
Artificial Intelligence

Endless Opportunities For Africa.

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About Sahara Ventures.

Mission | Building a stable innovation technology and entrepreneurship ecosystem in Africa.

Vision | Our long-term vision is to become Africa's largest consultants and investors in the area of innovation and technology entrepreneurship.

- **Sahara Accelerator**
- **Sahara Sparks**
- **Sahara Consult**



Overview

- Background | AI and Machine Learning
AI Application in Different Sectors in Africa
Where Do We Learn
It's Not All Perfect
Co-Creation Session

So, What is AI?

AI is where machines can do what humans can do,
this is what we wish at least.

Currently, systems do not have a sense of self
awareness, semi-smart or dumb machines.

Source | 2018, IBM, Digital Nation Africa.

So, What is Machine Learning?

Machine learning is a subset of AI, it's a fancy way of saying find me patterns, classify those patterns, group patterns, cluster those patterns. If you look at the sky long enough, you will say shape emerges out of the clouds. This is what machines do, except that they see data points, vector graphics to be exact. Human gather information, and we adjust our beliefs to predict outcomes based on past experiences with high accuracy. Mathematics is at the core of this all thing.

Augmented Intelligence

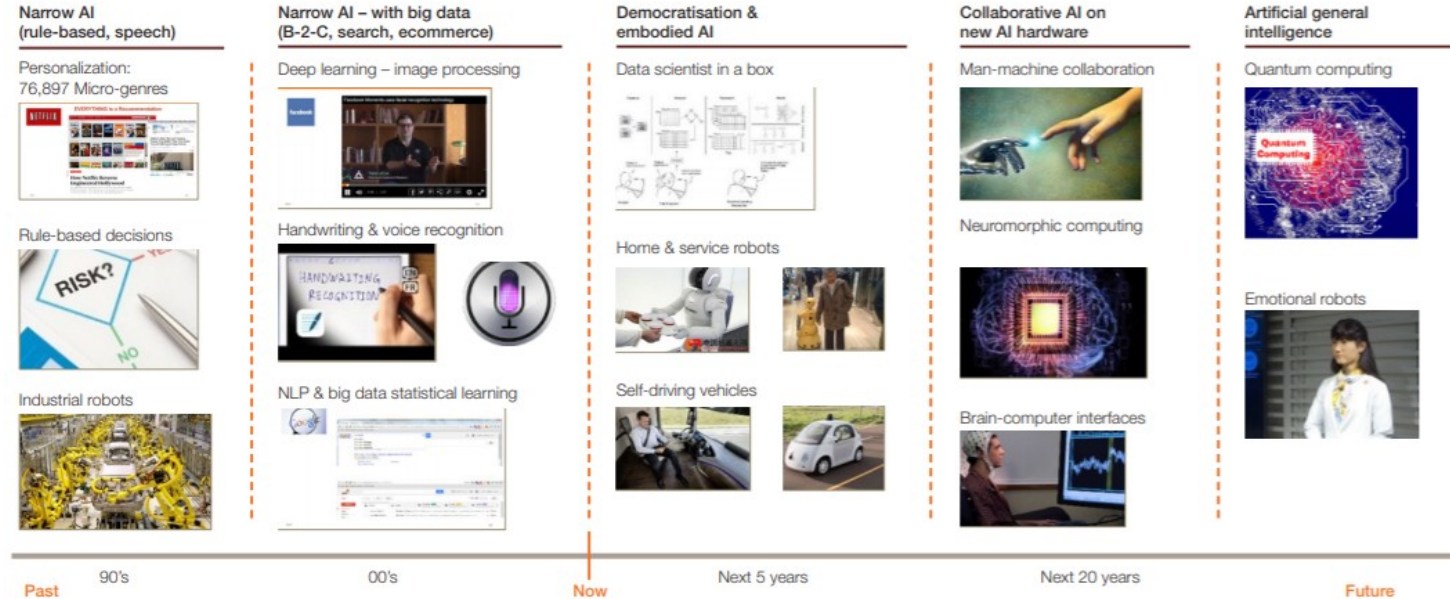
Helping People and Machines **Work Together** to Create Knowledge From The Data That **Enhances Human Expertise**. We View AI as a Technology Which is here to Help Doctors in Diagnostic Tumours and Helping Track Drivers to Avoid Accident Caused by Human Errors and Tiresomeness.

