

Forum: United Nations Educational, Scientific and Cultural Organization

Issue: Evaluating the impact of Emerging AI Technologies on the UN Sustainable Development Goals

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Introduction

5 years ago, on the 25th of September, 2015, The United Nations General Assembly set the [UN Sustainable Development Goals](#) - a collection of 17 different socio-economic milestones that are in line with the [2030 Agenda for Sustainable Development](#). These goals are said to be a “blueprint” to a more sustainable world.”, and consist of over 169 [indicators](#) covering a vast spectrum of socio-economic parameters that allow countries to quantitatively map and report progress on the goals. The ‘SDG’s’ were initially conceptualized at the United Nations Conference for Sustainable Development in 2012 as a more modern outlook on the pre-existing [Millennium Development Goals](#).

[Artificial Intelligence](#) is a rapidly growing field that is gaining worldwide recognition for its versatility, and progressively wider impact on the major industries of the world. Andrew Ng, one of the pioneers in the field, calls AI the ‘New Electricity’ in the sense of its *transformative potential*. As AI evolves to fit modern problems, a lot of new fields have come to life, focusing solely on the applications of AI into different needful areas. One of the most prominent ones is the field of [Computational Sustainability](#). Researchers in this field are looking at ways that large scale data analysis can be applied to better resource allocation and optimization, and over the years, have achieved many breakthroughs: primarily in the fields of [remote sensing](#) and [dynamic resource allocation](#).

As AI and its applications have gained more mainstream media attention, the United Nations and other bodies have started recognizing its potential to change the way that modern problems can be solved. Over the past 5 years, the United Nations has made active efforts to incorporate this technology into its many endeavors. The AI For Good, Global Summit was established in 2017, and the applications of AI towards the SDG’s has been a prominent topic

addressed throughout the years of the conference. As the deadline for these goals approaches *less than a decade away*, many have been looking at [Artificial Intelligence](#) as a way to optimize/speed up progress on the goals.

As researchers have started looking into the benefits of drawing on AI for the SDGs, many new findings have come to light - A prominent paper published by Swedish researchers discusses in detail the impact of [Artificial Intelligence](#) on each one of the goals individually. The published findings show that the introduction of [remote sensing](#) and [dynamic resource allocation](#) to government decision making and monitoring has definitely had a *significant* impact on the goals.

While the majority of the results are positive, the paper also depicts how AI has proved to be an *inhibitor* to some of the goals. The primary reasons for this are: Very limited applicability of current AI in the field (for example: areas like Domestic Abuse in Rural Areas), or AI technology not being developed well enough to handle the high-stakes of the application (for example: Remote Sensing of Poverty) The latter is an issue put forth by a lot of other critics highlighting how underdeveloped AI systems have actually caused unintentional bias or neglect in government resource allocation and decision making. Some say this goes against the very idea of the goals being to “leaving no one behind in the pursuit of Sustainability”.

All in all, AI has proved to be a *powerful* tool, and most see it as having a significant part to play in the future of sustainable development.

Definition of Key Terms

AI For Good Global Summit

Summit established by the United Nations to discuss and present AI research, focusing on sustainability and social good.

Artificial Intelligence (AI)

The field of computer science that deals with creating programs that ‘learn’ from data. It involves simulating operations of the human brain in technology.

Bugs

A fault/ flaw in an algorithm or computer program that causes it to output unexpected or inaccurate results,

Computational Sustainability

The field of computer science linked with improving sustainable practices through data analysis, mathematics, and algorithms.

Convolutional Neural Networks

A form of neural networks used to do image analysis.

Decision Boundaries

The Numerical boundaries that determine how an object is classified when put through a classification algorithm

Dynamic Resource Allocation

Usage of computer algorithms to find the most beneficial (as per a chosen parameter) allocation or distribution of a finite given resource (like funding, or energy)

Geospatial Data

Geolocated data: Data with location parameters, that can be expressed through maps

Global Partnership on AI

An international alliance initiated by France for the regulation and discussion of AI-related issues in collaboration with the leading AI nations.

GPU

Graphics Processing Unit, a circuit that is used in the creation and handling of images and graphics.

Human Cloud

The industry where labor (especially in relation to computer science research and data analysis) is outsourced to places around the world through the internet.

