Executive summary

NMI3-I GA no. 226507

Neutron scattering and muon spectroscopy are two of the most powerful probes for the investigation of materials, from the subatomic to the mesoscopic scale. Neutrons and muons have unique properties, which make them indispensable probes for achieving a complete picture of the structure and dynamics of matter. They are sometimes in close competition to other probes like synchrotron radiation or NMR, but most often they are complementary. Microscopic structure and dynamics are key to the technological and functional performance of materials. Neutron and muon studies are, therefore, of relevance to all areas of modern society. The knowledge obtained from neutron scattering and muon spectroscopy is published in the most prestigious scientific journals. These papers draw attention from a wide scientific community, as demonstrated by the numbers of citations. The scientific knowledge generated is often fed in the long term into innovation processes, thus closing the knowledge cycle.

Europe has an exceptionally strong tradition in providing world-class research infrastructures in the fields of neutron scattering and muon spectroscopy. These infrastructures serve the scientific needs of a broad user community - 9000 individual researchers - ranging from fundamental physics to materials science, engineering, life sciences and cultural heritage (see http://pan-data.eu/Users2012-Results).

Many of the technical services provided are unique, hence creating a highly mobile user community, coming from all around the world.

Neutron and muon research infrastructures are evolving rapidly. The last few years have seen a strong increase in the capacity and quality of the research infrastructures in this area. Despite considerable international effort, Europe still retains the lead both in terms of the quality of the infrastructures and the scientific output. All major facilities, like the European Intergovernmental Research Infrastructure, ILL, in France and the British, German, French, Dutch and Swiss national sources, are continuously engaged in ambitious upgrades of their instruments. Due to these combined efforts, Europe's competitiveness in the field will be maintained over the coming years despite the launch of strong, third generation sources in the USA (SNS) and Japan (J-SNS).

The technological difficulties of providing high-brilliance neutron and muon beams lead to a requirement for very large experimental installations. International competitiveness, at a sustainable cost, therefore demands strong coordination of their development and use on a European level. NMI3 aims to facilitate this coordination with the Integrating Activities scheme as means of leverage. NMI3 comprises all major European neutron and muon providers. **Transnational access** helps structuring the user community and optimises the use of the existing infrastructures. **Joint research activities** help to foster a coordinated and cost effective development of the facilities. Explicit networking actions create stronger links between the facilities such that users experience a more coherent and thus easier to use, research infrastructure. The overall management ensures that strategic decisions are taken from a European perspective, playing to the respective strengths of the individual facilities. NMI3 networking activities try to establish a greater degree of coherence in instrument simulation and data analysis.