The role of testbeds in the SME and Startup value chain

Workshop Internet of Things / Equipex FIT IoT-LAB

6th of November 2014, INRIA

HIKOB IDENTITY CARD

HIKOB

Founded the 4th of July 2011

Founding team: three ex- IT researchers in Wireless Sensor Networks Lyon

Spinoff from INRIA, INSA de Lyon & ENS Lyon

Two locations: Lyon & Grenoble

15 employees in November 2014.

International activity.

HIKOB MISSION

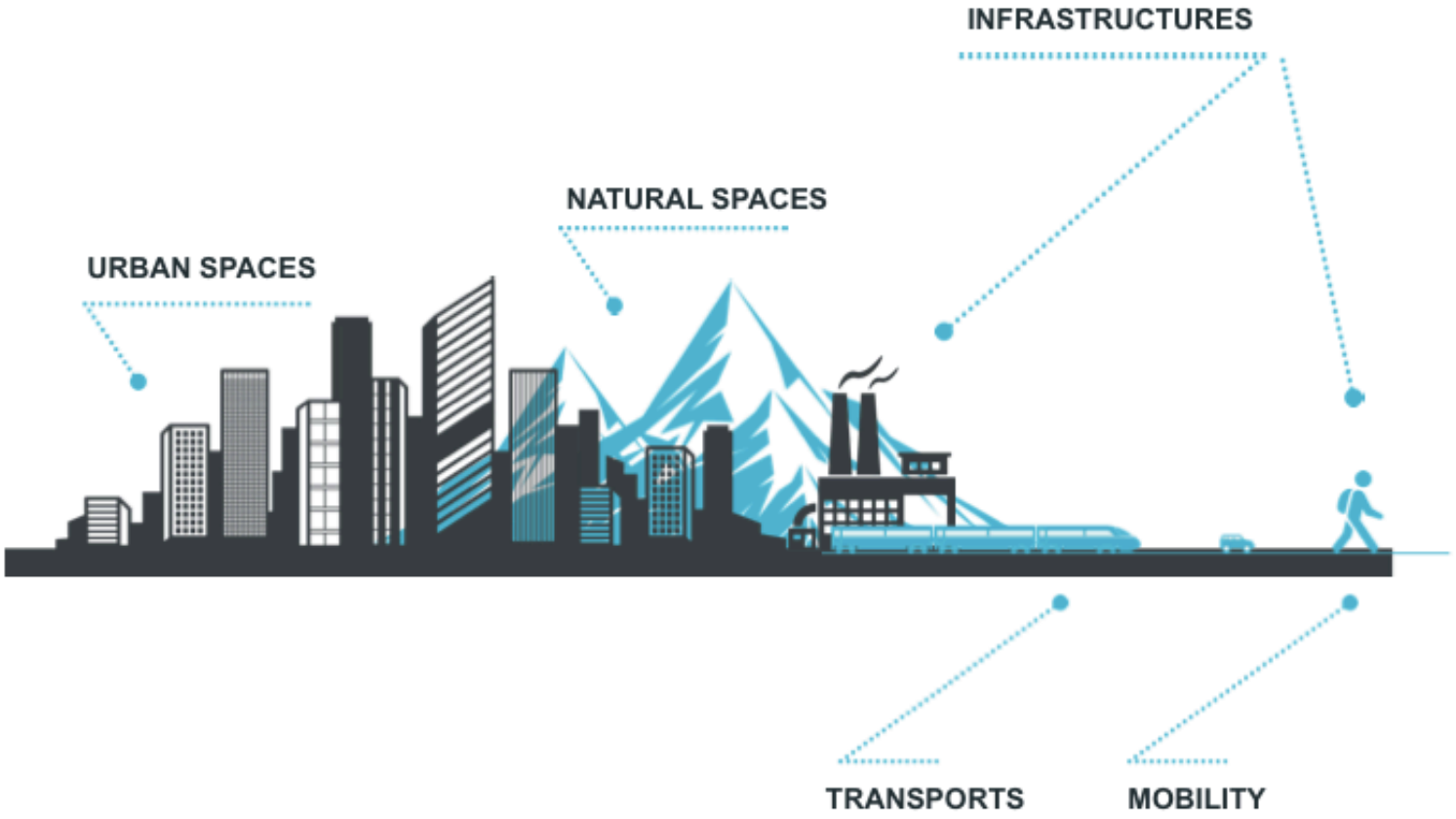
- Develop and provide wireless autonomous multi-point **data acquisition systems** to capture information on the field and learn from reality, in all contexts and conditions

