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### **Deliverable 4.2**

#### **Focussed events: Preparing SKA Pathfinder**

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Deliverable Leading Partner: The University of Manchester (UMAN), United Kingdom

## 1. Document information

Document name: RadioNet Advanced radio interferometry, commissioning skills and preparation for the SKA

Type: **Other**

WP: 4

Authors: Anita Richards (UMAN, UK)

### 1.1 Dissemination Level

Dissemination Level		
<b>PU</b>	Public	X
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

**1.2 Content**

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## 2. Report

### 2.1 Purpose of the workshop

The number of prospective radio interferometry users is increasing very rapidly, thanks to new and upgraded radio interferometry arrays coming into operation (ALMA, e-MERLIN, JVLA, KAT7, LOFAR, etc.) and those planned or under construction (ASKAP, MeerKAT, NOEMA, SKA etc.). All these telescopes aim to make their data accessible to astronomers with an interest in the science, not necessarily in the dirty details of techniques. Nonetheless, there is still a need for a core of experts to lead ambitious science projects and to test, operate and develop radio instruments.

The workshop 'Advanced radio interferometry, commissioning skills and preparation for the SKA' was intended to communicate skills needed to help commission a radio interferometry array or work on early science data. The new arrays coming into operation have all found a shortage of scientists able and willing to help troubleshoot early science. Talks and discussion sessions shared best practices between people working on the arrays, lessons from commissioning scientists and the experiences of working on early science data.

The workshop was on November 13-16, 2012 in Manchester (UK):

<http://www.alma.ac.uk/events/radionet-advanced-radio-astronomy>

### 2.2 Organization

Scientific Organising Committee

- Michiel Brentjens (LOFAR)
- Rick Perley (VLA)
- Roshene McCool (SKA)
- Simon Garrington (e-MERLIN/EVN)
- Anita Richards (RadioNet3)

### 2.3 Programme



## Agenda Nov 2012

Agenda for RadioNet Advanced Radio Astronomy, Commissioning Skills and Preparation for the SKA

**Venue for all events: Lovell Lecture Room, 3.225, JBCA, Alan Turing Building, University of Manchester**

<b>Tuesday</b>	<b>13 Nov</b>	Chair: <b>Anita Richards</b>	<b>Provisional titles</b>
1230	Registration		TEA/COFFEE
1315	Albert Zijlstra (Director, JBCA)		Welcome/practicalities
1330	Robert Laing (ESO)		Introduction and overview
	<b>Exemplar arrays</b>		
1415	Rick Perley (NRAO)		JVLA: wide band, high sensitivity
1500	Michiel Brentjens (LOFAR)		Wide fields, aperture arrays and the ionosphere
1545	TEA	Chair: <b>Michiel Brentjens</b>	
1615	Simon Garrington (JBO)		e-MERLIN/EVN High resolution
1700	Richard Hills (ALMA)		ALMA: High frequencies and the troposphere
1745	End of day		
<b>Wednesday</b>	<b>14 Nov</b>		
	<b>From sky to correlator</b>	Chair: <b>Adam Avison</b>	
0900	Roshene McCool (SKA)		Local oscillators, digital signal transport
0925	Eloy de Lera Ace do (Cambridge)		Aperture array antennas; design, modelling and measurements: Focus on AAVSO
0940	Danielle George (Manchester)		Future receiver front-end designs
1005	Jeremy Yates (UCL)		DiRAC for the SKA/Wide-band, wide field imaging
1020	COFFEE		
1055	Peter Dewdney (SKA)		Signal processing
	<b>Commissioning: (preparing for) Early science</b>	Chair: <b>Roshene McCool</b>	
1120	Rick Perley (NRAO)		What is commissioning?
1140	Robert Laing (ESO)		Designing and analysing performance tests
1200	Tim Shimwell (CSIRO)		Commissioning ASKAP
1225	Aaron Chippendale (CSIRO CASS)		Testing the ASKAP MkI Phased Array Feed
1240	Lindsay Magnus (SKA South Africa)		KAT7/MeeKAT commissioning
1305	LUNCH	Chair: <b>Danielle Fenech</b>	
1350	Steve Torchinsky (Nancay)/Henrik Olofsson (Chalmers)		Commissioning EMBRACE@Nancay
1405	Richard Davis (JBO)		Receivers and Planck LFI
1425	Richard Hills (ALMA)		Making ALMA work
1445	Panel: Chair: Robert Laing, Rick Perley/NRAO, Itziar de Gregorio-Monsalvo/ALMA, Michiel Brentjens/LOFAR, Lindsay Magnus/MeerKAT, Bob Campbell/VLBI, Ralph Spencer/e-MERLIN/VLBI		Assessing the performance of an array
1545	TEA		
1600	JBCA COLLOQUIUM Jay Farihi (Leicester)		Archaeology of Extrasolar, Terrestrial Planetary Systems
<b>Thursday</b>	<b>15 Nov</b>		
	<b>Data storage/retrieval and pipelines</b>	Chair: <b>Katherine Blundell</b>	
0900	Bryan Butler (NRAO)		Beginning-to-End data flows
0930	Bob Campbell (JIVE)		EVN B2E Dataflow/pipeline
0950	Michiel Brentjens		The LOFAR data flow
1010	Megan Argo (ASTRON)		Pipelining e-MERLIN data
1025	Dirk Petry (ESO)		ALMA service data analysis
1045	Lourdes Verdes-Montenegro (IAA)		e-Science tools and SKA
1055	COFFEE		
	<b>Calibration, imaging</b>	Chair: <b>Bob Campbell</b>	
1115	Rick Perley (NRAO)		Dynamic Range