Indicators

169 numerical parameters split between the different goals with the purpose of quantifying and measuring progress on different fronts.

Millennium Development Goals

8 Goals aiming to improve sustainability and promote global welfare, established by the UN in 2000

Neural Networks

Complex Machine Learning Algorithms that mimic the actions of a human brain to perform AI tasks.

Remote Sensing

Data Collection through non-physical means, typically using aerial or satellite imagery.

Sustainable Development Goals

The 17 goals for 2030 set by the UN Development Programme with the intention of causing welfare on social, environmental, and economical fronts.

Systematic Errors

Non-Random errors in a prediction that signify a logical flaw within an algorithm

UNDP

United Nations Development Programme, the UN's leading body on Global Sustainable Development

2030 Agenda for Sustainable Development

The agenda established by the UNDP in the 2015 conference as a vision for the future and a method to improve sustainable practices in countries.

Key Issues

AI is truly a tool with the potential to completely *build or break* efforts in sustainability. Its transformative potential can definitely be put to use to better the situation in regards to the SDGs. However, as the field advances, there are still a lot of potential issues coming to light that

may act as a barrier to the effective implementation of AI, or even as a hindrance to our sustainable efforts. As many researchers point out, there are socio-economic implications of the large-scale implementation of AI that need to be addressed before AI can successfully enable the SDGs.

Underdeveloped AI at a large scale:

AI is a fairly novel, underdeveloped field. While one can agree that in recent years AI has made significant breakthroughs, it is debatable whether the technology is mature enough to be implemented at a large scale yet. AI at national levels will have severe implications, affecting government decisions and consequently, civilian lives. Many claim that the technology is not robust enough to handle the stakes involved in these applications: Many researchers point out the different public failures of AI, and claim that it is still in the 'experimental stage' of development. Before it can be used by governments, researchers need to gain a much better understanding of the processes involved, to prevent any kinds of errors. Since the deadline for the SDGs is *less than a decade away*, it is questionable whether credible AI technology can be implemented on a global scale before then and cause tangible benefits to the outcomes of these goals.

Remote Sensing

[Remote sensing](#) of [Geospatial data](#) is one of the fields that has the most potential to be helpful to governments in regards to the SDGs. It involves large scale *remote* data collection, without using any physical means. Most commonly, it warrants the use of [Convolutional Neural Networks](#) on aerial and satellite imagery to gain spatial environmental and socio-economic data over large areas. This has been considered much more efficient than physical and census based data gathering, and can be very useful in mapping progress (especially in remote areas) at closer intervals, along with more efficient planning and resource allocation. The lack of socio-economic data, especially about rural and remote areas of developing countries has proven to be a major hurdle in the tackling of SDG related issues - which is why remote sensing is so important.

[Convolutional Neural networks](#) (CNNs) are the latest technology in image processing and classification. However, researchers still do not completely understand its [decision boundaries](#), and the complex mathematical processes that go into its operation. Consider Adversarial Attacking, a newly discovered phenomenon that proves how

susceptible CNNs are to small changes in pixel values. It is one of the many of the studies highlighting the flaws in current image analysis systems. However, novel research in remote sensing has also produced extremely promising results, for example, the Stanford Lab for Artificial Intelligence and Sustainability (one of the leaders in remote sensing research) produced algorithms that predict average household income across rural African states, with an extremely high accuracy using only satellite imagery.

Data collection like this will end up driving government decisions, and bias government attention to areas *predicted* to be problematic. Errors at this scale could result in unjust resource allocation and neglect of communities that need help, which is why the ethicality of using remote sensing to drive government decision making is still very questionable, especially with our limited understanding of the field.

Dynamic Resource Allocation

[Dynamic resource allocation](#) is another major application of machine learning into overall progress on the SDGs. It involves using algorithmic models to find the most *economically* or *socially* beneficial distribution of resources (like government funding), along with predicting the success of different government endeavours based on data from past measures taken. It has been viewed as a way to improve *fairness* in government decision making, but like Remote Sensing, we might not have a complete understanding of the processes that operate under the hood. Algorithms like these need a lot of logical basis, and are extremely susceptible to [bugs](#) and [systematic errors](#).

A very significant application of this goes into reducing energy usage, a lot of work has been done in this field: Google famously used it's 'DeepMind' AI to reduce its energy consumption by 30%. This is also, essentially a resource allocation problem, and current methods show a lot of promise, but the applicability of this to a larger scale is still very questionable, especially in more diverse contexts.