CAPTURE **COLLECT** **REPORT**

HIKOB FIELD DATA ACQUISITION SYSTEM

AUTONOMOUS WIRELESS MULTIPOINT MULTIHOP
DATA AQUISITION SYSTEMS
WITH EMBEDDED DATA PROCESSING

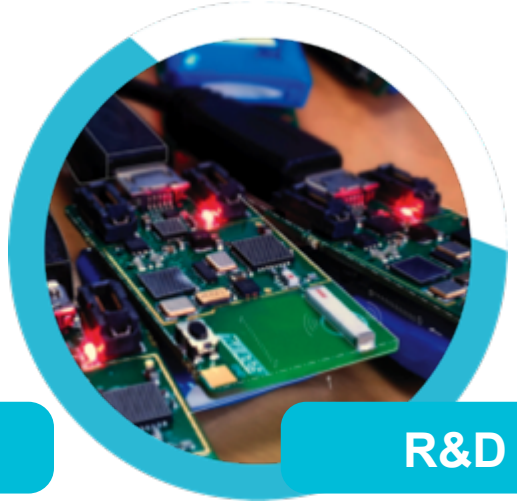
HIKOB FIELDS OF OPERATION



HIKOB APPLICATIONS

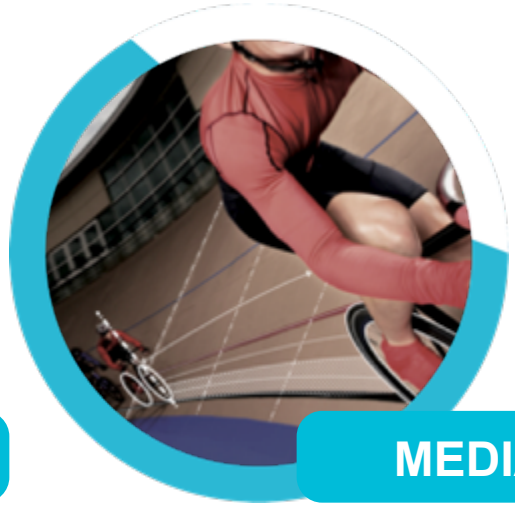
INFRA

ITS



R&D

INDUSTRY



MEDIA

STRUCTURAL HEALTH MONITORING

HIKOB

Parc des Princes stadium, Paris (France)

- Real-time monitoring of the roof structure (crack, tilt, bend, temperature)
- 32 acquisition nodes, 96 crackmeters, 32 PT100
- 8 routers, 1 gateway
- Also applied to bridges

Advitam

Infrastructure Management Solutions

INFRASTRUCTURE MANAGEMENT

HIKOB

Grand Lyon, Lyon (France)

- Real-time road surface and moisture measurement to optimize the timing for winter road management
- Optimization of management and reduction of cost and resource

GRANDLYON

R&D - INTERNET OF THINGS

HIKOB

INRIA

- R&D testbed spread over 4 universities in France
- 1700 open wireless sensor nodes
- Ubiquitous network / Internet of Things platform

Inria
INVENTEURS DU MONDE NUMÉRIQUE

IoT in B2B, Industrial Internet.
The third revolution.

The revolution: rise of the industrial Internet

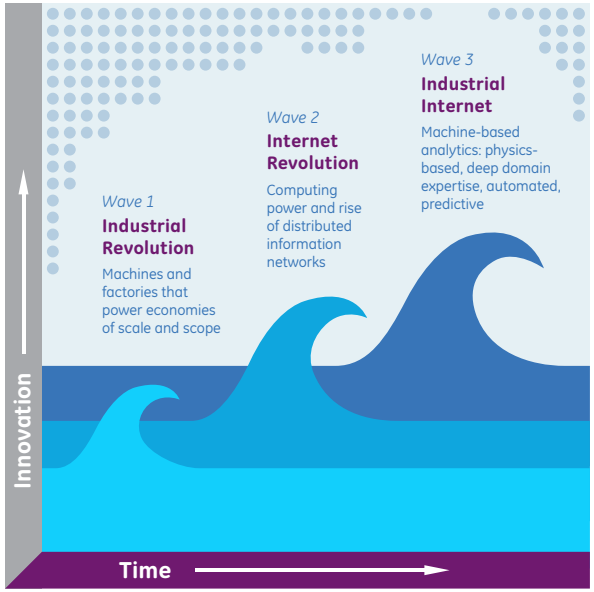
IoT revolution :

- Smart Objects
- Internet of Things
- Big Data Analysis

Industrial Internet :

