

leti
cea tech



INFRARED IMAGING

Leti Innovation Days | June 28-29, 2017



A NICE STORY OF THE HISTORY OF LETI



Almost 40 years of experience in Infrared imaging



Photonic Platform



2017



Infrared Laboratory
IR technology (MCT)



Beginning of
microbolometer
sensors development



1978

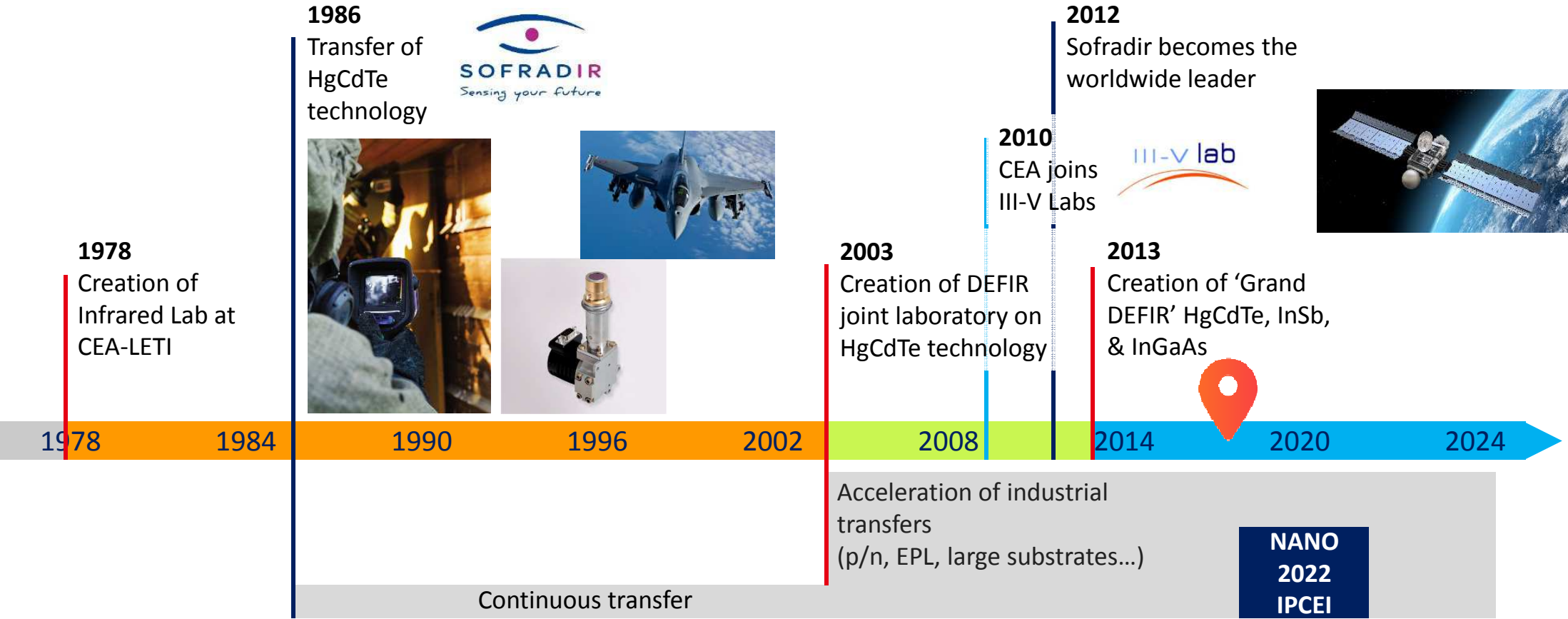


1986

1992

2002

HIGH-PERFORMANCE INFRARED IMAGING



High performance IR FPA for Astronomy and Space applications



HIGH-QUALITY THERMAL IMAGE SENSORS



2008-2009

Upgrade of LETI bolometer fab to 200mm wafers



2009

17µm pixel pitch

2002

Transfer of a-Si microbolometer technology