The cost of running large scale data-analysis

Realistic application of AI to global and national scales would require immense computing power: needless to say, this comes with its own *costs*. Data like this requires extensive storage space, along with large scale, expensive [GPU's](#). Some say that it creates an

even larger divide between the *rich* and the *poor* countries, especially looking at the level of skilled labor, financial resources and credible data required.

Economic Costs

Successful implementation of AI technology requires a lot of sophisticated hardware, resources and *skilled labor*. This puts developing and poorer countries at a disadvantage, especially when it comes to attracting (already scarce) skilled labor to work in their countries. The same algorithm and method is not applicable to every region, looking at the vast range of contextual differences (in Geography, Geology and socio-economic factors), which means that countries need individualized workforce and resources to develop solutions.

As mentioned, technology like this is very high stakes, and has the potential to affect the welfare of citizens, hence, quality cannot be compromised on.

Researchers say that in the long term the economic benefits gained by the implementation of such technology will outweigh the base costs in the future, but is it still ethical for governments to invest millions in AI when basic humanitarian needs cannot be met in the country?

Data

The essential logic behind machine learning models is that they *learn* from pre-existing data, to then predict the outcome of future situations. To create efficient ML models, there needs to be sufficient data to train on. For less developed countries, the extent and authenticity of the data available is questionable, and not comparable to the data collected using more sophisticated (and expensive) testing technology in developed nations. This puts us in something of a catch-22 where the lack of data will not allow us to successfully implement the solution to the lack of data. The shortage of *good quality* data in developing countries can hinder their ability to make good use of AI technologies, and consequently further the divide between the rich and poor nations.

Environmental Costs

The scale of computing, and the amount of hardware that is required comes with a lot of environmental costs. The large scale data centers and servers required are not very environmentally friendly: large computers and servers require a lot of energy to run, and

training models like this can take weeks, if not months. The constant running of these computers use tons of fuel, and generates a giant carbon footprint.

Even common large scale networks and servers (like the internet) have their own carbon footprint. Most large data-centers, servers and ICT hubs usually produce more carbon than any other factories. Global computing and networks already produce 2.7% of the world's emissions, and adopting techniques like this on a larger scale will only seek to increase that.

Some studies and researchers say that if successful, the long-term environmental and socio-economic benefits of these severely outweigh the short-term environmental benefits. If these algorithms can really help reduce energy usage, and more efficiently allocate resources on a national scale, they are definitely *worth it*. However, it is important to consider that all this research is *experimental*, and there is still a good chance that months of research may still not produce a tangible realistic algorithm to be used. This begs the question that is doing large scale *experimental* research worth the economic and environmental consequences?

Legality and Ethics

Implementation of AI and predictive technology is a fairly open field currently, where there are no restrictions on the kind of work that can be done with publicly available datasets. However, looking at the usage of this technology by governments, there will be a lot of other factors that can come into play restricting its usage and applications. The question of how well our current legislation can deal with AI-related problems is one to consider before looking at any realistic application.

Legal Considerations

AI-related technologies operate under a very different context in comparison to current technology. Already legislators are struggling with regulating the power of big tech companies, and the introduction of AI to government procedures will stem even further complications, Pre-existing legislation will not be able to provide the amount of regulation and control AI needs, looking at its major potential and virtually no restrictions currently.

AI in application is bound to make errors eventually, and when that happens, it is not clear who the one to blame is. Looking at the complexity of the logic, and basic

'self-learning' principle that AI operates under, it is very hard to assign legal blame and responsibility when decisions made by AI cause harm. Does this mean that humans are not responsible for errors made by AI, and what avenues for misuse can this open up?

Data rights and Privacy Issues

While there is a lot of potential in AI for better disaster management, and resource allocation, a lot of it requires a lot of data about the population. Government data rights are extremely controversial, and it is not clearly defined what data about the public the government has the right to gather and use. These rights are specific to different countries and different forms of government. For example, researchers recently found a way to better allocate resources during public disasters, and identify areas needing help using geolocation of tweets. Studies like this show a lot of promise, but also spark controversy on whether the government has the right to constantly monitor and geolocate social media activity.

