The Italian Industry Initiative for Large Astrophysical Projects

Supporting the Italian Industry right involvement into large Mega-Science Projects: the case of the E-ELT

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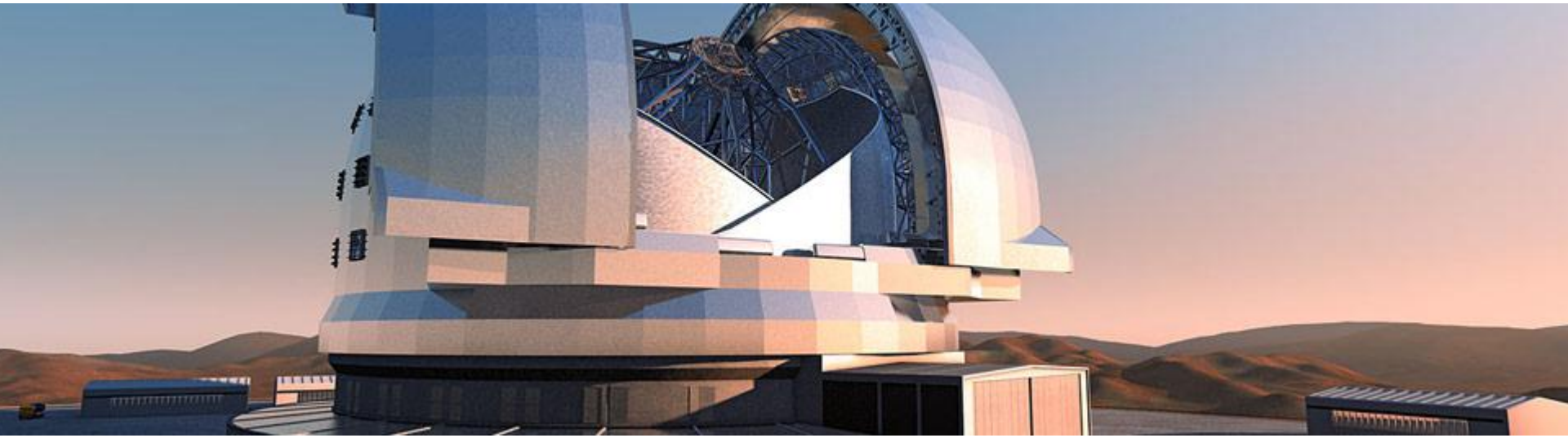


Opportunities for Industry from the European Southern Observatory - ESO

ESO Italy Industry Day 2012

Rome, MAE, June 22nd 2012

The Context

Large projects like E-ELT pose **enormous challenge** to entities who will be looking **for participation** and, in the same time, are seriously dependent from **international collaboration** both from the financial as well as from the technological point of view.

Normally SMEs which are capable of providing technological contribution will only be able to get **involvement through clusterization** of responsibilities, capacities and skills. These should be empowered by the **link with the national participating organization** (INAF for Italy).

Very likely industry will have to enter into **international consortia** which may be capable to bid for the telescope contracts.

Italy may have two additional constraints:

- **Role of large enterprise** in providing contribution and, more important, financial stability and reliability;
- **Qualification of industry**, particularly SMEs, from the technical and industrial point of view.

The Action

Recognizing these characteristics a program was initiated by TechNapoli Consortium in 2008 with the following objectives:

1. Be the reference for industry in our country
2. Be visible and connected with the government level
3. Be synergic with the action of INAF as the Italian PO (Participating Organization)
4. Be linked and proactive on the global scene, at least within industry
5. Be the starting point and the aggregator of Italian industry, particularly SMEs
6. Provide the frame to make possible consolidation, demonstration, development and displacement of required industrial, technological and procurement capacities.

