Workshop Internet of Things

Montbonnot, France — November 6 &7 2014

https://www.iot-lab.info/workshop-iot-nov2014/

FIT IoT-lab

E. Fleury, ENS de Lyon / Inria

Schneider Electric

informatics mathematics Inria

UPMC SORBONNE UNIVERSITÉS

UNIVERSITÉ DE STRASBOURG

cnrs

INSTITUT Mines-Télécom

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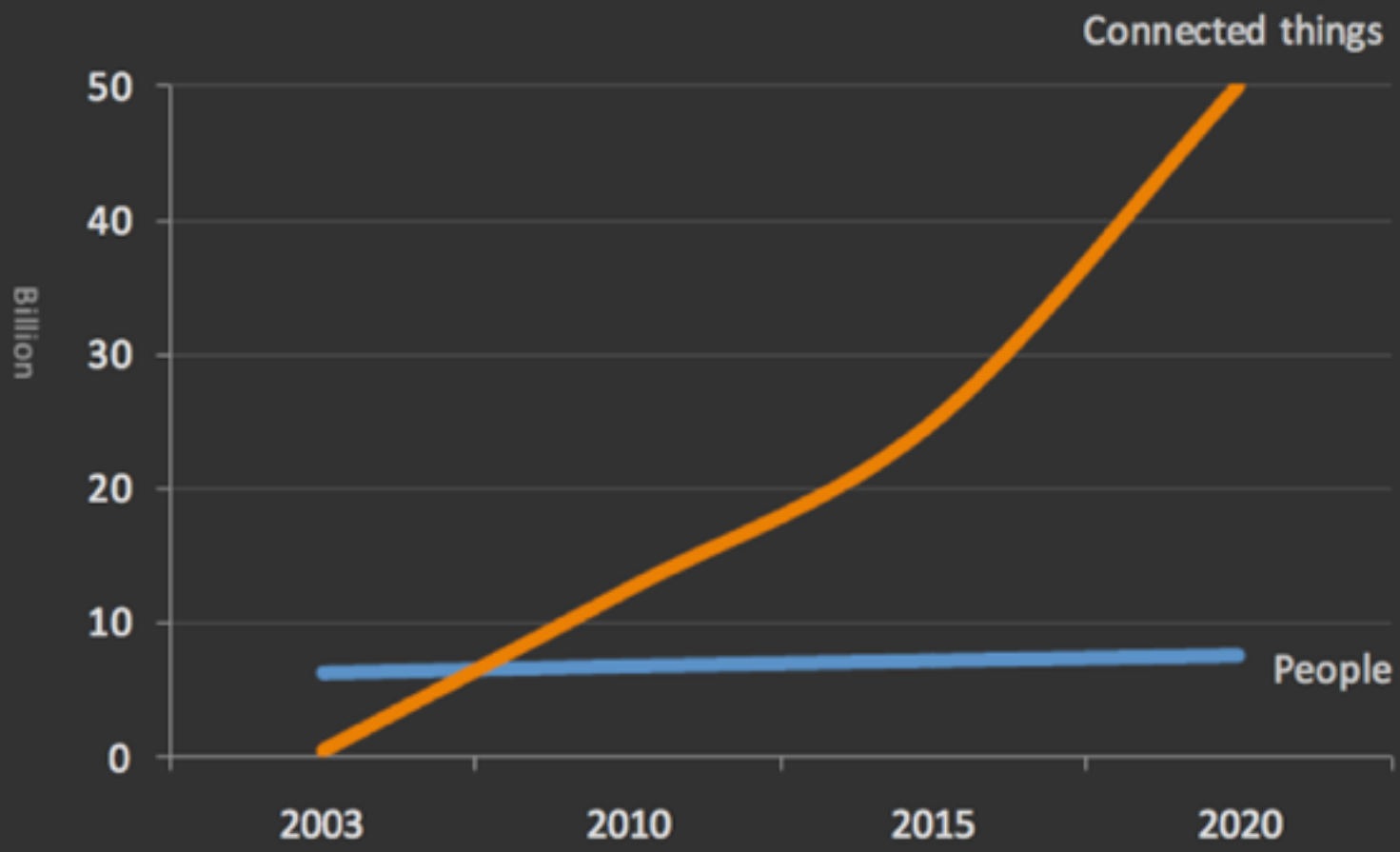
IoT promise

Connected objects in a numerical world

$2^{\wedge 128}$ = 340.282.366.920.938.463.463.374.607.431.768.211.456



Source: Cisco IoT 2011 infographic

Instrumented

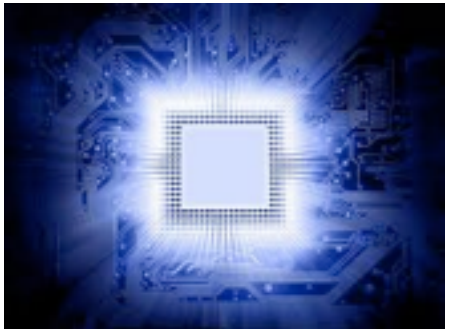
source: Kim Escherich , Executive Innovation Architect sur Pan-European Chief Technology Officer Team, IBM SWG

Interconnected

source: Kim Escherich , Executive Innovation Architect sur Pan-European Chief Technology Officer Team, IBM SWG

