8th ESA Roundtable on MNT for Space Applications

Heterogeneous Technology Alliance

Smart Integrated Systems and Solutions - SIS²

csem

cea leti liten

VTT

Fraunhofer MIKROELEKTRONIK

Pooling RTO Resources for Scale and Scope changing the paradigm of R&D&I:

and

what is good for ESA and Space applications

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The Heterogeneous Technology Alliance HTA

What is the HTA: an Alliance

Division Recherche Technologique

Grenoble

Empl. 1’400

Turnover : 240 M€

Clean room : 8’000 m^2

Neuchâtel

Empl. 350

Turnover: 35 M€

Clean room : 1200 m^2

Espoo, Oulu

Empl 400

Turnover : 60 M€

Clean room : 2450 m^2

Dresden, Berlin, München

Empl. 2’800

Turnover :305 M€

Clean room : 8450 m^2

Fraunhofer Verbund Mikroelektronik

The Heterogeneous Technology Alliance HTA

HTA – The Tools

- Top management Strategic orientation
- Operational tools
  - Technology mapping: what we have
  - Roadmaps: the environment
  - Flagships: speed up commercialisation
  - Platforms: the common force
    - SOI platform
    - Reliability platform
    - Photonics platform

With already important achievements per organisation

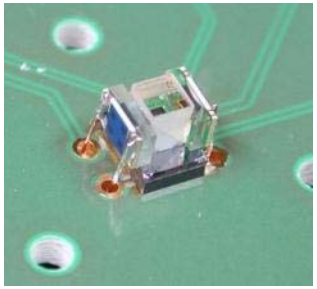
Micro- for Space

Sensors & MEMS

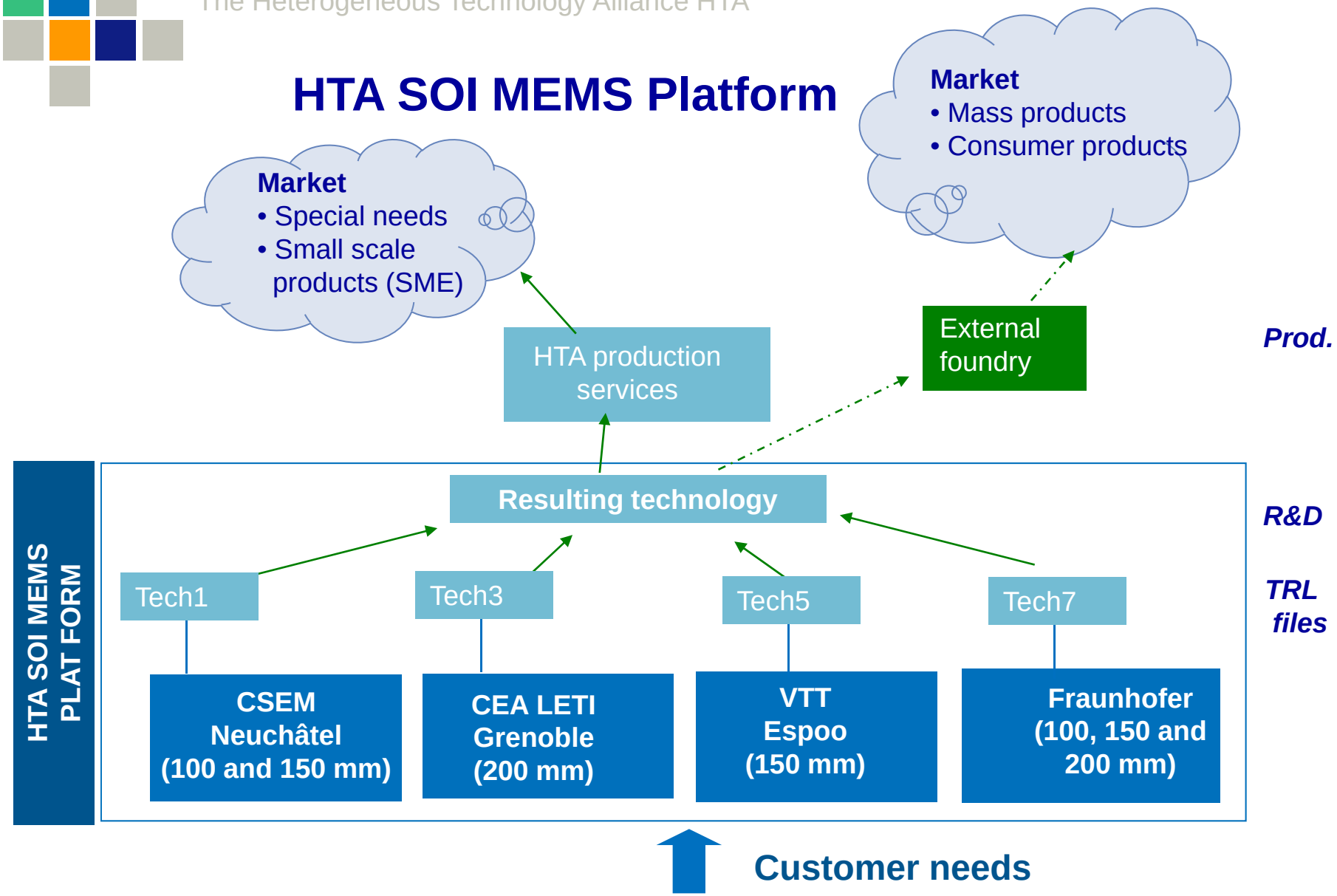
Medical devices

Precision mechanisms

Telecommunications



HTA SOI MEMS Platform



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Reliability Platform

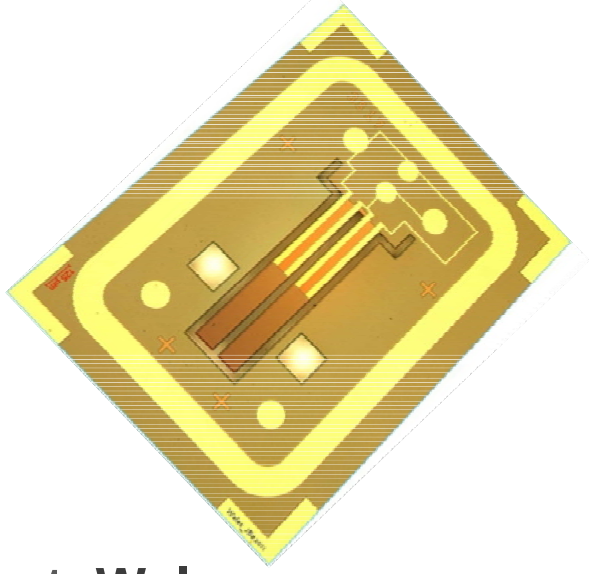
VISION

- HTA offers leading reliability platform for process and product development, aiming at **understanding of failure mechanisms and failure avoidance**, testing and health monitoring of devices

MISSION

- Makes the **large arsenal of tools available for customers** and all HTA partners
- Chaining of quite **different reliability methods and expertises**
- **Strengthening European products** by Made-in-Europe Quality
- Helping R&D engineers to select **and link most efficient methods and equipment for reliability driven purposes**

