RadioNet3

Advanced Radio Astronomy in Europe

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Contract No: 283393

RadioNet3 Advanced Radio Astronomy in Europe

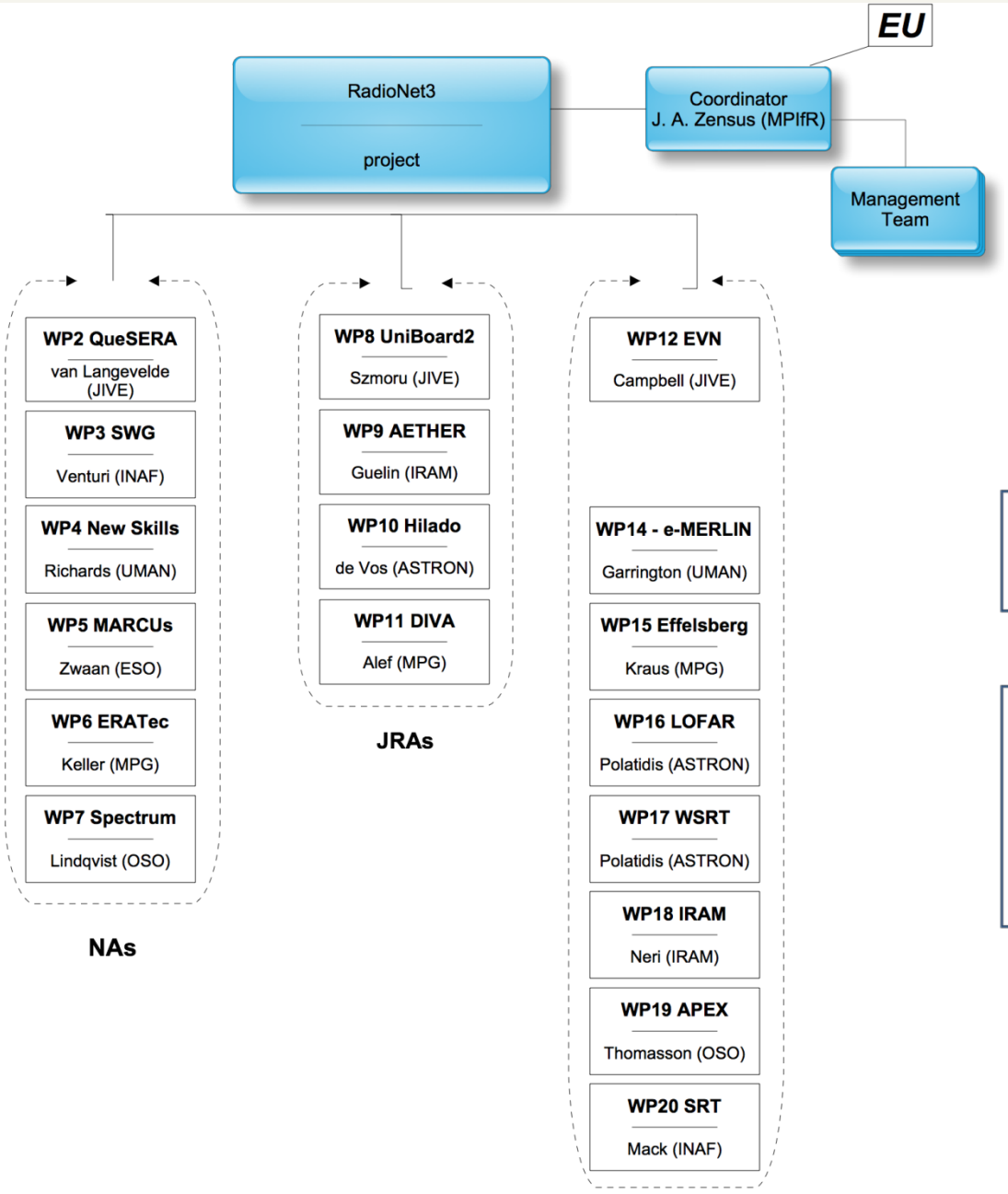
RadioNet3 coordinates Europe's leading radio astronomy institutions to support scientific research by all European astronomers

