African Center of Excellence in Internet of Things (ACEIoT)

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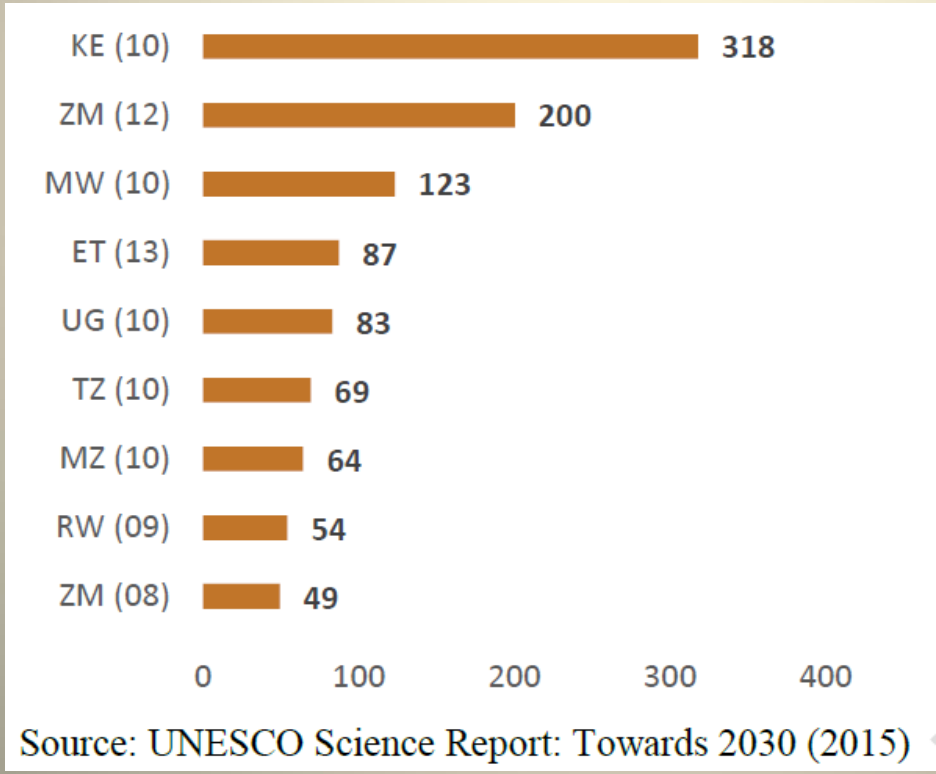
Outline of Presentation

- ACE II Project
- Tasks of ACEs
- Development Challenge addressed by ACEIoT
- Academic and Research Programs
- Regional Student Plan
- Partnerships
- Logical model of the Proposal
- Expected Results
- Laboratories
- Conclusion

African Center of Excellence II Project

- Funded by World Bank
- Project Development Objectives: To strengthen selected Eastern and Southern African higher education institutions to deliver quality post-graduate education and build collaborative research capacity in the regional priority areas.
- SSA contributes less than 2 percent of the global research output and just 0.1 percent of patents

