



The VLBI Future

A roadmap for the next decade

T. Venturi (INAF), M. Lindqvist (OSO), Z. Paragi (JIVE)

PROGRESS REPORT

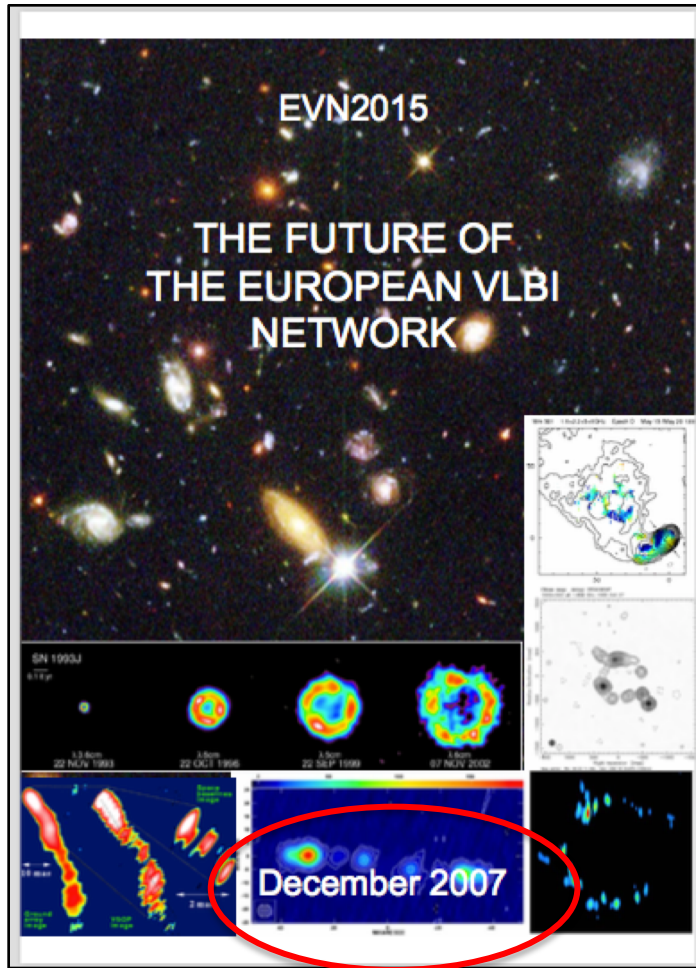


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A roadmap for the next decade

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- ✓ Background and “actors”
- ✓ The WP and the implementation plan
- ✓ The F2F meeting – Insight and feedback from the VLBI users’ community
- ✓ Special Session SS11 at EWASS 2018 – Insight and feedback from experts within and outside our community
- ✓ Current Stage
- ✓ Next steps and deadlines



BACKGROUND AND “ACTORS”

As highlighted by the EVN CBD in 2016: it is time to revise the VLBI Science case for several reasons

- Role and potentials of VLBI in the new astrophysical challenges
- Role, potentials and added value of VLBI in the SKA era
- Define key science areas and observational needs to have a roadmap for the technological development
- White book in support of funding requests to national agencies and ministries



BACKGROUND AND “ACTORS”

