AO7670 RF-MEMS benchmarking

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Project Web Summary	
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ESA and Project Consortium Members

1.1. Project Background and Objectives

The maturity and practical industrial adoption of RF-MEMS technology depends essentially on the capability to provide key enabling devices (as for instant switches) endowed of superior performance and satisfying given reliability standards.
Today, in spite of the several experimental research activities done on this field, an exhaustive reliability assessment of this technology is still missing. The major roadblock in this sense are the shortcoming in process stability hence DUT reproducibility on the one hand, and consistent and systematic qualification procedures on the other. In the last decade a number of RF-MEMS technological platforms have reached considerable progress in process development by issuing very promising prototypes. In Europe most of these activities have been fostered by Space driven applications and have reached a satisfactory level of maturity.

Hence the present project intends to answer to the pressing need of benchmarking, selecting, and eventually providing guidelines for further optimising the potential candidate capable to match the requirements of the space application value chain. In order to reach this goal the project is divided in the following four objectives:

- Surveying the existing European providers upon criteria such: compatibility with ESA specifications, technological process maturity
- Identify the most suitable space qualified test plan upon which carry out a systematic benchmarking
- Select the best performing technology
- Provide recommendations for industrial space qualification

1.2. Project structure

In order to achieve the aforementioned objectives, the activities will unfold accordingly to the project structures given hereby (Figure 1), organised in 7 work packages which are divided in two phases of a total duration of 6 and 18 months respectively.

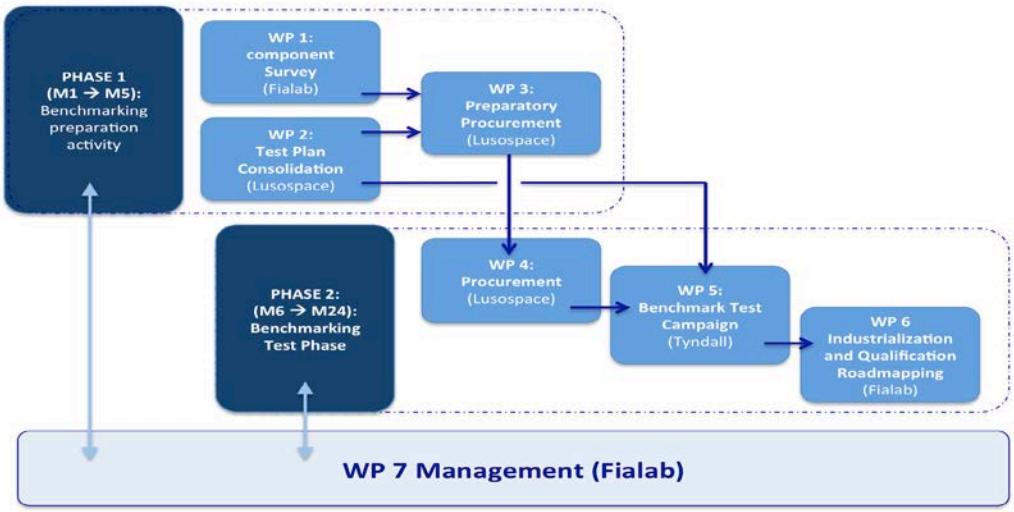

Figure 1 : Overview of the work breakdown structure

The core of the project will be the identification and selection of the most promising manufacturers (phase 1) and, upon successful selection, carry out a comprehensive and methodical benchmarking of the same (phase 2).

In order to carry out a systematic self-consistent benchmarking, the consortium has been casted upon the following best practice criteria:

- ✓ **Independence from the suppliers**: the team gathers testing, procurement and design experts who have no direct economic interests or involvements in RF MEMS production
- ✓ **Ensuring high quality standard test plan**: The test plan will be performed by a team of industrial partners and test houses, well recognized in the field of MEMS testing for space applications
- ✓ **Cross checking results**: multiple and concurrent RF-MEMS testing capabilities have been defined so to allow parallel tests and results cross validation
- ✓ **Addressing Accelerated Lifetime methodology**: dedicated reliability studies will be carry out with the aim to identify acceleration factors
- ✓ **Insuring ambient control for all tested components**: Hermetic sealing of the DUT will be implemented by using flight model hybrid capable to provide the most suitable testing conditions.

1.3. Project consortium

The objectives at stake in this project are crucial for the long term competitiveness of the future European Space industry. For this reason the present consortium gather highly qualified organisations (Figure 2) with solid background in the area of RF MEMS reliability assessment and failure analysis (Fialab, Tyndall), extensive experience in MEMS space qualification (Lusospace) and the largest European space end-user know-how and facilities in RF-MEMS lifetime characterisation (ThaleAaleniaSpace).

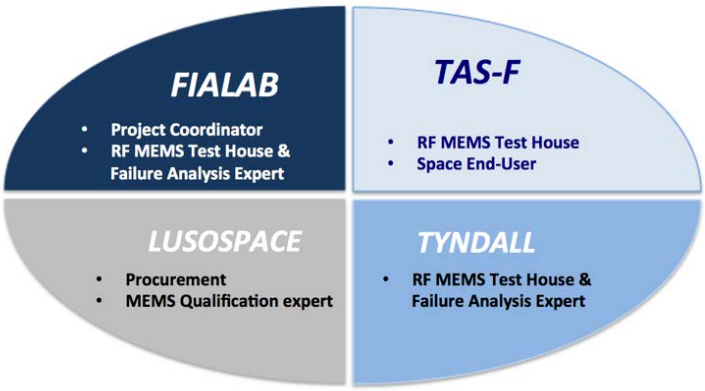

Figure 2: Consortium at whole and main expertise

In addition to this a number well recognized specialists in RF-MEMS physics of failure and reliability (in most cases partners of past ESA projects) would support this consortium by forming a so called Advisory Board of Expert (ABE). This board will play a twofold function. First, it may provide a critical scrutiny and independent analysis of the proposed test plan and second, it may suggest important feedbacks and recommendations for the industrialization and qualification roadmapping. The ABE will be involved punctually on a case by case basis and through a confidentiality agreement preventively discussed with ESA.