INTERNET OF THINGS (IoT) OPPORTUNITIES AND IMPACTS OF WELL-BEING

ARNOLDO JOSÉ DE HOYOS GUEVARA
JOSÉ LUIZ ALVES DA SILVA
ADMINISTRATION PROGRAM
• GENERAL OVERVIEW (History, Technology and Challenges)
• THE TECHNOLOGICAL ADVANCES
• IoT – OPPORTUNITIES AND IMPACTS
• CONCLUSION (New Business Models and Behavior Changes)
PONTIFICIAL UNIVERSITY CATHOLIC OF SÃO PAULO

PUC-SP in numbers
Campuses: 05
Undergraduate Programs: 36
Sequential Programs: 01
Master Programs: 28
MBA and Specialization Programs: 197
Doctorate Programs: 22
Research Groups: 238
Professors: 1.421
Undergraduate Students: 13,225
Master and Doctorate Students: 3,413
MBA and Specialization Students: 5,714
Administrative and Technical Staff: 1,542
Alumni: 372,000
GENERAL OVERVIEW

THE HISTORY

THE ADVANCED TECHNOLOGY

AND SOCIETY CHALLENGES
UP TO THE THIRD INDUSTRIAL REVOLUTION

FROM COLLECTOR TO AGRICULTURE AND LIVESTOCK
13,000 to 10,000 a.C.

URBANIZATION AND EMERGENCE OF CITIES
3,500 to 3,000 a.C.
(Mesopotamia / Egypt)

1ST INDUSTRIAL REVOLUTION - MECHANICAL ENERGY
1,760 to 1,840

2ND INDUSTRIAL REVOLUTION - ELECTRICITY AND ASSEMBLY LINE
1,890 to 1,930

3RD INDUSTRIAL REVOLUTION - COMPUTERS AND INTERNET
1,960 to 1,990

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AVANCE NA MOBILIDADE
MOTOROLA / AT&T / APPLE

Os primeiros aparelhos de rádio AM
SCR-914 a 195 são produzidos pelo United States Army Signal Corps Engineering Laboratories em Fort Monmouth, Nova Jersey.

1942
A Motolora produz o primeiro "handie talkie" para as EUA, denominado SCR-536.

1946
A Bell System introduz o primeiro serviço de telefone móvel comercial, chamado Mobile Telephone System (MTS).

1973
A primeira ligação por telefone móvel é feita.

1981
O Japão lança a primeira rede de telefone celular comercial, a 1G.

1983
A Motolora lança seu primeiro telefone móvel comercial, conhecido como Motolora DynaTAC 8000X, oferecendo 30 minutos de fala por face, 5 horas de standby e espaço para salvar 10 números de telefone.

1989
A Motolora introduz o MicroTAC, com o primeiro design aberto e tampa de celular.

1990
O primeiro telefone celular portátil, o Motolora MicroTAC 9000X, é criado.

1993
A primeira mensagem de texto é enviada.

1995
A primeira mensagem de texto comercial é lançada.

2000
O smartphone é lançado.

2004
A Califórnia instaura azell Phone Recycling Act, obrigando a Motolora a reciclar dispositivos e programas de reciclagem.

2005
O primeiro Blackberry com CDM Wi-Fi.

2008
O iPhone 3G é lançado.

Fontes: KnowYourMobile.com | BusinessInsider.com | XTimeline.com

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INTERNET
CERN (Conseil Européen pour la Recherche Nucléaire) - Meyrin, Genebra
1989

A história continua...

1990 - Portugal adere à Internet.
1991 - É aberto o uso da rede a entidades comerciais.
1994 - Surge o MOSAIC, primeiro navegador gráfico.
1998 - Ano de lançamento do Google e do NAPSTER.
2004 - Mark Zuckerberg e os seus colegas de quarto lançam o Facebook.

WWW

Sir Tim Berners-Lee

E- Commerce

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**SOCIETY AND MAJOR CHALLENGES**

**Five global mega trends shaping the future**

- **Rapid urbanisation**
- **Demographic and social change**
- **Climate change and resource scarcity**
- **Shift in global economic power**
- **Technological breakthroughs**

**2030**
- We predict that seven of the world’s biggest 12 economies in 2030 will come from emerging market, the "E7".
- 76 years taken for telephone to reach half of US households; the smartphone in under ten.

**2015**
- 50% of the world's population growth between now and 2050 is expected to come from Africa.
- 1.5 million people are added to the global urban population every week.
- In 2015 the size of the middle class in Asia Pacific is expected to overtake Europe and North America combined.
- 50% of global GDP is generated by the 300 largest metropolitan areas.

