biases, or train algorithms to interpret data within an ethical framework that considers minority and vulnerable populations," he added.



*We also have to identify data biases, or train algorithms to interpret data within an ethical framework that considers minority and vulnerable populations.* ”

Jürg Luterbacher

Chief Scientist & Director of Science and Innovation, World Meteorological Organization

## The robots unlocking ocean secrets

Despite covering 71 per cent of the Earth's surface, oceans remain a vast unknown in terms of what lies beneath their surface.

Advances in artificial intelligence (AI) and marine robotics, however, could soon make the undersea depths more familiar.



Read the [full article](#). Watch the [video](#).



*You can scale robotic technology without increasing your carbon footprint or sacrificing human safety.* ”

Sean Halpin

Vice President, Products and Services, Houston Mechatronics



## New standards steering digital agriculture

The next wave of technological progress to sustain the world's fast-growing global population will capitalize on artificial intelligence (AI) and the Internet of Things (IoT) to improve the precision and sustainability of farming techniques.

AI, IoT, connected services and autonomous systems together enable farmers to make decisions at the level of a single square metre or individual plant or animal, rather than entire fields or all livestock. This precision allows well-informed interventions that ultimately improve agricultural sustainability by helping farmers produce more, with less.

A new International Telecommunication Union (ITU) Focus Group dedicated to “[AI and IoT for digital agriculture](#)” will examine emerging cyber-physical systems as groundwork for standardization to stimulate their deployment for agriculture worldwide.

AI: 

**AI and IoT for digital agriculture**



Learn about the new [ITU focus group](#).

“The projection that our planet will host 9.7 billion people by 2050 necessitates significant technological progress to sustain so many lives,” said ITU Secretary-General Houlin Zhao. “This new focus group is the beginning of a global drive to ensure equitable access to the new capabilities emerging in agriculture with advances in digital technology.”

## Collaboration with FAO

The focus group will work in close collaboration with the Food and Agricultural Organization of the United Nations (FAO), which mobilizes international efforts to defeat hunger and improve nutrition and food security.

Under the group’s purview will be new capabilities to discern complex patterns from a growing volume of agricultural and geospatial data; improve the acquisition, handling, and analysis of these data; enable effective decision-making; and guide interventions to optimize agricultural production processes.

Dejan Jakovljevic, Chief Information Officer and Director of FAO’s Digitalization and Informatics Division, said: “New digital capabilities offer us a unique and immediate opportunity to transform food systems and accelerate impact towards zero hunger. The new focus group will significantly contribute towards these efforts, bringing together AI and IoT as key enablers behind new capabilities for digital agriculture.”

The envisaged study aims to support global progress in areas such as precision farming, predictive analytics for smart farming, the optimization of cultivable acreage, remote cattle monitoring and management, agricultural robotics and greenhouse automation.

The study will pay particular attention to the needs of developing countries where people’s livelihoods are most reliant on agriculture. Those are also the countries where digital solutions can provide the greatest gains in agricultural sustainability and resilience.

The focus group will report to ITU’s standardization expert group for “IoT and smart cities and communities”, [ITU-T Study Group 20](#).



*This new focus group is the beginning of a global drive to ensure equitable access to the new capabilities emerging in agriculture with advances in digital technology. ”*

Houlin Zhao

ITU Secretary-General



*New digital capabilities offer us a unique and immediate opportunity to transform food systems and accelerate impact towards zero hunger. ”*

Dejan Jakovljevic

Chief Information Officer and Director, Digitalization and Informatics Division, United Nations Food and Agriculture Organization





## What to expect from the AI/ML in 5G Challenge

Interview with Reinhard Scholl, Deputy Director,  
ITU Telecommunication Standardization Bureau

The 2nd Artificial Intelligence/Machine Learning (AI/ML) in 5G Challenge is set to conclude in December, capping a successful debut last year. Organized by the International Telecommunication Union (ITU) as part of its AI for Good initiative, the competition sees participants around the world solving real-world problems by applying machine learning in communications networks.

Reinhard Scholl, Deputy Director at ITU's Telecommunication Standardization Bureau, shares the journey of the Challenge and what's coming up next.



*When we started the Challenge, we had no idea where it would be going. ”*

Reinhard Scholl

Deputy Director, ITU  
Telecommunication  
Standardization Bureau





***This year's AI/ML in 5G Challenge is the second such competition. What were your learnings from the first year?***

🌟 **Reinhard Scholl:** When we started the Challenge, we had no idea where it would be going. It was an adventure and turned out to be such a positive experience. Last year, we had participants from 62 countries. And this year, we have participants from 82 countries, with the Grand Challenge Finale scheduled on 14 December.

We never expected such big numbers. We were also surprised by the large number of problem statements – between 15 and 20 each year – that we were able to offer so far. And we are grateful to this year's sponsors, Xilinx and the Ministry of Science and ICT of the Republic of Korea.

We also published a special issue on [AI and machine learning solutions in 5G and future networks](#) in the *ITU Journal Future and Evolving Technologies*, with a selection of peer-reviewed papers submitted by Challenge participants.

