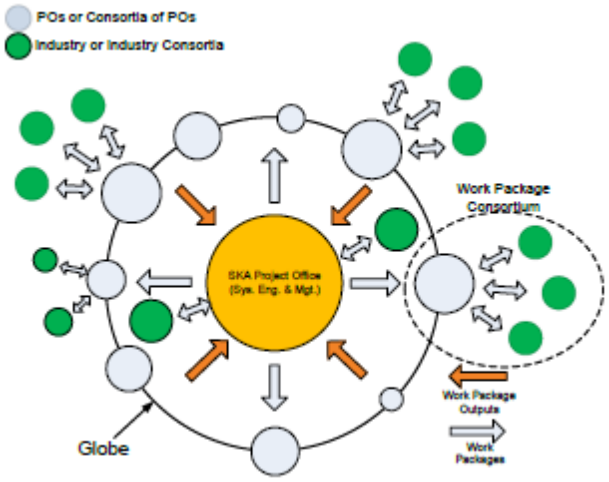
The Italian Industry Initiative for Large Astrophysical Projects

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

Rosario F. Cimmino, *TechNapoli Consortium*

First National Meeting on Science and Technology with the SKA
The Italian Pathway to SKA
Rome, MIUR, June 19-20, 2012

The Context



SKA Organization model for relationships between the SKA Office, Work Package Consortia (WPC), Participating Organizations (POs) and Industry

The **SKA Project** will pose **enormous challenge** to entities who will be looking **for participation** and, in the same time, will be seriously dependent from **international collaboration** both from the financial as well as from the technological point of view.

Normally industry 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). This has started already and has been key for submitting the Italian **Expression of Interest** into Stage 1 of the Pre-Construction Phase which was closed on May 13th 2012 and will be fundamental for next phase on **RFP this year**.

Very likely INAF and Italian industry will have to enter into **international consortia** which are expected to bid for the SKA Work Packages.

Italy has two added 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.

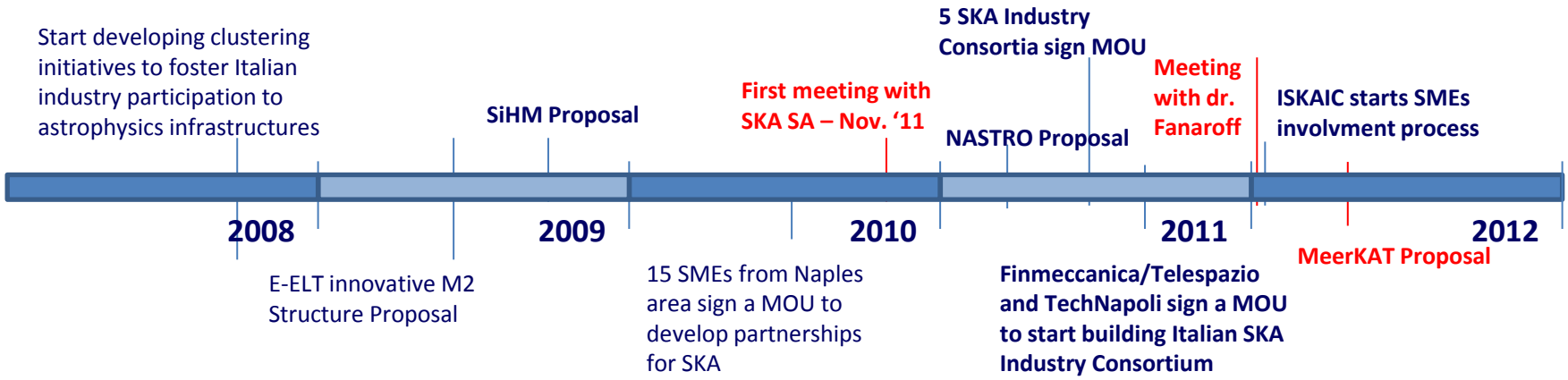
An action is in progress to develop the an **Industry Consortium** to participate to the SKA project. A major milestone into building the consortium has been signing of a MOU between **Finmeccanica/Telespazio** and T**echNapoli**. Telespazio has been identified by Finmeccanica as the "entry-point" company 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 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.