Intelligent

Every systems is becoming



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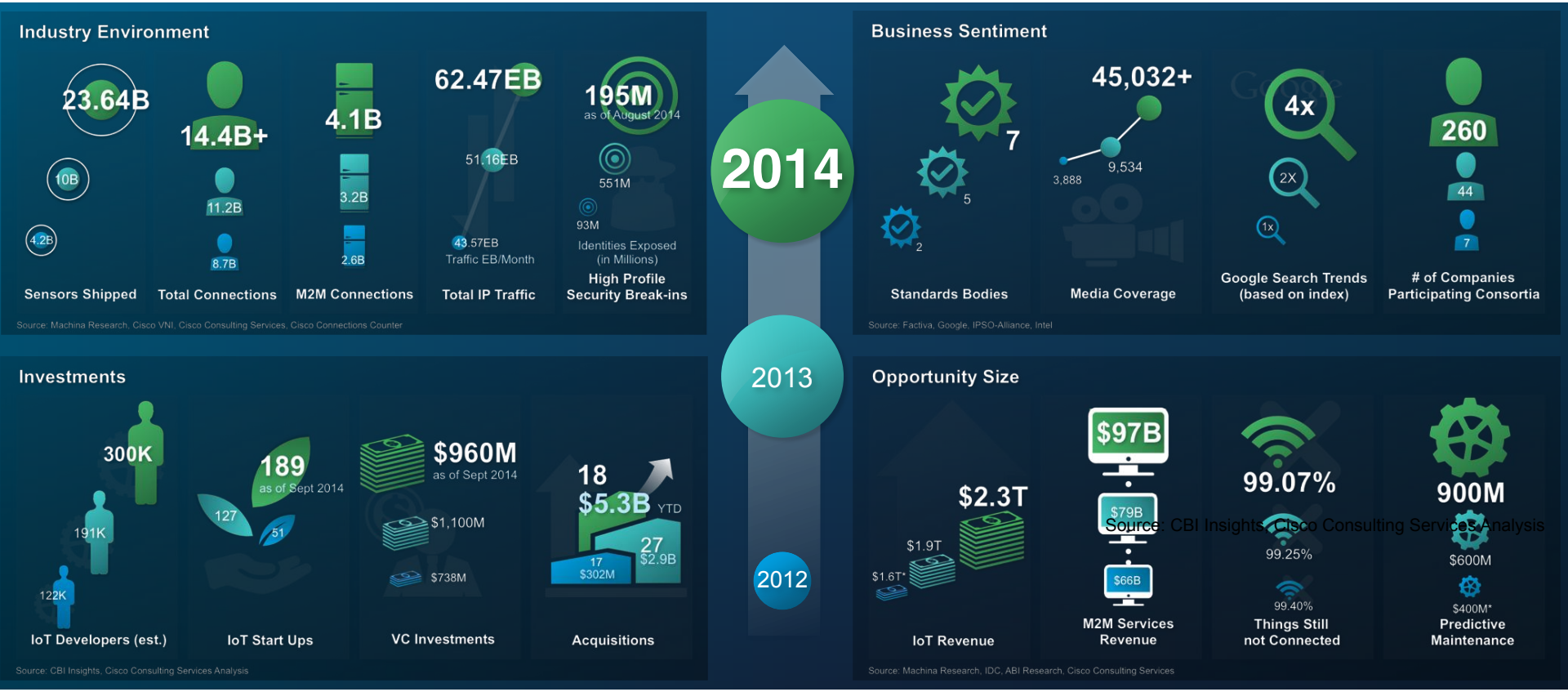
NEW INTELLIGENCE

SMART WORK

GREEN

DYNAMIC INFRATRUCTURE

IoT Acceleration Dashboard 2012-2014



Source: CBI Insights, Cisco Consulting Services Analysis

First takeaways

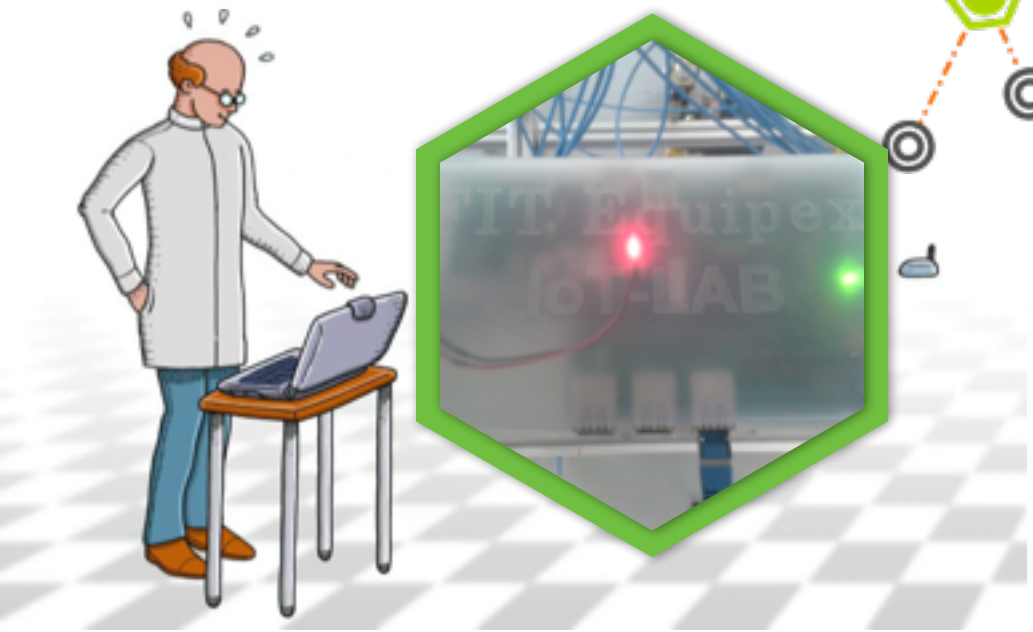
1. **IoT Is Here**. Now. And It's Big
2. IoT Dashboard: **IoT is Accelerating**
3. IoT... **Huge Opportunity for Ecosystem**

Needs for large scale scientific tools

Scientific & reproductible experiment

FIT IoT LAB Objectives

- **Target and challenge:**
  - M2M / scaling
  - IoT (heterogenous)
- **Designing / Testing / Deploying / Monitoring**



- **Use Cases:**
  - Home Gateway
  - Cloud service monitoring
  - IPv6 from sensors to the Cloud
  - Mobile nodes

