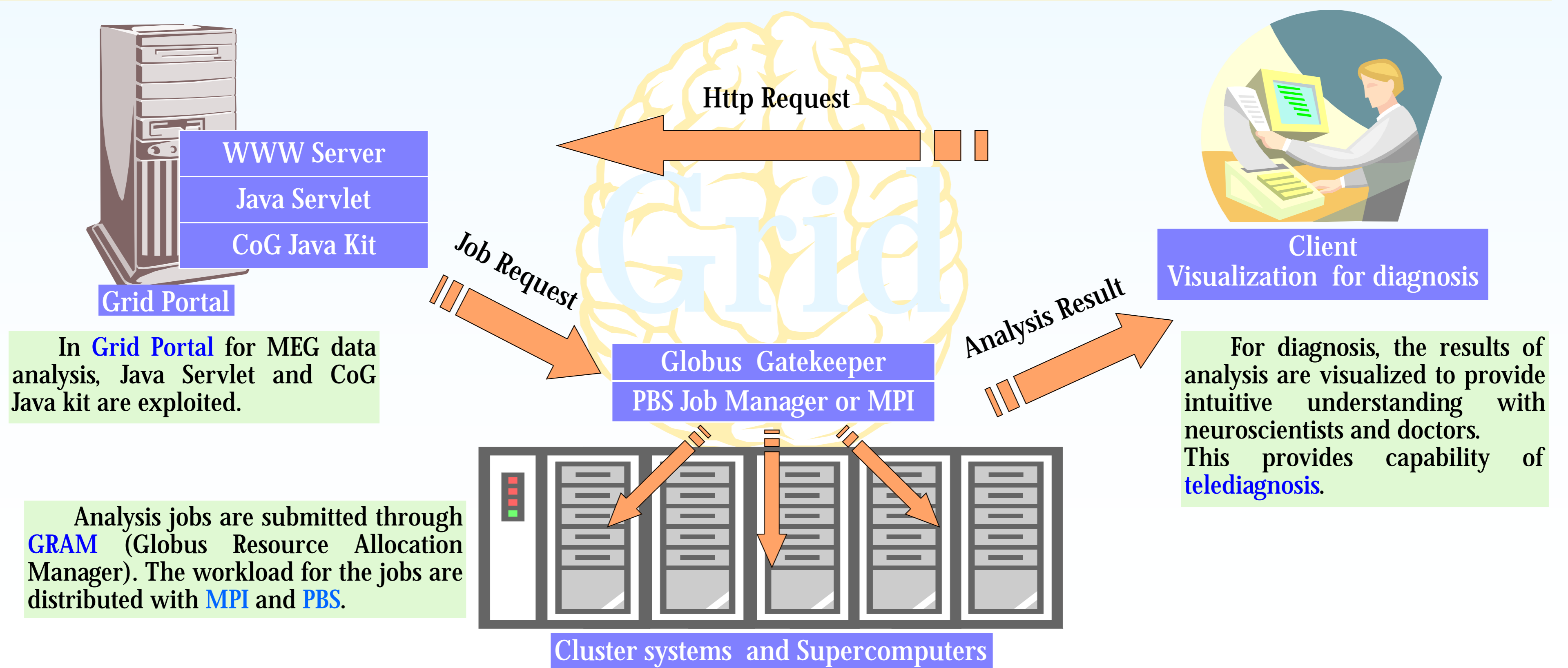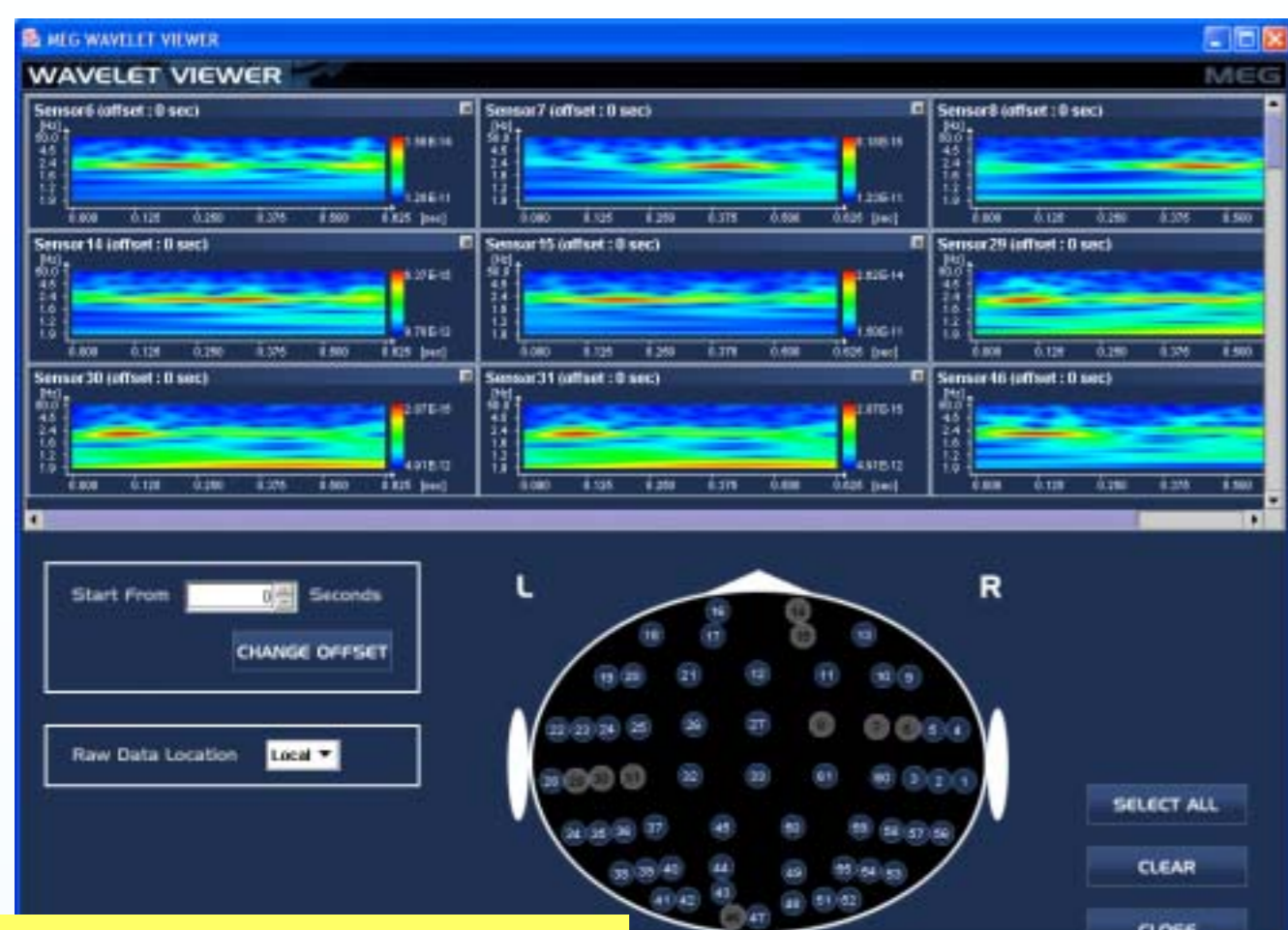# An Application of Grid Computing:
MEG Integrated Analysis System
for ease and high efficiency

