leti
cea tech



LETI EXPLORATION IN THE FUTURE

THE 3 BIG TRANSITIONS

THE DIGITAL REVOLUTION



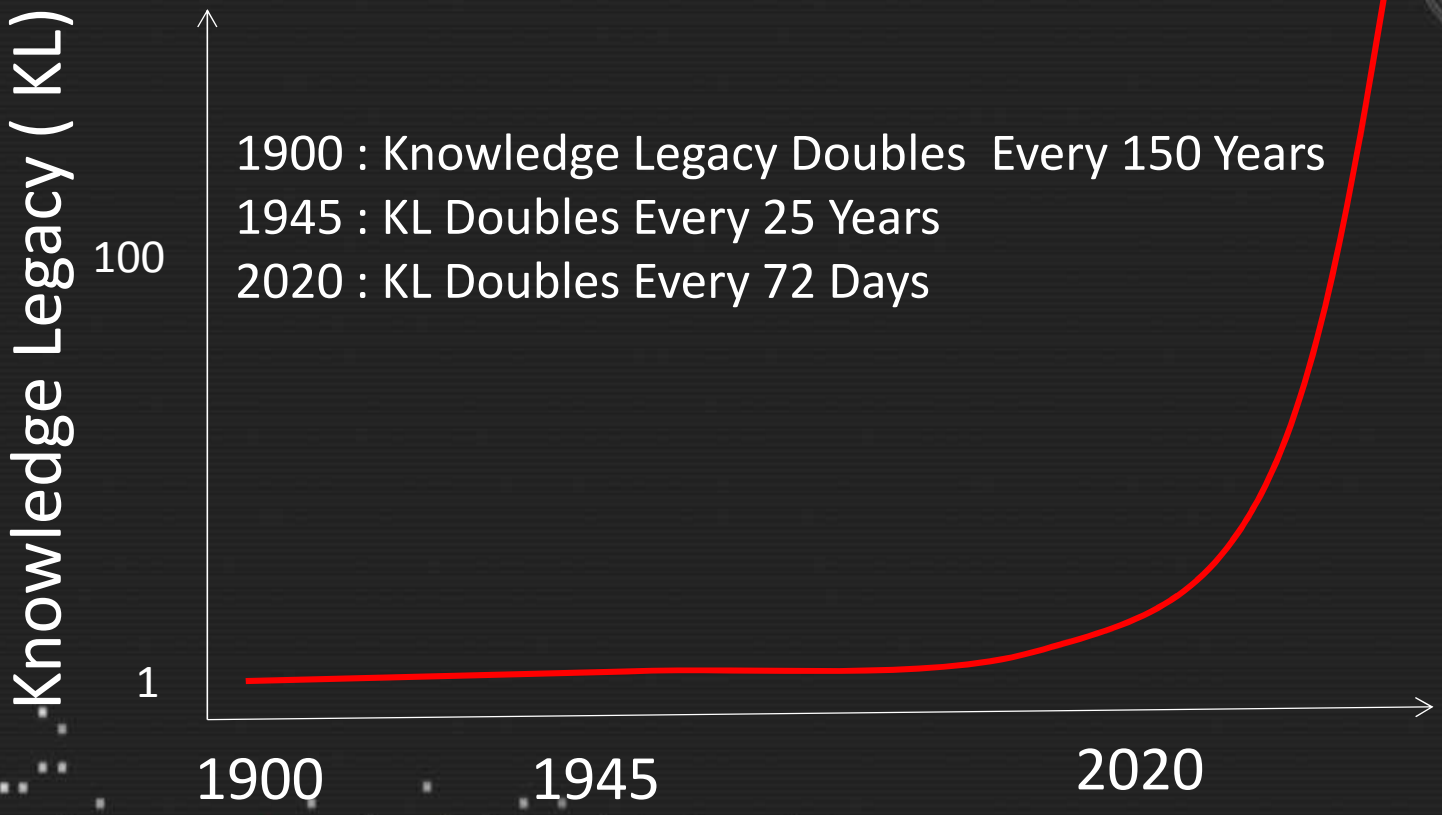
THE ENVIRONMENTAL TRANSITION



NEW FRONTIERS FOR HEALTCARE



SO MUCH DATA !