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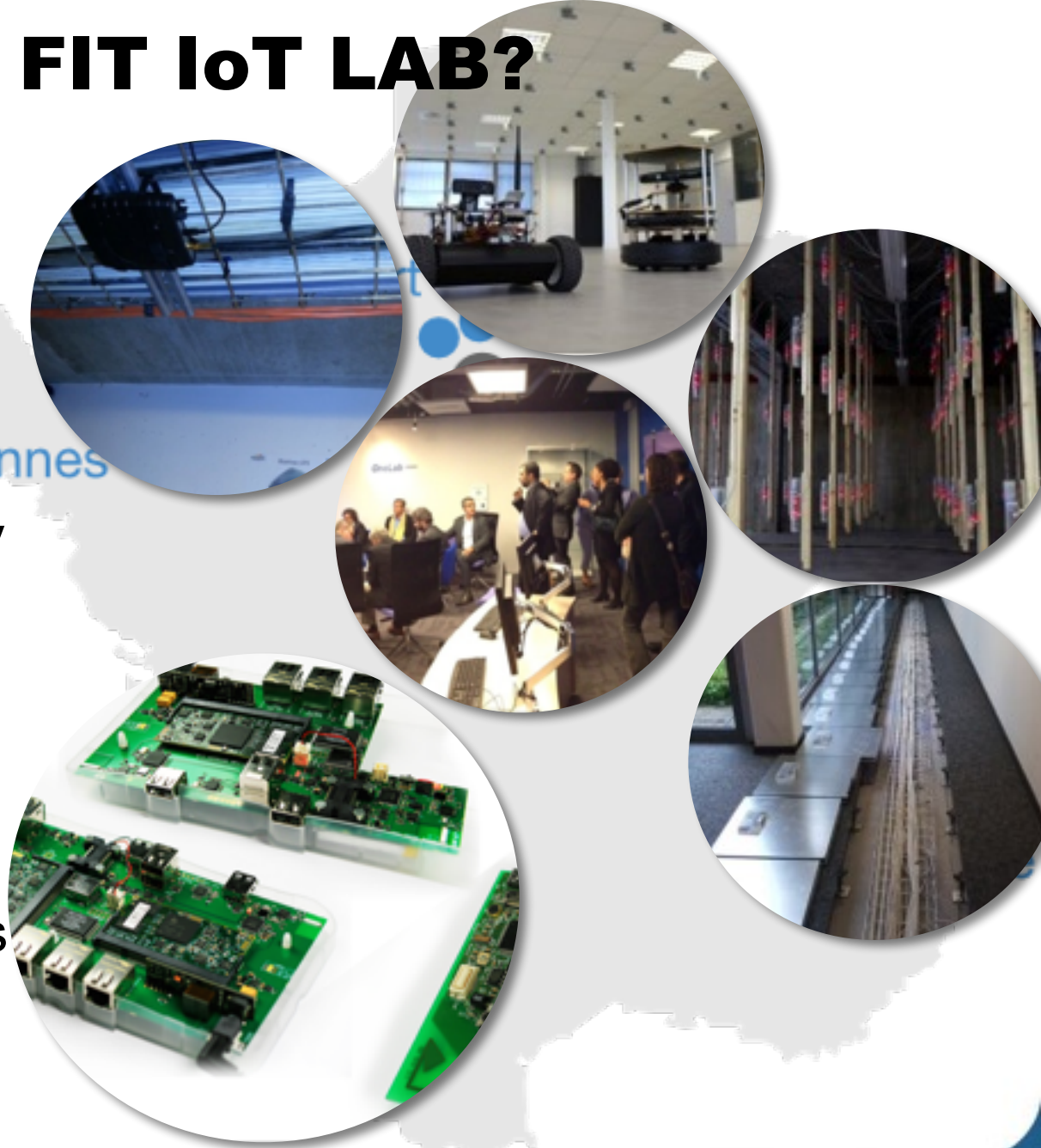
FIT IoT-LAB in the IoT Context

WHAT / WHERE / WHY / HOW

What/Where is FIT IoT LAB?

- **More than 2700+ wireless nodes**
  - IEEE 802.15.4
- Low Power and Lossy Networks
- Total Remote Access
- Total Open Access
- Mobile Nodes/Robots

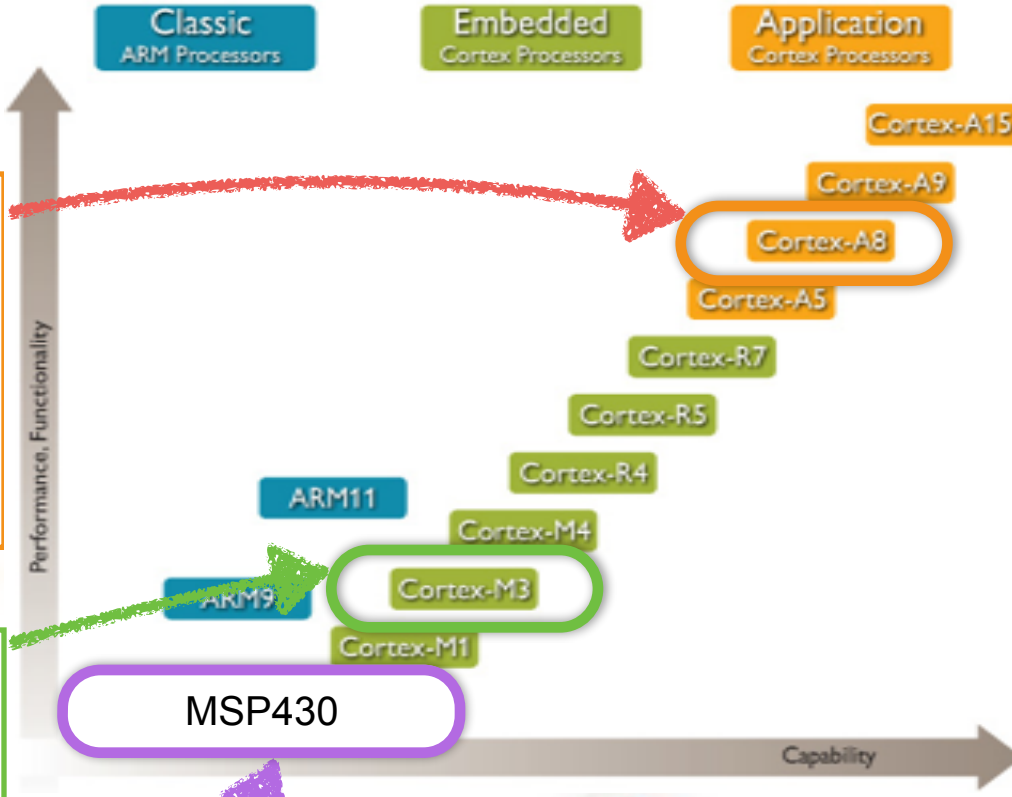


IoT LAB Nodes

- A8 node : TI-SITARA AM3505
  - Ethernet, USB
  - Linux/Android
  - Indoor GPS for highly accurate synchronisation