Brain science will have a role of much importance in this century. The perfect reveal of brain function has the potential to fundamentally change our life into the life in Hollywood movies envisioning near-future world. For example, car driving may be automated and most diseases involving brain function may disappear. To the end, we establish the infrastructure allowing neuroscientists to adequately analyze brain function.
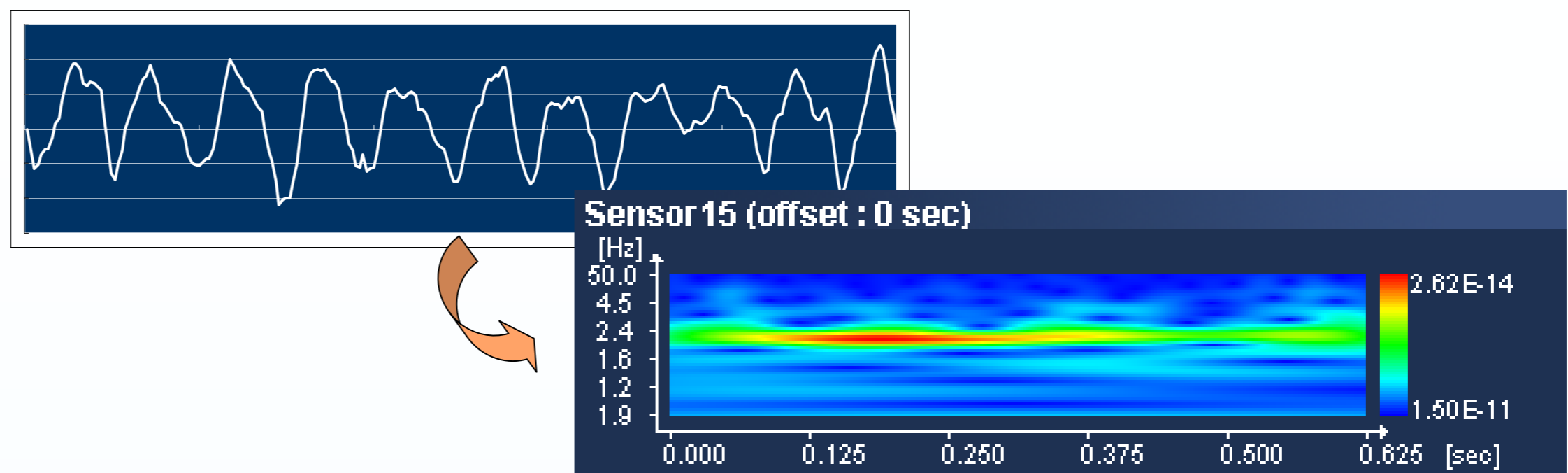
Essential for the analysis of brain science, our system seamlessly integrates three phases: measurement of Magnetoencephalography (MEG), computational analysis, and implementation of analysis results. Consequently, the system dramatically improves the efficiency in the analysis of brain function. The core technology used in the system is Globus Toolkit. Poster "MEG Image Analysis and Visualization" describes the overview of this system. The following shows how Globus Toolkit is used in this system.


