



Internet das Coisas

Hermano Pereira

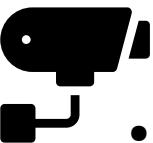
31 de outubro de 2017



Agenda

- Introdução
- As Três Fases
- As Três Gerações
- Como é hoje?
- Desafios
- Mudanças na Internet
- O que temos hoje?
- O que virá?
- Crítica
- Considerações

Introdução



- Internet das Coisas

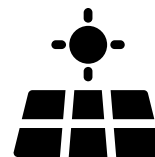
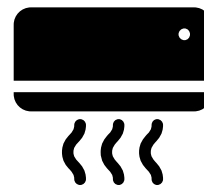
- *Internet of Things (IoT)*
- 1999 - Kevin Ashton (RFID + Internet)

- Transformar 'coisas' do cotidiano em objetos inteligentes e conectados à Internet.

- Indústria 4.0

- Coisas Inteligentes

- *Smart Home, Smart Grid, Smart Health, Smart Cities ...*



As Três Fases



As Três Fases

Internet



Três fases



Rede de Computadores



As Três Fases

Internet



Três fases



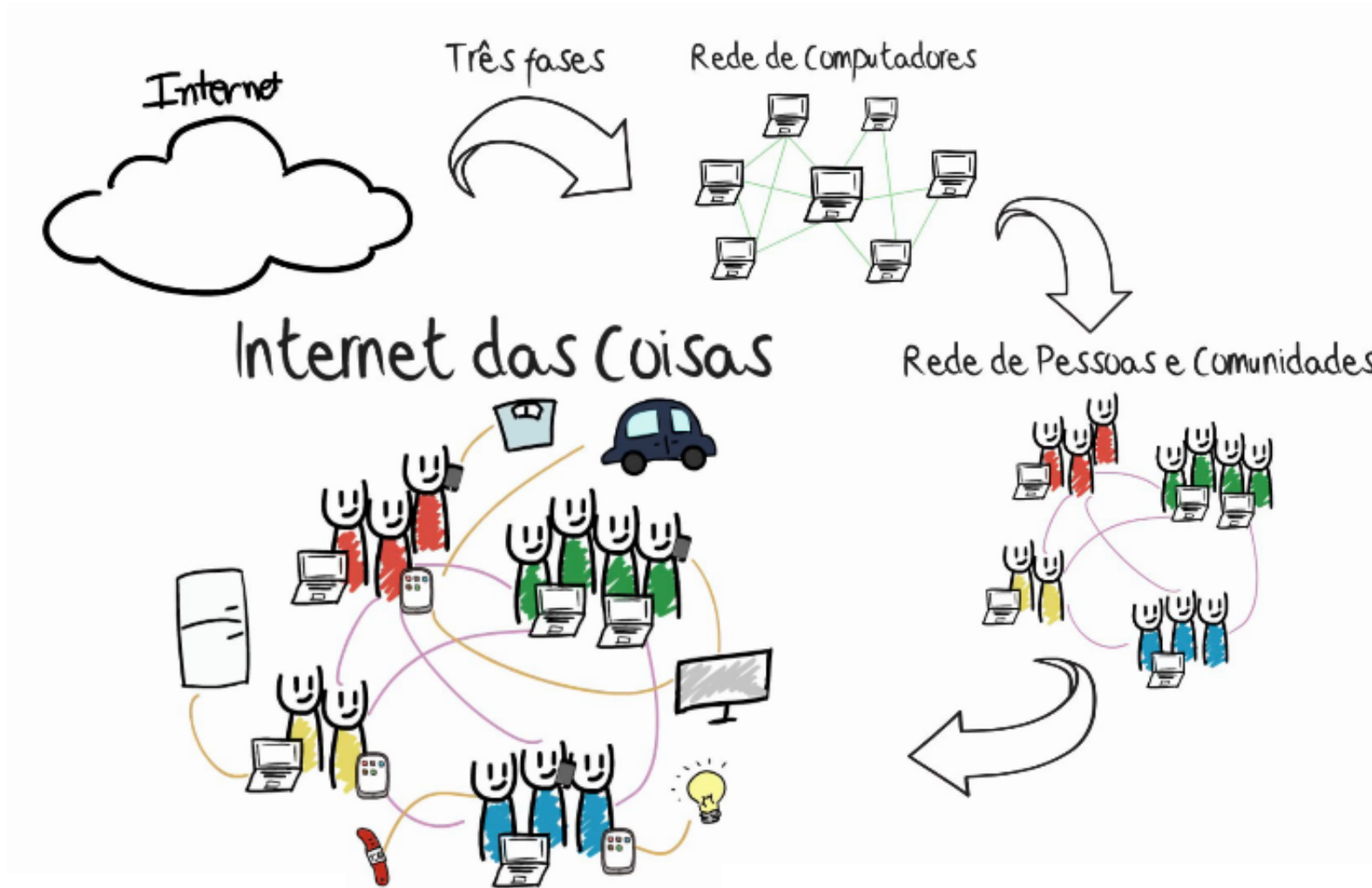
Rede de Computadores



Rede de Pessoas e Comunidades



As Três Fases





As Três Gerações

As Três Gerações

1 - objetos marcados



As Três Gerações

1 - objetos marcados



2 - objetos na web



As Três Gerações

1 - objetos marcados



2 - objetos na web



3 - objetos na nuvem





Como é hoje?

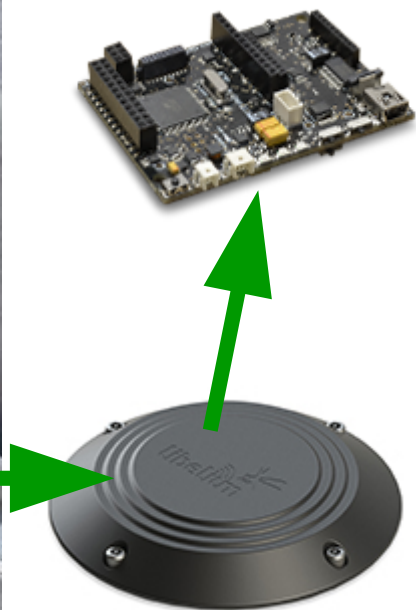
Como é hoje?



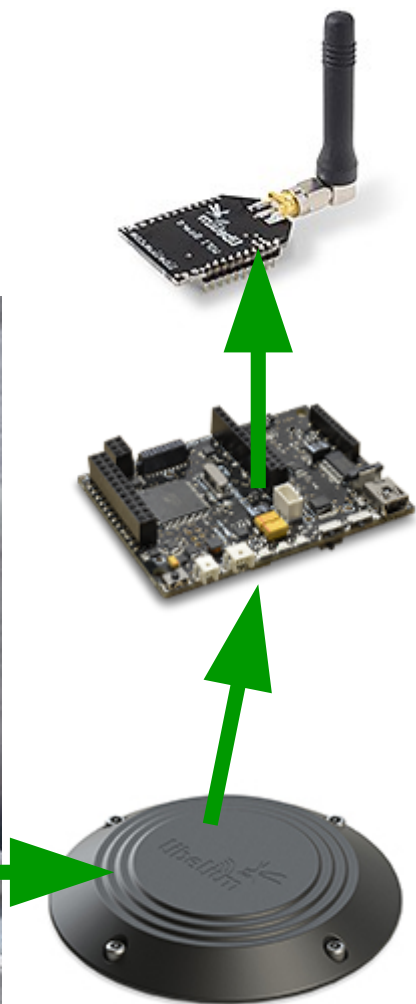
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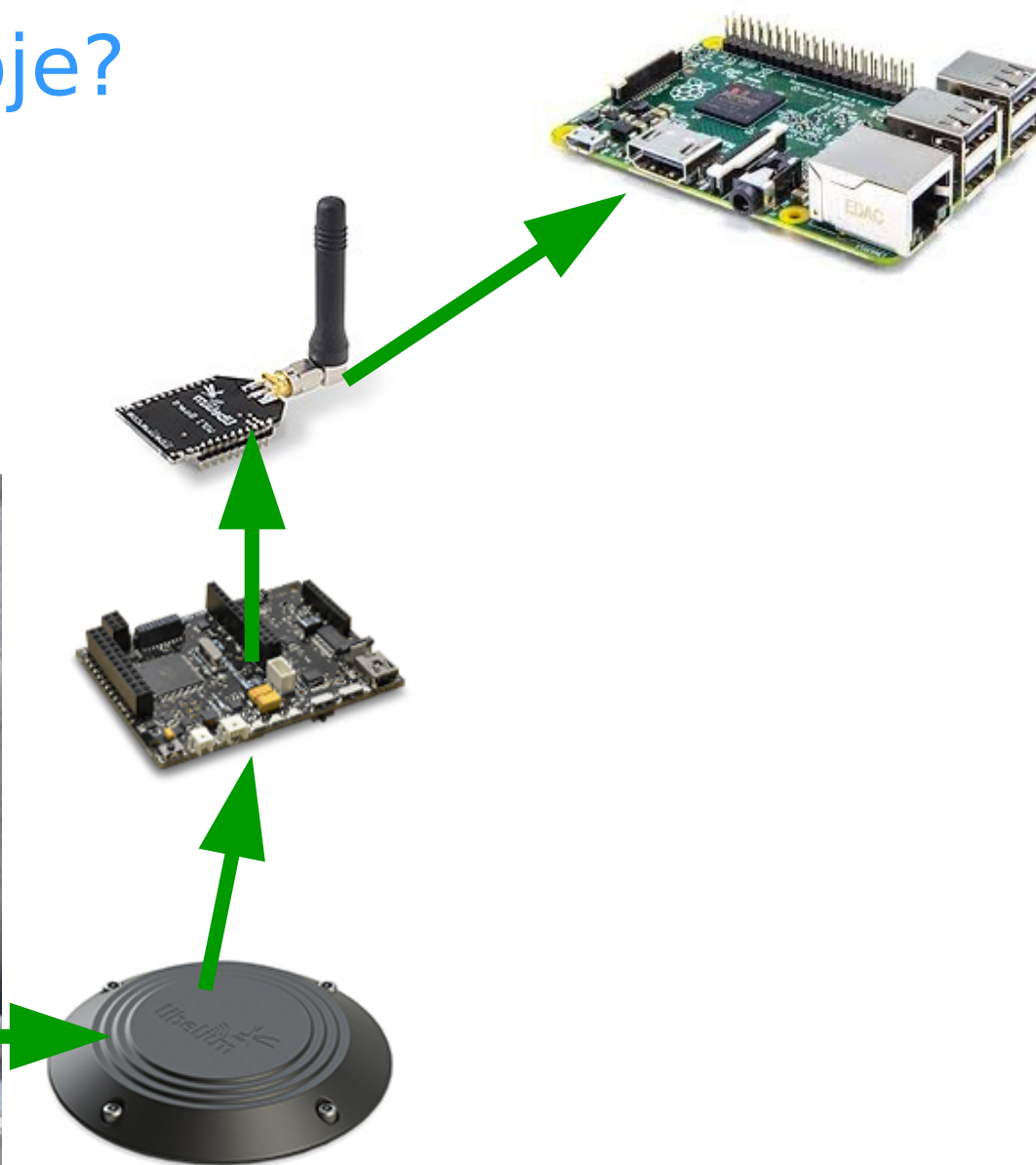
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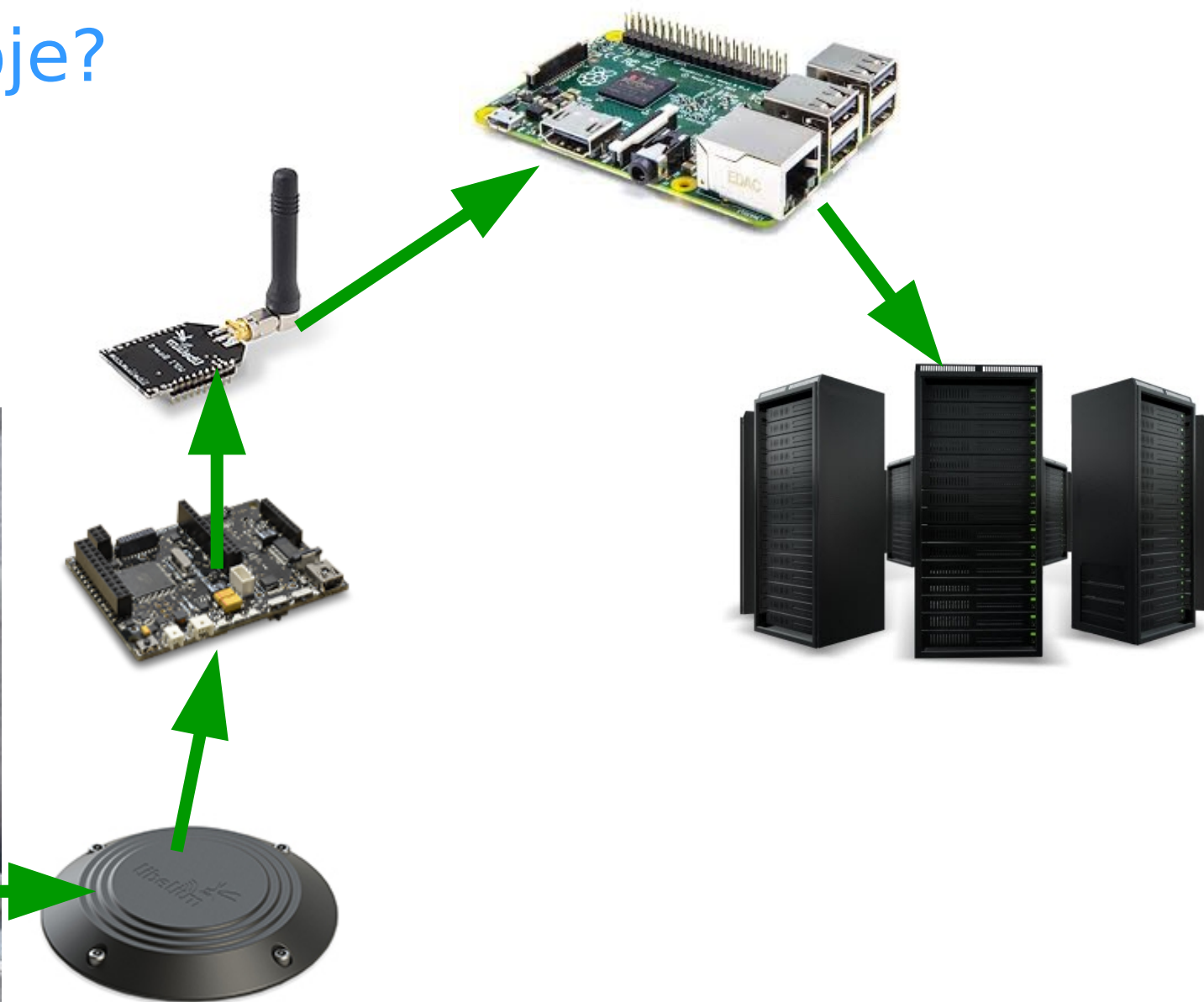
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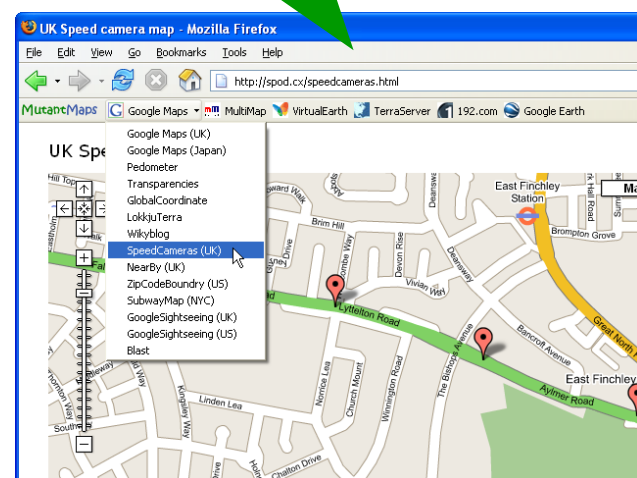
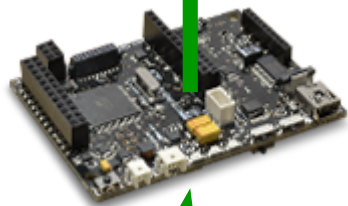
Como é hoje?