1900 : Knowledge Legacy Doubles Every 150 Years
1945 : KL Doubles Every 25 Years
2020 : KL Doubles Every 72 Days

THE PHILOSOPHY OF THE DIGITAL ERA

The digital age returns to Pythagoras (everything is number). The algorithmic thinking that allows to digitize everything allows us to grasp the individual in its plurality. **The present sciences are knowledge of singularities.**

Michel Serres – Pantopie :
de Hermès à petite poucette

The more information we receive, the more we are led to relate things that are not related to each other. Our universe is disparate, **thinking is connecting the disparate.**

The society of communication becomes a **society of pedagogy**..

8 oct 2014

FONCTIONS ENABLING THE DIGITAL TRANSFORMATION









At the Convergence Between Real World & Digital

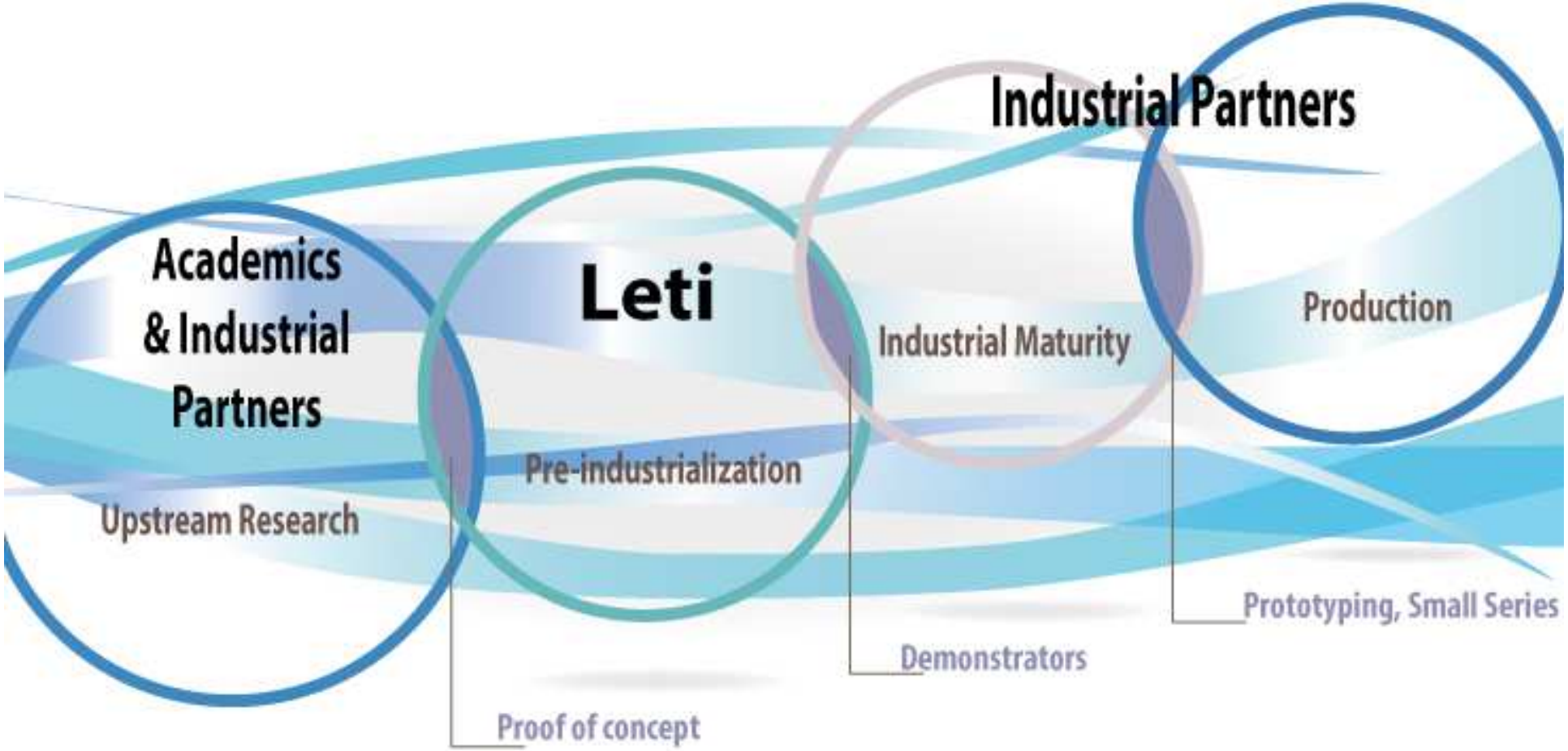






LETI'S MISSION

Committed to innovation, Leti pioneers differentiating solutions in miniaturization and energy-efficient technologies to enable industrial solutions for a human-centered world



ROUTES TO INNOVATION

FROM « IOT » TO « IOI »

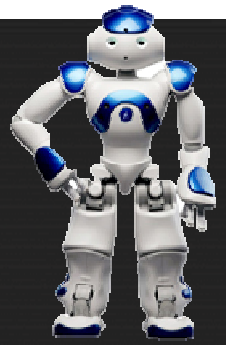
From Internet of Things to Internet of Intelligences



THE DIGITAL REVOLUTION

The wave which transforms our society, our industry, our business models the way we live, we move, we share.

