

United Nations Activities on Artificial Intelligence (AI)



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2018

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Recent progress in Artificial Intelligence has been immense and exponential. The technology is making its way out of research labs and into our everyday lives, promising to help us tackle humanity's greatest challenges.

As the UN specialized agency for information and communication technologies, ITU believes in the power of AI for good, and organizes the "AI for Good" series since 2017. The 2018 AI for Good Global Summit brought together AI innovators and public and private-sector decision-makers, including more than 30 UN agencies, to generate AI strategies and support projects to accelerate progress towards the UN Sustainable Development Goals (SDGs).

This report opens a window onto the diverse and innovative AI activities taking place across the UN system. It outlines how artificial intelligence is being used to fight hunger, mitigate climate change, or advance health for all. We see how UN agencies experiment with AI to improve response to disease outbreaks, monitor energy use in real-time, and facilitate the transition to smart sustainable cities.

It also offers insights into the challenges and risks associated with AI, addressing ethical, social and human rights implications – from autonomous weapons systems to the impact of AI on employment and the future of work.

This report makes clear that the path to a transformative but also a safe, trusted and inclusive AI will require unprecedented collaboration between government, industry, academia and civil society. I thank all the UN agencies who contributed to this effort, ensuring that the benefits of artificial intelligence are distributed in a fair, responsible and transparent manner.

The UN family has a critical role to play in balancing technological progress with social progress. ITU remains committed to continuing to work closely with sister UN agencies and all other stakeholders to build a common understanding of the capabilities of emerging AI technologies.

A handwritten signature in blue ink, consisting of three Chinese characters: 赵厚麟 (Zhao Houlin).

Mr Houlin Zhao
Secretary-General
International Telecommunication Union

The “**AI for Good**” series is the leading United Nations (UN) platform for dialogue on Artificial Intelligence (AI). As the UN specialized agency for ICTs, the International Telecommunication Union (ITU), in partnership with sister UN agencies, is organizing the annual “**AI for Good Global Summit**” for international dialogue, aimed at building a common understanding of the capabilities of emerging AI technologies.

While the first Summit in 2017 sparked the first ever inclusive global dialogue on beneficial AI, the 2018 Summit generated AI-related strategies and supporting projects to accelerate progress towards the UN Sustainable Development Goals (SDGs). The Summit connects AI innovators with public and/or private sector decision-makers, and contributes to formulate global strategies to ensure trusted, safe and inclusive development of AI technologies and equitable access to their benefits.

During the 2018 Summit, ITU and its 32 UN partner agencies, namely *CTBTO, ICAO, IFAD, ILO, OHCHR, UNAIDS, UNCTAD, UNDESA, UNDP, UNDP, UNECE, UNEP, UNESCO, UNFPA, UN Global Pulse, UNHCR, UNICEF, UNICRI, UNIDIR, UNIDO, UNISDR, UNITAR, UNODA, UNODC, UNOG, UNOOSA, UNOPS, UN University, WFP, WHO, WIPO*, and *the World Bank Group*, met at the second “UN Partners Meeting” on 16 May, 2018, to discuss their roles in Artificial Intelligence and solidify the UN-wide partnership to scale up AI-enabled innovative solutions to advance sustainable development.

Follow-up to the discussion at the “UN Partners Meeting”, this is a compendium of UN activities on AI, which includes the collection of 2-pager reports from 27 UN agencies: listed in Annex- *CTBTO, ICAO, ILO, ITU, UNAIDS, UNCTAD, UNDESA, UNDP, UNECE, UNEP, UNESCO, UNFPA, UN Global Pulse, UNHCR, UNICEF, UNICRI, UNIDIR, UNIDO, UNISDR, UNITAR, UNODA, UNOOSA, UN University, WFP, WHO, WIPO*, and *the World Bank Group*. This is not intended to produce an exhaustive inventory of the UN system’s work in AI, but to learn and understand the nature and scale of each agency’s work in AI, utilizing a wide array of AI technologies for further collaboration.

This compendium was first presented and discussed at the AI for Good UN Partners Meeting in New York, as below- which took place at the UNFPA Headquarters in New York, on 24 September 2018. At the meeting, it was agreed that this compendium is shared with all members of the UN Chief Executive Board.

AI for Good UN Partners Meeting in New York

- Topic: UN partnership on AI (Compendium of UN activities on AI)
- Time/Date: 07:30-09:30, 24 September, 2018 (Monday)
- Room/Place: Conference Room, UNFPA HQs, New York
- Invited Panels: 32 UN Partner agencies and Invited AI experts
- Format of the Meeting: Roundtable discussion (U-shaped table)
- Chair: Mr Houlin Zhao, Secretary-General of ITU

Annex: Activities on Artificial Intelligence



Comprehensive Nuclear-Test-Ban Treaty Organization

1. Description of Activities on AI

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans nuclear explosions by everyone, everywhere: on the Earth's surface, in the atmosphere, underwater and underground. The Treaty has a unique and comprehensive verification regime consisting of three pillars:

- The *International Monitoring System (IMS)* will, when complete, consist of 337 facilities worldwide to monitor the planet for signs of nuclear explosions. Around 90 percent of the facilities, using 4 technologies (seismic, infrasound, hydro-acoustic and radionuclide), are already up and running.
- The *International Data Centre (IDC)* at the CTBTO's headquarters in Vienna acquires data from the IMS global monitoring stations. The data are processed automatically, reviewed by human analysts and distributed to the CTBTO's Member States in both raw and analyzed form.
- *On-site inspections (OSI)* can be dispatched to the area of a suspicious nuclear explosion if the data from the IMS indicate that a nuclear test has taken place there. Inspectors will collect evidence on the ground at the suspected site.

On-going initiatives to apply Artificial Intelligence (AI) in all three pillars of the verification regime are described below.

As part of automatic data processing performed at the *IDC*, signals from seismic stations are being classified to determine their seismic phase based on features measured automatically (amplitude, frequency content, particle motion parameters, etc.). In processing data from auxiliary seismic stations, a combination of Artificial Neural Networks (ANN) and Bayesian Classifiers are used to automatically assign one of 9 possible phase types to signals. The ANN and Bayesian Classifiers are trained on automatic signals reviewed and corrected by human analysts. This component has been used operationally for many years. On-going activities are related on one hand to re-training (tuning) the existing ANNs on a per-station basis, and on the other hand, to improving performance of the automatic classifiers by replacing the current combination of ANN and Bayes Classifiers with one (deeper) ANN. We are also studying if the use of additional information, such as the raw waveform data, during classification, can further improve performance.

Another component of IDC automatic processing considers all signals detected at seismic, infrasound and hydro-acoustic stations of the IMS and determines the events that have caused these signals to be observed. At present, this type of processing, called *network processing* is performed by a rule-based system. Since 2011, the CTBTO, in co-operation with Professor Stuart Russell and Dr Nimar Arora from the University of California at Berkley, have been developing a machine-learning-based network processing software called NET-VISA (**NET**work processing **V**ertically **I**ntegrated **S**eismic **A**nalysis). The theoretical underpinnings of NET-VISA are provided by the concept of "Open Universe Probability Model", an extension of the Bayesian Network formalism to handle uncertainty about the existence of the objects whose relationship the network encodes. Following extensive testing, the NET-VISA software has been deployed in IDC operations, initially as a decision support tool for analysts, in 2017. It detects about 10-15 % more events than the current, rule-based system, while producing a similar percentage of false alarms. Current activities are focused on further improving NET-VISA and on completely replacing the current rule-based system with the machine-learning software in IDC Operations.

Initial development and testing of applications of AI are also underway to support operations and sustainment of the IMS. In co-operation with Pacific National Northwest Laboratory (PNNL), USA, an application to monitor and assess noble gas monitoring system state-of-health (SOH) data has been developed that analyses and may assist in predicting failures at IMS stations based on extensive SOH parameters that are continuously collected and stored. The current version of the software uses statistical methods and a rule-based system to determine deviation from normal operations based on changes in measured parameters. In a second version, the use of ANNs and support vector machines for failure prediction are being investigated.

A central technique used in OSI is Seismic Aftershock Monitoring, using mini-arrays deployed in the inspection area. Seismic monitoring is conducted at the early stages of an on-site inspection to identify cavities and changes in the geological structures caused by a possible nuclear explosion. To cope with the problem of the large number of false positives that tend to be produced through automatic detection of very “weak” signals typical of Seismic Aftershock Monitoring, a AI-based technique was developed by Prof. Manfred Joswig from the Institute for Geophysics, University of Stuttgart, Germany and is being tested at the CTBTO. The technique transforms the raw waveform data recorded into sonograms (a variation of the spectrogram concept, with adaptive noise removal), then applies Self-Organizing Map (SOM) to classify “weak” detections produced by a conventional detector, separating noise from signals of interest (aftershocks).

An additional technology being explored for OSI is satellite monitoring. The CTBTO has tested the use of space-borne multispectral imagery (MSIR) for classification and change detection in the inspection area, with the ultimate goal of limiting the search area and detecting features of interest. In past field exercises, several techniques for automatic classification of MSIR were tested and compared, for instance, unsupervised and supervised pixel-based classification, as well as object-based classification (using decision rules and fuzzy-logic). Change detection techniques were applied directly on the images using Multivariate Alteration Detection (MAD) or on the classification products, using GIS (Geographic Information Systems) operations.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 16. Peace, Justice and Strong Institutions

3. Relevant links (website, document, social media, etc.)

On NET-VISA:

- *NET-VISA: Network Processing Vertically Integrated Seismic Analysis* (Arora, N. S. et al.) Bulletin of the Seismological Society of America (2013), 103(2A):709 (<http://dx.doi.org/10.1785/0120120107>)
- Open Universe Probability Model, the theoretical basis for NET-VISA: (<https://people.eecs.berkeley.edu/~russell/papers/pearlbook10-blog.pdf>)
- Global Infrasound Association at the IDC: Advances and performances, Science and Technology 2017 (<https://ctnw.ctbto.org/DMZ/event/3239/posters/1F77E350BBFF49DDBB3328F34B48BEAE>)

On ANNs for automatic phase identification:

- See abstract submitted to the 2018 General Assembly of the European Geophysical Union: <https://meetingorganizer.copernicus.org/EGU2018/EGU2018-16216.pdf>, presentation can be provided on demand.

On Seismic Aftershock Monitoring System for On-Site Inspections:

- https://www.ctbto.org/fileadmin/user_upload/SandT_2011/posters/T4-P6%20B_Sick%20Automatic%20clustering%20of%20seismic%20events%20in%20an%20on-site%20inspection%20scenario.pdf

- https://www.ctbto.org/fileadmin/user_upload/SnT2015/SnT2015_Posters/T2.1-P18.pdf
- <https://www.ctbto.org/fileadmin/snt2013/posters/T3-P19.pdf>

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International Civil Aviation Organization

1. Description of Activities on AI

Increased Service for Aviation Community at large:

Neural Network application to classify Notice to Airmen (NOTAM) to reduce the noise (approximately 10k issued) and focus on those that are important for safety. [training phase]

Natural Language interface for decision-makers to interact with safety information (e.g. ask what the last accident in a country was, or know what level of compliance they have with international standards). [published]

AI applications to support big data analytics (together with UN partners), including:

- Predictive model for preventing the spread of communicable diseases through aviation). [development phase]
- Analysis of aviation infrastructure in terms of readiness for responding to disasters [development phase]

RNN application with Natural Language interface that can read ICAO documents (e.g. manual on airports) and answer simple questions (e.g. how much distance is required for safety at the end of a runway?) [research phase]

Increased internal efficiencies:

Natural Language interface to look up information needed to feed hungry internal bureaucratic systems. (e.g. 'ask: what is my sections cost center number?', or 'how much is there left for travel under runway safety programme?', or 'am I on leave today?') [testing phase]

RNN application to summarize conference papers and produce a draft (very draft) report. [research phase]

2. Related Sustainable Development Goals (please list all relevant goals)

- SDG 8. Promote inclusive and sustainable economic growth, employment and decent work for all.
- SDG 9. Build resilient infrastructure, promote sustainable industrialization and foster innovation.
- SDG 10. Reduce inequality within and among countries
- SDG 11. Make cities inclusive, safe, resilient and sustainable
- SDG 13. Take urgent action to combat climate change and its impacts.