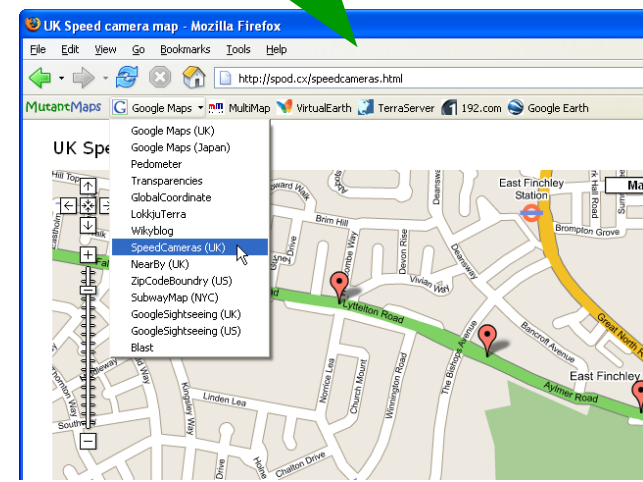
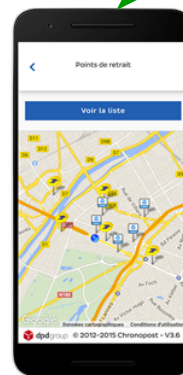
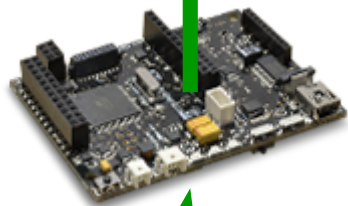
Como é hoje?



Como é hoje?



Como é hoje?



Como é hoje?

Dados – Mundo Real



Coleta
Coordenação

Dados – Mundo Virtual

Rede
Sem Fio



Sistema
Operacional



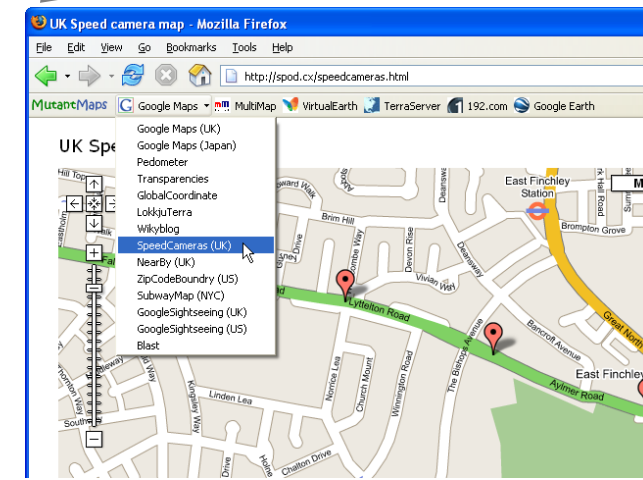
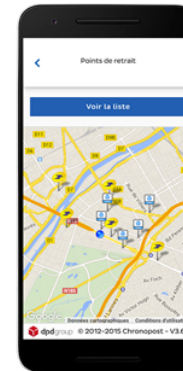
Web/Nuvem



Hardware



Sensores



Como é hoje?



Coleta
Coordenação



Dados – Mundo Virtual

Dados – Mundo Real

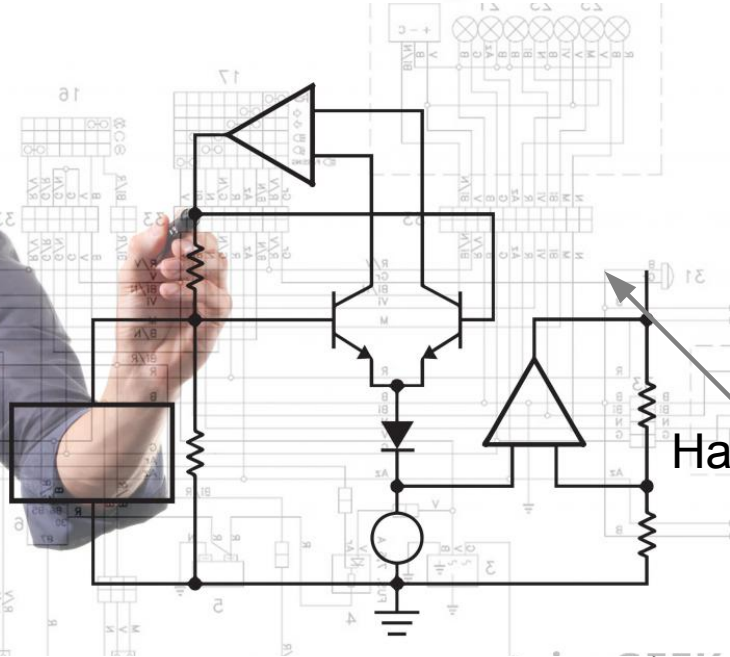
Rede
Sem Fio



Sistema
Operacional

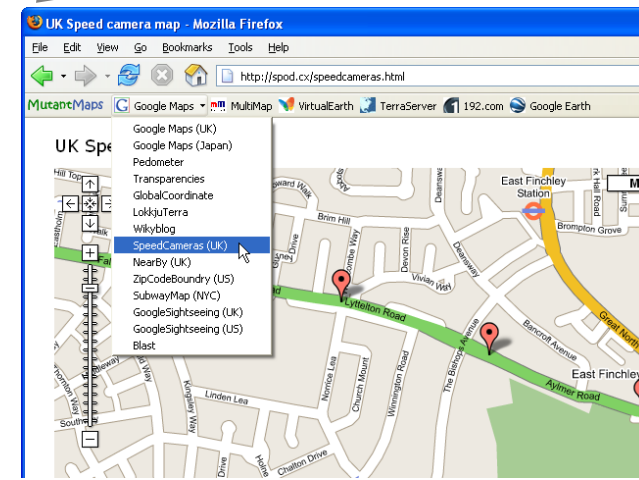
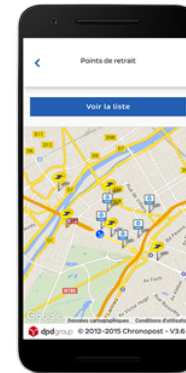


Web/Nuvem

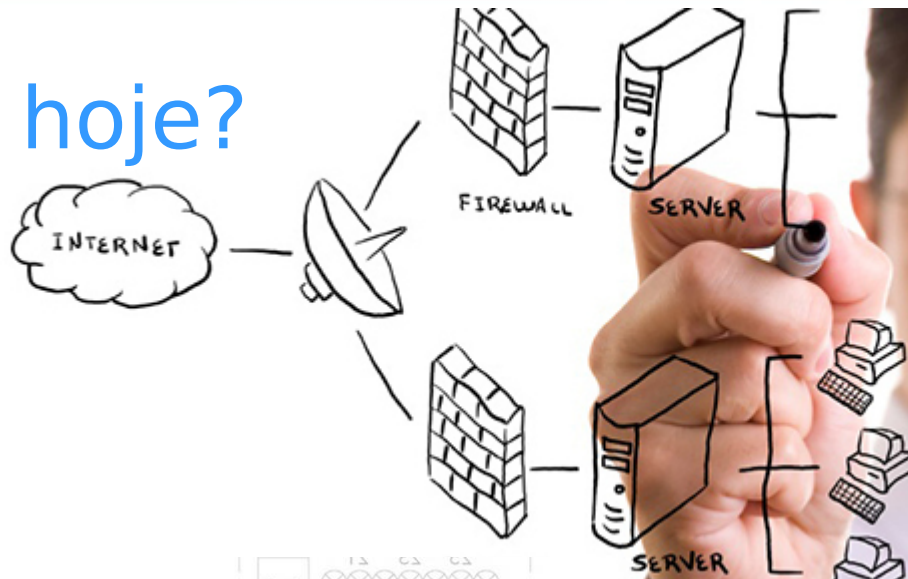


Hardware

Sensores



Como é hoje?

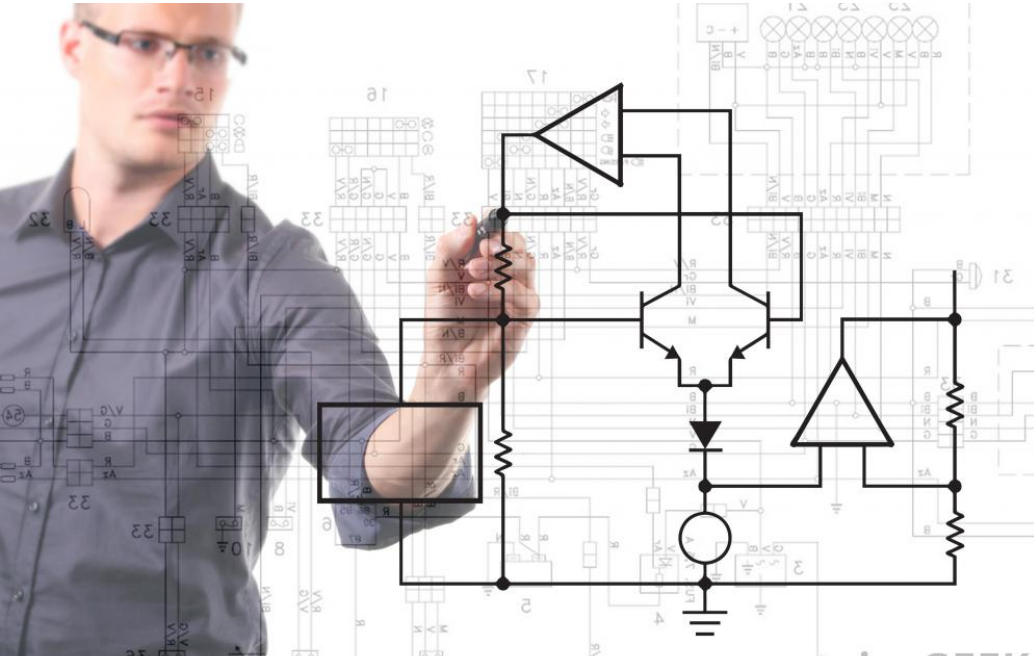
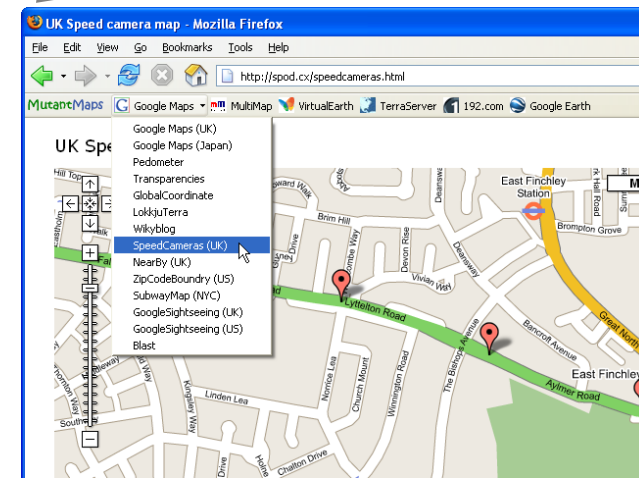
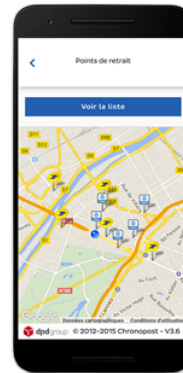