As satellite imagery develops, and the quality of images collected increases, it also raises major privacy concerns about constant visual monitoring of citizens, and public polls found that a majority of citizens are not comfortable with high-resolution satellite imagery being collected and monitored constantly by the government, and a lot of countries outlaw practices like these.

It is important to find the balance between upholding citizen rights and also putting AI technology to the best use.

Major Parties Involved and Their Views

UNDP (United Nations Development Programme)

The [UNDP](#) is the primary organization behind the setting of the 17 SDGs and the driving force behind the Sustainable Agenda for 2030. Over recent years, the UN Development Programme has made several efforts to encourage the usage and development of AI, especially in regards to the UN Sustainable Development Goals. In 2018, the UNDP joined the Partnership on Artificial Intelligence, an international consortium of different leading organizations involved in the field. It also published a study in 2018, in collaboration with IBM (International Business Machines Corporation), evaluating the impacts of AI on different industries. UNDP has worked

towards growing its 'AI Portfolio', investing in drones, [remote sensing](#), and disaster management technologies. Starting in 2014, it also established the Innovation Facility to encourage innovation in technology and since then, it has been known to support tech giants and researchers in AI.

USA (United States of America)

The USA is one of the leading countries in terms of AI and is home to the pioneer universities and research institutes that founded the field of AI, and now lead further research. A lot of tech companies like Google, Facebook, Amazon, etc., that are working on AI are also all based in the USA. In a recent study published by Oxford University, the USA is ranked one of the highest on the 'Government Readiness for AI index'. While a lot of American companies have incorporated AI into sustainable efforts, the US Government has not taken any substantial steps towards incorporating AI into government decision making, but it has incentivized a lot of research in the field through its various academic programs.

Over the years, the USA's stance on AI has always been positive, and the USA has generally stood *against* regulation of AI, this comes with the fact that a lot of US-based companies profit immensely from the usage of AI, and are the leaders in its development. It was the last of the G7 nations to join the [Global Partnership on AI](#) because it felt that the over-regulation of AI would hinder the growth of American Companies. It finally joined in early 2020, while still maintaining its stance supporting eased regulations on AI. It has also clashed with the EU and Canada over global AI regulation policies. While US technology laws are generally very non-restrictive, recent electoral conflicts have led the USA towards looking at tighter legislation.

PRC (People's Republic of China)

China is considered the leader in terms of AI, and the Chinese government is known for having implemented AI in many contexts already. China highly depends on AI especially in the fields of content monitoring and regulations. Recently, China also undertook an AI-based approach to combat its air pollution problem in Shanghai and broadcasted extremely successful results. China currently is one of the top countries in the field, home to some of the leading

research institutes and organizations. *It declared in 2017 that it was looking towards becoming the world leader in AI by 2030.*

In the recent COVID-19 Pandemic, the Chinese government made exemplary use of AI in contact tracing and disaster management and was one of the only countries to be able to do so successfully. China's three biggest tech companies: Baidu, Alibaba, and Tencent (commonly abbreviated as BAT) are leaders in the AI industry and a lot of their business endeavors are dependent on AI. The Chinese government has been known to encourage intersections of AI and Business and has made multiple investments into local AI + Business firms.

While the Chinese government is one of the only countries to have such extensive incorporation of AI into their government, many consider China's activities as infringements on human rights and privacy. China's authoritarian government has strict control over all content on the Internet, and often uses AI to detect anti-government content. Along with that, alarming claims have been made about the usage of AI and Facial Recognition in China to detect Muslims, and AI in China has been tied to multiple Human Rights infringements.

China's main successes in AI have been: Using AI in judicial courts, Advancing Healthcare using AI, Improved Disaster response, Online Content Moderation, and Sustainability (Air Pollution and Energy Usage). China, like the USA, is generally against the global regulation of AI.

European Union

EU countries have generally been very involved in AI-related developments, but the EU has often advocated for stricter global control on AI. Countries like France and Italy have been very involved in creating worldwide alliances and collaborative efforts on the regulation of AI. In April 2019, the European Commission published strict guidelines to ensure what they refer to as "Trustworthy AI", it provides ethical principles and checklists for the development of AI. While the EU has always been supportive of AI development, their approach has been described as more *prepared* than some of the other leading countries.