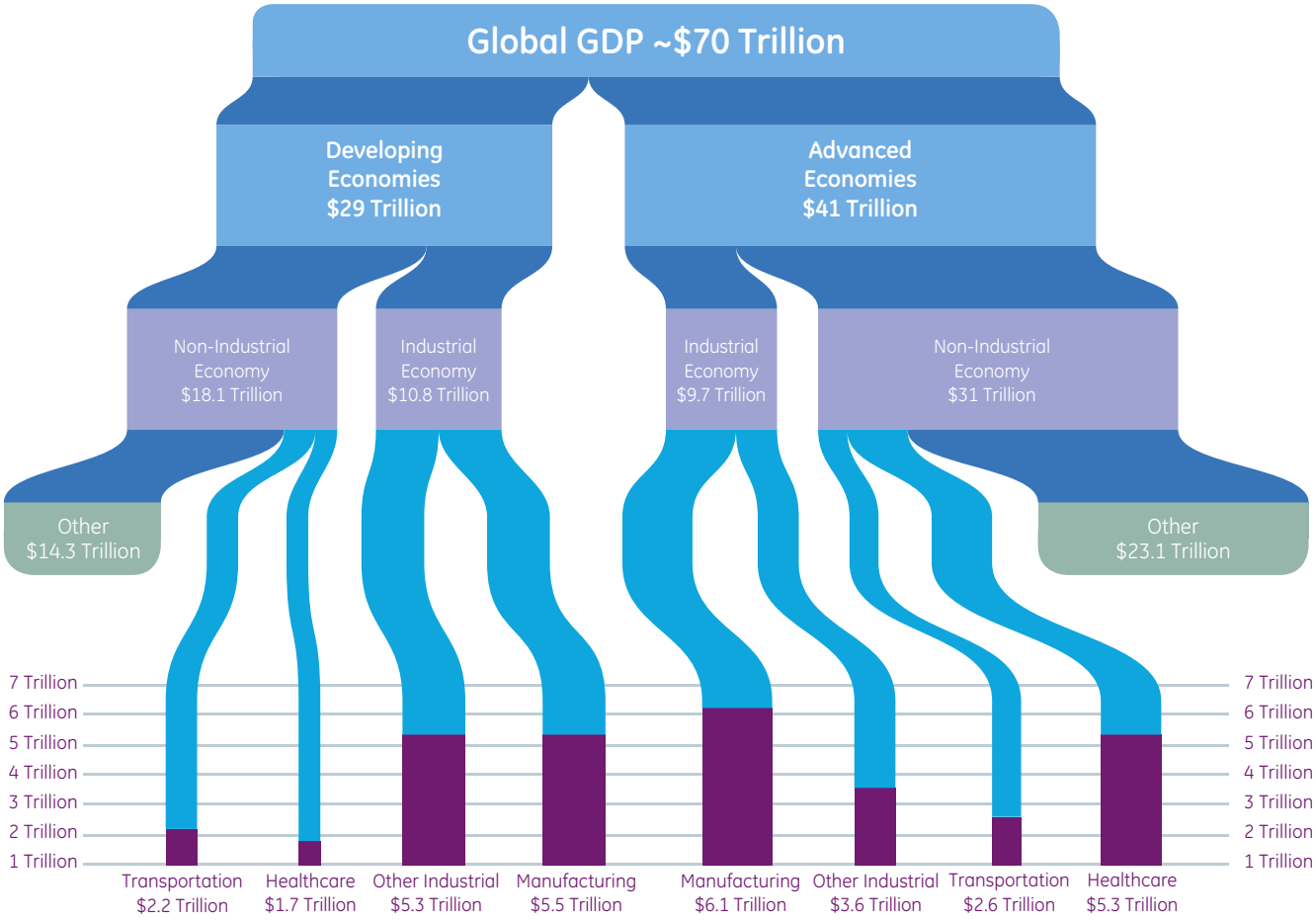
- Intelligent Machines
- Advanced Analytics
- People at Works

« *That which is measured improves. That which is measured and reported improves exponentially* » (Pearson's law)