Coleta
Coordenação

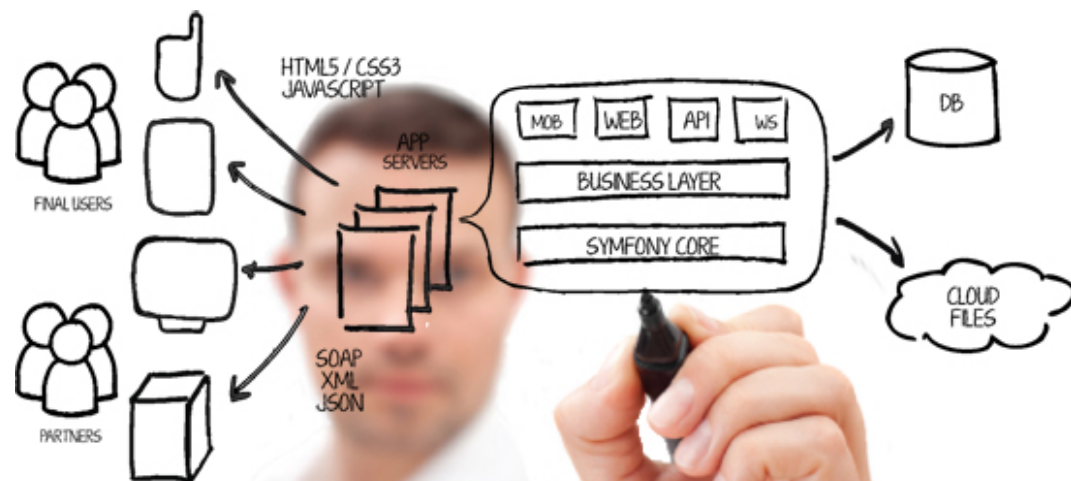
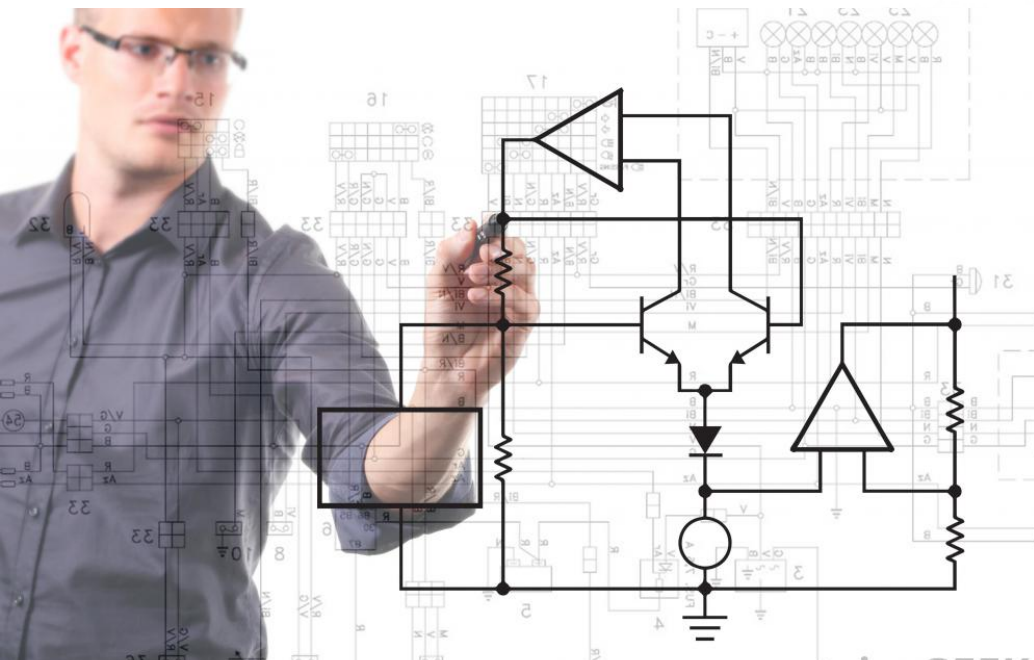
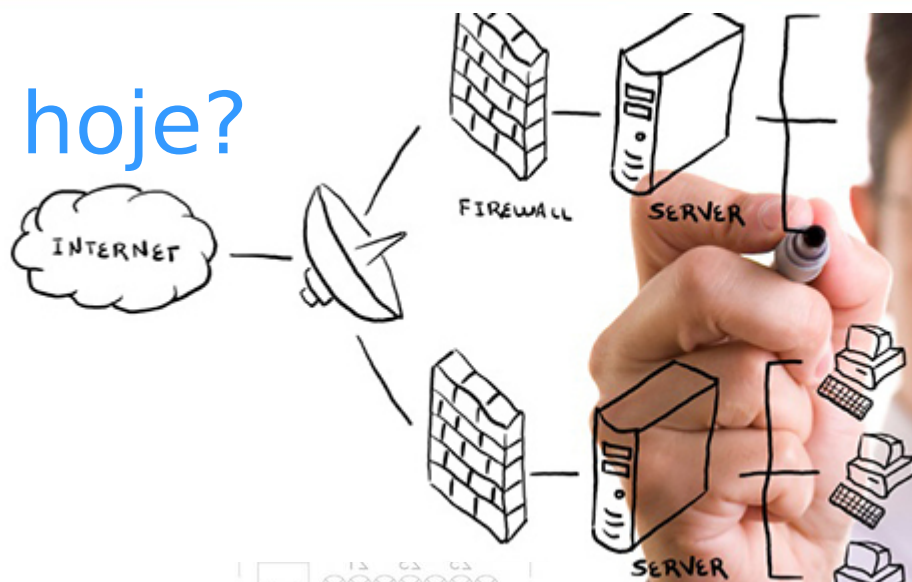
Dados – Mundo Virtual



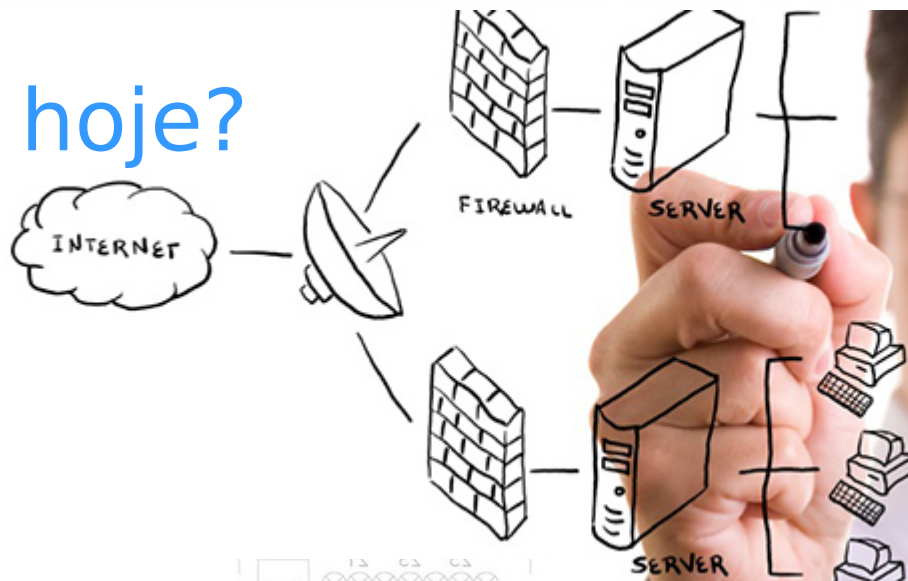
Web/Nuvem



Como é hoje?

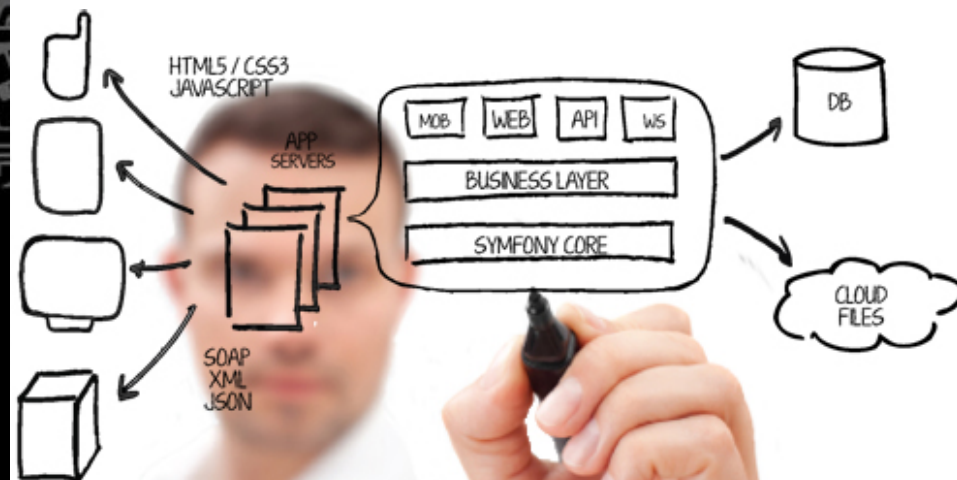
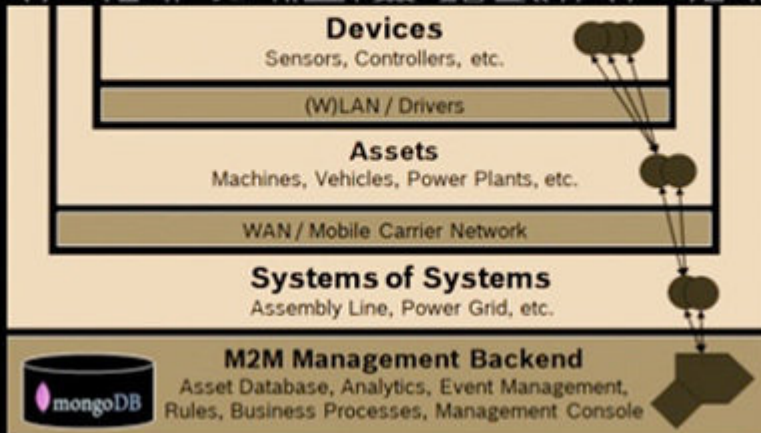


Como é hoje?



Bosch

- Scale
- B Flexibility
- C Analytics
- D



Como é hoje?



Cisco

Manufacturing Mining Energy Utility Oil and Gas Transportation City Defense SP/M2M

Connected Factory • Connected Train • City Safety and Security • Energy Distribution Automation • Connected Well

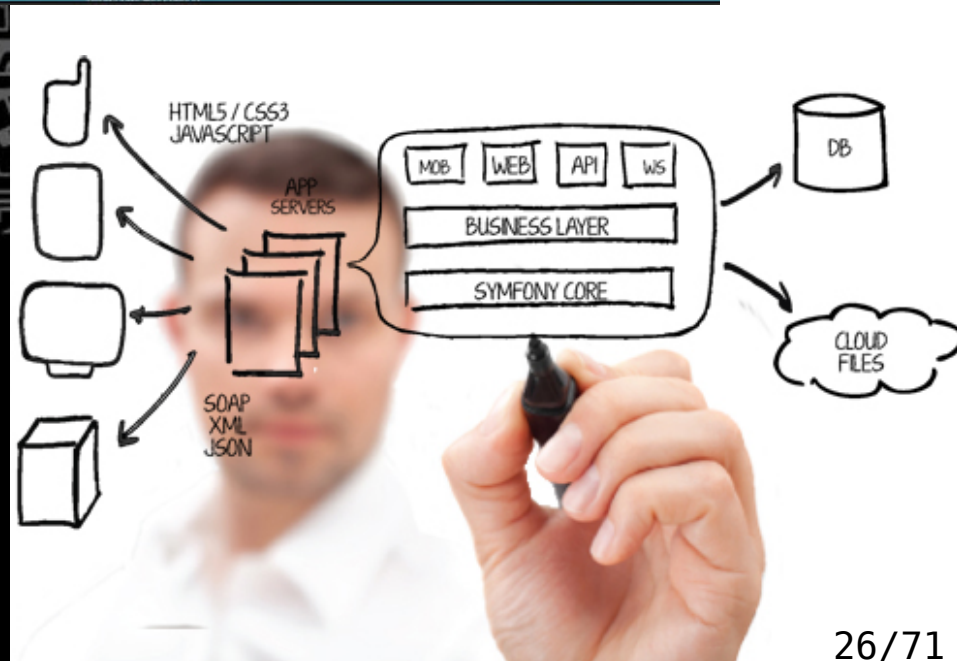
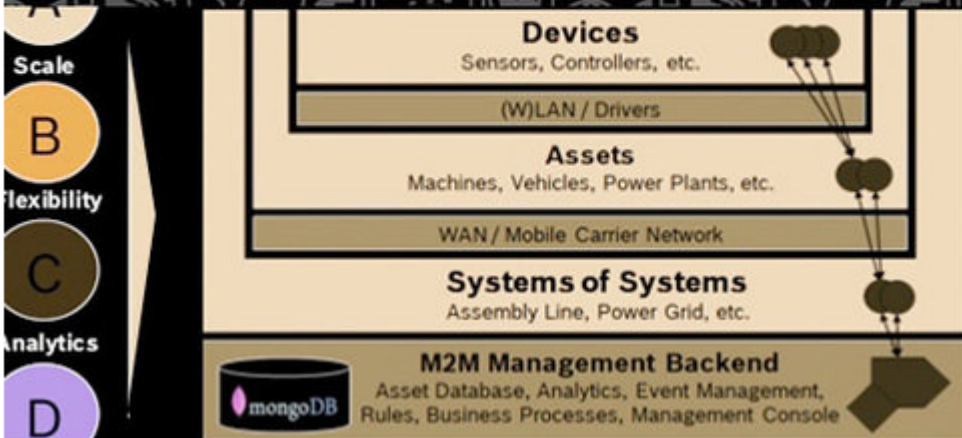
Industrial Switching E 2000 E 2000 CQ2000 Ps7 E 4100 IE 5000	Industrial Routing CQR 2010 ASR 903	Industrial Wireless Field AP - 1552 Industrial AP (Rackwall) Field AP - IW3700 802.11ac Positive Train Control	Field Network ODR 1000 8194 8194 820H 820H	Embedded Networks 5900 ESP ESS 3520 Switches 5921 ESP Software Router	Connected Safety & Security Video Surveillance Manager and IP Cameras Physical Access Manager	Digital Media DMM Digital Media Manager Digital Media Processing
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IoT Security

Application Enablement [Fog Computing/IOx]

Management

Bosch



Como é hoje?

Cisco

Manufacturing

Mining

Energy Utility

Oil and Gas

Transportation

City

Defense

SP/M2M

Connected Factory • Connected Train • City Safety and Security • Energy Distribution Automation • Connected Well

Industrial Switching	Industrial Routing	Industrial Wireless	Field Network	Embedded Networks	Connected Safety & Security	Digital Media
IE 2000 IE 2000 C2000-00 Ie 7 IE 4100 IE 5000	CQR 2010 ASR 903	Field AP - 1552 Industrial AP (Rackwall) Field AP - IW3700 802.11ac Positive Train Control	ODR 1000 8194 8194 820H 820H	5900 ESP ESS 3520 Switches 5921 ESP Software Router	Video Surveillance Manager and IP Cameras Physical Access Manager	DMM Digital Media Manager Digital Media Processing

IoT Security

Bosch

Scale

B

Flexibility

C

Analytics

D

Amazon Web Services

AWS IoT

AWS IoT DEVICE SDK
Set of client libraries to connect, authenticate and exchange messages

AUTHENTICATION & AUTHORIZATION
Secure with mutual authentication and encryption

DEVICE GATEWAY
Communicate with devices via MQTT, WebSockets, and HTTP 1.1

RULES ENGINE
Transform device messages based on rules and route to AWS Services

MESSAGES → **amazon web services**

MESSAGES → **APPLICATIONS**

DEVICE SHADOWS
Persistent device state during

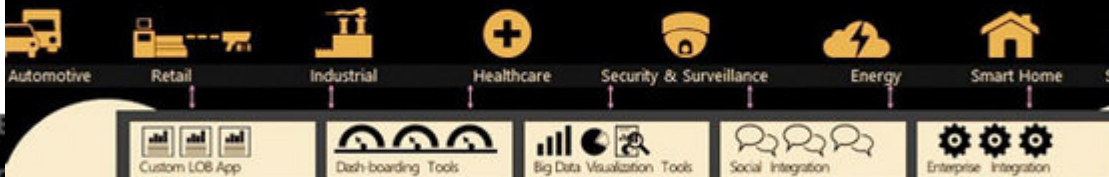
APPLICATIONS
Applications can connect to shadows at any time using an API

Como é hoje?