Wisdom From Ginni Rometty, IBM - CEO

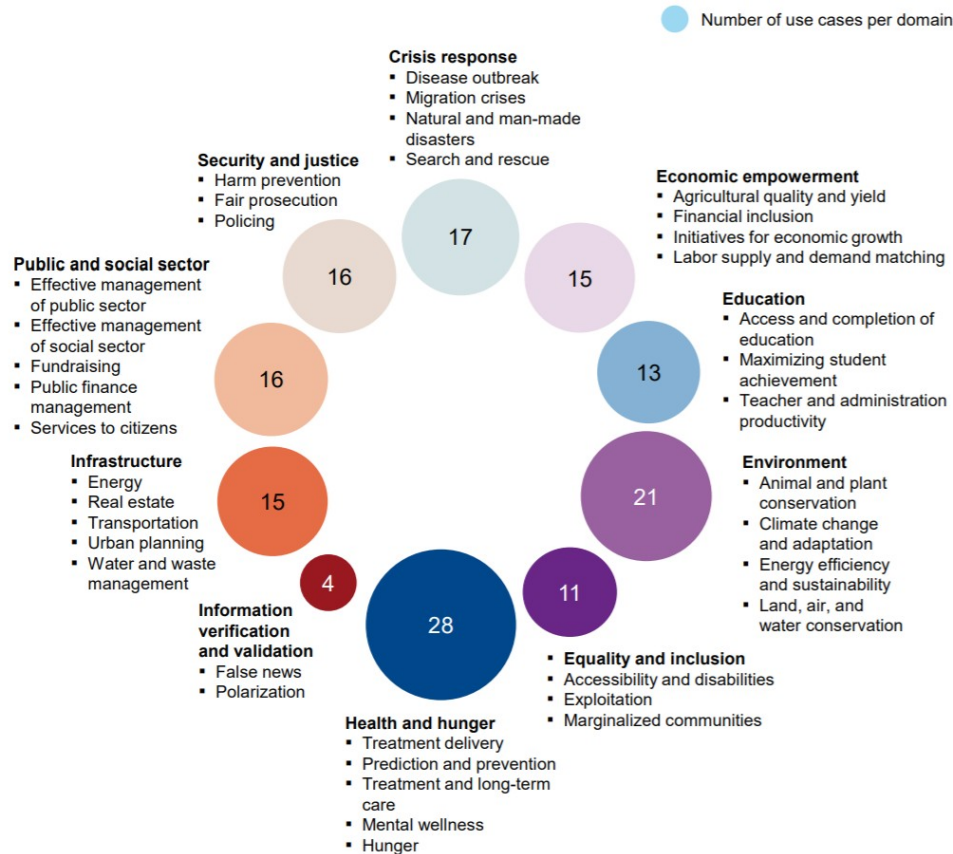
Source | 2018, IBM, **Digital Nation Africa**..

How This All Thing Started?

Past is not prologue when it comes to artificial intelligence



Source | PWC, World Economic Forum, [Harnessing Artificial Intelligence for the Earth..](#)



