Asia-Pacific
Economic Cooperation

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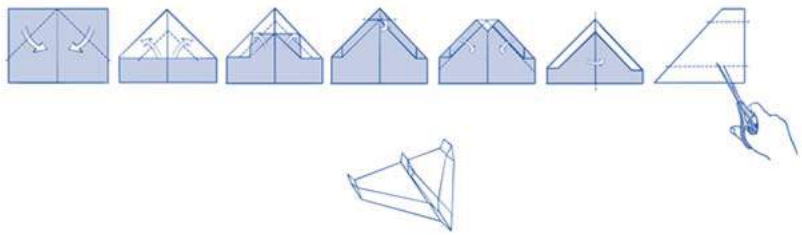
Session 1

A Brief History of the IoT

Submitted by: United Nations Social Enterprise Facility (UNSEF)

APEC
PHILIPPINES
2015

Workshop on Internet of Things Development for the Promotion of Information Economy
Boracay, Philippines
14 May 2015

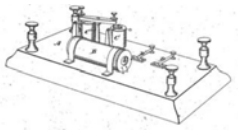


APEC TEL Workshop
Internet of Things Development for Information Economy

David Galipeau, United Nations Development Programme
United Nations Social Enterprise Facility (UNSEF)
May 14th, 2015
Boracay Island, the Philippines

A Brief History of the *Internet of Things*

1832



An electromagnetic telegraph was created by Baron Schilling in Russia, and in 1833 Carl Friedrich Gauss and Wilhelm Weber invented their own code to communicate over a distance of 1200 m within Göttingen, Germany.

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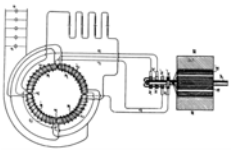

Nikola Tesla in an interview with Colliers magazine:

1926

"When wireless is perfectly applied the whole earth will be converted into a huge brain, which in fact it is, all things being particles of a real and rhythmic whole.....and the instruments through which we shall be able to do this will be amazingly simple compared with our present telephone.

A man will be able to carry one in his vest pocket."

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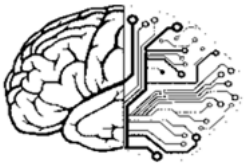

Alan Turing in his article *Computing Machinery and Intelligence* in the Oxford Mind Journal

1950

"...It can also be maintained that it is best to provide the machine with the best sense organs that money can buy, and then teach it to understand and speak English."

A Brief History of the *Internet of Things*

In *Understanding Media* Marshall McLuhan stated:

"*....by means of electric media, we set up a dynamic by which all previous technologies -- including cities -- will be translated into information systems*"

1964

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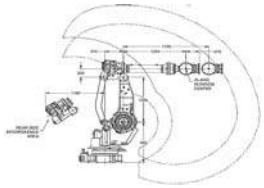

Karl Steinbuch a German computer science pioneer said,

"*In a few decades time, computers will be interwoven into almost every industrial product*"

1966

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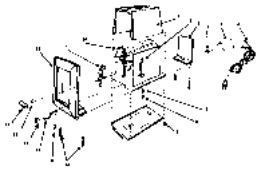

John Romkey created the first Internet 'device', a toaster that could be turned on and off over the Internet.

At the October '89 INTEROP conference, Romkey was asked to bring up his toaster on the Net, and therefore was connected to a computer with TCP/IP networking.

1989

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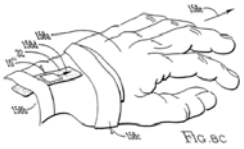

Paul Saffo's prescient article

"Sensors: The Next Wave of Infotech Innovation"

1997

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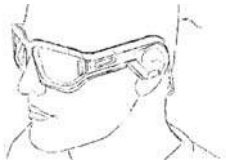

Mark Weiser, the Chief Scientist at Xerox PARC, constructs a water fountain outside his office whose flow and height mimicked the volume and price trends of the stock market.

