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CENTRE NATIONAL D'ÉTUDES SPATIALES

## Caneus Pilot Project “Reliability” output and future business model


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CANEUS 2006 Conference  
WP4 Reliability

Reliability of  
MNT Systems

NEXUS Methodology Working Group Reliability and Test 26 nov 06



## Purpose

- *Give attendees inputs from CANEUS reliability workshop*
  - Held in Toulouse in conjunction with CANEUS Conference August 27, September 1 2006
    - **CANEUS 2006 is world’s premier international forum devoted to successfully transitioning emerging Micro and Nano Technology (MNT) concepts to aerospace system applications.**
    - **Aerospace scope (low volume, high reliability)**
  - Specific workshop to define a pilot project and a business plan
  - Attendees from USA, CANADA, EUROPE, JAPAN
- *Key question: how to bring together existing networks, labs, university dealing with MEMS reliability*
  - It is the purpose of NEXUS, Methodology working group on reliability and test
  - Are there other clusters / initiatives?
  - **How to address them (user point of view)**

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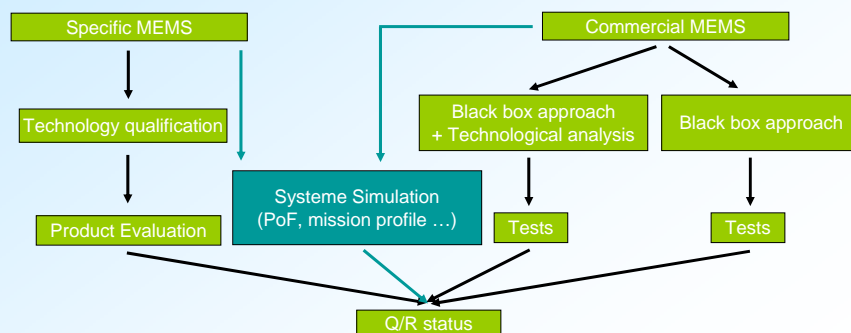
## OUTLINE

- *Low volume, High reliability end users requirements, specific products*
- *Existing approaches*
  - MOTS (MEMS on the shelves)
    - **Could rely on manufacturer data (cheapest approach)**
    - **Reliability tests**
  - Specific
  - Virtual prototyping
- *Pilot Project: Fully Integrated MNT Reliability Framework*
  - Existing Cluster, advantages and limitations
  - Business Plan for a (future) company performing reliability and testing services for MNT
  - Worldwide database exchange layout

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## Existing approaches

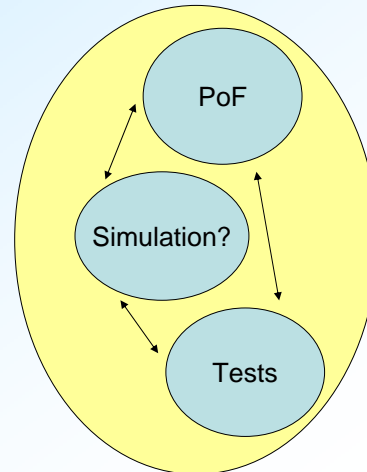
- *User specifications*
  - Performance, Cost and Schedule
  - Performance including reliability aspects
    - **Mission profile (environment: radiation ...)**
- *MOTS, Specific and Virtual prototyping approaches*



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## Common needs

- **Product driven approach**
  - Test intensive,
  - Accuracy of the test (accelerated test versus real life)
  - Large number of sample
- **PoF driven approach**
  - Technology based
  - To be linked to test
  - High “cost” (characterization, FA, technological analysis ...)
- **Simulation to speed up the development process**
- **Whatever the choice huge amount of material and mechanism characteristics is mandatory**



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## overall objective

- **The overall objective of this Reliability workshop was to promote a global reliability approach based on a clear identification of:**
  - All the end-user reliability and radiation tolerance needs,
  - Technical solutions to deal with MEMS Design For Reliability, Virtual Prototyping, Technology Analysis, Failure Analysis, Test, qualification and system versus component trade-off...
- **We should have proposed a framework implementation to deal with**
  - PoF (material, mechanisms, return from the field ...)
  - **Simulation tool (DFR, high level description language)**
  - **Database**
  - Open platform
  - **Test**
  - **Characterisations**
  - ...

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- ***Building a framework that fit with these requirements need to cluster exiting tools, techniques and companies dealing with MEMS analysis.***
- ***The objective is to gather***
  - All the characterization results (IP and founds issues to be discussed) in order to build a continuously improved database on material dedicated to MEMS.
  - Academic or Industrial Teams, Network Of Excellence already working on MNT reliability (ie NEXUS Workgroup on this topic).
  - Design software companies (DFR and high level description language)
  - MNT testing companies that can test the final product and check any discrepancy between expected reliability of the product and test results.
  - Failure Analysis labs that will expertise failed devices in case of relevant discrepancy between simulated results and tests results...