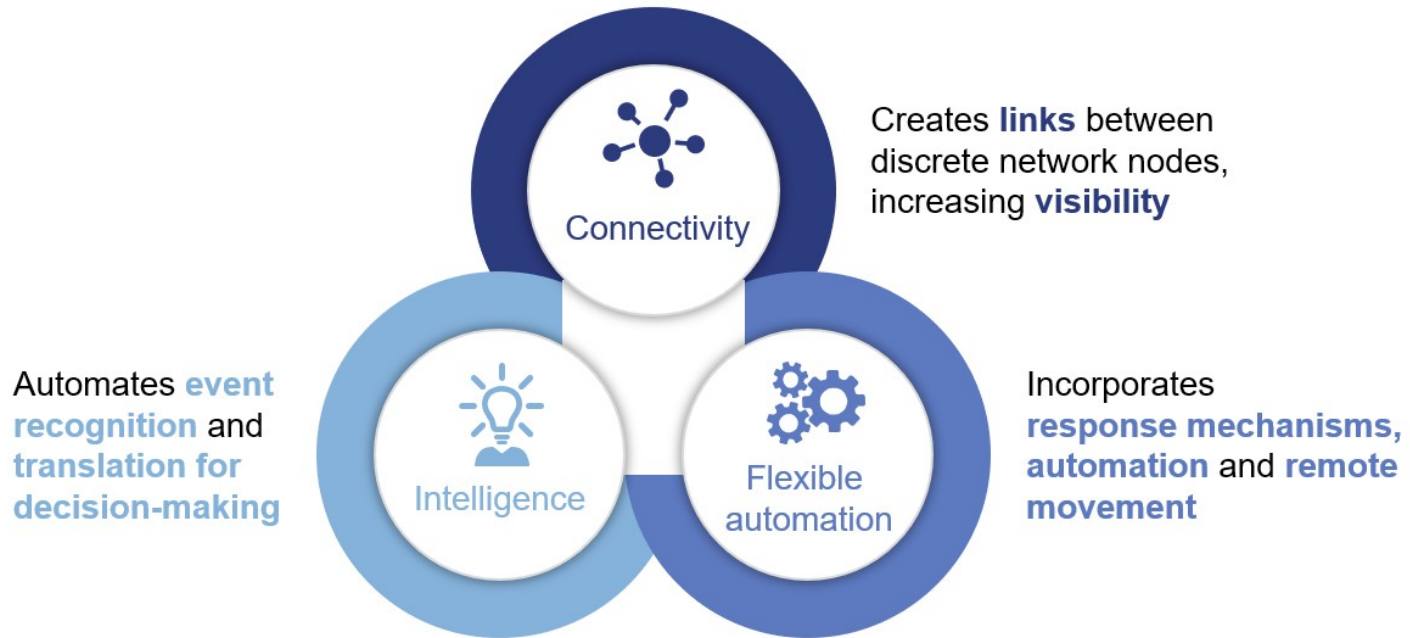
Source | 2018, McKinsey Global Institute, [Notes From The AI Frontier Applying AI For Social Good](#).

Is Technology Everything?

The latest technology isn't enough – you need the business model to go with it.

In manufacturing, early 1900s, electrification seemed like an obvious productivity boost, but it failed to produce any notable gains for more than three decades.

Source | 2019, World Economic Forum, The latest technology isn't enough – you need the business model to go with it.



Source | 2019, World Economic Forum, **The latest technology isn't enough – you need the business model to go with it.**

Artificial Intelligence is Just a Tool.

.....Manufacturers that adopt these technologies (Including AI) without a plan for reinvention will wind up like the 19th-century textile mills that electrified by replacing a single steam engine with a single electric motor, earning only incremental improvements and failing to realize the full value of new technologies....

Source | 2019, World Economic Forum, The latest technology isn't enough – you need the business model to go with it.

Artificial Intelligence in The Agriculture Sector.

