**TITLE and type of activity (Networking, Joint Research development):
NEXT - Neutron Experiment data Treament (JRA)**

Leading beneficiary:

Partners: ISIS, ESS, MLZ, PSI, ILL

Please do not forget evtl University partners!

Estimated budget (in person months, other direct cost) and tentative distribution per partner

360 PM

Abstract of your innovative activity: *(please make sure that you mention the following points)*

1. State of the Art – Riding the wave of BIG DATA requires appropriate software to expose it to all interested parties, in particular non-expert and industrial users, who want to obtain scientific results as efficiently as possible without necessarily working through the fine details of data treatment. Currently data reduction software is provided mainly by facilities while data analysis software involves more input from the broader scientific community. Very little of this software is shared in a structured, dependable way between facilities and other developers. Furthermore, software is generally developed 'ad hoc' which has resulted in a heterogenous collection of software, which constitutes a formidable challenge to the inexperienced user when treating data, or a 'bottleneck' at the instrument scientist who has to treat the data for users.

2. What is new? Why should it be done on a European consortium level (synergies)? – Recently, ISIS has developed the Mantid programme to provide a standard framework for data reduction at spallation sources and Mantid is now a collaborative project between ISIS and SNS. A networking activity in NMI3-II is currently evaluating the use of Mantid for reactor (-like) sources. It is clear that Mantid could constitute a significant part of data reduction requirements for all neutron sources. Establishing this level of coherence for data reduction across facilities and extending functionality, possibly with other programmes, requires significant resources. For data analysis, a wider range of programmes have to be brought together in a coherent framework which would allow workflows, potentially automated, to link data acquisition via data reduction to data analysis. Live data treatment will therefore feedback into data acquisition, optimising the use of beam time.

   This activity should be performed at the European level because most neutron scatterers are nomadic, using several facilities. The proposed software will allow users to treat data from different facilities in the same way, significantly increasing efficiency. From the facilities perspective, we are individually 'resource-limited' but collectively we would much better be able to meet the evolving data treatment needs of European users. The current project constitutes the critical step to facilitate a collective approach to data

treatment, building-on and federating dedicated resources in facilities and community input.

3. How could your activity be connected with other methods and techniques (outside the neutrons community)? - This activity will build on the developments of the PANDATA project, which has put in place the building blocks of a structured approach to data handling such as the data policy and common data catalogues. PANDATA brings together the neutron and X-ray communities and this project could similarly be extended to the X-ray community.

   This activity could be a work-package in a neutron and muon project or it could be envisaged as an additional activity for PANDATA, if it is extended to the X-ray community.

4. Is there any link with national initiatives/projects (e.g. national data initiatives, but also European roadmaps etc)?

   HDRI in Germany.

5. How is the user community involved in your activity? Benefit for the user (evtl for any specific science community?) – The user community will be required to contribute their software to this shared infrastructure. They will also play a key role as client in testing the software.

   The benefit of this activity to all users will be enormous. Expert users will have access to sophisticated software that allows data from the widest range of facilities and instruments to be treated in the same way. The benefit to non-expert (and industrial) users will be even greater as a simplified access to data treatment will be provided.

   While facilities have invested heavily in instrumentation over the years, providing world-class facilities for the user community, scientific software has rarely received significant funding. As we evolve from scientists writing functional software to treat small volumes of data to a professional approach to scientific software to deal with high data rates and large volumes of data of different kinds in an efficient, user-friendly way, investment in this area is timely. In this context, the most important gains in efficiency at large scale facilities will arise from the effective, professional provision of scientific software.