ARTIFICIAL INTELLIGENCE ROOTS IN HW

	TODAY	TOMORROW	AFTER TOMORROW
Cloud Computing	Supervised Learning Inference Memory + GPU Memory + specific HW	Supervised Learning Memory + GPU PIM	Memory
Embedded Computing	 Signal Capture **Personnal Assistant**	Inférence  Environment Awareness Data Fusion **Autonomous Car**	Non Supervised Learning Inference  Bio-Inspired Approach Learning Though Interactions Regularity **Robot Assistant**

FDSOI TACKLES THE CHALLENGE OF « IOI »

1980-1990 Early Work

1992 Substrates

2000-2007 Research

2008 Advanced R&D

2010 Industrial Partner

2014 Open Foundry

2015 Products On the Market

EDA Ecosystem

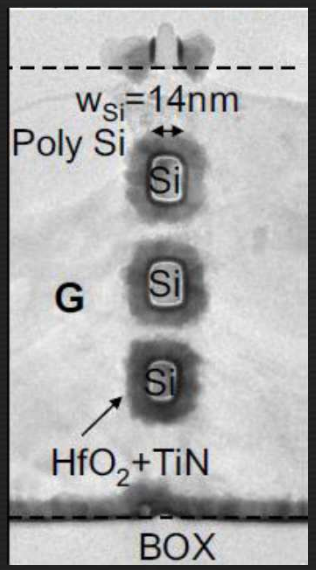


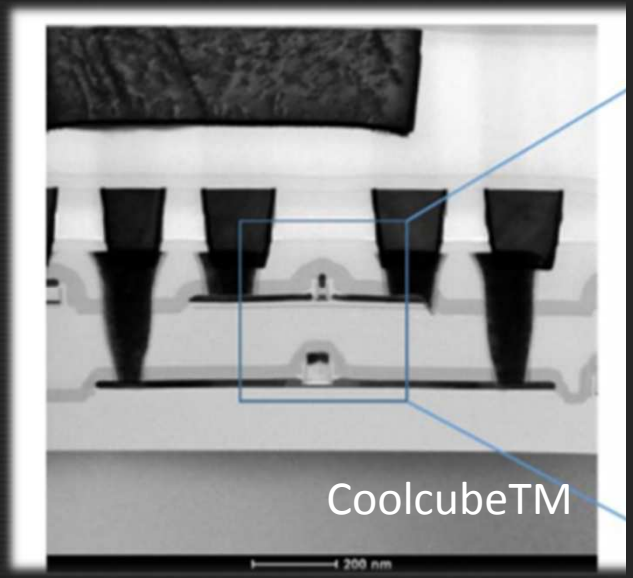
40% Power Saving, Cost Decrease, 100% Gain in RF, eNVM
FDSOI Extension up to 7 nm
State of the Art Compact Modeling Adopted by Industry
Leti and FgG Part of the GF FDXcelerator™ to Design SoC Solution

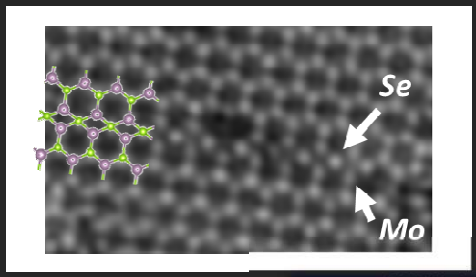
FDSOI is THE Low Power Low Cost Platform for IoI