In B2B: revolution of processes, not application

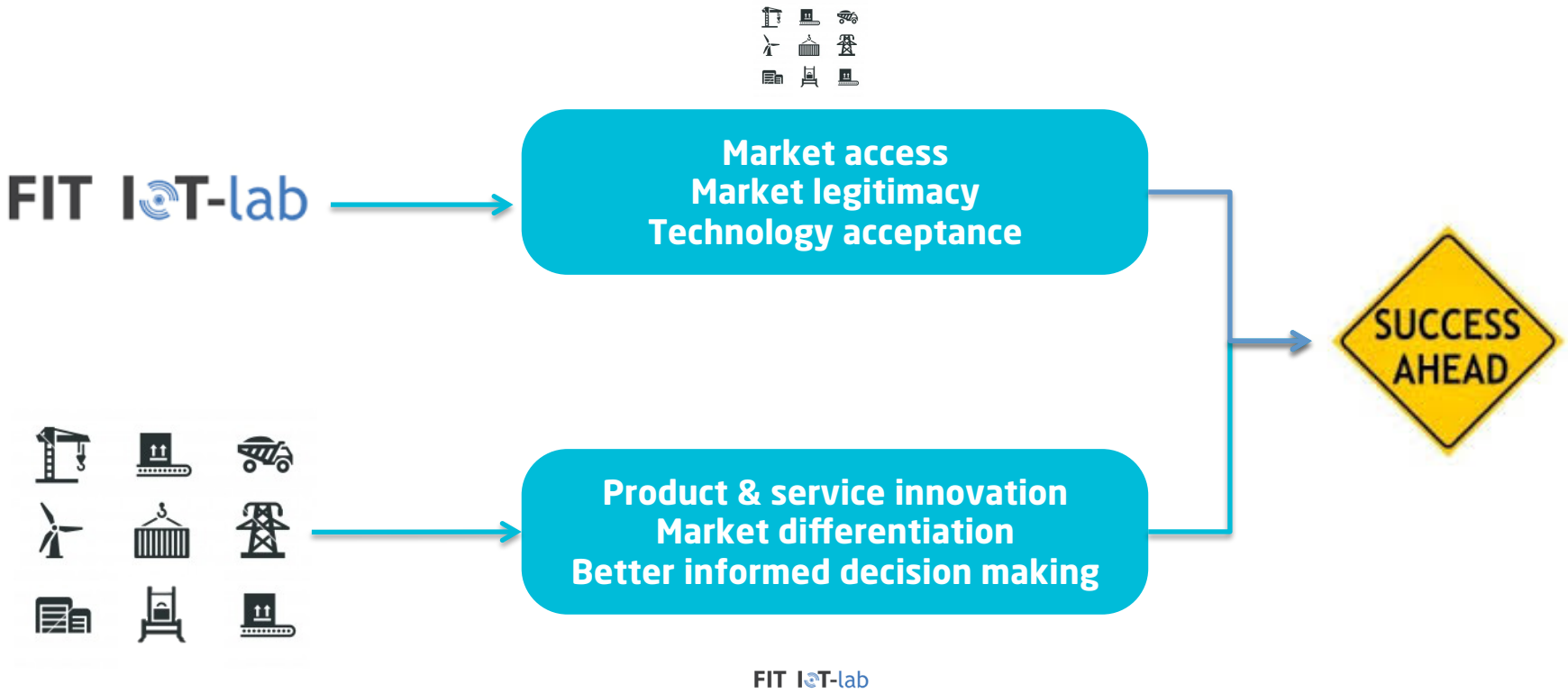
Figure 5. Industrial Internet Potential GDP Share



Industrial Internet opportunity ($32.3 Trillion) 46% share of global economy today

Source: World Bank, 2011 and General Electric

The war: traditionnal industries vs native IoT players



***Most** of the Industrial Internet **Market** belong to **traditional players**.*

*IoT technologies are **not disruptive** for the industries but instead they operate as an **enabler**: they open **new perspectives** to **existing industries** and give **existing players** the opportunity to **leap across the frontiers of their current exercise**.*

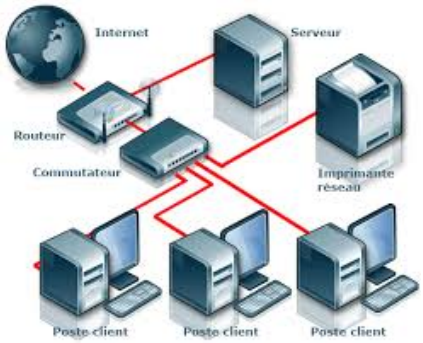
The pain: from engineers to digital engineers

?