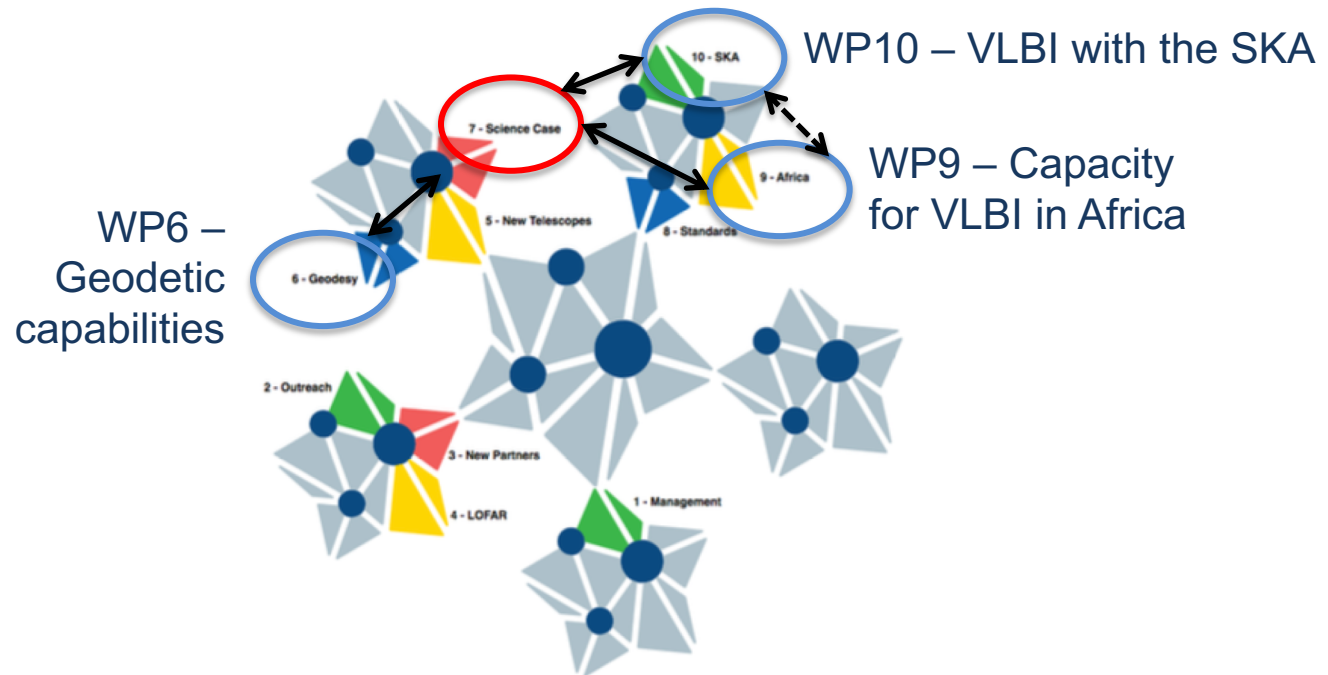
Objectives for WP7 as in the JUMPING JIVE proposal

Because of the progress in the field of astrophysics and the changes in the radio astronomy landscape it is timely to revisit the EVN science case. **In consultation with the user community and global partners** we will define the most important science areas for future VLBI array.

- One task: *VLBI Science case*
- One main deliverable: a white paper setting the future priorities of VLBI science capabilities