3. Relevant links (website, document, social media, etc.)

- iSTARS : <https://Portal.icao.int> (you will need to apply for access)
- natural language applications are available as a bot on SLACK through invitation

NB : ICAO is currently working on a repository (probably will go with Jupyter Notebook library on AWS with a link to GitHub for some source code)

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International Labour Organisation

1. Description of Activities on AI

- 1) A report is prepared on the impact of artificial intelligence on jobs and inequality, looking at the impact of AI-based technological change on productivity and income developments, gross job dynamics and inequality. It analyses the specific characteristics of artificial intelligence on changes in occupations, sectoral dynamics and aggregate productivity and looks at the benefits and challenges that these transitions entail. The research discusses the potential of AI both in the context of well-developed market economies as much as emerging and low-income countries that face governance and infrastructure gaps. In particular, it notes the risk of AI leading to further industry concentration, with adverse effects on income inequality and job creation but also highlights the potential for emerging economies to leapfrog and increase their per-capita income levels more rapidly, thanks to the significantly decreased price of capital that AI-based technological change brings about. (Research Department)
- 2) The analytics of Big Data is used to explore the capabilities of middle-income and emerging economies, and of regions within countries, to diversify into new economic activities, and adopt new technologies. Dynamic capabilities are embodied in the knowledge base of a society. They reside in the particular mix of competences and knowledge sets, and in the diversity and complexity of occupations in the labor force, as well as in the shared belief and knowledge systems, mindsets and attitudes of a society. The study uses a variety of data sets provided by social media, google analytics, and satellite data (e.g. occupations, work experience, education, training, attitudes) to generate insights on country- or regional-specific capabilities. Understanding capabilities informs industrial, technology and innovation policies on the feasible structural transformation patterns, the new jobs that can be created, and how to generate more equal access to job opportunities. (Research Department)
- 3) Research in the area of skills development addresses AI from three angles. Firstly, it explores the potential of AI tools to measure current and potential skills demand by using Big real time data on vacancies and job searches. This diagnostic tool may also be useful to understand the evolution of composition of job tasks, skills and knowledge content of occupations. The research aims at informing skills development, active labour market and job matching policies in developing countries. Secondly, case studies in selected developing countries analyze the impact of AI on skills demand as AI changes tasks, skills and knowledge content of jobs. Thirdly, research explores how AI and digitalization will shape the delivery of learning, the TVET offer and management. AI and digitalization provide multiple opportunities of expanding the learning offer and diversifying the forms of learning in future.(Employment Department)

Research on the platform economy explores working conditions in micro task platforms. Micro tasks are small, simple tasks that require human judgment and can be completed independently over the Internet. They play an Instrumental role in the functioning of AI systems, firstly, by providing human input into the system, and secondly through training in AI systems. Training, testing and tuning machine learning algorithms require human judgment. Work associated with AI is highly casualized and is therefore of concern for ILO (Conditions of Work and Equality Department).

An initiative seeks to develop a framework for developing a public employment creation policy that is adaptable to dynamic changes and specific circumstances that are envisaged to usher the Future

of Work as we seek transition to the Fourth Industrial Revolution. Moreover, stakeholders are becoming more empowered and assertive, thanks to tools such as smartphones and social media, to demand a meaningful role and transparent process in shaping the policy environment under which they operate. In order to offer Development Corporation partners effective, relevant and up-to-date advisory support, the framework for policy design requires mechanisms to review them continuously, whilst retaining their integrity and stakeholder buy-in. Artificial Intelligence based on Big Data is used to monitor performance, learn from the policy implementation and improve the system (policy framework) to account for changing reality, whilst maintaining stakeholder consensus, integrity and accountability (ILO Technical Assistance Team to the South Africa employment creation flagship programme, the Expanded Public Works Programme (EPWP)).

The ILO Project “Combating Child labour and Human Trafficking in Central Asia: Commitment becomes Action” partnered with young information technology (IT) specialists to find ways of applying innovative digital technologies to help monitor child labour in Kyrgyzstan. In the competition, “Central Asian Hackathon, Generation Z: Wellbeing of Children”, a group of young digital specialists – supported by the ILO project, designed an innovative application that has the potential to monitor the incidence of child labour in communities. The application and its linked database helps to conduct interviews with children, formulate recommendations and determine their status. It will help officials to assess the situation of the child, determine whether the child is being exploited and what needs to be done to resolve the situation. The ILO now plans to support pilot testing of the new software.

Several Country and regional ILO offices collaborates with governments in analyzing the impact of AI on employment and the future of work, and to design policies to prepare the labour force and to help mitigate disruptive effects on labour markets.

2. Sustainable Development Goals (please list all relevant goals)

- GOAL 3. Good Health and Well-being.
- GOAL 4. Quality Education.
- GOAL 8. Decent Work and Economic Growth.
- GOAL 9. Industrialisation, Innovation and Infrastructure
- Goal 10. Reduce inequality
- GOAL 17. Partnerships to achieve the Goal

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International Telecommunication Union

1. Description of Activities on AI

ITU provides a neutral platform for government, industry and academia to build a common understanding of capabilities of emerging AI technologies and consequence needs for technical standardization and policy guidance.

- **The AI for Good Global Summit**

In partnership with the sister UN agencies, ITU is organizing the annual “AI for Good Global Summit”, which aims to accelerate and advance the development and democratization of AI solutions that can address specific global challenges related to poverty, hunger, health, equality, education, the environment and others. The [first Summit](#) took place from 7 to 9 June 2017, the [2nd Summit](#) from 15 to 17 May 2018, and the 3rd Summit will take place from 28 to 30 May 2019.

- **Standardization in AI technology**

- i) Machine Learning for 5G networks

Today’s communication networks, both the current networks and the upcoming 5G networks, have not been designed to cope with big data analytics and Machine Learning (ML). Therefore, future networks need to be designed to do so. ITU’s standards activity (“[Focus Group on Machine Learning for Future Networks including 5G](#)”) analyzes the impact of ML on communication networks. Use cases from industry are driving the requirements on data formats and ML technologies. Based on these use cases, the group studies functional network architectures, data structures, interfaces, protocols and algorithms. The group is open to all interested parties.

- ii) AI for Health

ITU and WHO are joining forces to expand the use of AI in the health sector to a global scale, and to leverage the power of AI to advance health for all worldwide. The two organizations will work together through the ITU Focus Group on AI for Health, established in July 2018, to develop an international “AI for health” standards framework and to identify use cases of AI in the health sector that can be scaled-up for global impact. The group is open to all interested parties. The demand for such a platform was first identified by participants of the second [AI for Good Global Summit](#) held in Geneva, 15-17 May 2018. AI-powered technologies such as skin disease recognition and diagnostic applications based on symptom questions could be deployed on six billion smartphones by 2021.

The group will lead an intensive two-year analysis of international standardization opportunities towards delivery of a benchmarking framework of international standards and recommendations by ITU and WHO for the use of AI in the health sector. As part of this, the ITU Focus Group for AI for Health will also produce an assessment framework to standardize the evaluation and validation of AI algorithms-- including the identification of structured and normalized data to train AI algorithms. It will develop open benchmarks with the aim of these becoming international standards.

- **Policy and Strategy on AI technology**

i) Global Symposium for Regulators (GSR)

The GSR brings together heads of national telecom/ICT regulatory authorities from around the world, and fosters a dynamic dialogues among regulators, policy makers, industry leaders and other key ICT stakeholders. The theme of this year's GSR, which will take place from 9 – 12 July, is "Global Dialogue on AI, IoT and Cybersecurity – Policy and regulatory challenges and opportunities".

- **ITU Briefings on AI**

ITU is organizing a series of Briefings to Permanent Missions in Geneva and also in New York. The first briefing was held at the ITU HQs in Nov. 2016, and provided an overview of the emerging trends, challenges and opportunities relating to 5G, followed by a briefings on various emerging technologies, including *Internet of Things*, *Role of ICTs in accelerating the achievement of SDGs*, and *Artificial Intelligence*, among others. The latest briefing was held at the High Level Policy Forum (HLPF) in New York, in June 2018.

- **Publication on AI**

One of the main deliverables achieved by ITU has been strengthening of ITU's work with academic, R&Ds, and other research/consulting institutions. e.g., the first edition of ITU Journal "*ICT Discoveries*" released in March 2018 has explored novel applications of AI that can improve the performance and efficiency of communication infrastructure, systems, and components, create new services and ensure optimal user experience.

"*Kaleidoscope 2018: Machine learning for a 5G future*" is the tenth in a series of peer-reviewed academic conferences organized by ITU to bring together a wide range of views from universities, industry and research institutions. Kaleidoscope 2018 calls for original scientific papers addressing advances in research on machine learning and artificial intelligence techniques for future communication networks, covering all aspects of network design, management, implementation and optimization. This year's conference from 26 to 28 November 2018 takes place in Argentina.

Later in 2018, ITU's issue paper on "*Assessing the economic impact of AI*" will also be released, which aims to provide insights on the global economic impact of AI and so to improve the understanding of AI for a non-technical audience.

- **Repository of AI**

Following the success of the first AI for Good Global Summit, ITU launched a global Artificial Intelligence (AI) repository to identify AI related projects, research initiatives, think-tanks and organizations that can accelerate progress towards the "17 UN Sustainable Development Goals (SDGs)". The "AI Repository" is open to all and we invite anyone working in the field of AI to contribute to this resource.

- **UN Inter-agency efforts**

ITU is contributing to inter-agency efforts on AI, especially in the High-Level Committee on Programmes (HLCP), by leading the coordination of internal strategic discussion papers to develop a better internal understanding of the impact of AI-related technologies on the work of the entire UN system, especially the opportunities in relation to the achievement of the SDGs.

2. Related Sustainable Development Goals (please list all relevant goals)

All SDGs, especially including Goal 17

3. Relevant links (website, document, social media, etc.)

- AI for Good Global Summit (<https://www.itu.int/en/ITU-T/AI/2018/Pages/default.aspx>)

- Focus Group on Machine Learning & 5G (<https://www.itu.int/en/ITU-T/focusgroups/ml5g/Pages/default.aspx>)
- ITU GSR2018 (<http://www.itu.int/net4/ITU-D/CDS/GSR/2018/default.asp>)
- ITU Journal “ICT Discovery” (<https://www.itu.int/en/journal/001/Pages/default.aspx>)
- ITU Issue paper on Emerging Trends in ICTs, "Assessing the Economic Impact of AI" (<https://www.itu.int/pub/S-GEN-ISSUEPAPER-2018-1>)
- Repository of AI (<https://www.itu.int/en/ITU-T/AI/Pages/ai-repository.aspx>)



United Nations Programme on HIV/AIDS

1. Description of Activities on AI

UNAIDS is just starting the evaluation of the potential use of Artificial Intelligence in our area of work. Two initiatives are underway:

- The evaluation of using AI for key population prevention work. This initiative is led from our regional office for MENA in Cairo.
- The regional office in Johannesburg (for the ESA region) is also investigating on using AI, Big data and social media for key population and young people.

2. Related Sustainable Development Goals (please list all relevant goals)

3. Relevant links (website, document, social media, etc.)

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United Nations Conference on Trade and Development

1. Description of Activities on AI

On 15 May 2018, UNCTAD launched the Technology and Innovation Report 2018 on the theme of harnessing frontier technologies for sustainable development. These include AI and other technologies such as Big data, Internet of Things, 3D Printing, Biotech, Nanotech, Renewable Energy, Drones, and Satellites. The report argued that as frontier technologies are becoming cheaper and easier to access and use, their application represents an opportunity for developing countries to accelerate progress towards the SDGs. At the same time, they bring up new challenges for policymakers of these countries, as the rapid transformations that they bring about are likely to outpace the ability of societies to adapt and manage its social and economic effects.

UN General Assembly Resolution A/RES/72/242 on the “Impact of rapid technological change on the achievement of the Sustainable Development Goals” requested the Commission on Science and Technology for Development, through the Economic and Social Council, to give due consideration to the impact of key rapid technological changes on the achievement of the Sustainable Development Goals.

The Commission on Science and Technology for Development held its twentieth first session in Geneva from 14 to 18 May 2017. During the session, in response to that GA resolution, the Commission held a high-level roundtable on the “Impact of rapid technological change on the achievement of the sustainable development goals”. Key messages of the discussion were:

- Frontier technologies hold the promise of reviving productivity and making plentiful resources to end poverty for good, enable more sustainable patterns of growth and mitigate or even reverse decades of environmental degradation
- However, technological change and innovation need to be directed towards inclusive and sustainable outcomes through a purposeful effort by governments in collaboration with civil society, business and academia.
- Given that the pace of development of technologies, new challenges arise for policy makers and the society, involving potential risk of exacerbating existing economic, social and technological divides as well as raising ethical questions. In this regard, the Commission also noted the need to solve the ethical and safety dilemmas of genetic manipulation, and to have better mechanisms for identifying health hazards from emerging technologies, especially since most developing countries do not have the capacity to make comprehensive risk assessments. They also noted the importance of linking traditional knowledge with the new insights from modern science to allow the benefits of the use of this knowledge to return to their traditional owners, as in the case of traditional medicine.

