Towards a Virtual Human Body built on a broad network of Life Science Expertise and Advanced Research Infrastructure Tools in the Baltic Sea Region

Project partners

- Project Leader: Kajsa M. Paulsson**,** Experimental Medical Science, Lund University, Sweden, kajsa_m.paulsson@med.lu.se
- Anders Sjöström, LUNARC/CIPA, Lund University, Sweden
- Jonas Ahlstedt, LBIC/CIPA, Lund University, Sweden
- Selma Maric, MAX IV, Lund Sweden
- Christian Bressler, European XFEL, Schenefeld, Germany
- Frederic Le Pimpec, European XFEL, Schenefeld, Germany
- Linda Lancere, Digitālās Veselības biedrība, Riga, Latvia
- Prof., Dr. A. V.Soldatov, Director of The Smart Materials Research Institute, Southern Federal University, Rostov-on-Don, Russia
- Dr. A. A. Guda, Deputy director, The Smart Materials Research Institute, Southern Federal University and Project Director at Univirlab LtD, Rostov-on-Don, Russia

A brief description of the project proposal

Creating stronger connections and network**:** In addition to cooperation with existing networks, such as Baltic Science Network, ScanBalt and HALOS the aim is to seek new collaborations with stakeholders in the Baltic Sea Area who are not yet active in on-going initiatives. The goal is to create a sustainable network at and around Research Infrastructures (RIs) including the large-scale facilities and universities in the Baltic Sea Area. This broad collaboration embraces technology experts, university researchers, beamline scientists, industrial partners, regional development actors, as well as investors and other business developers. The outcome of strengthening and developing on-going initiatives will at the same time also create new avenues for cooperation.

Development of virtual tools: The goal is to develop new virtual tools for conducting meetings, communication, education and research, all allowing remote access to colleagues and infrastructures. Virtual versions of sensitive, complex and expensive instruments can provide researchers, technicians, students, and also the general public, an on-demand and cost-effective way to gain access to the facilities. Using such systems, these groups can learn how to setup test samples and perform complex experiments, and in this way gain a detailed understanding of the instrument functionalities. This tool will be implemented as a virtual advanced lab practical course for Master students, as well as can be used by different other scientists world-wide.

The mapping on infrastructure and competence resources: The goal is to create a map with experts in the macroregion and suggest pipelines for experimental analysis, handling and analysis of data in order to increase competence and analysis capacity of e.g., biological samples, or for handling of complex/large data sets, as well artificial intelligence. In Life Science this will feed into the work needed to generate clinically relevant hypotheses and enable greater precision in research, diagnostics and treatment. This will contribute to Research Infrastructure, expertise, education

and other relevant resources becoming more accessible and visible for potential users from both academia and industry. The map will help researchers and industry to find appropriate collaborators, research infrastructures and enable the development and use of joint pipelines for life science research and innovation projects. The mapping will also be used as a contribution to the development of a joint database of courses, as well as other tools for increased sharing of resources.

Developing a virtual human body: This project seeks to embark into developing and implementing a fully virtual human body for the life sciences down to the atomic level of proteins. This goal will be targeted by initially limiting itself to the human lung and its tissues. An existing Virtual Reality (VR) project on x-ray structural tools at large scale facilities will be interfaced to this project. This combination will allow students and scientists to understand better with what tools and with which analytical techniques the knowledge is gained about the human body. The use of a suite of diagnostic/analyzing tools will enable to design new experiments in order to learn about still unknown properties.

The project will involve international cooperation (Sweden, Germany, Latvia and Russia) and connects academic and private sector organizations to large-scale facilities (Lund University, Digital Health Cluster Latvia, The Southern Federal University of Rostov and its Spin-off Company UniVirLab Ltd, European XFEL, MAX IV).