## Agenda Nov 2012 — UK ALMA Regional Centre

<http://www.alma.ac.uk/events/agenda-nov-2012>


1135	Ian Heywood (Oxford)	Calibration of direction-dependent effects in JVLA/KAT-7 data
1155	Paul Harrison (JBO)	Measuring eMerlin Antenna beams
1210	Rob Beswick (JBO)	e-MERLIN early science
1230	Itziar de Gregorio-Monsalvo (ALMA, ESO)	Processing the first ALMA data
1250	Ed Fomalont	Astrometry and precision (Video)
1310	Andrew Markwick (JBCA)	Splatalogue
1315	LUNCH	
	<b>Problem solving</b>	
1400	Rick Perley, <i>others</i> Chair: <b>Rick Perley</b>	Introduce problem solving, problems
1430	Problem Solving in groups	
	EVLA Issues	Effects of calibration errors
	ALMA Antenna	
	Characterising image quality	
	ALMA data issues	
	e-MERLIN	
	LOFAR	LOFAR imaging issues (data)
	TEA available	
1730	Reports back from problem solving	
1800	End of formal events	
1830	Buffet and informal talks	
<b>Friday</b>	<b>16 Nov</b>	
	<b>Radio Frequency Interference and flagging</b> Chair: <b>Robert Laing</b>	
0900	Rob Millenaar (SKA)	The RFI landscape
0925	Danielle Fenech (UCL)	The SERPent autoflagger
	<b>Solar System</b>	
0950	Bryan Butler (NRAO)	Solar System observing
	<b>Commissioning: Planning and Requirements</b> Chair: <b>Megan Argo</b>	
1010	Thomas Kusel (SKA South Africa)	Capturing requirements for MeerKAT (Video)
1040	COFFEE	
1100	Jamie Stevens (CSIRO)	The Compact Array Broadband Backend Upgrade, and the MWA 128-tile system
1125	Sandra Etoka ( Hamburger Sternwarte)	Requirements for the ALMA Science Archive
1140	Peter Dewdney (SKA)	Commissioning challenges of the SKA
1205	Joe McMullin (National Solar Observatory)	Running a commissioning team
1250	Lunch	
1335	Panel: Chair: Michiel Brentjens. JoeMcMullin/National Solar Observatory, Bryan Butler/NRAO, Richard Hills/ALMA, Michael Kesteven/ASKAP, Simon Garrington/e-MERLIN/VLBI, Roshene McCool/SKA	How to translate requirements into specifications engineers can implement and how to know if they've been met
	<b>Working on new/upgraded arrays and their data</b> Chair: <b>Simon Garrington</b>	
1435	Rick Perley + Announcements/discussion	RESRO and similar opportunities, job announcements etc.**
1510	Simon Garrington	Wrap up
1530	END OF MEETING	

Panels: members take 3-5 mins to say a few things they think are significant to the topic, then throw it open to questions.

\*\*Opportunities... let Rick know in advance if they want to make a purely verbal announcement or provide a slide.

## 2.4 Participants

AttendanceNov2012 — UK ALMA Regional Centre <http://www.alma.ac.uk/events/attendancenov2012>




### AttendanceNov2012

List of accepted registrations

Last name	First name	Institute	Video?
Argo	Megan	ASTRON	
Avison	Adam	UK ARC Node	
Belles	Pierre-Emmanuel	CEA-Saclay & University of Hertfordshire	
Beswick	Rob	JBCA	
Blundell	Katherine	University of Oxford	
Brentjens	Michiel	ASTRON	
Butler	Bryan	NRAO	
Campbell	Bob	JIVE	
Chippendale	Aaron	CSIRO CASS	
Connolly	Samuel	University of Southampton	
D'Amico	Nichi	University of Cagliari	
Davis	Richard	University of Manchester	
de Gregorio-Monsalvo	Itziar	ALMA-ESO	
de Lera Acedo	Eloy	University of Cambridge	
Dewdney	Peter	SKA organisation	
Etoka	Sandra	Hamburger Sternwarte	
Eyres	Stewart	University of Central Lancashire	
Fenech	Danielle	UCLondon	
Fomalont	Ed	ALMA/NRAO	Y
Garrington	Simon	JBO, University of Manchester	
George	Danielle	University of Manchester	
Gregson	Jonathan	Open University	
Guzman-Ramirez	Lizette	JBCA	
Harrison	Paul	JBCA	
Harvey-Smith	Lisa	CSIRO	Y
Harwood	Jeremy	University of Hertfordshire	
Hebden	Kerry	Jodrell Bank Centre for Astrophysics	
Heesen	Volker	University of Southampton	
Heywood	Ian	University of Oxford	
Hills	Richard	University of Cambridge	
Jeffrey	Robert	University of Oxford	
Kesteven	Michael	CASS, CSIRO	
Kimball	Amy	National Radio Astronomy Observatory	
Koehler	Jana	MPIfR	
Koprowski	Maciej	University of Edinburgh	
Kurtz	Stan	Universidad Nacional Autonoma de Mexico	
Kusel	Thomas	SKA South Africa	Y
Laing	Robert	ESO	
Magnus	Lindsay	SKA SA	
Markwick	Andrew	University of Manchester	
McCool	Roshene	SKA Office	
Michalowski	Michal	Institute for Astronomy, University of Edinburgh	
Millenaar	Rob	SKA Organisation	
Morabito	Leah	University of Leiden	
Moulet	Arielle	NRAO	
Mulcahy	David	Max Planck Institute of Radio Astronomy	
Muxlow	Tom	JBCA	
Natt	Kiz	Open University	