- M3 node : STM32
  - Radio Atmel AT86RF231
  - Ambiant light, Temp, IMU, Pressure

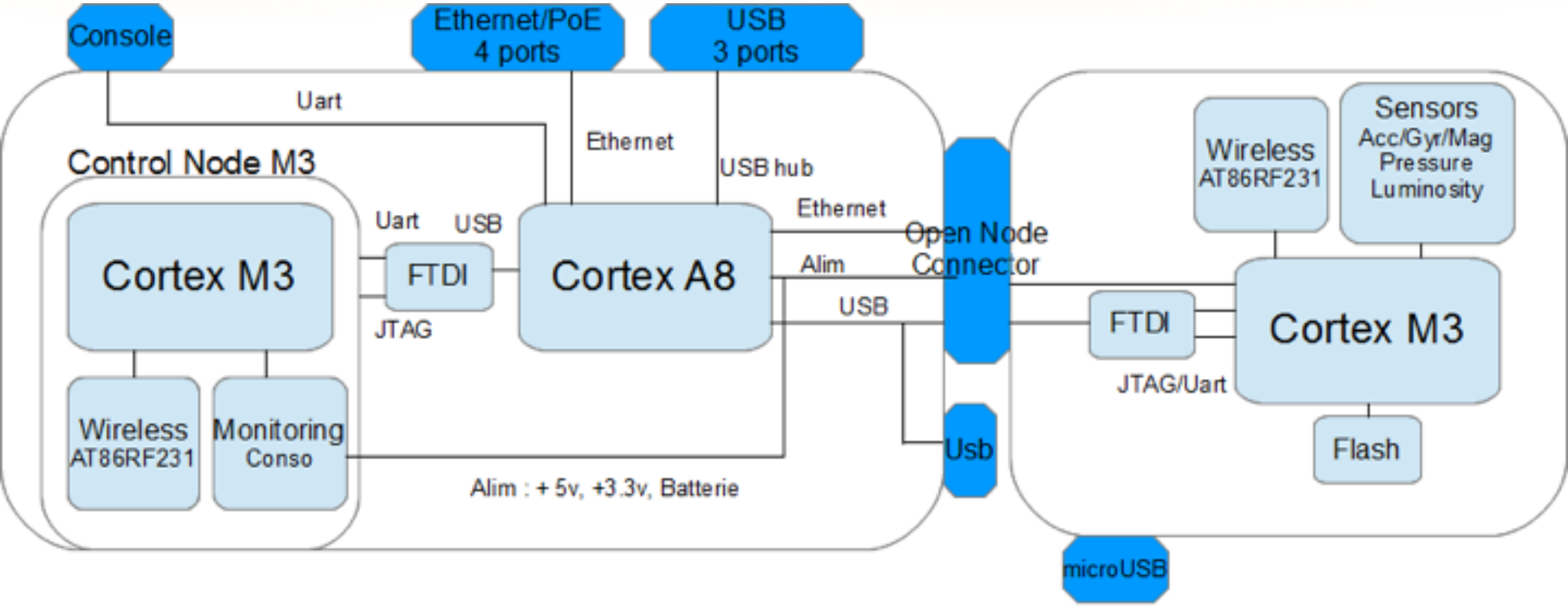
- WSN430 node : TI MSP430
  - Radio TI CC1101 / CC2420
  - Ambiant light, Temp



IoT-LAB Node M3 Architecture

- Automatic firmware deployment
- Consumption Monitoring
- Sensor polling
- Radio sniffer

- Feedback channel
- Power over ethernet
- SINK / Internet connexion
- USB for external

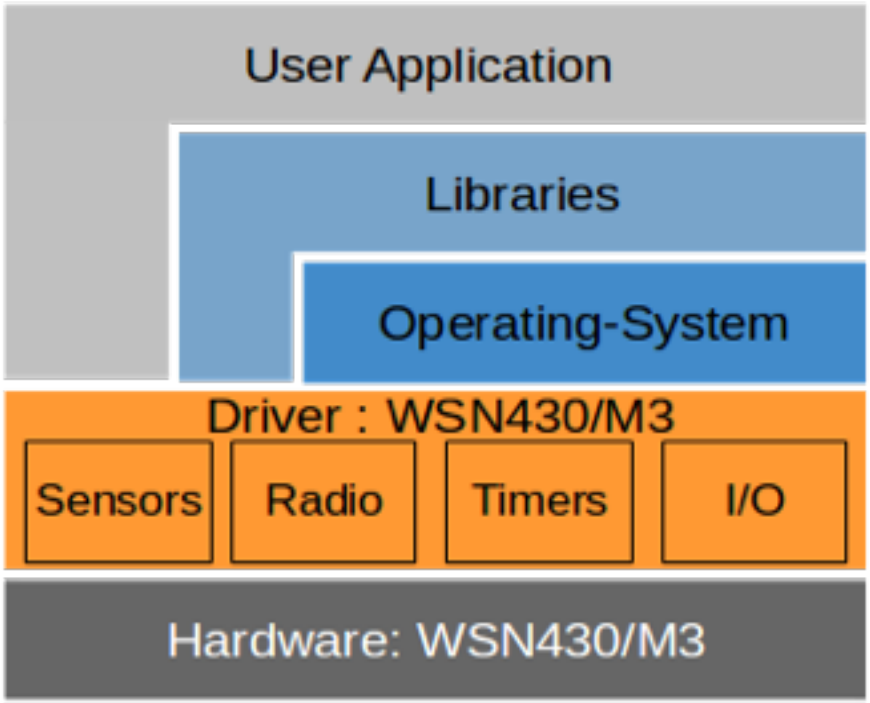


Gateway

Open Node M3

Embedded User Software

- IoT-LAB offers full support for embedded software development:
  - direct access to node HW
  - OS-level features
- Developers can leverage the different APIs to build applications.



