

ITU WORK ON INTERNET OF THINGS

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ITU HEADQUARTERS, GENEVA



OUTLINE

- ABOUT ITU
- MOVING TOWARDS A CONNECTED AND FULLY NETWORKED SOCIETY
- INTERNET OF THINGS (IoT) AND ITS APPLICATIONS
- ITU WORK IN IoT
- FUTURE TRENDS AND IMPACTS OF IoT
- CONCLUSIONS

ABOUT ITU

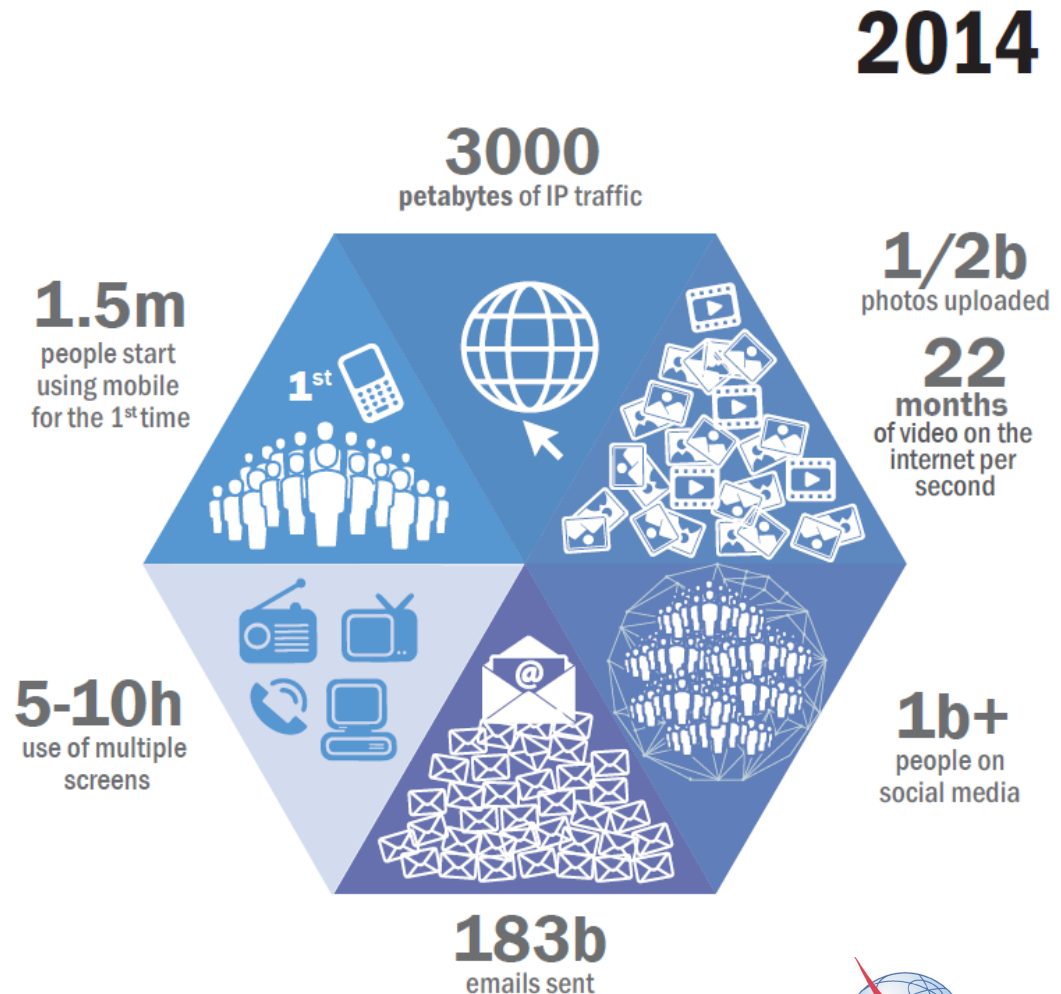
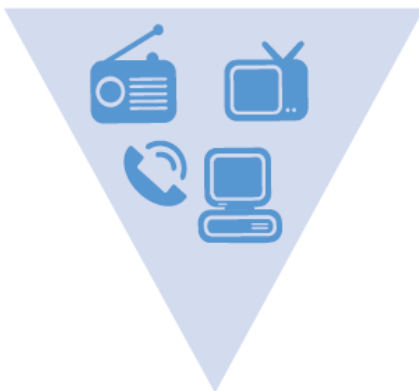
- Established in 1865.
- Three sectors:
 - **Radiocommunication**
 - **Standardization**
 - **Development**
- 193 Member States, 750+ Sector Members