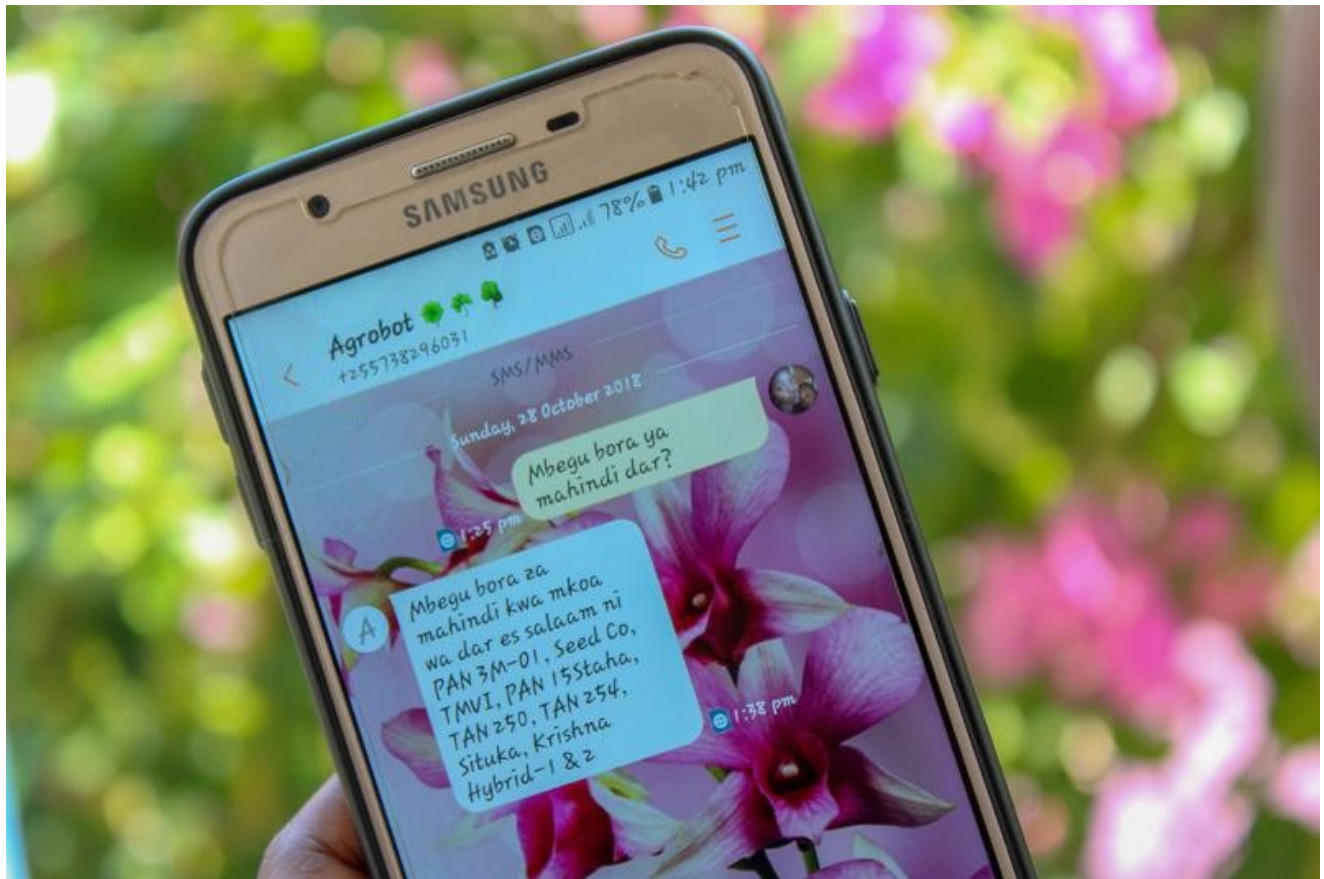
At Google I/O 2018, high school students Shaza Mehdi and Nile Ravenell developed PlantMD, an app that lets you detect diseases in plants using TensorFlow. These young researchers are not alone in their mission to help farmers. PlantMD's machine learning model was inspired by a dataset from PlantVillage, a research and development unit at Penn State University.

PlantVillage created an app called Nuru, Swahili for "light," to assist farmers to grow better cassava, a crop in Africa that provides food for over half a billion people daily.

Source | 2018, Google.org - AI For Good, A disease affected cassava.
Tensorflow - An open source machine learning library for research and production.



Source | 2018, Google.org - AI For Good, [A disease affected cassava.](#)



Source | 2019, e-Kilimo Accelerator - [Agrobot](#)

Artificial Intelligence in The Tourism Sector.

....The solution uses image classification and object detection to find animals and poachers on infrared video captured by a drone at night. A convolutional neural network model is trained to recognize both poachers and animals despite their small size in the video feed. The SPOT model does not need to be customized by the drone user and can be used in the field immediately, although a trained drone operator is still required....

How AI can be deployed to catch wildlife poachers

Six steps from offline training of AI model to online detection



1. Offline training

A neural network is trained on 70 videos, containing animals and poachers, that have been labeled. The model is tested with other videos.