We are on the lookout for new problem statements for the [third Challenge](#).

One thing we are hoping to offer next year is computing resources for participants who might not have the support of a rich university or company. Training machine-learning models can take a lot of time, and several participants informed us that they don't have the resources to run meaningful models. So, we are working on that.

***How does the Challenge align with the work of the ITU Telecommunication Standardization Sector (ITU-T) and the AI for Good platform?***

🌟 **Reinhard Scholl:** ITU-T does a lot of technical work related to machine learning in its focus groups – six of which have AI or machine learning in their title – and in its study groups. The specifications of the focus groups are generally turned into ITU standards ("ITU-T Recommendations").

The most popular standard is the "Architectural framework for machine learning in future networks including IMT-2020" ([ITU-T Y.3172](#)), which gives a common nomenclature and primer on how to talk about machine learning in communication networks, so that it can be used by anyone for any network. Some of the solutions submitted to problem statements in the ITU AI/ML in 5G Challenge reference ITU standards on machine learning. Some have generated contributions to the respective focus groups or study groups – and attracted new ITU-T members.



**ITU Journal on  
Future and Evolving  
Technologies**



Read the selection of peer-reviewed papers submitted by participants of the [2021 Challenge](#).



*One thing we are hoping to offer next year is computing resources to participants who might not have the support of a rich university or company. ”*

Reinhard Scholl

We have run [over 50 one-hour, in-depth talks](#) so far – by researchers on machine learning and communication networks – on the [AI for Good Discovery Channel](#), a fabulous resource on what the future of communication networks will look like. We have similar “Discovery Channels” on [Trustworthy AI](#), [AI and Health](#), as well as [AI and Climate Science](#). In January 2022 we are going to launch a Geospatial AI Discovery Channel.

### ***What are the opportunities and challenges you see for AI and ML in the real-world 5G sector?***

🌟 **Reinhard Scholl:** Network operators have used machine learning for some time, but not at the network level. They have used it to analyse the churn rate or to segment their customers. But applying it at the networking level is complicated.

Applying machine learning in communication networks is much more difficult than in computer vision or natural language processing, because time scales in a communication network span many orders of magnitude, ranging from parameters which change on an annual basis, like your subscription to a telecom provider, to milliseconds, like resource block allocations in radio access networks – for which you then have to retrain your machine learning model on a millisecond basis.

As networks get more and more complicated, machine learning will be essential to make sense of the plethora of data being collected.

On the other hand, machine learning could also be useful in the standardization process.

For now, standards are produced by people, who meet, make proposals, negotiate, and agree on a certain outcome. But the resulting protocols are often ambiguous and suboptimal, leading to increasing costs in testing and implementation. Part of this process could be taken on by machine learning, where the algorithm proposes a solution. There have been some attempts to do this, but there’s still quite a long way to go.



*The most popular standard is the 'Architectural framework for machine learning in future networks including IMT-2020'.* ”

Reinhard Scholl



*Network operators have been using machine learning for some time, but not at the network level.* ”

Reinhard Scholl

### What else can we expect?

🌟 **Reinhard Scholl:** We are branching into a new [Geospatial AI Challenge](#) that draws on location-based data. We have launched a call for problem statements.

ITU and the World Health Organization (WHO) meanwhile are working through their joint [focus group](#) on an incredibly ambitious AI for Health Assessment project. When we take a prescribed medicine or vaccine, there is a sense of trust in the process and in the institutions. But why would you trust an AI model looking at your X-rays? What does it take to trust a company that has an AI solution to detect skin cancer? The focus group is building a benchmarking framework that allows people to trust in AI health solutions.

The ITU-WHO focus group will come up with a process, guidelines and best practices to ensure trust in AI solutions. In addition, it's developing a platform where a company can submit and test solutions using undisclosed data. A score is generated and published on a leader board, which also allows a regulator to know how good the solution is. You must design a process that allows experts to come to an agreement and then build that into the platform.

The prototype will be ready in a matter of weeks. Then it needs to be transformed into a professional platform, which will cost serious money.

We are going to start an AI for Good Fund to secure donations for projects like the AI for Health Assessment Platform, along with other work, such as the [AI and Road Safety global initiative](#) established in October.



*We are branching into a new Geospatial AI Challenge that draws on location-based data. ”*

Reinhard Scholl



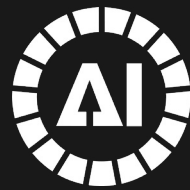
*What does it take to trust a company that has an AI solution to detect skin cancer? ”*

Reinhard Scholl

# The AI/ML in 5G Challenge

Don't miss the **Grand Challenge Finale!**

**14 December 2021 – 13:30-15:30 CET**

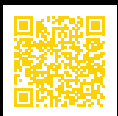


**AI for Good**

**How to apply ITU's  
ML architecture  
in 5G networks**



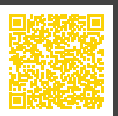
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Learn more about the  
**ITU AI/ML in 5G Challenge**



Meet the 2020 champions



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Andrew Kostyrskyj via Rexels

## Can AI be made trustworthy?

As artificial intelligence systems (AI) get increasingly complex, they are being used to make forecasts – or rather generate predictive model results – in more and more areas of our lives.