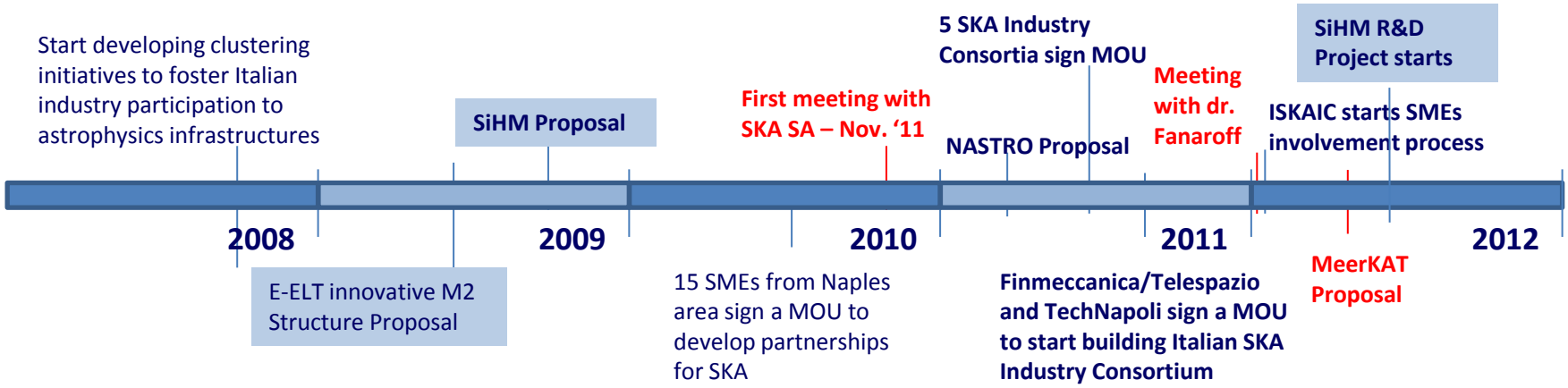
An action is in progress to develop the an **Industry Consortium** to participate to projects like the E-ELT. A major milestone into building the consortium has been signing of a MOU between **Finmeccanica/Telespazio** and T**echNapoli** which is perhaps focused on the SKA. Telespazio has been identified by Finmeccanica as the "entry-point" company for the actual phase of the SKA project.

TechNapoli has been the initiator of the entire process and will act also as the linkage within the SMEs environment and all the enterprises outside of the Finmeccanica Group.

A number of companies are currently in the process of finalizing their entrance into the consortium.

* TechNapoli Consortium, Science of Technology Park of the Metropolitan Areas of Naples and Caserta. Telespazio and TechNapoli are the "founding" members of the Italian Industry cluster.

The Italian Initiative Timeline



Industry clusterization process started more than three years ago. Over the years:

- Several MOUs were signed, both nationally as well as abroad
- At least 4 R&D projects were submitted for founding contribution
- A number of international meetings and presentations have been done.

Networking activities have been done with consortia from other countries.

What brought TechNapoli to launch the Initiative

A strong cultural and scientific heritage plus a remarkable system devoted to innovation, research and development

The **Capodimonte Observatory** founded in 1812 and its long tradition of research and work for astrophysical infrastructures and instrumentation

More than 100 years into aeronautics and advanced sciences culminated into the establishment in the area of **CIRA, Italian Aerospace Research Center**

The **Federico II University,** the second oldest in the world, founded in 1224, and its strong contribution to research and innovation.
Plus 4 more universities from the area (Campania Region).

campaniaaerospace

Member of EACP

A large industrial cluster of aerospace companies, linked with the European network of aerospace clusters, and a consolidated practice of cooperation in large international programs and projects.
The cluster comprises both large enterprises plants as well as SMEs.

Camera di Commercio di Napoli

The **Chamber of Commerce of Naples** has helped supporting the initiative since late 2008, both assisting for organizing international meetings as well as financing parts of the missions around the world.

Unione Industriali Napoli

Unione Industriali di Napoli has played the role of helping in interacting with the enterprises' system and coordinating the actions with **Confindustria**, the Italian main organisation representing manufacturing and services companies

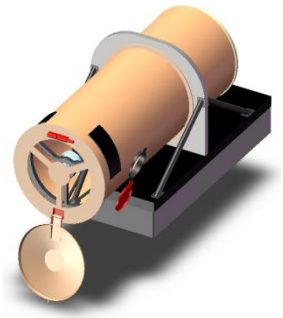
Finally **Regione Campania Government** will provide most of the financial effort required to sustain planned R&D activities.

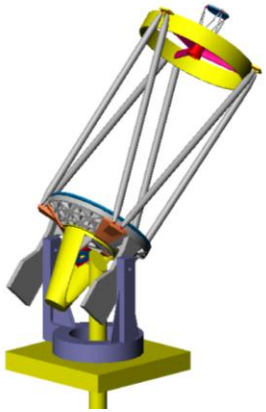
A number of other enterprises acting on Hi-Tech field, like ICT, green energy, and others with expertise, among the others, on:

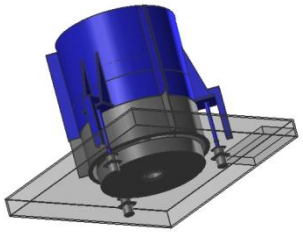
- System Integration
- Payload and Mission Management
- Modelling and Simulation
- Data Management and Exploitation

A consolidated integration with research organizations (some 14 centres) and universities (5 in the region).