RadioNet3: builds on the success of two preceding Integrating activities under FP6 and FP7

is funded by the European Commission under the Seven Framework Programme (FP7), Contract no. 283393

is a Consortium which comprises **27 partners**

Turun yliopisto
University of Turku



Consortium Board

Partners representatives

Executive Committee

Coordinator, Chair,
JRA Leaders,
TNA Leaders,
Project Scientist
Project Manager

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RadioNet3 Advanced Radio Astronomy in Europe

Management Team

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www.radionet-eu.org

Prof. Anton Zensus
Coordinator

Franco Mantovani
Project Scientist

Izabela Rottmann
Project Manager

Jacqueline Casado Iglesias
Project Assistant

Aukelien van den Poll
TNA/NA travel Assistant

Elena Schwetz
Financial Coordinator

RadioNet3 Goals

- provide and facilitate **access** to Europes most powerful radio-astronomical facilities, including the ALMA telescope and SKA pathfinders
- secure a long term **perspective** on scientific and technical developments in radio astronomy, pooling the skills, resources and expertise that exist within the RN3 partnership
- stimulate new R&D **activities** for the already existing radio infrastructures in synergy with ALMA and with the SKA
- contribute to the **implementation** of the vision developed in the ASTRONET Strategic Plan for European Astronomy

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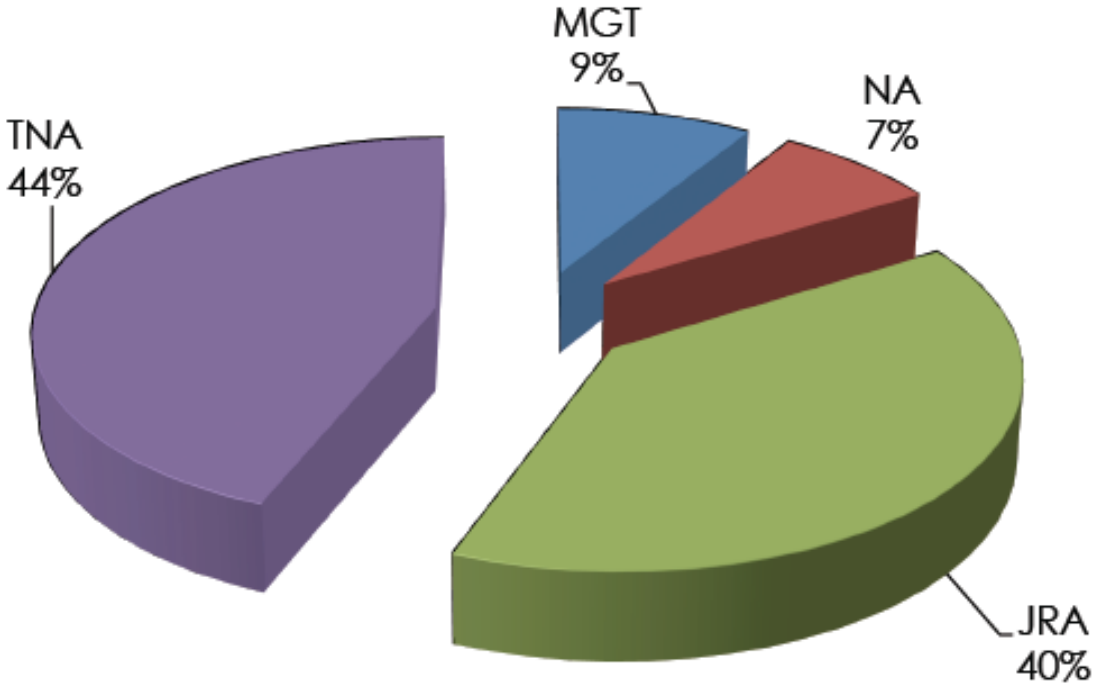
RadioNet3 Advanced Radio Astronomy in Europe

Duration: **2012 - 2015**

Total cost: **EUR 11 559 079**

EU contribution: **EUR 9 500 000**

- **Transnational Access**
- **Networking Activities**
- **Joint Research Activities**