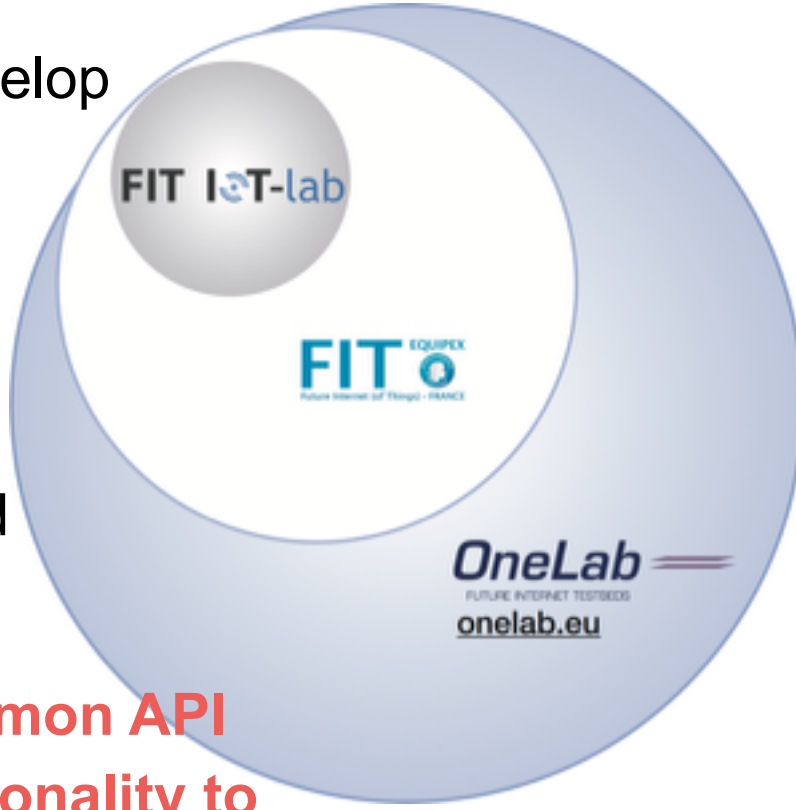
CeCILL

Several Operating Systems

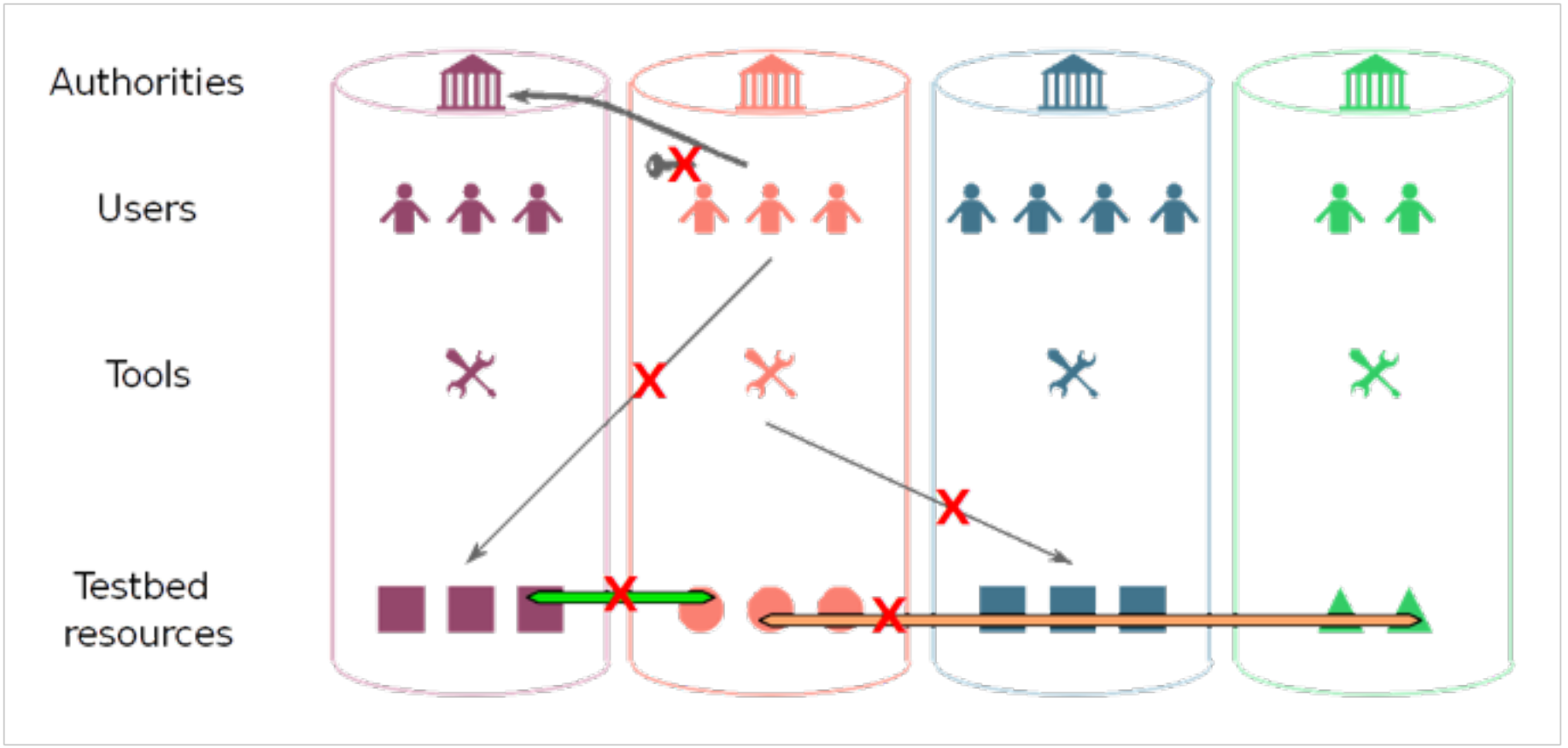
	WSN430	M3 NODE	A8 NODE
FreeRTOS	☑	☑	
Contiki	☑	☑	
RIOT	☑	☑	
TinyOS	☑	☑	
OpenWSN	☑	☑	
Linux			☑