At the same time, concerns are on the rise about reliability, amid widening margins of error in elaborate AI predictions.

Management science offers a set of tools that can make AI systems more trustworthy. The discipline that brings human decision-makers to the top of their game can also be applied to machines, according to Thomas Dietterich, Professor (Emeritus) and Director of Intelligent Systems Research at [Oregon State University](#).

Management science offers a set of tools that can make AI systems more trustworthy.



Read [full article](#).



Alexander Sinn via Unsplash

## Is 'provably beneficial' AI possible?

At some stage we should expect the machines to take control – at least, that is what Alan Turing predicted for the future of machine learning in 1951.

Despite this troubling prognosis, there are reasons to be hopeful about the future of artificial intelligence (AI), according to Stuart Russell, Professor of Computer Sciences at [Berkeley University of California](#) and author of "Human Compatible."

"AI is already helping to solve global problems," he noted in his Breakthrough Days keynote during the 2020 virtual AI for Good Summit.

So, why can't we just make AI "good"? Because it is not yet possible using current AI frameworks and models, Russell argued.



Read [full article](#).

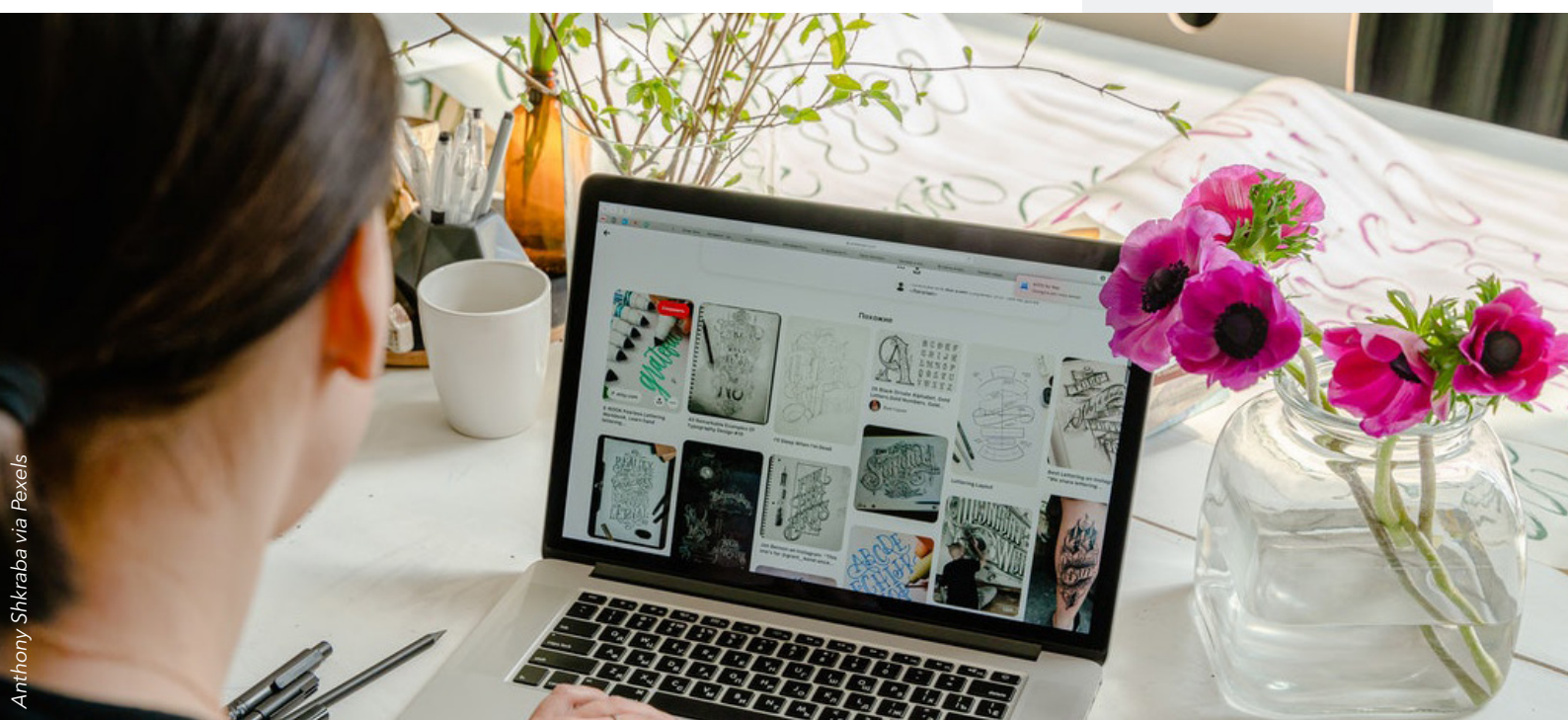


*Let's not forget that the solutions to our problems really are up to us and not up to a technology to solve. ??*

Stuart Russell

Professor of Computer Sciences, Berkeley University of California





Anthony Shkraba via Pexels

## AI: The next enabler of media, journalism and content creation?

In a digital world overloaded with content and short on resources, reaching and engaging new audiences has been a persistent challenge for creative industries. Some top media players have turned to artificial intelligence (AI) for a possible solution.