The EU played a significant part in initiating the Global Partnership for AI and EU leaders have publicly encouraged other countries to create stricter AI rules, and have pushed for China to be more involved in Global AI regulation.

Russia

Russia's government has also acknowledged the importance of AI in sustainability and economic growth. While Russia's previous focus in regards to AI was mostly military-related, over recent times, Russia has seemingly changed course to focus more on science and education related development of AI. While Russia has not been considered one of the world leaders in AI, it has significantly increased spending in AI research over the past years and incentivized Private sector research and investment in the field.

Unlike the United States and China, the Russian government is the main driving force behind AI research in the country. Recently, Russia successfully implemented AI in Moscow to boost development and education and is looking to do the same in other sectors. While originally, Russia had used AI to boost its military, it has now expressed support at the UN for worldwide regulation of AI, especially in terms of weapons and security related issues.

African Nations

African countries have started looking at AI as a method to solve the socio-economic problems in their regions, especially over the past 5 years. A lot of African countries have adopted official AI policies and are encouraging AI-related work within their universities and population. African countries have also started relying on [Human Cloud](#) related methods to outsource AI research and labor.

One of the main barriers (besides the expenditure of AI research) that African countries face in conducting AI research, is the lack of accurate and plentiful data. Many countries have taken initiatives to have high quality, publicly available datasets to encourage AI research. An example of this is Kenya's Open Data Initiative (KODI), established by its president. This allows high quality, historic socio-economic datasets to be published on government platforms.

A lot of worldwide research and charitable initiatives have focused on introducing AI to needful African regions, and UNESCO also held a forum in 2018 to find solutions to make AI more accessible in African nations through education and research. A lot of major AI organizations have identified African nations as one of the main areas where AI can be applied. Google has opened an AI lab in Ghana, and Google's head of AI has started many initiatives to promote AI education in African Nations. MIT, one of the leading research universities has called Africa the 'Future of AI', Stanford University's AI for Sustainability Lab has conducted

extensive successful research into Poverty Mapping in Africa. Many such top universities and organizations have contributed greatly to the growth of AI in African Nations.

Development of Issue/Timeline

Date	Event	Outcome
1936	Alan Turing (known as the father of AI) created the first-ever model of a self-learning machine.	This was the beginning of Artificial Intelligence as we know it, and Alan Turing's work during WW2 sparked research into AI.
18th June 1956	The Dartmouth Summer Research Project on Artificial Intelligence	This is known as the conference that <i>started</i> AI and was a gathering of some of the pioneers in the field, sparking a lot of research and further development.
22 November 1965	The UN Development Programme is established.	The UNDP is the leading organization driving sustainable development and collaboration,
6 September 2000	The Millennium Summit 2000 happens, where the Millennium Development Goals are set.	These were the first <i>edition</i> of the Sustainable Development Goals and were the first time quantified 'goals' were set with a set timeline.
20th June 2012	The Sustainable Development Goals are Conceptualized as a replacement to the MDGs	This conference in Rio was the birthplace of the SDG's as we know them today, where a modern replacement to the MDGs was suggested.

25th September 2015	The 2030 Agenda for Sustainable Development is implemented	This is the agenda that constitutes the SDGs. It is one of the most important measures taken by the UN
30th November 2015	United Nations Climate Change Conference (Paris)	This was also a very significant conference towards sustainable development, setting goals that contribute to sustainable actions around the world.
1st January 2016	The SDGs are officially in action	The SDGs were implemented and 169 specific indicators were published.
28th September 2016	The Partnership on AI is founded by Google, Amazon, Microsoft, Facebook, and IBM	These were the leading 5 firms in AI, and a collaborative effort between signified a lot of progress and a milestone in AI development.
7th June 2017	First UN AI for Good Global Summit	This was initiated by the UNDP, and featured a variety of speakers and represented a large step for AI involvement in the UN
20th June 2017	China declares its plan for becoming the world leader in Artificial Intelligence	China unveiled a detailed plan to lead the world in AI by 2030 and established itself as a pioneer in the field with their ambitious ideas.
1st August 2018	UNDP joins the Partnership on Artificial Intelligence	This signified a great step for AI incorporation into UN activities, and the UNDP collaborated

		with some of the leading organizations in the field.
December 2018	The Global Partnership on AI is conceptualized by Canada and France (then called the International Panel on Artificial Intelligence)	This idea instigated by the Canadian and French government then developed into one of the biggest International Collaborative Efforts on AI Regulation
September 2019	Sustainable Development Goals Summit	This was the first summit established solely for the purpose of discussing progress on the SDGs.
15th June 2020	The Global Partnership for AI is launched, (the USA joins)	This is now one of the largest collaborative efforts on potential future AI development and regulation.

