

Enabling Science Through European Electron Microscopy – ESTEEM: A European Success Story

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Achievements and importance of the ESTEEM initiatives: ESTEEM (2006-2011), ESTEEM2 (2012-2016) and ESTEEM3 (2019-2023)

The three successive **ESTEEM (Enabling Science and Technology through European Electron Microscopy)** projects bring together in a sustainable network, since the 6th Framework Programme of the European Commission and up until now, the leading European Laboratories equipped with the most advanced transmission electron microscopy (TEM) installations offering the best expertise in all different TEM fields.

This advanced consortium is now established as **the primary European portal for industrial and academic scientists, who need access to latest generation TEM instrumentation, methodology or tools** combined with the most cutting-edge TEM expertise for solving complex materials problems in various fields of science such as physics, materials science, engineering, chemistry or even life and earth sciences.

The core of ESTEEM has been **the provision of Transnational Access (TA)** to front-line instrumentation located in the partner laboratories. As a demonstration of the ESTEEM capabilities to meet the users' needs, since the beginning of ESTEEM and until the first 30 months of ESTEEM3, a total of about 10.000 transnational access days were offered to more than 600 scientists coming from more than 40 countries. **These figures show a real demand from the academic and industrial communities and an urgent need for a strong European infrastructure network to be maintained in the field of TEM. In addition, between ESTEEM and ESTEEM3, the focus has strongly evolved towards mainly TA activities**

The **Networking Activities (NA)** of the ESTEEM projects firstly aimed **at disseminating the outputs to both academic and industrial users and the wider media**. ESTEEM has recently implemented **a wide variety of activities aiming at improving the dissemination of outputs**, such as Open Access publications in high-ranked journals, lectures at selected conferences and setting up of an educational hub. An important component of these activities has been the organisation of a **series of schools, workshops and webinars** offering training by specialists in advanced techniques. **ESTEEM has also put a focus on communication towards industrial engagement** to attract more companies with the support of six SMEs, which are partners of the project. **These networking activities have developed the core tools required to offer a stable and sustainable pan-European user facility across multiple laboratories, where ESTEEM, ESTEEM2 and ESTEEM3 provided excellent results.**

The **Joint Research Activities (JRA)** of the ESTEEM projects focus on the development of advanced TEM methods required for the solution of key problems in materials and nanoscience, in which key issues such as specimen preparation, data interpretation, treatment and automation through theory and simulation, and standardization of protocols and methodologies were addressed. **These JRA have strengthened TA capabilities within the ESTEEM3 consortium by providing a higher level of overall service to all TA users for the benefit of European scientists and industry.**

In terms of impact: The ESTEEM consortium has contributed to the **establishment of a strategic leadership in electron microscopy** (i) to guide future developments and promote advanced electron microscopy to the wider research community, (ii) **to provide transnational access for the academic and industrial research communities** to the most powerful characterisation techniques available at the nanoscale, (iii) **to train in innovative methods in electron microscopy**, and (iv) to be a forum for discussing emerging cutting-edge electron microscopy techniques.