For Kati Bremme, Executive Product Manager for Innovation at France Télévisions, AI has been a “faithful companion” to speed the digital transformation of media amid shifting audience expectations.

But the adoption of AI-powered technologies in the media has been slow compared to its uptake in other sectors, she said, speaking at an online [event](#) organized by the European Broadcasting Union’s AI and Data Initiative ([AIDI](#)).



Read [full article](#).

Four key Cs for AI media to resonate:

- 1 Citizen
- 2 Content
- 3 Context
- 4 Container



## Phantom jam session: Can AI help musicians improvise?

Creativity is often seen as a quintessentially human quality. But that has not stopped experimentation with artificial intelligence (AI) to generate art in various forms, from the language generator GPT-3 drafting an [article](#) for The Guardian to the generative adversarial network (GAN) creating a canvas portrait that was [sold](#) for a whopping 432 500 USD in 2018.

These experiments have run alongside earnest attempts to use AI not to replace human output, but to make it a collaborator that inspires and supports the human creative process. Free-flowing, spontaneous improvisations are often considered the truest expression of creative artistic collaboration among musicians. “Jamming” not only requires musical ability, but also trust, intuition and empathy towards one’s bandmates.



Read [full article](#).



*As the piece develops, the AI learns more and more in real time about what you are playing and is able to dig from that whole vocabulary given over the whole performance. ”*

Matthew Yee-King

Programme Director,  
Computer Science BSc  
online, Goldsmiths,  
University of London



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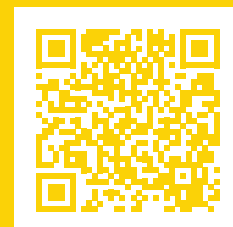
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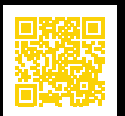
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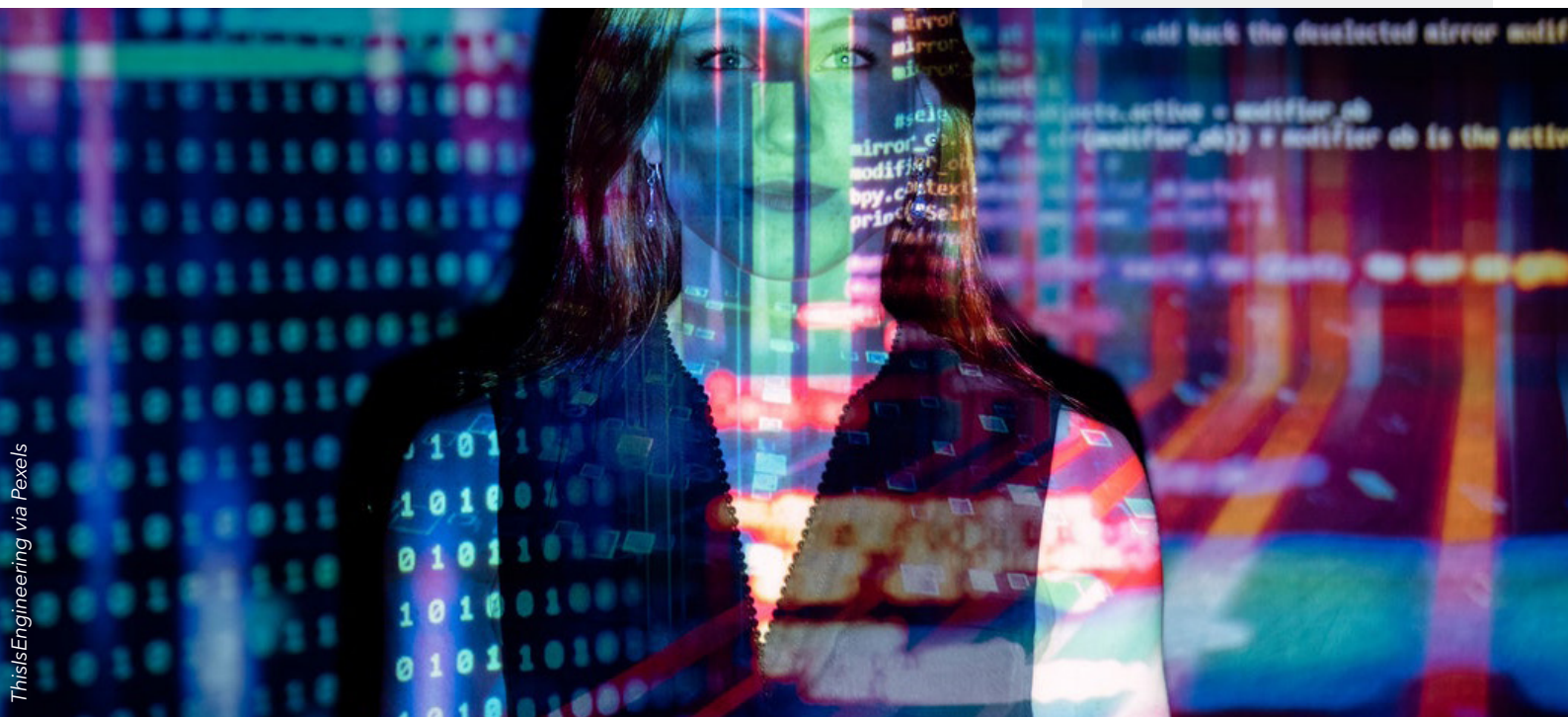
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## The AI gender gap: Caroline Criado Perez on why we need better data for an equal world