**Around half of US jobs are at risk of being computerised over the next two decades.**

**The world’s 85 richest people own as much wealth today as the poorest 3.5 billion.**

**Source:** PwC via @The Economist
THE TECHNOLOGICAL ADVANCES
The changes are so profound that, from the perspective of human history, there has never been a time OF GREATER PROMISE OR POTENTIAL PERIL.

“The fourth industrial revolution IS MORE SIGNIFICANT, and its ramifications more profound, than in ANY PRIOR PERIOD OF HUMAN HISTORY.”
This revolution is different in scale, scope and complexity from any that have come before. **FUSING THE PHYSICAL, DIGITAL AND BIOLOGICAL WORLDS**, the developments are affecting all disciplines, economies, industries and governments, and even **CHALLENGING IDEAS ABOUT WHAT IT MEANS TO BE HUMAN.**
THE FOURTH INDUSTRIAL REVOLUTION – DISRUPTIVES TECHNOLOGIES

- Artificial Intelligence and Machine Learning
- Top 100 Influencers and Brands
- The Internet of Things
- Big Data
- FinTech
- Virtual Reality
- New Business Models
- Nanotechnology
- New Materials
- Biotecnologia
- Productivity
- Robotic
- Renewable Energies
IoT OPPORTUNITIES AND IMPACTS
As the person that created the term IoT, Kevin Ashton, mentioned already in 2009:

IoT has the potential to change the world, just as the Internet did. Maybe even more so.

https://www.rfidjournal.com/articles/view?4986
IoT:
2014: 12 Bi Active Devices
2020: 50 Bi Active Devices
2030: 1 Tri Connected Devices

IoE – Internet of Everything

H2M

IoM

IoH

M2M

M2S

General Internet

Industrial Internet

SmartPhones

IoT:
U$ 613 Mi ao ano
U$ 14,4 Bi em 10 anos
IoT

Smart Water

Today, the worldwide water consumption is 300% compared to 1950.

Smart Environment

More than 100,000 wildfires clear 4 million to 5 million acres (1.6 - 2 million ha) of land only in the USA.

Security & Emergencies

Nuclear energy covers 16% of the planet energy needs.

Smart Metering

European Union mandates that 100% of European households have smart metering capabilities by 2022.

http://www.libelium.com/
IoT – INTELLIGENT WORLD

Air Pollution
Control of CO, emissions of factories, pollution emitted by cars and toxic gases generated in facilities.

Forest Fire Detection
Monitoring of distribution maps and prescriptive fire conditions to define alert zones.

Wine Quality Enhancing
Monitoring soil moisture and估on diameter in vineyards to control the amount of sugar in grapes and improve wine quality.

Offspring Care
Control of growing conditions of the offspring in animal farms to ensure its survival and health.

Sportsmen Care
Wearable monitoring in high-performance centers and fields.

Structural Health
Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Smartphones Detection
Detect iPhone and Android devices and, in general, any device that works with Wi-Fi or Bluetooth interfaces.

Perimeter Access Control
Access control to restricted areas and detection of people in non-authorized areas.

Electromagnetic Levels
Measurement of the energy radiated by cell stations and Wi-Fi routers.

Traffic Congestion
Monitoring of vehicles and pedestrian influence to optimize driving and walking routes.

Radiation Levels
Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Water Quality
Study of water suitability in rivers and the trend that led to the use for drinkable purposes.

Smart Roads
Warning messages and diagnoses according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting
Intelligent and weather adaptive lighting in streets.

Intelligent Shopping
Getting advice on the point of sale according to customers' habits, preferences, presence of allergen components for them or existing diseases.

Noise Urban Maps
Sound monitoring in key areas and centers zones in real time.

Waste Management
Detection of radiation levels in containers to optimize the trash collection routes.

Smart Parking
Monitoring of parking spaces availability in the city.

Water Leaks
Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis
Information collection from GPS & 4G to send real-time alarms to emergencies or provide advice to drivers.

Item Location
Search of individual items in big surfaces like warehouses or harbours.

