



Eumirel

European Microsystems Reliability Service Cluster
Equipment & Services Access across Europe

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More than just a 80-20 rule:

Today, many microsystems, originating often from very bright ideas and concepts, never make it to the market.

Demonstrating functionality is relatively simple, but demonstrating reliability in real applications turns out to be very difficult.

Why is it so difficult to achieve the last 20% to bring a prototype to be a product?

There are many reasons behind this:

- lack of awareness of the expected reliability problems,
- lack of insight in the application requirements,
- lack of know-how on failure mechanisms in microsystems,
- lack of know-how on test methodology,
- lack of accessibility and availability of the appropriate test equipment,
- lack of know-how on modelling techniques to predict reliability
- and a lack of funding for focused reliability studies.

How to overcome these difficulties:

Considering reliability engineering from a holistic approach including modelling, reliability testing, physics of failure and packaging issues starting at the very beginning of the development.

What is the market situation?

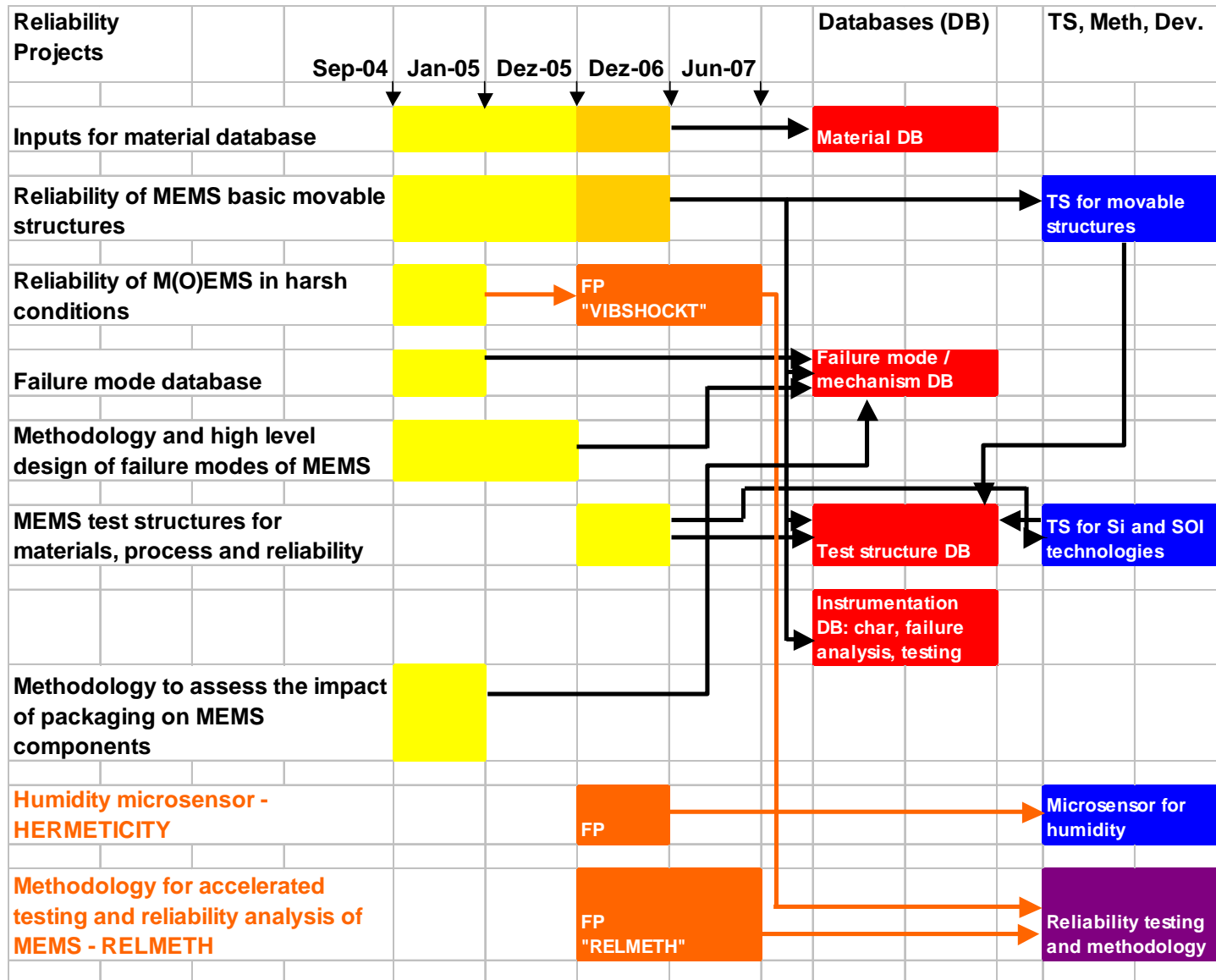
Only a few companies execute Accelerated Life Testing (ALT) of MEMS, 4 European SME's offer MEMS services, but not really for reliability: Delfmems: focus on processing, repair; Novamems: focus on failure analysis, test; Delta: focus on wafer level testing; Boalab: focus on wafer level testing of MEMS, combined with optical profilometry.

