



# AXE FRONTIÈRES ET INTERFACES CYBERPHYSIQUES

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COLLOQUE DU GDR SOC-SIP  
BORDEAUX, 14-16 juin 2017

# EQUIPE RESP/ANIM DE L'AXE



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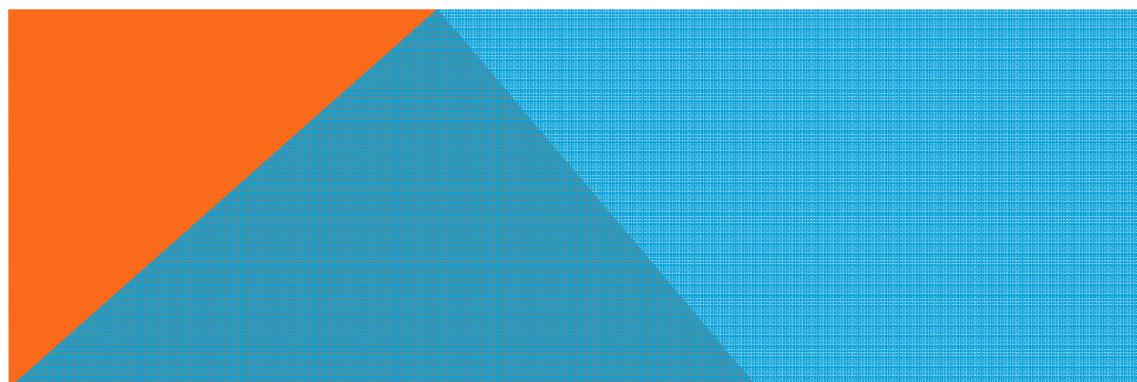
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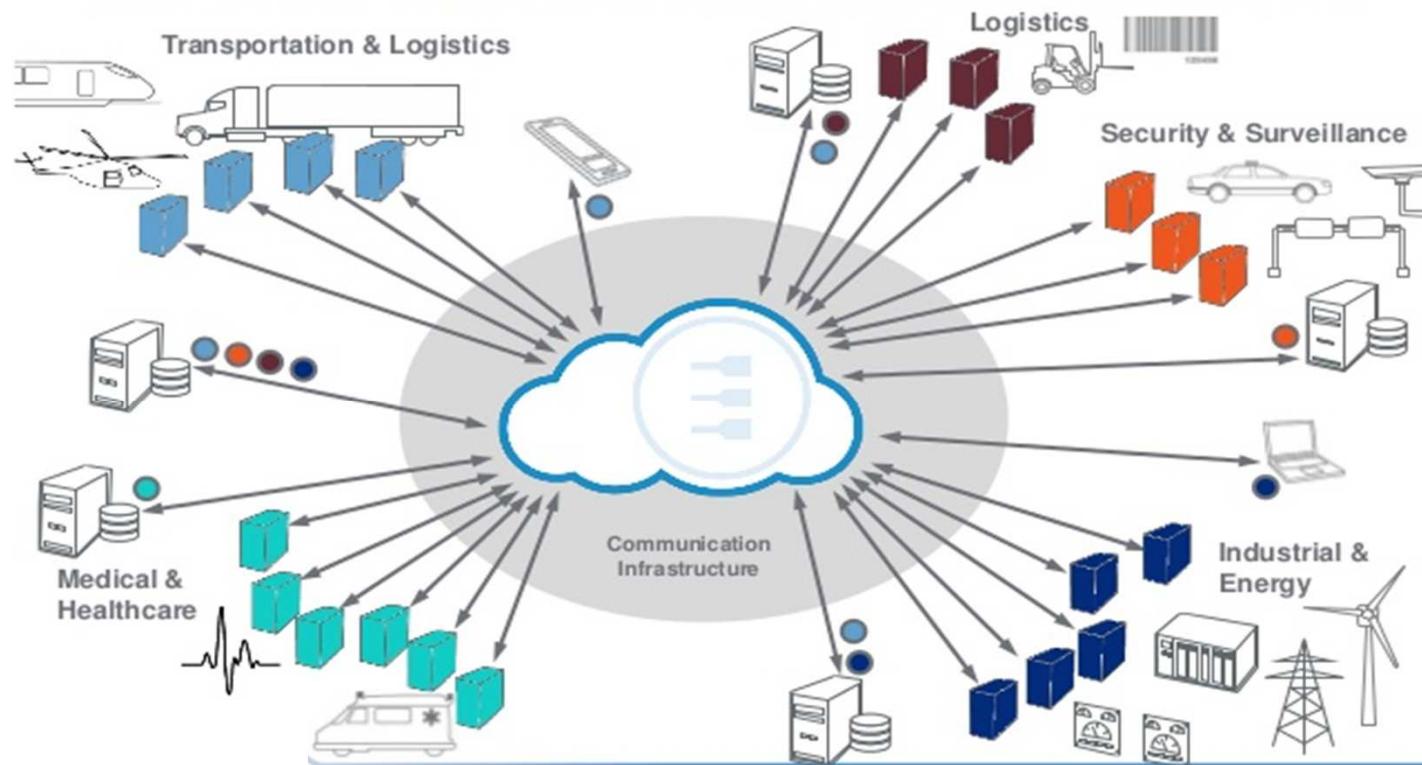
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# DATA DRIVEN WORLD → CYBER-PHYSICAL SYSTEM