The CSTD has decided that one of the priority themes of its 22nd Session to be held in Geneva in May 2019 is on rapid technological change and the impact on the sustainable development goals. UNCTAD will prepare a report on the topic to inform the discussions at the Commission.

UNCTAD is preparing a paper for the CEB/HLCP on Implications of frontier technologies on developing countries with focus on the “bottom billion”. The paper will examine the opportunities and challenges brought about by frontier technologies, which are expected to have broad, and sometimes disruptive, impact on the economy and the society.

UNCTAD co-leads together with DESA the UN interagency task team on Science, Technology and Innovation (STI) for the SDGs, which is part of the Technology Facilitation Mechanism of the Agenda 2030. The interagency task team prepared the Multistakeholder STI Forum 2018 in June 2018 under the guidance of the two co-chairs from Japan and Mexico. The STI Forum had a session dedicated to the discussion of the impact of key rapid technological changes on the achievement of the Sustainable Development Goals.

On 26 to 27 April 2018, DESA, UNCTAD the Economic Commission for Latin America and the Caribbean, and the Government of Mexico organized in Mexico City the Expert Group Meeting on Accelerated Technological Change, Artificial Intelligence, Automation, and Their Policy Implications for Sustainable Development Targets. Some of the conclusion of the Expert Group meeting include:

- New technologies, and Artificial intelligence in particular, can be used positively to accelerate solutions to accomplish the Sustainable Development Goals of the 2030 Agenda, including particular targets, but they also can increase inequality among and within countries, affecting particularly vulnerable groups, fostering a concentration of critical knowledge and wealth, and posing significant ethical questions.
- Technological change could both have broader global effects than climate change on our societies, and even vitally contribute to overcoming its worst effects. Therefore, it is urgent to raise awareness of its increasing disruptive power and prevent possible negative impacts in the present, instead of mitigating them in the future.

Common to all these activities is the realization that there is a need for continuous broad discussion with the involvement of all stakeholders on the impacts of new technologies and the need for technical assessments of these impacts that systematically use models, scenarios and foresight exercises to make clear the assumptions and the most relevant policy areas when considering the impact of these technologies.

2. Related Sustainable Development Goals (please list all relevant goals)

All SDGs

3. Relevant links (website, document, social media, etc.)

- Technology and Innovation Report 2018: Harnessing Frontier Technologies for Sustainable Development (<http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=2110>)
- Commission on Science and Technology for Development, twenty-first session (<http://unctad.org/en/pages/MeetingDetails.aspx?meetingid=1670>)

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United Nations Department of Economic and Social Affairs

1. Description of Activities on AI

- United Nations E-Government Survey 2018- Chapter 8. Fast-evolving technologies affecting e-government and possible applications for the SDGs
- Various events during the STI Forum and HLPF 2018
- World Economic and Social Survey 2018 – Emerging Technologies and Sustainable Development
- Frontier issues – the impact of technological revolution on labor markets and income distribution (a publication available online)
- ECOSOC and the Second Committee held a joint meeting on “The Future of Everything: Sustainable Development in the Age of Rapid Technological Change”. The meeting underscored that the United Nations should remain engaged in the conversation on the effects of ‘frontier issues’ on the 2030 Agenda, providing a platform for exchange between all relevant stakeholders to ensure that the benefits of new and emerging technologies are distributed in a fair, responsible and transparent manner.
- ECOSOC Partnership Forum “big data for public good”
- UN Big Data for Official Statistics

2. Related Sustainable Development Goals (please list all relevant goals)

These activities are relevant to all SDGs

3. Relevant links (website, document, social media, etc.)

- <https://www.un.org/ecosoc/en/events/2017/joint-meeting-ecosoc-and-second-committee-%E2%80%9Cfuture-everything-%E2%80%93-sustainable-development>
- <https://www.un.org/ecosoc/en/node/4965587>
- <https://www.un.org/development/desa/dpad/tag/world-economic-and-social-survey/>

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United Nations Development Programme

1. Description of Activities on AI

Assessing the alignment between the Sustainable Development Goals and different countries' own development priorities is a critical but challenging task. It requires three to four weeks of full dedication and meticulous work from a team of policy experts, having to analyzing more than thousands of pages, on multiple documents. This reality is changing.

Together and leveraging on Machine Learning and Natural Language Processing, IBM Research and the United Nations Development Programme (UNDP) are exploring the feasibility of automating UNDP's Rapid Integrated Assessment (RIA), which evaluates national development priorities alignment to 169 SDG targets.¹ First outcomes give reason for optimism.² RIA's automated process was tested in five countries that had already gone through the manual RIA (Namibia, Mauritius, Liberia, Cambodia, and Bhutan). In three to four days, instead of three to four weeks, the system recognized the alignment to SDGs of many of the most important national goals, including national targets that had been overlooked by experts.

This proof-of-concept validates and encourages the use of AI to enhance the work of experts on development policy. Innovation presents UNDP an opportunity to be faster and more efficient on supporting countries for the achievement of SDGs. This transformation is already taking place.

To take data collection to the next level and provide better resources for decision-making, UNDP has a portfolio of frontier technology experiments. Drones and machine learning have been used for environmental protection in Mongolia, disaster preparedness in the Maldives, and, with UNHCR, the mapping of the Oruchinga Refugee Settlement in Uganda, used for joint development of infrastructure by and for refugees and host communities. MapX, a cloud-based geospatial solution developed by UNEP, the World Bank and the Global Resource Information Database, has been a key tool for management of natural resources, leading to the creation of the UN Biodiversity Lab. The Lab, a partnership between UNEP and UNDP, provides a tailored and customizable spatial analysis platform to enhance decision-making on conservation and development worldwide. The goal is not only to accelerate the delivery of SDGs but also of the [Aichi Biodiversity Targets \(ABTs\)](#), set on the Convention on Biological Diversity (CBD).

Finally, in Sudan, to predict proxy levels of poverty, UNDP has partnered with the Central Bureau of Statistics, the Sudan Telecom, Zain Telecom, the University of Berlin and others. The initiative uses covariates from call details records as proxies for poverty levels and has found high correlations with the conventional multidimensional poverty index.

¹ UNDP. 2018. *Rapid Integrated Assessment*. [online] Available at: <http://www.undp.org/content/undp/en/home/librarypage/sustainable-development-goals/rapid-integrated-assessment---mainstreaming-sdgs-into-national-a.html>. [Accessed 12 April 2018].

² Galsurkar, Jonathan, Moninder Singh, Lingfei Wu, Aditya Vempaty, Mikhail Sushkov, Devika Iyer, Serge Kapto, and Kush R. Varshney. 2018. "Assessing National Development Plans for Alignment with Sustainable Development Goals via Semantic Search." In *The Thirty-Second AAAI Conference on Artificial Intelligence (AAAI-18)*.

From efficiently evaluating alignment of national priorities to enhancing environmental conservation and measuring poverty levels more quickly, AI has been an important asset for UNDP's support to countries in accelerating the achievement of the SDGs.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 1, SDG 11, SDG 13, SDG 15, SDG 17

3. Relevant links (website, document, social media, etc.)

- AI and the future of work (<http://www.undp.org/content/undp/en/home/blog/2018/ai-and-the-future-of-our-work.html>)
- Who is writing the future: Designing ethical infrastructure for AI (<https://medium.com/@UNDP/who-is-writing-the-future-designing-infrastructure-for-ethical-ai-4999620db295>)
- Let's talk about artificial intelligence (http://www.undp.org/content/undp/en/home/blog/2018/let_s-talk-about-artificial-intelligence.html)

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United Nations Economic Commission for Europe

1. Description of Activities on AI

- The World Forum for the Harmonization of Vehicle Regulations (WP.29)

The UNECE Sustainable Transport Division provides the secretariat services to WP.29, the World Forum that incorporates into its regulatory framework the technological innovations of vehicles to make them safer and more environmentally sound.

Since November 2014, WP.29 is working on technical regulations for automated and autonomous vehicles. In the context of these regulatory activities, the screening of vehicle technologies showed that AI has found some prominent applications in the automotive sector. Some of these applications are related to infotainment and vehicle management (as Human Machine Interface (HMI) enhancement) e.g. infotainment management (incl. destination entry in the navigation systems). Some applications are related to the development of the vehicle self-driving capability.

WP.29, being the regulatory body managing the three Multilateral Frameworks related to the construction of vehicles, their subsystems and parts as well as the periodic technical inspection of road vehicles, is monitoring these technological developments. WP.29 did not take any action framing the use of AI in vehicles to avoid limitations to innovation and technological development, as regulatory measures would be premature. WP.29 is envisaging to draft a resolution with non-regulatory guidelines aimed at limiting wrong use of AI.

- The Future Networked Car event jointly organized by UNECE and ITU

During the 2017 event of the FUTURE Networked Car event organized by UNECE and ITU, held on the first public day of the Geneva International Motor Show, representatives of vehicle manufacturers, the automotive and information and communication technology (ICT) industries, governments and their regulators to discuss the status and future of vehicle communications and automated driving. The Future Networked Car examined advances in connected vehicles, from the perspectives of business, technology and policy. One session was dedicated to AI with a presentation of the UNICRI Centre for Artificial Intelligence and Robotics and a report of the IEEE Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems.

- The United for Smart Sustainable Cities initiative (U4SSC)

In 2016, UNECE Committee on Housing and Land Management and the International Telecommunication Union (ITU) established the UN global initiative [United for Smart Sustainable Cities \(U4SSC\)](#), which currently involves 16 UN bodies.

U4SSC is a global platform for smart cities stakeholders, which advocates for public policies to encourage the use of ICT to facilitate the transition to smart sustainable cities. The initiative aims to:

Generate guidelines, policies and frameworks for the integration of ICTs into urban operations, based on the SDGs, international standards and urban key performance indicators (KPIs); and help streamline smart sustainable cities action plans and establish best practices with feasible targets that urban development stakeholders are encouraged to meet.

The topics of this phase of U4SSC are: circular cities, financing smart sustainable cities projects, blockchain in cities, artificial intelligence in cities, sensing technologies and Internet of Things in cities.

The initiative delivers policy guidelines and training materials through the work on specific outputs elaborated via regular e-meetings and physically gathers once per year.

In 2017, the U4SSC stakeholders also elaborated a set of [Key Performance Indicators \(KPIs\) for smart sustainable cities](#) which includes 92 indicators (core and advanced) divided in the 3 dimensions of sustainable development: economy, environment, and society and culture. The indicators are fully aligned with the Sustainable Development Goals (SDGs) and serve as a tool for evidence-based decision making, progress monitoring and achieving the SDGs at the local level. They are being implemented by 50 cities of different sizes and development worldwide

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 3, SDG 11, SDG 13, SDG 17

3. Relevant links (website, document, social media, etc.)

- <http://www.unece.org/selfdriving.html>

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United Nations Environment Programme

1. Description of Activities on AI

Artificial Intelligence activities in UN Environment are still in the early stages of adoption. UN Environment continues to articulate strategies to illuminate the opportunities and challenges inherent in UN Environment's work; including how this can be of more impact and inspire practical action through innovative efforts.

Some of the work / activities that have been done and others still being worked on include:

- A. The UN Environment report: *Fintech And Sustainable Development: Assessing the Implications*, December 2016.

The report, a companion to the second edition of "The Financial System We Need", assesses how the financial system's core functions are likely to be disrupted by financial technology ("fintech") innovations and how they could help – or hinder – efforts to align financing with sustainable development.

The report highlights three technologies as the key to the ongoing transformation: **blockchain, the internet of things (IoT) and artificial intelligence (AI)**. IoT and AI enable the 'animation of the physical world', enabling physical and natural assets, machines, physical and natural infrastructures to sense and interact with each other while responding in real time. Smart contracts on the undisputable distributed ledger of blockchain will allow real economy assets, infrastructures and processes to interact with the financial system in predictable ways and with unprecedented business models. Blockchain could solve problems of trust, information asymmetry and economics of small transactions while eliminating the requirement of the current costly and complex risk infrastructures and central intermediaries.

- B. First GEO-6 Innovative Scenarios and Policy Pathways Stakeholder Visioning Workshop, May 2017.

This workshop was organized as part of the UN Environment's sixth Global Environment Outlook (GEO-6) process and the development of the Innovative Outlooks section of the forthcoming assessment report. The objective was to elicit and explore innovative ideas (or 'seeds of change') that stakeholders believe could lead to positive futures and help realize the achievement of the Sustainable Development Goals (SDGs).

One of the proposals that came out of the workshop is Planet Tech, a vision of the future with a focus on planet altering technologies and earth systems including: geoengineering / carbon capture storage technologies, mesopelagic exploration, planetary tech, and artificial intelligence.