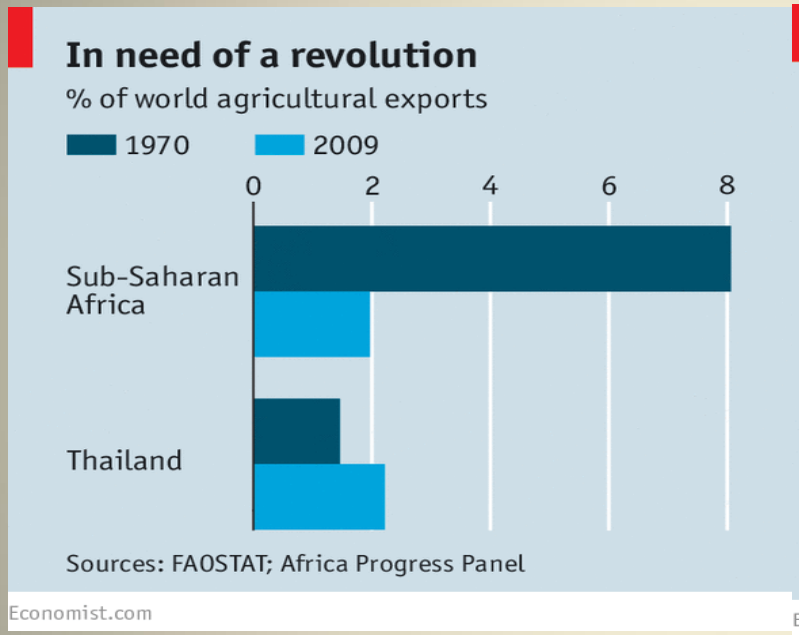


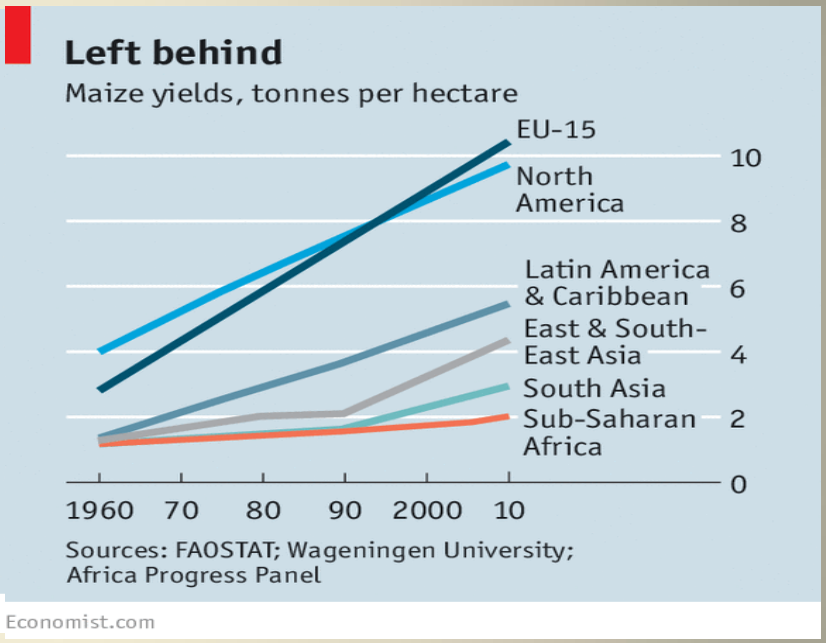
Source: UNESCO Science Report: Towards 2030 (2015)

Researchers in ESA per million inhabitants (headcount)

Contd…

- **Decline in Agricultural Production in SSA**





Source: The Economist

- Priority areas :Agriculture, Health, STEM, Education, Applied Statistics
- Participating Countries – Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe

Tasks of ACEs II

(a) Enhancing capacity to deliver high **quality training** in the region to produce skilled personnel needed for addressing a specific development challenge defined in the regional priority areas;

(b) Enhancing capacity to deliver **applied research** to find solutions for addressing a specific development challenge defined in the regional priority areas;

(c) Building and strengthening **academic collaboration** both within and outside the ESA region to raise the quality of education and research in the specialized priority discipline;

(d) Building and using **industry/sector partnerships** to enhance the impact on the chosen priority area through improved relevance of training, research and outreach of the ACE; and

(e) Strengthening **monitoring and evaluation** (M&E) to improve governance and management of the ACE and its hosting university.

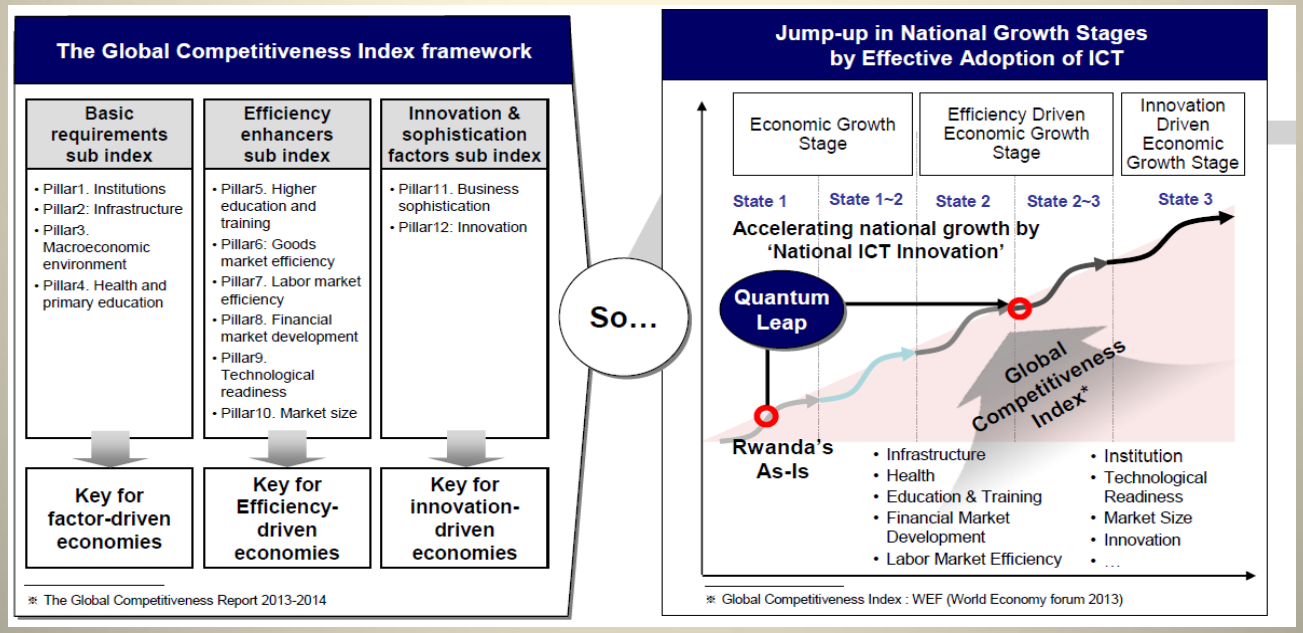
Development challenge addressed by ACEIoT