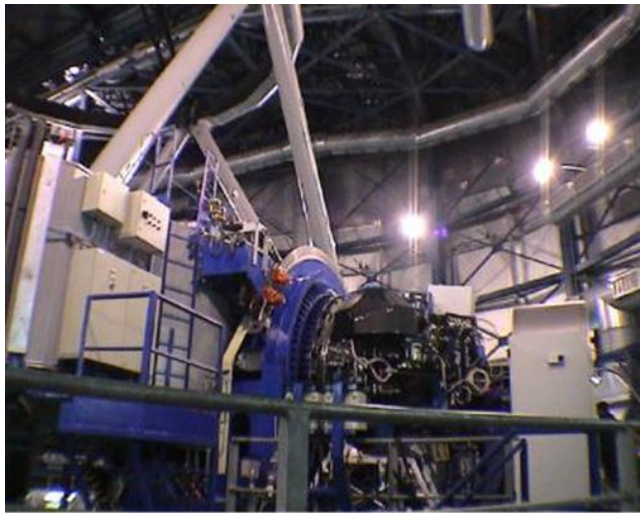
Some Relevant Activities on Telescopes







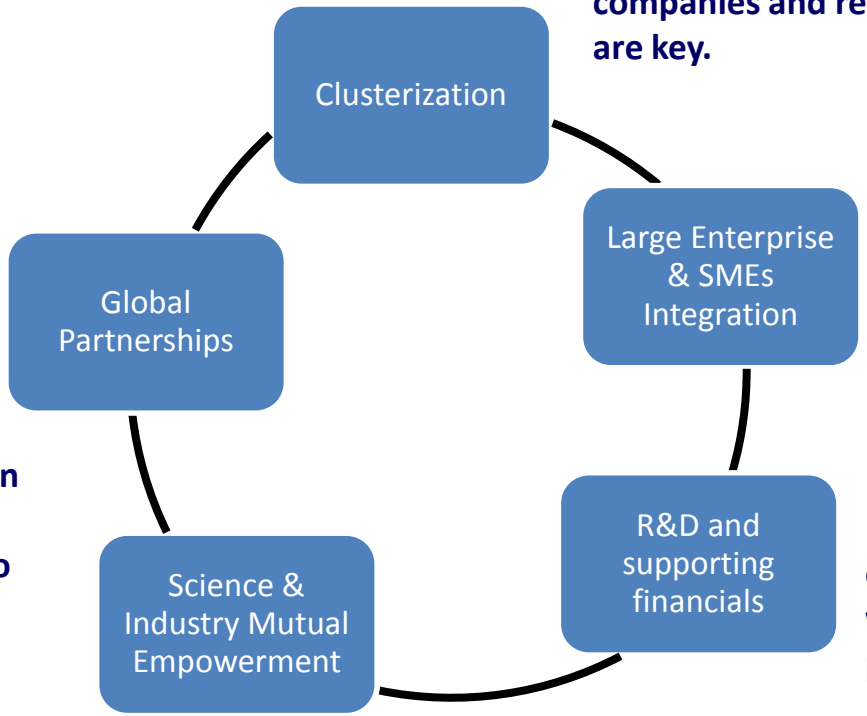
- VIMOS: “multi-object” spectrograph mounted on Nasmyth focus B of VLT-UT3 telescope Melipal (ESO-Cile)
- VST: VLT Survey Telescope (operative 2009 Paranal)
- GOHSS “fiber-fed multi-echelle” Spectrograph of TNG “second light” (Telescopio Nazionale Galileo)
- UE FP7 - EST (European Solar Telecope)
  - Heat Stop design
  - Primary mirror Preliminary design
  - Overall thermal design
- ASI – ADAHELI satellite
  - Preliminary design of the solar telescope structure (ISODY)
- ASI – MIOSAT satellite deployable Telescope
  - Optical design (Phases A / B)
  - Autofocus electronic system
  - Deployment control system



Five Main Drivers Have Constantly Guided the Program

Complementary of competences and capacities and synergy between companies and research organizations are key.