Http Request

WWW Server
Java Servlet
CoG Java Kit
Grid Portal

Job Request

Grid

Globus Gatekeeper
PBS Job Manager or MPI

Analysis Result

Client
Visualization for diagnosis

In Grid Portal for MEG data analysis, Java Servlet and CoG Java kit are exploited.

Analysis jobs are submitted through GRAM (Globus Resource Allocation Manager). The workload for the jobs are distributed with MPI and PBS.

Cluster systems and Supercomputers

For diagnosis, the results of analysis are visualized to provide intuitive understanding with neuroscientists and doctors.
This provides capability of telediagnosis.
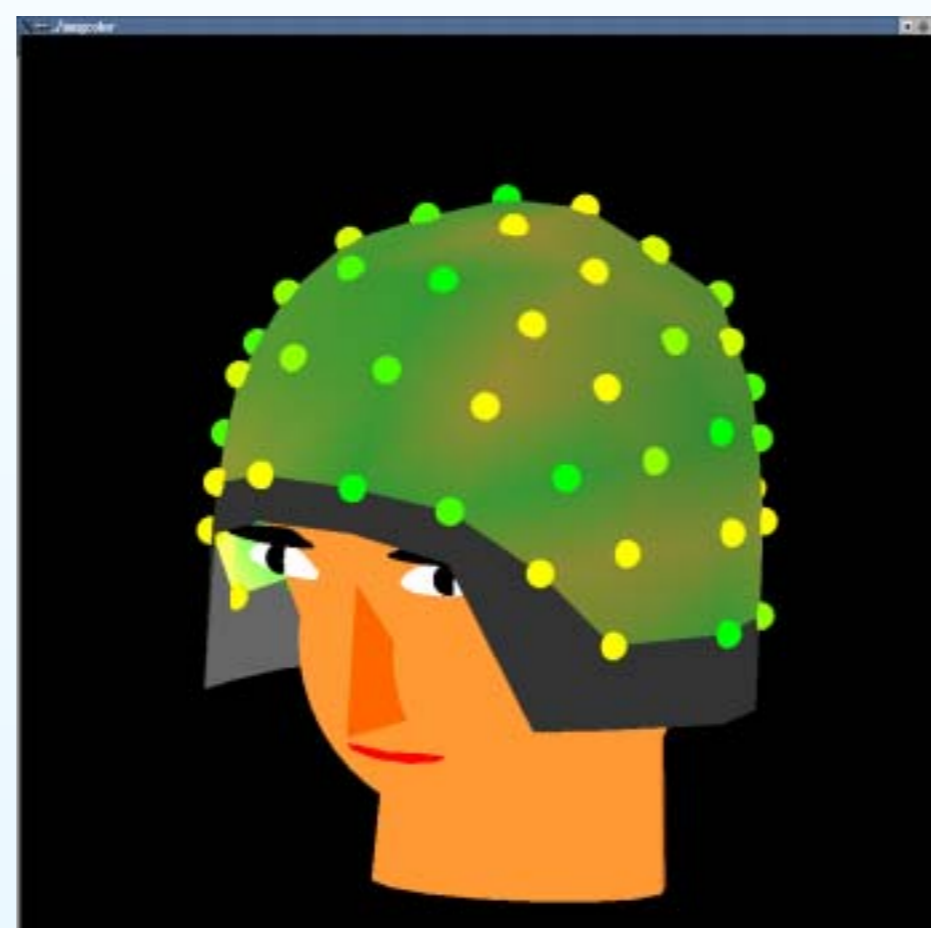
Analysis Methods and Visualization

