ITU CAPACITY BUILDING ACTIVITIES IN INTERNET OF THINGS

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PRESENTATION OUTLINE



- ABOUT ITU
- THE DIGITAL ECOSYSTEM AND CAPACITY BUILDING IMPLICATIONS
- WORK DONE WITHIN ITU IN THE AREA OF IOT
- BDT BUILDING CAPACITY IN IOT
- Development of the IoT TP
- Delivery of IoT Regional Activities
- CONCLUSION

ITU HEADQUARTERS, GENEVA

villa.

will.



IoT and the digital economy







SMART CITY



Everybody is affected by IoT



The Internet of Things and Data



Source: GSR Discussion Paper, "Regulation and the Internet of Things" Professor Ian Brown (2015).

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What does this all Mean?



- **Digital skills are among the most sought after** skills in the labour market today
- Big data will top the list of competencies needed by 2018
- Most companies are worried about a looming skills gap
- Retooling existing workforce is through Digital training initiatives

2016 Survey by Economic Intelligence Unit:

 A report by the Economist Intelligence Unit
 THE QUEST FOR DIGITAL SKILLS A multi-industry executive survey

The Economist telliaence





The 10 skills you need to thrive in the Fourth Industrial Revolution

Top 10 skills

in 2020

- 1. Complex Problem Solving
- Critical Thinking
- Creativity
- 4. People Management
- 5. Coordinating with Others
- 6. Emotional Intelligence
- 7. Judgment and Decision Making
- 8. Service Orientation
- 9. Negotiation
- Cognitive Flexibility

in 2015

- 1. Complex Problem Solving
- Coordinating with Others
- People Management
- 4. Critical Thinking
- 5. Negotiation
- 6. Quality Control
- 7. Service Orientation
- 8. Judgment and Decision Making
- 9. Active Listening
- 10. Creativity



- Mantra is , From Technology to Development
- □ The real divide is increasingly becoming a Knowledge divide
- IoT and the entire Fourth Industrial revolution ecosystem threatens to widen the digital divide...... Unless we do something
- Capacity building , knowledge dissemination and skills development are tools at our disposal to at best bridge this divide before it takes effect.

A holistic approach to digital inclusion



The ICT development process, and a country's evolution towards becoming an information society, can be depicted using the three-stage model illustrated



Stage 1: ICT Readiness – reflecting the level of networked infrastructure and access to ICTs

Stage 2: ICT Intensity – reflecting the level of use of ICTs in the society Stage 3: ICT Impact – reflecting the results/outcomes of more efficient and effective ICT use

ITU WORK IN IOT



FULLY connected Society – Concept

Full connectivity describes the increasing digital interconnection of people and things – connectivity *anywhere*, *anytime*, by *anyone* and *anything*.

The Internet of Things ITU, 2005



ITU-T Focus Group on Smart Sustainable Cities (FG-SSC)



- □ Since 2013
- Released 21 technical reports and specifications
- ended activities in May 2015
- □ Followed by SG20.

ITU-T Study Group 20 on Internet of Things and smart cities and communities

- □ Created in June 2015
- develops international standards aimed at implementing IoT and smart cities and communities;
- promotes interoperability and transparency

ITU- WORK through Study Groups



FROM TECHNOLOGY STANDARDS TO PROJECTS AND DEVELOPMENT INITIATIVES

Technology Standards	Development Initiatives, Programmes and Projects		
 SG17 → Security and privacy protection aspects of LoT) 	Security	 <u>SG2 Question 3/2:</u> securing information and communication networks; best practices for developing a culture of cybersecurity <u>Output 3.1 on building confidence and security in the use of ICTs:</u> Regional initiatives on building confidence security in use of tel/IC 	
 SG13 → Focus on Network Aspects of IoT SG15 → Smart Grids, Home Networks 	Networks	 Output 2.2 on <u>Telecomms/ICT networks</u> <u>SG7 Question 1/1</u>: Policy, regulatory aspects of migration from existing networks to broadband networks in developing countries, including NGN. 	
 Focus Group on Smart Sustainable Cities (FG SSC) (since 02/2013) Focus Group on Smart Water Management 	Capacity Building on Smart Sustainable Cities	Regional Initiatives on Smart cities	

ITU-T standards and Publications



Recommendation ITU-T Y.2060: Overview of the Internet of things (IoT), 2012, http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=y.2060