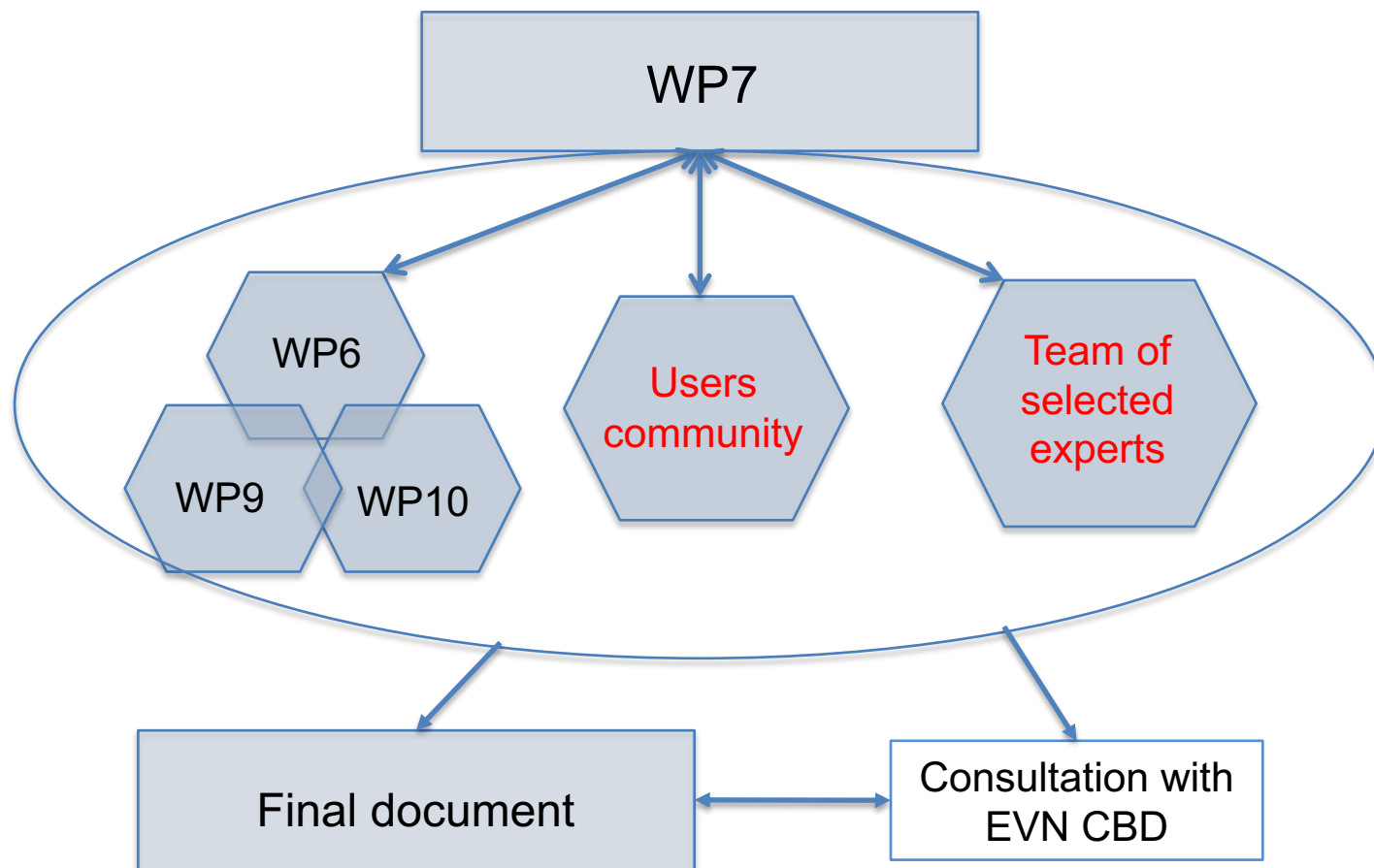


Relations to other WPs in the project Capacity for doing science



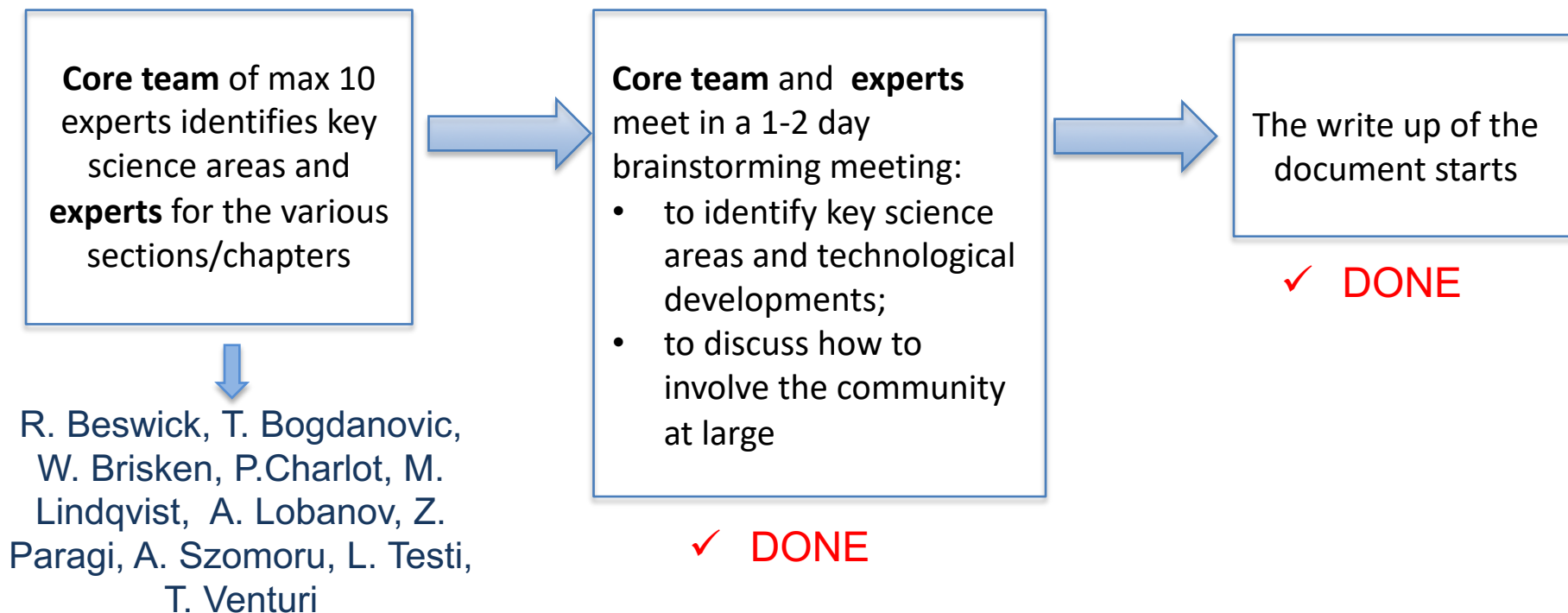


THE PROCESS





IMPLEMENTATION PLAN AND STATUS





First presentation of the project to the community at the meeting: eMERLIN and EVN in the SKA era (Jodrell Bank, 11-12 September 2017)

