Introduction to Annexes

The materials for much of the annexes are derived from the Description of Work for the project. The EXPReS contract and Description of Work are available from the project's website <http:// http://www.expres-eu.org/>.

List of Annexes:

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ANNEX 1: Description of Programme of Activities

EXPReS activities are divided into three groups: Networking Activities (NA), Specific Service Activities (SA), and Joint Research Activities (JRA). The four NA's, two SA's and one JRA are described below. The Description of Work contains the complete outline and description for the activities.

NA1- Management of I3

Provides resources to effectively manage the EXPReS I3 project. The objective is to efficiently manage EXPRES and monitor the overall progress of the project goals, in particular the realisation of a production-level e-VLBI infrastructure. Responsible for the overall financial management of the project and the generation of annual and final reports via input from the chairs of the NA, SA and JRAs.

NA2- EVN-NREN Forum

Partially supports a forum in which representatives of the networking and radio astronomy technical community will meet and interact with each other, including day-to-day communication via the on-line EVN-NREN email forum. The objective is to ensure that both communities are effectively engaged and that together they agree and move forward on the solutions, objectives and development priorities within EXPReS.

NA3- e-VLBI Science Forum

Partially support the activities of the e-VLBI Science Advisory Group (eVSAG). The objectives of this activity will be to ensure that e-VLBI end-users are well informed and organised about EXPReS developments and can provide critical review of the project's evolution. This group will also help promote & develop the full potential of the e-VLBI technique as an astronomical application.

NA4- e-VLBI Outreach, Dissemination & Communications

Partially supports outreach and communication aspects of the EXPReS I3.Objectives include: creation of the EXPReS web-site (addressing public outreach, project management and end-user communication requirements), general promotion of EXPReS to the broad scientific and networking communities via a programme of PR activities.

SA1- Production e-VLBI Service

A programme of integration and development that will provide astronomers (and other end-users) with a production level e-VLBI infrastructure service, capable of servicing and robustly processing e-VLBI data streams of up to 16 Gbps (net) at the EVN data processor at JIVE. The objectives will be to realise a distributed scientific instrument with unique capabilities - an e-VLBI infrastructure operating in real-time - a service that will be expandable to include input from up to 16 telescopes located across the planet (including individual telescopes of the UK e-MERLIN array).

SA2- Network Provision for a Global e-VLBI Array
A programme of network communication provision that will permit radio telescopes across Europe and the rest of the world to obtain last mile connections to high-speed communication networks that can be connected to national research networks and international communication networks, in particular GÉANT.

JRA1- Future Arrays of Broadband Radio Telescopes on Internet Computing
A research project that looks towards the future hardware and software requirements that will enable the development of an e-VLBI facility in which data flows of ~ 10-30 Gbps per telescope can be reliably sustained and processed. The main objectives are to design and prototype an e-VLBI data acquisition platform (based on COTS hardware), investigate transport mechanisms and identify protocols that are optimal for e-VLBI, develop a software correlator (e-VLBI data processor) that can run on standard workstations and take advantage of distributed Grid computing resources.

ANNEX 2: Detailed Joint Programme of Activities/Implementation Plan for the first 18 months[1]

The following table is a subset of details deliverables, sorted by delivery date, for the first 18 months of EXPReS as originally described in the Description of Work. The Description of Work also contains the full table for the length of the project, including details regarding the nature of the deliverable as well as the dissemination level.

[1] As taken from the official Approved EXPReS Description of Work dated 28 Sep 2006.

Deliverable No	Activity No.	Deliverable title	Lead Participant	Delivery date[2]
D1	NA4	Creation of Public EXPReS web-site	JIVE	2
D2	JRA1	Data acquisition requirements document	MRO	2
D3	JRA1	Protocols strategic document	JBO	2
D4	NA2	EVN-NREN meeting No. 1 (under auspices of EXPReS)	DANTE	3
D5	SA1	Central data link control	JIVE	3
D6	NA3	First meeting of eVSAG under auspices of EXPReS	OSO	4
D7	NA4	Creation of EXPReS web-based management tools	JIVE	4
D8	JRA1	Visualization software	JIVE	4
D9	JRA1	Correlator design specification	JIVE	5
D10	NA4	Generation of PR material (phase 1)		6
D11	SA1	Job preparation utilities	JIVE	6
D12	SA1	Fast/adaptive scheduling tools	JIVE	6
D13	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant CNIG-IGN	CNIG-IGN	6
D14	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant MPIfR	MPIfR	6
D15	SA2	Equipment of the last-mile infrastructure for participant INAF (telescope in Medicina)	INAF	6
D16	SA2	Feasibility study of the last-mile connections to the nearest GÉANT node for participant CAS (Shanghai, Urumqi, Miyun, Yunnan)	CAS	6
D17	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant VIRAC	VIRAC	6
D18	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant HRAO	HRAO	6
D19	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant NAIC (Arecibo)	NAIC	6
D20	SA2	Feasibility study of the last-mile connection to the nearest GÉANT node for participant TIGO	TIGO	6
D21	SA2	Feasibility study of the last-mile connection to AARNET for participant CSIRO	AARNET	6

[2] Indicate the month of delivery. This should be relative to the start date of the *I3*, month 1 marking the first month of the project.

