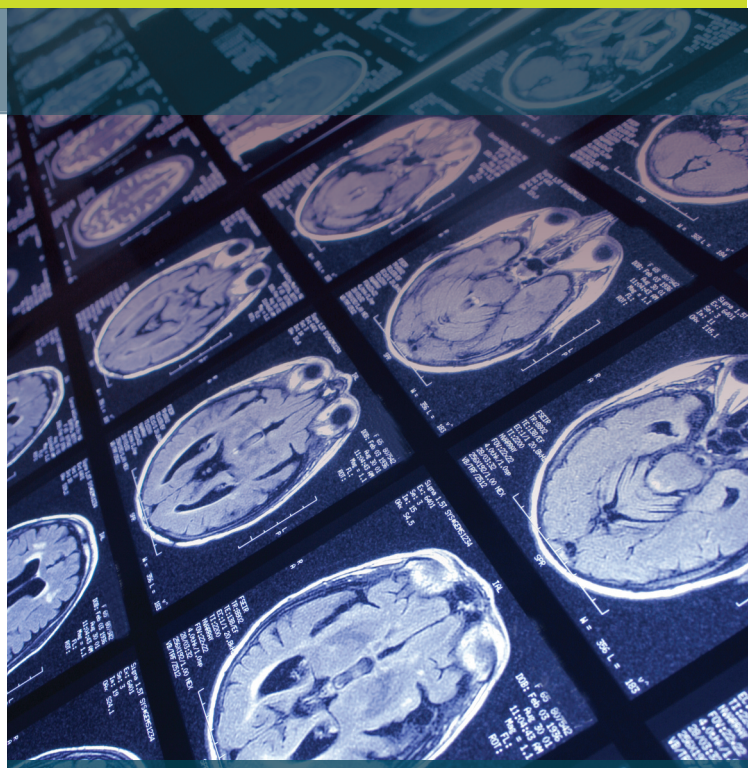
CASE STUDY

GÉANT
global collaboration

Early diagnosis of neuro-degenerative diseases



Alzheimer's is a neuro-degenerative disease that affects the elderly population, for which there is currently no cure. With people in general living longer, the incidence of the disease is increasing along with associated social costs such as medical treatment, and hospitalisation.

In order to reduce development time for new effective drugs, and thus improve the quality of life and reduce the social costs of disease, it is necessary to identify markers of disease or biological parameters that allow accurate and early diagnosis of the disease and its progression.

By leveraging the network capabilities of pan-European GÉANT and its NREN partners (European National Research and Education Networks), the neu-GRID project can undertake ground-breaking research to help to identify these markers. Potentially this will make a huge positive impact on one of the major health issues facing Europe's aging population.

Data infrastructure for neuroscience

neuGRID is a Grid-based e-infrastructure that enables the neuroscience community to collect and archive large amounts of imaging data and to access resources for computationally intensive data analyses. Neuroscientists will be able to identify neuro-degenerative disease markers through the analysis of brain images, thanks to an innovative new set of distributed and medical grid services.

The main objective of the neuGRID e-infrastructure is to provide clinical research centres on Alzheimer's disease with the three key elements for modern research on this disease: powerful computing resources; sophisticated algorithms required for processing images of the brain; and remote access to large databases (of brain images) held in different locations worldwide. The support of GÉANT and the national networks is vital in ensuring high speed movement of, and access to, this data.

According to the latest estimates of EU, the cost of brain diseases in Europe in 2004 was of 386 billion euros and the global prevalence of Alzheimer's disease is predicted to quadruple to 106 million by 2050.

Speed advantages for image processing

Using Grids and GÉANT, neuGRID can process the world's largest Alzheimer's disease imaging database in ten days, instead of five years. That equates to approximately 6,500 brain MRI scans consisting of over 1.6 million images related to more than 700

neuGRID Partners:

neuGRID · Karolinska Institutet · UWE Bristol · VU medisch centrum · HealthGrid · Mfo · prodema informatics · maatG international

About the Grid e-infrastructure

The Grid is a distributed computing environment, which allows the syndication of a potentially unlimited number of physically disparate computing resources into one virtual space. Therefore it constitutes a genuine alternative to supercomputers at a fraction of the cost. Decentralised with no single point of failure, the whole infrastructure is scalable and able to cope with more computers over time. neugrid is based upon the research grid middleware developed in the framework of the EGEE project (www.eu-egee.org).

patients with Alzheimer's disease and Mild Cognitive Impairment. This is tremendously effective because the analysis that can be done today in neuGRID would require more than five years to be run on a single computer.

The neuGrid dedicated Grid network

In neuGRID, a dedicated Grid network is being deployed. It will provide hundreds of processors paired with terabytes of storage capacity.

Through the so-called Data Archiving and Computing Sites (DACS), additional resources such as local clusters and supercomputers interconnected by GÉANT, will be attached and shared in the infrastructure.

The researchers at the medical institutions involved in the project will be able to access a potentially unlimited pool of computing resources to run large imaging and statistical analyses over the distributed database. These researchers will also catalogue and store their own findings and resources in standardized format on the neuGRID database, to share with their European counterparts.

Unlimited computing power

Together with Grid technology, GÉANT and Europe's NRENs constitute the enabling layer underlying the neuGRID e-infrastructure. Thanks to their multi-gigabit links, GÉANT and these national networks seamlessly interconnect many computers distributed across Europe. This provides neuGRID with virtually unlimited computing and storage capacity required for its computationally intensive data analyses. It is these analyses that allow the neuroscientists to identify the markers and biological parameters of the neuro-degenerative diseases.

neuGRID Partners:

Provincia Lombardo-Veneta – Fatebenefratelli (Italy)
Prodema Informatics AG (Switzerland)
University of the West of England (UK)
Maat G Knowledge SL (Spain)
VU University Medical Center (Netherlands)
Karolinska Institutet (Sweden)
HealthGrid (France)
CF Consulting Finanziamenti Unione Europea s.r.l. (Italy)

Our goal is to ensure that not only researchers but also doctors can benefit from the neuGRID infrastructure. The next project called DECIDE began on September 1, 2010. It starts from the nucleus of neuGRID and, by leveraging the resources of the European research network GÉANT and the national research networks, will provide medical services for the extraction of markers to facilitate diagnosis of Alzheimer's disease, schizophrenia disease and also multiple sclerosis.

Giovanni B. Frisoni,
Deputy Scientific Director
San Giovanni di Dio Fatebenefratelli

connect • communicate • collaborate

The world is criss-crossed with high-capacity data communications networks, connecting and serving research and academic institutions across the globe. The most advanced of these is GÉANT, serving Europe.

Separate from the public Internet for reasons of security and performance, GÉANT is designed, deployed and run by the networking organisation DANTE, and makes an enormous practical contribution to research in a wide variety of areas; establishing real-time collaboration between scientists all over the world.

Through its interconnections, GÉANT enables professionals across Europe and beyond to participate in world-class research aimed at finding effective treatments for medical disorders, cures for diseases, and to enable medical staff around the world to learn from specialists, whatever their location.

For more information:

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