Meeting part 2 : The future of VLBI

(Organisers: Tiziana Venturi (INAF) /Michael Lindqvist (Onsala) /Zsolt Paragi (JIVE)

12:00 - [Introduction, welcome and overall vision](#) - Tiziana Venturi (INAF, Italy)

12:15 - [EVN present status and future direction](#) - Michael Lindqvist (Onsala Space Observatory, Sweden)

12:30 - [VLBA technical roadmap : 2020-2035](#) - Walter Briske (LBO, USA)

12:45 - [Wide-Band single pixel feeds and EVN technical upgrades](#) - John Conway (Onsala Space Observatory, Sweden)

13:00 - Lunch

14:15 - [VLBI and the SKA \(an update from the SKA-VLBI SWG\)](#) - Zsolt Paragi (JIVE)

14:15 - [Investigating radio quiet quasars using e-MERLIN and EVN observations of strong gravitational lensing](#) - Philippa Hartley (JBCA)

14:15 - [Probing circumstellar structures through masers with the EVN and e-MERLIN](#) - Sandra Etoka (JBCA)

14:30 onwards - Discussion and Wrap-up



28/02/2018

The F2F Meeting Zaandam (NL), 28/2-1/3/18

Start at 13:30

SESSION I	Insights from the EVN Bodies	Chair P. de Vicente
13:30 - 13:40	Welcome and Introduction of all participants	G. Cimò
13:40 - 14:00	Presentation of the task, deliverables and timeline	T. Venturi
14:00 - 14:20	Lessons from EVN2015	H. van Langevelde
14:20 - 14:50	Prospects and ambitions of the EVN for the next decade	J. Conway
14:50 - 15:15	Technological prospects for the EVN for the next decade	A. Szomoru
15:15 - 15:45	Discussion	Chair P. de Vicente
15:45 - 16:00	Coffee break	

SESSION II	Scientific achievements, open questions and future prospects for VLBI	Chair: T. Muxlow
16:00 - 16:25	Cosmology	J. McKean
16:25 - 16:50	Galaxy formation and AGN feedback	R. Beswick
16:50 - 17:15	Close to the AGN cores: mmVLBI and jet formation	A. Lobanov
17:15 - 17:40	Stars: formation and evolutionary stages	A. Bartkiewicz
17:40 - 18:05	Astrometry and geodesy	P. Charlot

Requests to the invited speakers

- ❖ Provide a brief overview of the scientific context
- ❖ Highlight the open questions and potentials of VLBI
- ❖ Highlight the observational and technological requirements

Dinner


http://www.jive.eu/jumpingjive/doku.php?id=vlbi_future:meetings:280218#meeting_location_and_accommodation



EVN CBD Meeting – Shanghai – May 15th 2018




The F2F Meeting Zaandam (NL), 28/2-1/3/18

01/03/2018

SESSION II	Continued	Chair: T. Muxlow
08:15 - 08:40	 Transient phenomena	M. Perez-Torres

SESSION III	Thinking Global	Chair: F. Colomer
08:40 - 09:00	 Prospects for Global VLBI	W. Briskin
09:00 - 09:20	 Prospects for e-MERLIN-EVN	T. Muxlow

SESSION IV	General discussion	Chair: M. Garrett
09:20 - 10:40	 What are we still missing? Suggestions/insights	Chair & All
10:40 - 11:00	Coffee break	
11:00 - 12:45	Chapter coordinators and writing teams	Short parallel sessions
12:45 - 13:30	Wrap up and future steps	M. Lindqvist, Z. Paragi, T. Venturi
13:30	Lunch	
15:00	Meeting ends	

Requests to the invited speakers

- ❖ Provide a brief overview of the scientific context
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EVN CBD Meeting – Shanghai – May 15th 2018



The F2F Meeting Zaandam (NL), 28/2-1/3/18



- Very successful meeting
- 34 participants (four connected remotely)
- Good attendance of young generation of VLBI users
- Excellent presentations (all available online)
- Lively and productive discussion
- Chapter coordinators identified