2. Drone deployment

Drones are flown over wildlife sanctuaries, capturing thermal infrared images.



3. User interface

Video and still images are transmitted via radio waves to a computer.



4. Pre-processing

The infrared images may need to be converted to "white-hot" format, where warm objects are lighter against a dark background.



5. Detection

The video is processed in batches and sent to the cloud for analysis. Each image is treated as an input into the neural network.



6. Output

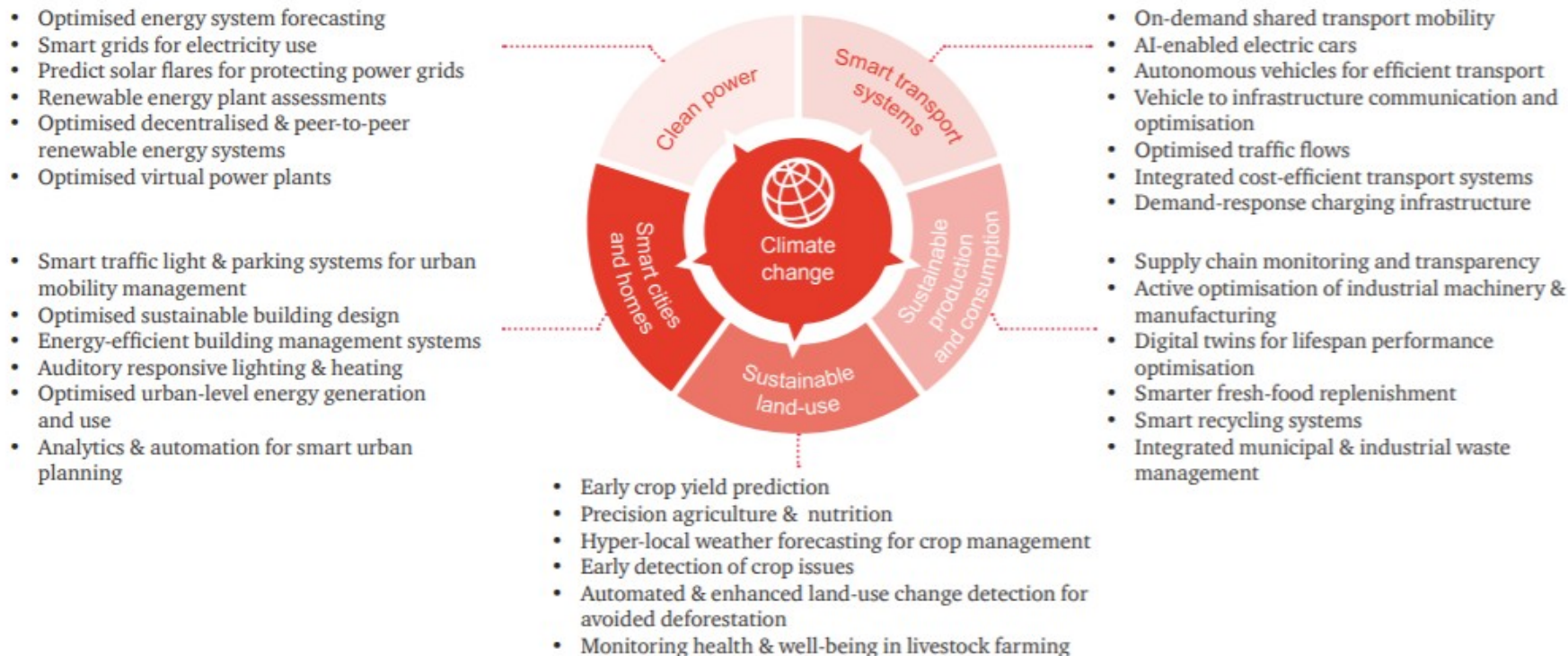
The neural network outputs annotations that are overlaid on top of the original image. This enables identification of the poachers' whereabouts.

Artificial Intelligence On Addressing Climate Change

‘Ento AI’ to help companies forecast their consumption and plan accordingly. The tool recommends specific energy efficiency initiatives — some in real-time — based on environmental impact and return on investment.