Cisco

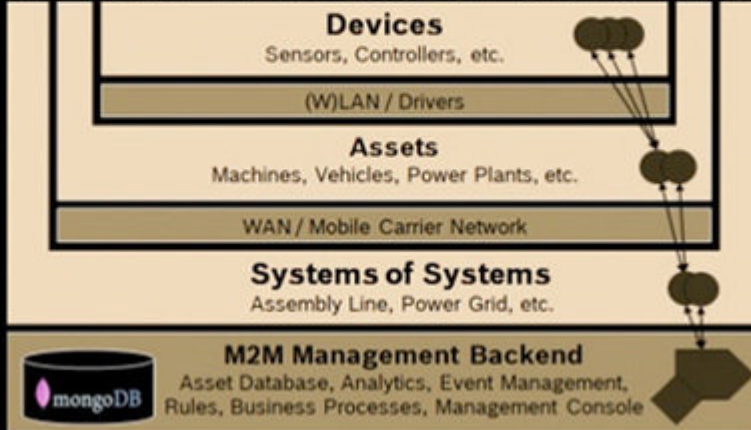
Microsoft

Microsoft IoT Solution Architecture

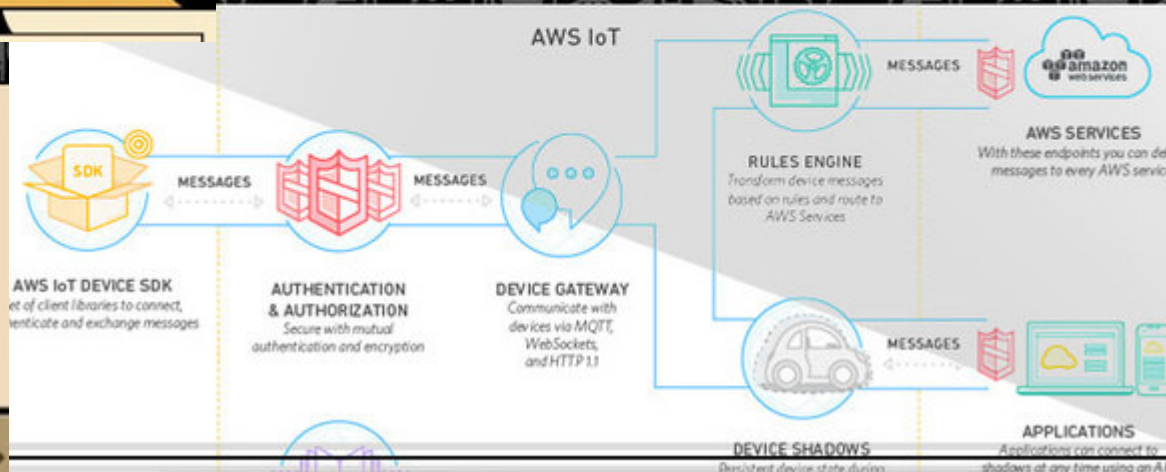


Microsoft Internet of Things Services

Scale
B
Flexibility
C
Analytics
D



Amazon Web Services



Como é hoje?

Cisco

Microsoft

Microsoft IoT Solution Architecture

Automotive Retail Industrial Healthcare Security & Surveillance Energy Smart Home

Custom LOB App Dash-boarding Tools Big Data Visualization Tools Social Integr

Microsoft Internet of Things Service

Scale
B
Flexibility
C
Analytics
D

Devices

Sensors, Controllers, etc.

(WLAN / Drivers

Assets

Machines, Vehicles, Power Plants, etc.

WAN / Mobile Carrier Network

Systems of Systems

Assembly Line, Power Grid, etc.

M2M Management Backend

Asset Database, Analytics, Event Management, Rules, Business Processes, Management Console



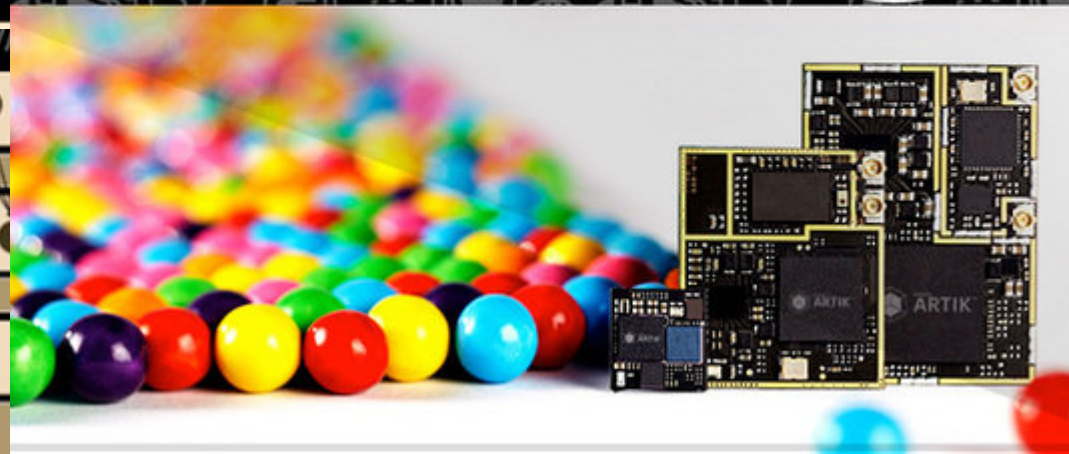
Oil and Gas Transportation City Defense SP/M2M

Safety and Security • Energy Distribution Automation • Connected Well

Field Network ODR 1000 8194 8190 98 508 820H 830H	Embedded Networks 5900 ESP, ESS 3520 Switches 5921 ESP Software Router	Connected Safety & Security Video Surveillance Manager and IP Cameras Physical Access Manager	Digital Media DMM Digital Media Manager Digital Media Processing
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IoT Security

Samsung



amazon AWS SERVICES

With these endpoints you can do messages to every AWS service

APPLICATIONS

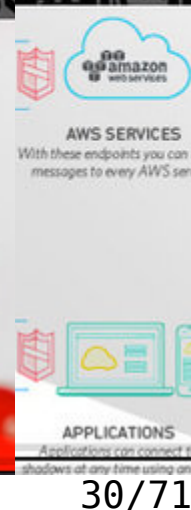
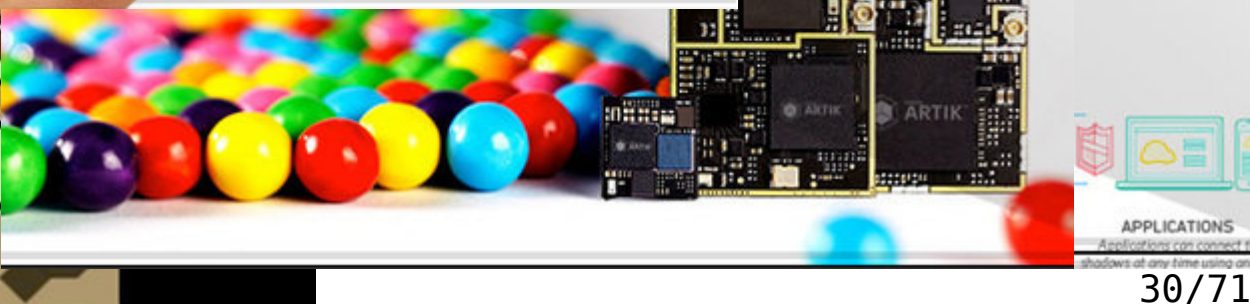
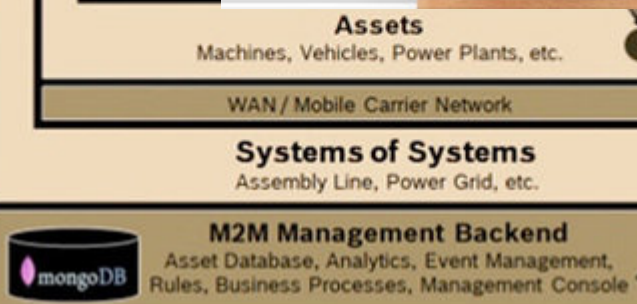
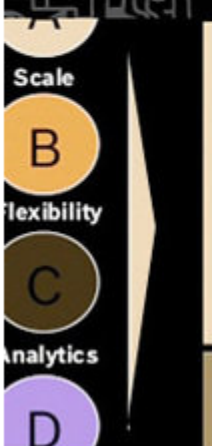
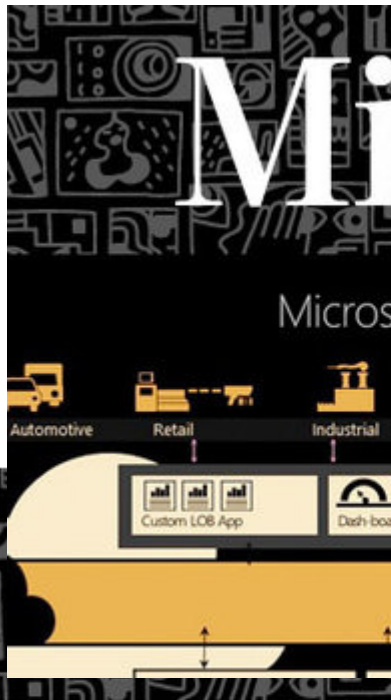
Applications can connect to shadows at any time using an API

Como é hoje?

Cisco

Microsoft

Google





Como é hoje?

Alguns problemas hoje:

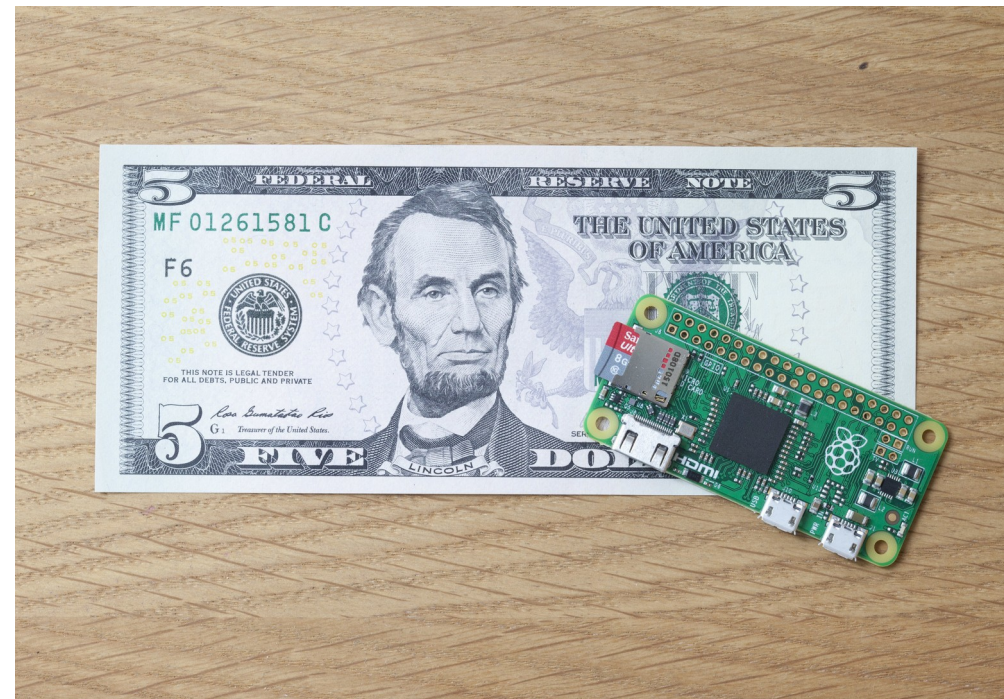
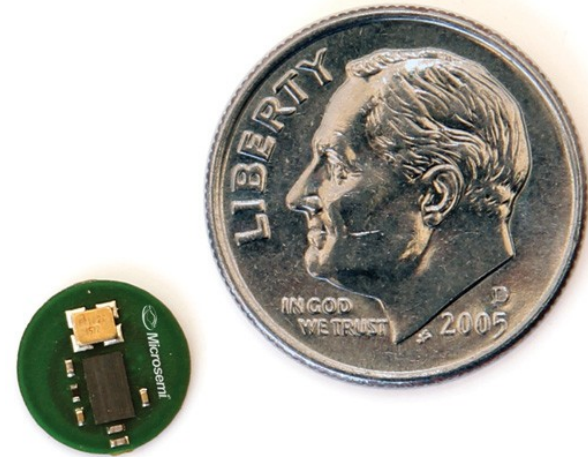
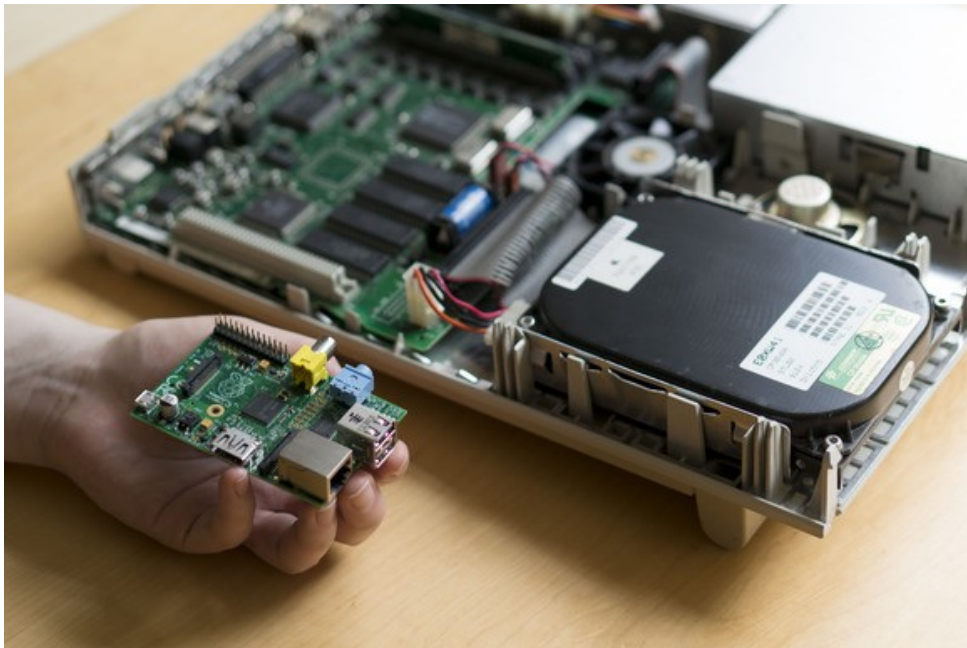
- Faltam profissionais
- Incompatibilidade entre produtos