Requires smart data & smart and self reconfigurable objects

2 key challenges  
power efficiency & security



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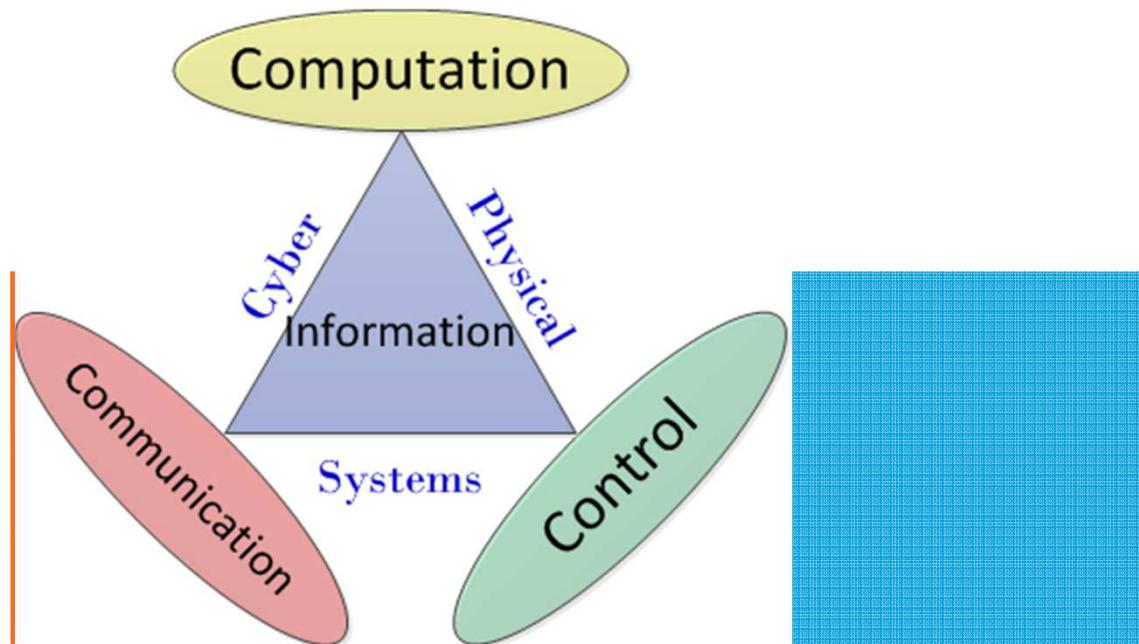
# NEW CHALLENGES FOR CYBER-PHYSICAL SYSTEM

## ■ Smart sensors

- To minimize the power → towards autonomous sensors
- To increase the flexibility (=> digital architecture)

## ■ Innovative algorithms

- Enhance the performance
- Improve the security and reliability
- Synchronicity between physical and software components



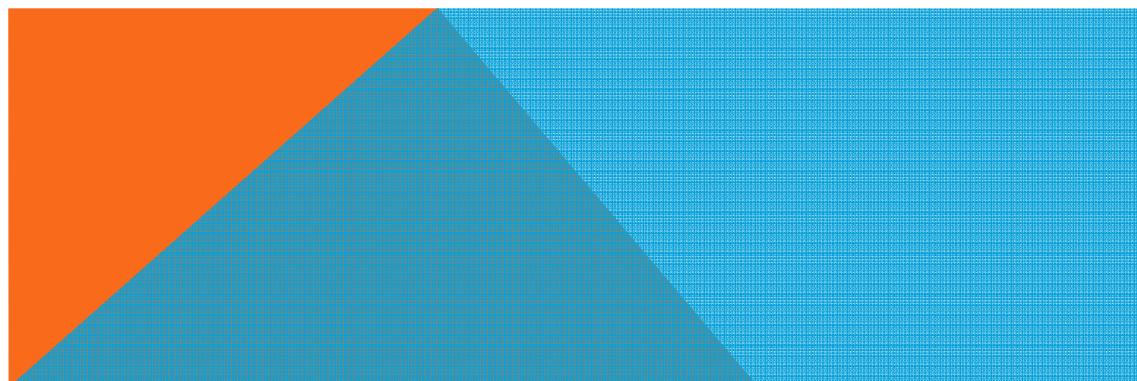
# ONE OF THE MAIN BOTTLENECKS : CONNECTIVITY, INTERFACE

## Interface with the physical data

- To integrate a localized intelligence at the level of the object (sensitive node), this intelligence must consume as little as possible, in agreement with the application
- power management, reconfiguration to reach drastic reduction in power consumption around 70%
- Compressed sensing to reduce the number of data → towards smart data