The proposed vision was predominantly geared towards addressing macro/planetary scale environmental challenges including climate change, biodiversity and complex atmospheric-ocean related issues. The common thread for this alliance was the potential for plenary harm and on the other hand opportunities for transformational 'planet-alerting' solutions. The main SDG that the Planet Tech was targeting include 12 (Responsible Consumption), 14 (Life Below Water) and 17 (Partnerships For The Goals).

- C. Development of a planetary dashboard for surface water monitoring using AI, May 2018.

The project pitched by UN Environment at the AI for Good Summit 2018, developing a planetary dashboard for surface water monitoring using AI (in partnership with Google Earth Engine, JRC, ESA and NASA) was voted as a potential project for inclusion in the list of projects for further exploration. UN Environment invites other UN agencies to participate in moving forward this proposal.

- D. Technology and Innovation Dialogue - Exploring Blockchain Technology and Environmental Sustainability, 23-24 July 2018.

This dialogue explores existing and potential applications of blockchain technology to address issues of environmental sustainability. It aims to improve collective understanding of blockchains, and how best they can be applied in environmental sustainability measures such as climate mitigation, green value chains, natural capital, and regulatory compliance.

- E. Planetary data governance.

UN Environment is currently working on a policy position paper on the 4th industrial revolution to solve global environmental challenges. Included in the paper a topic on planetary data governance.

The combination of planetary data with other technology revolutions such as AI and blockchain smart contracts is fundamentally transforming the management of natural resources and the protection of the environment. While planetary data is the foundation of the digital ecosystem, it requires both processing infrastructure together with algorithms and analytics to extract relevant insights and business intelligence. It is only when big data is coupled with analytical methods involving AI that it can be used to detect patterns, identify trends, determine interactions, optimize variables and make predictions.

UN Environment invites partners to form strategic collaboration on the question of planetary data governance and to potentially launch the collaboration at the 4th UN Environment Assembly (UNEA-4) April 2019. Governments have decided that the overall theme of UNEA-4 is “innovative solutions to address environmental challenges and promote sustainable consumption and production”.

2. Related Sustainable Development Goals (please list all relevant goals)

3. Relevant links (website, document, social media, etc.)

- http://wedocs.unep.org/bitstream/handle/20.500.11822/20721/Fintech_and_Sustainable_Development_Assessing_the_Implications.pdf
- http://unepinquiry.org/wp-content/uploads/2016/09/The_Financial_System_We_Need_From_Momentum_to_Transformation.pdf
- https://wedocs.unep.org/bitstream/handle/20.500.11822/21463/Outlooks_Meeting_First_GEO-6_Workshop_Report_v5_final.pdf

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United Nations Educational, Scientific and Cultural Organization

1. Description of Activities on AI

UNESCO will focus its efforts on strategic actions and objectives in the areas of **ethics, policy, and capacity building**, in line with the expected results of its Programme and Budget, 2018-2021 (document 39 C/5) and in response to new emerging challenges related to AI technologies across all Major Programmes:

1) Positioning UNESCO as a platform for international intellectual debate on AI:

A high-level multi-stakeholder event on the Ethical, Social and Human Rights Implications of Artificial Intelligence is planned on 18 January 2019 in Paris to launch the new UNESCO initiative on AI. The event would be designed around the ethical dimensions of AI, to collectively:

- Reflect on how AI is transforming or could transform societies in each of UNESCO's fields of competence, including fundamental philosophical reflection on what it means to be human in the face of disruptive technologies;
- Identify the potential risks and benefits of such transformations in each of these areas, especially with regard to ethical, social and human rights implications;
- Identify and frame the concrete questions that need to be addressed through UNESCO's actions and objectives in ethics, policy and capacity building;
- Formulate some preliminary proposals on responses to these questions in each of these areas.

A series of smaller events to raise awareness about AI amongst Member States and other stakeholders will be organized in cooperation with relevant partners prior to and after the high-level event. Particular emphasis will be put on capturing regional cultural and ethical diversity in interpretation of AI and its challenges.

2) Setting ethical norms and standards

- The way in which societies are transformed and the motivation behind the development and use of technologies, such as AI, need to be understood and accompanied by ethical reflection, as they are based on values either they are based on ungrounded scientific knowledge. From the ethical perspective, UNESCO will focus on: a) A normative reflection to identify or "create" **ethical principles** to respond to the ethical questions raised, and to guide the development and application of AI accordingly; b) reflection on the need for and manner to achieve **fairness, accountability, transparency, gender equality, cultural diversity** in AI, to ensure that AI-driven decisions respect human dignity and protect fundamental human rights.

The possible goal of such reflection is consideration by UNESCO's governing bodies of **a normative instrument on the Ethics of Artificial Intelligence**.

Producing policy solutions:

The rapid development of AI technologies requires UNESCO to **support Member States** that struggle to keep up with the tremendous pace of innovation and change. In this regard, the Organization will work on **producing innovative policy solutions for the governance of AI**, using evidence-based research to **formulate policy recommendations, guidelines and toolkits** for governments, policymakers,

and other actors, in relation to the development and use of AI in education, the sciences, culture and communication and information. UNESCO will also work on providing technical assistance to policymakers, governments and judicial actors on relevant ethical principles and international human rights standards related to AI.

1. Capacity Building

UNESCO will seek to counter the risk of growing a digital and knowledge divides that could leave behind those who are relatively disadvantaged, such as people in Least Developed Countries (LDCs), women and girls, youth, people with disabilities and marginalized groups in all societies. The Organization will help strengthen the capacity of Member States to harness AI for the benefit of humanity and for achieving the SDGs in line with ethical principles and human rights, particularly in the areas of education, the sciences, culture and communication and information. UNESCO will create awareness and information about the participation of scientists and engineers (men and women) in all regions in the World in the development of AI science and technologies, encouraging sound science, technology and innovation ecosystems and building endogenous capacities, particularly at higher education institutions. With this objective, UNESCO will function as a **clearinghouse of innovations through the network of UNESCO Chairs and Category II Centres, and through policy fora and special partnerships**. UNESCO will enhance and/or start working with AI laboratories to **develop innovative and efficient projects on the ground** related to the SDGs and UNESCO's fields of competence. The Organization will start developing **model curricula and training modules** for the beneficiaries of UNESCO Major Programmes, as well as reviewing and contributing to the diffusion of good practices in the application of AI technologies to fields such as water resources and ecosystems management, or disaster risk reduction. UNESCO will also work with AI designers and professional associations to promote relevant **guidelines and ethical codes**, as well as to ensure an approach of **ethics and human rights by design** for AI, without stifling innovation.

2. Upcoming AI events:

- COMEST roundtables on 11-12 September 2018. Five round tables on A.I. and five on Bioethics themes (gene editing). The idea will be to produce short videos after each of the roundtables.
- UNESCO plans to organize a regional Asia-Pacific panel discussion on A.I. in the context of the International Day for Universal Access to Information to be hosted in Colombo, Sri Lanka, **27-28 September 2018**
- UNESCO will organize a side event on the impact of A.I. on Cultural Industries as part of "UNESCO Creativity Talks" **11 December 2018** in Room II
- UNESCO is organizing a Africa regional reflection on A.I. impact for development and the Digital Divide on **12-13 December 2018** in Morocco with support from the OCP Foundation.
- Next **Mobile Learning Week** in **April 2019** will focus on AI in education.
- Next Issue of UNESCO's Courier will focus on AI

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 4, SDG 16, SDG 17, SDG 9, SDG 11

3. Relevant links (website, document, social media, etc.)

Website is being developed on UNESCO's AI activities and will be shared shortly

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United Nations Population Fund

1. Description of Activities on AI

GRID³ (Geo-Referenced Infrastructure and Demographic Data for Development)

The data revolution enables countries to meet development goals and mitigate humanitarian crises by facilitating significant innovations in national data systems. Strategic investments in spatial reference data—population, settlements and boundaries—can dramatically enhance the power of these innovations.

GRID³ (Geo-Referenced Infrastructure and Demographic Data for Development) provides support to low- and middle-income countries to collect, analyze, integrate, disseminate and utilize high-resolution geo-referenced data on population, boundaries, settlements and infrastructure along with other key spatial datasets for evidence-based development and humanitarian decision making.

GRID³ partners (UNFPA, Bill & Melinda Gates Foundation, DFID, Flowminder/WorldPop, Oak Ridge National Laboratory and The Center for International Earth Science Information Network), in collaboration with national governments and other stakeholders, aim to identify specific opportunities and design strategies to harness the power of spatial reference data. We commit to strengthen national capacity for conducting high-quality geo-referenced censuses that meet international standards and to ensure wide dissemination and use of census data for development planning. We offer assistance in implementing these strategies, utilizing country-specific partnerships linking government, science, and civil society.

The initiative focuses on high-resolution spatial reference data on population, boundaries, settlements, and infrastructure. By doing so, the national data systems will become even more robust and useful. The ability to map population distribution with high spatial precision and accuracy is now within the reach of all countries. By bringing spatial technology and design into national censuses, on the one hand, and applying sophisticated spatial modeling techniques including machine learning algorithms, on the other, high-resolution digital population maps can be generated at reasonable cost.

Such maps enable the full power of geospatial technologies to enter the data-for-development mainstream, creating an empirical framework for achieving development and humanitarian goals that

leaves no one behind. GRID³ pursues two complementary pathways to support countries in the production of high-resolution population data: 1) assisting in carrying out the highest resolution census possible, and 2) where such a census cannot be fully executed everywhere, producing population counts through the use of “hybrid census” that combines a traditional census with population estimates based on microcensus, survey and satellite imagery.

2. Related Sustainable Development Goals (please list all relevant goals)

All SDGs given the focus on data for development

3. Relevant links (website, document, social media, etc.)

- <http://grid3.org/> (website under development)
- @PopDevUNFPA

- @Flowminder
- @WorldPopProject

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United Nations Global Pulse

1. Description of Activities on AI

Global Pulse is an innovation initiative of the United Nations working to harness big data, artificial intelligence and other emerging technologies to support sustainable development and humanitarian action. Global Pulse works through a network of regional innovation labs, known as Pulse Labs, and with partners to build and implement innovative solutions and to provide policy guidance and technical assistance to accelerate adoption of data innovation. The network of Pulse Labs operates in Kampala (Uganda), Jakarta (Indonesia) and at the UN Headquarters in New York.

The overarching objectives of Global Pulse are to: (I) achieve a critical mass of high-potential applications of big data and AI; (II) lower systematic barriers to innovation; and (III) strengthen the data innovation ecosystem.

Since its inception, Global Pulse developed more than 75 data innovation projects and tools together with partners. Among the achievements are the first algorithm ever developed for using social media to track food prices, the first use of speech recognition for indigenous African languages for global development, the first use of debit card transactions to assess disaster resilience of communities, and the first use of marine traffic data to detect refugee rescue events in the Mediterranean Sea.

- *Using speech recognition technology to inform on SDG-related topics in Africa. The Radio Content Analysis Tool uses AI based speech-recognition technology to convert public discussions on radio broadcasts into text for native languages spoken in Uganda.*
- *Using AI to detect structures in satellite images during humanitarian emergencies. The project developed neural network architectures (Mask-RCNN) to detect shelters that were evaluated in images from multiple humanitarian crises in East Africa and the Middle East.*
- *Haze Gazer – A crisis analysis tool. The platform combines satellite imagery of fire hotspots, census data on population, and real-time data from social media to enhance disaster management efforts by the Indonesian Government. It also allows to nowcast air quality by fusing meteorological data, insights from satellite imagery and photos shared on social media using deep learning.*

Through its lab in Kampala, Global Pulse acts as one of the premier data science centers in Africa, co-leading efforts such as the organization of the annual Data Science Africa conference. In Asia, Pulse Lab Jakarta, in consultation with the Government of Indonesia and the UN Country Team, identifies national development priorities for applied research. Pulse Lab New York serves as the headquarters of Global Pulse and the thought-leadership and knowledge-sharing hub for the network of Pulse Labs.

- *Data Science Africa. Since 2015, Global Pulse is one of the organizers of the Data Science Africa events, which take place in different countries across Africa. The weeklong conference consists of a summer school and workshop, which train participants on machine learning and data science methods and provide an avenue to apply these techniques to problems relevant to the continent.*
- *Big Ideas Competition series. Hosted every year under a different theme, the competition calls for data-driven proposals from enthusiastic data scientists and researchers across ASEAN member*

states, Sri Lanka and the Republic of Korea. The challenge spurs inspiration and facilitates connections between communities of data and technology innovators across the region.

- *The AI for Good Global Summit and the UN World Data Forum.* Global Pulse sits on the organizing committees and is a partner of several high-impact global forums, where it leverages its network of partners and expertise to contribute to the success of these events. Global Pulse is also invited as an expert speaker in big data and AI to more than 300 events every year.