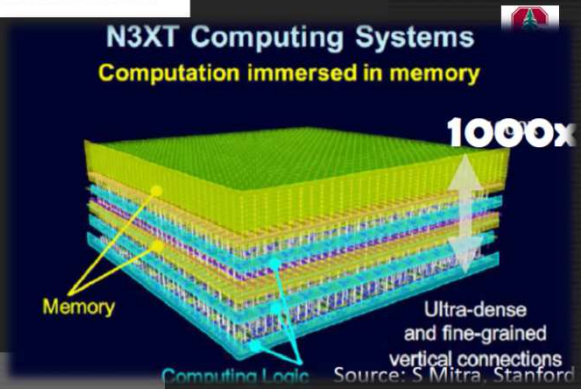
ELECTRONS D'OR 2017

THE NEXT MAJOR DISRUPTIONS



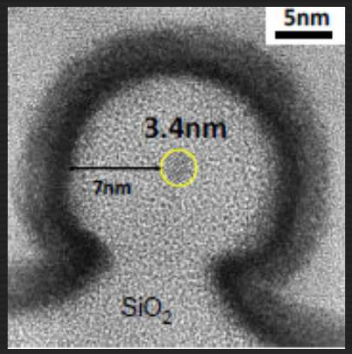


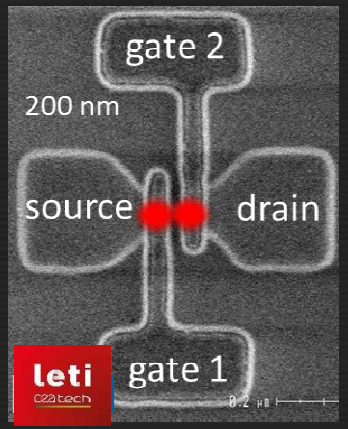




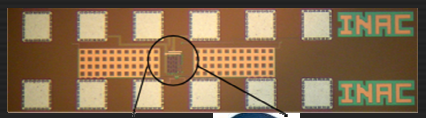
- Si Nanowires Will be the Next Platform:
  State of Art Modeling and Advanced Si Devices
- Disruptive 3D Architectures for Computing:
  3D Integration, Coolcube ™, NanoSystem
- Innovative Materials: 2D, Functional Materials

SI-CMOS QUANTUM TECHNOLOGY PLATFORM

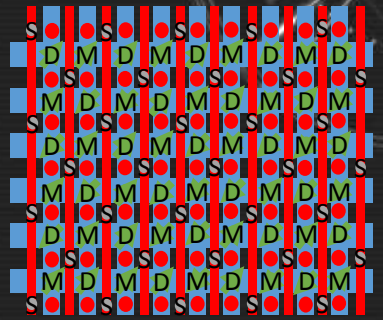




2016 VLSI CIRCUITS SYMPOSIUM HONOLULU



cea INSTITUT NANOSCIENCE ET CRYOGÉNIE cnrs



Large-Scale Qbit Integration

First 2 Qubits Logic Gate on Si 28 Compatible with CMOS300 Demonstrated
Grenoble Unique Technologic Hub : Si Technology and Cryogenic Electronics
Leti Leads the European Project Mosquito in Quantuum
French Research and Engineering Program in Quantuum
European Flagship in Preparation

UNIVERSITÉ Grenoble Alpes

LETI Q Platform Open to Physics, Mathematics and Computer Science Teams to Experiment .