More than just an isolated testbed

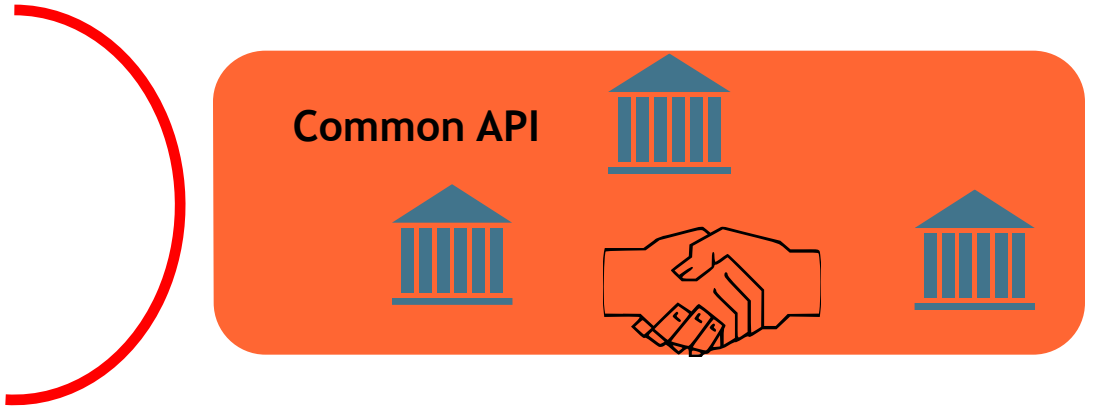
- **An Internet of Testbeds**
  - A **Facility** – A playground for the future Internet
  - Wide-variety of eco-systems and develop openness
- **Benefits from FIT / OneLAB.eu**
  - An architecture for federation
  - Fundamental components for testbed federation
  - **SFA aims to provide a secure common API with the minimum possible functionality to enable a global testbed federation**