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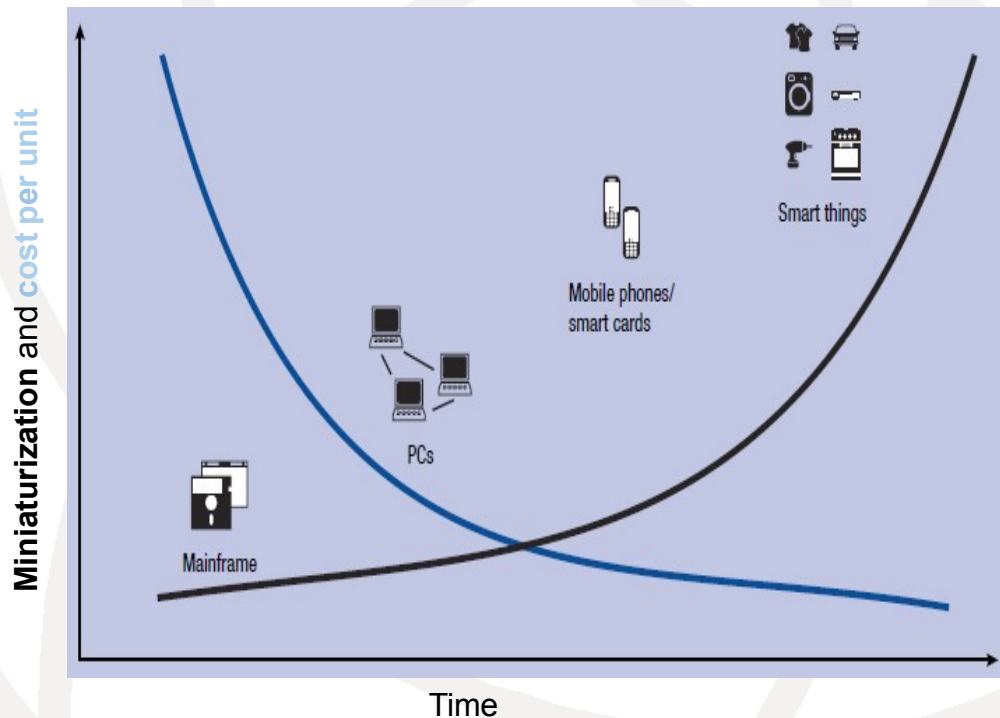
TRENDS: A CONNECTED WORLD

- The first commercial citywide **cellular network** was launched in Japan in **1979**
- The milestone of **1 billion** mobile phone connections was reached in **2002**
- The **4 billion** mobile phone connections milestone was reached in **2009**



