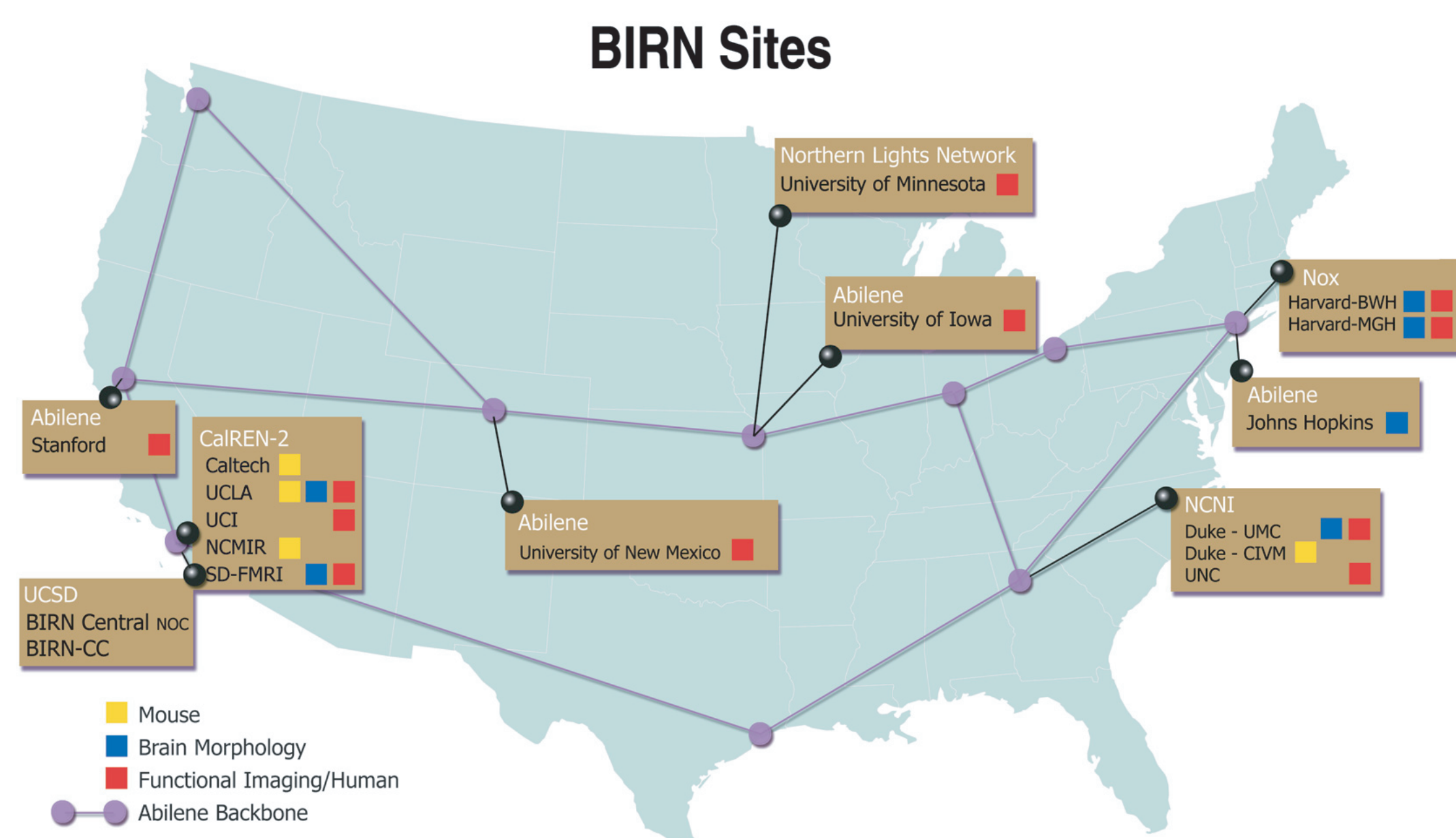


# Biomedical Informatics Research Network

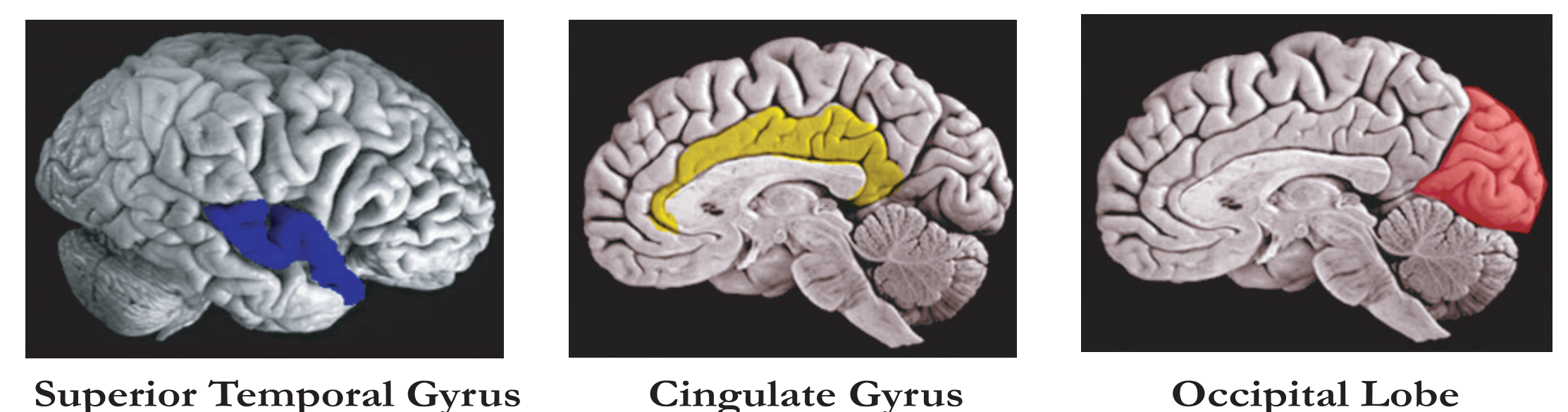
## Computational Anatomy on the Geometries of the Brain

The BIRN project is a consortium of hospitals and research centers tasked to create a distributed medical-imaging database and provide analysis tools. The project utilizes the new Internet 2 network and broadband networking technologies to link sites in the United States. With this new technology, scientists will distribute and share brain-imaging data, including high resolution digital magnetic resonance images (MRI) of brain structure and function, advanced 3-D microscope images, and related genomic, structural and gene expression data. CIS will be studying the computational anatomy of geometric structures within the brain.



## JHU CIS/KKI Medical Image Data

Our group is interested in analyzing anatomical similarities and differences that arise in neurodevelopmental and neurodegenerative processes in the brain such as schizophrenia, Alzheimer's and Huntington's, particularly in the analysis of the exquisite macroscopic features of the neocortical surfaces and the cortical mantle composed of gray matter. Current projects focus on using highly sophisticated mathematical algorithms to quantify volume, surface area and cortical thickness metrics in the superior temporal gyrus, cingulate gyrus and occipital lobe. As part of the BIRN we are coordinating these projects with the MGH, Harvard, and UCLA efforts in these areas.



