

# EMU Research Plan for 2011.0-2011.5

RPN 2010 December 15

## 1 Management

- We will conduct monthly EMU meetings at Marsfield, bi-annual international EMU meetings, and monthly management meetings in which we track progress against goals.
- By the end of January 2011, we will review all working groups (both design study WG and science WG), ensuring that they are active, relevant and engaged, repairing or closing those that are not, and producing a new blueprint plan for the delivery of EMU.
- We will organise the Leiden SPARCS workshop in Feb 2011, and set up the resulting collaborations and working groups to accelerate progress on issues facing EMU and the other projects.
- We will produce a new issue of the EMU newsletter every 3 months.
- We will overhaul and update the public EMU web site by the end of March 2011.

## 2 Simulations and Imaging Pipeline

- We will continue our program of simulations by including extended structures in the simulation input sky model for the Nov-dec 2010 simulations.
- We will continue to explore the known problem that extended strong sources produce clean artefacts at high dynamic range, and will test possible solutions on the simulated data set. and perhaps the ATLAS data set, with a report in March 2011 detailing our findings.
- By end of March 2011, we will deliver a report detailing the issues that we are so far aware of, and suggesting routes to address them.

These issues will include:

- The artefacts caused by strong extended sources and sources that are not centred in a pixel,
- An investigation of whether two processing pipelines with different weighting are required to ensure optimum sensitivity to both compact and extended sources,
- imaging and detection of extended low-surface-brightness structures,
- what other simulations we need and why - e.g why weren't these achieved in earlier simulations.

## 3 Source Finding & Measurement

- We will continue our program of testing the available source extraction programs for compact (i.e. unresolved or marginally resolved) sources, and in March 2011 will generate a report listing the advantages and disadvantages of each of the available techniques for compact sources, and identify what further work needs to be done in this area.
- We will start a program of testing the available source extraction programs for diffuse and extended sources, and in March 2011 will generate a report listing the available techniques, for extended and lsb/diffuse sources, and identify subsequent directions for testing, measurement, and development of algorithms.
- In June we will generate a report on the various corrections (clean bias, noise bias, bandwidth smearing, etc) and describe how they should be implemented in the EMU data pipeline.

## 4 Survey Strategy

- By March 2011 we will deliver a report to ASKAP on our survey strategy plans so far, including
  - The Healpix optimization routine to tile the sky, in coordination with Dr. Bradley Warren of WALLABY,

- Reports on discussion on commensality with POSSUM and WALLABY, including a listing of potential obstacles to commensality.
- We will coordinate a joint EMU/POSSUM/VAST continuum simulated sky to be delivered to the ASKAP computing team for the 2011 simulation runs (in June?). As an inter-SSP goal, this has been initiated and is organised by WG3 members.
- When the performance of the PAF feed becomes better understood, we will examine its effect on field uniformity, sidelobes, and dynamic range.

## **5 Commissioning**

- When the BETA parameters become better defined, we will select specific commissioning tests and define potential early science targets. We will identify science goals by June 2011 with a final plan for BETA observations by October 2011.
- We will participate in the planned ATCA observations/analysis for the BETA tests.

## **6 Data Format, VO tools, and Access**

- We will produce a report listing our detailed data requirements by the end of January 2011, although further revision is likely because of additional science requirements (below).
- We will explore the implications of stacking on data requirements and produce a preliminary report on this by June 2011.
- By June 2011, we will define potential data-intensive research projects that will produce additional value from EMU, and define use cases.
- By March 2011, we will produce a report detailing our existing VO server for ATLAS, list what we have learnt from it, give a strawman plan showing what we expect the ASKAP group to supply, and detail a path from our current position to the final VO server for EMU.
- By June 2011 we will produce a strawman proposal for data quality control, detailing what we expect the ASKAP data group to supply and what we expect to do ourselves.

## **7 Source Characterisation and Cross-identification**

- By March 2011, we will produce a report including
  - (a) what the significant surveys are with which EMU needs to be cross-identified,
  - (b) How many sources we expect to be identified in each survey, taking into account area covered, depths, and expected SEDs,
  - (c) a summary of available cross-ID techniques and algorithms,
  - (d) a summary of how to do the grouping of radio components into radio sources.
- By June 2011, we will produce a report detailing the design of a prototype cross-ID pipeline, including
  - (a) an outline of how the cross-ID pipeline might run,
  - (b) details of who will write the code, its architecture and language, where it will run, etc.,
  - (c) reports of discussions that will have taken place with PIs of the other projects, (WISE, VHS, SkyMapper) and plans of how we will obtain the data from these surveys from crossmatching.
- By March 2011 we will define a set of rules for radio/IR identification for use with RadioZoo.

## **8 Science Working Groups**

- By March 2011 all SWG will have defined their requirements for the survey, and these will be summarised in a report submitted by Andrew to ASKAP.