## Interface with the computational heart

- Fast and interoperable wired or RF communications
- Cyber security
- Power efficiency increase : drastic reduction in the power consumption of 90% for future 5G communications compared to the existing ones



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**Des journée  
d'animation  
2017-2018**

# CAPTEURS INNOVANTS & OBJETS CONNECTÉS AUTONOMES FAIBLE CONSOMMATION

Date : 25 avril 2017

Lieu : Université de Toulon

Programme :

**10h00 – 12h00:** *Talks I & II*

**Futur de la RFID : Au-delà de l'Identification**

Dr. Claude TETELIN

*Président de la commission IoT de l'Afnor, CNRFID, Rousset*

**Radio for IoT Networks : From Adaptive Radio to BiCephalous Systems**

Dr. Dominique MORCHE

*CEA LETI, Grenoble*

**14h00 – 16h00:** *Talks III & IV*

**Micro-Capteurs Magnétiques Intégrés sur CMOS et Applications**

Dr. Luc HEBRARD

Laboratoire ICube - UMR 7357, Université de Strasbourg

**RF Low Power Design Technics**

Dr. Sylvain BOURDEL

*Minatec-Phelma, Grenoble INP*



# ENVIRONMENTAL IMPACT OF RF 5G COMMUNICATIONS AND IOT GROWTH : TOWARDS GREEN TECHNOLOGY

Date : November 13th to 17<sup>th</sup>

Lieu : IMS Laboratory

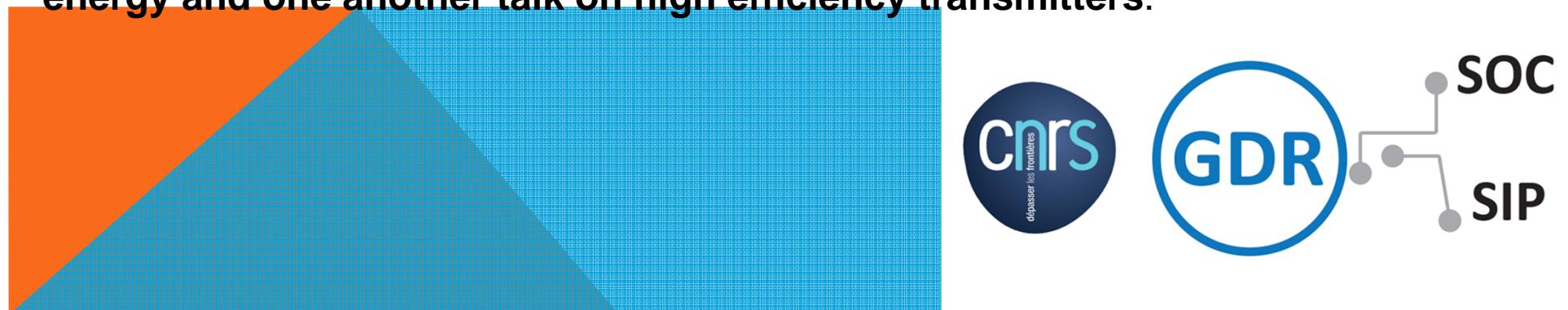
## Topics of the presentations:

The most urgent issue for green technology, includes the development of alternative materials/substrates, new means of generating energy and energy efficiency.

1/ Life cycle of materials in mobile phones from extraction to recycling

2/ Technologies: green flexible electronics based on biodegradable cellulose nanofibril paper, FDSOI technology, and so on.

3/ Energy consumption with one talk on the wireless transfer of electromagnetic energy and one another talk on high efficiency transmitters.