Companies like Google are already using AI-based energy solutions for their servers, but if we’re to apply AI solutions on a bigger scale, we’ll need better data to support innovation by AI startups and companies.

Climate change



Source | PWC, World Economic Forum, [Harnessing Artificial Intelligence for the Earth..](#)

Artificial Intelligence in The Health Sector.

Google's Thailand diabetes program was announced in partnership with a Thai state-run Rajavithi Hospital. This followed a joint-study which found the AI program to have an accuracy rate of 95 percent when it comes to disease detection, compared with 74 percent from opticians or eye doctors.

The program analyses patients' eye screen results to assess if they are at a risk of vision loss, which will enable them to have preemptive treatment. Thailand is one of the world's most important sugar producers and high sugar consumption is common amongst its 69 million population.

Source | 2018, ai.google/healthcare | Diagnosing Diabetic Eye Disease



Mild/Moderate



Proliferative

No DR

Mild DR

Moderate DR

Severe DR

Proliferative DR



ONGEA NA DR. ELSA

UKIWA MAHALI POPOTE.



Njoo tutete



Important Resources For Learners and Researchers.

Google AI | Bringing the benefits of AI to everyone. At Google AI, they are conducting research that advances the state-of-the-art in the field, applying AI to products and to new domains, and developing tools to ensure that everyone can access AI.

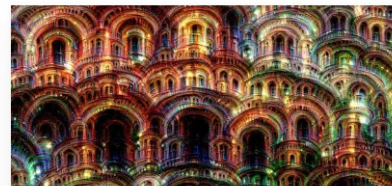
IBM Digital Nation Africa | With Digital - Nation Africa (D - NA), access knowledge & tools to innovate & launch your own digital solutions and find jobs that fit your skills for free.

Explore TensorFlow, our open-source machine learning platform for everyone



ML Kit

ML Kit brings Google's machine learning expertise to mobile developers in a powerful yet easy-to-use package through Firebase.



DeepDream

This repository contains IPython Notebook with sample code, complementing Google Research blog post about Neural Network art.



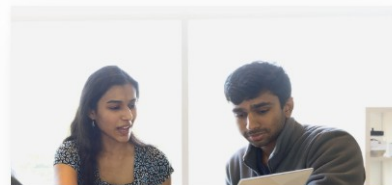
TensorFlow.js



CoLaboratory



Google Open Source



Learn with Google AI

Source | 2018, google.org, <https://ai.google/tools/>

PUBLICATIONS

Recent research publications

We publish hundreds of research papers each year and present our work in a wide range of venues.

[See our publications](#)

Barren Plateaus in Quantum Neural Network Training Landscapes

[Jarrod McClean](#), [Sergio Boixo](#), Vadim Smelyanskiy, [Ryan Babbush](#), [Hartmut Neven](#) • *Nature Communications*, vol. 9 (2018), pp. 4812



Grader variability and the importance of reference standards for evaluating machine learning models for diabetic retinopathy

[Jonathan Krause](#), [Varun Gulshan](#), Ehsan Rahimy, Peter Karth, [Kasumi Widner](#), [Greg Corrado](#), Lily Peng, [Dale Webster](#) • *Ophthalmology* (2018)



Episodic Curiosity through Reachability

Nikolay Savinov, [Anton Raichuk](#), [Raphaël Marinier](#), Damien Vincent, Marc Pollefeys, Timothy Lillicrap, [Sylvain Gelly](#) • *ICLR 2019* (2019) (to appear)



Identifying Exoplanets with Deep Learning: A Five-planet Resonant Chain around Kepler-80 and an Eighth Planet around Kepler-90

[Christopher J. Shallue](#), Andrew Vanderburg • *The Astronomical Journal*, vol. 155 (2018), pp. 94



Source | 2018, google.org, <https://ai.google/>

Google AI For Social Good.

Google.org is issuing an open call to organizations around the world to submit their ideas for how they could use AI to help address societal challenges. Selected organizations will receive support from Google's AI experts, Google.org grant funding from a \$25M pool, credit and consulting from Google Cloud, and more and chance to join launchpad accelerator.