Wavelet analysis

Wavelet Analysis is one of the time frequency analysis. The brain signal collected from MEG is decomposed of frequency components over time.
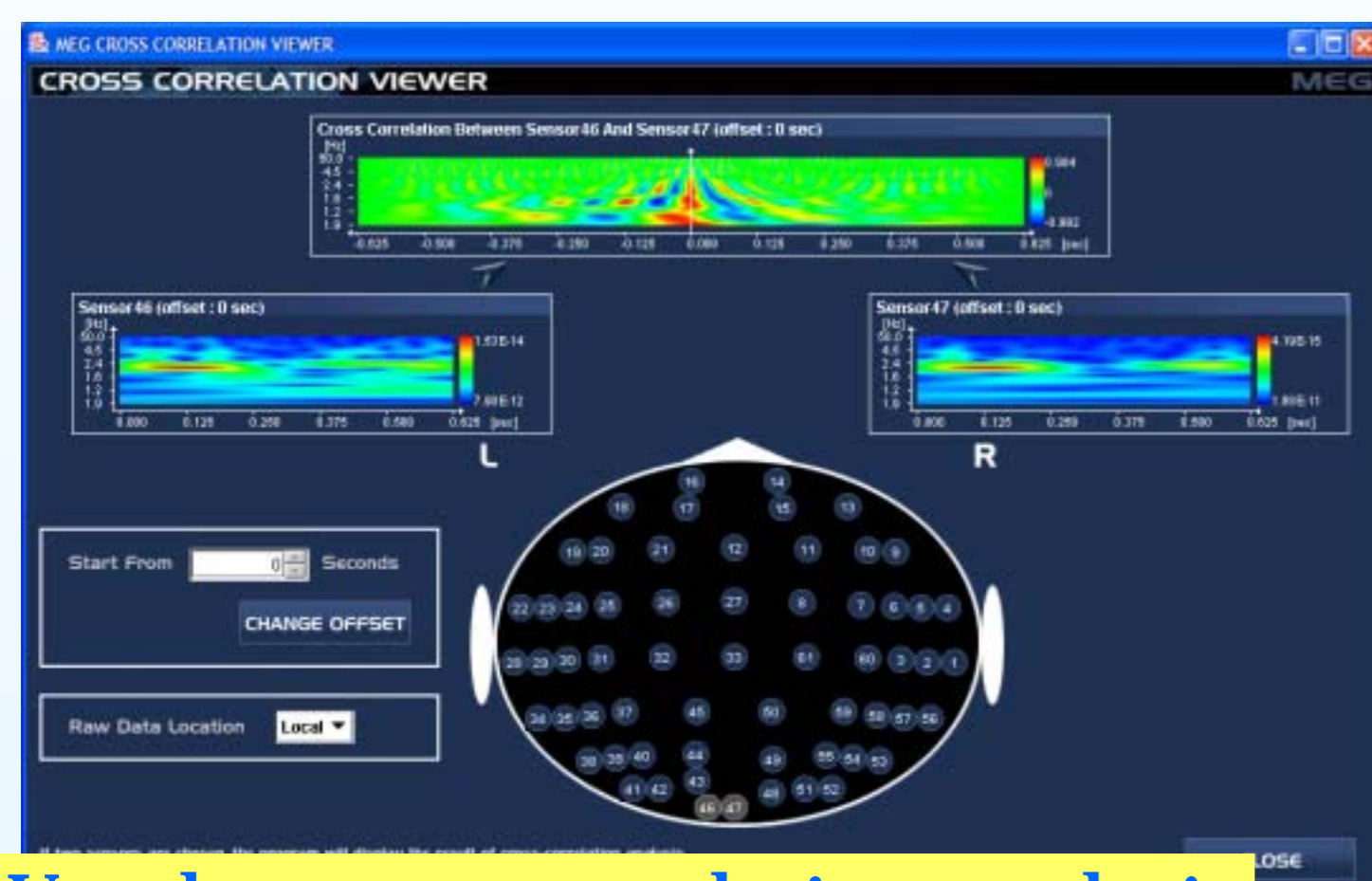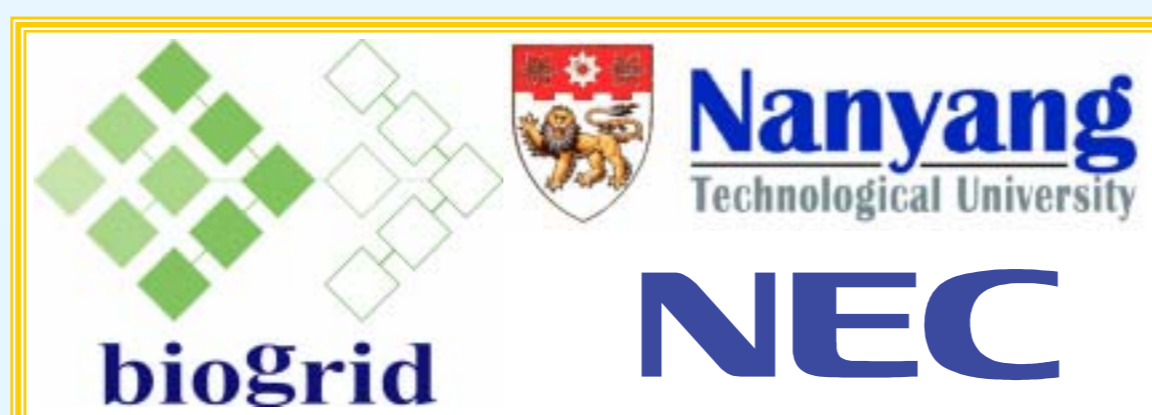

Wavelet cross-correlation analysis

Wavelet cross-correlation analysis (WCCA) provides information on "similarity" between two brain signals with respect to frequency components in signals. The information helps doctors to specify the signal source of interest.

Doctors are able to understand the time lag between signals, and the directions of brain waves propagation.

Research groups:
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