Previous Attempts to Solve the Issue

[Global Partnership for AI](#)

This was an initiative started by France and Canada in 2018 as a way to “ initiative to guide the responsible development and use of AI, grounded in human rights, inclusion, diversity, innovation, and economic growth.” Originally, it was intended to have the G7 countries, but the USA did not agree to join. However, In 2020 the USA did agree to finally join, and the Global Initiative on AI was officially founded. Currently, it has 15 founding members. While this is a fairly recently founded organization, it aims to establish global laws and regulations for the use of AI, to potentially solve some of the issues (mentioned above), and optimize government implementation of AI.

This organization was founded only in 2020 but seems like it will produce promising results in the future, especially promoting collaboration between the leading nations in AI like

never seen before. While there is a lot of conflict in ideology in members of the Partnership, it could potentially lead to worldwide solutions for some of the issues with AI.

[AI for good Global Summit](#)

AI for Good is a United Nations Platform that holds annual summits where researchers and experts gather to discuss applications and pressing problems with the implementation of [Artificial Intelligence](#) to solve Worldwide Problems. It is very centered on the SDGs, and multiple innovative ideas and proposals have come up in their summits to improve SDG AI implementation. It was founded in 2017 and was a significant step towards the UN recognizing and dealing with modern world problems. It is partnered with some of the major UN Bodies (UNICEF, UNESCO, UNDP, WHO, etc.).

This council has produced a lot of fruitful debate and innovation over its years, but not a lot of the ideas proposed have been implemented on significantly large scales, and despite incentivized research efforts from all over the world, the biggest hurdles in the successful implementation of AI still stand. This summit has been very productive, but it does not hold any power in making decisions, or involving governments, which is the primary reason behind it not being able to cause radical change.

[United Nations AI Policy](#)

The United Nations has also been very active about the regulation of AI and has multiple publications and platforms where ethical and sustainable AI practices are advised/regulated. For example, on the United Nations Website, the Director of UNESCO has published literature on ethics in AI, which loosely outlines different regulations on AI, along with further action the UNESCO aims to take on the issue. The United Nations also released the 'UN AI Policy' around 2015. They opened the Center for AI and Robotics in the Netherlands to promote research into Sustainable AI, along with establishing the [AI for Good Global Summit](#). While they do have more concretely defined guidelines on data privacy and data ethics, actionable and specific guidelines/agreements on the use of AI have not yet been published. The UN's actions have not brought any radical change or significant improvement to the state of AI legislation and ethics around the world. While their different platforms and laboratories have incentivized researchers to pursue topics in this field and created a discussion space for these issues to be addressed, the UN has not come up with any *hard rules* yet.

Every year they release a document about the involvement of AI into their various committees, called 'The UN Activities on Artificial Intelligence) and these have shown a lot of progress over the years, along with the encouragement of innovation through grants and competitions. However, the extent of actions required to realistically solve these problems is higher, and the UN is looking at taking more severe and radical action in the future.

Possible Solutions

Preventing Losses due to Underdeveloped AI

Establishing a council/standard test for testing technology

It seems logical to establish some sort of testing, or standard that an algorithm needs to pass before it can be globally implemented. The major challenge for this is that it would need extremely skilled members (in computer science and AI), in combination with a diverse range of representatives from different countries. Implementing something like this as a globally accepted standard is going to prove to be a challenge, especially with such a dynamic, constantly changing field that researchers still have very limited knowledge about.

In the scientific community, theories and algorithms are constantly disproven by others, and newer technologies constantly come to light, which is why having a council of experienced and knowledgeable people is much more feasible than having standardized tests for algorithms. While this may eliminate standardization and a uniform judging and approval process, giving way to bias and political conflict, it would be a much better idea than having solely numerical tests to pass.