- Unleashing the potential of the Internet of Things, 2016, https://www.itu.int/pub/T-TUT-SMARTCITY-2016-2
- Recommendation ITU-T Y.2063, Framework of the web of things, 2012, https://www.itu.int/rec/T-REC-Y.2063/en
- Internet of Things Global Standards Initiative, 2015, http://www.itu.int/en/ITU-T/gsi/iot/Pages/default.aspx
- Shaping smarter and more sustainable cities: Striving for sustainable development goals, 2016, http://wftp3.itu.int/pub/epub_shared/TSB/ITUT-Tech-Report-Specs/2016/en/flipviewerxpress.html
- WTSA Resolution 98 Enhancing the standardization of Internet of things and smart cities and communities for global development, 2016, https://www.itu.int/dms_pub/itu-t/opb/res/T-RES-T.98-2016-PDF-E.pdf
- Implementing ITU-T International Standards to Shape Smart Sustainable Cities: The Case of Dubai, 2016, http://www.itu.int/en/publications/Documents/tsb/2016-DubaiCase/index.html

ITU-T standards and Publications



 United for Smart Sustainable Cities: Striving for Sustainable Development Goals, 2016, http://wftp3.itu.int/pub/epub_shared/TSB/2016-ITUT-SSC-Brochure/en/index.html#p=1

- Joint Coordination Activity on Internet of Things and Smart Cities and Communities (JCA-IoT and SC&C), available online: http://www.itu.int/en/ITU-T/jca/iot/Pages/default.aspx
- ITU-T SG20: IoT and smart cities and communities (SC&C), available online: https://www.itu.int/en/ITU-T/studygroups/2017-2020/20/Pages/default.aspx

Other ITU Publications on IoT



Published by ITU-R

- Resolution ITU-R 66: Studies related to wireless systems and applications for the development of the Internet of Things, 2015, <u>http://www.itu.int/pub/R-RES-R.66-2015</u>
- Resolution ITU-R 54-2: Studies to achieve harmonization for short-range devices, 2015, <u>http://www.itu.int/pub/R-RES-R.54-2-2015</u>

Published by ITU-D:

The Internet of Things: data for development. In Measuring the Information Society Report 2015, 2015, pp. 147-171. <u>http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2015.aspx</u>

Published by ITU General Secretariat:

- ITU Internet Reports 2005: The Internet of Things, 2005, <u>http://www.itu.int/pub/S-POL-IR.IT-2005/e</u>
- Harnessing the Internet of Things for Global Development, 2016
 <u>https://www.itu.int/en/action/broadband/Documents/Harnessing-IoT-Global-Development.pdf</u>



- □ WSIS Action Line C4 (Capacity building) theme since 2015:
- "Transcending from Infrastructure to Applications and services: Building capacity to leverage e-applications."
- Development of training materials
- Delivery of training in IoT
- Organise Forums and workshops at regional level

Internet of Things Training Programme (IoTTP)



Problem Statement

- □ There is dramatic growth of IoT due to:
 - Widepsread adoption of IP
 - Ubiquititous connectivity
 - Miniaturization
 - Rise of cloud computing
 - Advances in data analytics
- □ his technology has potential to change the world even more than the internet did
- □ There is a need to develop experts that are able to plan design and maintain IoT systems
- □ special focus on applications, and adopting a problem-solving methodology.
- □ Today there are no formal complete IoT training programmes.

SOLUTION: IoTTP



ITU is developing a standardized training progamme in IoT (IoTTP)

 IoTTP is the fourth in a series of high-level training programmes developed under the auspices of the ITU Academy



Internet of Things Training Programme (IoTTP)



Solution

To develop a full set of high-level training materials prepared by high caliber subject-matter experts, designed for anyone either a beginner or a specialist, which will:

- Provide ITU membership with capacity building solutions in all areas of IoT
- Offer access IoT training and forward-looking professional vision
- Provide possibility for different certification options;
- Provide international recognition, with possible options of university credits/diploma



IMPLEMENTATION PROCESS



- Collaboration of efforts between ITU-T and ITU-D (task force to coordinate development process)
- Identification of subject-matter experts within the global IoT community
- Conceptualization and development of the programme scope
- Preparation of high-level training materials by experts;
- Quality Assurance Process (peer-review); and Editing;
- Establishment of partnership with universities and other partner institutions in order to deliver the IoTTP and provide accreditation/certification

IMPLEMENTATION PROCESS





Quality Assurance

Course Coordinator

- Consistency across modules
- Module linkages
- Elimination of overlaps
- Guidelines and Frameworks to standardize material

Peer review

- Several review rounds through the course development process
- Conducted by minimum 2 top experts in the field per module
- Ensures that materials are technically up to date and of the highest standard
 Editorial Review
- Standardization of language and terminology ensuring conformance to the rules, policies, procedures and instruments of the ITU.