2004

35µm pixel pitch

2005

25µm pixel pitch

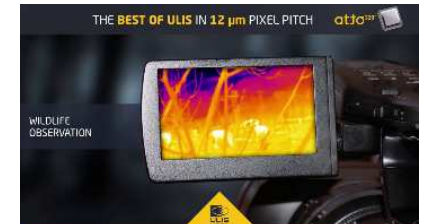
2016

µ80 product
Pixel Level
Packaging



2017

12 µm pixel pitch



2002

2006

2010

2014

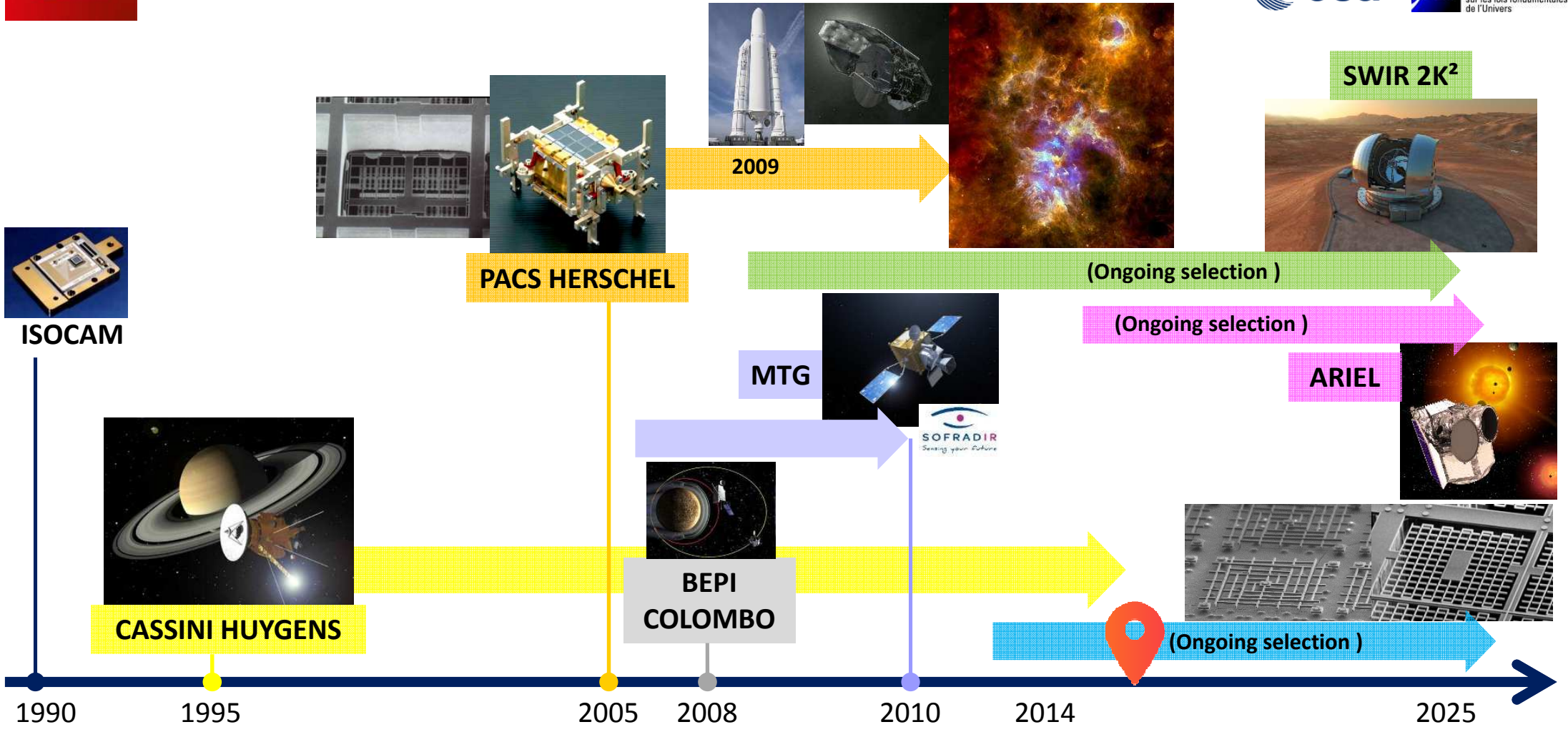
2018

2022

Continuous transfer

NANO 2022 - IPCEI

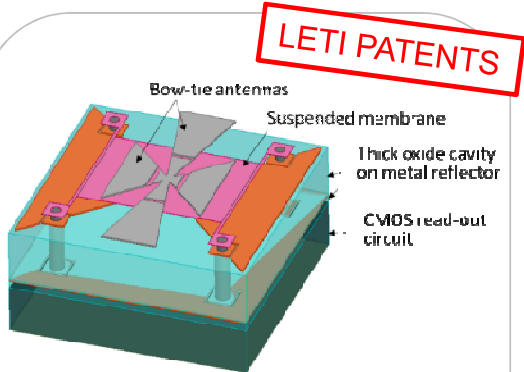
HIGH END IR SENSORS FOR SPACE OBSERVATION



PUSHING THE FRONTIERS OF IR TOWARDS TERAHERTZ IMAGING

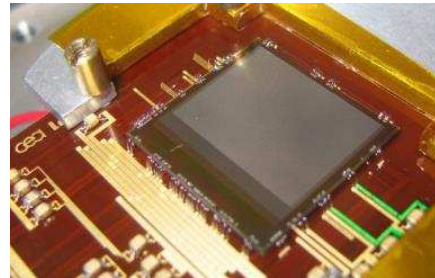
FROM CONCEPT TO COMMERCIAL TERAHERTZ VIDEO CAMERA

➤ Innovative THz pixel



- Leti proprietary THz bolometer
- Silicon microelectronics compatible
