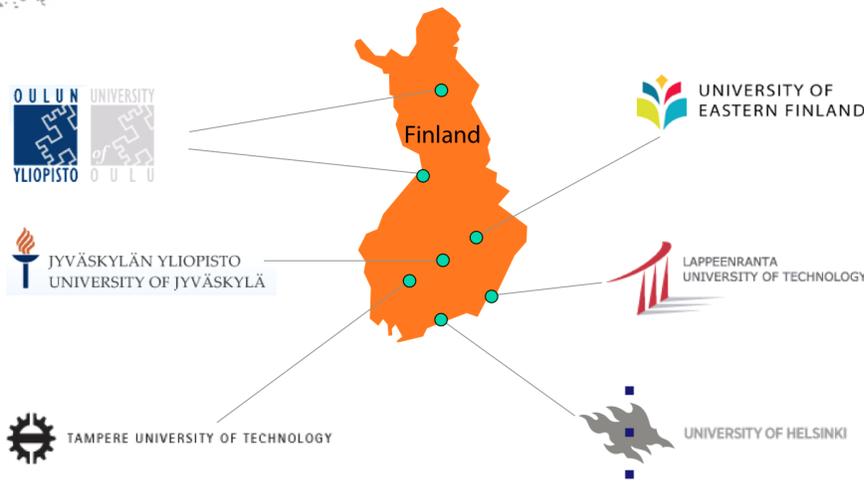


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CENTRE OF EXCELLENCE

The programme for Centres of Excellence (CoEs) in research is a significant funding scheme in the Finnish research system. The CoE programme offers an excellent opportunity for research teams and consortia to carry out research of a high international standard with six-year funding. The aim of CoE programmes is to create favourable operating conditions for consortia of research teams, create potential for scientific breakthroughs at the interfaces of scientific disciplines and research fields, network Centres of Excellence nationally and internationally and raise the quality standard, international competitiveness, visibility and esteem of Finnish research.

A Centre of Excellence is a competitive, innovative and target-oriented research community with a clear and challenging research vision. A Centre of Excellence is at the international cutting edge of research in its field and renews scientific research and expertise and combines international cutting-edge research.



INVERSE PROBLEMS

Inverse problems appear in several fields, including medical imaging, image processing, mathematical finance, astronomy, geophysics, nondestructive material testing and sub-surface prospecting. Typical inverse problems arise from asking simple questions "backwards". For instance, the simple question might be "If we know precisely the structure of the inner organs of a patient, what kind of X-ray images would we get from her?" The same question backwards is "Given a set of X-ray images of a patient, what is the three-dimensional structure of her inner organs?" This is the inverse problem of Computerized Tomography, or CT imaging.

Usually the inverse problem is more difficult than the simple question that it reverses. For example, even though the Earth's gravitational field is governed by Newton's law of gravitation, the inverse problem of finding sub-surface structures from minor variations of the gravitational field on the surface is extremely hard. Successful solution of inverse problems requires specially designed algorithms that can tolerate errors in measured data.

Inverse problems research concentrates on the mathematical theory and practical interpretation of indirect measurements. The study of inverse problems is an active area of modern applied mathematics and one of the most interdisciplinary fields of science.