FULLY CONNECTED SOCIETY – CONCEPT

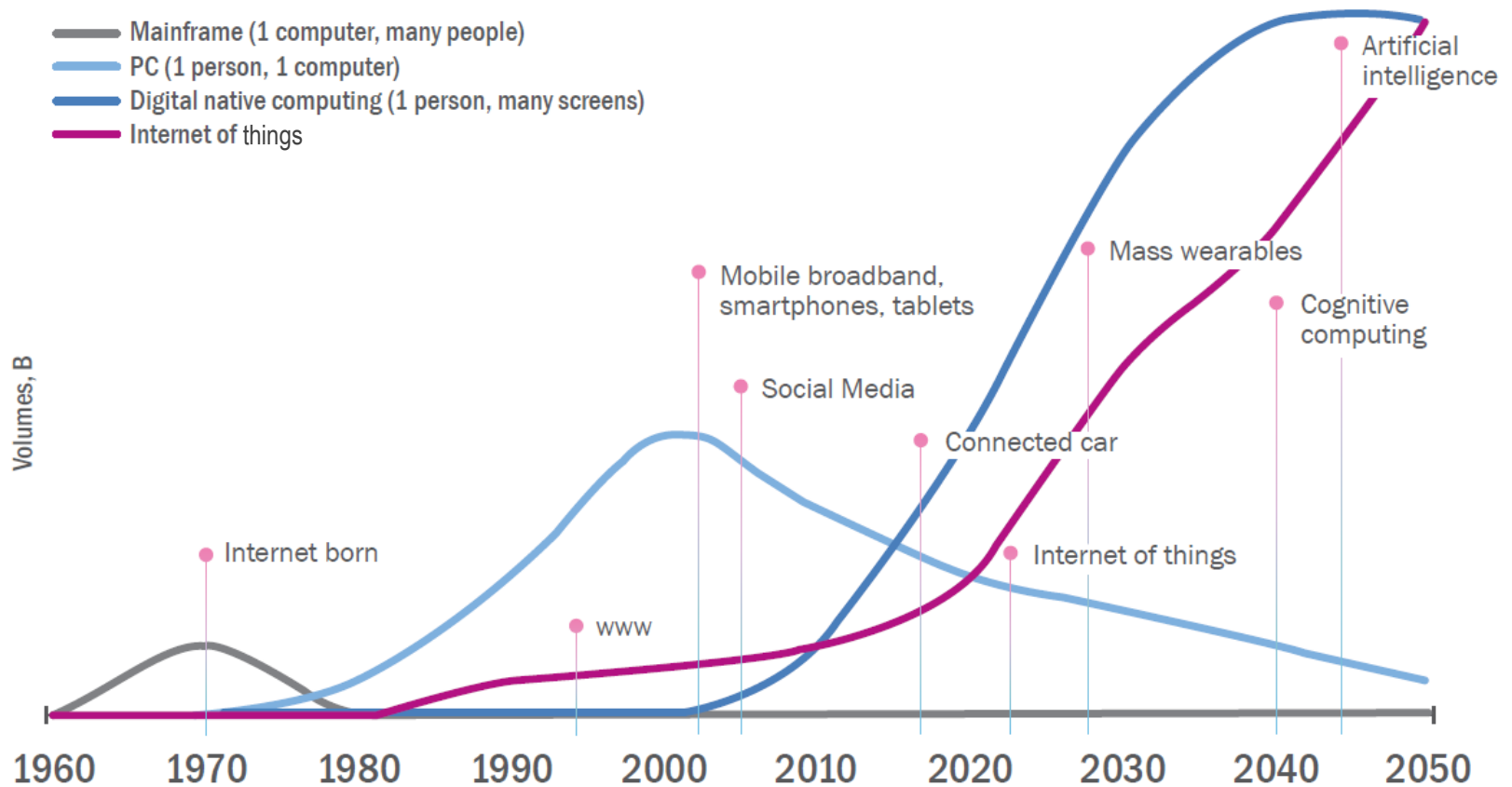
Connected Things



- Cost per unit has been falling over time
- Miniaturization has risen over time, increasing sharply in recent years
- There has been a progression from mainframe computers to smart objects

