



IoT: Application and services

**ITU ASP COE TRAINING ON
“Developing the ICT ecosystem to harness IoTs”**

**Marco Zennaro, PhD
13-15 December 2016
Bangkok, Thailand**

Libelium Smart World

Air Pollution

Control of CO₂ emissions of factories, pollution emitted by cars and toxic gases generated in farms.

Forest Fire Detection

Monitoring of combustion gases and preemptive fire conditions to define alert zones.

Wine Quality Enhancing

Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

Offspring Care

Control of growing conditions of the offspring in animal farms to ensure its survival and health.

Sportsmen Care

Vital signs monitoring in high performance centers and fields.

Structural Health

Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Quality of Shipment Conditions

Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

Smartphones Detection

Detect iPhone and Android devices and in general any device which works with Wifi or Bluetooth interfaces.

Perimeter Access Control

Access control to restricted areas and detection of people in non-authorized areas.

Radiation Levels

Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Electromagnetic Levels

Measurement of the energy radiated by cell stations and WiFi routers.

Traffic Congestion

Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

Smart Roads

Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting

Intelligent and weather adaptive lighting in street lights.

Intelligent Shopping

Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

Noise Urban Maps

Sound monitoring in bar areas and centric zones in real time.

Water Leakages

Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis

Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

Item Location

Search of individual items in big surfaces like warehouses or harbours.

Waste Management

Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Parking

Monitoring of parking spaces availability in the city.

Golf Courses

Selective irrigation in dry zones to reduce the water resources required in the green.

Water Quality

Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

The Internet of Things Moves In

The 2014 U.S. edition of Deloitte's Global Mobile Consumer Survey reveals that smartphone owners overindexed in their desire for Internet of Things (IoT) solutions for the home and car.

Would find value in smart HOME solutions



Would find value in connected CAR solutions



SMART HOME % of most valued technologies

CONNECTED CAR % of most valued technologies

Home Control
lights, heating and burglar alarms controlled by smartphone

47%

Home Monitoring
in-home camera footage viewed and controlled by smartphone

40%

Entertainment
entertainment systems display social media postings

20%

Appliance Control
sensors in appliances send notifications to smartphone

18%

Landscape Control
landscape systems measure plant moisture, watering only when necessary

9%

Younger Generations (18-24)

17% Compared to other consumers surveyed, the youngest generation valued landscape control the most. Do they not want to do their chores?

16% Surprisingly, the youngest generation is also the age group most interested in self-driving cars. Would they rather text than get behind the wheel?

10%

Automation

driverless operation

60% While the least valued connected technology is the self-driving car, 60% of all consumers would be willing to pay for one.