Desafios

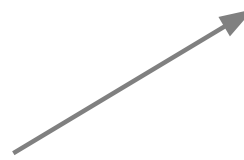
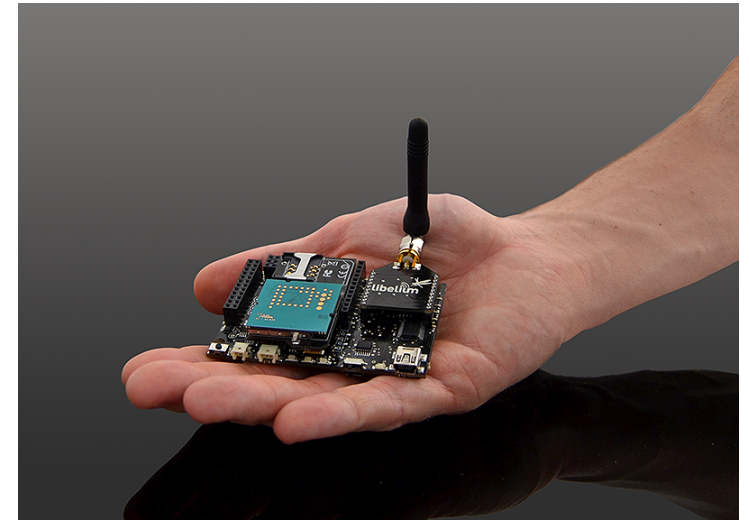
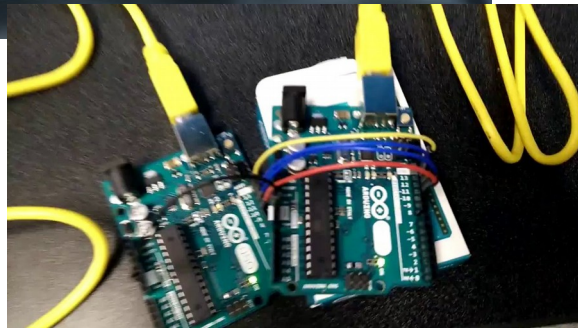
Desafios

- Miniaturização



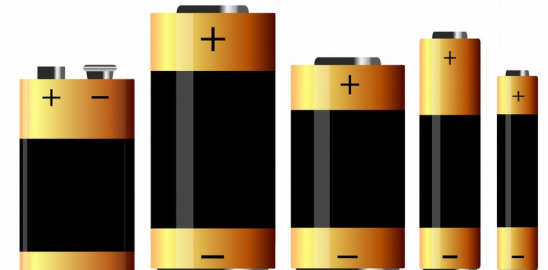
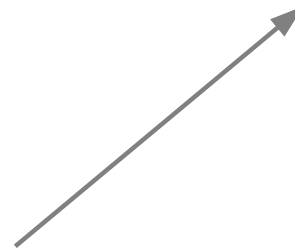
Desafios

- Miniaturização
- Comunicação Sem Fio



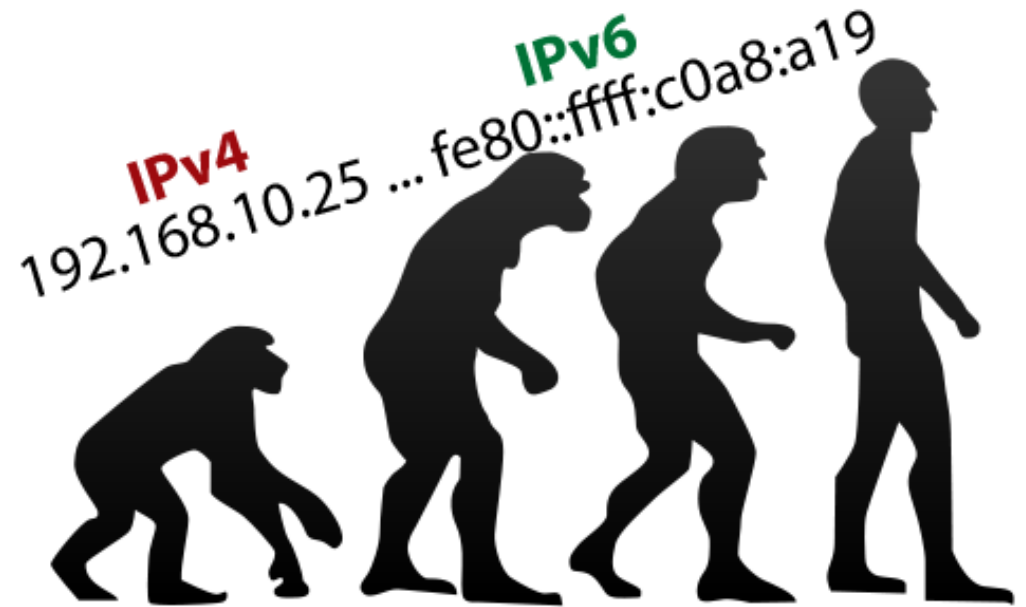
Desafios

- Miniaturização
- Comunicação Sem Fio
- Eficiência Energética



Desafios

- Miniaturização
- Comunicação Sem Fio
- Eficiência Energética
- Internet



Desafios

- Miniaturização
- Comunicação Sem Fio
- Eficiência Energética
- Internet
- Segurança





Desafios

- Miniaturização
- Comunicação Sem Fio
- Eficiência Energética
- Internet
- Segurança



Mudanças na Internet

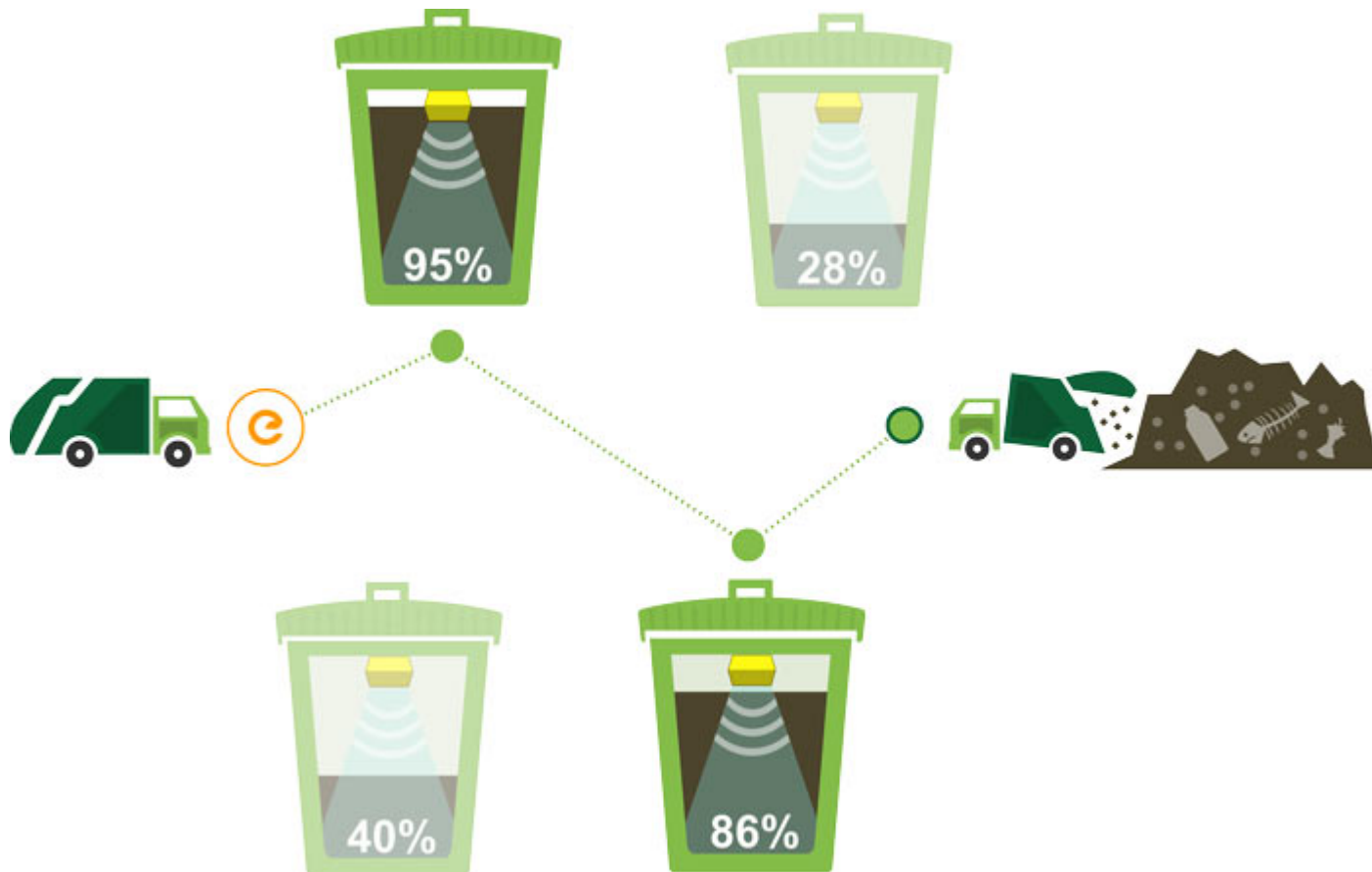
- Adaptação do Protocolo **IPv6** → **6LoWPAN**
- Protocolo próprio de **roteamento** → RPL
- Protocolo próprio para **web** → CoAP



O que temos hoje? (Cidade Inteligente)

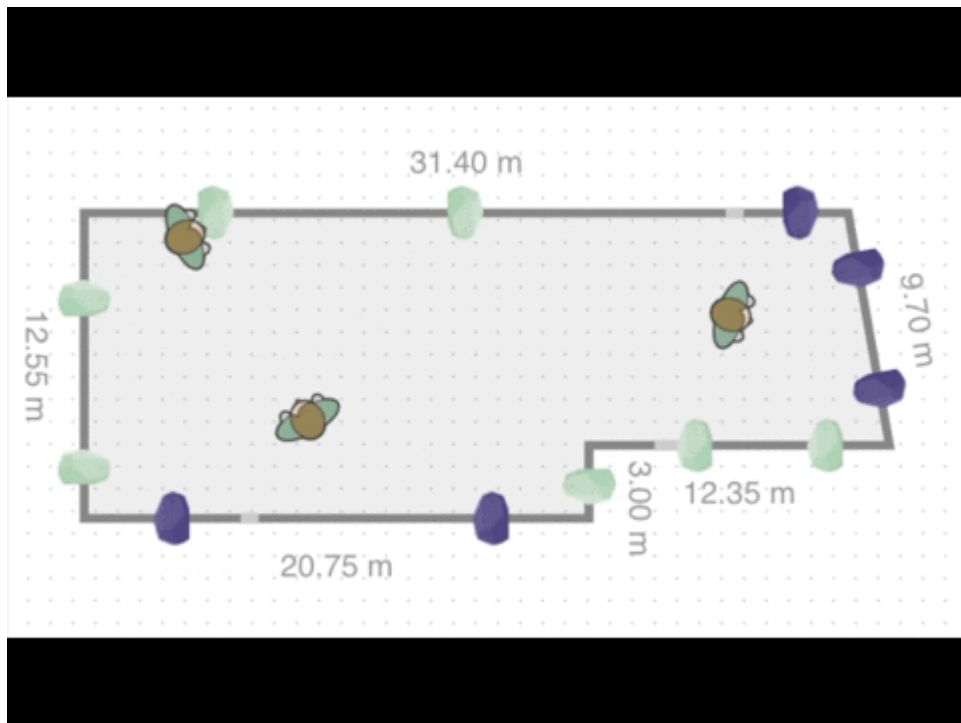
O que temos hoje? (Cidade Inteligente)

- Coleta de Lixo (enevo.com) – Cidade economia até 50%
 - Rotterdam (Holanda)



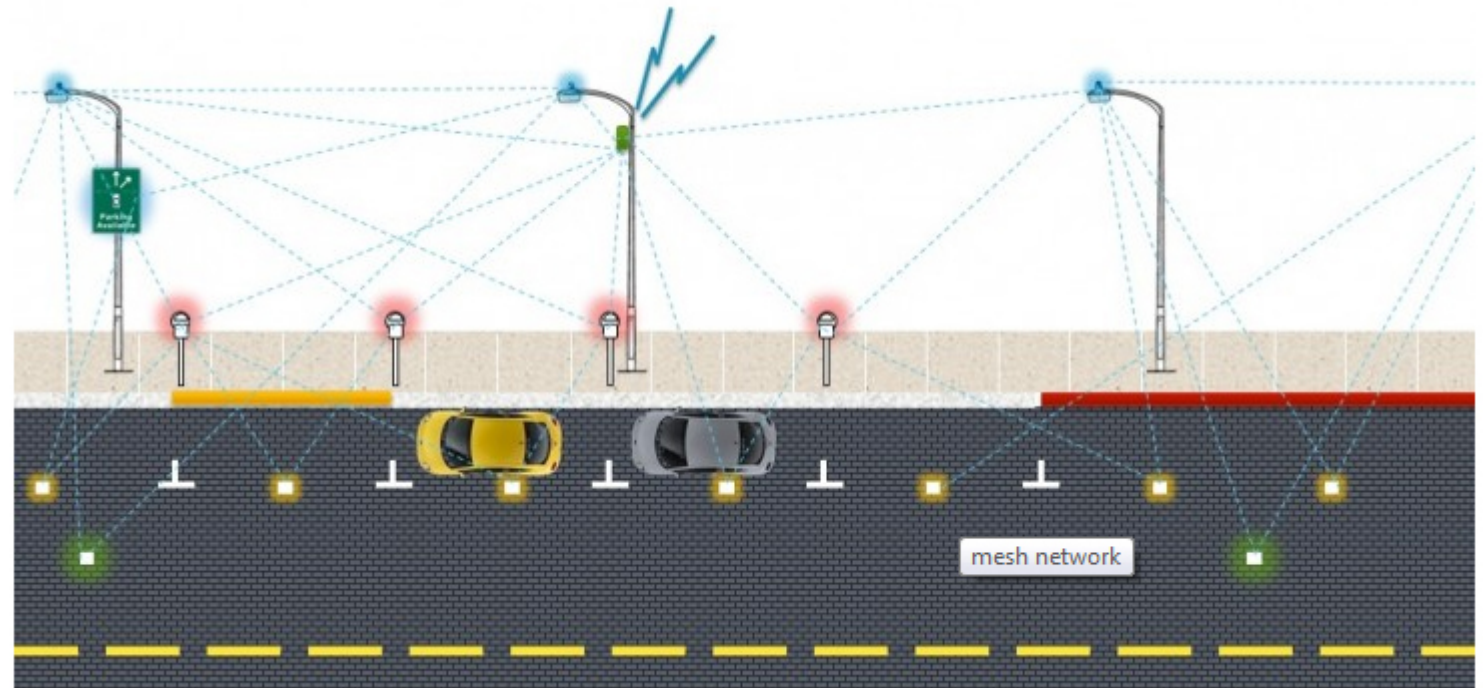
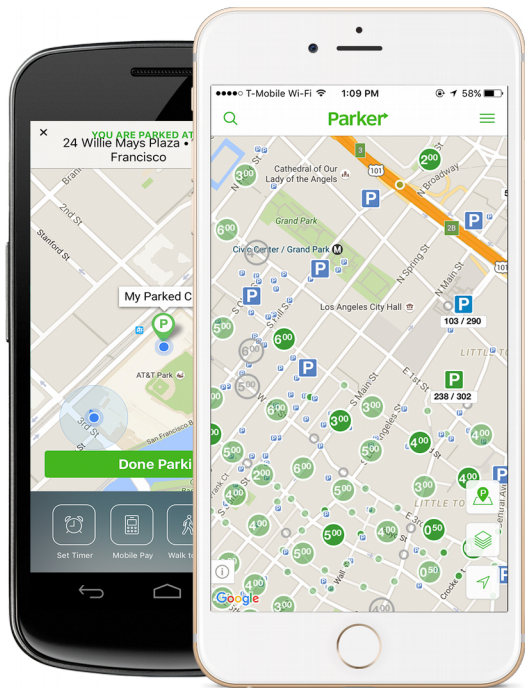
O que temos hoje? (Cidade Inteligente)