Getting countries with diverse viewpoints to all agree to something like this would be time-taking, but with the rise of technology, it is obvious that more internationally collaborative organizations will have to be formed to regulate AI in the foreseeable future. Something like this would potentially start from a pre-existing UN council or organization like the GPAI. This could also be implemented at a national level, similar to a patent board or a drug approval board.

Making governmentally used algorithms open-sourced and publicly available.

One of the best ways to encourage collaboration and effectively find flaws in code is to make it open-sourced (completely published on a public platform.) This could be a solution to the underdeveloped AI problem, where [bugs](#) and flaws in the code can be more rapidly identified. While this may open up some security concerns, the best way current programmers and organizations better their code is by making it open-sourced, so any developer around the world can find flaws in it, and notify the authorities.

Already, many countries have worked towards creating publicly available datasets to encourage independent AI developers to conduct research. Similarly, the government adopted AI (at least the ones that do not pose any major security concerns) can be open-sourced, and the public can be incentivized to find flaws in the algorithm. It can be agreed that this will inevitably lead to better (if not perfect) evaluation and identification of flaws in code, in comparison to having a committee judge the program. It will also encourage learning code, and instill interest in computer science throughout citizens.

However, realistically, this poses a lot of constraints, especially in relation to national security and government vulnerability. This method will only be applicable and useful for a very narrow range of applications for AI, and might even open up unwarranted opportunities for crime and scam.

Incentivizing further research

This is the least radical (but arguably the safest) solution. Governments can cultivate an interest in the subject and encourage further research within their countries through scholarships, grants, national recognition opportunities, etc. This is a more long-term idea, but with research, we gain a better understanding of the technology and the implementation becomes safer.

A lot of leading countries already do this, but it could be a chance for more developing countries to improve their economy by encouraging research in this economically rewarding field. Research incentives and competitions have already produced some of the most important and innovative research in the field already, and further extension of this kind of thing on a global scale can contribute greatly to the betterment of AI for the SDGs.

Mitigating economic and environmental costs:

Making SDG AI Research Centrally Funded

The United Nations and UNDP have shown a lot of interest in incorporating AI into the SDGs, so leading research labs and organizations could receive funding from the UN and its bodies to conduct AI and Sustainability Research for both developing and developed countries.

While there are a lot of challenges involving this, the incentivization and funding behind the research is still the best way to make progress in this field. If developing countries cannot afford to attract labor or instigate technology like this in their countries, the UN and its bodies could incentivize research for those developing countries in other established laboratories around the world, by giving awards, recognition, etc. that are incentivizing for academia.

Investing in such research could also help greatly mitigate the environmental impact of computing, recently a lot of research has been done into making [CNNs](#) and [Neural Networks](#) operate faster to improve computation time and cost. Further incentivizing such research will definitely lead to improvements in the costs of AI research.

Improving AI from an ethical and legal standpoint:

[Establishing UN Bodies or International Collaborative Initiatives for AI Regulation](#)

Different countries have different views on the regulation of AI, but the most efficient way to make real change and real rules is to establish collaborative efforts that involve all the major leaders in the field (China, Canada, USA, Russia, etc.). In 2020, one such body was formed ([The Global Partnership on AI](#)), and similar organizations/committees, perhaps formed under the United Nations would definitely benefit AI legislation and ethics rules world over, to prevent the misuse and enable sustainable use of AI.

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Appendix

- I. Report on Applicability of AI on the Sustainable Development Goals:
<https://www.nature.com/articles/s41467-019-14108-y>
- II. EU's report on Government Implementation of AI:
https://ec.europa.eu/futurium/en/system/files/ged/vincent-pedemonte_ai-for-sustainability_0.pdf

III. Detailed Summary of the SDG's by the UNDP:

[Sustainable Development Goals - UNDPwww.undp.org › brochure ›
SDGs_Booklet_Web_En](http://www.undp.org/brochure/SDGs_Booklet_Web_En)

IV. List of Relevant SDG related Keywords and Terminology:

[Compiled SDG Keywords - SDSN Australia/Pacificap-unsdsn.org › wp-content › uploads
› 2017/04 › Co...](http://www.unsdsn.org/wp-content/uploads/2017/04/Compiled-SDG-Keywords-and-Terminology.pdf)

V. Collaborative Paper on [Computational Sustainability](https://dl.acm.org/doi/pdf/10.1145/3339399):

<https://dl.acm.org/doi/pdf/10.1145/3339399>