40%

Traffic/Weather

real-time traffic and weather updates displayed on in-car screens

39%

Navigation

mapping and route optimization

28%

Maintenance

automated diagnosis and tracking of vehicle's systems

23%

Access

remotely lock and track vehicle via Internet-connected device

18%

Entertainment



music streaming to in-car entertainment system

18%

Fuel Tracking

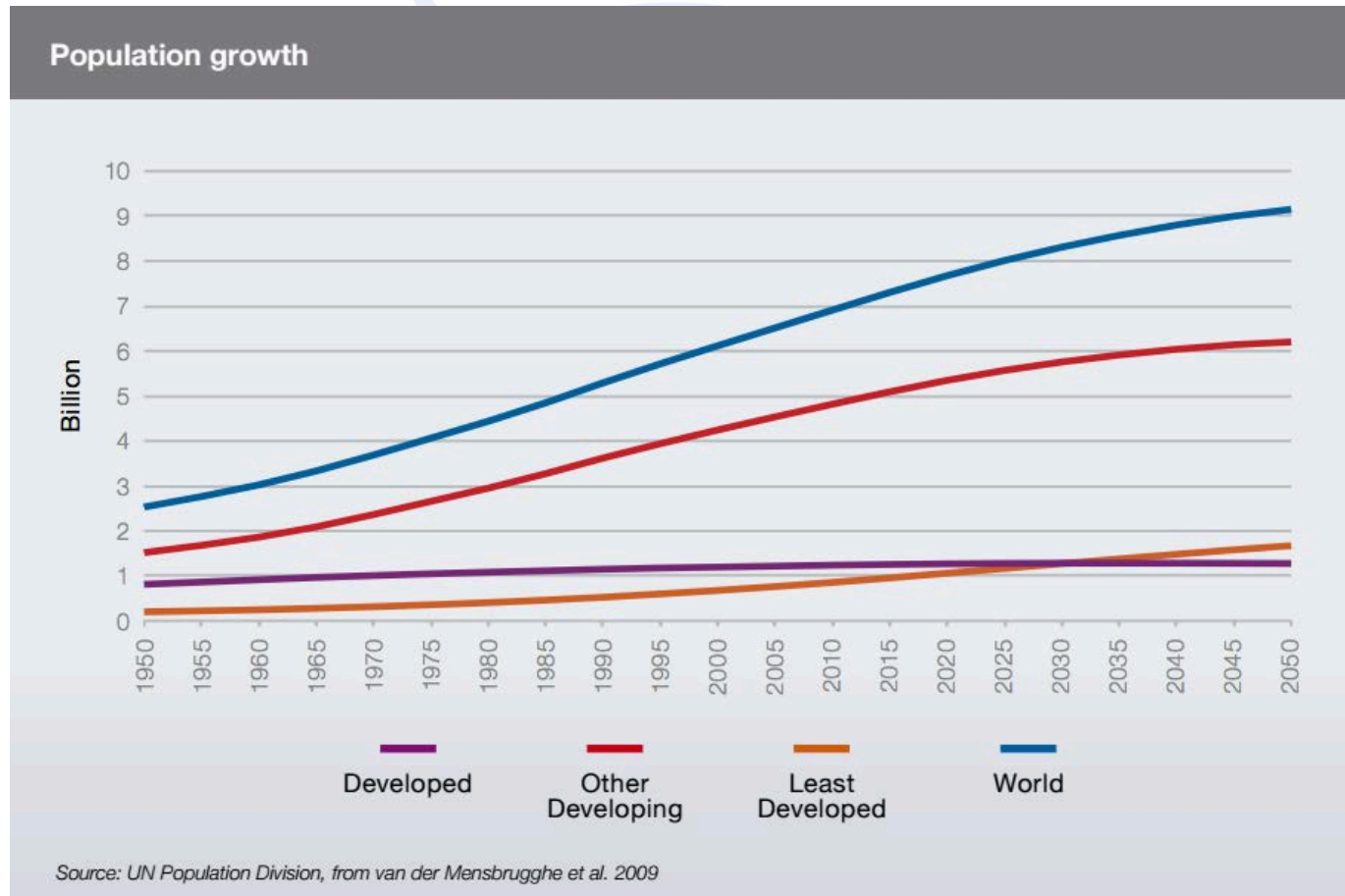
fuel efficiency tracking

Deloitte.

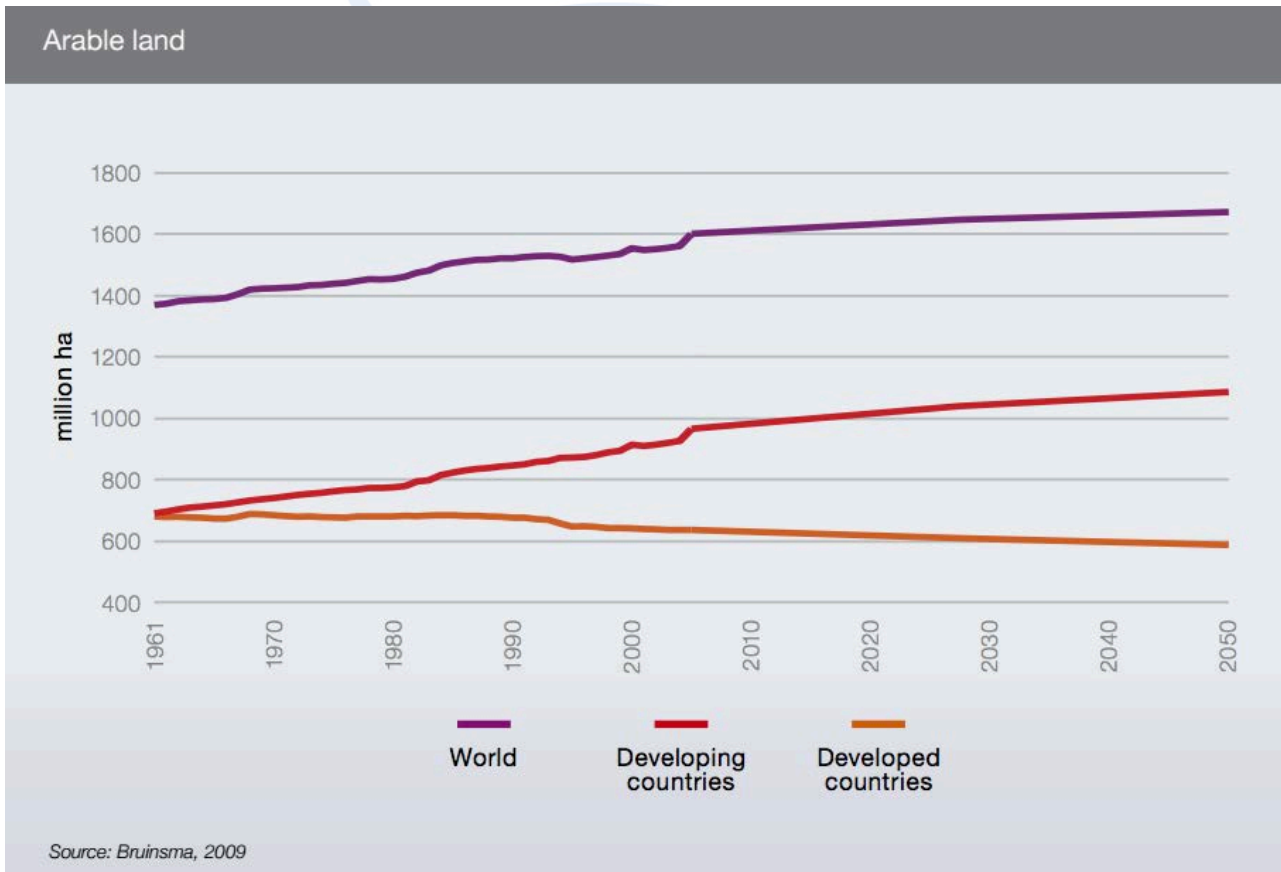
For additional insights from the 2014 Global Mobile Consumer Survey: U.S. edition, visit www.deloitte.com/us/mobileconsumer   @DeloitteTMT
"% of most valued technologies" refers to smartphone owner data. Respondents could select more than one option.