IOTTP: STRUCTURE

9 Foundation Modules

- OM: Overview Module
- FM1: Introduction to the Internet of Things
- FM2: Standards, Architectures and Interoperability
- FM3: Policies and Regulations Pertaining to the IoT
- □ FM4: Design & Functioning of Wireless IoT Technologies
- FM5: Physical IoT Infrastructure and Network Planning: from Devices to Cloud
- □ FM6: IoT Data Security, Privacy and Trust
- □ FM7: Introduction to IoT Data Science
- □ FM8: Global IoT Use Cases

IOTTP: STRUCTURE

7 Advanced Modules

- □ AM1: Understanding & Designing Sensor Electronics
- □ AM2: Advanced Wireless IoT Design in 5G
- □ AM3: Designing & Programming of the Web of Things
- AM4: AI and Machine Learning for IoT Big Data
- AM5: Social & Ethical Implications and Case Studies
- □ AM6: Business Models and Case Study Implementations
- □ AM7: IoT Entrepreneurship

IoTTP: COMPOSITION



Each Module will Consist of:



IoTTP: Delivery times



Time required to complete each part of the IoTTP:



IoTTP: Delivery modes





IoTTP Certification Routes



Foundation IoT Certificate

Overview Module	
Introduction to the Internet of Things	
Standards, Architectures and Interoperability	JRY
Regulation Pertaining to the IoT	WPULS(
Design & Functioning of Wireless IoT Technologies	CO
Physical IoT Infrastructure: from Devices to Cloud	
IoT Data Security, Privacy and Trust	ONE
Introduction to IoT Data Science	T LEAST
Exciting Global IoT Use Cases	A'



ITU Foundational IoT Certificate



FM1-FM5 ARE COMPULSORY
 PLUS
 1 of the three FM 6-8

IoTTP Certification Routes









Development of training materials

Engage training providers for partnerships in the delivery of the training

Convert material to multimedia



- Undertaken at Regional Level
- Respond to requests from membership
- Mainly undertaken as part of the Centres of Excellence training programs
- Trend-Demand is growing. Some are in depth, others are awareness raising

IoT workshop in Thailand(Dec 2017)









□ Regional Workshop for Africa: 28-30 June 2017, Mauritius

Developing the ICT ecosystem to harness Internet-of-Things (IoT)





- Policy makers, regulators, service providers and academia involved in Internet of Things.
- □ 151 participants: (90 Mauritians and 61 foreign delegates)
- CEOs, IT Managers/Engineers, policy makers, telecommunication
 Engineers/ ICT Regulators, University Lecturers and Professionals from
 Key Economic Sectors.



- □ Internet of Things (IoTs) A technical overview of the ecosystem
- □ Internet of Things Policy and regulatory enablers
- IOT: Application and services and ITU-T Standards
- IOT: Application and services
- IOT Technical planning: Network planning
- IOT: Solutions and deployment experiences
- □ : IOT: Business Models and Opportunities











- Internet of Things: Technology, Standards and Planning
- 8-11 July, 2017 in Tehran, I.R. Iran. The training is organized jointly by the ITU, CAICT
- Hosted by Faculty of ICT (I.R. Iran) and CAICT





- Under the auspices of the Centres of Excellence
- □ So far 60 participants have registered.



- Broadband Mobile and Internet of Things Network Planning",
- 19-22 September in Bangkok , Thailand
- To build knowledge of policy makers, regulators and telecom operators in the areas of 4G, 5G and IoT ecosystem and related network planning









Conformity and Interoperability for Internet of Things

30 October - 3 November 2017, Shanghai, China

To be hosted by



Future IoT Regional Activities



- IoT for Smart and Sustainable Cities Khartoum, Sudan,
- 12-13 Dec 2017



- Regional Initiative on Use of ICTs for transition to Smart and Sustainable Development and Protection of Environment.
- to understand what the Internet of Things is, how it evolves from the Internet, what the core technologies and systems are and how it is important for SSC implementation



- □ ITU-D intends to make IoT a key priority area.
- □ To be run regionally as we plan to do with Internet Governance
- Academic and research institutions will be key partners
- We see Academic institutions as part off shaping the future IoT ecosystem
- □ Understanding IoT will be key to the digital inclusion agenda.

ACADEMIA EVENT-2017



ITU Academia Partnership Meeting

Developing skills for the digital era





Hotel Gellért Budapest Hungary 19-21 September 2017





IoT will be one of the defining technologies of our time that will be treasured for positive impacts in human development.

Evolution of IoT requires a workforce with a positive disposition to technology as well as adaptive capabilities





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