Golf Courses
Selection irrigation in dry areas to reduce the water consumption required in the green.
## IoT

**Internet of Things Value Chain**

<table>
<thead>
<tr>
<th>Smart Module</th>
<th>Smart Object</th>
<th>Connectivity</th>
<th>Platform</th>
<th>Software Customization</th>
<th>Applications</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM Card, Sensors, Embedded Chips, Aggregator, Transporter</td>
<td>Vending Machine, Appliances, Meters, Car, Camera, Meters</td>
<td>Network, Connectivity, Availability, Quality</td>
<td>IoT Enabling Capabilities, Billing, Integration with 3rd party applications, Analytics</td>
<td>Interfaces, Solution Build-up, Hardware, Back-end, Data Management</td>
<td>Vertical solutions, Bundling of service, CRM &amp; Billing, Customer Care</td>
<td>Buys Services, Sells Services</td>
</tr>
</tbody>
</table>

Note, the above is not an exhaustive list of companies and any company may have play in more than one component of value chain.

Copyright: Telecomcircle.com

IPT: http://www.nepiot.com.br/WP/sobre-nepiot/cadeia-de-valor/
PREVISION FOR NEXT YEARS

ADVANCED APPLICATIONS

MASSIFICATION
SEMICONDUCTORS
MICROELECTRONIC
COMPUTER DESIGN
SMART PHONES
HIGH SPEED NETWORKS
WI-FI, CELLULAR, WIRE

IoT

ADCANCED MOBILITY
APIs
BIGDATA ANALYTICS
STORAGE DEVICES
CLOUD ARCHITECTURE

INFORMATION: Real Time Access

TODAY:
3,0 BI persons in the Internet
6,8 BI mobile devices

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Today: Around 1.5 Tri of Things in the World

INFORMATION: Real Time Decision

IoT

DIGITAL WORLD
- CELULAR / PDAs / LAP-TOPS / TABLETS
- DIGITAIS MACHINES
- ROBOTS
- CARS / ATMs
- CAMERAS / SENSORIALS

PHISICAL WORLD BRIDGES
- RFID
- NFC
- BARCODES
- QR CODE
- BLUETOOTH

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EXPECTED USES

- Traffic Control
- Technical Uses in Engineering
- Clothing (Temperature, Size Adjustment)
- Health Care
- Agriculture
- General Monitoring
- Energy Control
- Cost Reduction
- Geoprocessing
- Disaster Recovery

Information for Decision Making

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EXPECTED USES

The 10 most popular Internet of Things applications

A ranking based on web analytics

1. Smart Home 100%
2. Wearables 63%
3. Smart City 34%
4. Smart Grid 28%
5. Industrial Internet 25%
6. Connected Car 19%
7. Connected Health 6%
8. Smart Retail 2%
9. Smart Supply Chain 2%
10. Smart Farming 1%
EXPECTED RISKS

- Hacking
- Malwares
- Cyber attacks
- Privacy breaches
- Financial losses
- Fraud and theft
- Control and decision errors
- Strategic data loss
- Traffic control

Security information and major planning required

Arnoldo Hoyos and José Luiz Alves
CONCLUSION
NEW BUSINESS MODELS
AND
NEW BEHAVIORS
SOCIETY CHANGES

NEW BUSINESS MODELS
Initial Research Basis: Litteris Consulting

IoT is the access door to this “New Brave Word”

The Smartphone itself is the largest "IoT personal sensor" already available

ARNOLDO HOYOS AND JOSÉ LUIZ ALVES
The objective of this article is to present the IoT as the main technological PERSONAL ADVANCE, connected with AI and Big Data, and the SPECIAL BEHAVIORAL CHANGES in curse in our society.

These observations are expected to assist in the definition of personal and professional choices.
CONCLUSION:
SHARED ECONOMY

BIG COMPANIES X START-UPs

BREAKDOWN OF INTERMEDIARIES X ACCESS VIA PLATAFORMS

ACCESS TO TECHNOLOGY FOR ANYBODY

PROFIT REDUCTION X VALUE CHAIN BREAKDOWN

DIRECT ACCESS TO FUNDING/FINTECHs / CROWDFUNDING

SHARING RESOURCES BY USERS

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ALVIN TOFFLER: the illiterate of the 21st century will be who couldn’t learn, unlearn and relearn

HOW TO BE PART OF IT?

STAYING CONNECTED AND AWARE OF THE CHANGES AND THE RISKS

QUESTION:

 WHICH IS OUR CALLING, OUR VOCATION?

TO AVOID DECISION BY OTHERS (PEOPLE OR MACHINES)

QUESTION:

 WHICH IS OUR AMBITION?

TO CHOOSE, TO CHOOSE, TO CHOOSE

AND ABOUT VALUES?

OPTION: DON’T BE SURPRISED

MORALITY, ETHIC, INEQUALITY
THANK YOU!

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