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Transnational Access

The TNA programme is designed to stimulate the full exploitation of the **open skies policy**

The TNA offers to astronomers **access** (providing funds) to several radio telescopes and arrays covering an **unprecedented**

- **range of wavelengths** (from 10 MHz to 1 THz)
- **resolving power** (from arcminutes to milli-arcseconds)

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Transnational Access

Interferometer arrays and Single-dishes

- **European VLBI Network**
- **Westerbork Synthesis Radio Telescope**
- **Plateau de Bure interferometer**
- **e-MERLIN**
- **Low Frequency Array**
- **Pico Veleta 30 m**
- **Effelsberg 100 m**
- **Atacama Pathfinder Experiment**
- **Sardinia Radio Telescope**

SKA pathfinders are underlined

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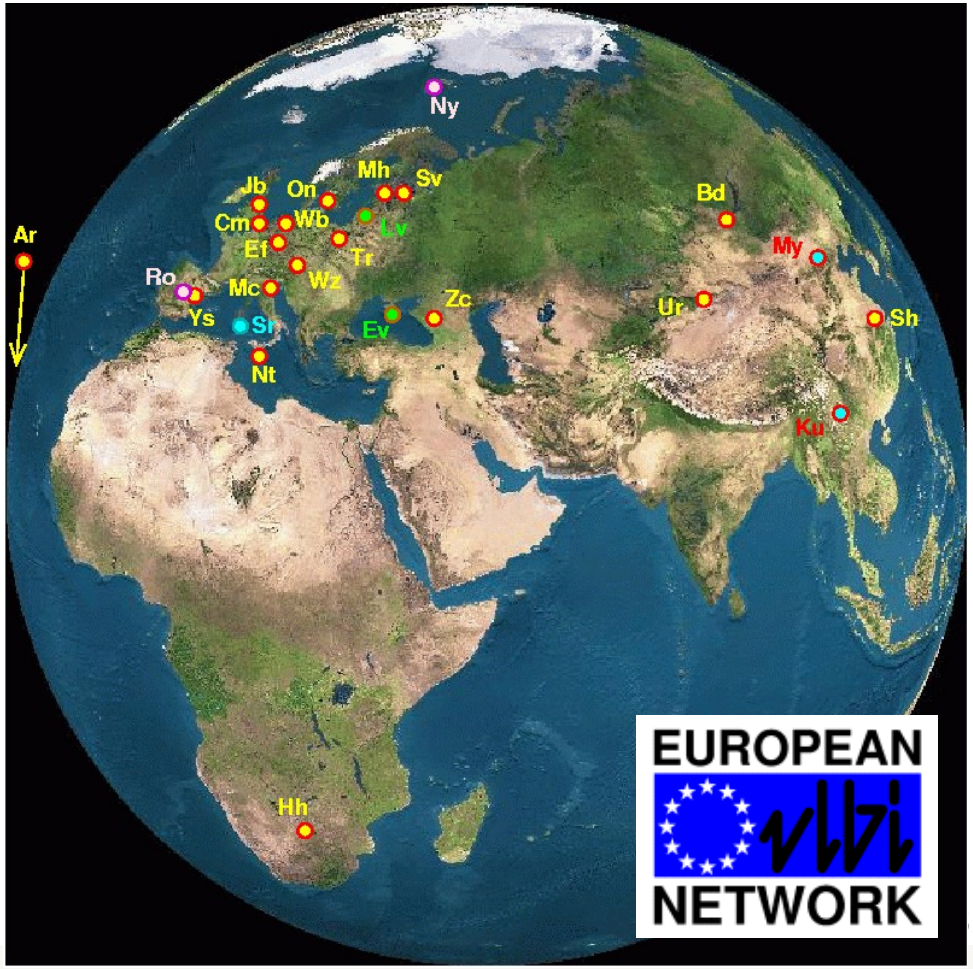
European VLBI Network www.evlbi.org