In 2012 there have been presentation was at the Canadian SKA Preconstruction Networking Workshop in April 2012 and with SKA South Africa (in January and in May).

Way to establish cooperation on work packages are under consideration with CSIRO in Australia, SKA SA in South Africa, and others.

A meeting is planned for next July with the Canadian cluster.

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

REGIONE CAMPANIA

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:

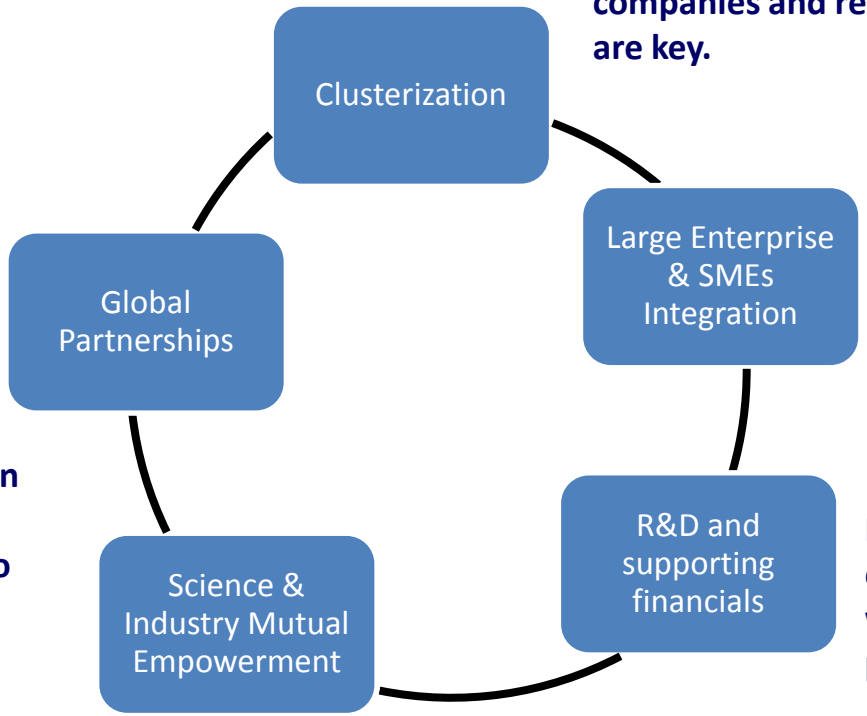
- System Integration
- Payload and Mission Management
- Modelling and Simulation
- Data Management and Exploitation

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

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 SKA technologies in order to develop additional business opportunities and help industries finding rationales for their engagement.**

The Global Industry Partners Cluster

MEMORANDUM OF UNDERSTANDING

Between

- Australasian SKA Industry Consortium (ASKAIC);
- United Kingdom SKA Industry Cluster (SKAIUKC)
- 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 (SKAIUKC)

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.