During the last decade, ESA low-income economies GDPs grew at 6 percent surpassing the world average

ESA countries still remain challenged in terms of global competitiveness

They lag behind in

- **Human Capital Creation in STI**
- **Adoption of more advanced technologies**

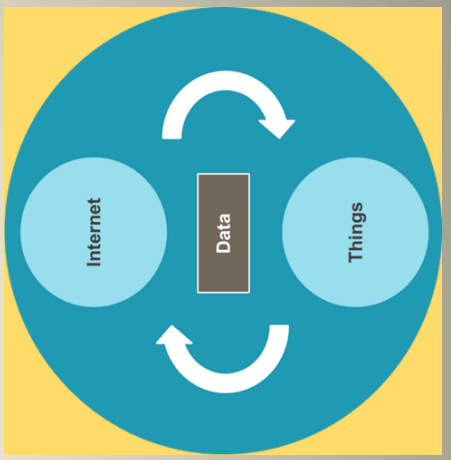


The Global Competitiveness Report – 2012 by World Economic Forum [3]

IoT

Smart World –IoT

A term with so many different definitions



What is real is:

- user needs
- technologies to be used to fulfill those needs

Interaction between Internet, Things and Data
Connecting Places → People → Things

Mix of many technology domains:

- **–Embedded Systems+ intelligent computing = >Smart computing**
- **–Application software => Smart Devices to create Smart Spaces**
- **–Telecom + Data communications => connectivity to Internet => ubiquitous computing**

Academic and Research Programs

The main objective of the center is to build a critical mass of African scientists and engineers in the field of IoT through higher education, research and training.