- Process above CMOS
- Uncooled operation

➤ Processed 2D sensor



- Optimized for 1 – 3 THz operation
- 50µm pitch **320x240 pixels array**
- 200mm diameter 0.18µm CMOS ASIC designed at Leti

➤ Camera prototype



- Real-time video output
- Ethernet port
- Synchro input (/source)
- **State-of-the-art sensitivity: <30pW/pixel in video mode**

➤ Commercial camera & industrial test offer



- Compact camera with 50mm f/0,8 optics



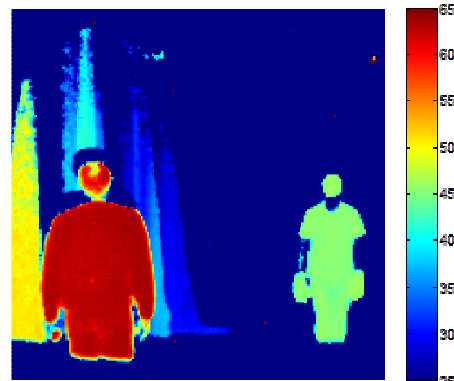
- From feasibility study to system tests



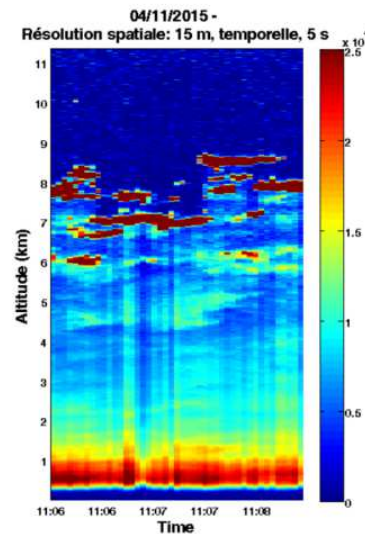
NEW PERSPECTIVES : IR AVALANCHE PHOTODIODE