TRENDS

One to many to any: ICTs from happy few to the masses



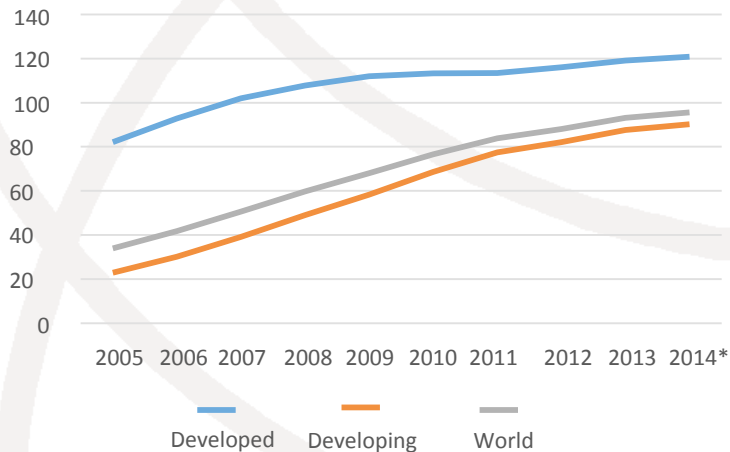
Source: ITU

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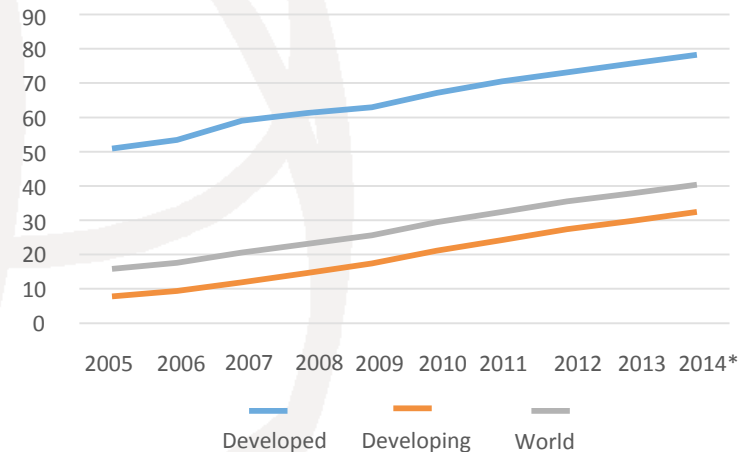
TOWARDS A FULLY CONNECTED SOCIETY

Connected People

Mobile-cellular subscriptions
(per 100 inhabitants)



Individuals using the Internet
(per 100 inhabitants)



*Estimate

Source: ITU

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MACHINE TO MACHINE

- Machine-to-Machine communication is growing fast
- Over 5 billion devices expected to be connected to each other by end of 2015. If this trend continues, more than 20 billion devices will be communicating with each other by the year 2020

FULLY CONNECTED SOCIETY – APPLICATIONS

Government

Transportation

Government: access and enable interaction with government service providers

Industrial: Efficient factory, supply chain and logistics

Healthcare: increase efficiency in health service delivery, personalized health solutions

Smart governance

Smart mobility

Automotive / Transport: connected cars, smart road-side infrastructure, emergency notification, driver assistance systems, car sharing, navigation, driverless car

Consumer

Retail, finance, marketing: contactless payment, customized branding and advertising

Smart living

Smart environment

Consumer: Smart buildings, home automation

Retail

Security: tracking and anti-theft solutions

Utilities: smart grid and water supply

Utilities

Security / defense

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ITU WORK IN THE AREA OF INTERNET OF THINGS

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DEFINITION OF IoT IN ITU

“A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on, existing and evolving, interoperable information and communication technologies.

Recommendation ITU-T Y.2060

Elements

- Through the exploitation of identification, data capture, processing and communication capabilities, the IoT makes full use of things to offer services to all kinds of applications, whilst ensuring that security and privacy requirements are fulfilled.
- In a broad perspective, the IoT can be perceived as a vision with technological and societal implications.”

BACKGROUND

- ITU published one of the first reports on “The Internet of Things” (www.itu.int/internetofthings) in 2005 and has been involved in The Internet of Things (IoT) since then.
- ITU has studied and published Recommendations in the areas of tag-based identification services, ubiquitous sensor networks (USN) and ubiquitous applications in next generation networks (NGN) environment.