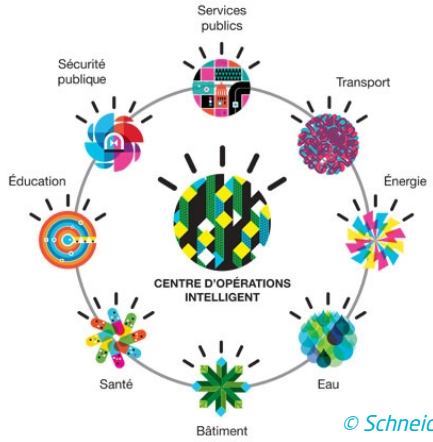
FIT IoT-lab

- Data analysis
- Product/service innovation
- Prototyping
- Understanding

The transition: hard & fast

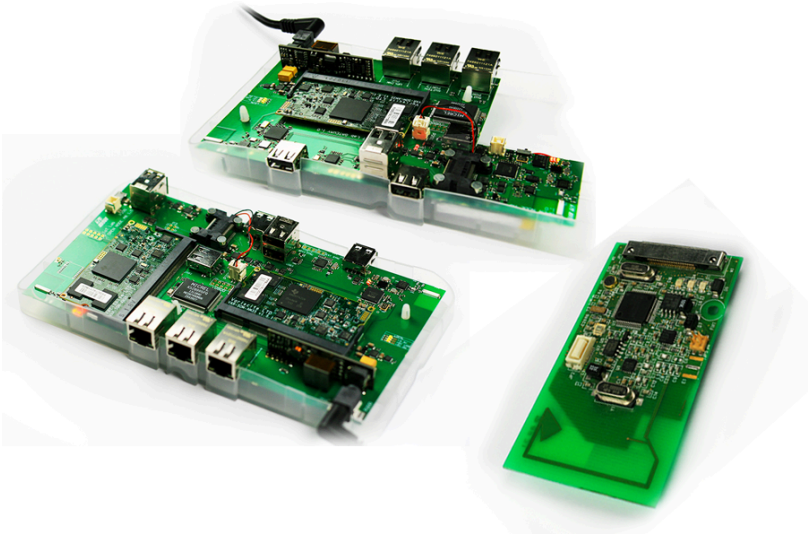


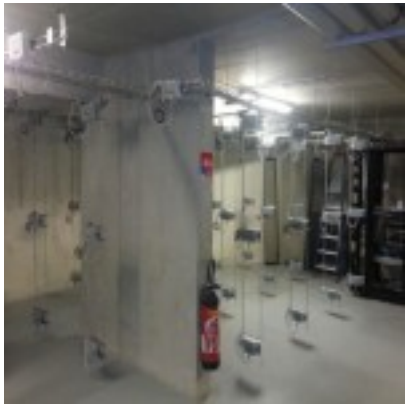
1850 ***1980*** ***2000*** ***2010***



© Schneider

The need: IoT engineering tools





FIT IoT-lab

The role of Testbeds for Native IoT Startups and Traditional industries.

Where do we need testbeds ?

FROM AN IDEA TO A PROOF OF CONCEPT

PRODUCT DEVELOPMENT

PRODUCT TESTING & VALIDTION

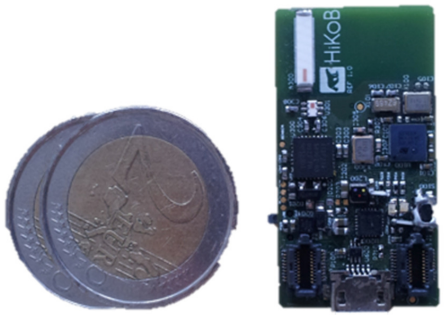
Why do we need testbeds ? (1)
From idea to proof of concept

- Because we **need to innovate**, we have to **concretize ideas** into proof of concepts.

- **Services expected**: engineering support to make the technology accessible

- **Value**: speed and easyness of concept validation, which translate into a shorter time-to-market.

- **Targets**: product manufacturers, integrators, service & application providers // they know the application & service, not necessarily the technology // they neeed help to see what the technology can do.



Why do we need testbeds ? (1)
Prototype / product testing and validation

- Because we do hardware/software, we need **testing and operational validation**.

- Because we sell **real systems** to **real people** operating them in **real conditions**, the testbed should somehow be **« in vivo »**, not only **« in vitro »**

- **Services expected**: in vivo, close to what the product will experience, with the capability to experience many conditions.

- **Value**: space of testing conditions / paramters (e.g. scale, *etc.*)

- **Targets**: product/software manufacturer // they now the technology // they want to play in conditions they don't have!

Ex: CMS for « things that spin »