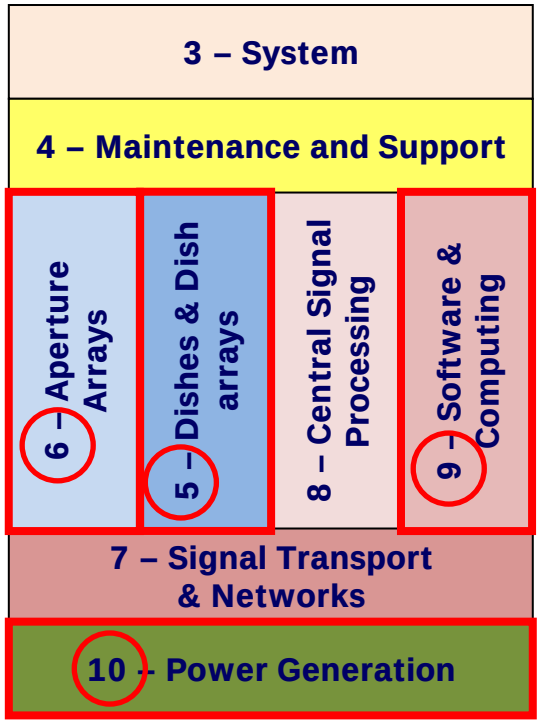
First Information from the EoIs

#	WBS AREA	ITALY		SOUTH AFRICA		OTHERS …
		Lead	Notes	Lead	EoI Status/Notes	
1	Dish Array (DSHA)	YES	Y 18/19 P 1/19	YES	Submitted	
2	Low Frequency Aperture Array (LFAA)		Y 4/47 P 43/47			
3	Signal and Data Transport (SADT)		Y 0/33 P 28/33 **N 5/33**	University Manchester ?	SKA SA was included in EoI submission	
4	Sync and Timing (SaT)		Y 0/13 P 13/13	University Manchester ?	SKA SA was included in EOI submission	
5	Central Signal Processor (CSP)		Y 3/18 P 15/18	**YES** (joint lead?)	Submitted	
6	Science Data Processor (SDP)		Y 9/30 P 19/30 **N 2/30**	University Cambridge	SKA SA was included in EoI submission	
7	Telescope Manager (TM)	YES	Y 13/27 P 14/27	NCRA (India)	Submitted – very strong SKA SA involvment	
8	Power (PWR)		Y 12/19 P 7/19	**YES**	Submitted	
9	Site & Infrastructure (INFRA)		Y 20/31 P 11/31	**YES**	Submitted	
10	Mid Frequency Aperture Array (MFAA)		Y 1/22 P 21/22			
11	Phased Array Feed (PAF)	YES	Y 1/10 P 6/10 **N 3/10**			
12	Wide Band Single Pixel Feed (WBSPF)		Y 0/6 P 3/6 **N 3/6**	**YES** (EMSS)	Submitted	

Y indicates interest to execute all the tasks of the given WBS element; P stands for interest to contribute to the total required effort . N indicates no interest expressed.

SKA SA view, not final. This might be influenced by the site decision.

The Focusing



SKA Organization's actual work packages definition schema (horizontal and vertical positioning doesn't reflect original SKA Organization's point of view).

The Italian role into the SKA can only be improved by a strong link between science and industry that can foster synergic approach and provide for better capacities.

Following this criteria four areas are now under consideration:

1. Low and medium frequencies antennas (Aperture Array and others)
2. High frequency antennas (dishes)
3. Data processing methods
4. Green energy

An effort is underway to establish activities that may lead to develop systems and components utilizable on part of the Medicina's large Northern Cross radio telescope to demonstrate on a sort of Italian "path finder" competences and capacity for the national involvement.

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€.

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

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

Objective-1 and SiHM, our first 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 called in the next weeks.

Collaboration with other SKA clusters is mostly welcomed.

Next Steps

INAF
ISTITUTO NAZIONALE DI ASTROFISICA
NATIONAL INSTITUTE FOR ASTROPHYSICS

ITALIAN INDUSTRY CLUSTER FOR SKA

SKA-ITALY

SKA-Italy will link together INAF, the Italian Industry Cluster, and all the other relevant institutions and organizations.

Once the RFP from the SKA Organization will be issued, next July 2nd , SKA-Italy will manage the proposal preparation activities and all the related effort.

"SKA-Italy" has supported INAF in submitting the Italian Expression of Interest into Stage 1 of the Pre-Construction Phase which was closed on the last May 13th 2012.

SKA-Italy will support INAF and the founding agencies in the process of defining the international consortia which are expected to bid for the Stage -1 Pre-Construction Phase Work Packages.

INTERNATIONAL CLUSTERING

Establish the right connections, partnership agreements and policies to enter the WPC (Work Package Consortia) who will respond to RFP in the next months and compete to win contracts.

DIALOG WITH THE SKA ORGANIZATION

Assess the opportunity to inaugurate a dialog with the SKA Organization for maximizing the value of Italian preparatory activities (demonstrators and/or pathfinders) and to drive international cooperation toward positive contribution for both technical value and easing availability of national foundings.