ROUTES TO INNOVATION



THE ENVIRONMENTAL TRANSITION

Electronics are Driving
the Change
New Mobilities
New Way of Living

SEMI-CONDUCTOR ENABLERS

HM Interface

Power Efficiency

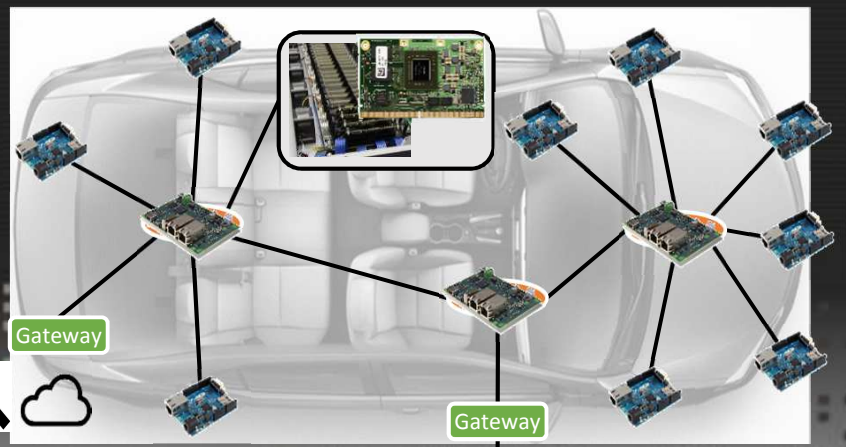
Digital Platform

Semiconductors Technologies

Multi Sensors Solutions

5G Communication Radio Frequency

Security



SMART SENSORS ARE THE GAME CHANGERS

IMAGING SENSING



1 Md€
1500 employees
10000 m² of clean rooms

Low Energy and High Performance

New Materials, Transducers, WLpackaging, ULP Imagers

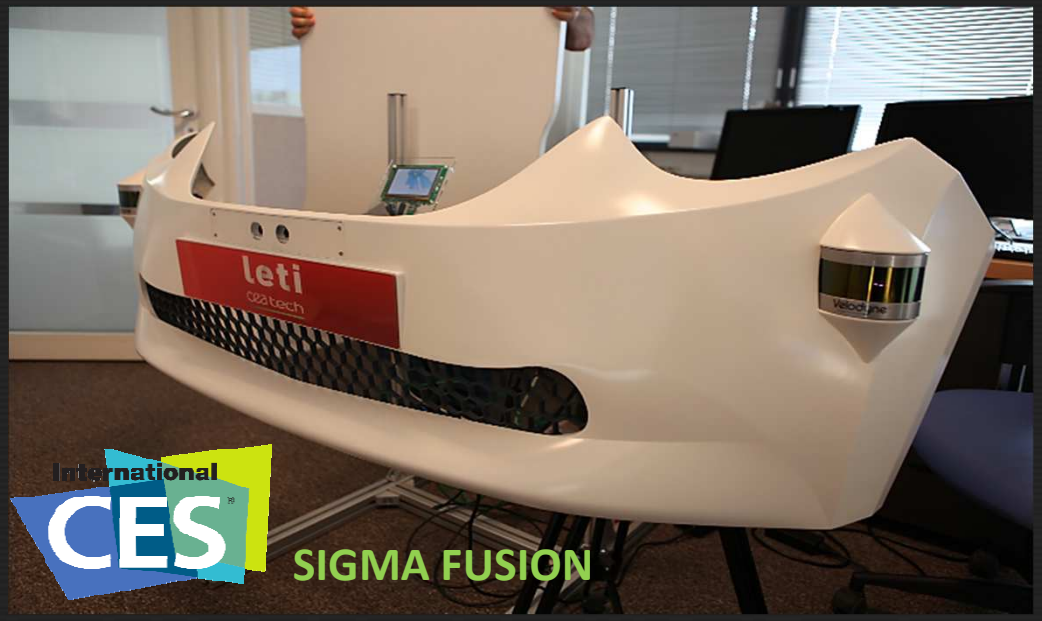
Beyond Eye-Vision

3D Imaging,VIS & IR, Xspectral,Xsensor, Night Vision

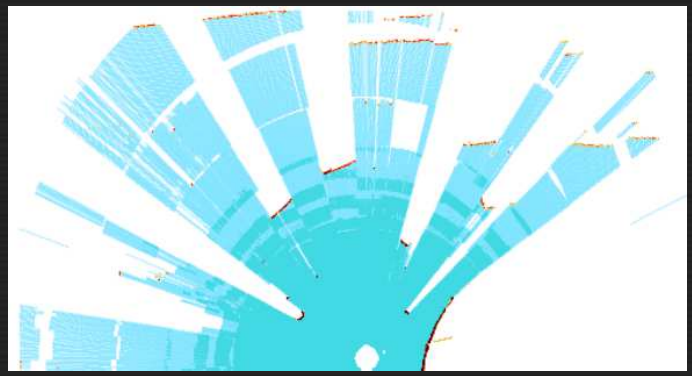
Embedded Intelligence System

Embedded Image Processing for low Power
Higher Security and Smaller Latency
Enablers for ADAS, VR&AR, Health & Wellness, Factrory 4.0

SENSORS FUSION ALGORITHMS







SIGMA FUSION SOLUTION : Low Power Sensor Fusion Solution

For Safe Autonomous Driving

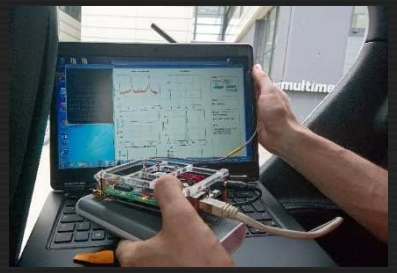
< 1 Watt, Gain x 100

Compatible With Any Sensors
(Optics, Camera, Radar, Ultrasound,..)