As used in this document, "Deloitte" means Deloitte LLP. Please see www.deloitte.com/us/about for a detailed description of the legal structure of Deloitte LLP and its subsidiaries. Certain services may not be available to attest clients under the rules and regulations of public accounting. Copyright © 2015 Deloitte Development LLC. All rights reserved. Member of Deloitte Touche Tohmatsu Limited.

Population growth



Arable Land



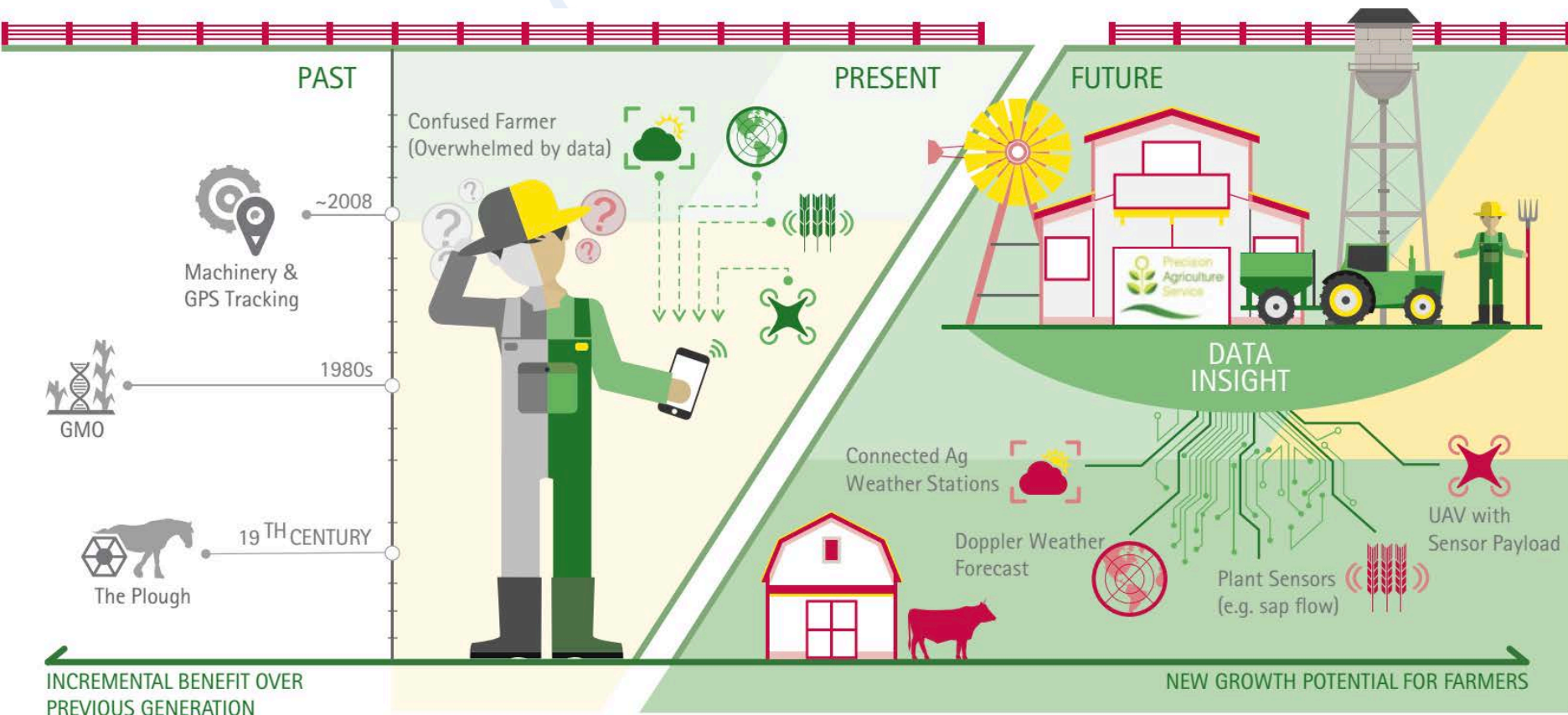
Food Production

- By 2050 the world's population will reach 9.1 billion, 34 percent higher than today.
- Urbanization will continue at an accelerated pace, and about 70 percent of the world's population will be urban (compared to 49 percent today).
- In order to feed this larger, more urban and richer population, **food production** (net of food used for biofuels) **must increase by 70 percent.**
- Annual cereal production will need to rise to about 3 billion tonnes from 2.1 billion today and annual meat production will need to rise by over 200 million tonnes to reach 470 million tonnes.

ICT and Agriculture

- E-Agriculture is an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes
- Solution-oriented and demand driven
- Technologies alone are not enough
- Includes standards, norms, methodologies, tools, development of individual and institutional capacities, and policy support are all key components.

