B2 TRAINING AND/OR TRANSFER OF KNOWLEDGE ACTIVITIES

B2.1. Content and quality of the training and transfer of knowledge programme *(three A4 pages)*

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State the training and/or transfer of knowledge objectives of the project.

The principal training and knowledge transfer objectives of the project are:

1. To provide training in major techniques of modern astronomy. The key features are: use of facilities spanning many wavelengths; the handling of large data-sets and their archiving; the development of data mining techniques; the use of theory/simulation to interpret state-of-the art observations.

2. The training in techniques of relevance outside astronomy. This is aimed towards the career development of young researchers who move to a different field after working in astronomy.

3. The exposure of young researchers to the organisation and management of large, complex, multi-facility projects. This will provide project management training.

4. For those young people who remain in the field, our intention is to prepare members of the generation of astronomers who will make the most effective use the very large facilities of the future: ALMA, OWL, JWST etc. Such people are an essential and lasting complement to the extensive investment in these world-leading facilities.

Explain how you intend to exploit the network potential and complementarity to add value to the training of the researchers over and above that which could be provided within a single research organisation and national context.

GOODS, COSMOS and GEMS are very major collaborative programmes designed to orchestrate the most powerful observatories on the ground and in space. There are many co-investigators in Europe and in the US. These researchers, and the institutes within which they work, represent a very broad range of skill and expertise — much broader that that which exists within any one of them. The Network is designed to open up an interface for young researchers that offers them the most complete possible range of experience, training and opportunity.

Training elements:

1. **Basic familiarity with data sources and archives.** Carried out with an introductory school at one of the major observatories/archive centres (eg. ESO). Give the background to the large collaborative projects and their undertakings to disseminate data products, software and expertise at different levels. Teach the procedures necessary to access the archives for raw and reduced data products. Describe data formats and the ways in which the data are described.

2. **Data processing techniques and calibration science.** Since these processes will differ in detail for the different data sources and since the expertise is spread widely throughout the network, this training is best carried out at the different participating institutes. There will be opportunities for trainees, if deemed necessary, to travel for a few days to an institute other than their current base to learn a process or technique. This procedure gives trainees access to the very best level of expertise within the network.

3. **Data analysis and measurement.** Although these are multi-wavelength surveys, there are many commonalities in the analysis and measurement techniques. It is anticipated that this process and the resultant data products, when carried out for the three surveys, will provide a major input source for the Virtual Observatory. We therfore plan a second school/workshop, run by scientists from the network but in conjunction with the VO, to give both the early-stage and the more experienced researchers a broad and comprehensive training in the various analysis methodologies and tools. Such a school will have a dual benefit since VO staff will learn about the requirements for data products from the surveys.

4. **Relevant astrophysics and survey goals.** The scientific relevance of the surveys and the means to exploit them will be instilled in the trainees as part of their everyday work in the network institutes. The proposed three conferences will reinforce this experience with broader overviews of the science and will prepare them for subsequent scientific exploitation by illuminating the scientific potential of the newly acquired data and providing opportunities for the formation of science- rather than data-oriented teams within the network.

5. **The broader relevance of the training.** We propose to produce a document for the trainees that points out the broader relevance of some of the techniques and organisational practices that would find ready application outside astronomy. In addition to helping the young people recognise their potential, such a document would be a useful reference for potential employers outside the subject – especially since there are several 'cutting-edge' technologies employed in survey astronomy.

Explain, for each network team, in terms of the objectives for the research project, the rationale for the requested number of person-months of early-stage and experienced researchers (detailed in section B2.3).

TBD. This must be done in conjunction with B2.3.

Demonstrate that each network team has sufficient resources, both in terms of research infrastructure and experienced personnel, to host and/or offer a suitable environment for training and transfer of knowledge to the requested early-stage and experienced researchers.

TBD

Explain the chosen mixture of early-stage and experienced researchers. Describe how the Career Development Plan will be used to involve early-stage and experienced researchers in the development of their own training and transfer of knowledge programme both on an individual and network-wide level.

I suppose this means the way we use the experience researchers within the network to 'seed' the learning of the early-stage researchers. This is kind-of covered by what we have written above.

Explain how the differing training and transfer of knowledge needs of the early-stage and experienced researchers respectively will be taken into account. The measures should emphasise the scientific and technical aspects taking into account, if relevant, the multidisciplinary and/or intersectorial nature of the project. The network should also address the following measures:

Individual training (through, for example, supervision, courses, tutorials, visits and secondments to other teams in the network, training on specialised instruments etc.);

Description of foreseen training measures that will be undertaken on a network-wide basis (topical modules, schools, workshops etc.);

Participation in and presentations to workshops, schools and conferences, and any envisaged contact with relevant users of the research, whether academic or industrial/commercial;

Training in complementary skills, such as communication, awareness of ethical issues, intellectual property issues, enterprise and project management skills;

To some extent, these points have been covered above. Maybe we should add something about explicit communications training, e.g., getting the young researchers to present their results within their own peer-group and also to wider audiences at the workshops and conferences.

Tutorials and documentation will be available to all the young researchers on the PUDS website. The network will also provide teaching support for an IAC Winter School ???

Outline any proposed methods to enhance transfer of knowledge (e.g. secondments, sample/material exchanges) within the network.

Done.

Demonstration that gender aspects have been adequately integrated into the proposed training/transfer of knowledge programme (balance of men/women in teams, decision-making, etc);

This network contains XX% women in the teams and YY women team leaders. All the members of the network will actively encourage women to apply for the network positions.

Describe the envisaged ratio between individual training and network-wide training. If your network includes meaningful connections to industrial or commercial enterprises and you intend to exploit these connections in the training and/or transfer of knowledge programme, explain how. Indicate, for example, access to technological excellence or unique equipment, short training placements in company premises, assistance in training by industry staff, and modules for common training on subjects of entrepreneurial relevance.

Although this is partly covered in the text above, it depends on the actual number of schools, workshops and conferences and so should be built in conjunction with B2.3. We need to refer to the particular skills and capabilities available within the network – perhaps in a table. E.g., ESO would be in data-flow, archiving, VO, ground-based imaging and spectroscopy – etc.