Global Pulse actively participates in developing data privacy frameworks and raising awareness of the responsible use of data and technology for the SDGs. Global Pulse drafted and facilitated the adoption of the [UN Development Group Guidance Note on Big Data for Achievement of the 2030 Agenda](#). The note is the first officially adopted document that provides guidance to 32 UN entities on ethical and privacy protecting applications of big data. Global Pulse founded and serves as Co-Chair of the UN Privacy Policy Group, and the Privacy Advisory Group.

Global Pulse has also played a foundational role in mobilizing the data philanthropy movement, developing [public-private partnerships](#) and frameworks for sharing of big data and analytic insights.

2. Related Sustainable Development Goals (please list all relevant goals)

All 17 SDGs and humanitarian efforts

3. Relevant links (website, document, social media, etc.)

- Website: www.unglobalpulse.org
- Twitter: [@UNGlobalPulse](https://twitter.com/UNGlobalPulse)
- FB: <https://www.facebook.com/UNGlobalPulse/>
- LinkedIn: <https://www.linkedin.com/company/global-pulse/>
- 2017 Annual Report: <http://bit.ly/2uFls5Z>
- UN Global Pulse data innovation projects: <https://www.unglobalpulse.org/projects>

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United Nations High Commissioner for Refugees

1. Description of Activities on AI

Predictive analytics - Somalia

Project Jetson is an experimental project that combines data science, design, and strategic communications, and was launched by UNHCR's Innovation Service in 2017 to predict population movements in the Horn of Africa, starting with Somalia. Project Jetson with its machine-learning predictive analytics engine is first of its kind in the humanitarian response sector, would be looking for expanding to regions beyond Somalia with improved artificial intelligence techniques and automation processes in the near future.

Artificial Intelligence in HR

Using artificial intelligence, including machine learning processes and diversity and inclusion methodologies, UNHCR Innovation Service is working together with UNHCR's Division of Human Resources and Management (DHRM) to build a more effective process for screening-in candidates to its Talent Pool (TOAS team), among other human resources (HR) processes. The aim for the project is for human decisions in HR to be supported by machines that can screen large datasets in a faster way. Recognizing that the artificial intelligence component will never replace human HR processes, the project aims to reduce data processing that would normally take hours to screen, in a matter of just minutes. By modifying our screening processes, we can better target the type of people, experiences, and expertise needed in the workforce.

2. Related Sustainable Development Goals (please list all relevant goals)

Partnerships for the goals (SDG 17); industry, innovation and infrastructure (SDG 9); end poverty in all its forms everywhere (SDG 1)

3. Relevant links (website, document, social media, etc.)

unhcr.org/innovation; [@UNHCRInnovation](https://twitter.com/UNHCRInnovation); <http://www.unhcr.org/innovation/jetson-insights-into-building-a-predictive-analytics-platform-for-displacement/>

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United Nations Children's Fund

1. Description of Activities on AI

UNICEF is using Machine Learning and Artificial Intelligence (ML/AI) for both programmatic and operational purposes. Based in the "Principles of Digital Development," (<https://digitalprinciples.org/>) the organization promotes applications and development of Machine Learning and Artificial Intelligence with *equity* at their core, whether through fair and open training sets or through discussions on algorithmic equity and information poverty.

- 1) **Programme / solution focused:** Using AI to improve UNICEF's and other humanitarian & development programmes. Some examples of these efforts are:
 - a. **Magic Box**, an open-source platform that combines new sources of data and computational modelling to generate insights such as the spread of an epidemic (<http://unicefstories.org/magicbox/epidemics/>). (Developed in collaboration with Google, Telefonica, IBM, Redhat, Amadeus, and others)
 - b. **Project Connect:** Satellite imagery and Deep Learning for automatic feature extraction and infrastructure mapping (i.e. over 130,000 schools mapped in over 9 countries <http://unicefstories.org/magicbox/schoolmapping/>).
 - c. **Deep Empathy:** Collaborating with academic institutions like MIT to use AI to increase empathy for victims of far-away disasters (<https://deepempathy.mit.edu/>).
 - d. **Generating equitable data sets** that take into account the most marginalized populations and that are essential to train equitable AI algorithms (i.e. compilation of symbols from different languages and cultures for children with disabilities <http://unicefstories.org/2017/12/07/aacohort/>).
 - e. **Venture Fund Investments:** Capacity-building in the countries where we work and in our Country Offices by investing in AI based local startups and CO initiatives through our 16M\$ Innovation Fund (<https://unicefinnovationfund.org/>) :
 - i. Red Crow (<http://www.redcrow.co/login>)
 - ii. MERON, Kimetrica (<https://kimetrica.com/our-projects/>)
 - f. **Building internal knowledge and capacity** by bringing in technical talent and setting the required IT infrastructure. The **Magic Box** platform is being incorporated into UNICEF's ICT Division to make it, and its learning, available to the organization.
- 2) **Policy:** Using AI to guide UNICEF's policy as well as advocating for children's rights with governments and external private sector partners. Examples of some of the work in this category are:
 - a. Understanding constitutional change and its impact on children. Using AI and Natural Language Processing to analyse constitutions from 194 countries across the globe and advocate for human and environmental rights with governments. (<https://www.nature.com/news/what-countries-constitutions-reveal-about-how-societies-evolve-1.23001>)

- b. Research on the impact of AI on the economy, society and in particular, children including the digital challenges and opportunities facing young people (<https://www.unicef.org/sowc2017/>)
- c. Partnership on AI (PAI) where UNICEF, together with other main tech companies, is one of the founding partners (<https://www.partnershiponai.org/>)

The methods that underlay this work are:

- 1) **Partnerships:** Creating spaces for collaboration where different stakeholders can have conversations around AI and ensuring that the voice of the most vulnerable children are part of these conversations
 - a. Collaborating with the European Space Agency (ESA) to explore and disseminate the use of AI within earth observation techniques.
 - b. Working and co-creating with academic institutions such as MIT, UCSD, Notre Dame University or RIT.
 - c. Partnering with tech companies like Google and Redhat to build open-source platforms that can process large amounts of data and run AI models at scale.
 - d. PAI- Founding partner and member of several working groups including 'Fair, Transparent and Accountable AI' and 'AI, Labor and the Economy'.
 - e. Collaboration in the UN Innovation Network (www.uninnovation.network) to share research and learnings with other agencies and partners.
- 2) **Publications and conferences:** bringing in UNICEF's problems and topics to the state of the art scientific work while incorporating the latest scientific advances within UNICEF's work.
 - a. Constitutions work (<https://arxiv.org/abs/1606.04012>)
 - b. GDBX Sustainability Challenge (<http://blog.digitalglobe.com/industry/gbdx-for-sustainability-challenge-mapping-every-school-in-the-world-and-reducing-the-digital-divide-in-education/>)
 - c. Participating and leading multiple sessions in the main AI and CS conferences (i.e. AI for Good Summit, World AI Summit, Complex Systems for the most Vulnerable <https://cs4v18.weebly.com/>).
 - d. Part of the World Economic Forum's *How to Prevent Discriminatory Outcomes in Machine Learning* white paper (<http://unicefstories.org/2018/03/13/world-economic-forum-unveils-new-principles-to-make-machine-learning-more-human/>)
- 3) **Prototyping:** Investing in pilots and new solutions that can accelerate UNICEF's work and can have a positive impact in children's life.
 - a. UNICEF Innovation Fund's DS and AI cohort of companies. (<http://unicefstories.org/2018/04/06/unicef-announces-funding-for-ai-data-science-and-vr-startups-to-help-solve-the-worlds-biggest-problems/>)
 - b. Combining drone imagery and AI to improve the response during cholera outbreaks in Malawi (https://www.unicef.org/malawi/reallives_21348.html)

Future work will include:

- Integrating AI within existing solutions and technologies such as chat bot capabilities within U-Report, our social media messaging platform (<https://ureport.in/>).
- Analysing the implications of child labor in the supply chain.
- Using DS/AI/ML for optimizing transactions and communications flows in organization, by training agents on large internal data sets.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG1, SDG2, SDG3, SDG4, SDG5, SDG8, SDG9, SDG10, SDG11, SDG13, SDG16, SDG17

3. Relevant links (website, document, social media, etc.)

www.unicefstories.org/magicbox, www.unicefinnovationfund.org, Follow us at @unicefinnovate on social, Be part of the UN Innovation Network: www.uninnovation.network

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United Nations Interregional Crime and Justice Research Institute

- The UNICRI Centre for Artificial Intelligence and Robotics

1. Description of Activities on AI

Crime Prevention, Criminal justice, as well as Law enforcement and national security is one of the areas where AI and robotics has the potential to compliment or even greatly enhance traditional techniques. For instance, AI could be used to monitor the changing landscape of criminal and terrorist networks; efficiently analyze threat data and historical information; recognize behavioral patterns that cannot be seen by the human eye; and create hypotheses for commission of future criminal or terrorist acts. So-called 'predictive policing', in particular, could offer the opportunity for law enforcement and national security agencies to adopt a proactive, rather than a reactive, approach to crime and security. Robotics, on the other hand, could be used to gather actionable data and handle situations that may be too dull, dirty or dangerous for human counterparts, for example, responding to bomb threats.

Masked behind these benefits, however, are a range of social, ethical and legal issues that have yet to be fully explored and analyzed, which could even jeopardize trust and belief in AI and robotics as agents for positive change. For instance, not only do these technologies themselves present an inherent potential for physical harm to humans, there are concerns surrounding the autonomous use of force, algorithmic bias and black boxes in decision-making systems, data collection and violations of the right to privacy, and, of course, the ever-present risk that these technologies may be misused by criminals or terrorist organizations. Indeed, with every new technology comes vulnerability to new forms of crime and threats to security. There is, furthermore, concern that AI-enabled automation may result in the widespread displacement of workers and usher in social instability through new waves of migration and increased crime rates, with developing countries and economies in transition standing to bear the brunt of the disruption.

In spite of the widespread and rapid innovation that is taking place in the field of AI and robotics, there is no dedicated international discussion on the risks and benefits from a law enforcement and national security perspective. Potential best practices for the application of AI and robotics to the field of law enforcement and national security or the adequacy existing policies or legal frameworks to address the potential associated risks and prepare against criminal or terrorist misuse remain fringe issues, confined to the realms of science fiction.

The United Nations Interregional Crime and Justice Research Institute (UNICRI). UNICRI is a United Nations entity established in 1965 to support intergovernmental, governmental and non-governmental organizations in formulating and implementing improved policies in the field of crime prevention and criminal justice. UNICRI's programmes focus on different areas of crime prevention and criminal justice, including: counter-terrorism; international criminal law; security at major events; cyber-crime; environmental crime; juvenile justice; and urban security.

In early 2015, UNICRI launched its programme on artificial intelligence and robotics, and with support of the Municipality of the Hague and the Ministry of Foreign Affairs of the Netherlands UNICRI signed the host country agreement for the opening of its Centre for Artificial Intelligence and Robotics in The Hague, the Netherlands, in September 2017. This Centre is dedicated to understanding and addressing the risks and benefits of AI and robotics from the perspective of crime and security through awareness-raising, education, exchange of information, and harmonization of stakeholders.

The Centre seeks to advance knowledge and understanding of the potential implications of AI and robotics for Crime Prevention, Criminal justice, as well as law enforcement and national security, focusing on both possible risks and benefits. More specifically, the it will provide both a platform and the requisite tools required for law enforcement and national security agencies to take stock of the advancements being made in AI and robotics, share and examine best practices for how AI and robotics can be used to fight crime and enhance security, and discuss the policies or legal frameworks that may be required to address the potential associated risks. It will seek to foster a culture around technology-enabled policing and security and garner international support for further action with respect to AI and robotics from a law enforcement and national security perspective.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 16. Peace, justice and strong institutions

3. Relevant links (website, document, social media, etc.)

- http://www.unicri.it/topics/ai_robotics/
- <https://trustfactory.ai/>

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United Nations Institute for Disarmament Research

1. Description of Activities on AI

As part of the workstream established in 2013 on the weaponization of increasingly autonomous technologies, UNIDIR is focusing on the Impact of AI on International Security. UNIDIR is convinced that mitigating or reducing the potential harms caused by AI will be crucial in order to harness “AI for Good”.

Background

Artificial intelligence (AI) research in the last 50 years has developed a powerful set of tools including search algorithms, discriminators and recognisers, and new advances mean that machines will soon interact with the world in new ways. This will have many impacts, including important potential ramifications for international security.

To date, these ramifications have been explored only cursorily or very narrowly. Notably, since the 2013 States Parties to the Convention on Certain Conventional Weapons (CCW) have discussed questions related to “emerging technologies in the area of lethal autonomous weapons systems” with subsequent meetings of experts held in 2014, 2015, and 2016, and a Group of Governmental Experts on the subject scheduled to convene in November 2017. Given the lacuna in the field, the Secretary-General’s Advisory Board on Disarmament Matters recommended in July 2017 that States commission UNIDIR to carry out a study on “the likely impact of artificial intelligence on international security”. While AI can be used to uphold international security, the risks it presents as the technology continues to mature are manifold, warranting attention from the highest levels of the international community. This workstream seeks to facilitate a common understanding among the many stakeholders—including States, international organizations, industry, and civil society—that will be critical to the development of norms and governance in the realm.

