IOT AND DEVELOPMENT: LESSONS LEARNED

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History of the future

IOT AND DEVELOPMENT

Credit: https://www.thingful.net

IOT AND DEVELOPMENT

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CLIMATE CHANGE

54% of Africa's surface weather stations can't capture data properly

With extreme weather events becoming the new normal, forecasting has become more important than ever. It's time African nations invest in observation networks

NEXT NEWS >

By Maina Waruru
Last Updated: Tuesday 29 May 2018

Antarctic seals recruited to measure effects of climate change

Deep-diving animals collected data that could be used to sharpen projections of rising seas.

Alex Fox

RELATED ARTICLES

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SUBJECTS

Applied physics

Climat

IOT AND SDG

SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

IOT AND SDG

➤ SDG 2: ZERO HUNGER:

An estimated 821 million people were undernourished in 2017. Annual cereal production will need to rise to about 3 billion tonnes and annual meat production will need to rise by over 200 million tonnes to reach 470 million tonnes to feed 9.1 billion people by 2050.

➤ SDG 3: GOOD HEALTH AND WELL-BEING:

3 billion people worldwide lack access to basic sanitation. Noncommunicable diseases alone will cost low- and middle-income countries more than $7 trillion in the next 15 years.

IOT AND SDG

➤ SDG 11: SUSTAINABLE CITIES:

Half of humanity – 3.5 billion people – lives in cities today and 5 billion people are projected to live in cities by 2030.The world's cities occupy just 3 per cent of the Earth's land, but account for 60-80 per cent of energy consumption and 75 per cent of carbon emissions.

➤ SDG 13 & 15: CLIMATE ACTION and LIFE ON LAND:

Given current concentrations and on-going emissions of greenhouse gases, it is likely that by the end of this century, the increase in global temperature will exceed 1.5°C. Global emissions of carbon dioxide (CO2) have increased by almost 50 per cent since 1990

IOT4D AND ICT4D

There is a good paper on the use of ICT in Developing Countries:

The case for Technology in developing regions, E.Brewer et al., IEEE Pervasive Computing, 2005

The World Bank's infoDev site catalogs hundreds of ICT projects (http://www.infodev.org), albeit not all successful. Most of these projects use existing off-the-shelf technology designed for the industrialized world.

IOT4D AND ICT4D

The paper claims that there are **four technological requirements** for an ICT4D project to be successful:

Autonomous Connectivity

Low-cost equipment

Power resilience

Appropriate User Interface

IOT TRAINING ACTIVITIES

- Argentina (2016, 2019)
- Benin (2014)
- Colombia (2016)
- Costa Rica (2015)
- Ecuador (2014)
- Egypt (2015)
- El Salvador (2017)
- Ethiopia (2017)
- Ghana (2011)
- Guatemala (2019)
- Honduras (2017)
- India (2011, 2019)
- Indonesia (2012 and 2017)
- Japan (2014, 2015, 2016, 2017, 2018 for ICT4D students)
- Kenya (2011)
- Mauritius (2015)
- Myanmar (2020)
- Nepal (2018)
- Nicaragua (2013)
- Rwanda (2015)
- South Africa (2010)
- Thailand (2014, 2016 and 2017)
- Uganda (2020)

30 activities in 23 countries and 5 at ICTP (Italy)

LESSONS LEARNED

AIR QUALITY IN BENIN

2014, Institut de Mathématiques et de Sciences Physiques (IMSP)

SENSORS FOR GLOBAL DEVELOPMENT FINALISTS

Fresh Air in Benin by Marco Zennaro source files

We are developing a network of air quality sensors in Benin. There are few air quality sensors in Africa, the problem of pollution is relevant in many big cities. Some pictures are available here: https://www.flickr.com/photos/zennaro/sets/72157645018270403/

#1: mobile connectivity. 3G is not available everywhere, SMS might be the solution

#2: keep the final users in the loop

#3: data privacy vs openness

LESSONS LEARNED

THE AIR POLLUTION IN

NAIROBI, KENYA

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Death by air pollution in Kenya yearly

19,112

Child Deaths caused by air pollution in Kenya yearly

6,672

The top illness caused by air pollution in Kenya is

ACUTE LOWER RESPIRATORY INFECTION

POLLUTION LEVELS IN NAIROBI

The air in Nairobi has an annual average of

17 $\mu g/m^3$

of $PM_{2.5}$ particles. That's 70% more than the WHO safe level.

