

<b>Work package number</b>	WP3	<b>Start date or starting event:</b>							month 1
<b>Work package title</b>	European Radio Astronomy Engineering Forum								
<b>Activity Type</b>	COORD								
<b>Participant id</b>	5	17							Total
<b>Person-months per beneficiary:</b>	5+0	2+0							7+0

### Objectives

The communication, training and scientific interaction among engineers involved in the development and operation of Radio Astronomy instruments represent a key issue in keeping these facilities at a world-leading technical level. While several opportunities for dissemination and training are possible for radio astronomy scientists and guaranteed by the scientific community, radio astronomy engineers are *de facto* limited to minor interactions. Building on the RadioNet FP6 Engineering Forum, and the VLBI operations (EVN Technical Operation Group), the Engineering Forum will address this problem. The major objectives of this network activity is to further strengthen the collaboration between those groups active in the development and operation of Radio Astronomy instruments at the European level, providing a solid and formal ground for mutual growth, collaboration and support. With local manpower and range of expertise limited at most observatories, close cooperation among engineers is essential. Collaborations and mutual support structures on a European scale will be enhanced so that duplication of effort can be avoided, and it permits expertise to be shared freely, across the RadioNet institutes. This Networking Activity is heavily focused on improving the data quality of current radio telescopes in Europe, in particular the Transnational Access facilities.

More specifically, the objectives, related to the larger radio astronomical community, including not only radio astronomy institutes but also academic groups and industrial collaborators operating in the development of high-performance hardware for radio astronomy, are to:

- Identify the technical expertise and competence areas of the larger European Radio astronomy community thus providing a database of design, characterisation and manufacturing facilities,
- Facilitate and assess the best practice of high performance systems and design methodologies,
- Train the next generation of radio astronomy engineers by means of short courses and lectures given by experts in the specific field,
- Identify key technical issues and directions, in order to provide appropriate solutions or to propose collaborative projects in particular areas of technological development,
- Strengthen and ease the interaction with industrial (and other academic) entities, with the two-fold objective of commercially capitalising the remarkable technical know-how and to have affordable and reliable partners for the development of future large-scale instrumentation in the era of SKA.

### Description of work

The main activity of the RadioNet FP7 Engineering Forum will be to organise and support meetings and workshops of European radio astronomy engineers and other partners in related academic and industrial environments. The training of young engineers will also form a crucial part of the work programme. The forum will maintain and update a series of web pages in the appropriate section of the RadioNet FP7 web/wiki sites. These pages will be the central reference location for calls for technical material, meeting registration and event announcements. This work

package will be lead by engineers from the MPG (Reinhard Keller and Walter Alef) and UROM (Ernesto Limiti).

### **European Radio Astronomy Engineering Special Sessions**

In order to bring the results and expertise of the European radio astronomy engineers to the notice of the broader engineering community, special sessions will be organised within the framework of large international conferences (e.g. IEEE conferences, European Microwave Week etc.). The objective will be to exchange ideas and new directions, and to attract the interest of researchers in related fields to collaborate in the development of Radio Astronomy applications. Particularly in the field of new digital back-ends, and enormous growth of technology for more and more bandwidth is underway. Industry can already deliver off-the-shelf components meeting the requirements of the current facilities, but the detailed implementation still requires significant effort within institutes. One special session per year will be organised. The session organiser will provide a brief report detailing a summary of the presented contributions, the number of participants and major points raised. The management of this WP will be lead from MPG and partially funded by the EC.

### **Topic related engineering Workshops.**

Forum participants will meet at least once per year for at least one day. The meetings (workshops) will be topical ones, and the themes will be selected and planned on a yearly basis. An appropriate call for contribution will be published on the Forum pages and the perspective contributors will upload presentation material to be accessible in advance to every meeting participant. In any case, each meeting will be configured to provide enough time both for formal presentation of high-level achievements and informal discussions on details of the work or further planning. The meetings will be preferably hosted by one of the participating WP3 institutions that, in conjunction with the event, may describe its own technical facilities and achievements. The meeting Chair will be responsible for providing, for each meeting, a report containing a series of information amongst which:

- Meeting Agenda;
- Material from the formal presentations;
- List of participants;
- Summary of the meeting.

### **EVN Technical Operation Group (TOG).**

The European VLBI Network (EVN), Technical & Operations Group (TOG) meetings have a long and colourful history that extends back over more than 3 decades. TOG meetings represent the main basis on which other engineering collaborations have been built (e.g. SKADS), and they form a solid foundation of the success of WP3. Due to the nature of VLBI operations, standardised data recording and handling is required at each station. These meetings will take place 5 times in the duration of RadioNet FP7 and will provide an element of training and development, targeting topical subjects of direct relevance to VLBI operations and thus the quality of the data received by EVN and Global VLBI users.

The activities will include:

- Meeting Agenda, List of participants,
- A programme of bi-annual lectures and practical demonstrations by the EVN TOG,
- Progress reports from EVN stations, correlators and other VLBI related institutions,
- Minutes of the meetings and material from the formal presentations,
- Action item list, to be pursued between meetings.

### **Engineering Facilities Database**

To maximise the technical interaction among the participating institutes, the knowledge of the

capabilities, expertise and methodologies adopted by the various partners is an essential starting point. To further this goal, one of the activities of the engineering forum in the first 24 months, will be to build-up a database of relevant technical facilities and engineering capabilities. Such a database or register will be regularly updated during the project duration, and will form a fundamental WP deliverable. The database will be populated either utilising the description generated by each participating partner or, in the case of facilities of particular importance to the community, by a direct visit to the facilities. In the latter case, the description of the facility and the methodologies adopted for characterisation and testing will be addressed, eventually utilising a common test vehicle, to be agreed among the participants. The database will therefore include not only the hardware facilities, but also the methodologies and processing of the participating institution. This activity will be lead by UROM.

### **Participants**

Members of the European Radio Astronomy Engineering Forum will include both engineers from RadioNet FP7 partners, academic institutions engaged in the development of radio astronomy hardware and representatives from selected industrial entities: Massachusetts Institute of Technology Haystack Observatory ((MIT, USA); National Radio Astronomy Observatory (NRAO, USA); Arecibo- Cornell University (USA); Jet Propulsion Laboratory (JPL, USA); NASA Goddard Space Flight Center (NASA/GSFC, USA); Bundesamt für Kartographie und Geodäsie (BKG, Germany); University of Bonn (Germany); Commonwealth Scientific and Industrial Research Organisation (CSIRO, Australia); Berkeley University of California (USA), National Space Agency of Ukraine (NSAU, Ukraine), Ventspils International Radio Astronomy Center (VIRAC, Latvia), Crimea Astrophysical Observatory (CrAO, Ukraine).

### **Deliverables** (month of delivery)

1. Reports from Engineering Workshops 1-5 – months: 8, 16, 23, 30, 35
2. Reports from the EVN TOG meetings 1-5 – months: 5, 13, 20, 26, 34
3. Database of technical facilities, engineering expertise – months: 12, 24