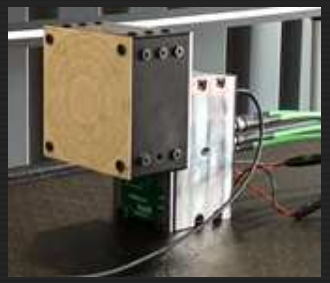
ISO 26262

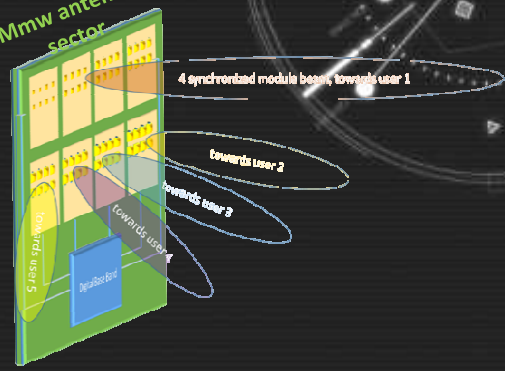
ASIL-D
certified platform

LETI AT THE HEART OF 5G









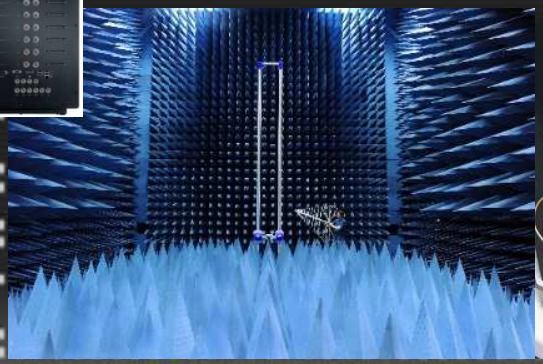
Investigating New Opportunities for End-users

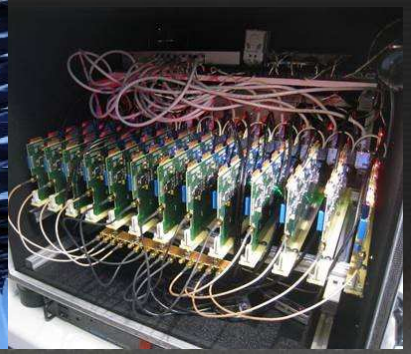
New Multi-Service Radio
Field Trials in Grenoble in 3,5GHz
Massive IoT Development Platform

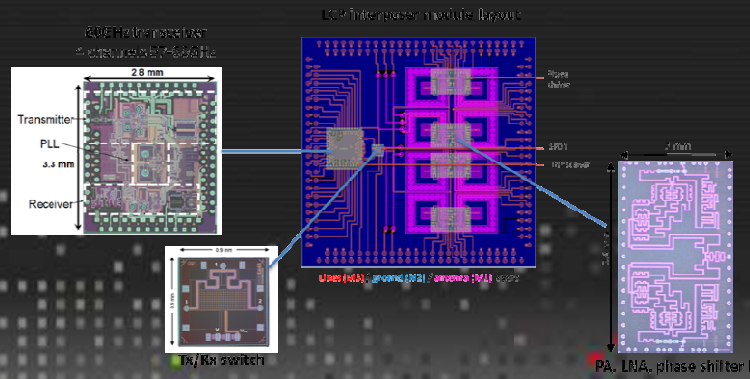
Driving the roadmap with the vision of system

Mmwave Radios, Backhauling & Fronthauling
Platform for New RFICs
RFSOI and New Materials










1990
ISOCAM : IR Detector – Cold Universe – with
1995
CASSINI HUYGENS : IR MCT – Saturne Rings
2005
HERSCHEL : Submm component – Cold Ground Universe
2008
BEPI COLUMBO : IR Detector
2010
With
SOFRADIR
Sensing your future
On going
LWIR, SWIR 2K2, Exoplanet, Black Matter,
ISOCAM : IR Detector – Cold Universe
II-V Technologies and Newly III-
More than 30 Years of Partnership
Extension to
III-V lab
More than 30 Years in Front of us
Image of the Earth by Thomas Pesquet

ROUTES TO INNOVATION



NEW FRONTIERS FOR HEALTCARE

Differentiating Solutions to Improve Quality of Life
the Disruption of Data and Biology
Smart Medical Devices are the New Game Changers