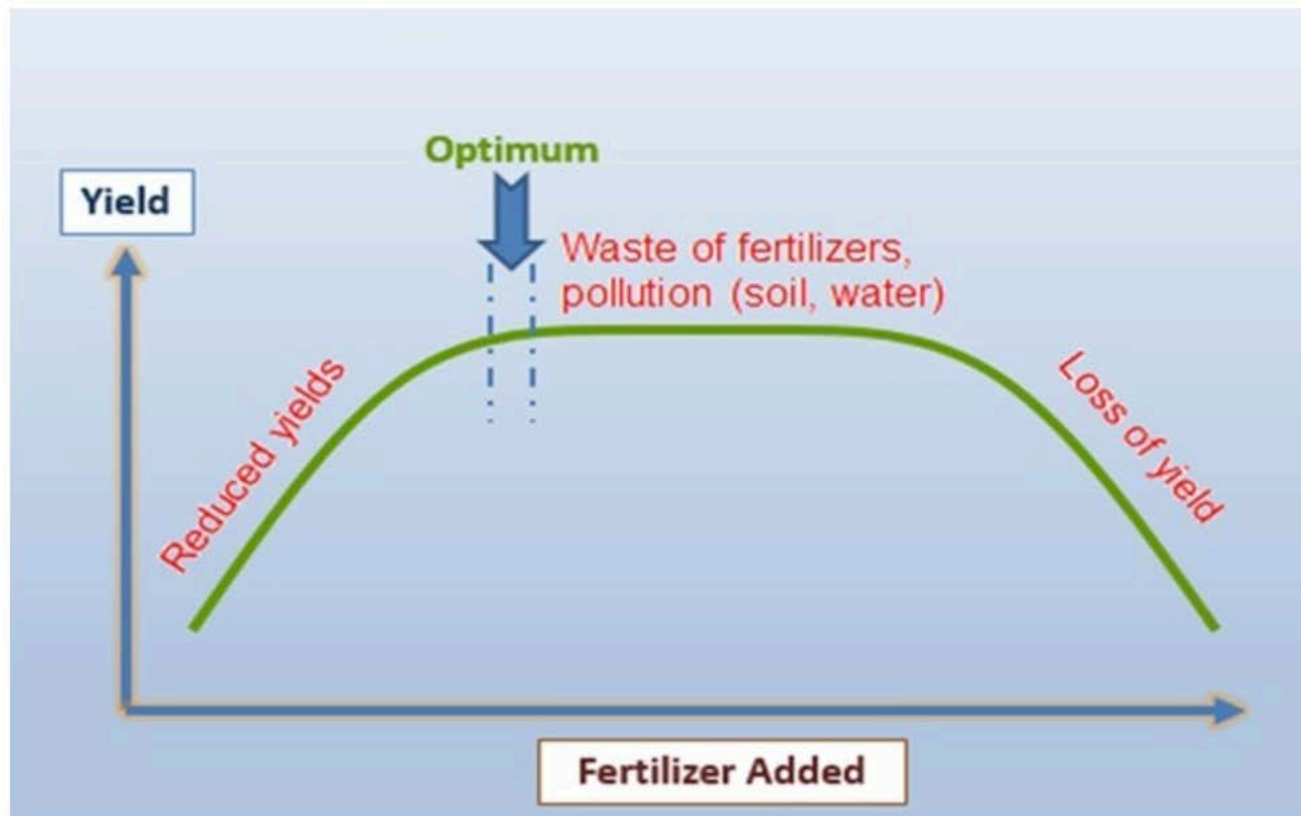
Future of Agriculture



Source: <https://www.accenture.com>



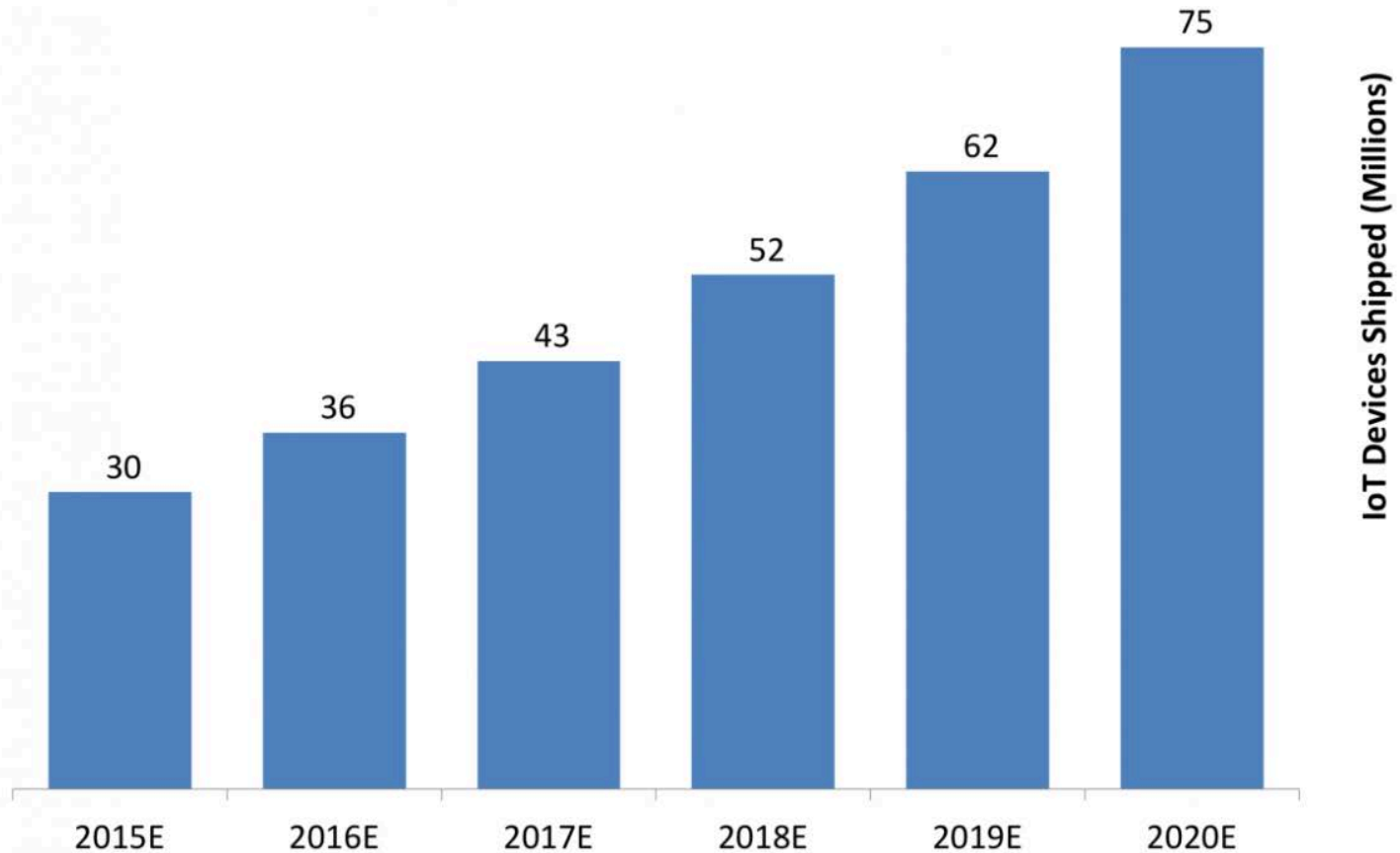
Fertilizers



Source: <http://www.smart-fertilizer.com/>



Estimated Agricultural IoT Device Shipments *Global*

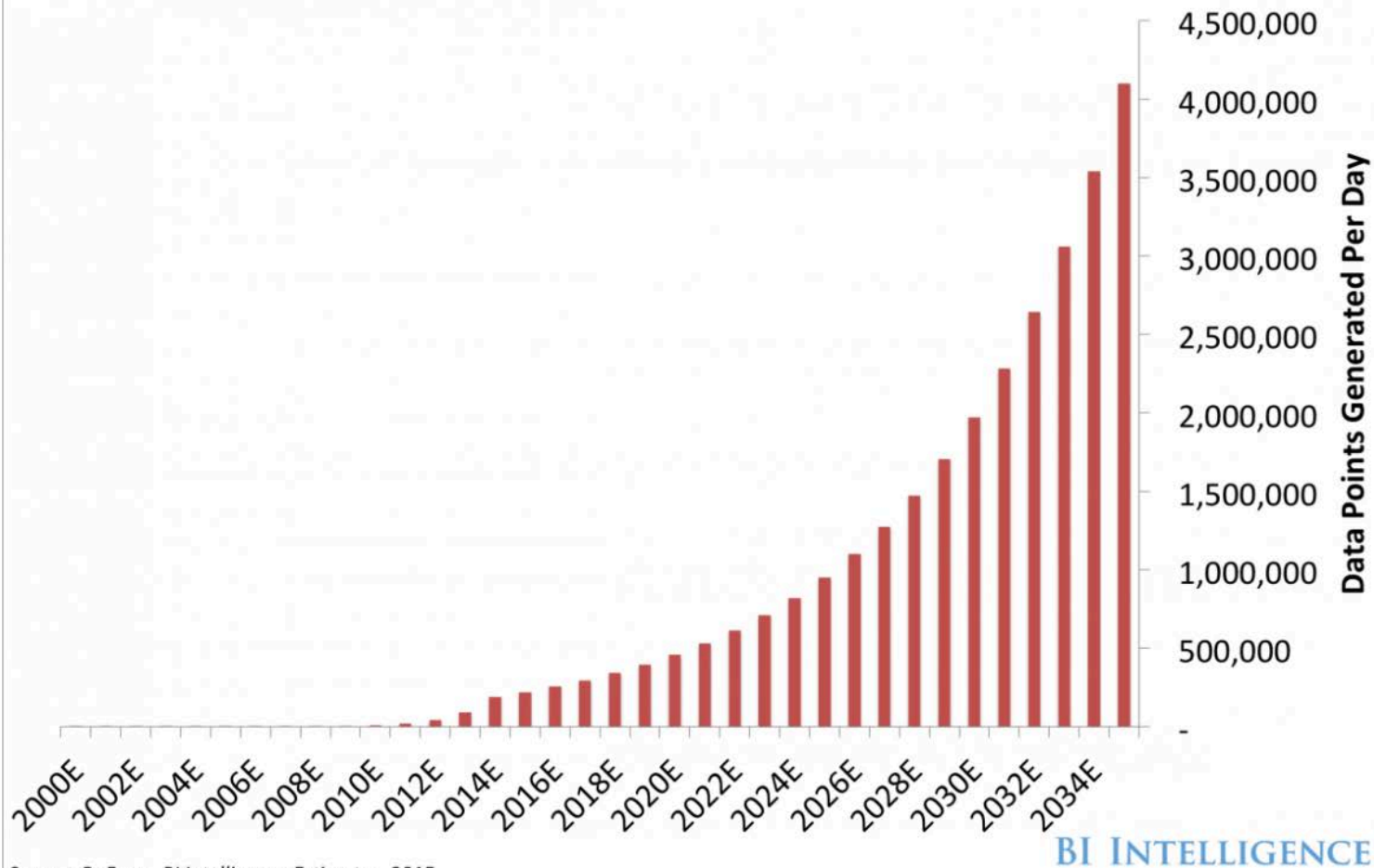


Source: BI Intelligence Estimates, 2015

BI INTELLIGENCE



Estimated Amount Of Data Generated By The Average Farm Per Day



Source: OnFarm, BI Intelligence Estimates, 2015

BI INTELLIGENCE



Syngenta's Kilimo

- Syngenta's Kilimo Salama ("Safe Farming"), now ACRE
- It is a connected weather station that monitors agricultural events and facilitates linkages with insurance firms.
- Various types of micro-weather stations capture a range of data such as air and soil temperatures, air and soil moisture levels, solar radiation, wind direction, wind speed, atmospheric pressure, amount of rainfall, soil electrical conductivity and visual appearance.

Syngenta's Kilimo

- At the end of each growing season, weather statistics collected from solar-powered weather stations are automatically compared with an index of historical weather data. Rainfall measurements are factored into specialized agronomic models to determine the impact and likely loss that farmers experience.



Syngenta's Kilimo

- Insurance payouts are then calculated and sent to the insured farmers via automated mobile payments. This mechanism has effectively automated and simplified the claims process, cultivating a financially supportive environment for individual farmers and encouraging agricultural production at all levels.

Nano Ganesh

- Nano Ganesh is a low-cost solution to provide small-shareholder farmers with a tool that can remotely control their micro irrigation pumps.
- In India about 25 million water pumps are in use for farm irrigation. Many of these pumps have to be manually operated, based on rainwater conditions, electricity availability and crop needs.