- Estimote - Localização Indoor (Tecnologia de Beacons)
 - Camp Nou - FCBarcelona



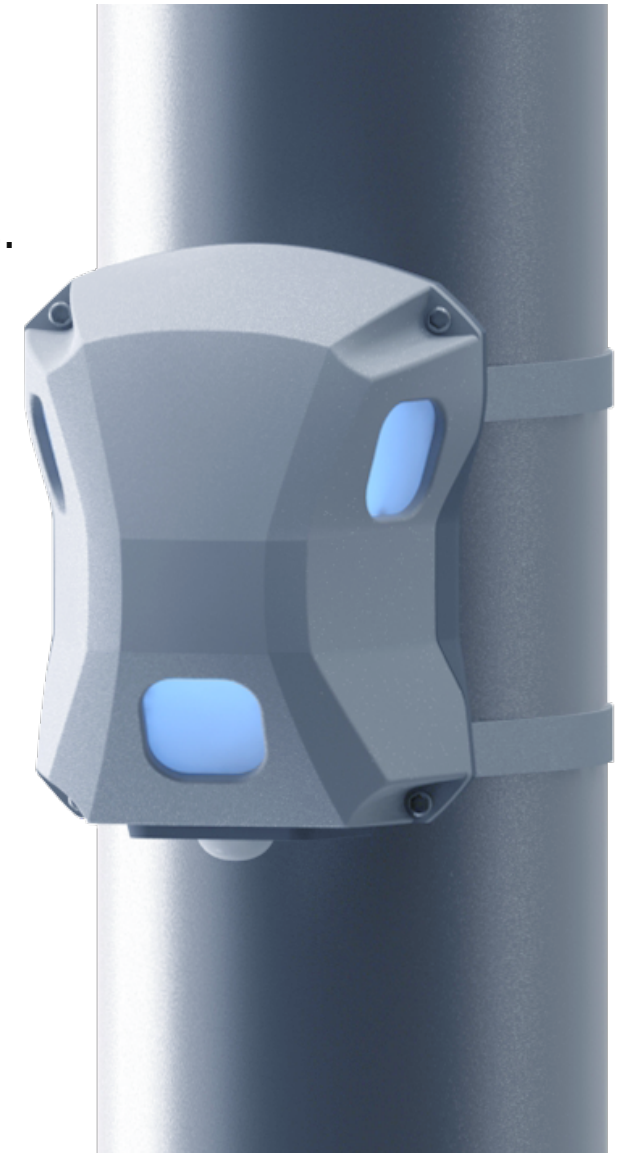
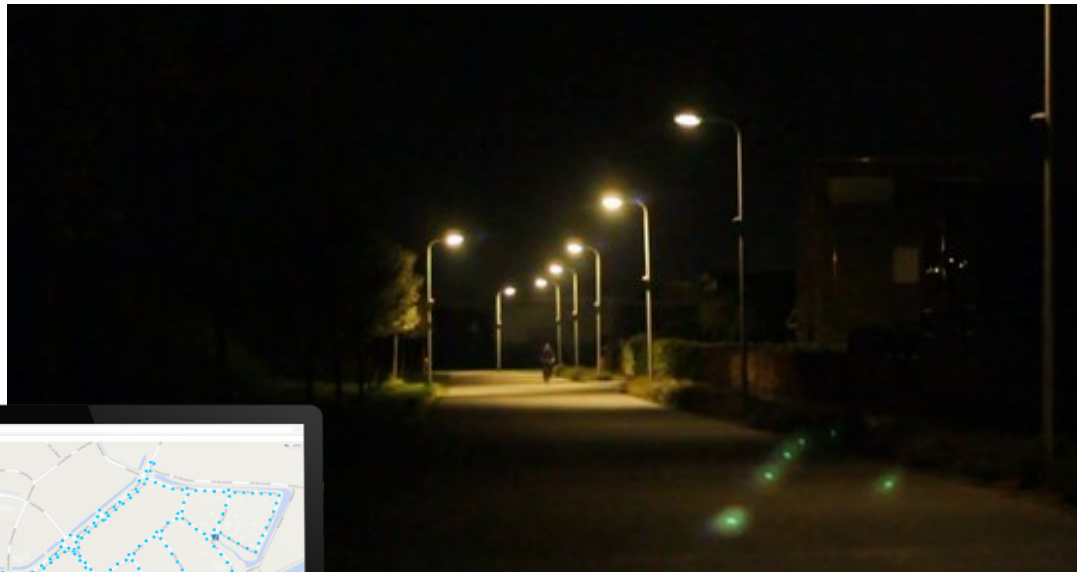
O que temos hoje? (Cidade Inteligente)

- Streetline.com – Estacionamento Inteligente – Cidades EUA
 - Reduz congestionamento e emissão de gases



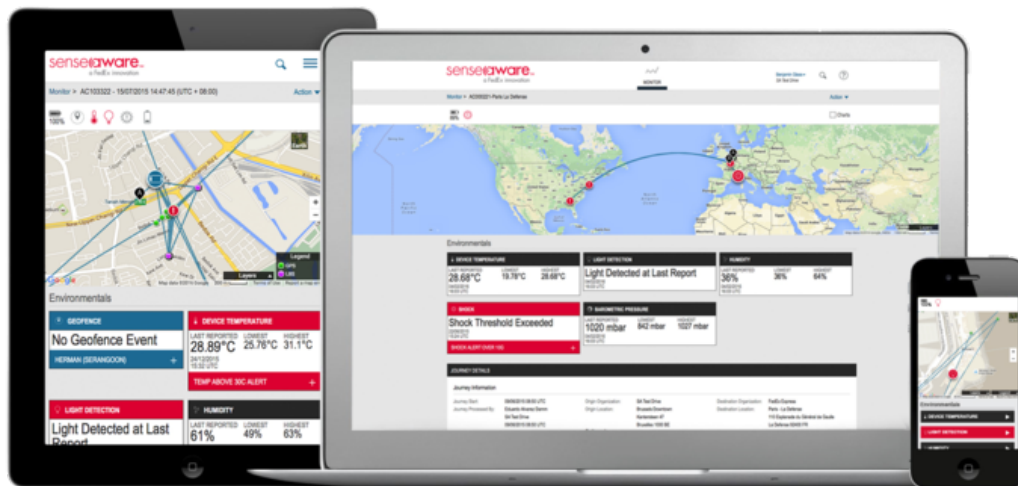
O que temos hoje? (Cidade Inteligente)

- Smart Lighting (tvilight.com)
 - Detecta presença de pedestres, ciclistas, carros.
 - Vila de Nuenen - Holanda



O que temos hoje? (Empresa Inteligente)

- SenseAware (FedEx)
 - Monitoração de Entrega de Pacotes (logística)
 - Temperatura, umidade, pressão, exposição/luz, localização, etc.



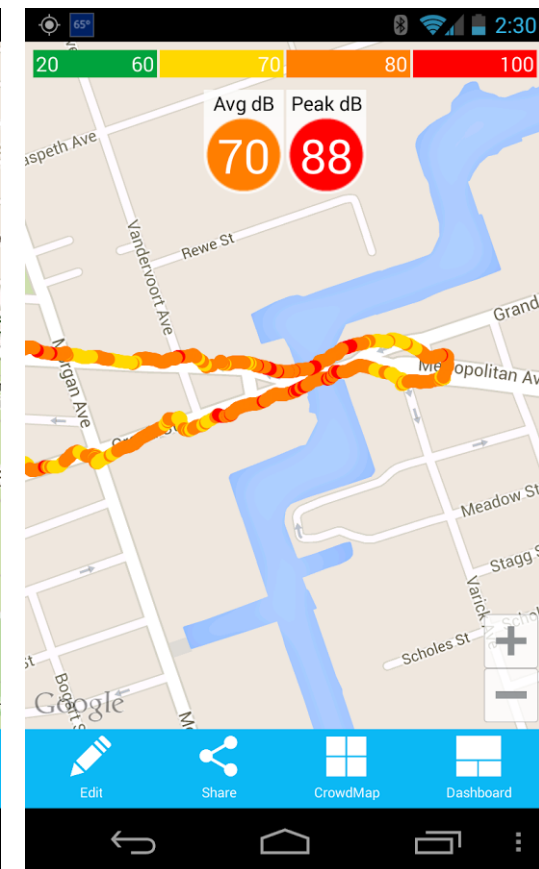
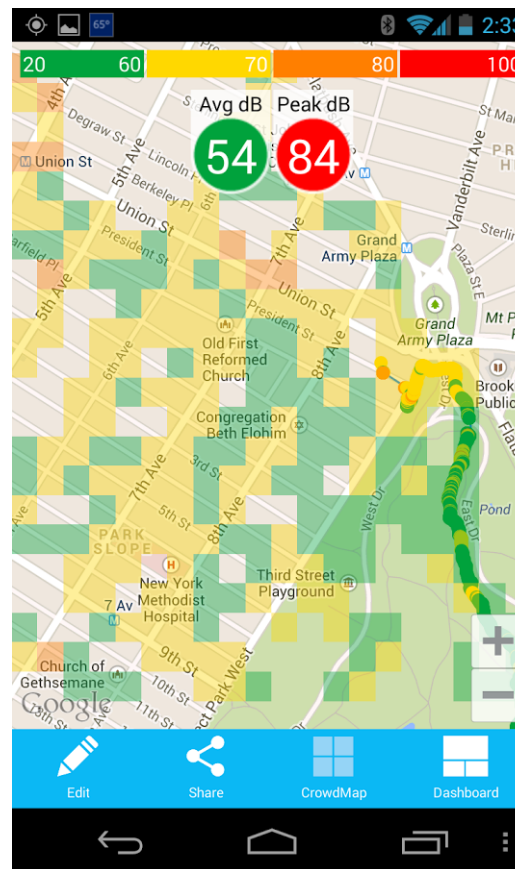
O que temos hoje? (Empresa Inteligente)

- SmartGlasses (smartpick.be)
 - Localização de produtos/empresa
 - Ex. de uso: Continental, Audi



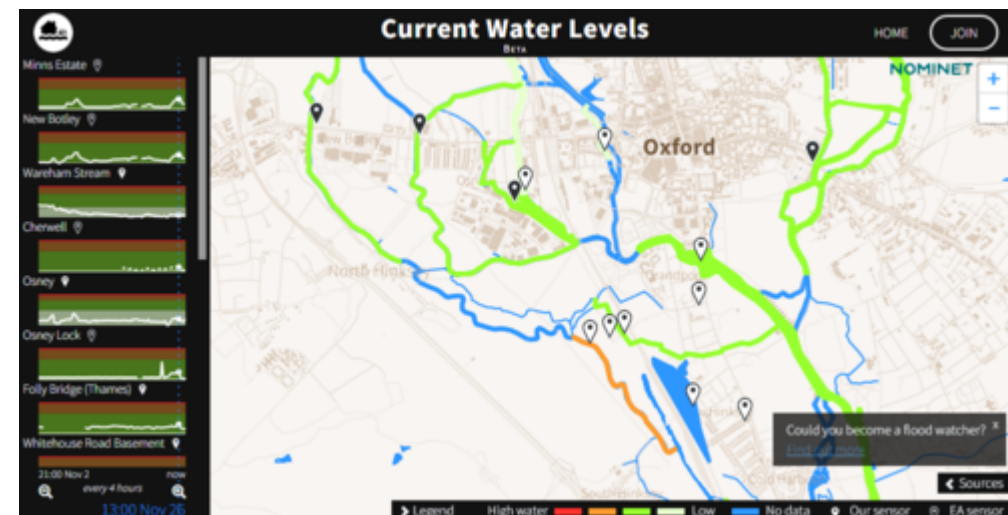
O que temos hoje? (Ambiente Inteligente)

- AirCasting.org – Vários lugares EUA (opensource)
 - Qualidade do Ar
 - Som, temperatura, poluição



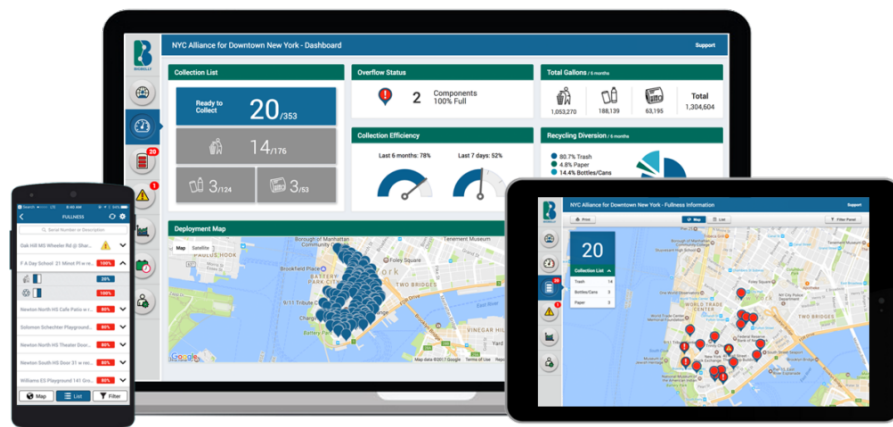
O que temos hoje? (Ambiente Inteligente)

- Flood Network (ex: Oxford - ING)
 - Detecção de inundação
 - <https://map.flood.network/>



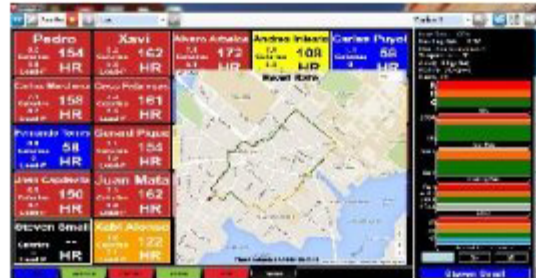
O que temos hoje? (Ambiente Inteligente)

- Lixeira inteligente – BigBelly.com – Ex. Sydney Music Festival
 - Localização e aviso remoto quando está cheio
 - Alimentação por energia solar



O que temos hoje? (Vestis Inteligentes)

- Zephyr (performance/esporte)
 - Sensores de desempenho (volei, basquete, futebol)



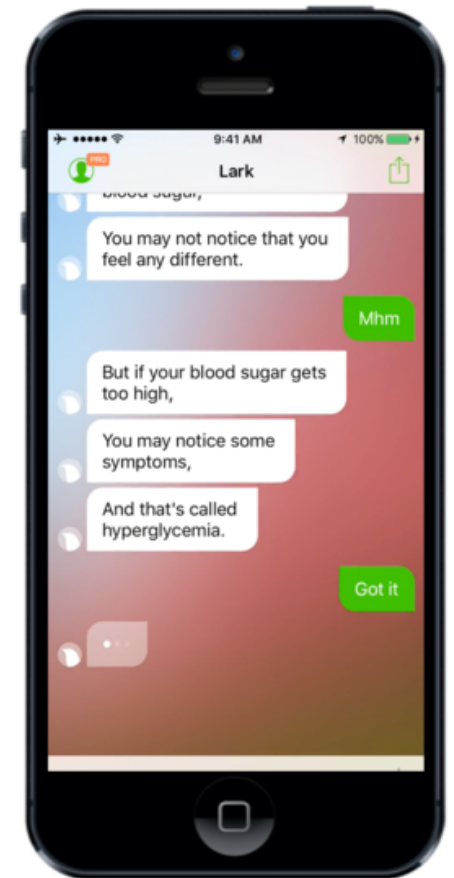
O que temos hoje? (Vestes Inteligentes)

- Electricfoxy (diversas vestes)
 - Colar com fotos digitais,
anel com batimentos,



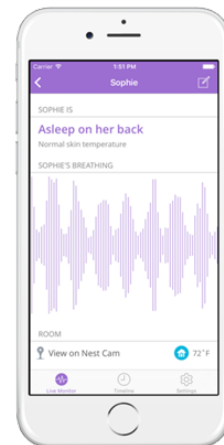
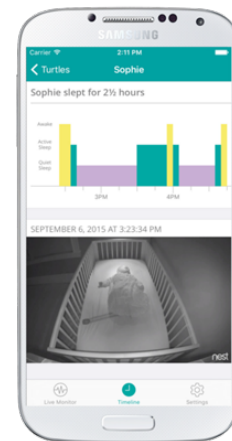
O que temos hoje? (Vestes Inteligentes)

- Lark.com (monitoração de saúde)
 - Diabetes, Hipertensão



O que temos hoje? (Vestis Inteligentes)

- MimoBaby.com (monitoração do bebê)
 - Movimento, temperatura, vídeo.