A real world built and designed using data for men ignores the needs of half its population. This holds true even when artificial intelligence (AI) is harnessed to solve challenges facing all of humanity.

The default human at the centre of most data is "Reference Man", said Caroline Criado Perez, campaigner and author of the book "Invisible Women: Exposing Data Bias in a World Designed for Men". This Caucasian man, who is 25-30 years old and weighs 70 kg, has been the "human of reference" in research studies across sectors for decades.

“

*The default human at the centre of most data is 'Reference Man.' ”*

Caroline Criado Perez  
Campaigner and author



The gender data gap is this “phenomenon whereby the vast majority of information that we have collected globally and continue to collect – everything from economic data to urban planning data to medical data – have been collected on men”, Criado Perez said during her [Breakthrough Days keynote](#) as part of the [AI for Good Global Summit 2020](#).

When data is not collected and separated by gender, there is no way to learn what works and what doesn’t for different groups.

Fixing this gap by collecting gender-disaggregated data is essential if AI is to fulfil its promise of improving outcomes for everyone.

### Missing data leads to missed opportunities

Relying on data from male bodies and lifestyles to define and solve problems results not just in discomfort – it can also be unsafe.

According to Criado Perez, several female front-line health workers have spoken about feeling more exposed to COVID-19 due to their badly-fitting “unisex” personal protective equipment (PPE). Studies have also found that a woman wearing a seat belt in a car crash is [47 per cent more likely to be seriously injured](#) and 17 per cent more likely to die than a man in the same crash because the dummies used in tests were based on the 50th-percentile man, Criado Perez said.

Similarly, any algorithm trained on male-dominated datasets is unlikely to predict accurate risks and results for everyone.

Criado Perez brought up a gender-neutral algorithm that was designed to predict heart attacks, but her research found flaws in the data.

“The paper provided hardly any disaggregated data and the studies on which the AI was trialled were heavily male-dominated,” she said, pointing out the lack of mentions of diabetes or smoking, both higher risk factors for women. When it comes to COVID-19, a lack of gender data will prevent us from understanding potential differences in how men and women respond to the virus.



*Fixing this gap by collecting gender-disaggregated data is essential if AI is to fulfil its promise of improving outcomes for everyone. ”*

Caroline Criado Perez



## Threat of increased bias

Another drawback of gender bias and data gaps in AI is that it does not just reflect them; it amplifies them.

One [study](#) found that an image-recognition software trained by a deliberately biased set of photographs ended up making stronger sexist associations.

“The dataset had pictures of cooking, which were over 33 per cent more likely to involve women than men. But the algorithms trained on this dataset connected pictures of kitchens with women 68 per cent of the time. That’s a pretty big jump,” Criado Perez said.

Google’s AI tool has since [dropped](#) gendered labels from image recognition to reduce bias, using “person” instead of “man” or “woman” to tag images.

## How do we bridge the gender data gap?

When biased data is used in AI, the danger is that it will increase prevailing inequalities in the world.

This is concerning as AI applications are increasingly deployed in health care, judicial and policing practices, and human resources.

When it comes to gender, the data gap applies not just to women, but also to transgender and non-binary people.

According to Criado Perez, one way to bridge the gap is to collect more data disaggregated by gender and sex.

But the first step in getting there is to acknowledge the bias problem in the first place, she acknowledged. “This means [...] asking the right questions like ‘What are we missing?’ or ‘Are we even equipped to know what we are missing?’” said Criado Perez.

Bias need not be inherently malicious and can stem from gaps in knowledge. This is why diversity matters, she asserted.



*Another drawback of gender bias and data gaps in AI is that it does not just reflect them; it amplifies them.* ”

Caroline Criado Perez





The more diverse a team or organization, the better positioned it is to provide varied perspectives and spot any omissions.

In 2014, when Apple launched its health tracking app, it allowed users to monitor their copper intake but did not provide the option to track menstrual cycles, Criado Perez noted.

A diverse team can help answer the question of whether efforts are being directed towards solving the right problem in the first place.

### Making data open and accountable

To understand whether AI and algorithms work for everyone, Criado Perez calls for data to be more accessible.

“We need to make it a right to know what data companies, manufacturers and governments are using to make decisions that affect all of our lives,” she said.

Transparent AI means an end to indecipherable “black box” algorithms with potential hidden biases and unaccountable data-driven decisions, Criado Perez added.

