Work package number [9]	WP4	Lead beneficiary [10]	2 - ASTRON
Work package title	Sustainability		
Start month	1	End month	48

Objectives

To enhance the sustainability of future radio astronomical research in Europe with a focus on:

- The standardization of VLBI operations and equipment at EVN and GMVA observatories to enhance the quality of the received data. Training and development are key elements, which will be shared by the TOG and GMVA technical groups on a regular basis.

- Protection and maintenance of the radio spectrum for radio astronomy to enable radio-astronomical observations, which are sensitive enough to contribute significantly to relevant science goals. The Committee on Radio Astronomy Frequencies (CRAF) is responsible for this activity. It contains elements of training and collaboration with the industry to improve engineering standards.

- The establishment of a formal platform in which European radio astronomy institutes and organisations come together and discuss the broad coordination of the field in areas related to strategic planning and other high-level policy matters. The platform will focus on joint activities, including EVN, ALMA and the SKA.

Description of work and role of partners

WP4 - Sustainability [Months: 1-48]
ASTRON, MPG, UMAN, OBSPARIS, UAH, DST
WP4.1: EVN TOG & GMVA Technical meetings [UAH, MPG, all RadioNet partners]

EVN is a network of radio telescopes (Europe, Asia and South Africa) that performs simultaneous observations in the cm-wavelength regime. GMVA provides a complementary infrastructure that combines European and US telescopes, and ALMA to provide ultra-high resolution observations at mm-wavelengths. It is essential to maintain and improve these infrastructures in order to satisfy the requests for constantly increasing science goals and to sustain radio astronomy into the far future.

The success of EVN is heavily based on standardisation of equipment and procedures across the network. The Technical & Operations Group (TOG) of EVN is the platform for innovations and standardisation within EVN and has been responsible for the maintenance of the technical and operational infrastructure of EVN for the last 30 years. Regular technical meetings provide a crucial work platform for the TOG. In early 2016 the GMVA Technical Group (GTG) will be officially constituted to provide comparable services to the GMVA. Similarly, regular technical meetings are also planned for the GTG.
As there is considerable overlap between EVN and GMVA infrastructures in terms of the participating stations, the technical personnel, as well as in the observing equipment it is intended to organize TOG and GTG technical meetings in conjunction with each other. The associated meetings will increase the synergy between both networks, and optimize the labour costs. These meetings allow staff from the stations to agree on common developments and share knowledge from which both networks will benefit. The TOG & GTG technical meetings will provide a crucial element of training and development, maintaining and enhancing the quality of the data received by EVN and GMVA users. The financial support provided in this project will boost these new combined meetings with the aim to make them an established part of the infrastructure at the end of the project.

The meetings will take place approximately every 8 months. Financial support will be provided to operators and engineers and to the hosting institutes of the events. The requests for financial support will be approved on an individual basis by the WP4 selection committee giving special consideration to participants from less well-funded institutes, external experts, and to gender diversity aspects. In particular, due to the fact of ALMA joining some of the GMVA observations starting 2017, inviting ALMA experts to GTG meetings will be of great importance. We also foresee the need for additional GTG meetings on request, addressing urgent GMVA-ALMA related issues. Meeting reports will be communicated to a diverse list including technicians and scientists from radio astronomy and other related communities (e.g. geodetic VLBI). The activity webpage will additionally hold action items from each meeting, lists of developments by the technical staff, status of the equipment and disk space resources, as well as the efficiency of EVN and GMVA networks after each session to examine the evolution and the impact of the technical support. The main outcomes of

the meetings will be reported to the governing bodies of EVN and GMVA respectively, to assure the continuation of the development processes.

WP4.2: Spectrum Management [OBSPARIS, all RadioNet partners]

In CRAF the European radio astronomy institutes collaborate to coordinate activities to keep the bands used by radio astronomy free from interference and to have a common voice in the international frequency management arena. The members of CRAF are delegated from radio astronomy institutes in 20 countries in Europe and from South Africa as well as from organizations such as SKA, ESA, IVS and IRAM. They are involved in spectrum management for radio astronomy and as such represent their institutes in national and international issues to protect and maintain the radio spectrum infrastructure. The member institutes bring together the money to employ one frequency manager who represents radio astronomy at many international meetings.

CRAF holds up to two meetings per year, to report on the current interference issues and possible solutions, interactions with national administrations and anticipated developments related to scientific spectrum. Also information about international developments that may have an effect on radio astronomy is shared and discussed. During the meetings a coordinated strategy and common policy to address current and future issues is developed. CRAF meetings also have an educative aspect: attendees learn more about the techniques that are used in spectrum management.