O que temos hoje? (Casas Inteligentes)

- Nest (soluções de segurança)
 - Vídeo, chaves, alarmes

 Nest · now ▾

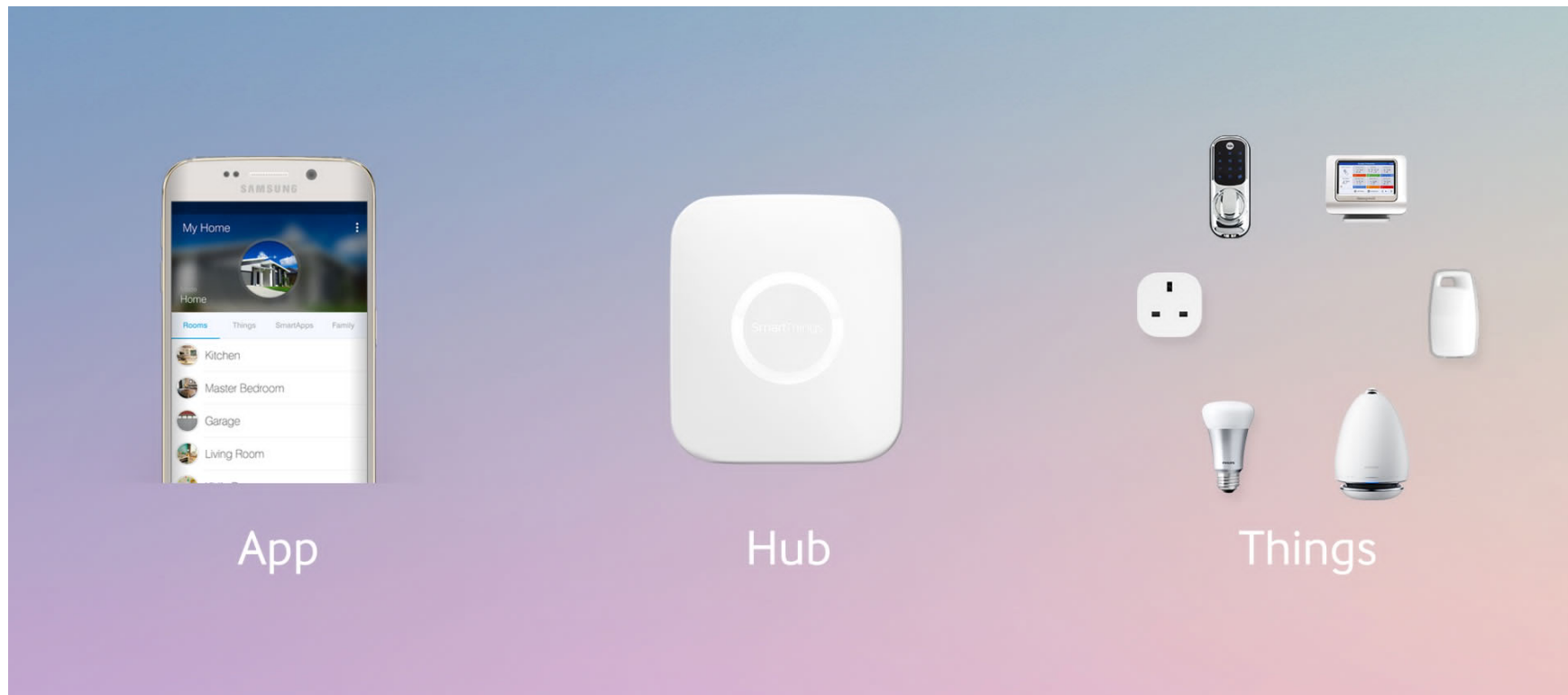
Nest

Looks like you left home. Switch to *Away* and set the alarm?



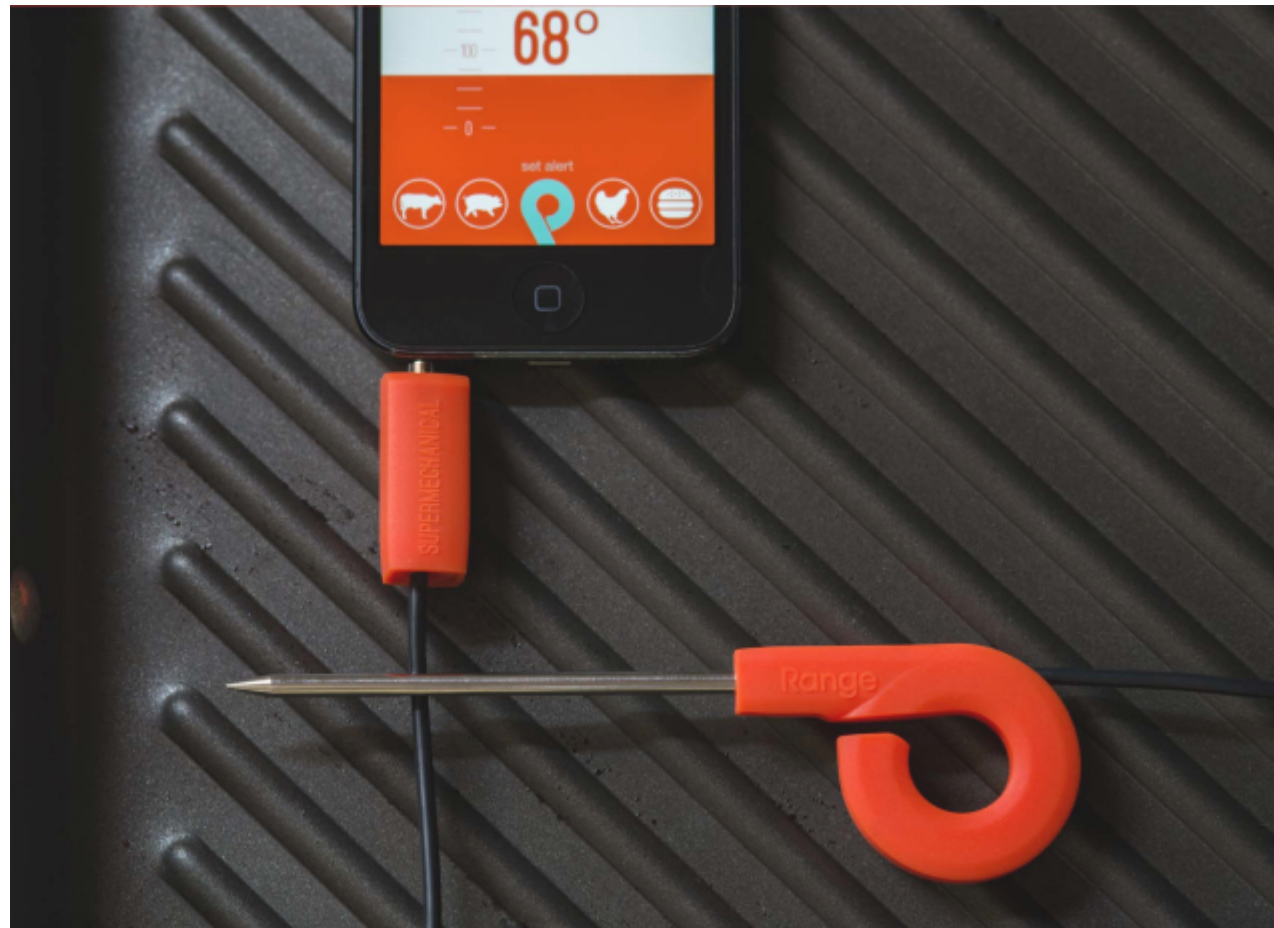
O que temos hoje? (Casas Inteligentes)

- Samsung - SmartThings.com
 - Hub, Sensor de Movimento, Presença, Outlet Energia, etc...



O que temos hoje? (Casas Inteligentes)

- Range (Cozinha Inteligente) – Supermechanical.com



O que temos hoje? (Casas Inteligentes)

- Whistle.com (Localizador para Pets)



O que temos hoje? (Casas Inteligentes)

- MaidOven.com (eletrodomésticos inteligentes)
 - Forno, geladeira, máquina de lavar roupas.



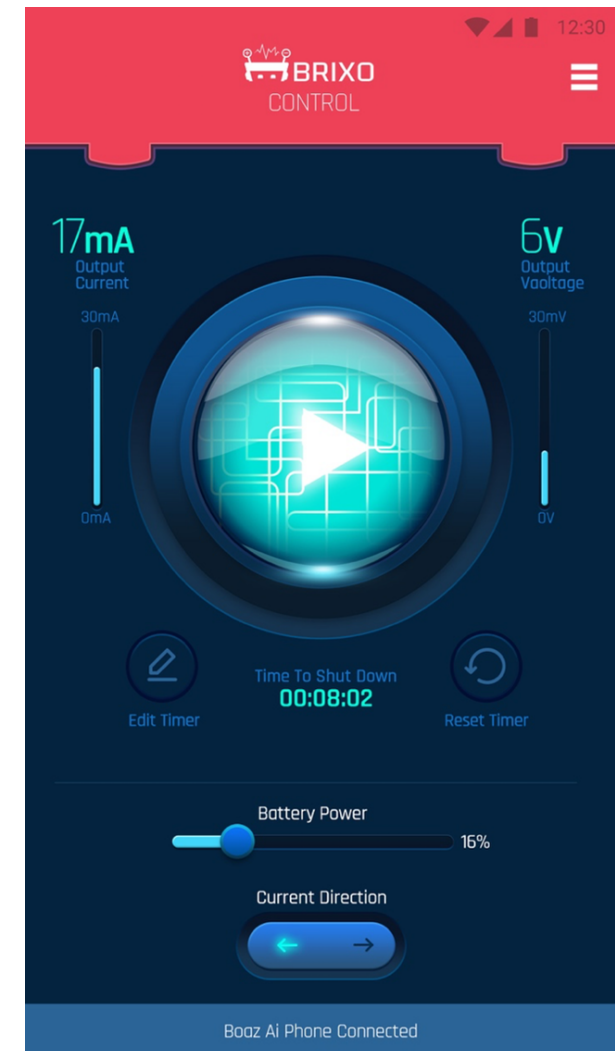
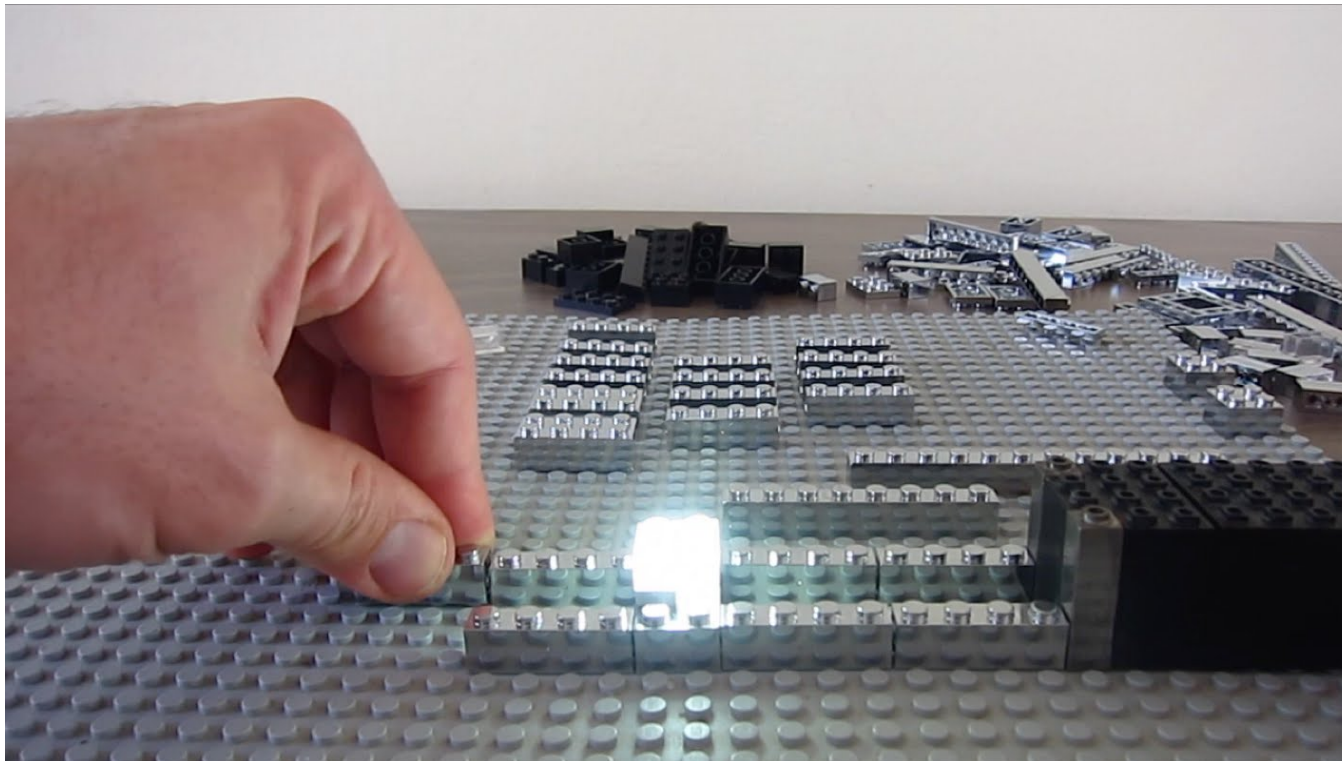
O que temos hoje? (Casas Inteligentes)