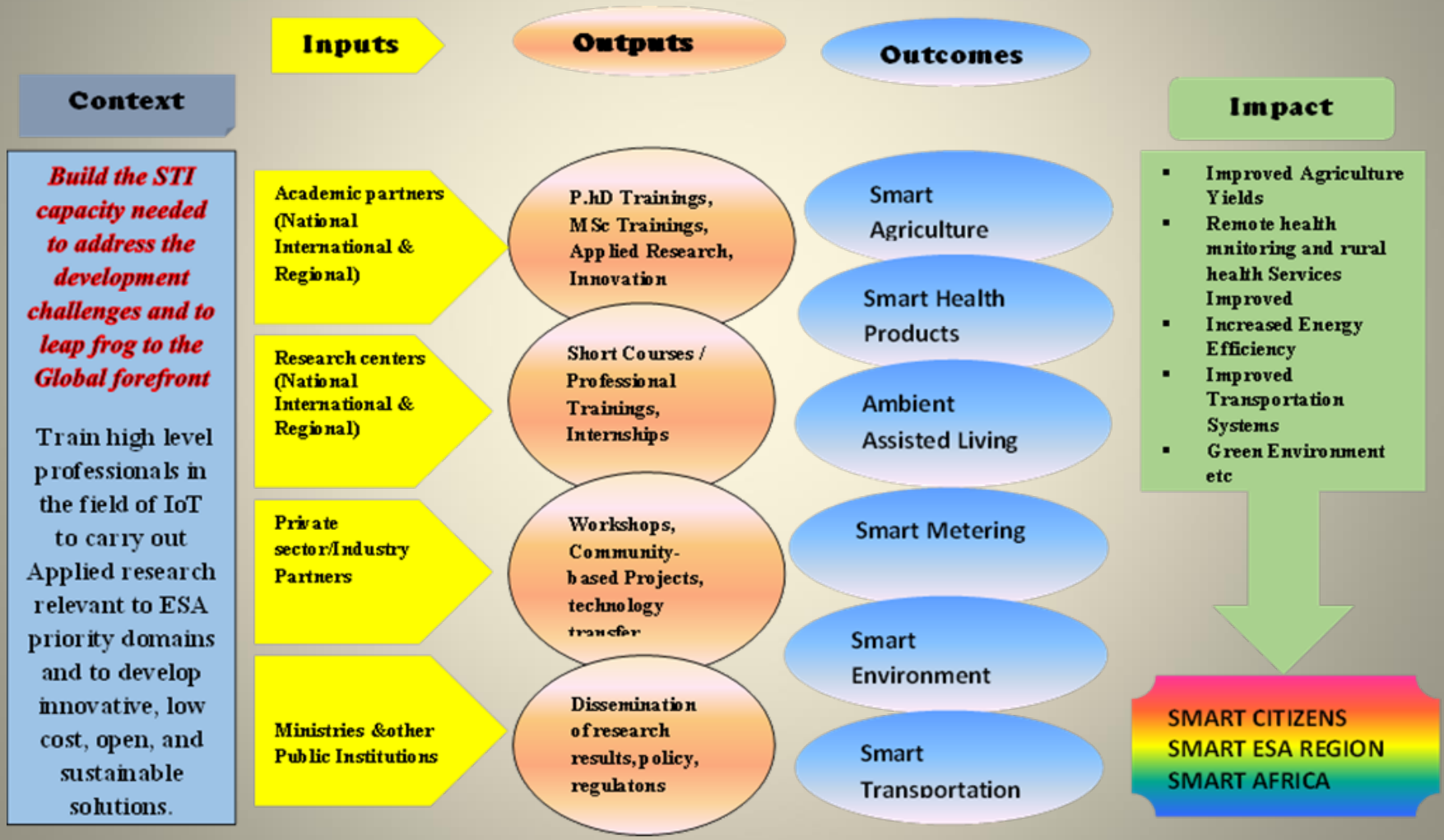
Areas of Research	Degree programs
Wireless Sensor Networks and Embedded Computing Systems	1) **Master of Science in Wireless Intelligent Sensor Networks)** ***[MSc in WISeNet]*** 1) **Master of Science in Embedded Computing Systems** ***[MSc in ECS]***
Cyber-Physical Systems, Smart devices, Sensors, Actuators for new application areas, Wireless Sensor Networks and Communication Protocols, Intelligent Data Processing and Semantic Technologies, Embedded computing for Wireless Sensor Systems, Energy harvesting for Wireless Sensors, Security of IoT.	**1)PhD in WISeNet** **2)PhD in ECS**

Short Courses/ Professional Trainings = 6
Specialised Workshops =5
Community based Projects=4
Staff exchanges within the region, joint supervision, collaborative projects, joint publications

Partnerships

Category/type of partnership	Key Partner	Partner	Associate Partner
Advanced knowledge institution			KOICA, ITU, IEEE
Private sector national		HeHe labs Ltd, K-Lab, NARADA Ltd, ICT Chamber-PSF	
Private sector international			IBM
Peer universities national	Carnegie Mellon University (CMU), Rwanda campus		UR-CAVM, UR-CHMS
Peer universities regional	State University of Zanzibar(SUZA), Zanzibar	University of Malawi, Malawi	
Peer universities international	Bharath Institute of Science and Technology, Bharat University, India	Rochester Institute of Technology (RIT), Rochester, NY 14623	
Research institutions national		National Industrial Research and Development Agency (NIRDA), Kigali, Rwanda	
Research institutions regional	East Africa Institute for Fundamental Research (EAIFR)		
Research institutions international		1) International Center for Theoretical Physics(ICTP), Italy 2) Centre of Excellence in Information and Communication Technologies (CETIC), Belgium	
Others			From Rwanda: 1)National Commission of Science and Technology, Rwanda (NCST) 2)Rwanda Development Board Board (RDB) 3)Ministry of Youth and ICT (MYICT) 4) Ministry of Education (MINEDUC) 5) Rwanda utility and Regulatory Authority (RURA)