## Pilot project idea (1)

- ***“Reliability Pilot Project: Fully Integrated MNT Reliability Framework”***
- ***“Front desk” service company for virtual reliability platform access***
- ***Time schedule***
  - **Too late starting**
  - **Too short sessions**
  - **Refinement is required for Business plan and project implementation**
  - **Could be done at Milan (just before general membership meeting of NEXUS)**

## Pilot project idea (2)

- **What can be shared (not specific)**
  - skills and resources database that identifies the key technology providers, equipment and skills together with modes of access.
  - R&D and project database
  - Material and mechanisms database
- **What are the issues?**
  - IP (has to be identified ASAP in this process)
  - Project holder (CANEUS? Nexus?, Eurelnet? )
  - Project implementation (3 year program)
- **\$, €, ¥, £ ...**
  - Partial re-allocation + project implementation cost
  - ROI x% of total amount invested in reliability studies

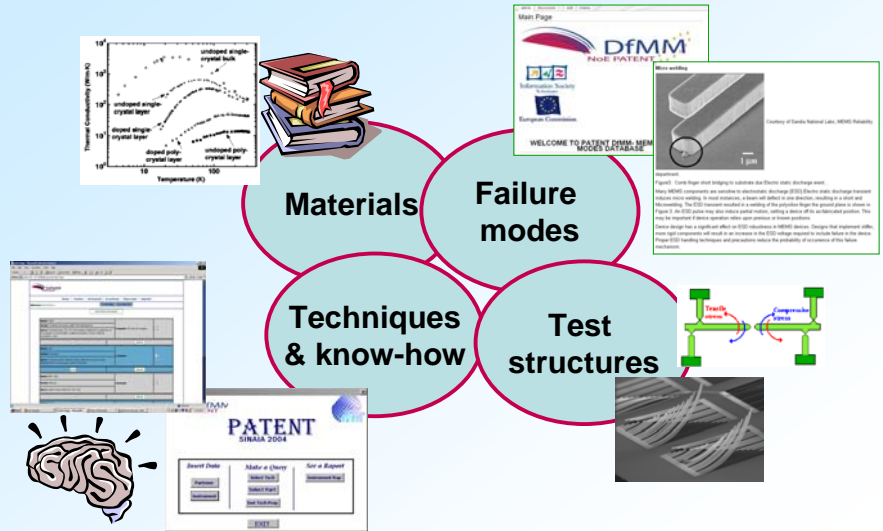
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## Pilot project idea (3)

- **A service company, NOE, consortium can offer virtual lab resources access:**
  - Collaboration corner, Yellow pages ...
  - Fundamental MEMS reliability
  - Platform access
    - **Database**
    - **Test facilities**
    - **Methodology**
    - **training**
- **Business plan discussed**
  - Addressable Market : all High Rel end users / manufacturers
  - Product and Services
  - Business model

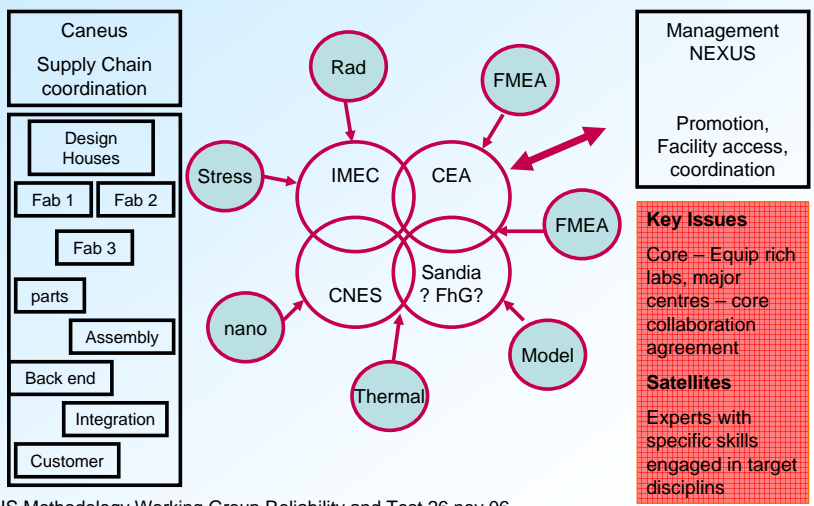
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### 4 different databases are being set-up



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### Business Model



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## Needs

- *Where do we fit inside the supply chain?*
- *Needs must be clarified*
  - Reliability models for MEMS
    - ***What kind of process (at least one of the needs, what is the most critical)***
    - ***Is it possible? Wide range of product/application***
  - Reliability models for MEMS based system
  - Methodology / test procedures

### KEY QUESTION

- Are there common needs between user / “maker” communities?

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- *Issues to be solved ... and possible solutions*
  - How to disseminate EU funded data bases (from NoE, from EU project) to thirds parts countries ? ***Private service company used as a bridge between users and suppliers could be a solution***

**FRONT DESK**

- How to share without clear identified funding?
  - ***By sharing results (leverage effect) obtained by each partners with its own resources (no money exchange). Could work for fundamental researches. Ad Hoc collaboration !***
  - ***Could be included in an existing organization***

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- **To do list**
  - Get seed money to put labs together and identify technologies
  - Launch a common study
  - Show results of these cooperation
  - Lesson learned and set up of the final structure
- **1st year**
  - Cost for seed 300 k\$: NASA, CNES, SANDIA, JAXA, ESA, EADS, ALCATEL, BOEING, Mexico .... 15 / 30 k\$ each?
  - First returns = leverage effect,
  - Possible holders: ???
- **Process status**
  - **Focused on reliability**
  - **No feedback from US, Canada or Japan**
  - **Need a well defined front desk project with business plan**
  - **Who is volunteer? (academic, start up ...)**

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