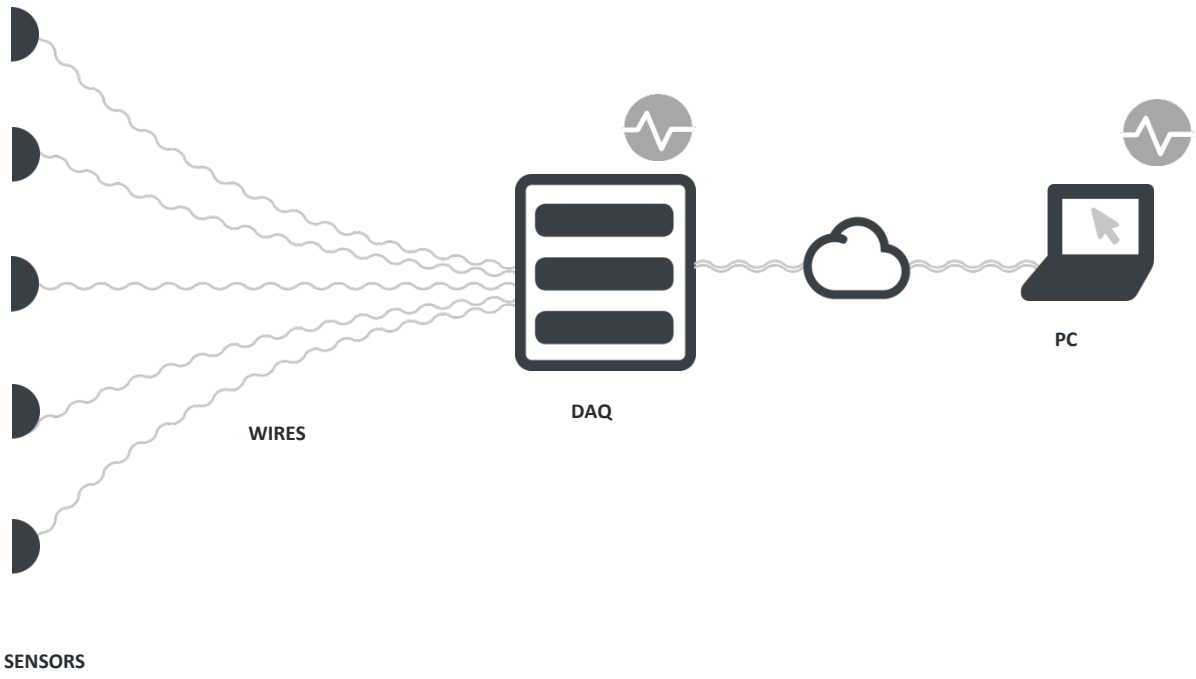
Table 2. Things that Spin: Illustrative List of Rotating Machines

Sector		# of Global Assets & Plants	"Big" things that spin
Transportation	**Rotating Machinery**		
Rail: Diesel Electric Engines	Wheel Motors, Engine, Drives, Alternators	120,000	2,160,000
Aircraft: Commercial Engines	Compressors, Turbines, Turbofans	43,000	129,000
Marine: Bulk Carriers	Steam Turbines, Reciprocating Engines, Pumps, Generators	9,400	84,600
Oil and Gas	**Rotating Machinery**		
Big Energy Processing Plants (1)	Compressors, Turbines, Pumps, Generators, Fans, Blowers, Motors	990	36,900
Midstream Systems (2)	Engines, Turbines, Compressors, Turbo Expanders, Pumps, Blowers	16,300	63,000
Drilling Equipment: Drillships, Land Rigs etc.	Engines, Generators, Electric Motors, Drilling Works, Propulsion Drives	4,100	29,200
Power Plants	**Rotating Machinery**		
Thermal Turbines: Steam, CCGT, etc.	Turbines, Generators	17,500	74,000
Other Plants: Hydro, Wind, Engines, etc. (3)	Turbines, Generators, Reciprocating Engines	45,000	190,000
Industrial Facilities	**Rotating Machinery**		
Steel Mills	Blast and Basic Oxygen Furnace Systems, Steam Turbines, Handling Systems	1,600	47,000
Pulp and Paper Mills	Debarkers, Radial Chippers, Steam Turbines, Fourdrinier Machines, Rollers	3,900	176,000
Cement Plants	Rotary Kilns, Conveyors, Drive Motors, Ball Mills	2,000	30,000
Sugar Plants	Cane Handling Systems, Rotary Vacuums, Centrifuges, Cystalizers, Evaporators	650	23,000
Ethanol Plants	Grain Handling Systems, Conveyors, Evaporators, Reboilers, Dryer Fans, Motors	450	16,000
Ammonia and Methanol Plants	Steam Turbines, Reformer and Distillation Systems, Compressors, Blowers	1,300	45,000
Medical Machines	**Rotating Machinery**		
CT Scanners	Spinning X-Ray Tube Rotors, Spinning Gantries	52,000	104,000
		Total	**3,207,700**

Notes: Not exhaustive. (1) includes LNG processing trains, Refineries, and Ethylene steam crackers. (2) includes Compressor and pumping stations, LNG regasification terminals, Large Crude carriers, gas processing plants. (3) Only counting engines in large scale power generation greater than 30 MW

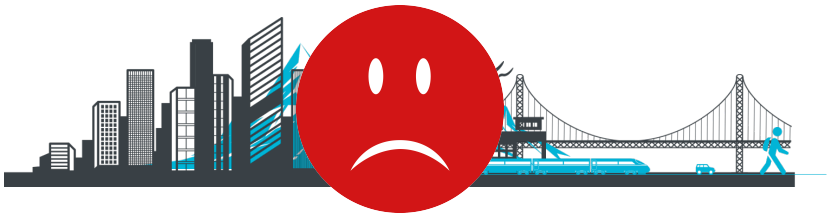
Sources: Multiple aggregated sources including Platts UDI, IHS-CERA, Oil and Gas Journal, Clarkson Research, GE Aviation & Transportation, InMedica, industrial info, RISI, US Dept. of Energy, GE Strategy and Analytics estimates of large rotating systems