D22	JRA1	Overall design document	ALL	6
D23	JRA1	eVLBI-Grid design document	PSNC	6
D24	JRA1	eVLBI fringes PC-EVN	OSO	7
D25	JRA1	LOFAR connection strategic document	ASTRON	7
D26	JRA1	Data acquisition design document	MRO	8
D27	SA1	eMERLIN VSI interfaces design	UniMan	9
D28	SA1	Selective data processor controls	JIVE	9
D29	SA2	e-VLBI test observations, Medicina	INAF	10
D30	JRA1	eVLBI-Grid interface document	OSNC	10
D31	NA2	NA2 annual report No. 2 (as part of EXPReS Ann. Rep No. 2)	JIVE	24
D32	NA1	Annual report (incl. Financial information) to EC	JIVE	12
D33	NA2	NA2 annual report No. 1 (as part of EXPReS Ann. Rep No. 1)	JIVE	12
D34	NA4	e-VLBI Demonstration and attendance at Network events.	JIVE	12
D35	SA1	Network protocol decision	JIVE	12
D36	SA1	Monitored information handling modules	JIVE	12
D37	SA2	Equipment of the last-mile infrastructure for participant MRO	MRO	12
D38	SA2	Construction and equipment of the last-mile infrastructure for participant CNIG-IGN	CNIG-IGN	12
D39	SA2	Construction and equipment of the last-mile infrastructure for participant MPIfR	MPIfR	12
D40	SA1	Monitoring processes	JIVE	12
D41	JRA1	Protocols performance report	JBO	13
D42	JRA1	Software correlator core	JIVE	14
D43	JRA1	Software data product	JIVE	15
D44	SA1	Real-time data processor control software	JIVE	15
D45	SA1	Tests using local Jodrell Bank home e-MERLIN telescope	UniMan	15
D46	NA3	eVSAG meeting No. 2	OSO	16
D47	SA1	Real-time Pipeline	JIVE	16

D48	NA2	EVN-NREN meeting No. 2	JIVE	18
D49	NA4	Generation of new PR material (phase 2)	DANTE	18
D50	SA1	Visibility monitor	JIVE	18
D51	SA1	Tested software for operational improvements	JIVE	18
D52	SA1	Test using remote e-MERLIN telescope	UniMan	18
D53	SA1	VSI support software	JIVE	18
D54	SA1	VSI Interfaces	JIVE	12
D55	SA2	10 Gbps link upgrade between MERLIN and JIVE	MERLIN JIVE	18
D56	SA2	e-VLBI test observations, Metsahovi	MRO	18
D57	SA2	Construction and equipment of the last-mile infrastructure for participant Shanghai	CAS	18
D58	SA2	Construction and equipment of the last-mile infrastructure in AARNET to allow connection of participant CSIRO	AARNET CSIRO	18
D59	SA2	Construction and equipment of the last-mile infrastructure for participant Urumqi	CAS	18
D60	SA2	Construction and equipment of the last-mile infrastructure for participant Miyun	CAS	18
D61	SA2	Construction and equipment of the last-mile infrastructure for participant Kunming	CAS	18
D62	SA2	Construction and equipment of the last-mile infrastructure for participant VIRAC	VIRAC	18
D63	SA2	Equipment of the last-mile infrastructure for participant NAIC	NAIC	18
D64	SA2	Construction and equipment of the last-mile infrastructure for participant TIGO	TIGO	18
D65	SA2	AARNET connectivity enhancements	AARNET	18
D66	JRA1	Data acquisition interface document	MPI	18
D67	JRA1	LOFAR station interface report	ASTRON	18
D68	JRA1	Software for workflow management	PSNC	18

ANNEX 3: List of Pre-Existing Know-How brought to the Project
ANNEX 4: List of excluded Pre-Existing Know-How
Annexes 3 and 4 are combined and listed below. The itemizations and exclusions are listed by participant.

Participant: Max Planck Society:

Pre-existing Know-How of the MPIfR is all Know-How generated within the group of the MPIfR working for the Project, as far as needed to duly perform work in the Project. The MPIfR hereby excludes from iths obligation to grant Access Rights all pre-existing Know-How generated by the Max Planck Society other than generated within the group of the MPIfR working for the Project

Participant: JIVE

Pre-existing Know-How of JIVE is all Know-How generated within the group of JIVE working for the Project, as far as needed to duly perform the work in the Project. JIVE hereby excludes from its obligation to grant Access Rights all preexisting Know-How generated by JIVE which was funded in full or in part by sponsors other than generated within the group of JIVE in working for the Project.

Participant: ASTRON

Pre-existing Know-How of ASTRON is all Know-How generated within the group of ASTRON working for the Project, as far as needed to duly perform the work in the Project. ASTRON hereby excludes from its obligation to grant Access Rights all preexisting Know-How generated by ASTRON which was funded in full or in part by sponsors other than generated within the group of ASTRON in working for the Project.

ANNEX 5: Use and Dissemination Plan
The use and dissemination plan is outlined in the EXPReS Consortium Agreement, Article 9 and has been agreed to by all participants.

ANNEX 6: First budget of the proposed Allocation of Resources

The A3.3 forms for the agreed basis for the first budget as agreed upon by participants. They are not included with this document, but are available upon request.]

ANNEX 7: EC Contract
The EC Contract (EXPReS Contract, no: 026642) is not included with this document, but is available online via <http://www.expres-eu.org/docs.html>.