## Data Analysis Pipeline

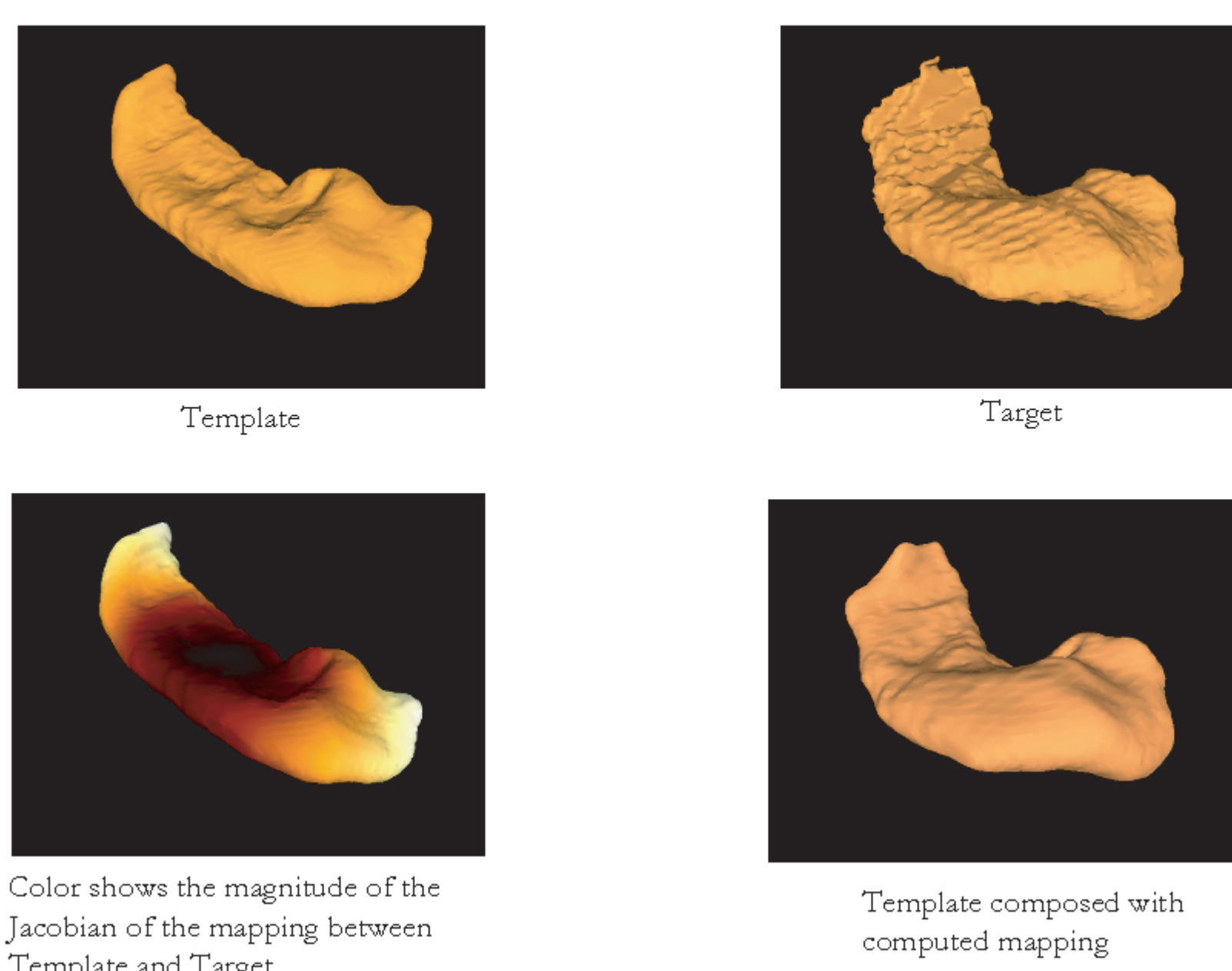
Image analysis will be carried out using algorithms developed by BIRN collaborators that will be processed through the visual programming LONI pipeline developed at UCLA. The algorithms have been incorporated into analysis tools including FreeSurfer developed at MGH, Slicer developed at Harvard, and LDMM developed at JHU's Center for Imaging Science.