"*Ubiquitous computing is roughly the opposite of virtual reality, where virtual reality puts people inside a computer-generated world, ubiquitous computing forces the computer to live out here in the world with people.*"

1998

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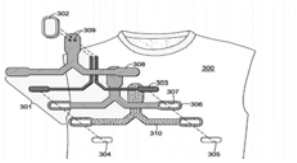

The *Internet of Things* term is coined by Kevin Ashton executive director of the Auto-ID Center:

"*I could be wrong, but I'm fairly sure the phrase 'Internet of Things' started life as the title of a presentation I made at Procter & Gamble in 1999.*

Neil Gershenfeld was speaking about similar things from the MIT Media Lab in his book *When Things Start to Think*

"*in retrospect it looks like the rapid growth of the World Wide Web may have been just the trigger charge that is now setting off the real explosion, as things start to use the Net.*"

1999

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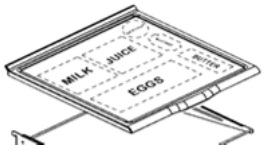

Starting off what is now becoming a meme, LG announces it's first plan for 'connected appliances' – the Internet Refrigerator

2000

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The IoT hit another level when the UN's International Telecommunications Union (ITU) published its first report on the topic.

"A new dimension has been added to the world of information and communication technologies (ICTs): from *anytime, any place* connectivity for *anyone*, we will now have connectivity for *anything*. Connections will multiply and create an entirely new dynamic network of networks – an Internet of Things"

2005

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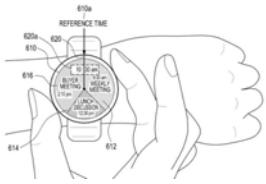


Recognition by the EU, and the *first European IOT Conference* is held

A group of 50+ companies launches the *IPSO Alliance* to promote the use of Internet Protocol (IP) in networks of 'smart objects' and to enable the Internet of Things.

The FCC voted 5-0 to approve opening the use of the 'white space' spectrum.

U.S. National Intelligence Council listed the Internet of Things as one of the 6 '*Disruptive Civil Technologies*' with potential impacts on US interests out to 2025

2008

A Brief History of the *Internet of Things*

Chinese Premier Wen Jiabao calls the IOT a key industry for China and has plans to make major investments in it.

China continues to fund and support developmental research in the field of Internet of Things at institutions like Shanghai Institute and the Chinese Academy of Sciences

The number of Internet-connected devices (12.5 billion) surpassed the number of human beings (7 billion) on the planet

2010

A Brief History of the *Internet of Things*

2011

The IPV6 protocol launched which allows for 2^{128} (approximately 340 undecillion or 340,282,366,920,938,463,463,374,607,431,768,211,456) unique addresses or as Steven Leibson, Director of Strategic Planning at Xilinx put it, "we could assign an IPV6 address to every atom in every human on the earth."

The creation of the IoT-GSI Global Standards Initiative which promotes a unified approach for development of technical standards enabling the Internet of Things on a global scale.

Private Sector Invests: Acquisitions, VC investment and government/corporate spending in the IoT space is rising dramatically.

2015 …. 'The Internet of Things' is Already Here

The Internet of Things (IoT) is the network of physical objects that can independently share data, instructions and decisions through intelligent networks – creating a 'system of systems'.

IoT is the third wave in the development of Internet-based information systems:

1. The 1990s' Internet wave connected 1 billion users
2. The 2000s' mobile wave connected another 2 billion users and growing fast
3. The IoT has the potential to connect 30X or as many 50 billion 'objects' to the Internet by 2020, ranging from bracelets, clothing, appliances, cars, offices, schools, houses and even cities.

These objects can 'sense' and can communicate amongst themselves, therefore it changes how and where decisions are made, and who makes them.

The convergence of connecting people, things, data and processes is already transforming our internal and external facing lives … and everything in between.

You will have little impact on the direction of IoT in the next few years but the time to act is NOW.

2015 …. 'The Internet of Things' is Already Here

Not an emerging industry or a vision – required infrastructure and stakeholders impacts are well known and hundreds of viable applications exist today

Not designed by corporations – similarly with the Internet, IoT will be driven by research and academic institutions but corporations will 'claim' to own it – why?