Develop effective collaboration and engagements strategies with other countries similar organizations



Complexity, financial constraints, technologies and other important factor dictate integration between large and small and medium enterprises.

Ensure phasing between "science" activities and industry involvement to maximize integration, collaboration and competitive advantage

Industry technologies and capability may need increase which require supporting projects and financials.

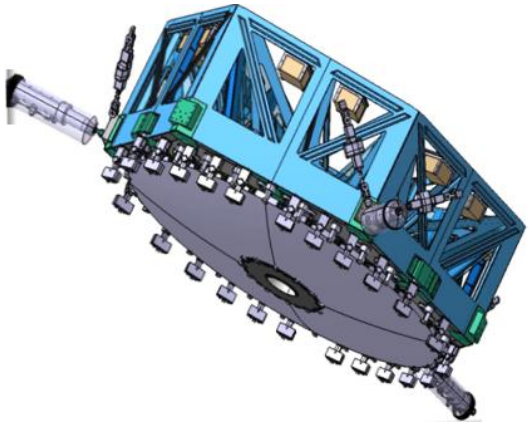
Plus one: **detect and foster outcome from adopted technologies in order to develop additional business opportunities and help industries finding rationales for their engagement.**

A first step: the proposal for the M2 FEED Study – September '09

In September 2009 a cluster of 10 companies presented, in response to a E-ELT bid, a proposal for the Front End Engineering and Design (FEED) study for the Secondary Mirror Unit of the E-ELT.

The team included a company from Finland, 6 companies from Italy, two research centres, including the Italian National Aerospace Research Centre (CIRA). TechNapoli was the leader and coordinator of the action.

The proposal completed the entire evaluation process and was rated at the second place.



CIRA

CNR IMM

EUROSOFT

MAGNAGHI

Marotta

NTK NEWTEK

Powertech

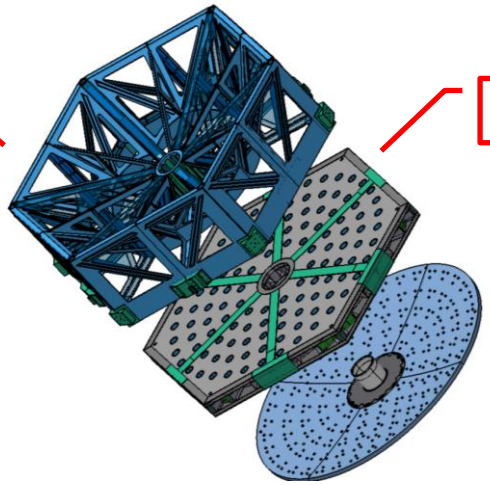
SALVER

Technapoli

PROPOSAL OBJECTIVES: use state-of-the-art technologies, proved in hi-tech industry (mostly aerospace), to design the M2 Unit complete system with compliancy, or even exceeding, to the ESO specifications and providing in the same time innovative approach.

Frame

Composite structure to stiffen the M2 Unit and to interface it to altitude structure of telescope (crown) through the Stage



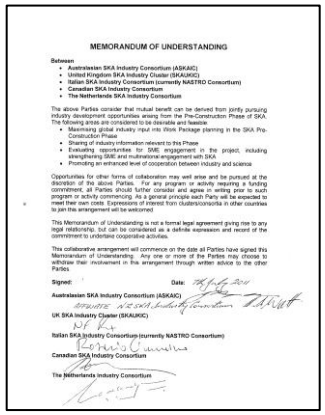
Sandwich

Honeycomb structure to physically reproduce the Actuator's pattern

MAIN BENEFITS:

- Maximum reduction of the system weight and inertia;
- Maximum stiffness related to the system eigenvalue frequency
- Maximum stability of the connected and drive components in order to minimize the system error budget (zero backlash)
- Maximum safety during telescope science and maintenance operations
- Maximum performances within the overall telescope structure
- Easy and economic to produce with industrial robust solutions
  - with the highest accuracy
  - easy to test
  - easy to maintain
  - innovative respect to other solutions adopted at the time.