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AttendanceNov2012 — UK ALMA Regional Centre

<http://www.alma.ac.uk/events/attendancenov2012>

Ojha	Roopesh	NASA/GSFC/ORAU
Olofsson	A.O.Henrik	Onsala/Nancay
Oozeer	Nadeem	SKA
Peck	Luke	University College London
Perley	Rick	National Radio Astronomy Observatory
Petry	Dirk	ESO
Razavi Ghods	Nima	University of Cambridge
Richards	Anita	University of Manchester
Rushton	Tony	ESO
Sabater	Jose	IFA, University of Edinburgh
Shimwell	Timothy	CSIRO
Sohn	Bong Won	Korea Astronomy and Space Science Institute
Spencer	Ralph	JBO
Stevens	Jamie	CSIRO Astronomy and Space Science
Stroe	Andra	Leiden Observatory
Thomson	Alasdair	IfA, Royal Observatory Edinburgh
Torchinsky	Steve	Nancay, Observatoire de Paris
Traficante	Alessio	University of Manchester
Triglio	Corrado	INAF Osservatorio Astrofisico Catania
Umana	Grazia	INAF-Osservatorio Astrofisico, Catania
Vacca	Valentina	Istituto di Radioastronomia - INAF (Bologna)
Verdes-Montenegro	Lourdes	IAA
White	Sarah	Oxford University
van Bommel	Ilse	ASTRON
Yates	Jeremy	UCL
Zhao	Jun-Hui	Harvard-Smithsonian CfA

I confirm this list of attendance



Anita Richards

74 participants from countries: Australia, France, Germany, Italy, Korea, Mexico, Netherlands, South Africa, Spain, Sweden, UK, US participated in the workshop. About 1/3 were female. They covered a wide range of experience, including leading project or commissioning scientists and engineers from VLA, e-MERLIN, ALMA, LOFAR, ASKAP, MeerKAT, ATCA and WSRT upgrades, and the SKA. The rest of the participants were divided between newer staff and postdocs involved in developing or testing specific instruments or data reduction techniques, and early-career students and researchers about to embark on projects (scientific or instrumental) with new/upgraded arrays.

## 2.4 Summary of the workshop

This workshop was intended to communicate skills needed to help commission a radio interferometry array or work on early science data. The new arrays coming into operation have all found a shortage of scientists able and willing to help troubleshoot early science. Participants were expected to have a basic knowledge of radio interferometry. Invited talks gave descriptions of specific instruments and what was new about them, and of the



components of the signal path, from the perspective of what a commissioning scientist or 'shared risk' astronomer needed to know about potential problems, or how to test if a component was performing to spec using observed data. Contributed talks and discussion sessions shared best practices between people working on the arrays, lessons from commissioning scientists and the experiences of working on early science data. One afternoon was devoted to problem solving using real examples from the VLA (troubleshooting observing issues using diagnostics from wide-band, wide-field visibility data), LOFAR (data reduction), ALMA (Calibration issues and recognising what are good or bad solutions) and e-MERLIN (auto-flagging). The conference dinner featured some informal anecdotes from people with commissioning experience about the various 'interesting situations' they had encountered in real life. The final sessions covered capturing requirements and turning them into practical specifications, and human issues in building commissioning teams.

All talks and relevant problem-solving material are on line at

<http://www.alma.ac.uk/events/agenda-nov-2012>

## 2.5 Information of the EC financial contribution

RadioNet3 contributed 6.300 EUR and the UK ARC Node GBP 2000. This was used to pay the refreshment during the meeting and the travel of invited participants and a few others who were unable to obtain the full costs from their institutes.

The RadioNet3 contribution covered 3 invited and 2 contributed speakers (D. Perley, B. Butler, I. Heywood, S. Etoke, L. Verdes-Montenegro) and 3 students/early career PDRA (S. White, V. Heesen, V. Vacca); all of whom are pursuing careers involving early science data reduction or commissioning, a total of approx. 3.800 EUR; the remaining contributed towards the meeting organisation.

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