Synergies between Euro-BioImaging and Instruct in EM technologies

Instruct

Instruct has established a distributed pan-European infrastructure of high-end technologies for integrated structural biology. This recognizes the need to set molecular structure in the biological context. The scope therefore includes the traditional techniques of crystallography, NMR and electron microscopy, but aims to encourage the integration of these and other technologies, extending to techniques including cryo-electron tomography, X-ray microscopy and correlative microscopy. Instruct, via its Hub, and delivered at its Centres, provides simple, integrated, access to these cutting edge technologies on the basis of scientific excellence, thereby promoting a more systems-based approach to structural biology and increasing its biomedical impact.

Euro-BioImaging

Euro-BioImaging will establish a distributed pan-European research infrastructure in the fields of biological and medical imaging. Its mission is to provide access to a wide range of essential imaging technologies - that can visualize life from the molecule via the cell and model organism to the human patient - for every biologist and biomedical scientist in Europe. Euro-BioImaging will provide integrated access to these imaging technologies, service by expert facility staff, training for its users and tools for management and analysis of image data. Euro-BioImaging will furthermore provide the framework to organize and interlink the different European imaging infrastructure communities.

Electron Microscopy (EM) in Euro-BioImaging and Instruct

EM technologies are widely used at different length scales of biomedical research, to determine molecular structures (answering questions in structural biology - this is the user base of Instruct) or to determine cellular morphology (answering questions in cell and developmental biology - this is a major part of the user base of Euro-BioImaging). A significant portion of the user communities of both Instruct and Euro-BioImaging have therefore traditionally required access to EM technologies and methodologies.

These formerly separate scales of EM imaging are increasingly collaborating to enable researchers to go directly from the molecular level to the cellular level or from in vitro studies to in situ studies, driven by innovative bridging technologies, such as correlative light - electron microscopy including the use of super-resolution techniques.

The correlative techniques aim to bridge the divide between molecular and cellular structural biology: This is a common vision of Instruct and Euro-BioImaging.

Coordinated access to EM technologies by Instruct and Euro-BioImaging

To maximize the access of users to the different kinds of EM and directly correlated technologies and the ability of researchers to move seamlessly between structural and functional imaging at different scales, Instruct and Euro-BioImaging will closely coordinate their activities and collaborate at this interface. Instruct and Euro-BioImaging agree on the following joint activities and division of labor:

- Instruct will focus on provision of EM methods which can be interpreted in molecular detail (Ångstrom to nanometer resolution), not excluding correlative approaches where these can add biological value to a structural biology study.

- Euro-BioImaging will focus on the provision of EM methods for the determination of ultrastructural morphology and correlation to light microscopy at the cellular and higher scales of biological organization (nanometer to micrometer resolution).

- Euro-BioImaging will provide access to super-resolution light microscopy, whilst Instruct will normally only offer this in the context of correlation with molecular structures.

- Wherever possible, Euro-BioImaging and Instruct will offer joint access to bridging technologies such as correlative light - electron microscopy in future infrastructure nodes.

- Instruct and Euro-BioImaging will refer users to each other, if the requested or most suitable technology is available in the other infrastructure and refer to each other in their access portals.

- Euro-BioImaging will provide the framework for the national and European organization of the EM core facilities that provide ultrastructural morphology and cellular and developmental biology level imaging, since this is the by far the more common type of EM core facility within Euro-BioImaging.

- Instruct will fulfill a similar role for EM facilities that have a clear focus on molecular interpretation.

- Instruct and Euro-BioImaging will explore possibilities to further reduce the barriers to effective imaging across the size and time domains.