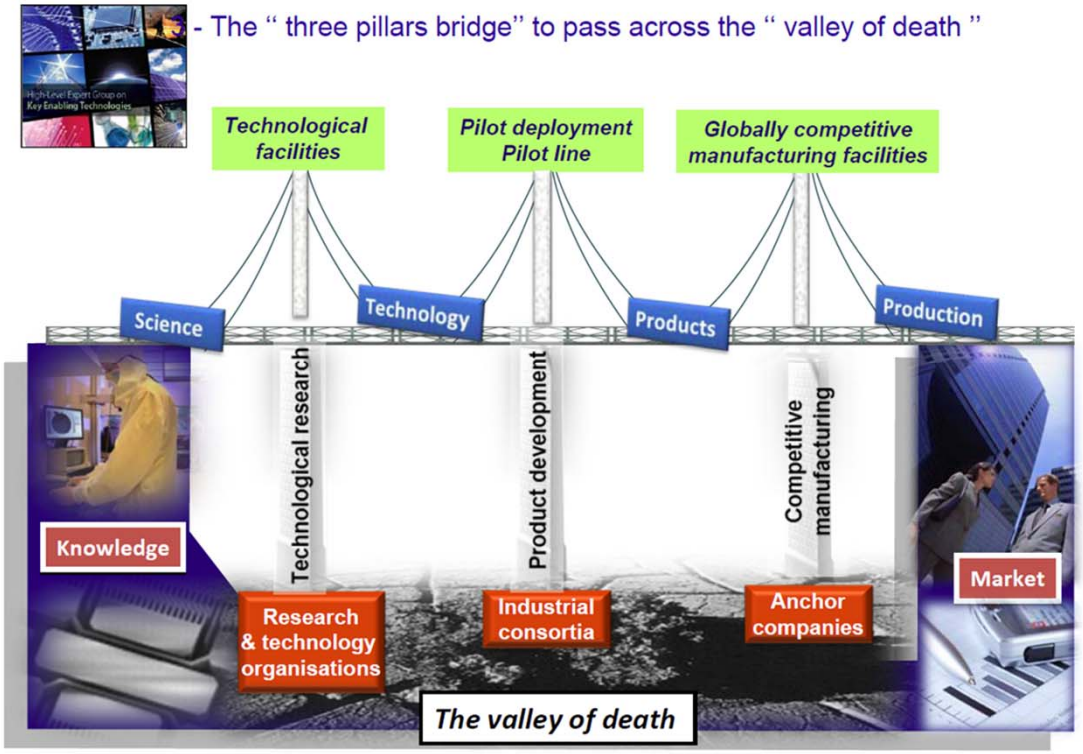
Packaging and testing development for MEMS used in space missions



- **European Space Agency (ESA) project: Wales**
- **Challenge:** How to connect and protect microelectromechanical (MEMS) devices to **withstand extreme weather and radiation conditions encountered in space**.
- **Key benefits:** New, proven and reliable packaging concepts can dramatically **extend the lifetime of MEMS devices**. This expands their suitability in space missions. MEMS in space will benefit Europe's space industry through the **increase overall flight-and-exploration reliability** by using of more sensing devices, and **reduce costs through smaller payloads.**

KET Pilot Lines for Europe

- The KET report addresses the need for *Pilot Lines* as one of the pillars to overcome the so-called *valley-of-death*



A European SIS² Facility*

- a proposal of the HTA partners CEA-Leti, CSEM, FhG and VTT

- ***Vision***
  - Ensure supply with *highly specialized integrated systems* for the European “hidden champions” (often SMEs).
  - Establish a *More-than-Moore*-oriented *research & pilot facility:*
    - To develop the necessary technologies
    - To serve as a manufacturing line for demonstrators
    - To serve as a manufacturing line for small and medium volume products.
- ***Mission***
  - To make available an ***Innovation driver and Technology Evaluation Platform*** to all European companies and research organizations with a special focus on small and medium sized enterprises (SMEs).

* SIS² - Smart Integrated System Solutions

A European SIS² Facility

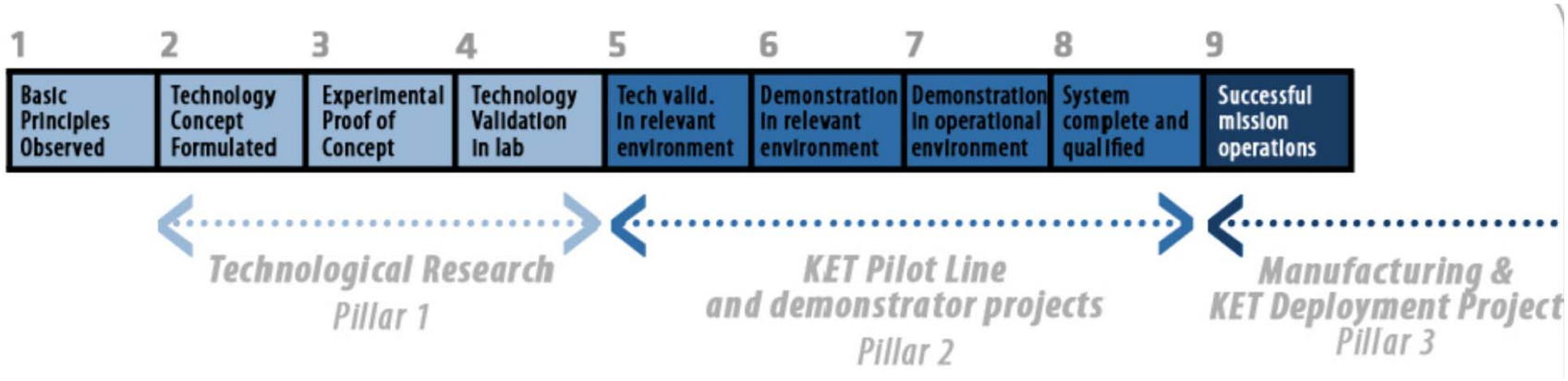
- ***Goals***
  - To *combine* the main locations of European RTOs with respect to functional diversification
  - To *complement* plans for nanoelectronics pilot manufacturing lines and “testbeds”.
  - To *ensure* Pan European access for industry by using the RTOs with their special knowledge and their function to act as a portal for companies of their specific home countries by:
    - joint development projects,
    - R&D service,
    - technological support,
    - foundry service