Consistent support from JUMPING JIVE
to all participants



SS11 @ EWASS 2018 Liverpool (UK) 04/04/2018



EWASS 2018

- Welcome & News
- About EWASS
- Organisers
- Dates
- Venue
- Programme
- Plenary Lectures
- Abstract Submission
- Registration
- Travel Information
- Accommodation

Special Session SS11

4 April 2018

3 – 6 April 2018 (TBD)

Exploring the Universe: a European vision for the future of VLBI

Aims and scope

The aim of this special session is to discuss and position the role of very long baseline interferometry (VLBI) at radio wavelengths in the context of the challenges and open questions of astrophysics as we approach the next decade. VLBI arrays are the only instruments capable of reaching milliarcsecond scale resolution and below, and in this special session we aim at addressing those astrophysical key areas where VLBI will prove to be crucial for a major improvement of our knowledge. This special session is part of an ongoing effort to shape the VLBI roadmap for the next decade, and will be an excellent good chance to gather many experts within and outside the VLBI community, to discuss the most fundamental astrophysical questions VLBI will be able to address, complementing the other main forthcoming astronomical facilities. The speakers have been selected, but we still accept and encourage poster submission.



Programme

- Topic 1
OBSERVATIONAL COSMOLOGY: Cosmology and Gravity; Galaxy and AGN co-evolution
- Topic 2
EXTREME PHYSICS: Towards the horizon of events; Transient events
- Topic 3
THE LOCAL UNIVERSE: Masers, stars and planetary systems
- Topic 4
THE FUTURE OF HIGH RESOLUTION RADIO ASTRONOMY IN EUROPE

Invited speakers

- Andreas Brunthaler MPIfR, Bonn, Germany
- John Conway Onsala Space Observatory/Chalmers University, Sweden
- Heino Falcke Radboud University, The Netherlands
- Jason Hessels ASTRON, The Netherlands
- Andrea Merloni MPE, Garching, Germany
- Tom Muxlow University of Manchester/Jodrell Bank Observatory, UK
- Hans Olofsson Chalmers University, Sweden
- Miguel Perez-Torres IAA, Spain
- Cristiana Spingola Kapteyn Astronomical Institute, The Netherlands
- Tullia Sbarrato University Milano Bicocca, Italy
- Andrew Williamson Radboud University, The Netherlands

Scientific organisers

Tiziana Venturi (tventuri@ira.inaf.it), Istituto di Radioastronomia, INAF

Zsolt Paragi (zparagi@jive.eu) Joint Institute for VLBI ERIC (JIVE)

Michael Lindqvist (Michael.Lindqvist@chalmers.se) Onsala Space Observatory

Contact












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Zsolt Paragi - zparagi@jive.eu

Michael Lindqvist - Michael.Lindqvist@chalmers.se



Chair: Tiziana Venturi

09:00	Gravitational waves: potential contribution of VLBI	Andrew Williamson	 PDF
09:30	Gravitational Lensing with the next generation of VLBI arrays	Cristina Spingola	 PDF
09:45	Coevolution of Supermassive Black Holes and their host galaxies: open questions and prospects for VLBI	Andrea Merloni	 PDF
10:15	The impact of VLBI Observations on our Understanding of Star-formation Activity and Low-Luminosity AGN Systems	Tom Muxlow	 PDF
10:30	COFFEE BREAK		
11:00	MERAC Prize in Theoretical Astrophysics	Sandrine Codis	
11:30	MERAC Prize in Observational Astrophysics	Renske Smit	
12:00	MERAC Prize in New Technologies	Martin Pertenais	
12:30	Cosmological hydrodynamical simulations	Joop Schaye	
13:00	LUNCH		
14:30	Imaging black holes with mm-VLBI: past, present and future	Heino Falcke	 PDF
15:00	Big and young SMBHs in the early Universe: how can we observe jetted AGN?	Tullia Sbarrato	 PDF
15:15	Zooming in on fast radio bursts	Jason Hessels	 PDF
15:45	Extragalactic Synchrotron Transients with VLBI: from Supernovae to TDEs	Migues Perez-Torres	 PDF
16:00	COFFEE BREAK		
16:30	Stellar masers and the structure of the Galaxy	Andreas Brunthaler	 PDF
17:00	VLBI and the life-cycles of stars	Hans Olofsson	 PDF
17:15	The future of VLBI	John Conway	 PDF
17:45	Summary and concluding remarks	Tiziana Venturi	
18:00	Close		

http://www.jive.eu/jumpingjive/doku.php?id=vlbi_future:meetings:ewass18

EVN CBD Meeting – Shanghai – May 15th 2018





EVN CBD Meeting – Shanghai – May 15th 2018



SS11 @ EWASS 2018 Liverpool (UK) 04/04/2018

- ❖ Session by invitation
- ❖ A few posters presented
- ❖ Very good attendance (40-50 people throughout the day)
- ❖ Excellent presentation (all available online) highlighting the potentials of VLBI over a very broad range of science
- ❖ Very successful engagement of experts outside the radio domain for the development of the EVN Science case