Nano Ganesh

- In many cases, farmers need to travel long distances through difficult conditions to access their pumps from their households. The Nano Ganesh unit works by attaching to the irrigation pump, and serving as an actuator which can turn the pump on and off via basic commands from a farmer's simple feature phone (2G mobile telephones).
- By August 2014, around twenty thousand farmers in India had benefitted from Nano Ganesh.

Nano Ganesh



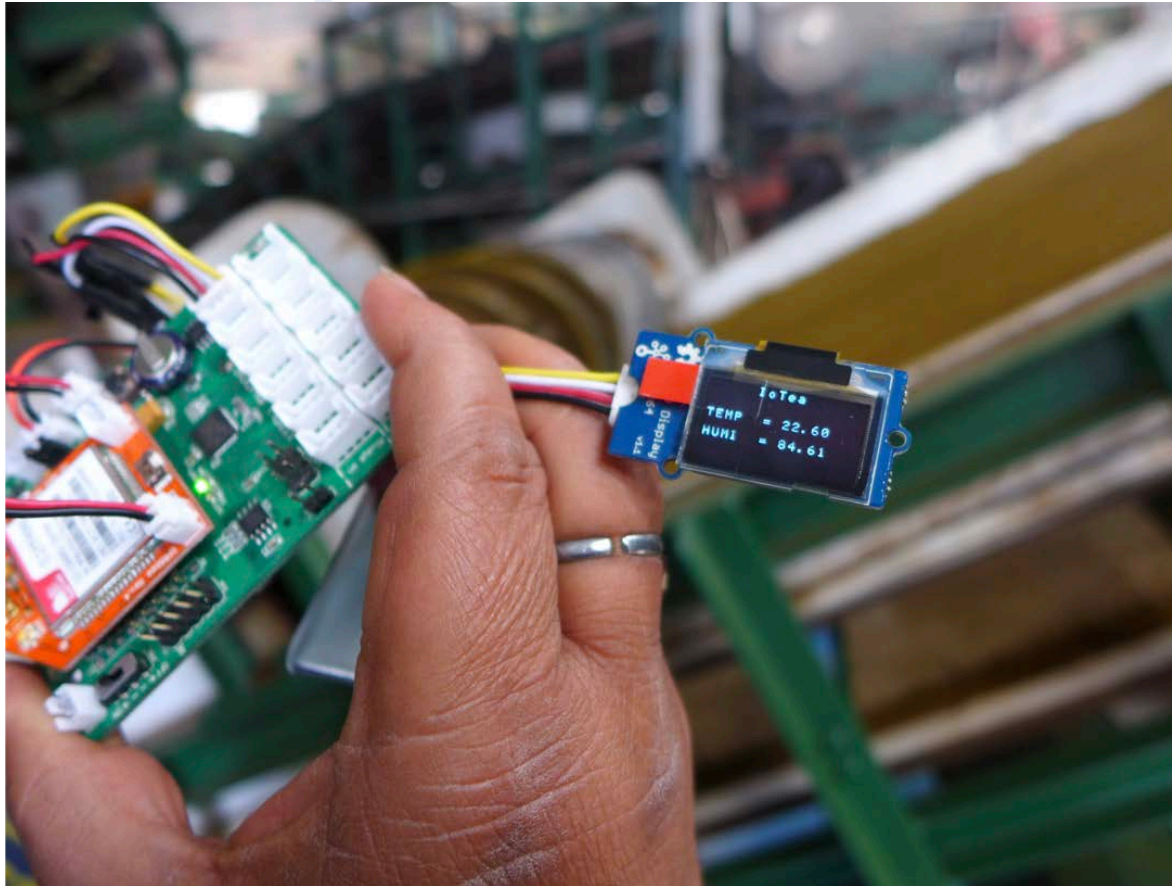
Rwanda



Source: <http://www.ictp.it/about-ictp/media-centre/news/news-archive/2015/6/teatime-with-iot.aspx>



Rwanda



Source: <http://www.ictp.it/about-ictp/media-centre/news/news-archive/2015/6/teatime-with-iot.aspx>

Rwanda



Source: <http://www.ictp.it/about-ictp/media-centre/news/news-archive/2015/6/teatime-with-iot.aspx>



Rwanda



Source: <http://www.ictp.it/about-ictp/media-centre/news/news-archive/2015/6/teatime-with-iot.aspx>