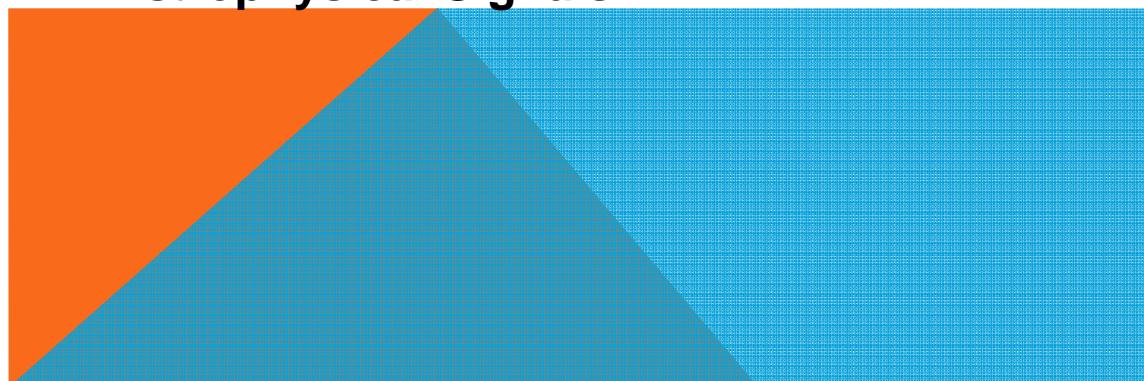
# **ANALOG TO INFORMATION, ANALOG-TO-CLASSIFICATION: NEW PRINCIPLES TO EXTRACT RELEVANT INFORMATION**

**Date: December 2017**

**Lieu: LTCI, Telecom ParisTech**

Topics of the presentations:

- 1) Analog-to-information sensing, going beyond compressive sampling**
- 2) Traitement parcimonieux de signaux biologiques (A to C)**
- 3) Analog-to-Information Converter Design for Low-Power Acquisition of Astrophysical Signals**

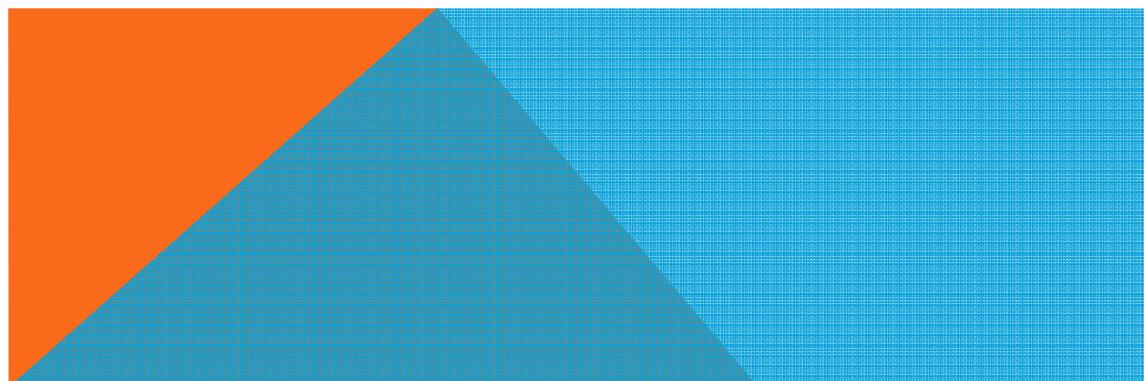


# CAPTEURS ET INTERFACES POUR LA SANTÉ

Période de programmation : S1 2018

Thèmes qui seront abordés :

interface avec l'environnement biologique (contraintes thermiques de biocompatibilité, d'usage (discrétion)...), compression et transmission de l'information...



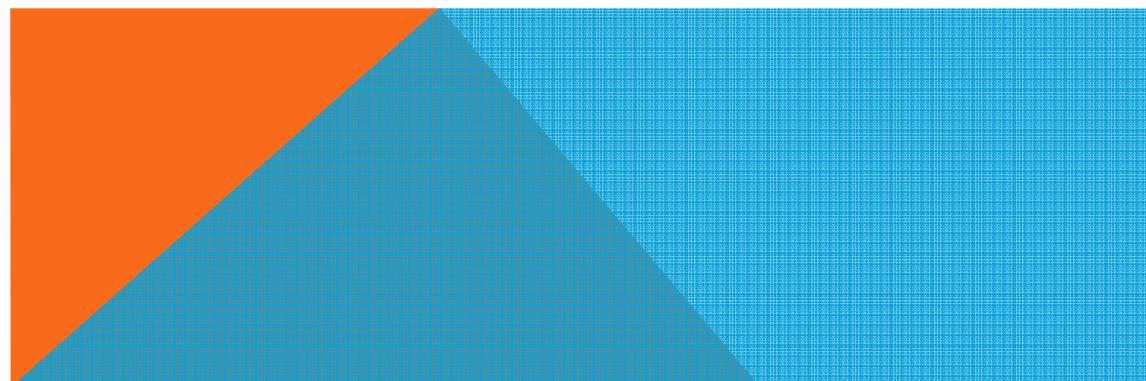
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# FULL SOFTWARE RADIO TRANSMITTER FOR 5G APPLICATIONS

Période de programmation : S1 ou S2 2018

Thèmes qui seront abordés :

- **Highly digital and flexible transmitters**
- RF DAC based-Tx
- ARFPD to linearize wideband PA
- exploring better efficient algorithms, mixed analog-digital implementation and co-design of algorithms with merged DAC+PA functions.



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