Source | 2018, google.org, Working together to apply AI for social good

Learning Paths

All

Artificial Intelligence
Analyst

Web Application
Developer

Cloud Application
Developer

Blockchain Developer

Data Scientist

Artificial Intelligence Analyst

Remove all



Artificial Intelligence V2

Remove from My
Learning



IBM Watson V2

Remove from My
Learning



Natural Language
Processing V2

Remove from My
Learning



Chatbot V2

Remove from My
Learning

← Back to My Learning

Download

Download booklets of our featured collections of IBM AI research papers from 2018 on advancing, scaling, and trusting AI.

[View available downloads](#)



Source | 2018, IBM Digital Nation Africa, <https://developer.ibm.com>

It's Not All Perfect

....AI technology also has the potential to amplify and exacerbate many of the risks we face today. To be sure that AI is developed and governed wisely, government and industry leaders must ensure the safety, explainability, transparency and validity of AI applications. It is incumbent on authorities, AI researchers, technology pioneers and AI adopters in industry alike to encourage deployments that earn trust and avoid abuse of the social contract. Achieving this requires a collaborative effort to ensure that as AI progresses, its idea of a good future is aligned to human values and encapsulates a future that is safe for humanity in all respects – its people and their planet.

Source | PWC, World Economic Forum, [Harnessing Artificial Intelligence for the Earth..](#)

It's Not All Perfect



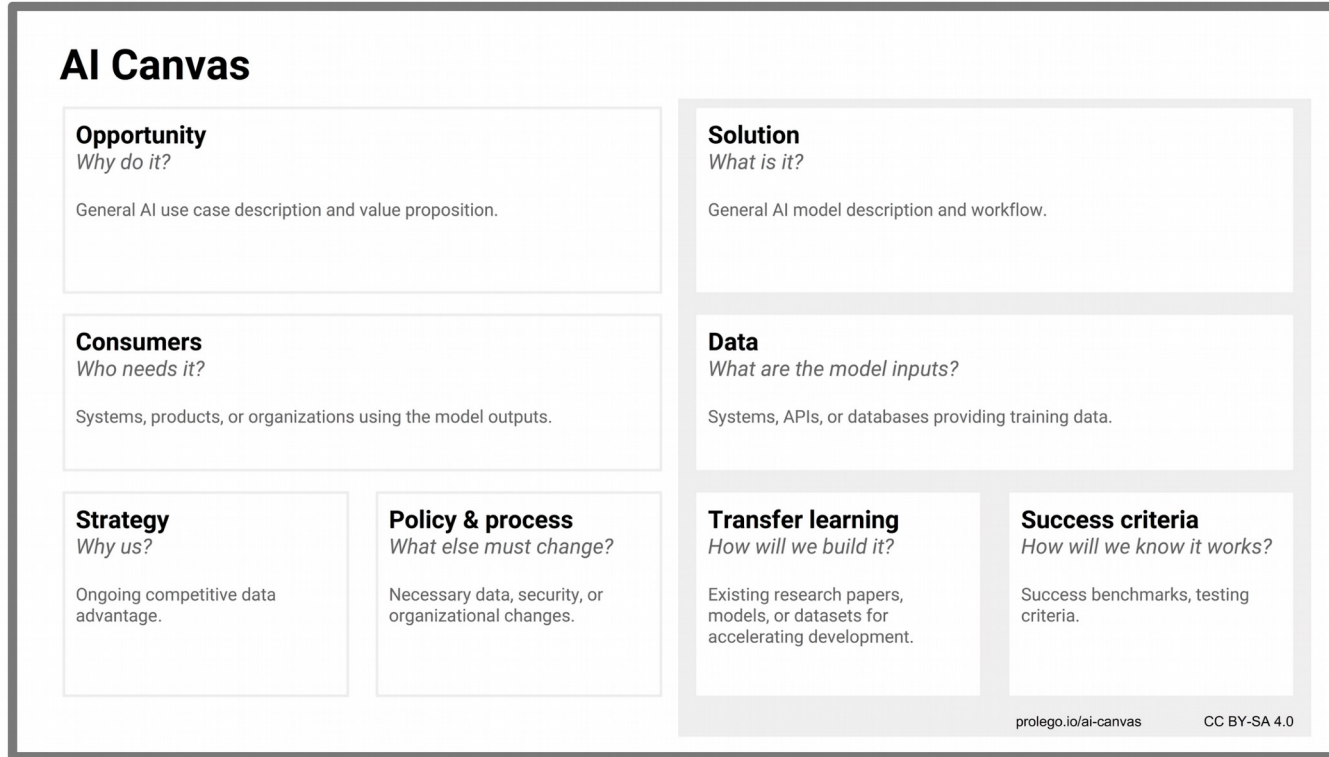
Source | PWC, World Economic Forum, [Harnessing Artificial Intelligence for the Earth](#).