Rwanda

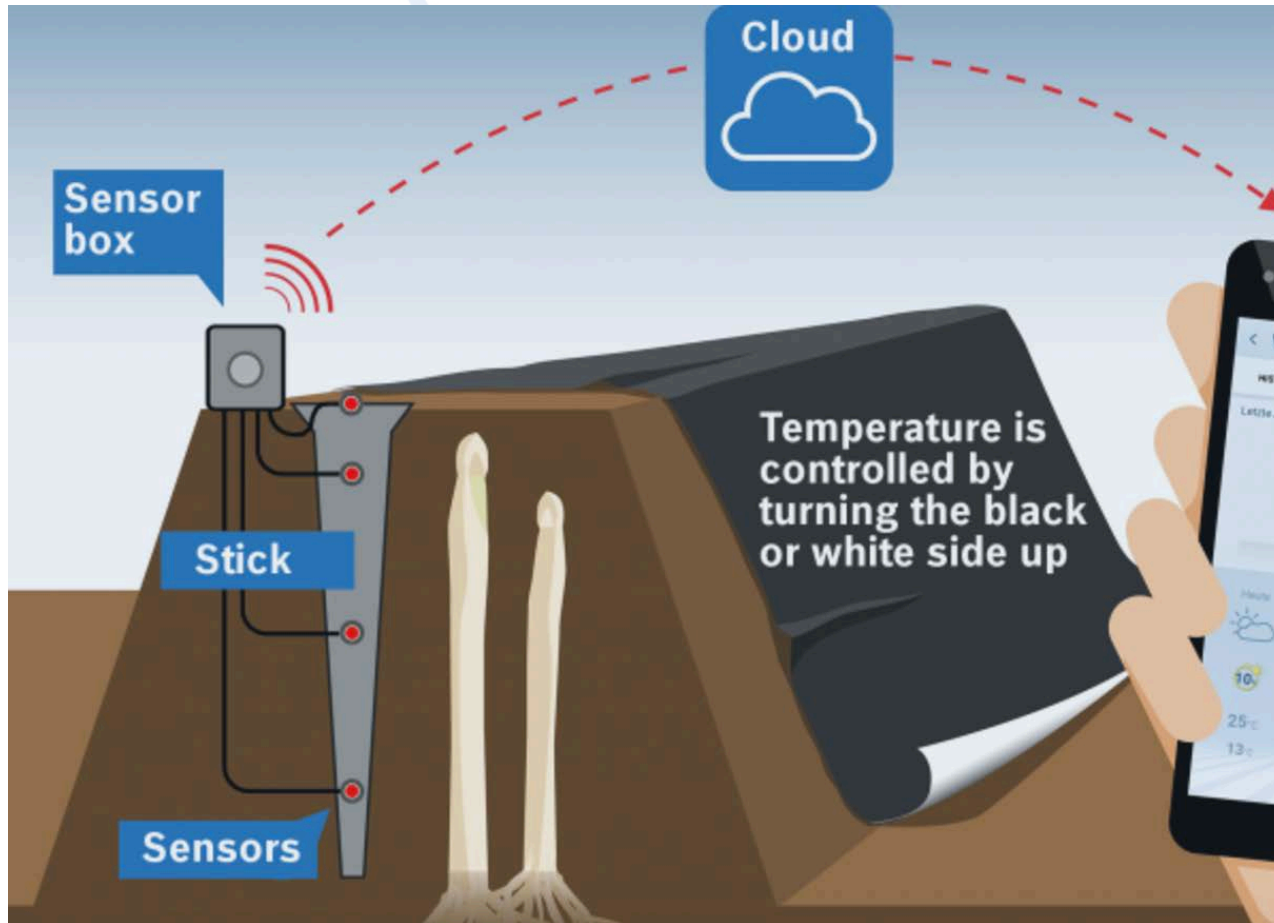
- Currently **Sorwathe** produces around **3 million kgs of tea per annum** and it accounts for around 14% of Rwanda's production.
- It employs around 2500 workers directly and purchases leaf from 4500 small tea farmers/outgrowers who are all members of the Assopthe Tea Cooperative.



Asparagus

- Asparagus grows especially well between 18 and 22 degrees Celsius.
- Bosch developed a sensor that measures the temperature in the beds where the popular vegetable is grown and transmits it to the farmer's smartphone.
- Farmers can use this data to track the temperature changes of their crops in detail and optimize the growing conditions.

Asparagus



Wine

- TracoVino measures: air humidity, air temperature, soil humidity, soil temperature and solar intensity. Additional sensors for leaf wetness, soil PH values and nutrient levels.
- It helps to define the optimal time for actions like fertilization and the use of pesticides and helps to avoid waste.
- It helps to plan precisely and in advance working resources and necessary actions.

Wine



Source: <http://www.myomegasys.com/>



Arable

- Measures rainfall, crop water demand, water stress, microclimate, canopy biomass and chlorophyll.
- Connect using WiFi, cellular or bluetooth. You can plug in one other device, such as soil moisture probe or camera.

Arable



Source: <http://www.myomegasys.com/>



Arable



Source: <http://www.myomegasys.com/>





Thank You