The EVN is a distributed network of **21** individual antennas

Diameter	14 m – 305 m
Baseline	up to 10.000 km
Wavelength	0.7 cm – 90 cm
Max. resolution	0.5 mas (K-band)

Joint observations with the **MERLIN** (UK) array and telescopes operated by **NRAO** (U.S.) are made on a regular basis

Correlation facility at the **Joint Institute for VLBI in Europe** (JIVE)



e-EVN

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e-MERLIN www.e-merlin.ac.uk

Telescope	array of 7 antennas
Frequency	1.3 – 24 GHz
Total bandwidth	4 GHz
Sensitivity	1 µJy
Resolution	10-150 mas

Effelsberg 100 m

www.mpifr.de

Telescope	parabolic dish
Diameter	100 m
Frequency	300 MHz – 95 GHz
Max.angular resolution	10” (90 GHz)

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Low Frequency Array

www.lofar.org

Stations	40 in the NL
	5 in Germany
	1 in UK, FR & SE
Diameter	1000 km or more
Frequency	10 – 240 MHz
Max.angular resolution	0.3” (240 MHz)
	5.3” (10 MHz)

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WSRT www.astron.nl

Telescope	array of 14 antennas
Diameter	25 m
Frequency	250 MHz – 8.3 GHz
Max.angular resolution	2.2” (8.3 GHz) 72” (250 MHz)

The project **Apertif:** increase of the field of view with a factor 25, placing a *focal-plane array* in the focus of each parabolic dish. Operational in 2013.

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IRAM Plateau de Bure

www.iram-institute.org

Telescope	6 parabolic dishes
Diameter	15 m each
Wavelength	3 – 0.8 mm
Max.angular resolution	0.2” (350 GHz)

Northern Extended Millimetre Array (**NOEMA**) project will double the number of antennas by 2018

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IRAM 30 m

www.iram-institute.org

Telescope	parabolic dish
Diameter	30 m
Wavelength	3 – 0.8 mm
Max.angular resolution	7.5” (350 GHz)

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Atacama Pathfinder Experiment

www.chalmers.se/oso - www.eso.org - www.mpifr.de

Telescope	parabolic dish
Diameter	12 m
Frequency	0.2 – 1.4 THz
Max.angular resolution	4” - 30”