A UNIQUE BIOMEDICAL CENTER INSIDE A TECHNOLOGIC HUB


Pr. AL. Benabid


J. Therme


Pr. A. Mérieux

2014 **Lasker~DeBakey**
2015 Breakthrough Prize
Clinical Medical Research Award



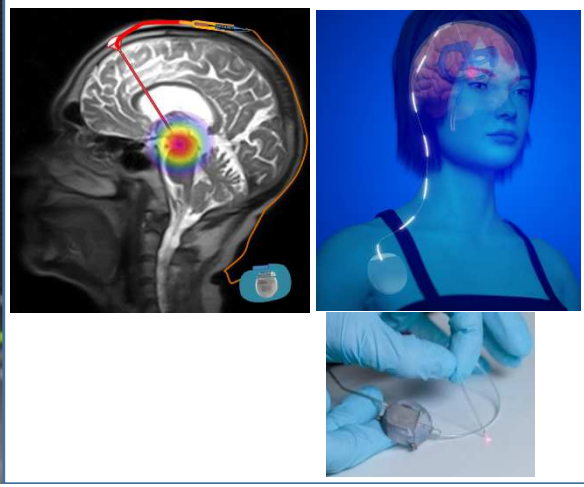
Innovative Technologies for New Healthcare Solutions