The issue with testbed isolation

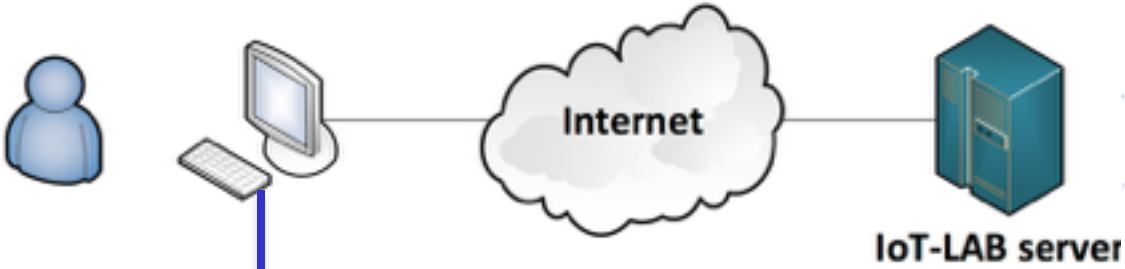


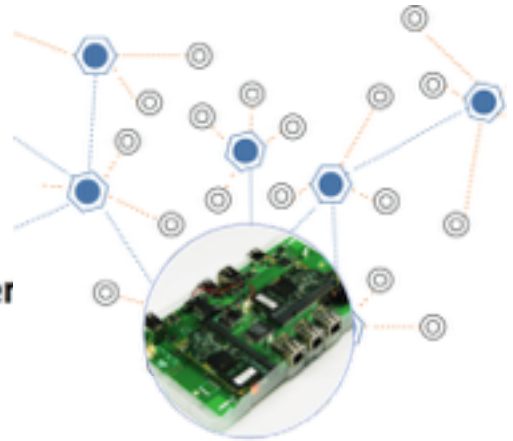
Experimenters



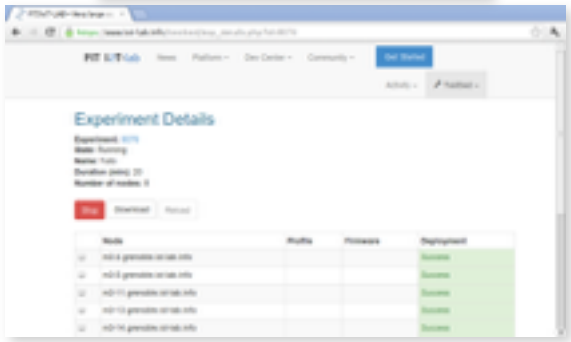
Testbeds resources

How to run an experiment

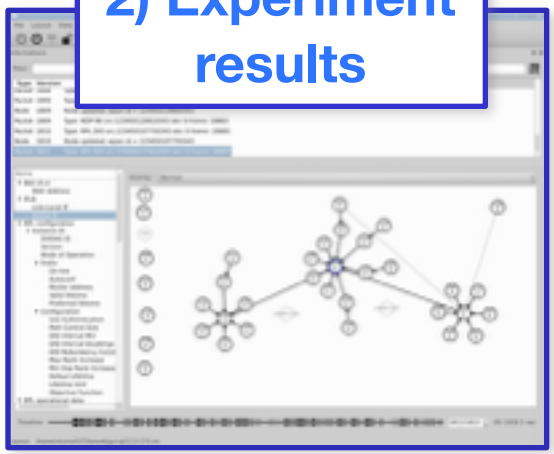




1) Experiment configuration



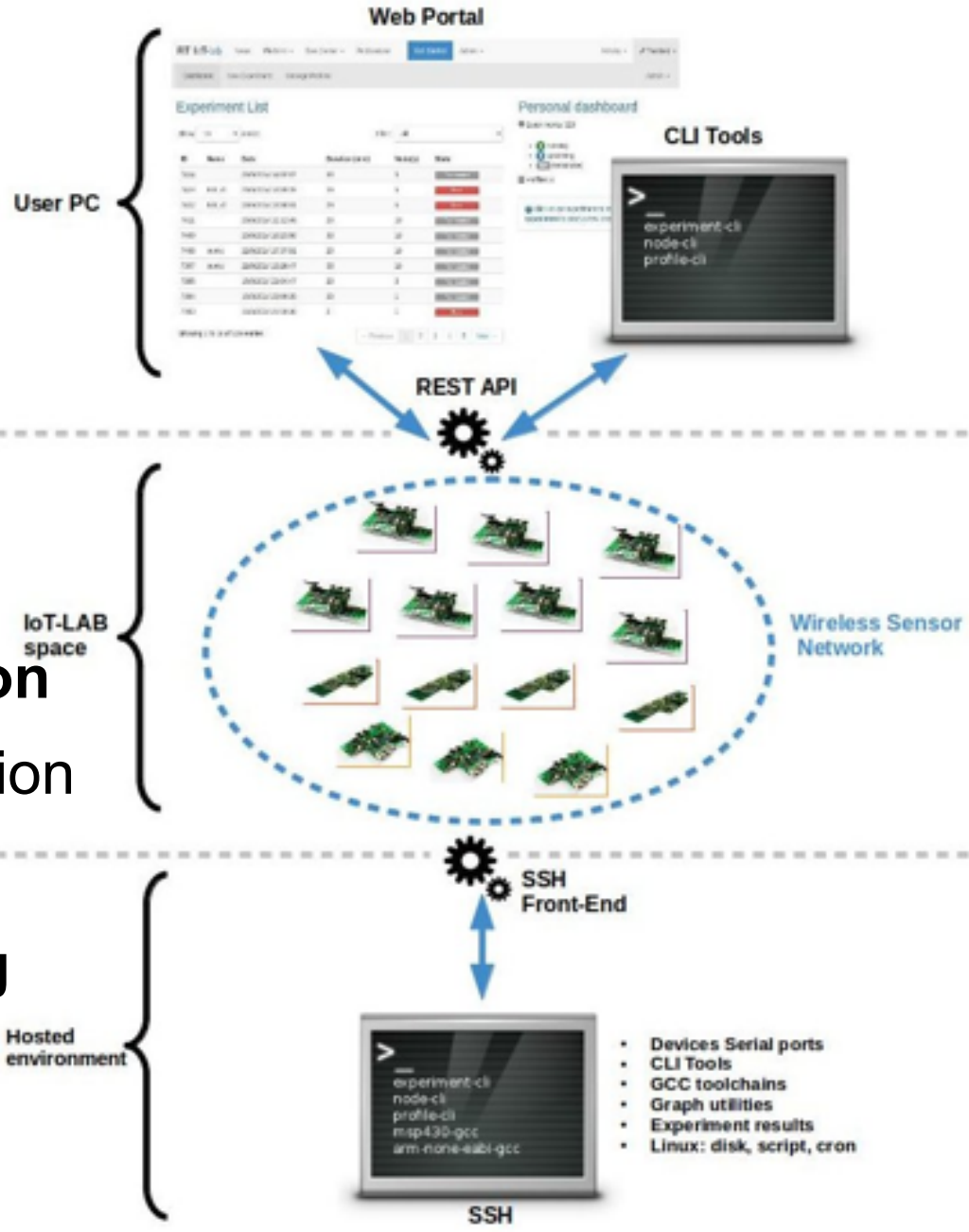
2) Experiment results



Open systems with IETF protocols (RPL/COAP/6TiSCH/…)

How to run an experiment

- **Open a user account**
- **Ressources reservation**
  - Geographical sites
  - WSN430/M3/A8 nodes
- **Experimentation description**
  - Firmware/nodes association
  - Monitoring tuning
- **Experimentation launching**
- **Monitoring data analysis**