Ex: CMS for « things that spin »

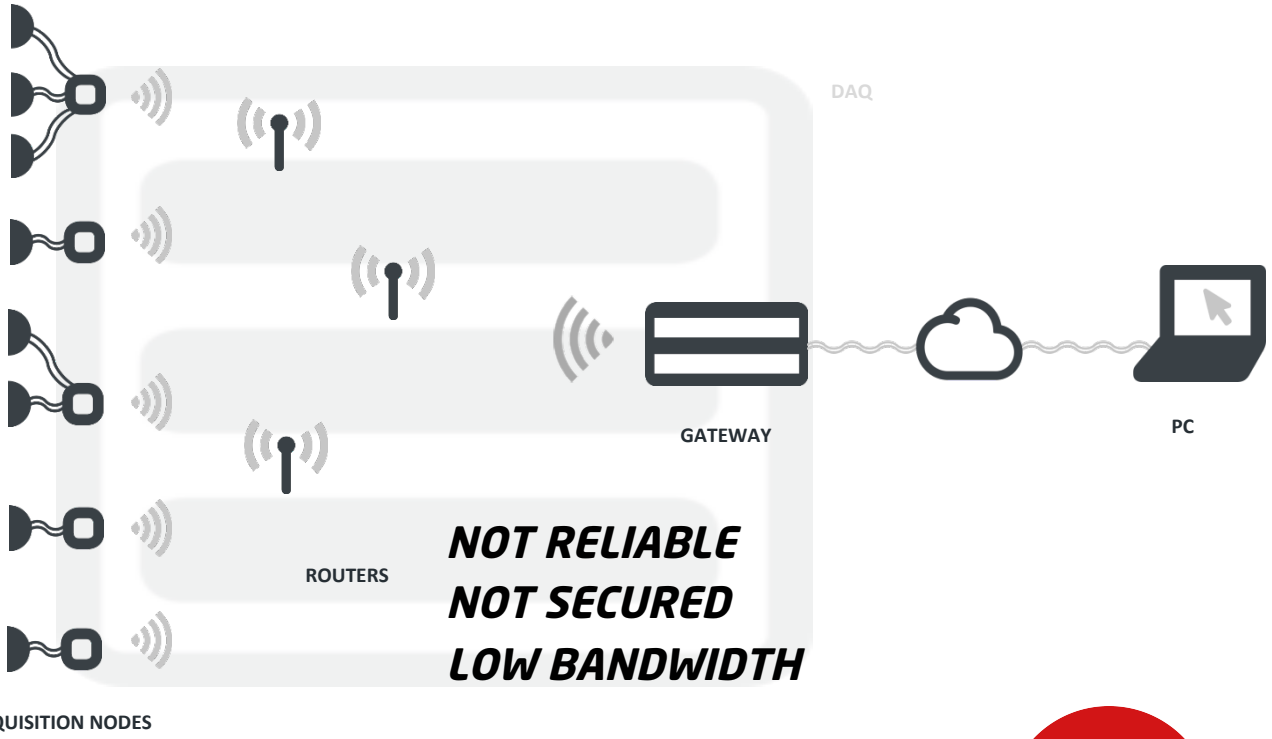


Ex: CMS for « things that spin »

Ex: CMS for « things that spin »