On the global level, once every 3–4 years the World Radio communication Conferences (WRC) of the International Telecommunication Union (ITU) take far reaching and legally binding decisions on the allocation and use of radio spectrum for all services, including radio astronomy. Study Group 7 of the ITU (SG7) covers the science services and has a subsection dealing with radio astronomy. CRAF representatives are needed there to give evidence on the requirements of radio astronomy and to study the impact of decisions proposed by administrations. The next WRC is expected in 2019 and CRAF must attend this conference with enough representatives to cover all relevant meeting sessions.

The European Conference of Postal and Telecommunications Administrations (CEPT) makes binding decisions on European spectrum policy and use of the radio spectrum. There are at least seven committees, meeting two to four times a year, where issues involving scientific use of radio spectrum are discussed. Representatives of CRAF provide input on these issues and take part in the discussions. In many cases representatives from industry are also involved and together with telecom administrations, guidelines are provided to the European Telecommunications Standards Institute (ETSI) for developing engineering standards.
About 60% of the budget of this task will be used to subsidise the annual CRAF meetings: organisational cost, travel support for external experts and travel for CRAF members from less funded institutes. The remaining 40% of the budget will be used to provide financial support for CRAF representatives to travel to international spectrum management meetings at the ITU and CEPT. Funding will be assessed and approved on an individual basis by the WP4 selection committee. Written meeting reports will be distributed to CRAF members and stored on the password protected area. The reports contain decisions, action points and future reference. The summary is publicly available. The CRAF members discuss the outcomes with the appropriate people in their institutes.

WP4.3: RadioNet Strategy & Policy forum – SPOOR [UMAN, all RadioNet partners]

The SPOOR activities build upon the output of the previous RadioNet3 project and the recommendations of the ASTRONET ERTRC report. The SPOOR task will explore with the RadioNet Board, the EVN Board and other relevant bodies across Europe the best way forward into the next decade for European Radio Astronomy. The SPOOR will focus on recommendations 7 and 8 of the ERTRC report:

“7. We recommend that local and national radio institutes remain independent, as local support and expertise centres for radio astronomy, but that their joint activities, such as EVN and RadioNet, become more robustly and permanently organised and funded (but not through the same body that organises the European participation in the SKA).”
“8. We recommend that the European involvement in the SKA be organised through a treaty organisation that is robustly mandated and funded, to ensure the strongest impact of and participation in SKA by Europe. The ERTRC considers ESO to be a prime candidate to be that organisation.”

Major strategic issues will be addressed by the RadioNet partners within SPOOR, including the need to arrive at a sustained approach for European collaboration. These include EVN, SKA and CRAF, and go beyond the traditional sources of EC funding. A sustained platform for strategy and policy discussions under agreed governance beyond the RadioNet project will also be addressed. The results will be discussed by the RadioNet Board and published in the final report of this task. With this task financial support will be provided for the organization of several meetings and for travel support of participants, including external experts, to the respective meetings.

Participation per Partner

Partner number and short name	WP4 effort
1 - MPG	0.01
2 - ASTRON	0.01
6 - UMAN	0.01
10 - OBSPARIS	0.01
12 - UAH	0.01
28 - DST	0.08
Total	0.13

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D4.1	Progress report 1 - SPOOR	6 - UMAN	Report	Public	18
D4.2	Report 1 Technical Meeting	12 - UAH	Report	Public	24
D4.3	CRAF Meetings - Report 1	10 - OBSPARIS	Report	Public	24
D4.4	Progress report 2 - SPOOR	6 - UMAN	Report	Public	36
D4.5	Final report of SPOOR	6 - UMAN	Report	Public	47
D4.6	Report 2 Technical Meeting	12 - UAH	Report	Public	48
D4.7	CRAF Meetings - Report 2	10 - OBSPARIS	Report	Public	48

Description of deliverables

Reports from the meetings of technical (e.g. TOG, GMVA, CRAF) and political groups (e.g. SPOOR).

D4.1 : Progress report 1 - SPOOR [18]
Progress report SPOOR

D4.2 : Report 1 Technical Meeting [24]
Report Technical Meeting

D4.3 : CRAF Meetings - Report 1 [24]
CRAF Meetings

D4.4 : Progress report 2 - SPOOR [36]
Progress report - SPOOR

D4.5 : Final report of SPOOR [47]
Final report of SPOOR

D4.6 : Report 2 Technical Meeting [48]
Report Technical Meeting

D4.7 : CRAF Meetings - Report 2 [48]
CRAF Meetings

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS17	Annual SPOOR meeting 1	6 - UMAN	12	Meeting minutes
MS18	CRAF meeting	10 - OBSPARIS	20	Meeting minutes
MS19	Technical meeting 1	12 - UAH	22	Meeting minutes
MS20	Annual SPOOR meeting 2	6 - UMAN	24	Meeting minutes
MS21	CRAF meeting 2	10 - OBSPARIS	44	Meeting minutes
MS22	Technical meeting 2	12 - UAH	46	Meeting minutes
MS23	Delivery of final SPOOR report	6 - UMAN	46	Publication