Do We Still Have Our Privacy?

The patterns found by machine learning analysis of your online behavior disclose your political beliefs, religious affiliation, race, ethnicity, health conditions, gender and sexual orientation, even if you have never revealed this information to anyone online.

Source | Brookings.Edu, [How to address new privacy issues raised by artificial intelligence and machine learning.](#)

AI-Canvas | Team Activity



Source | Prolego, AI Canvas The strategic framework for enterprise deep learning.

Business Block

Opportunity—A high-level description of the business benefit for the AI models. Revenue growth, cost reduction, speed, etc.

Consumers—AI models produce results from input data sources. Consumers are the products, systems, and people who use the model results to deliver business value.

Strategy—Unique data assets provide the only ongoing sustainable advantage in AI products. Without a data differentiation maintaining a competitive moat will be challenging.

Policy & process—AI can present unique legal and policy questions. For instance, you may have to address model interpretability challenges or data rights issues.

Technical Block

Solution—A high level description of the models, workflow and system architecture.

Data—Primary internal and external sources of data for model inputs. Consider accessibility, cleansing challenges, costs. The highest risk block on the canvas.

Transfer learning—The most technically challenging block of the canvas. Identify existing models, datasets or research papers the development team can use to accelerate deployment.

Success criteria—Model benchmarks (e.g. existing baseline performance) or necessary business metrics. Ideally quantified to compare with industry benchmarks.

Which Sector Do You Think Will Be Impacted Most by AI?

- ☐ Health
- ☐ Agriculture
- ☐ Education
- ☐ Governance
- ☐ Other



Between a Human Doctor and AI Machine Which One Would You Trust With Your Life?

- ☐ Human Doctor
- ☐ AI Machine
- ☐ I'm Not Sure



Do You Think AI Supported Machines Will Come and Take Over Our Jobs?

- ☐ Yes
- ☐ No
- ☐ I'm Not Sure



Does AI Becoming More Intelligent Than Human Concerns YOU?

- ☐ Yes
- ☐ No



What Do You See As The Future of African Society After Massive Adoption of AI Technologies?

- ☐ Things Will Change For Good
- ☐ Things Will Change For Bad
- ☐ Things Will Remain The Same



What Will Be The Biggest Obstacle For The Adoption and Scaling of AI Technologies in Africa?

- ☐ Lack of Data
- ☐ Technical Skills.
- ☐ R&D
- ☐ Policies and Regulations



Between a Politician and an AI Machine Which One Would You Trust to Set Your Country Strategy?

- ☐ Politician
- ☐ AI Machine
- ☐ I'm Not Sure



Does AI Becoming More Intelligent Than Human Concerns YOU?

- ☐ Yes
- ☐ No



What Do You Think About Some of The Current AI Solutions in Africa?

- ☐ They Are Really Addressing the Problem.
- ☐ They are too Soft, Addressing Top Layers.
- ☐ I'm Not Sure



Do you think we will one day be walking on streets alongside androids (A.I.s who have a full-fledged bodies)?

- ☐ Yes
- ☐ No



What Is Your Biggest Fear With AI?

- ☐ Losing Jobs.
- ☐ Machines Taking Over.
- ☐ Cyber Warfare
- ☐ Other, Explain.





Thank You

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