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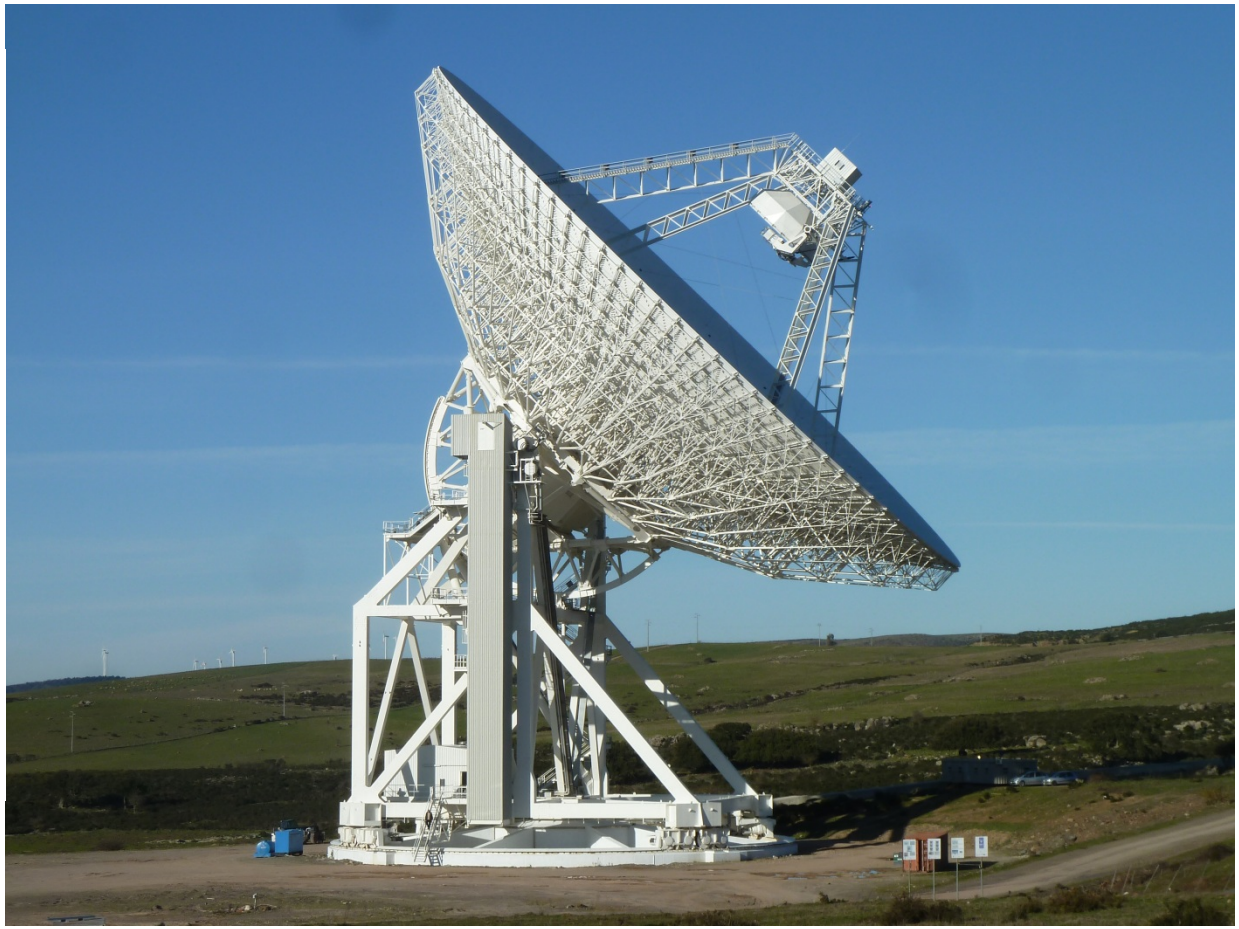
Sardinia Radio Telescope www.inaf.it

Telescope	parabolic dish
Diameter	64 m
Frequency	300 – 100 GHz
Max.angular resolution	11” (100 GHz)



Network Activities (NAs)

The NAs transform the way science is conducted in Europe

NAs are a **forum** for discussion, collaboration, and organization of specialized events, and training

NAs provide **financial support** for the organization of events

NAs provide **travel grants** to join the meetings

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Network Activities

QueSERA to better integrate, represent and advertise the radio astronomical facilities and ambitions

SWG central coordination of the dissemination of knowledge and scientific results

New Skills to equip astronomers to exploit current and future radio astronomy facilities

MARCUs to support user visits to the seven nodes of the EU ARC network

ERATec to foster the collaboration on the development and operations of radio astronomy instruments in Europe, promoting interactions among engineers and scientists

Spectrum to keep the radio astronomy frequency bands free of man-made interferences

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Joint Research Activities

Support targeted R&D of new digital techniques

JRAs: UniBoard^2, AETHER, Hilado, and DIVA

Main aims are:

- more efficient use of telescope hardware
- increase the observing bandwidth (including operation to beyond 1 THz)
- increase the field of view of the telescopes (multi-feeds, phased array)

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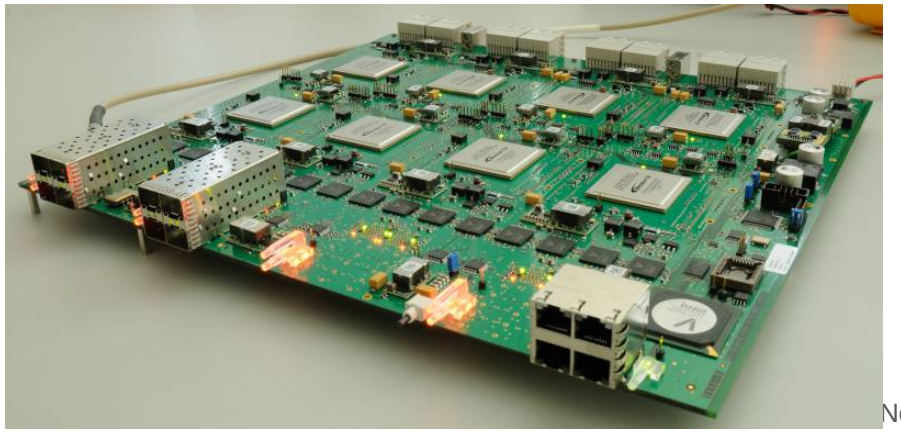
JRA UniBoard^2