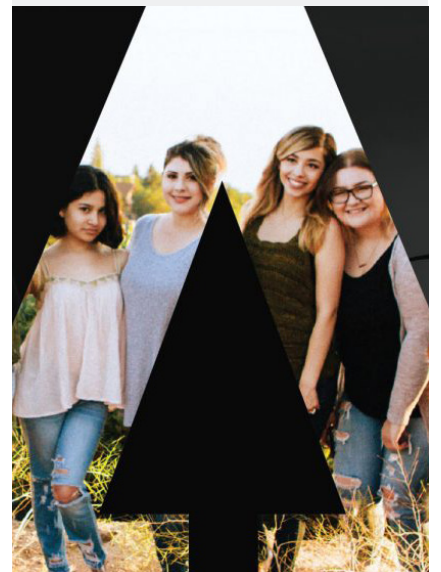
Designing new solutions for gender equity is a [focus track](#) in interactive workshops which took place during the Breakthrough Days of the 2020 AI for Good Global Summit.

Teams have come together to present and refine solutions for gender bias with feedback from AI and gender experts. One group hopes to develop global recommendations for judiciaries to address gender-related issues in AI systems. Other projects include building a tool to detect bias in language data used for training AI, and intentionally constructing datasets through user research and data science to detect gender bias in algorithms.



*We need to make it a right to know what data companies, manufacturers and governments are using to make decisions that affect all of our lives.”*

Caroline Criado Perez





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## 2041 envisioned: AI-driven futures according to Kai-Fu Lee

We connected with pioneering artificial intelligence (AI) expert Kai-Fu Lee, former president of Google China, Chairman and CEO of [Sinovation Ventures](#), and co-author of the book "AI 2041: Ten visions for our future."

Lee shares insights on how much – and how deeply – AI could shape our world in the decades to come.



### AI: 2021: Ten visions for our future

With Kai-Fu Lee, New York Times bestselling author of "AI Superpowers".



Watch the full AI for Good interactive keynote [here](#).

***Your new book is a collection of short stories that speculate on ways AI could shape daily life and experiences in different parts of the world. In one story, AI companions form an integral part of the education system. How would this affect young children, such as those under age 5?***

🌟 **Kai-Fu Lee:** Classic childhood companions like Barbie or GI Joe – once inanimate objects – will come to life on mobile phone screens, or through virtual reality (VR) or augmented reality (AR) glasses. They will converse in an increasingly more natural language too.

They don't have to know everything, just how to converse with you in ways you like and that represent their character. This can help kids learn things in a fun way – like multiplication or division – before going into school. Or recast problems: math equations could become basketball games. Superheroes and animals can also make education more fun and targeted.

***What do you mean by targeted education?***

🌟 **Kai-Fu Lee:** Today, Facebook and TikTok are so good at targeting us with content to keep us clicking. To use that same tech for good would mean targeting content to students so they are naturally incentivized to learn. Applying AI at the individual level can help students learn at a pace that suits their individual preferences and passion.

***Do human teachers fit into this speculative future?***

🌟 **Kai-Fu Lee:** Teachers can still play a strong role as mentors, helping improve the child's curiosity and creativity, communication skills, teamwork and compassion. The human teacher becomes more of a mentor to develop values and skillsets, whereas the AI companion makes learning personalized. That combination will help the next generation grow up better than previous ones.

***Are there risks to such deep levels of personalization? Might people eventually prefer communicating with their favourite bots rather than spouses or friends?***

🌟 **Kai-Fu Lee:** That may happen in my lifetime – but it wouldn't happen to me! People connect soul-to-soul, because we are made of the same organic materials. We feel a sense of love and empathy from people, not from robots. Bots may very accurately emulate what I say and do, and appear interested in human life, but inside they are just matching patterns without self-awareness, emotion or connection. Remind yourself: AI will not love you back!



*Applying AI at the individual level can help students learn at a pace that suits their individual preferences and passion. ”*

Kai-Fu Lee

Chairman and CEO,  
Sinovation Ventures



***The second story has to do with deepfakes – AI-generated images in which a person is replaced with someone else’s likeness, with great potential for deception. How do you see deepfakes evolving?***

🌟 **Kai-Fu Lee:** Deepfakes of audio, video, and images are already used to sling mud online. Finding them in courtroom evidence is a likely path.

We are already at a point where human eyes can barely tell the difference between real and fake.

Even computers will have a hard time telling. Whether they can differentiate depends on computing power – which becomes an arms race between bad guys and good guys.

***Can anything be done to mitigate the problem?***

🌟 **Kai-Fu Lee:** Authoritative websites – for governments, the United Nations, hospitals and major news organizations, for example – must do everything they can to control quality, especially with content uploaded by users.

Deepfake scanning mechanisms must be built into all websites, just like virus scanning software. Even then, some deepfakes will get through. We need to get used to it.

Perhaps technologies could authenticate content at time of capture, making it impossible to modify as a deepfake.

But upgrading every camera, phone, or other capture module will take 20 years to happen.