A European SIS² Facility

- ***Infrastructure***
  - Utilizing the long established relationships between
    - Research institutes (e.g. Heterogeneous Technology Alliance HTA: today CEA-Leti, CSEM, Fraunhofer, VTT; IMEC, …)
    - Companies (e.g. ST, Silicon Saxony, Infineon, MFI, Nokia, …)
    - Regions
      (Dresden – Grenoble – Neuchatel/Geneva – Helsinki – Leuven – …).
  - Combining the already existing infrastructures at research institutes and companies into a distributed *More-than-Moore* manufacturing
  - Focusing on 200mm wafer size with extensions to 300mm and links to 3D-Integration and printed electronics.

A European SIS² Facility

- ***Modus Operandi***
  - *R&D*: pre-products for universities, large organisations and research organizations, development of product demonstrators, pilot production) (TRL level 4-6)
  - *Analytics & testing* service (TRL level 5-8)
  - *Design* service (TRL level 5-8)
  - Small and medium sized volume *production* (TRL level 7-9)



What's Good in the SIS^2 facility for Space Applications

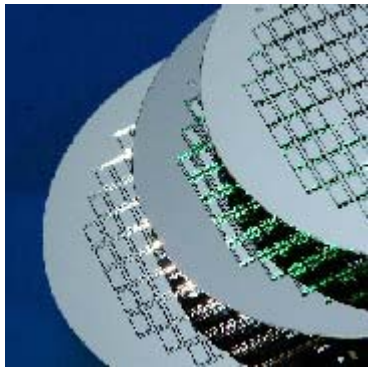
Features of the SIS^2 facility important for space applications

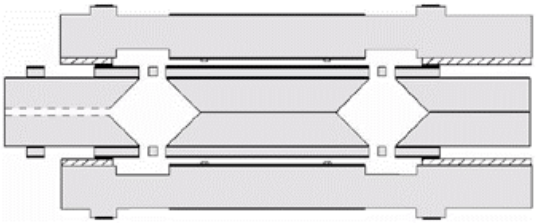
- Critical mass
- Expertise
- Versatility
- *De facto* second source

What's Good in the SIS^2 facility for Space Applications

- Dedicated –tested- platforms, integrates in the SIS^2 facility
- Packaging
- Reliability
- Harsch environment
- Low volume dedicated production
- Spinoff Terrestrial applications using space developments

To reproduce success story of the past…





COLIBRYS

Societal Impact – Changing our world

For our wellbeing: from space to us!

2003

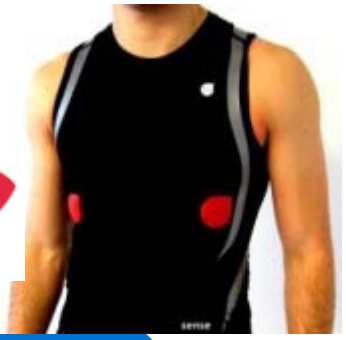
2008

TODAY

csem

SUI Sport Units of Innovation

sense



Development & Integration

Transfer

Industrialization

esa

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Thank you!

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