- **FPGA-based**, generic, scalable, high-performance **computing platform** for radio-astronomical applications that will be ready for the next generation of astronomical instruments, notably the **SKA**
- **digital receiver** application, which converts a wide input bandwidth into a variable number of data streams, which can then be further processed by a **correlator, a spectrometer or pulsar processor**



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JRA AETHER

Advanced European Terahertz Heterodyne Receivers

Develops innovative heterodyne detectors and devices that yield a maximum gain sensitivity, bandwidth beyond 1 THz, and mapping speed for ALMA and for large existing EU mm/sub-mm facilities

- 67-116 GHz extremely wide RF-band heterodyne module (HEMT MMIC)
- Highly integrated and miniaturized 2SB SIS receivers for λ~1 mm Focal Plane Arrays
- Sub-millimetre Wave 2SB SIS Mixers
- Supra-THz Heterodyne Receivers operating in the highest atmospheric windows

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JRA Hilado

High performance processing of Large Astronomical Datasets in an Open-source environment

Optimized **software and demonstrator processing pipelines**

- **imaging pipeline -** to process in a realistic timescale LOFAR data for all 80 km baselines at full FoV, 30MHz bandwidth at the lowest frequencies

- **fast transient imaging -** currently limited for LOFAR and other RadioNet facilities

These developments apply to the **ALMA** and **SKA pathfinders**

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JRA DIVA

Developments In VLBI Astronomy

- **DBBC** project: a VLBI digital backend with
  - 4 GHz bandwidth
  - single FPGA processor unit
  - 40/100 Gbps Ethernet output data highway

- **LNA Monolithic Microwave Integrated Circuite** (MMIC)

- **Low-noise cryogenic** application of semiconductor technologies for existing and upcoming VLBI facilities as well as for the **SKA**

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Status of the first 12 months

Scientific achievements of NAs:

- ALMA & SKA were the most frequently subjects of supported conferences
- The majority of the participants came from European Institutes, however the popularity of the RadioNet3 events is growing world-wide
- 40% of the participants are women

We conform with the requirements of RadioNet3

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Status of the first 12 months

Scientific achievements of JRAs:

- **JRAs** Activities in phase with the plan

Scientific achievements of TNAs:

- Offering 3000 hrs (out of 1600 expected for 18 months) of access to the leading radio telescopes
- Hosting more than 700 users
- SRT - Call for Proposals for observations in 2014 will be distributed

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Status of the first 12 months

Additional achievements:

- Collaborations:

  ASTRONET

  AERAP - Africa Europe Radio Astronomy Partnership

  MERIL - Mapping of the European Research Infrastructure Landscape

  Leibnitz Institute for the Social Science – Centre of Excellence Women and Science

- **Horizon 2020 -** responding to the EC calls for suggestions

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EWASS 2013 - RadioNet3 Sp2

European Week of Astronomy and Space Science

2013 Turku / Finland

8 - 12 July 2013

RadioNet3 Special Session Sp2 - Monday 08 July 2013

“The role of modern radio observatories in black hole and jet studies”

Organizers: F. Mantovani, T. Savolainen, M. Tornikoski

“Call for Contributions” open

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Plans for the next 12 months

- **Follow the scientific work plan of RadioNet3**
- **Prepare a high quality Annual Report**
- **Prepare a high quality Mid Term Review**

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Conclusions

To date

We met our scientific goals in 2012 and are on a good way for also achieving those for the coming years

In future

We aim at strengthening RadioNet and bringing radio astronomy community on a good way for the new challenges

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the end

Thanks for your attention

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Status of the first 12 months

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Status of the first 12 months

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