***Speaking of 2041 visions, one character feels practically blind without her so-called “XR” contact lenses. Is this the future of AR/VR?***

🌟 **Kai-Fu Lee:** The problem in AR/VR today is that headsets are so big and heavy. They look nerdy and also suffer issues with realism, resolution and rendering, and can even make people dizzy.

A lot of these problems will get fixed in the next few years. We will likely end up with glasses that are no thicker or heavier than normal frames, which display more realistic-feeling content than current interfaces.

Games like Pokémon Go will work with such glasses. AR/VR can also be used for education – tours with historical characters, for example. Or for training: learn to fix an airplane in virtual space.

Product research is happening. We should have AR glasses in a ten-year time-frame.



*Bots may very accurately emulate what I say and do, and appear interested in human life, but inside they are just matching patterns without self-awareness, emotion or connection. ”*

Kai-Fu Lee



*Deepfake scanning mechanisms must be built into all websites, just like virus scanning software. ”*

Kai-Fu Lee



***On the future of work, we meet an optimist and a pessimist. The former says technology replaces certain jobs, but humans always invent new jobs to meet new needs. The latter says it's different this time; all but a few jobs will be replaced by AI. Which is it?***

🌟 **Kai-Fu Lee:** Both. AI is good at doing repetitive routine tasks, like customer service, telemarketing, simple assembly-line jobs, delivering packages, waiting tables, and soon, perhaps, even driving. These will be the first to go.

Companies will purchase AI products and services, so 30–40 per cent of jobs will be replaced in the next 20 years. In the longer term, AI will create new job opportunities – some of which are impossible for us to conceive now. Still, data labelling needs people; repairs need to be done by humans.

So, AI will indirectly create jobs in the service sector. Only humans can do human-to-human services, such as in health care.

Those will grow as people live longer, and people will be willing to pay more for human-to-human services.

***What about AI in developing countries? Can the benefits reach everyone by 2041? In our Machine Learning in 5G Challenge, some participants lacked the computing resources to train their models – some needed up to 20 days. How could developing countries catch up?***

🌟 **Kai-Fu Lee:** Unfortunately, we are going down a path of growing inequality between countries. The United Nations can try to address this. Developing countries that cannot offer advanced AI education to all might consider allocating resources to programmes for the gifted and talented, or sending the best students on a scholarship to countries with strong AI education. Some of those countries will even pay to receive top students.

This approach was critical for past growth in China. While some students stayed in other countries, some went back to China and became professors or founded tech companies.

Those can form the new tech or AI nucleus in their home country.



*AI will indirectly create jobs in the service sector. Only humans can do human-to-human services, such as in health care. Those will grow as people live longer... ”*

Kai-Fu Lee



## AI and machine learning for a 5G world

Meet the champions of the 2020 ITU AI/ML in 5G Challenge [here](#).



Read the 2020 magazine [here](#).



# Action-oriented community building: Scaling AI as a force for good

By Fred Werner, Head of Strategic Engagement, ITU Telecommunication Standardization Bureau

As a United Nations agency with a specialized focus on digital technologies, the International Telecommunication Union (ITU) strives to align new and emerging tech with global Sustainable Development Goals.

Through the [AI for Good platform](#), we connect artificial intelligence (AI) innovators with what we call problem owners and help them create a common language of understanding to connect and work on solutions.

Making those connections and generating opportunities for collaboration is going to be one of the most important elements for scaling the AI for Good promise. When COVID-19 hit, we had to reinvent ourselves.



*This transition to action-driven collaboration has made us a year-round digital platform where AI enthusiasts come to learn, connect, and build. ”*

Fred Werner

Head of Strategic Engagement,  
ITU Telecommunication Standardization Bureau



## From physical event to all-year digital platform

From a yearly physical event in Geneva, Switzerland, we have become a virtual channel – always available all year long. We've built a 60 000-strong community from over 170 countries.

Participation from developing countries has more than doubled – and gender balance has improved as well.

Five years on, AI for Good is no longer a summit. This transition to action-driven collaboration has made us a year-round digital platform where AI enthusiasts come to learn, connect and build.

We are setting up an AI-powered community matchmaking platform, where users get smart recommendations on AI for Good content spanning the last five years and can be matched with people with shared areas of expertise and action.

AI for Good complements pre-standardization work by ITU focus groups looking at AI in environmental, energy, autonomous driving and [road safety](#), health, agriculture and other applications.

At our Innovation Factory, start-ups pitch AI innovations that contribute to the UN Sustainable Development Goals for 2030.

We issue problem statements to fix bottlenecks that could hinder AI at scale. Our challenge for [AI and machine learning \(ML\) in 5G](#) brings professionals and students together to compete in solving problems like how a windy or hot day affects 5G network transmission.

## The maturing AI narrative

From hype and fear around AI, we now see a maturity in the narrative – with a focus on removing obstacles and building frameworks to deliver the benefits of AI responsibly. But our work is far from finished. What people want to achieve collectively must inform and shape AI, instead of AI shaping us.

Since we launched the AI for Good summit in 2017, we have witnessed several breakthroughs in the field.