The Annual Reports of MIG for 2003 ("Focused on Reliability") and 2004 ("MEMS Accelerated Life Testing"): Need for reliability know-how and services; ALT is "one of the most important issues at this moment".

Small companies focused on MEMS need ALT and wafer level reliability tests, but they don't have enough funds for buying their own facilities. (very important considering increasing use of MEMS)

Big MEMS companies have extended programs on ALT, but the results are not published, because the reliability level (failure rate) is one of the most important values of a product. They do certainly not offer services to others.

- PATENT-DfMM has brought together partners with a unique concentration in equipment for reliability engineering you can't find anywhere else.
<http://www.imt.ro/patent/>
- PATENT-DfMM has brought together partners with decades of experience in the development of a variety of MEMS devices like Gyroscope, Capacitive RF-MEMS, Ohmic RF-MEMS, Resonator, Pressure sensor, Accelerometer, Micro / nano optics, Microfluidics, integrated MEMS.
- PATENT-DfMM has brought together partners with decades of experience in failure mechanism like Fatigue, Charging, Stiction, Cracking, Thermal elastic deformation, Thermal plastic deformation, Creep, Friction, Out gassing, Radiation.
- PATENT-DfMM has trained the partners to work together.



RELIABILITY ANALYSIS

- Application depending accelerated reliability tests of MEMS, especially for harsh environment
- Quantitative Accelerated Life Testing of MEMS for calculating reliability indicators
- Functional testing in different environments: temperatures, pressure, gasses, humidity, vibration, etc.
- Electrical and environmental reliability testing including statistical data processing where possible
- Failure analysis including multi-physics modelling
- Design of dedicated test structures for reliability monitoring
- Research based services on MEMS reliability

TRAINING

- Training courses on Accelerated Testing of MEMS Reliability

CONSULTANCY

- Consultancy: Advice on MEMS reliability including material, processing and packaging related issues; Development of reliability test plans; FMEA studies; Advice on test instrumentation and set-up and reliability methodology

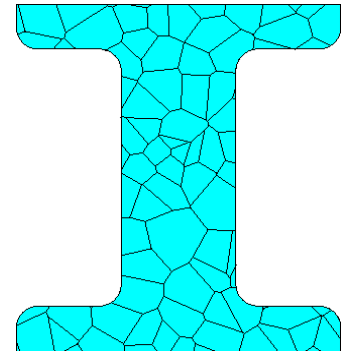
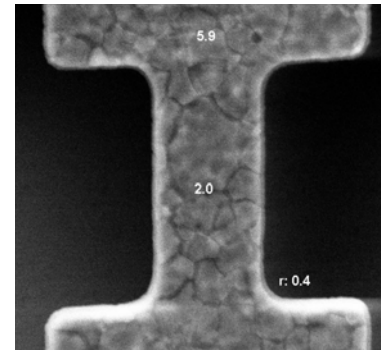
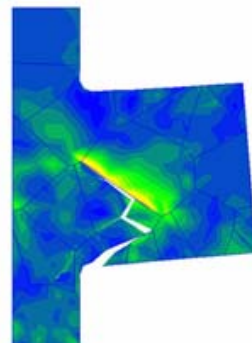
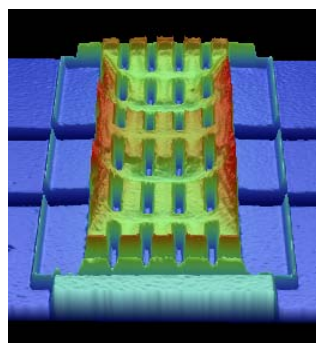
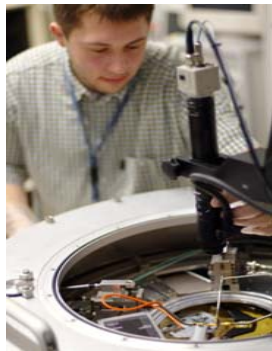
INFORMATION

- Access to databases on material issues, test structures, test equipment availability and MEMS failure mechanisms

EUMIREL might provide services mainly to those microsystem manufacturers which are not able to develop in-house solutions for the reliability issues of their products, because the facilities for executing reliability testing are expensive.

