TITLE and type of activity (Networking, Joint Research development): Networking IMAGING

Leading beneficiary: Delft University of Technology

Partners: LLB, FRM2, ESS, PSI

Please do not forget evtl University partners!

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

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

1. State of the Art

   Neutron imaging is a fast developing technique, which opens up new possibilities for real space investigations of organic materials, complex fractal structures or magnetic fields. Often the images obtained by this technique are self-contained and do not require additional effort (eg in cultural heritage studies). The situation is different, however, when high-resolution neutron imaging is used to investigate the microstructure of materials. In this case, similarly to X-Ray imaging, a quantitative analysis of the images is required in order to find the link between the microstructure and the physical properties of the investigated materials. This problem exists also in other fields - X-Ray imaging and tomography, Positron Emission Tomography (PET) or electron microscopy - and mathematical tools are being developed. The TU Delft plays a pro-eminent role in this field with a group specialised in the development of such mathematical tools.

2. What is new? Why should it be done on a European consortium level (synergies)?

   We propose to further develop the existing programs and adapt them to neutron imaging and tomography. An important issue is to be able to link imaging and scattering obtained by high resolution SANS, including Spin Echo SANS. The goal is to be able to combine these different techniques and thus obtain structural information of complex and multi-scale structures over the whole relevant range of distances, from mm down to nm.

3. How could your activity be connected with other methods and techniques (outside the neutrons community)?

   These developments, and in particular of themathematical tools will be of relevance to the other imaging techniques: X-Ray imaging and tomography or PET.

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

   Fast, reliable and quantitative analysis of images has been part of several European activities, eg the Diagnostics and Imaging project of FP7.

5. How is the user community involved in your activity? Benefit for the user (evtl for any specific science community?)

   This project will be very relevant to the neutron user community and beyond.