From AlphaGo beating the Go world champion and now coaching top Go players, to DeepMind's AlphaFold, which solved a 50-year-old protein folding problem, to the GPT-3 algorithm generating increasingly convincing stories, AI applications have grown exponentially.



*From hype and fear around AI, we now see a maturity in the narrative — with a focus on removing obstacles and building frameworks to deliver the benefits of AI responsibly. ”*

Fred Werner



While such advancements are exciting, too much AI talent and money are channelled into building profiles and figuring out consumer preferences. I remember Jim Hagemann Snabe, current Chairman of Siemens and Maersk, suggesting at the summit a few years ago that AI-powered social media ads were perhaps not the smartest way of using AI.

But the Sustainable Development Goals agreed upon by 193 United Nations Member States offer a more constructive path for AI.

AI and ML can predict early onset of Alzheimer's and help curb the 10 million cases of dementia that occur every year. They can help to predict and mitigate natural disasters that claimed 1.23 million lives in the period 2000 to 2019. Computer vision on mobile phones can flag skin cancer and allow farmers to identify plant diseases. AI can help to detect financial fraud and fake news. We can even use algorithms to preserve endangered languages.

But even with so many positive use cases for AI, there is a need for caution. A [study](#) in *Nature Communications* found that AI could enable 134 SDG-related targets, but could also inhibit 59 such targets.

## Balancing scale with safety

One of the bottlenecks in using AI for good is figuring out how to scale those solutions, especially to places that need them the most. A solution developed in Silicon Valley, in Shenzhen, or at a well-funded university may not work smoothly on the ground in a low-resource setting where it's meant to be deployed.

AI growth often stokes fear, such as of mass job losses. By the mid-2030s one-third of all jobs could face the risk of being automated, according to a PwC [report](#). But millions of new jobs could be created by AI adoption as well. How do we manage that bumpy transition?

Automation raises safety concerns. As the saying goes: "Anything that can be hacked will be."

Even putting a few stickers on a stop sign could confuse an autonomous car. Cybersecurity is crucial in a world of connected devices. Safety and security are vital to build public trust in AI solutions.

Questions of ethics and liability also come into play. In the classic "trolley problem", one must choose if a runaway trolley hits a group of people straight ahead or swerves onto another track, endangering the life of just one person.



*One of the bottlenecks in using AI for good is figuring out how to scale those solutions, especially to places that need them the most.* ”

Fred Werner



Autonomous driving researchers have updated the thought experiment to the “Molly problem.” How should a self-driving car accident be reported without witnesses? One ITU focus group is preparing a framework for building trust in AI on roads.

## Making data work

AI cannot work without data. Humans are biased by nature, meaning the data we collect is also biased. Data will never be perfect, but we must strive to ensure the data that feeds algorithms is as unbiased as possible. That means building inclusive datasets that work equally well for all genders, ages, skin colour and economic backgrounds.

As we strive to build collaborative solutions through the AI for Good platform, we see the need for unbiased, anonymous data-pooling frameworks.

Whenever we ask who has data, almost everyone in the room raises a hand. But when we ask who’s willing to share or donate it, no-one responds. This all comes down to the conditions by which data is shared.

There are techniques to handle data in a way where it’s useful for AI but also respectful of anonymity and privacy. In federated learning, for instance, data is processed “on the edge,” never leaving the initial device. Homomorphic encryption allows analysis without the underlying data ever being revealed.

## Leaving no one behind

As AI proliferates, there is a risk of deepening the digital divide. Developing countries potentially have the most to gain from AI and also the most to lose if the building blocks of mass digitization and connectivity are not in place.

AI for Good is more than a summit and brings as many people to the table as possible – from technology companies and government agencies to academics, civil society, artists and young people.

It has formed partnerships with 38 UN agencies.

Together, we explore practical, deployable solutions aimed at tackling the biggest challenges confronting humanity.



*One ITU focus group is preparing a framework for building trust in AI on roads. ”*

Fred Werner



*... We see the need for unbiased, anonymous data-pooling frameworks. ”*

Fred Werner



*Homomorphic encryption allows analysis without the underlying data ever being revealed. ”*

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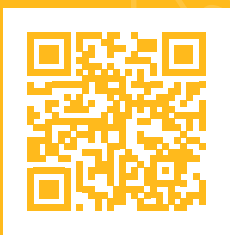
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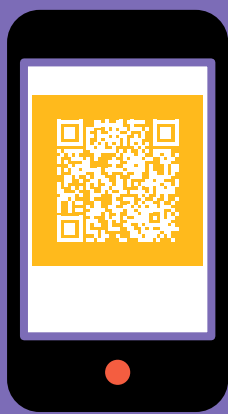


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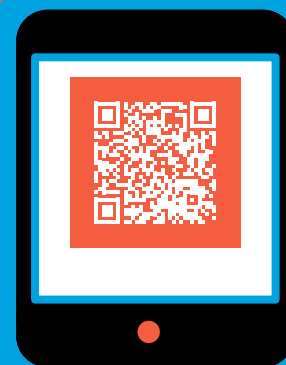
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