CORRELATION BETWEEN BIG DATA IOT

We are in an era of big data:

- High Volume
- High Velocity
- High Variety
- High Veracity
- High Value

INTERNET OF THINGS

High Volume
High Velocity
High Variety
High Veracity
High Value

Identification

Data capturing

Data processing

A VISION WITH SOCIETAL IMPLICATIONS

GLOBAL STANDARDS INITIATIVE (IoT-GSI)

- Established in May 2011 by TSAG.
- Visible single location for information on/development of IoT standards.
- Harmonizes different approaches to the IoT architecture worldwide
- Initial key efforts have included:
 - **IoT terminology** (including the definition of “IoT”)
 - **IoT overview** (Y.2060 “Overview of IoT”, 06/2012)
 - ITU-T Y.2061, Requirements for support of machine-oriented communication applications in the NGN environment
 - **IoT work plan** (potential study items within ITU)

The success of the Internet of Things in business and social communities will depend strongly on the existence and effective operation of global standards

GLOBAL STANDARDS INITIATIVE

- ITU produced **recommendations** spanning an IoT framework (basic concepts and terminology, common requirements and capabilities, ecosystem and business models etc.), various **areas of applications and services** (e.g. networked vehicles, e-health, home networks, machine oriented communications, sensor control networks, gateway applications) as well as **testing aspects**

JOINT COORDINATION ACTIVITY ON INTERNET OF THINGS (JCA-IOT)

- ITU-T TSAG approved the establishment of the JCA-IoT in February 2011
- JCA-IoT is open to ITU Members and designated representatives of relevant Standards Development Organizations and Forums
- DELIVERABLES

D.1 - Generic reference model architecture

D.2 - IoT standards roadmap

D.3 – Network Aspects of Identification Systems JCA-NID terms and definitions

D.4 – Ubiquitous Sensor Networks (USN) terms and definitions

IOT JOINT COORDINATION ACTIVITY (JCA-IOT)

- Coordinates ITU work related to the IoT including network aspects of identification of things, and ubiquitous sensor networks (USN)
- Provides a platform to share information among various involved Standards Development Organizations (SDOs) to avoid duplication of work
- Maintains a IoT worldwide [standards roadmap](#) freely accessible to everybody
- Acts as a single ITU point of contact on IoT matters

ITU ACTIVITIES RELATED TO IOT

Within IoT-GSI [numerous Recommendations completed]

- SG11 → APIs and protocols for IoT (activity started 07/2014), IoT Testing
- **SG13 → Focus on Network Aspects of IoT**
- SG16 → Focus on IoT applications, including e-health
- SG17 → Security and privacy protection aspects of IoT (already published some specs related to USN and services using tag-based identification)

Other activities

- SG15 → Smart Grids, Home Networks
- Focus Group on Smart Sustainable Cities (FG SSC) (since 02/2013)
- Focus Group on Smart Water Management (FG SWM) (since 06/2013)
- Focus Group on M2M Service Layer (FG M2M) (closed 03/2014)
- Collaboration on ITS Communication Standards (also some past FGs on Cars)

OTHER IOT RELATED ACTIVITIES

M2M FOCUS GROUP ON EHEALTH

- Promising growing sector
- Enabled by ICTs
- Recommendation **ITU-T H.810**
 - Transposition of the Continua Health Alliance Design Guidelines
- Cooperation with IEEE PHD WG
- Consultation with WHO

OTHER IOT RELATED ACTIVITIES

ITU-T Study Groups (SG 2, SG 3, SG 11, SG 13, SG 16, SG 17)

- ITU-R Study Groups (WP1A, WP1B, WP5A)
- ISO (TC 122/104 JWG, TC 204)
- ISO/IEC JTC 1 (SC 6, SC 29/WG11, SC 31, and WG7 on sensor networks)
- ETSI (ERM TG28 and TG 28, TC M2M, TISPAN and WG7)

QUESTION 1/2 ON SMART SOCIETIES

A new question from WTDC-14

Will collect Case Studies from developing countries on M2M applications.

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BIG DATA

Intersectoral Task force established within ITU on Big data, comprising Focal points from all Bureaus.