The objectives involve exploring the following themes central to the relationship between artificial intelligence and international security:

- **Functional Concerns:** The development and future deployment of autonomous weapons systems underline challenges posed by increased reliance on AI, including the possibility for accidents.¹
- **Manipulation and Weaponization:** As current AI approaches rely upon machine learning algorithms, its use contains inherent vulnerabilities—with the collected data sets as well as the algorithms themselves subject to manipulation. Assertions that the algorithm-driven weaponization of information was used to influence foreign elections underscores the destabilizing potential of AI. Some suggest AI will inevitably be used to enhance cyberattacks, to even “create and control cyberweapons”. Such usage adds dimension to the era of constant “low-to-moderate level cyber-attacks” as envisioned by US Director of National Intelligence James Clapper.
- **Conflict and Stability:** Increased reliance on automation and AI technologies may fundamentally alter the nature of conflict. The increasing insulation of some parties from the physical battlefield could alter the way in which those societies not only conducts but perceives of war. Meanwhile,

¹ UNIDIR (2016), *Safety, Unintentional Risk and Accidents in the Weaponization of Increasingly Autonomous Technologies* (UNIDIR papers on the weaponization of increasingly autonomous technologies).

because decisions be made faster, and vulnerabilities more quickly exposed (and perhaps patched), the overall AI capacity will likely “put security actors in a constant state of high alert” – with ramifications for strategic stability.

- Commercial Development: Much of the development of AI-related technologies, including autonomous systems, is taking place in the commercial sector. The implications of this shift, and the potential dual-use nature of AI—as it pertains to the vulnerability of components, the makeup of the global defence industry, and the possibility of regulation—are yet to be explored.
- Accessibility and Asymmetry: For now, large industry players and traditional powers like the US and China remain at the forefront of investment in AI. But there are questions as to whether and how access to expertise and sensitive technologies will proliferate. If AI becomes widespread, it may in fact echo the impact of the cyber domain on international security, providing a tool for non-state actors and nation-states alike to conduct asymmetric warfare, threatening stability in the process.
- Structural Impact: Artificial intelligence will be at the heart of what the World Economic Forum has called a Fourth Industrial Revolution. The automation of particular industries will have a disproportionate effect across states, and the corresponding restructuring of the global economy will have a profound effect on geopolitics and power dynamics in the international system. The very foundation of international security could be upended in the long term because of the far-reaching impact of the AI revolution.

2. Related Sustainable Development Goals (please list all relevant goals)

While peaceful and stable societies contribute conditions for the achievement of all of the SDGs, UNIDIR’s work contributes directly to goal 16 on Peace, Justice and Strong Institutions.

3. Relevant links (website, document, social media, etc.)

- www.unidir.org
- bit.ly/UNIDIR_Autonomy
- @unidir

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United Nations Industrial Development Organization

1. Description of Activities on AI

AI activities and those fostering the uptake of AI are currently gaining traction and increasingly more attention within UNIDO and among its Member States. Many technical cooperation projects are currently being developed, or are in preparations that have an AI connection and Global Forum events are organized, or are in preparation, with the objective to raise awareness for the AI for Good and other Industry 4.0-related technologies.

More specifically:

- SAP SE and the United Nations Industrial Development Organization (UNIDO) have joined forces to advance the 2030 Agenda for Sustainable Development and monitor its implementation in the area of inclusive and sustainable industrialization (SDG 9), by utilizing innovative technologies including analytics, reporting, the Internet of Things, AI, block chain, and others. The joint initiative will focus on the development of an innovative platform, SAP Digital Boardroom, to monitor, manage, and report on the Sustainable Development Goals (SDGs) and their industry-related targets.
- Global Forum events linking the technology providers (private sector), academia, and policy makers to share knowledge on the prospects of leveraging frontier technologies, such as AI applications in a developing country context. So far, UNIDO has organized ten panel sessions on Industry 4.0, opportunities and challenges. Those events produced recommendations for the follow up activities. These events organized in Vienna, New York, Washington and Buenos Aires included also panels on industry 4.0 in smart cities, linking mayors, smart city experts and industry to directly communicate and find solutions to the world's cities problems.
- Together with the Russian Federation, UNIDO is organizing a Global Forum on naturally-based and convergent technologies (nano, bio, ICT and cognitive sciences). The role of AI, particularly in the convergence of technologies, will be highlighted and emphasized. AI scientists, experts and institutions and organizations dealing with the commercialization of new knowledge, are expected to provide their expertise at the conference. A website featuring this conference will be set up shortly.
- In a forthcoming conference on Industrial Safety, the focus will be on how best to enhance Industrial safety, its monitoring, implementation and how to strengthen supervisory authorities by using some of the frontier technologies. The AI potentials for this purpose will be discussed including the regulations, standards and norms setting.
- Pipeline technical cooperation projects are in the process of development, aiming at leveraging AI for industrial modernization and upgrading and supporting the establishment of multi-stakeholder knowledge-sharing platforms to create awareness on Industry 4.0, AI, opportunities and challenges for pursuing inclusive and sustainable industrial development in developing countries and by industrial sectors. UNIDO cooperates with private sector technology providers to bring AI applications to machines that are deployed in the agribusiness. For instance, machines equipped with the AI can enable drying of meat, herbs, and fruit to be more efficient and sustainable. Other AI applications of AI in agriculture include precision agriculture, image

processing, and vertical farming and so on. The AI applications are also mainstreamed in the TC projects in automotive industry and pharmaceuticals.

- There are initiatives underway to foster new generation of industrial parks such as eco parks based on circular economy, and smart parks and cities with Industry 4.0 technology applications, among them IoT and AI. Moreover, the connection of cities and industrial development is particularly visible in Smart Industrial Parks, which are currently being piloted throughout the world with UNIDO providing expertise on planning and operating such parks.

A comprehensive strategic framework is to be published shortly. Smart and sustainable cities, which are connected by the Internet of Things, powered by AI, are part of UNIDO's innovation portfolio. The Aim is to bring together technology providers, industry and policy maker representatives. An annual event, the Bridge for Cities, is held particularly with the aim of bringing together cities, businesses and academia for the good of cities. The department of energy is actively contributing to industrial energy efficiency through the application of sensors, forming an Internet of Things that gives real-time monitoring of energy use. In a next step, the automation and connection of the data, enhanced by AI algorithms is envisaged. UNIDO energy projects are considering new technological applications in in the energy sector.

- UNIDO is currently working on establishing an Industry 4.0 Centre in South Africa, which will act as a knowledge hub supporting the uptake of industry 4.0 technologies, such as AI in other parts of Africa.
- E-commerce is a driver of growth for many SMEs in the developing world. At the same time, digital business ecosystem platforms become inevitably the most important aspects of it. E-commerce on a large scale sees the wide application of algorithms, data crunching and similar activities that improve the overall consumption footprint. Ongoing projects aim at helping SMEs prepare for e-commerce in the developing world and enable their access to international markets, and to connect local producers with global value chains.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 7, SDG 9, SDG 11, SDG 12

3. Relevant links (website, document, social media, etc.)

- <https://www.unido.org/news/sap-and-unido-join-forces-enable-un-sustainable-development-goals-innovative-technologies>
- <https://www.unido.org/2nd-bridge-cities-event>
- <https://www.unido.org/news/unido-initiates-e-commerce-policy-framework-and-industry-alliance-brics>
- <https://www.unido.org/gc17/industry40>

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United Nations Office for Disaster Risk Reduction

1. Description of Activities on AI

AI, machine learning, and deep learning technologies and their application, offer enormous potential for the work of The United Nations Office for Disaster Risk Reduction (UNISDR) and Member States in implementing the Sendai Framework for Disaster Risk Reduction 2015-2030 and pursuing risk-informed sustainable development. This ranges from sophisticated multi-dimensional understanding and mapping of risk through time to traditional crisis management capabilities.

The application of AI technologies, as they evolve, will be central to the co-design and development of the forthcoming Global Risk Assessment Framework (GRAF), and featured in preceding work on the Global Risk Model. The GRAF aims to improve the understanding of future risk conditions on Earth, at all scales and across relevant time periods, to better manage uncertainties and risk-informed decision-making, innovation and finance by:

- fostering interdisciplinary systems-risk-thinking, at all scales, with a *shared methodology*, and
- enabling the identification of anomalies and precursor signals, as well as the interlinkages, relationships, correlations and dependencies across systems to build a *shared understanding* and enable decision-makers to act.

AI and machine learning is expected to be a critical enabling aspect to identify these signals – explicitly, adopting and integrating AI into understanding risk and developing actionable risk information, risk management tools and scenarios at relevant scales to decision makers on a timely basis. In so doing, the GRAF can build collective intelligence to steer societies towards risk-informed implementation of the 2030 Agenda, the Sendai Framework, the Paris Agreement and the New Urban Agenda.

Through engagement of stakeholders and ultimately citizens and communities, the GRAF will support the transition from silo-based, hierarchical approaches to systems based, heterarchical¹ approaches to improve the solving of complex problems. By actively designing for AI, UNISDR can aim to significantly accelerate the processing and computation of complexity across systems at all scales, and understand critically important phenomenon – like the sensitivity to change of certain determinants of risk on the real-world impacts and consequences – providing a much richer understanding of the options that are made available ex-ante to decision-makers.

This improvement in individual and collective intelligence – and accompanying new skills and competencies – allows the potential for lasting change. In applying AI – for example to process vast arrays of data with high performance computing and machine learning – people can be empowered to adopt decision-making processes which have in some instances (e.g. multi-hazard high density urban contexts) been empirically demonstrated to result in better decision-making and with a higher proportion of optimised outcomes

The GRAF creates a collaborative, open space in which risk modelling and assessment capabilities, impact and consequence analyses, risk knowledge and tools can be braided together and made available for action by users everywhere. This goal can be achieved by increasing the multi-science

¹ A heterarchy is a system of organization where the elements of the organization are unranked (non-hierarchical) or where they possess the potential to be ranked a number of different ways.

foundation of risk assessments in an inclusive, open collaborative, building on existing processes and data to the greatest extent possible. The GRAF seeks to:

- To provide decision makers with **actionable insights and access to products, tools, demonstrations and scenarios at all scales** (spatial and temporal) to better understand systems impacts and consequences to prevent risk creation, manage and reduce existing risk, including systemic risk, transition risks and emerging risks
- To **support national governments to maximise synergies** across the implementation and achievement of the targets and goals of the 2030 Agenda, the Paris Agreement, the New Urban Agenda and the Sendai Framework
- To **increase trust and confidence in the multi-science foundation of risk assessments** in an inclusive, open process, building on existing processes and data to the greatest extent possible
- To **foster a culture of inclusive, collaborative, and proactive behaviour** based on interdisciplinary systems thinking
- To **mobilize finance and de-risk investments** to enable risk-informed sustainable development

The combination of artificial intelligence and human intelligence is providing the basis for the adoption of systems-based approaches that will influence behaviours, enable self-organisation and emergent learning pathways focused on local processing of information by relevant stakeholders on the impacts and consequences of decisions across the *shared metrics*.

AI applications feature prominently in more traditional crisis management approaches. In the Greater Paris Region for example, UNISDR has supported artificial intelligence simulation through its ARISE Alliance member, the MASA Group, to train senior crisis management personnel and validate contingency plans in the management of major flooding. Through simulation involving officials and the private sector, contingency plans are updated, and personnel trained to manage the impacts of this type of hazard. In this scenario, artificial intelligence simulates the occurrence and propagation of the disaster, its impact on people and infrastructure, and the execution of high level orders at subordinate levels; this represents potential cost savings, and can drill senior crisis managers in hypothetical crisis management in preparation for actual events.

2. Related Sustainable Development Goals (please list all relevant goals)

Being a crosscutting issue, disaster risk reduction (DRR) is relevant for all SDGs. Specific DRR- related indicators are included in SDGs 1, 11 and 13

3. Relevant links (website, document, social media, etc.)

- www.unisdr.org; www.preventionweb.net
- <http://preview.grid.unep.ch/>



United Nations Institute for Training and Research

1. Description of Activities on AI

The United Nations Institute for Training and Research (UNITAR) Operational Satellite Applications Programme (UNOSAT) focuses on the use of satellite imagery and related geospatial technologies to better understand and support the UN's work in humanitarian crises, natural disaster impacts, human rights issues, environmental dynamics, sustainable water management, the 2030 Agenda for Sustainable Development and much more. UNOSAT is based in Geneva at the European Organization for Nuclear Research (CERN) research facility, which possesses vast computing resources and some of the top academic researchers on a range of topics from particle physics to supercomputing to artificial intelligence. UNOSAT and CERN, together with other partners including the UN Global Pulse and the University of Geneva département d'informatique, have continuously engaged in research activities to push the envelope of applications of satellite imagery and related technologies to key areas of UN activities. These resources are now part of UNOSAT's efforts on artificial intelligence and applications to satellite imagery analysis focused on the Sustainable Development Goals (SDGs). UNOSAT was pleased to help co-organize a track on this topic at the ITU AI for Good Global Summit to help develop projects that seek to address the SDGs.