Current stage

- Preliminary list of topics defined
- Template for the document chosen
- Overall format of the document decided
- Chapter coordinators have selected their «team» of contributors



Current stage

- Preliminary list of topics and chapter coordinators
 - Present and future VLBI arrays and radio facilities/ Present an future space and ground observatories at other wavelengths – **Walter Briskin**
 - Cosmology – **John McKean**
 - Galaxy formation & AGN feedback - **Tom Muxlow**
 - AGN/BH evolution over cosmic time – **Sandor Frey**
 - mm-VLBI and jet formation – **Andrei Lobanov**
 - Explosive phenomena/transients – **Miguel Perez-Torres & Zsolt Paragi**
 - Stellar maser science – **Anna Bartkiewicz & Kazi Rygl**
 - Stellar radio continuum and planetary systems – **Jose' Carlos Guirado**
 - Astrometry, Earth and celestia reference frames – **Partrick Charlot**
 - Space science developments – **Leonid Gurvits**
 - New technological developments – **Arpad Szomoru & Pablo de Vicente**
 - VLBI & synergies in the next decade – **Huib van Langevelde**



The full team (as of today)

An Tao (ShAO) – **C. Reynolds** (CSIRO) – **R. Pizzo** (ASTRON) – **M. Giroletti** (INAF, IRA) – **L. Testi** (ESO) – **A. Deller** (ASTRON) – **A. Possenti** (INAF, OACagliari) – **A. Polatidis** (ASTRON) - **R. Morganti** (ASTRON) - **R. Schultz** (ASTRON) – **R. Deane** (UPretoria) – **A. Merloni** (MPE) – **T. Sbarrato** (Milano Bicocca) – **K. Gabany** - **B. Boccardi** (INAF, OAS) – **R. Laing** (SKAO) - **E. Ros** (MPIfR) – **T. Bogdanovich** (Georgia) – **E. Rossi** (Leiden) – **G. Ghirlanda** (INAF, Brera) – **I. Donnarumma** (INAF, IAPS) - **R. Fender** (ASTRON) – **J. Hessels** (UVA) – **J. Miller-Jones** (Curtin) – **T. O'Brien** (JBO) – **A. van der Horst** (Washington) - **S. van Velzen** (Baltimore) – **R. Williamson** (UChicago) – **J. Chibueze** (SKA-SA) – **F. Colomer** (JIVE) - **S. Etoka** (UMan) – **C. Goddi** (Radboud Uni) – **M. Gray** (UMan) - **L. Moscadelli** (INAF, Arcetri) – **A. Richards** (UMan) – **A. Sanna** (MPIfR) – **G. Surcis** (INAF, OA Cagliari) - **J. van der Walt** (UBerkeley) – **W. Vlemmings** (OSO) - **C. Trigilio** (INAF, Catania) – **J. Greaves** (Cardiff) – **G. Anglada** (London) – **M. Gawonski** (Torun) – **H. Olofsson** (OSO) – **D. Fenech** (UMan) – **G. Bourda** (Ubordeaux) – **G. Cimo'** (JIVE) – **G. Molera** (Finland) – **D. Duev** (Caltech) – **M. Lindqvist** (OSO) - **U. Bach** (MPIfR) – **J. Quick** (HartRAO) – **I. van Bemmelen** (JIVE).

Male

Female



Next steps and deadlines

- ☐ A. Szomoru and P. de Vicente to deliver a preliminary version of their chapter by June
- ☐ Other coordinators to deliver a preliminary version of their chapter by September 3, 2018
- ☐ WP leaders to assemble the chapters and prepare a first version of the document for the EVN Symposium
- ☐ EVN Symposium & Users' meeting to collect further input/feedback from the community



Next steps and deadlines

- ☐ Updated report to the CBD in Autumn 2018
- ☐ Meeting among WP leaders, chapter coordinators and writing team some time in 2019
- ☐ Advanced draft to be delivered to the EVN CBD by Q3-2019 as requested.

Thank you to many people:

Michael, Zsolt, core team members, chapter coordinators, contributors and experts who have enthusiastically agreed to be involved