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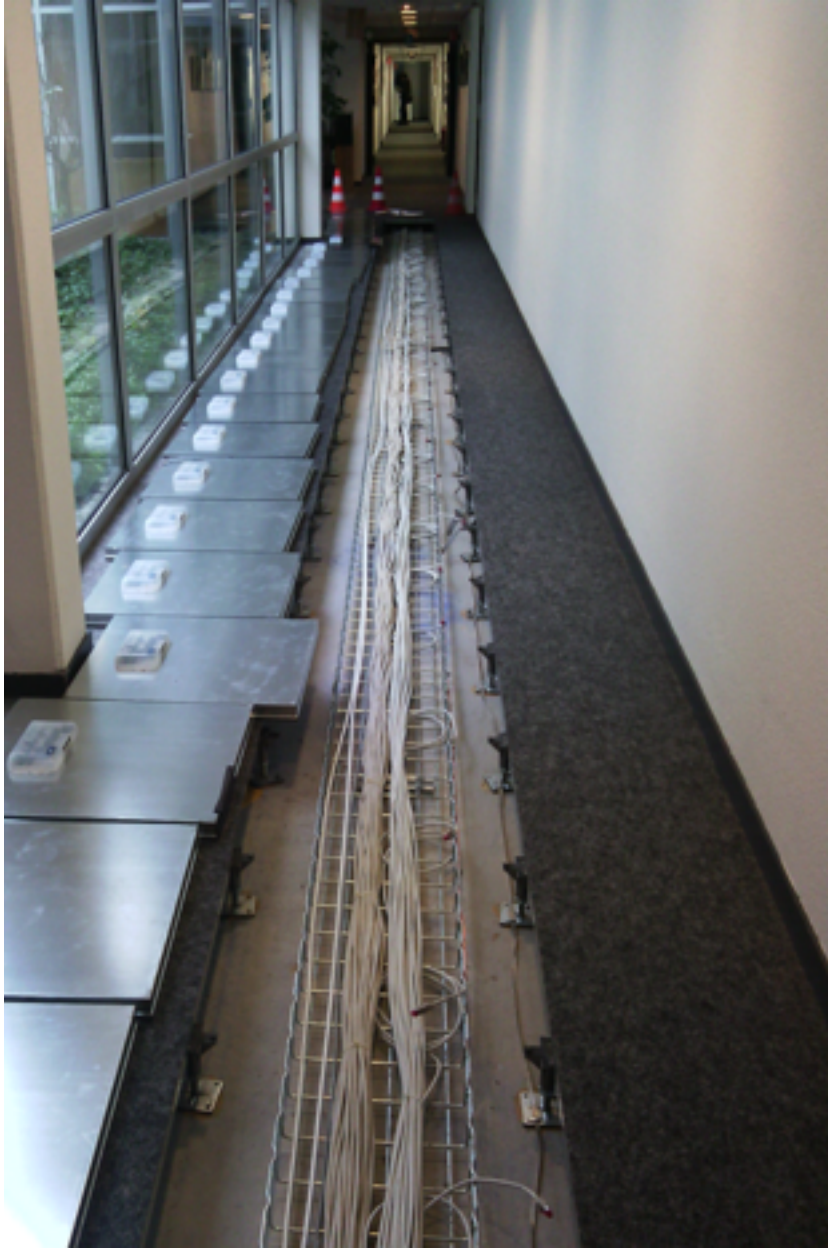
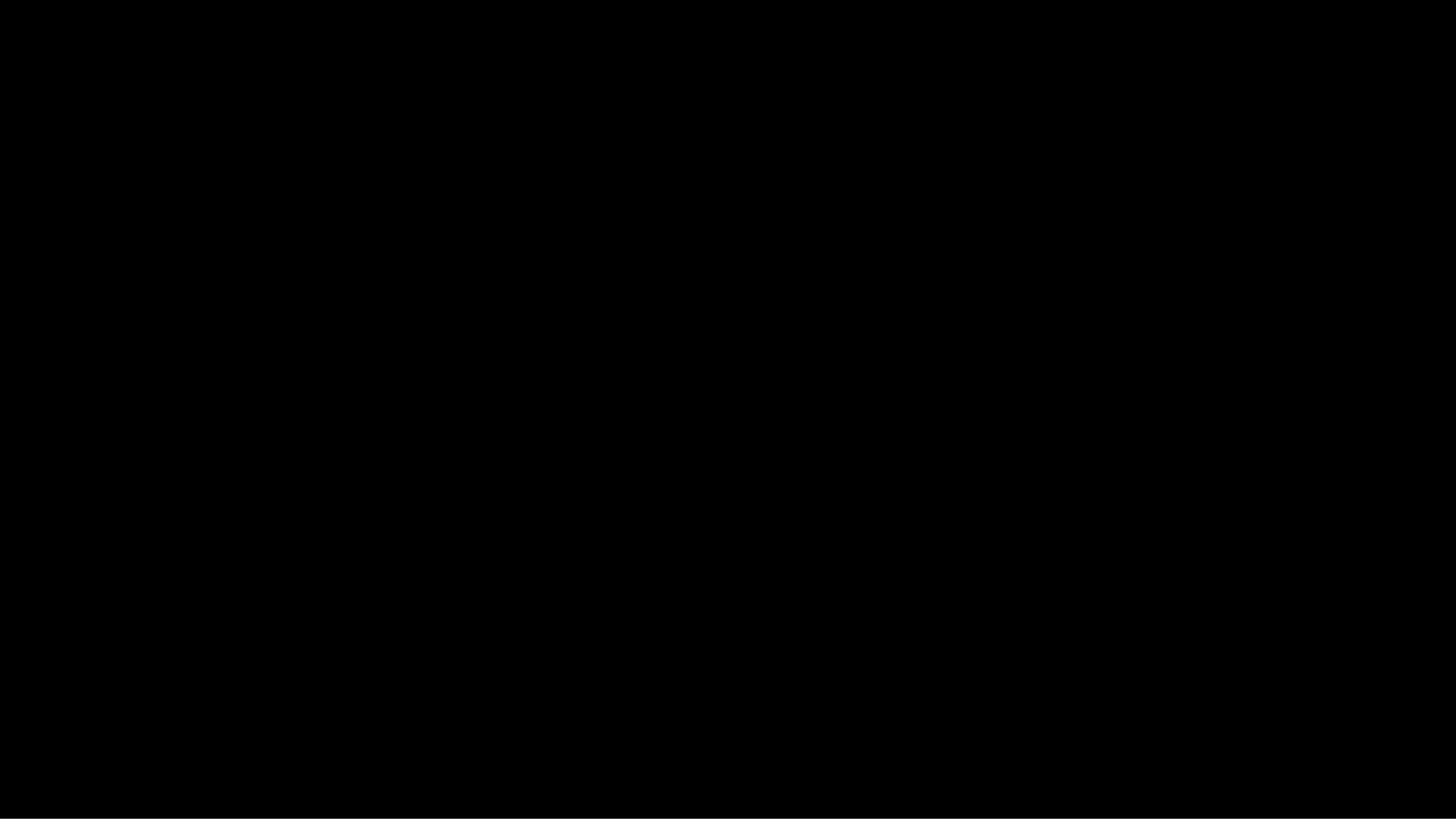
IoT-LAB Inria Grenoble Site

Demo

IoT LAB Inria Grenoble

- 256 WSN nodes
- 200/384 M3 nodes
- 256 A8 nodes
- 32 Open nodes





Smart Tiles

for

Robots and Humans Detection

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Conclusions

Time to use it !

- **Statistiques**
  - more than 350 users registered
  - in more than 45 countries
  - 11K experiments launched

- **Futur development**
  - Full iPv6 support end tho end
  - Open robots

- H2020 calls on IoT

https://www.iot-lab.info

Huge collaborative and collective work

- **Strasbourg**
  - Guillaume Schreiner
  - Erkan Valentin
- **Rocquencourt**
  - Ala-eddin Weslati
  - Ichrak Amdouni
  - Vincent Ladeveze
- **Lille**
  - Julien Vandaele
  - Loic Schmidt
  - Anne-Sophie Tonneau
  - Raymond Borenstein
- **Grenoble**
  - Frédéric Saint-Marcel
  - Roger Pissard-Gibollet
  - Nicolas Turro
  - Gaetan Harter
  - Olivier Fambon
  - Sandrine Avakian
  - Fabien Vauvilliers
  - Jean-Francois Cuniberto
- C. Chaudet, N. Mitton, T. Noel, C. Adjih, E. baccelli,

https://www.iot-lab.info

For more information

- IoT-LAB
  - https://www.iot-lab.info
- Equipex FIT
  - https://www.fit-equipex.fr
- OneLAB
  - https://www.iot-lab.info