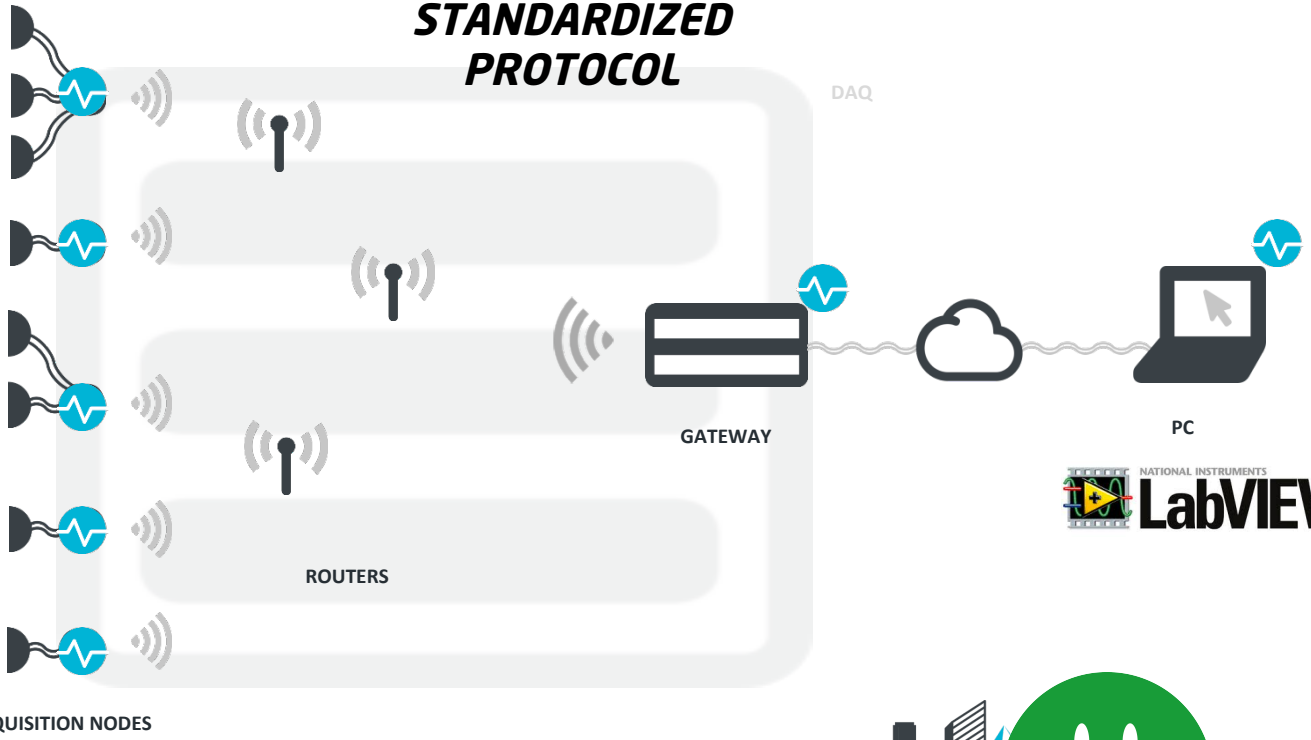
Ex: CMS for « things that spin »



NOT RELIABLE
NOT SECURED
LOW BANDWIDTH

NO ENERGY

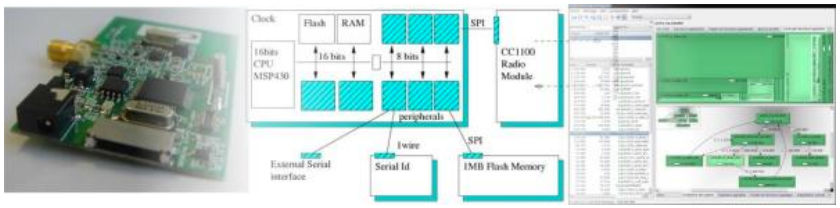
Ex: CMS for « things that spin »



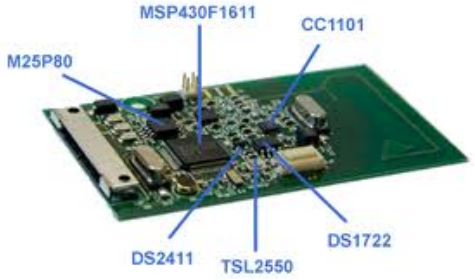
LOW ENERGY
DATA PROCESSING

HIKOB story: from simulation tools, testbeds

WSNet
An Event-driven Simulator for Large Scale Wireless Networks



WSim, WSNet

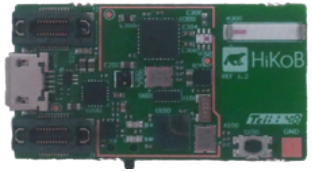


WSN430

Senslab
Very large scale open wireless sensor network testbed

Through experiments to industrial products and industrial partnertships.

XtremLog



HIKOB
developers.

CONCLUSION

Strong interest in testbed to:
- Confront a concept to the reality of the technology
- Test and validate prototypes / products in specific conditions

But:
- What is the service brought with the testbed ?
- It is IoT-native players oriented or traditional industries oriented ?

They know the application, we bring them the technology.

Next step:
- Develop the programming tools to smartly spread the data processing and the configuration among the different system components.

They know the application, we bring them the tools to play with the technology.

THANK YOU VERY MUCH !

HIKOB

Questions ?

HIKOB CONTACT

Guillaume Chelius

CEO

guillaume.chelius@hikob.com

66 boulevard Niels Bohr, CS 52132

69603 Villeurbanne Cedex - FRANCE

contact@hikob.com

http://www.hikob.com