UNOSAT's current focus on AI and satellite imagery is to help develop AI methods for satellite imagery analysis, assess the accuracy of those methods, and track overall progress to operational usability, i.e. the point when UNOSAT analysts, or a national expert, can utilize the methodologies within daily analysis work. From UNOSAT's perspective, and based on our experience in humanitarian support and disaster response, satellite imagery analysis absolutely must be highly accurate in order to guarantee effective use by field-based partners. AI-based methods are getting better, and some are already in regular use, but in general they still have some way to go before they can match the accuracy delivered by a skilled and trained analyst. The Director for Satellite Analysis and Applied Research at UNITAR, Einar Bjorgo, elaborated on this at the ITU event in this [video](#).

With our long history of satellite imagery analysis in service to UN partners on critical humanitarian issues, UNOSAT has a lot of expertise on sources and uses of satellite imagery. Because of this UNOSAT has been approached by multiple UN entities and member states in recent years on this topic and we've also been able to connect differing UN entities together on common topics of interest. UNOSAT intends to continue these efforts and contribute to coordination within the UN system on these topics as they apply to the SDGs, and to develop the frameworks and indicators needed to actually assess progress on making useable algorithms that are valid for operational analysis.

UNOSAT is also exploring AI as a tool for improved use of earth observation data by member states, in particular as support to the 2030 Agenda. This includes a detailed understanding of the requirements and the country level and how the resulting datasets can be used across ministries.

UNOSAT is more directly engaging on analytical efforts to design algorithms that perform analysis, a CERN summer student is currently exploring this area. More broadly, UNOSAT AI activities also include using Generative Adversarial Networks to simulate satellite imagery, which would provide benefits for sharing images for training purposes. In the longer term UNOSAT will also review costs and methods of commercial providers of AI-based analysis to ascertain their efficacy. UNOSAT is working to make

more CERN computing resources available to the UN community to provide additional processing capabilities to the UN system.

With presence at the UN regional hubs of Nairobi and Bangkok, we are exploring support to regional and national entities in the use of AI, with a focus on Africa and Asia. Our collaboration with regional organizations, such as the Intergovernmental Authority on Development (IGAD) in East Africa and the UN Economic and Social Commission for Asia and the Pacific (UN ESCAP) are examples of that. We are supporting and collaborating with such organizations to strive towards practical use of earth observation and for that the latest technologies, such as AI and related machine learning, has a large potential for significant impact.

Benefiting from advances in free and opens source data, such as the European Space Agency Sentinel programme, the existing Landsat series from US Geological Survey, coupled with cloud storage and direct data feeds, developing countries now have a great opportunity to benefit from this technology. The UN Institute for Training and Research, through it's UNOSAT programme, is fully dedicated to strengthen capacities in developing countries to bring these to the forefront of actual users of earth observation data and products. To do this we work in partnership with a range of organizations, such as UN ESCAP, UN Office for Outer Space Affairs (UNOOSA), UN Environment as well as national government agencies.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 1, SDG 2, SDG 3, SDG 6, SDG 10, SDG 11, SDG 13, SDG 16

3. Relevant links (website, document, social media, etc.)

- <http://unitar.org/unosat/>
- <https://home.cern/>
- <https://www.unglobalpulse.org/>
- <https://www.unige.ch/dinfo/>
- <https://www.youtube.com/watch?v=9HUbZ-WZgrA>

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United Nations Office for Disarmament Affairs

1. Description of Activities on AI

The Office for Disarmament Affairs supports the work of the Group of Governmental Experts on emerging technologies in the area of lethal autonomous weapons systems. The Group was established by the Fifth Review Conference of High Contracting Parties to the Convention on Certain Conventional Weapons. It has held two one-week sessions, in November 2018 and April 2018, and will meet again in August 2018.

As requested by General Assembly resolution A/RES/72/28, the Secretary-General will provide to the 73rd session of the General Assembly a report on current developments in science and technology and their potential impact on international security and disarmament efforts. The report is being drafted by the Office for Disarmament Affairs and will contain a section on developments related to AI.

The Office for Disarmament Affairs supports the work of Subsidiary Body 5 of the Conference on Disarmament, "New types of weapons of mass destruction and new systems of such weapons; radiological weapons", which will – inter alia – consider issues related to AI.

On 24 May 2018, the Secretary-General released his agenda for disarmament, *Securing Our Common Future*. A priority is "Disarmament for Future Generations", which seeks to address the possible challenges new weapon technologies pose to existing legal, humanitarian and ethical norms; non-proliferation; international stability; and peace and security. This includes the implications of the increasing autonomy of weapons and the potential weaponization of AI. The Agenda includes as an action point: "The Secretary-General will support the efforts of Member States to elaborate new measures, including through political or legally binding arrangements, to ensure that humans remain at all times in control over the use of force."

The Secretary-General and the High Representative and Under-Secretary-General for Disarmament Affairs have both sought to raise awareness of the possible implications of the weaponization of artificial intelligence in various speeches in 2018.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 16. Peace, justice and strong institutions

3. Relevant links (website, document, social media, etc.)

- [https://www.unog.ch/80256EE600585943/\(httpPages\)/8FA3C2562A60FF81C1257CE600393DF6?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/8FA3C2562A60FF81C1257CE600393DF6?OpenDocument)
- <https://www.un.org/disarmament/sg-agenda/>
- <https://www.un.org/sg/en/content/sg/statement/2018-03-23/secretary-general%E2%80%99s-remarks-turtle-bay-security-roundtable-managing>
- <https://s3.amazonaws.com/unoda-web/wp-content/uploads/2018/04/Izumi-GGE-speech-in-Geneva.pdf>

- [https://www.unog.ch/80256EE600585943/\(httpPages\)/BF18ABFEFE5D344DC1256F3100311CE9?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/BF18ABFEFE5D344DC1256F3100311CE9?OpenDocument)

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UNITED NATIONS Office for Outer Space Affairs

United Nations Office for Outer Space Affairs

1. Description of Activities on AI

Recognizing that AI and Machine Learning (ML) technology can be highly valuable in exploiting very high resolution satellite imagery mainly in the commercial domain, in addition to medium and high resolution data already available freely, UNOOSA is working in partnership with commercial satellite data providers to facilitate Member States access to their data including free access during major disaster situations. Working closely with such commercial entities (such as DigitalGlobe, Airbus and Planet), UNOOSA is raising awareness alongside our advisory missions and workshops to enhance Member States use of such tools in their implementation of SDGs such as SDG 6, 11 and 15.

Cutting-edge analytics through the GBDX platform of DigitalGlobe can already experimentally combine machine learning with satellite imagery to predict human characteristics of a city, an approach that will ultimately help plan for tomorrow's challenges and make decisions with confidence, for a more resilient society (see penny.digitalglobe.com). DigitalGlobe in cooperation with Facebook and academia also used face recognition technology to "train" automated recognition of buildings on high resolution satellite imagery to respond to health crises, allowing in just weeks the generation of important and accurate building footprint and derived population density data crucial for responding to crises. Such data would take years to develop through traditional methods. The UNOOSA partnership with DigitalGlobe allows such data to be also released as open data in major crises, such as in the ongoing Ebola outbreak in the DR Congo (see www.digitalglobe.com/opendata).

Other groups collaborating with UNOOSA include OneConcern, a partnership that is supporting the development of AI technology that within minutes of an earthquake can predict what areas of a settlement are likely to be worst affected. While such tools do not yet fully rely on satellite imagery and more on in-situ data, the incorporation of satellite imagery can improve predictions in the future. AI strategies can prove useful in less-developed areas of the world where there is not much in-situ data available about the buildings present. For example, online volunteers can view satellite images of an affected area after software had pre-scanned them and decided there might be settlements, then rate images as high priority if they believe houses are present. With an AI engine working out consensus and flagging specific areas or a closer look by specialist response teams, as tested in the case of the 2015 Nepal earthquake by a UK-based group. Similar efforts in deploying AI on vast satellite imagery archives are undertaken by Airbus or Planet too, as well as by new startups considering small Earth observation satellite fleets for deployment. Such tools ultimately help better know our planet, through combining the power of satellite imagery and ML/AI platforms to understand patterns of human activity from space and to solve problems more quickly and efficiently than with traditional methods. UNOOSA works with all its partners mentioned to ensure wide awareness of these tools and for encouraging open or at least easy access to generated data for developing countries and relevant UN entities, bringing those closer to where needed most.

Such tools and AI-derived geospatial data become more important as the amount of Earth Observation (EO) satellites increases, new constellations are deployed and the amount of daily data collected increases exponentially. The only way to exploit all that data in a timely manner will soon be through automation, ML and AI tools.

UNOOSA through its UN-SPIDER programme (www.un-spider.org) is already conducting hands-on capacity building to enhance awareness and ability to access, analyse and use big data and automated tools in disaster management and for disaster risk reduction and policy implementation in over 40 vulnerable countries, following up on earlier fact-finding technical advisory missions at the invitation of those countries.

UNOOSA, as Secretariat to the UN Committee on the Peaceful Uses of Outer Space (COPUOS), also facilitates the UN intergovernmental forum where Member States exchange of views on the use of space-enabled big-data, artificial intelligence and machine learning in support of sustainable development. Two recent examples of such exchanges include presentations on national best-practices in the use of earth observation information to mitigate drought risks and how space-enabled big-data sets can be used to tackle deforestation.

2. Related Sustainable Development Goals (please list all relevant goals)

Recent research has shown that of the 169 indicators underpinning the 17 SDGs, 40% are reliant on the use of space-based technology. Such statistics demonstrate the universal applicability of space to the implementation of all 17 SDGs.

UNOOSA's current portfolio of programmatic activity is focused on supporting Member States implementation efforts in:

SDG 2, Zero Hunger, SDG 3, Good Health and Well-being, SDG 6 Clean Water and Sanitation, SDG 11, Sustainable Cities and Communities, SDG 13, Climate Action and SDG 15, Life on Land.

3. Relevant links (website, document, social media, etc.)

- unoosa.org
- un-spider.org
- 2017 Annual Report- http://www.unoosa.org/documents/pdf/annualreport/UNOOSA_Annual_Report_2017.pdf
- Space and the SDGs- http://www.unoosa.org/oosa/en/oosadoc/data/documents/2018/stspace/stspace71_0.html

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**UNITED NATIONS
UNIVERSITY**

UNU-CS

Computing and Society

United Nations University

- United Nations University Center for Policy Research (UNU-CPR)

1. Description of Activities on AI

The United Nations University Center for Policy Research (UNU-CPR) will build programming around the global policy puzzles posed by the increasing convergence of an array of existing and emerging technologies, including biotechnologies and artificial intelligence.

New technologies such as artificial intelligence, distributed ledger systems and cybersecurity-enhancing techniques, neuro- and biotechnologies, are pervading and altering society. The discussions, analyses and actions we initiate today – and those we don't – will determine our capacity to anticipate how powerful technologies take shape in our socio-technical systems and transform who we are. How do we get ahead of the curve?

We will conduct deep-dive and foresight analyses, collaborative research projects with external partners, and convenings.

Current UNU-CPR Activity on AI:

On 22 June, "Governing AI" is being convened by the United Nations University's Centre for Policy Research and the International Peace Institute. The policy seminar will bring together high-level experts from the United Nations, tech industry, academia and national delegations to the United Nations, and will be live-streamed to a global audience.

The event aims to foster informed discussion on the global public policy implications of artificial intelligence (AI). What opportunities and challenges does AI hold for humanity? What public policy puzzles emerge from the development and deployment of AI globally and in different political, economic and social contexts? And what role(s), if any, does the United Nations have to play in helping governments, industry and civil society worldwide solve these policy puzzles?

About the Policy Seminar

There are growing signs of a global AI arms race. At least four of the five Permanent Members of the Security Council are placing AI at the centre of their current grand strategies. Some suggest that this kind of global competition for AI and data dominance is inevitable, given the network effects that underlie value-capture in the digital economy. Others see it as a perversion of permission-less innovation and free market competition, brought about by sovereigntist policies focused on economic protectionism or even neo-mercantilism.