The Global Industry Partners Cluster for the SKA



MEMORANDUM OF UNDERSTANDING

Between

- Australasian SKA Industry Consortium (ASKAIC)
- United Kingdom SKA Industry Cluster (SKAUKIC)
- Italian SKA Industry Consortium (currently NASTRO Consortium)
- Canadian SKA Industry Consortium
- The Netherlands SKA Industry Consortium

The above Parties consider that mutual benefit can be derived from jointly pursuing industry development opportunities arising from the Pre-Construction Phase of SKA. The following areas are considered to be desirable and feasible:

- Maximising global industry input into Work Package planning in the SKA Pre-Construction Phase
- Sharing of industry information relevant to this Phase
- Evaluating opportunities for SME engagement in the project, including strengthening SME and multinational engagement with SKA
- Promoting an enhanced level of cooperation between industry and science

Opportunities for other forms of collaboration may well arise and be pursued at the discretion of the above Parties. For any program or activity requiring a funding commitment, all Parties should further consider and agree in writing prior to such program or activity commencing. As a general principle each Party will be expected to meet their own costs. Expressions of interest from clusters/consortia in other countries to join this arrangement will be welcomed.

This Memorandum of Understanding is not a formal legal agreement giving rise to any legal relationship, but can be considered as a definite expression and record of the commitment to undertake cooperative activities.

This collaborative arrangement will commence on the date all Parties have signed this Memorandum of Understanding. Any one or more of the Parties may choose to withdraw their involvement in this arrangement through written advice to the other Parties.

Signed: Date:

Australasian SKA Industry Consortium (ASKAIC)

UK SKA Industry Cluster (SKAUKIC)

Italian SKA Industry Consortium (currently NASTRO Consortium)

Canadian SKA Industry Consortium

The Netherlands Industry Consortium

In July 2011 during the SKA Forum held in Banff, a MOU was signed between all the five, at the time, existing industry clusters on the global scale.

Australasian SKA Industry Consortium

UK SKA Industry Consortium

SKA NL Industry Consortium

Canadian SKA Industry Consortium

Italian SKA Industry Consortium (at the time NASTRO)

Two main objectives were established:

- To jointly **pursue industrial development opportunities** starting from the SKA Pre-Construction Phase
- To investigate if establishing an **industry advisory function** or group to the SKA Organization for the SKA project, drawing on industry clusters that are willing to support such a function, can be a viable way to enforce collaboration and ensure achieving the best results.

The Supporting R&D Program

Project have been developed in the areas of:

- Control
- “Intelligent” Materials
- Health Monitoring and Management
- Use of Composite Materials
- Actuators and others components

Total effort planned is around 18 M€.

First project started in June ‘12.

Not all of the projects are expected to overcome approval processes also due to overall financial constraints.

Finding collateral funding will remain among the main line of actions.

Italian Astrophysical Cluster Proposed R&D Projects
MASTRI (part of it) – R&D skills development for “Intelligent” Structures and related materials, manufacturing and ICT technologies development
SiHM – Control, Health Monitoring and Management of Mixed Composite-Metal Materials Structures designed to operate with Heavy Loads and into Hostile Environments. Project has started in June ’12. Will end in ’15.
HMCD (part of it) – Demonstrator development for astrophysical application
NASTRO – Joint Research Institutions and Industry initiative to develop technologies for Astronomy

Objective-1 and SiHM, our first to start R&D project

Campania falls within the so called Objective 1 of the Regional policy of the European Union (EU) which has the aim of improving the economic well-being of regions in the EU and also to avoid regional disparities. EU regional policy is geared towards making regions more competitive, fostering economic growth and creating new jobs. The policy also has a role to play in wider challenges for the future, including climate change, energy supply and globalisation.

Within this framework a number of R&D programs have been presented and are in the approval process. They total for some 18 M€.

SiHM

The first of such projects is called **SiHM** – *Control & Health Monitoring and Management of Complex Systems and Mixed Metal-Composites Structures Operating into hostile environments and under Critical Loads.*

The project will have a budget of some 5 M€ and will terminate in June 2015. 1 large enterprise, 6 SMEs and 3 research organizations will take part to the project.

An international panel to define characteristics of a so-called "**astrophysical demonstrator**" will be involved to provide objective guidelines and help establishing competitive specifications.

Collaboration with ESO is mostly welcomed.

The project will be conducted by a team of 11 which comprises:

- A large enterprise
- 7 SMES, 5 as full-participants and 2 as external partners
- 3 research organizations: the Center of Competences on New Materials from the Federico II University of Naples, the Observatory of Capodimonte of INAF, and TechNapoli.

Project will end by June '15.