A logical model of the Project addressing the developmental challenges



Expected Results

	Number of programs	Students trained/participated
Masters	2 specializations 15 students/programme	120
PhD	2 specializations 7 students/ spec	14 +4+4+4
Post Doc		6
Short courses/ Professional Trainings	6 nos 30 participants/ course	180
Workshops	5 nos 100 participants/ workshop	500
Community based Projects	4 nos 40 participants/project	160
Publications	Average 54 publications/year from second year	198 (50 high impact factor)
Internships	40 internships/year	160
Laboratories set up	2 laboratories	Mobile & Wireless Sensor Networking laboratory Microcontroller and Embedded Systems laboratory

Laboratory facilities

Conclusion

The 2015 Global Information Technology Report by WEF ranked Rwanda first globally in government success in ICT promotion.

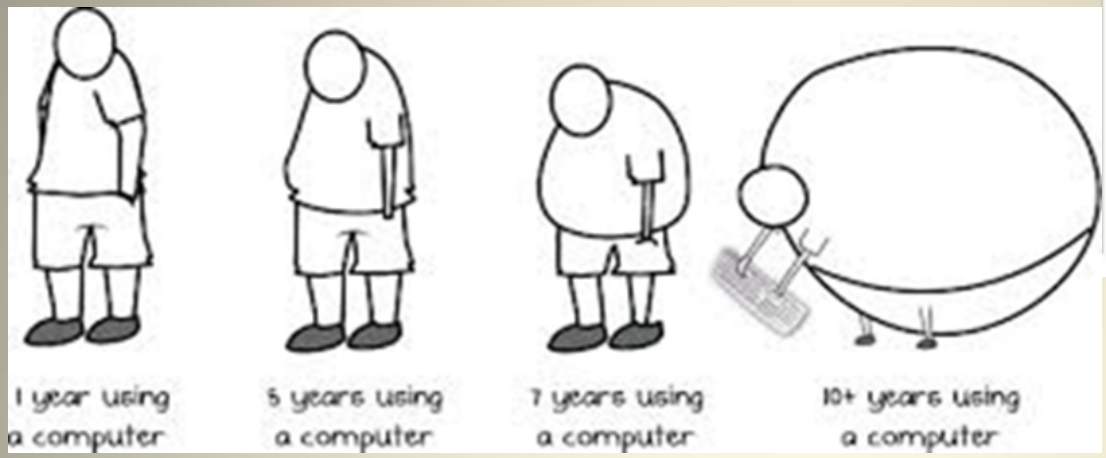
National broadband strategy: Increasing access to innovative IT-enabled services to citizens, broadband coverage of 95% by 2018.

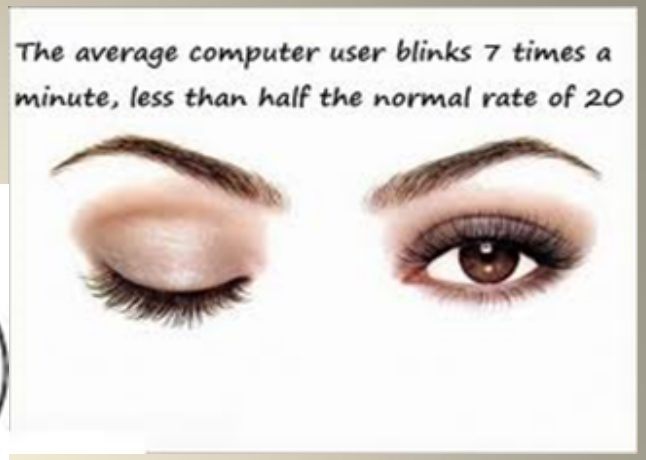
"Without change there is no innovation, creativity, or incentive for improvement. Those who initiate change will have a better opportunity to manage the change that is inevitable."

William Pollard

We from University of Rwanda would like to initiate the change through ACEIoT by STI training and by addressing the challenges faced by the ESA region

Thank You





TECH NEWS

- The term "Internet of Things" was added in oxford dictionary in August, 2013
- National Intelligence Council (NIC) U.S. listed IoT in the six technologies with potential impacts on U.S. interests out to 2025.
- "Shodan", World's first search engine that finds connected 'Things'.