Explore how to manage the huge data that will be generated under IoT

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STANDARDS FOR DEVELOPMENT

- The success of the Internet of Things in business and social communities will depend strongly on the existence and effective operation of global standards(Standardisation)
- It will also depend on the application of those standards in real life for the social and economic benefit of people(Development)

FROM TECHNOLOGY STANDARDS TO PROJECTS AND DEVELOPMENT INITIATIVES

Technology Standards	Development Initiatives, Programmes and Projects	
<ul style="list-style-type: none"> Smart Environment 	Smart sustainable development model	<ul style="list-style-type: none"> Connectivity project for the Pacific Islands Disaster risk reduction, climate change adaptation and mitigation activities
<ul style="list-style-type: none"> eM2M Focus Group on eHealth SG16 → Focus on IoT applications, including e-health 	mPowering Development initiative.	<ul style="list-style-type: none"> Project on ICT applications, including eHealth for Europe Global eHealth repository. Launched jointly by ITU and WHO in 2013
<ul style="list-style-type: none"> Big Data 	Intersectoral Task Force on Big Data	<ul style="list-style-type: none"> Statistics Division; Worlds Telecommunications Indicators Symposium 2014

FROM TECHNOLOGY STANDARDS TO PROJECTS AND DEVELOPMENT INITIATIVES

Technology Standards	Development Initiatives, <u>Programmes</u> and Projects	
<ul style="list-style-type: none"> SG17 → Security and privacy protection aspects of <u>IoT</u>) 	Security	<ul style="list-style-type: none"> <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 <u>tel/IC</u>
<ul style="list-style-type: none"> SG13 → Focus on Network Aspects of <u>IoT</u> SG15 → Smart Grids, Home Networks 	Networks	<ul style="list-style-type: none"> Output 2.2 on <u>Telecomms/ICT</u> networks <u>SG7 Question 1/1</u>: Policy, regulatory aspects of migration from existing networks to broadband networks in developing countries, including NGN.
<ul style="list-style-type: none"> Focus Group on Smart Sustainable Cities (FG SSC) (since 02/2013) Focus Group on Smart Water Management 	Capacity Building on Smart Sustainable Cities	<ul style="list-style-type: none"> Regional Initiatives on Smart cities

KEY ISSUES

- Security , Privacy, and Trust
- However, privacy means different things to different people.
- Privacy is no longer a local notion but trans-border data exchange and distributed data processing call for minimum international privacy measures.
- ITU (under the ICT Security Standards Roadmap), and others (European Commission under its Digital Agenda for Europe, the United States Federal Trade Commission) are looking at these issues

FUTURE TRENDS AND IMPACTS

- The world of IoT goes hand in hand with the smart cities. It will be life transforming in more ways than one:
- Capacity Building.... New knowledge and skills sets in almost every field(statistics, engineering, medicine);
- Citizen participation;
- Improved Quality of life, through efficiency of urban operation and services, and competitiveness, while guaranteeing economic, social and environmental development for present and future generations.

FUTURE TRENDS AND IMPACTS

- The IoT hype is likely to increase in 2015 going forwards
- Big data: Every single “thing” becomes identifiable. All new applications, new chips etc. add more data to what we already have All this mass of information needs to be managed. IoT requires a holistic data management system.
- Companies will exploit business opportunities offered by IoTs to develop the inputs needs to drive IoT
- New IoT Hardware platforms and software applications will be developed.
- Products that improve efficiency and customer experience will come onto the market

FUTURE TRENDS AND IMPACTS

- The world of IoT goes hand in hand with the smart cities. It will be life transforming in more ways than one:
- Capacity Building.... New knowledge and skills sets in almost every field(statistics, engineering, Medicine). Smart education goes with IoT
- Citizen participation;-in economic activity, business,
- Improved Quality of life: through health, education, wealth, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects.

CONCLUSIONS: TYING THE LOOSE ENDS

- IoT is a disruptive technology
- The future lies in **Big Data** for decision making: volume, velocity, variety, value, and veracity.
- Exponential Growth in IoTs anticipated:
 - 4.9 billion IoT devices expected in 2015;
 - Figure predicted to rise to 25 billion by 2020
- As IoTs impact all industries, an influx of big data is anticipated.

LA FINE!

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