Photon counting
Wave front correction
Ultra low flux detection

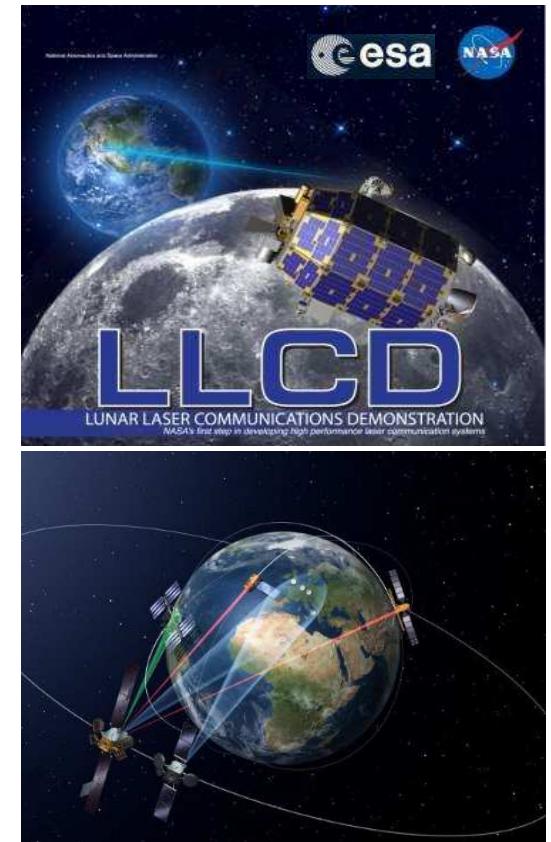


3D LIDAR Imaging
(High end applications)



CO2 atmospheric measurement

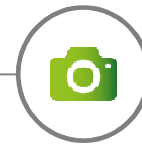
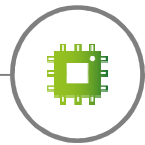
Greenhouse gases monitoring



Deep space communication



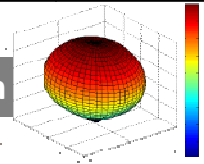
IMAGING SENSORS & SYSTEMS @LETI: FROM SENSOR TO SYSTEM ... FROM PHOTON TO DECISION



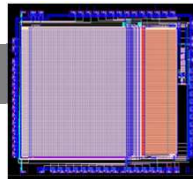
Materials



Modelling - simulation



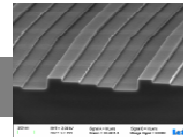
IC design



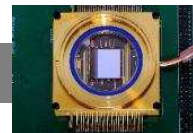
Technologies



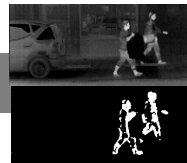
Optics



Packaging



Embedded processing



Characterization



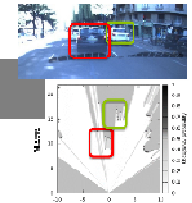
Camera



Embedded software

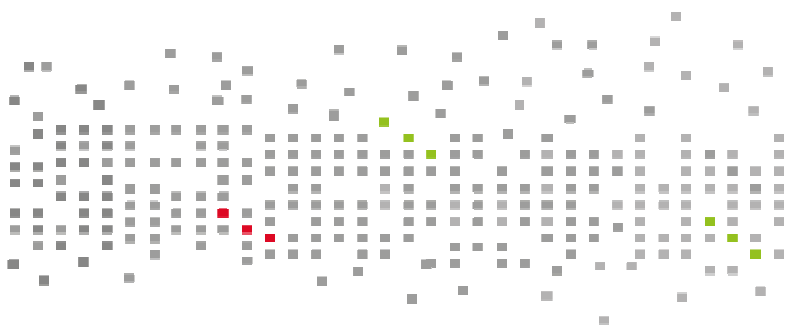


Data fusion



In field tests





We can ask your questions in numerical environment

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Pierre Castelein
François Simoens

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