SENSORS IN YOUR AREA

* Click a sensor to view latest readings.

PM 2.5	HUMIDITY	TEMPERATURE
242.23 µg/m3	99.90 % RH	30.10 °C
11.43 µg/m3	79.83 % RH	22.73 °C

IOT LIVING LABS AT AIT

2016, Asian Institute of Technology (AIT)

#1: mobile connectivity. WiFi is the cheapest solution, but it is hard to plan ahead

#2: sensors need maintenance

#3: scalability is an issue

LESSONS LEARNED

TEA MONITORING IN RWANDA

2016, University of Rwanda in Kigali

4G IN RWANDA

SAMSUNG
14:58
+250787604462
Tue, 26/05/2015
Hello World
14:57
Hello World
14:57
Hello World
14:58

WT 1

#1: mobile connectivity: 4G in Rwanda.

#2: business model is a strong driver

#3: data ownership

LESSONS LEARNED

ACEIoT

AFRICAN CENTER OF EXCELLENCE IN INTERNET OF THINGS

UNIVERSITY OF RWANDA College of Science and Technology

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- Annual action Plan Fiscal year 2018-2019

IoT Tech News

Internet of Things – The Bright Wave of the Future

Events

Blockchain EXE meetup

IOT IN ETHIOPIA

2017, Addis Ababa University

#1: internet connectivity is key

#2: type approval of equipment

#3: data ownership, including servers

LESSONS LEARNED

Kenya's Communications Authority (CA) to Scrutinize IoT Devices Before Sale

By **Kenn Abuya** - May 21, 2018 0

14 SHARES 4 10

LOW COST WEATHER STATIONS

2017, Palembang (Indonesia) and Mauritius

#1: calibration is an issue

#2: connectivity (interesting to report from unconnected sites!)

#3: data exchange

LESSONS LEARNED

ITU REPORT ON IOT4D

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THANK YOU!

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EXERCISE

- Let's pick one application that benefits society (water monitoring, traffic monitoring, agriculture, e-health, air-quality measurement, weather stations,…..) and think about aspects you should consider when planning that specific application.

IoT4D: water quality
Benefit
Children
Women
Whole community
Sensors
Temperature
Level
Redox
Turbidity
Biological
Arsenic
Communications
SMS
LoRa - Sigfox
WiFi
Satellite
Regulation
ISM
Licensed
Sampling
Hourly
Ethical
What if....
Who takes decisions
Cost
Government
Donor
Sustainability
Business
Maintenance
Maintenance
Who
How
Who pays
How often
Business Model
Supplier
Competitor to local water
Data ownership
Open
Government
Academic
Usage
Drinking
Benefit
Community
Children
Industrial
Benefit
Business owners

IoT4D: water quality
Data ownership
Open
Government
Academic
Usage
Drinking
Benefit
Community
Children
Industrial
Benefit
Business owners
Washing
Power Source
Solar
Mains
Battery
Security
High
Low
Physical
Enclosure
DIY - 3D printed
Commercial
Community engagement
Capacity building
Awareness
Open project
Communicate results
Technical
Decision Makers
Local community
Groups
Women
Technical
Poor
Managers
Educators
Closing the loop
What intervention
Who owns the data/loop
Outreach
Data
Ownership
Quality
Verification
Communication
Storage
Aggregation / Exchange / Format

EXERCISE

- Use a free online tool such as https://www.mindmup.com to produce a mind map.
- Work in groups of 2
- Presentation on **Wednesday 7th**