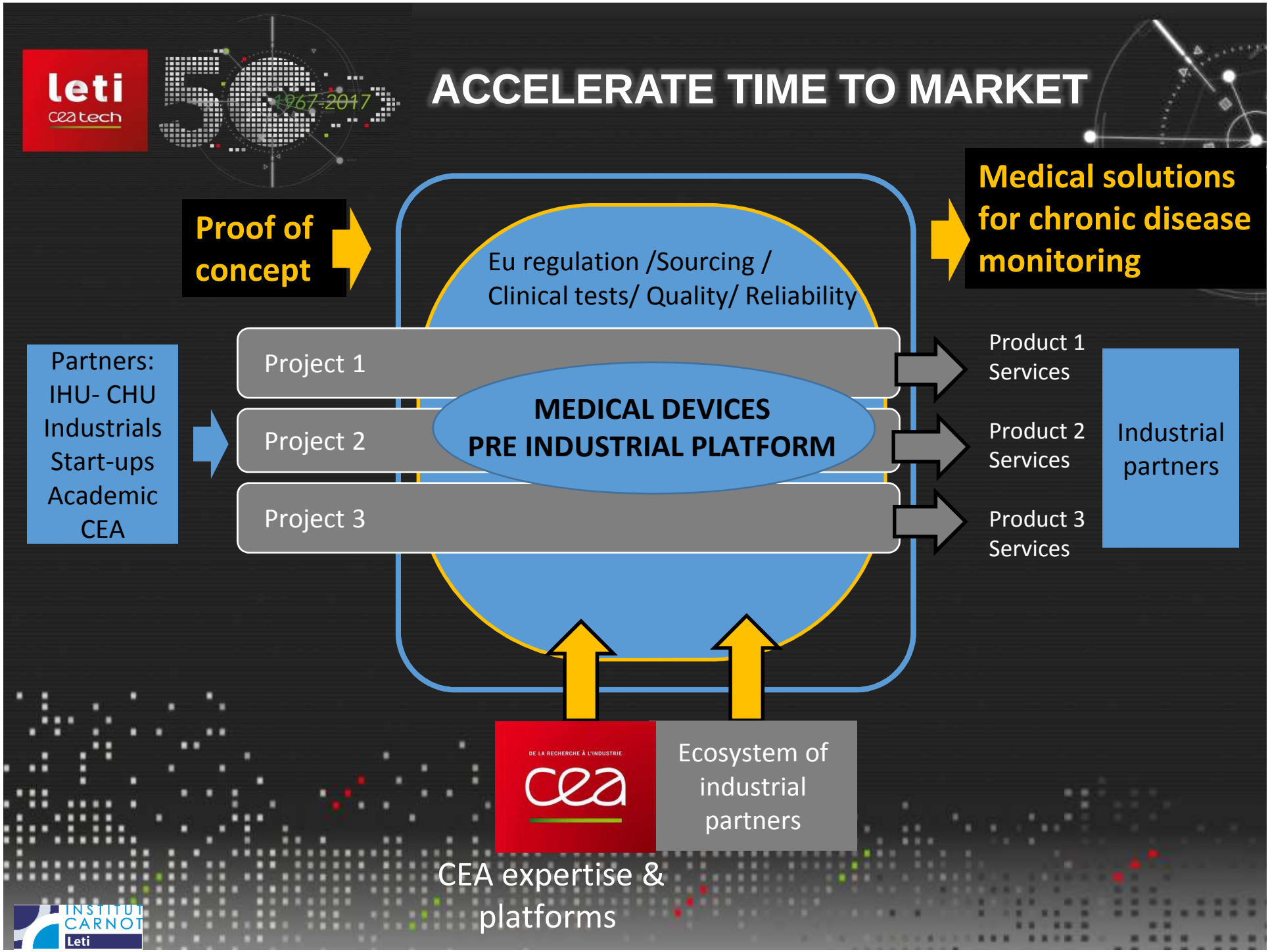


BCI PROJECT



NIR PROJECT




ACCELERATE TIME TO MARKET
Proof of concept
Medical solutions for chronic disease monitoring
Eu regulation /Sourcing /
Clinical tests/ Quality/ Reliability
Partners:
IHU- CHU
Industrials
Start-ups
Academic
CEA
Project 1
Project 2
Project 3
MEDICAL DEVICES
PRE INDUSTRIAL PLATFORM
Product 1
Services
Product 2
Services
Product 3
Services
Industrial partners
Ecosystem of industrial partners
CEA expertise & platforms



From Materials

To Systems

‘I want France to be a “start-up nation”, meaning both a nation that works with and for the start ups, but also a nation that thinks and moves like a start up’

President E. Macron – Vivatech-July 2017

Leti did and will continue to act as startup incubator and startup partner

FRENCH TECH VISA

Innovation Fund of € 10bn

leti
ceatech

1967-2017



64

STARTUPS

INSTITUT CARNOT Leti

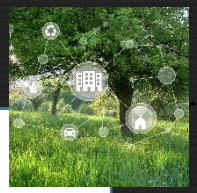
LETI START-UP PROGRAM
LAST 4 YEARS

THE DIGITAL REVOLUTION



- iskn
- Primo1D — The E-Thread® Company
- MORPHOSENSE
- BAG-ERA — CONNECTED CONSISTENCY
- the airboard®

THE ENVIRONMENTAL TRANSITION



- elichens
- APIX ANALYTICS
- mir sense
- EXAGAN — Accelerate Power Transition

NEW FRONTIERS FOR HEALTCARE

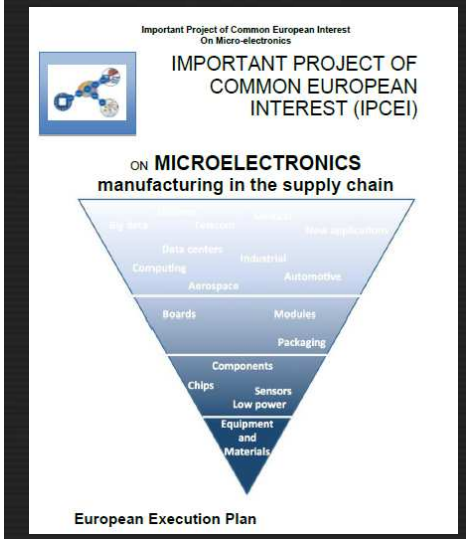


- avalun®
- DIABELOOP
- REMEDEE
- ARYBALLE Technologies

INSTITUT CARNOT Leti

A NEW EUROPEAN INITIATIVE IN MICROELECTRONICS

- Microelectronics is a Key Enabler for Competitiveness and Innovation
- Comprehensive Project of Common European Interest
- Allows Europe to Stay Sovereign in for its Industrial Future for the Decades to Come





Want to Forge a New French-German Partnership for Shaping the Technological Digital Future

LETI : LABORATORY OF ELECTRONICS AND TECHNOLOGIES OF INTELLIGENCE

" Since its creation, the Leti has found the meaning of its action, key to its success.

In a world that has profoundly changed and that is questioning today its future, intelligence technologies will play a major role in the next years to get out of the trap, a whole program for Leti "

Jacques Lacour

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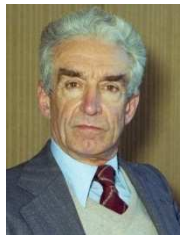
Michelle Cordelle
1967-1983


Jacques Lacour
1983-1990


Denis Randet
1991-1998


Jean Therme
1999-2003


Bernard Barbier
2003-2006


Laurent Malier
2006-2014


Marie-Noëlle Semeria
2014

Innovate !

- Materials
- Process integration
- System integration
- IC architecture
- Usage



The Place to Move to Invent the Solutions of Tomorrow




leti
cea tech
1967-2017
LETI EXPLORATION IN THE FUTURE