- WigWag.com (diversos sensores)



O que temos hoje? (Casas Inteligentes)

- Brixo.com (brinquedos inteligentes)

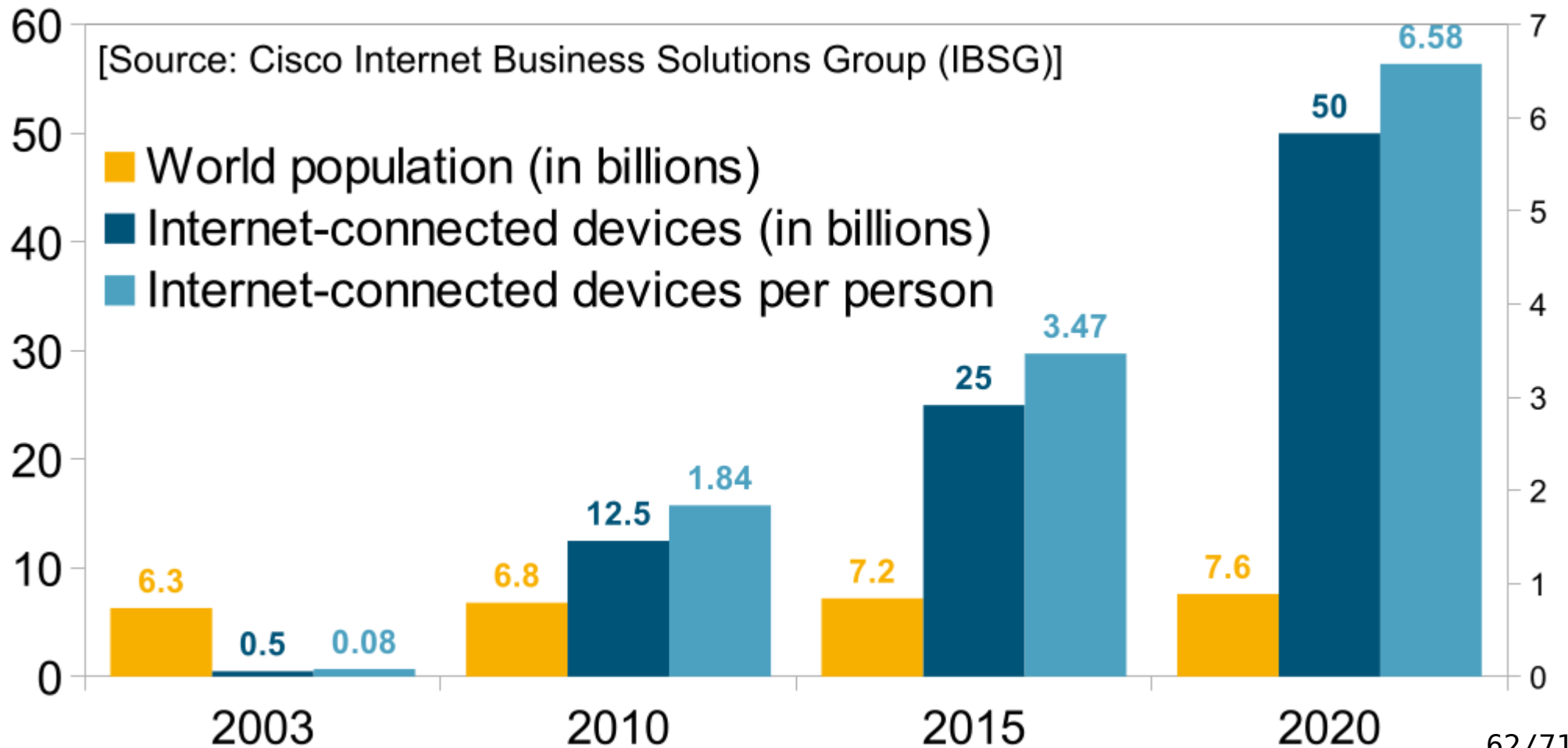




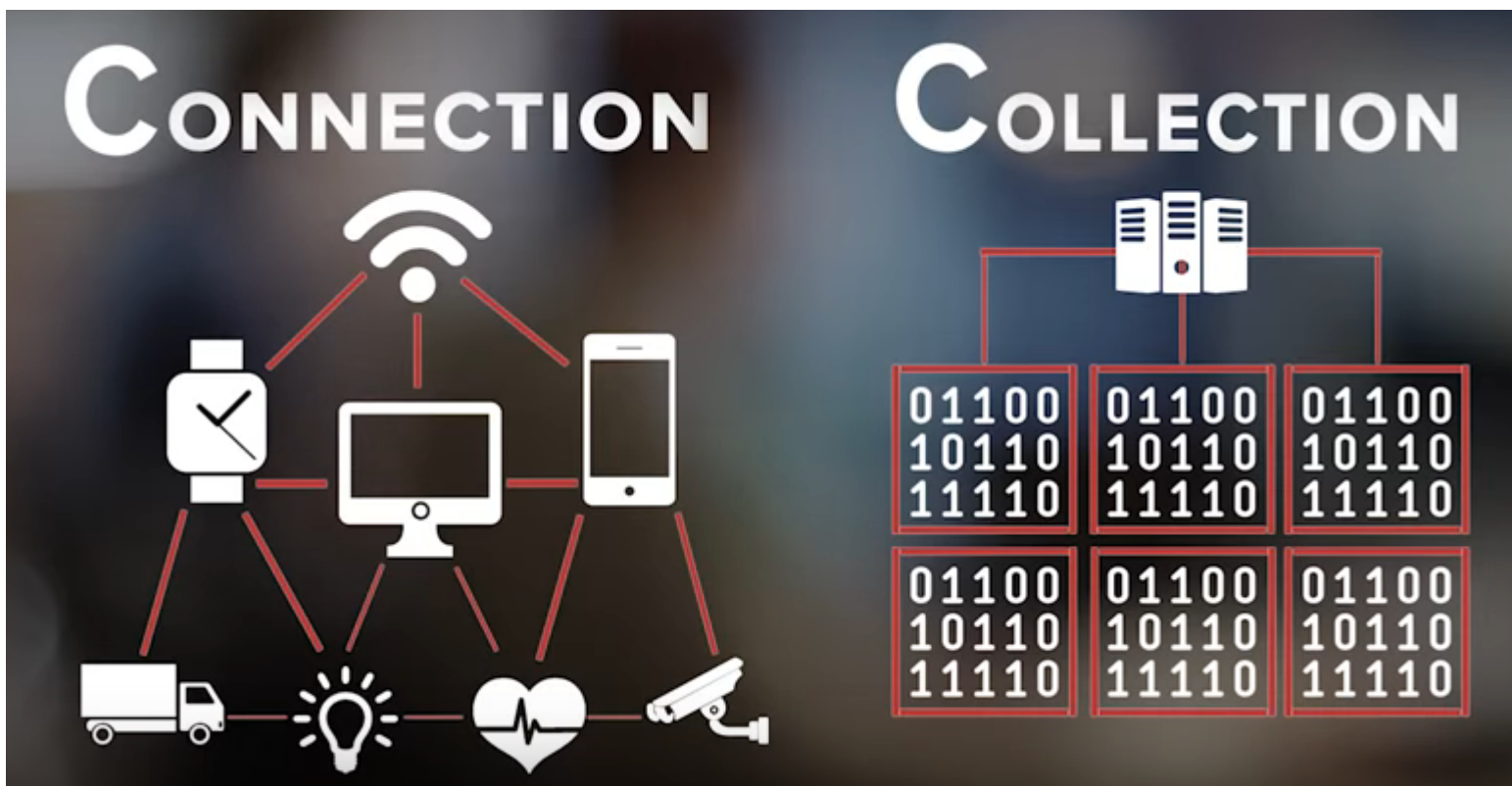
O que virá?

O que virá?

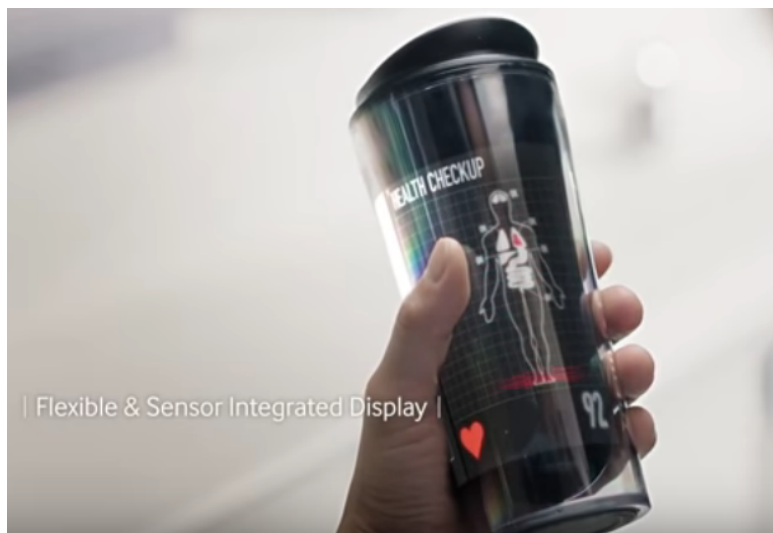
- PIB Global aumentará em 11% até 2025 (McKinsey)



O que virá?



O que virá?



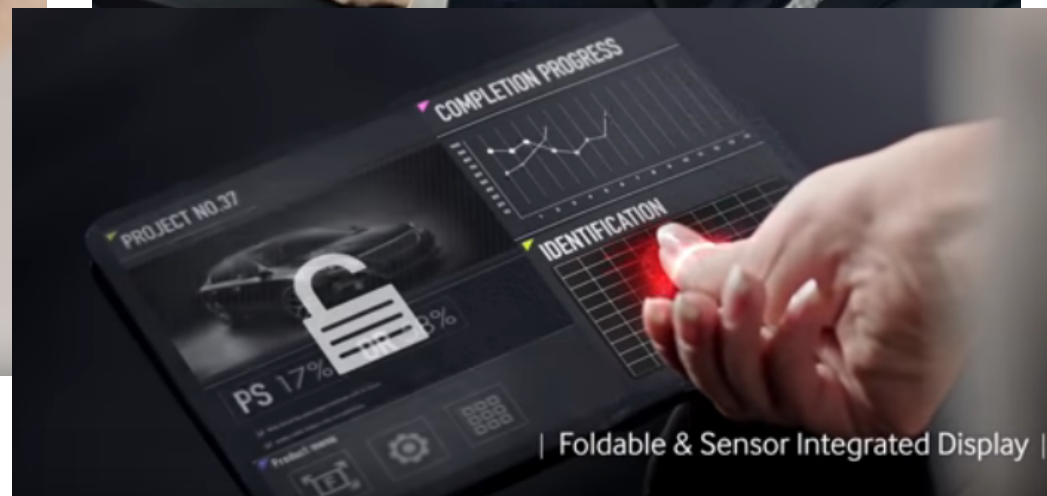
| Flexible & Sensor Integrated Display |



Bended Display |



| Wearable Display |



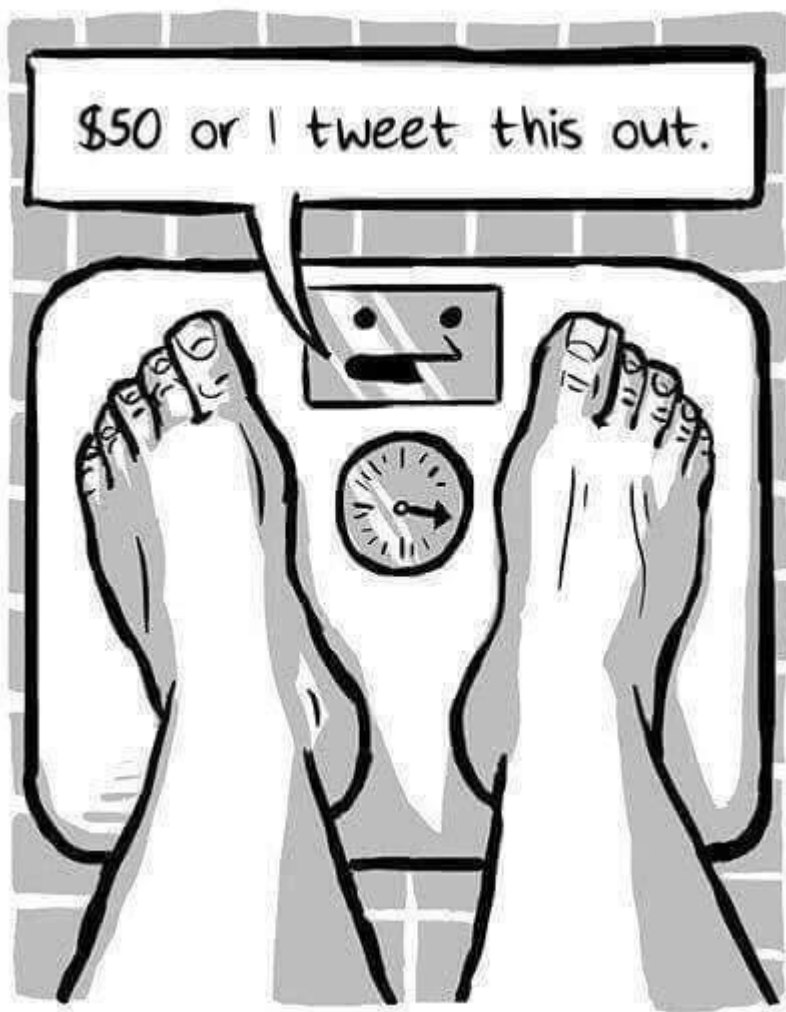
| Foldable & Sensor Integrated Display |

Vídeo Samsung



Crítica!

Crítica!



Crítica!





Considerações

Considerações





Obrigado

:-)

Hermano Pereira

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Fontes:

<http://www.rfidjournal.com/articles/pdf?4986>

<https://www.youtube.com/watch?v=jlkvzcG1UMk>

L. Atzori, A. Iera, and G. Morabito, “Understanding the Internet of Things: definition, potentials, and societal role of a fast evolving paradigm,” *Ad Hoc Networks*, vol. 56, pp. 122–140, 2017.

C. Perera, C.H. Liu, S. Jayawardena, M. Chen, “A Survey on Internet of Things From Industrial Market Perspective”, *IEEE Access*, 2015.

<https://www.youtube.com/watch?v=GiaznbYm7g>

<https://www.youtube.com/watch?v=M0IR40ud0jU>