AI holds unique promise for accelerating progress towards the Sustainable Development Goals. However, as with any transformative technology, its rollout will not occur uniformly, and will disrupt established political, social and economic systems. The convergence of AI with control of new biotechnologies and large data sets will be a major factor in determining which communities, organizations and even countries benefit most from AI and which are at risk of being left behind.

The seminar on June 22 is the first step in a sustained and inclusive effort by the United Nations University over the next year to frame and structure informal reflection on the importance of coordinated policy responses to the rapid transformations global AI promises.

2. Related Sustainable Development Goals (please list all relevant goals)

To some extent: Goals 8, 9, 10, 16

3. Relevant links (website, document, social media, etc.)

- <https://unu.edu/>

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World Food Programme

- World Food Programme, Innovation and Change Management Division (INC)

1. Description of Activities on AI

Over 800 million people – one in nine people globally – live in hunger due to poverty and/or the impact of natural disasters, conflict, climate change, or governance challenges. The World Food Programme (WFP) is the humanitarian organization leading the fight against hunger worldwide. As the world's largest humanitarian assistance organization, WFP provides assistance and support to more than 80 million people in food insecure situations in seventy-five countries each year. Focused on SDG 2- ending hunger by 2030- and the other SDGs, WFP is actively looking at how AI can help us with our life-saving work.

As assessment is a major part of WFP's work, we currently deploy artificial intelligence in the field to help multiple forms of assessment and analysis, particularly in otherwise hard-to-access areas. For example, through an initiative called Sudden-Onset Emergency Aerial Reconnaissance for Coordination of Humanitarian Intervention (SEARCH) and an AI partner initiative called Rapid On-Demand Analysis (RUDA), WFP is using drones and artificial intelligence to lower the amount of time needed to understand the impact of disaster.

An unmanned aerial vehicle (UAV), commonly known as a drone, is an aircraft without a human pilot aboard. The flight of UAVs may operate with various degrees of autonomy: either under remote control by a human operator or autonomously by onboard computers. While UAVs provide a platform to efficiently collect remotely sensed image data (for example, in the aftermath of a natural disaster) the data must then be processed and analysed in order to extract meaningful information. An experienced remote sensing analyst normally achieves this image analysis through visual interpretation; a manual approach which presents a very high workload and is time intensive to perform. Automating or partially automating some of the interpretation with machine learning techniques such as Artificial Intelligence (AI) can greatly reduce the time required to carry out the analysis and help get better and faster information into the hands of Emergency Coordinators.

WFP's Rapid UAVs for Data Analysis in Emergencies (RUDA) pilot sees machine learning software integrated with data collection and analysis workflows in order to tag and analyse image data collected by drones. The pilot will be implemented in five countries prone to natural disasters, aligning with the locations chosen for the coordination model. AI can help WFP to quickly analyse satellite and drone imagery by enhancing the quality and speed of information available to humanitarian workers responding to disasters. RUDA's goal is to build a platform that can store and manage thousands of images collected by drones and then train the AI system on how to assess each photo in order to identify homes destroyed by natural disasters or spot failed harvests.

For humanitarian relief, we are beginning to explore additional possibilities to implement AI including using autonomous vehicles to deliver food to beneficiaries in hard-to-reach or dangerous places. We also see AI as able to help optimize our supply chain processes for desperately needed food assistance. As we look toward building long term resilience and nutrition, AI can help build more efficient food systems communities who need it most. By collecting vast quantities of information on weather, soil conditions, and crop status using data from low-cost sensors, UAV imagery, and satellite imagery, AI can help WFP and its partners such as FAO, IFAD and the private sector, among others, to analyse

significantly more data than ever before, helping farmers to increase crop-yields and market their crops more efficiently by optimizing supply chains.

Lastly, AI is being piloted to help WFP better communicate with those we serve. Using an AI-based chatbot to conduct surveys, WFP is learning how to “talk” to those we serve in 20 different languages. Chatbots have the potential to allow us to understand the needs and concerns of significantly more people, at a fraction of the cost, in almost real time. We can then tailor and target our assistance to the needs of the most vulnerable.

While these projects have helped us make great strides in the use of innovative technologies to fight global hunger, we have barely scratched the surface in its potential to evolve the world’s most pressing humanitarian challenges. However, only through partnerships that combine the expertise of humanitarian actors like WFP with the cutting-edge expertise of leading academic institutions or private sector companies will we truly achieve AI’s full potential. Working together, we can accelerate the development and use of AI technologies to ensure no one is left behind.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG2, SDG17

3. Relevant links (website, document, social media, etc.)

- <http://innovation.wfp.org/project/rapid-uavs-data-analysis>

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**World Health
Organization**

World Health Organization

1. Description of Activities on AI

WHO's top priority is universal health coverage: ensuring that all people can access the health services they need, without facing financial hardship. The foundation for achieving this vision is strong health systems, based on primary care that delivers the services that people say they need, rather than those other people decide they should have. In this regard, WHO emphasizes the underscores that Artificial Intelligence (AI) for health is both important useful for advancing health for all.

As part of working with ITU, academia and relevant non-state actors, WHO is actively engaged in discussions to explore appropriate and safe ways of using AI in advancing health for all. Application of AI in healthcare is most effective when it helps achieve national health-related SDG goals. In this regard, WHO is developing normative guidance documents aimed at national and sub-national governments to encourage them to have appropriate policy and governance mechanisms to ensure ethical and safe use of AI in Healthcare without hindering innovation.

WHO is engaged in working with Member States to ensure that health services both more accessible and more effective. By making data collection and triage more efficient, AI can reduce the costs of care, making services more affordable for patients.

WHO recognizes that Artificial intelligence is playing an increasing role in disease surveillance and our defenses against outbreaks. With the use of AI, large and complex data sets representing variables related to public health facilities, essential medicines and commodities, health conditions, health workforce, ports of entry, population, satellite images and earth observation data can be better analyzed using AI tools and approaches. The use of AI in analyzing near-real time integrated health information will allow health authorities to monitor emerging infectious disease and its containment efforts. WHO is working with Member States in the effective use of AI and machine learning algorithms to improve response to disease outbreaks through enhanced early warning of disease outbreaks, forecasting epidemics, improved decision making for outbreak response and simulation tools.

In addition to the aforementioned, a collaborative project by the *Be He@lthy, Be Mobile* Initiative by WHO/ITU and GSMA is exploring the use of AI for Health. Aggregated mobile data, used to describe population migration patterns, is overlaid with data on tuberculosis incidents and used to identify areas of increased risk of tuberculosis outbreaks. Such data can then be used to improve the targeting of resources and help contain the infection.

The application of AI in healthcare will help achieve national health-related SDG goals and one of WHO's top priorities is ensuring that all people can access the health services they need. Thus, WHO has partnered up with ITU, academia and relevant non-state actors to explore appropriate and safe ways of using AI to reach SDG3. This resulted in establishment of the *Focus Group on AI for Health* at the ITU, in collaboration with the WHO, as well as the European mHealth Hub, which aim to facilitate a global dialogue on the use of AI for health and to identify benchmarking opportunities. When aligned with the national strategy, AI can accelerate our progress towards better health and well-being for all.

2. Related Sustainable Development Goals (please list all relevant goals)

SDG3

3. Relevant links (website, document, social media, etc.)

- www.who.int

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World Intellectual Property Organization

1. Description of Activities on AI

WIPO organized a meeting of Heads of Intellectual Property Offices (IPOs) in May 2018 to deliberate on AI applications and their potential for management of IP titles by Member States. At that meeting the Director General of WIPO shared WIPO's views on the implications and use of AI in the field of IP. More than 20 IPOs in the world are active users of AI applications to enhance their IP administration.

WIPO has developed several tools using neural network technologies. These include a machine translation tool (WIPO Translate), a trademark image similarity search tool, and an automatic patent classification tool (IPCCAT). These were made publicly available on the WIPO web site.

WIPO Translate was provided to several UN organizations and a few other intergovernmental organizations with necessary customization. Feedback from users is excellent.

WIPO has shared AI related studies and analytic articles contributed by experts on its web site. Those resources are made available at WIPO's dedicated web site to AI for IP at http://www.wipo.int/about-ip/en/artificial_intelligence/

2. Related Sustainable Development Goals (please list all relevant goals)

- GOAL 9: INDUSTRY, INNOVATION AND INFRASTRUCTURE
- GOAL 17: PARTNERSHIPS FOR THE GOALS

3. Relevant links (website, document, social media, etc.)

- http://www.wipo.int/about-ip/en/artificial_intelligence/

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World Bank Group

1. Description of Activities on AI

1) WBG partners with private sector to scale AI solutions for development and demonstrate a new philanthropic path for technology companies.

As part of the Famine Early Action Mechanism (FAM) initiative, the data analytics workstream (led by WBG's Fragile, Conflict and Violence Global Practice) is developing a suite of quantitative models, called Artemis A and B. Project Artemis is constructing an ensemble model that uses advanced artificial intelligence algorithms to estimate and forecast the near to mid-term risk of famine at a local (district/province) level using a variety of remotely sensed imagery and geo-referenced survey data. WBG partners with Amazon and Google AI scientists in compiling the diverse data sets and developing the algorithm.

2) WBG builds/mainstreams internal capabilities for AI.

Internal Innovation Labs provide WBG staff with learning and technology advice, and an experimentation and exploration space around disruptive technologies such as Blockchain and AI.

Projects include (FY18):

- AI & Poverty
- AI & Anticorruption
- Virtual Assistant
- Cognitive Assistant

The **Big Data Program** accelerates big data capabilities in WB operations through technical assistance, knowledge initiatives, and creation of essential resources such as partnerships, code repositories, and cluster computing.

3) WBG aims to articulate global standards in AI

WBG's Unit of Development Economics is releasing its Data Development Strategy that can serve as a stepping stone to a broader AI strategy.

4) There are ongoing AI-driven projects at the WBG.

Governance Global Practice (GGP)

Big data & Machine Learning (BDML)

- Tackling Public Sector Information Data Fragmentation

The GGP has been piloting how to apply open source "machine learning/prediction" tools to analyze and enhance information value in existing public sector financial management and administration data. Through these engagements, simple tools emerging from the big data analysis space can now help the Bank support clients with more proactive and dynamic analytics.

The GGP has launched the 'OnTrack' application in Pakistan and the Philippines, which builds on plagiarism detection tools to help piece together budget execution and procurement data to provide client governments tools for proactive and dynamic analytics on public sector performance.

- Land Governance and Road Detection through Satellite 'Computer Vision'

The GGP is working to advance the use of rapidly expanding satellite data and mapping to: (i) promote improved land use governance and infrastructure tracking; and (ii) reduce barriers for sub-national governments and civil society to use satellite and machine learning to promote public sector accountability.

The GGP is continuing to connect this frontier technology with basic public sector governance challenges. For example, demonstration cases are currently focusing on land use and zoning ("real estate asset") and road networks ("public infrastructure assets"). The GGP can serve as a bridge between "high-tech" applications as such (satellite processing and machine learning is both a complex and sophisticated field) and impact applications that bring these to repeat applications (either across budget years and/or localities). The work is currently feeding into a Sub-National DPO Program for HCMC integrating actions on Smart City governance and zoning disclosure.

- Crowdsourcing Tax Compliance

The GGP has applied paid crowdsourcing technology to monitor cigarette excise tax stamp compliance in the Philippines. The approach used hundreds of thousands of geo-tagged imaged captures across the Philippines to monitor where tax stamps were being used. The approach / technology is also being shared with other teams/counterparts in such settings as Tanzania (including looking at the power of satellite versus UAV imagery at different price and resolution points).

Other ongoing activities related to Big Data & Machine Learning/AI are summarized below:

- In Brazil, the GGP is providing cross support on using machine-learning for small and medium businesses to obtain environmental licenses (tech under development) and for managing citizen complaints through governmental transparency portal. Additionally, data analytics will be used for corruption detection in health and environmental sectors.
- Another analytic work is focused on supporting citizen engagement (gender inclusion and government responsiveness) using administrative data from existing civic tech platforms, such as change.org (132 countries), FOI system of law requests in Brazil, I Change My City in India, etc.
- In Madagascar, machine-learning will be supporting the creation of unique tax number (specs under definition) and providing a unique identifier (digital ID) for the country

2. Related Sustainable Development Goals (please list all relevant goals)

SDG 1, SDG 3, SDG 4, SDG 5, SDG 8, SDG 9, SDG 10, SDG 11, SDG 13, SDG 15, SDG 16, SDG 17

3. Relevant links (website, document, social media, etc.)

- <http://www.worldbank.org/>
- <http://www.worldbank.org/en/publication/wdr2019>
- <http://www.worldbank.org/en/news/feature/2018/05/24/how-can-artificial-intelligence-support-development-we-asked-a-robot>

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