Not about applications and sensors - real value lies in the production, capture and analysis of real time data, and the possibility to use of this data for the social good

Not about globalization – the next wave of IoT will be about real-time data analysis, decision-making modeling, shaping the global citizen and ultimately, power dynamics

Not about 'wait and see' - Throughout history, technology has evolved much faster than society and politics are able to assimilate. Technologists are notoriously bad at understanding the unintended societal consequences of their innovations

Not about today – you must now understand the role of new technologies and their larger societal impact in the future

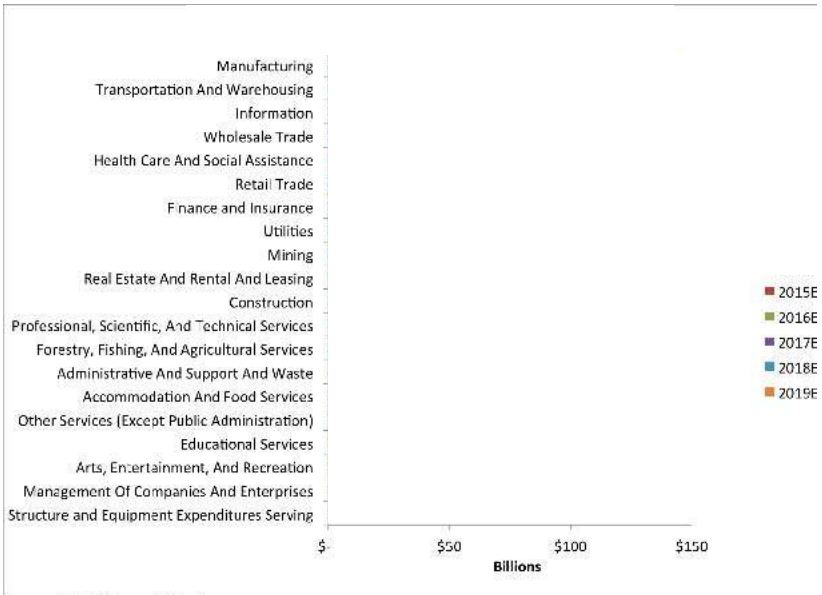
Welcome

to the

Internet of

ANYthing

IoA will Impact and Influence All Sector (and Ministries)



Source: BI Intelligence Estimates

IoA Creates both Opportunities and Challenges

Just as with tech revolutions of the past, the IoA creates a revolutionary and global information economy that can benefit governments, businesses and individuals.

But challenges remain:

- IoA requires a new kind of 'trusted collaboration' as a globally unified and scalable network architecture is required across all developed and developing economies
- IoA data will be often noisy, unstructured and real-time requiring a sustainable decentralized data ecosystems to store and analyze the vast amount of data
- IoA infrastructure needs power. Without a large and collaborative investment in energy research, the IoA movement will stall
- IoA puts many more doors on the networks that need to be securely locked and monitored
- New economic, social and political understanding of IoA fundamentals is required. Those ahead of the curve will have a major advantage

The Biggest IoA Challenge is You.

Get involved, learn and lead the development of IoA. Get ahead of the curve.

Work together. Those that collaborate will own the IoA and will own the future of economic, social and political power. Corporations are collaborating - are you?

Put citizens, not consumers, at the center. Security and privacy standards are imperative. Economic benefits are clear - Social benefits are more important.

Invest in the cohesive ecosystem of academic research and entrepreneurship - especially youth, women and social entrepreneurs. Position SME/mSMEs at the forefront of investments.

Establish the sustainable and cohesive policy frameworks that mandate cross-border collaboration for all policy, economic and social initiatives.

Adaptability and scalability are paramount. Design now for 5, 10, 20 years in advance.

Be prepared and open. Only you have the power and the choice to turn disruption into positive disruption. Take charge or you will miss the IoA land grab.

Thank you and Enjoy the Workshop