For microsystems manufacturers, EUMIREL will offer:
Services for assessing the reliability level for the final product,
Design for Reliability methods for developing reliable products.

Moreover, EUMIREL could act as an independent “third party” between manufacturers and customers, offering services of assessing the reliability parameters to the company which are using microsystems for building their own products.



11 partners:

- ❑ IMT (Romania)
- ❑ IMEC (Belgium)
- ❑ Fraunhofer IMS (Germany)
- ❑ POLIMI (Italy)
- ❑ 4M2C (Germany)
- ❑ CSL (Belgium)
- ❑ WUT (Poland)
- ❑ BUTE (Hungary)
- ❑ HWU (UK)
- ❑ NovaMEMS (France)
- ❑ Boalab (Spain) (strong interest)



- **Steering Committee:** IMEC, IMS, POLIMI and IMT
 - technical group and key service hubs,
 - responsible for various regions of Europe: IMEC – for Western Europe, IMS – for Central and Northern Europe; POLIMI – for Southern Europe and IMT – for Eastern Europe;
 - IMT will coordinate the technical activities and pre-checking the feasibility of requests;

- **Executive Director:** 4M2C
 - doing coordination, publicity and administration;

- **Sales Desk:** NovaMEMS
 - main sales channel, but not exclusive, because all partners should approach regional customers or contacts as well (this is a characteristic feature of EUMIREL).

- IPR protection and leakage prevention are ensured by appropriate procedures, which specify the access rights for each EUMIREL member. For each project or service agreement:
 - An MOU will be set-up between the customer and each involved EUMIREL partner;
 - The generated data are property of the customer. EUMIREL partners can only use or publish them if the customer agrees;
 - Instrumentation set-up and methodology is property of the involved EUMIREL partner unless the customer had a large involvement in this;
 - Non-involved EUMIREL partners will only get access to the results and the methodology if the customer and the involved EUMIREL partners agree;
 - If one EUMIREL member is a possible competitor for a customer (and was subject of a veto of this customer), he will have no access to any of the data.

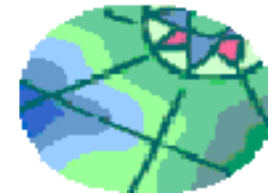
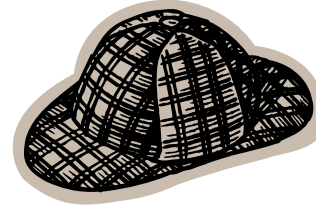
- EUMIREL has the advantage to get together researchers & equipment from various countries, all across Europe.
- Each institution can address a regional market, being, in the same time, partner in an organisation covering all Europe.
- Complementary equipment could be found in EUMIREL, at various partners, the overall offer being superior to the possibilities of any individual institution.
- Databases covering the main elements of reliability analysis (instruments, materials, test structures, failure mechanisms) will be an essential tool for EUMIREL, allowing to increase the speed of solving the demands;
- The working period of 4 years of joint researches in the frame of the NoE Patent-DfMM led to the strengthening of a team of specialists, trained to work together.
- Decades of experience in various fields of microsystems covering all relevant aspects from process technology to packaging and system application level are available.

- Eumirel is a “one-stop-shop with multiple entrances”, but with only one interface for you as a customer.
- As a customer, you can select your trusted “entrance”. I.e. you can contact either one of the partners of this cluster directly, because you feel confident with this partner,
or you can contact the board of Eumirel that will redirect you to one or more of the best suited partners.
- This partner of your confidence will be your interface for the task performing by Eumirel.

- In 2007, the activity of elaborating the structure of EUMIREL for the eleven partners will be financed by Patent-DfMM
- Till March 2008, the structure of Eumirel will be established.
- Starting from April 2008, Eumirel will become active on the market of the reliability services offered for microsystems.
- In 2011, Eumirel will be a Virtual Laboratory acting as a one-stop-shop on MEMS Reliability.

Eumirel

- is a team grown out of Patent NoE
- is dedicated to reliability
- is unique: nothing like this exists in Europe
- is international/European
- has decades of experience
- is a One-stop-shop...with multiple entrances



What is your point of view as potential customers?

What else should we offer to you?