## Large Deformation Metric Mapping (LDMM)

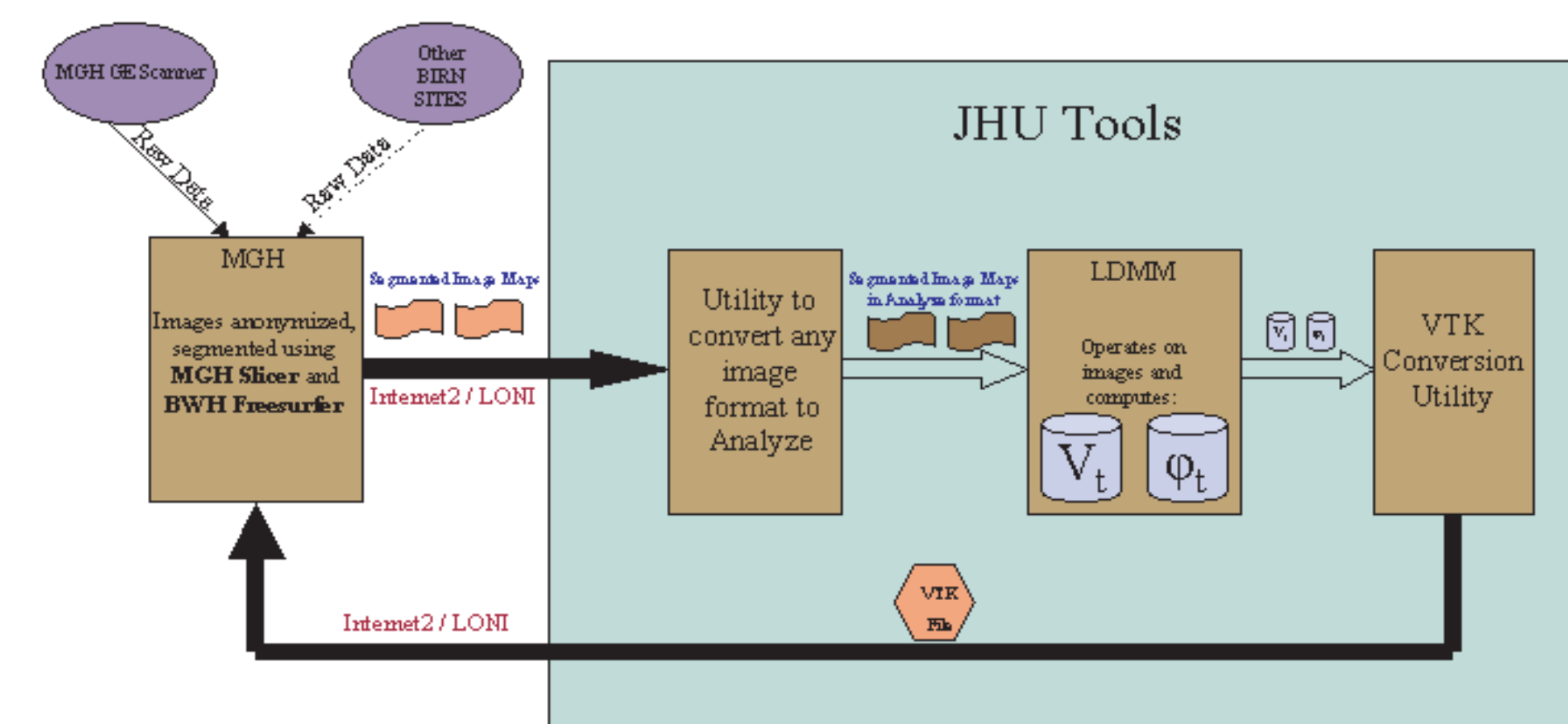
The Center for Imaging Science at Johns Hopkins University is providing the shape analysis tool for the BIRN project known as Large Deformation Metric Mapping (LDMM). The tool will allow researchers to make shape comparisons between anatomical shapes such as the hippocampus the cordate and other brain structures.

Image Data acquired from Harvard University and processed with the LDMM tool identifies shape differences. The tool is being integrated into the BIRN suite of analysis tools.

Mapping the Hippocampus Using Large Deformations Metric Mapping Algorithm

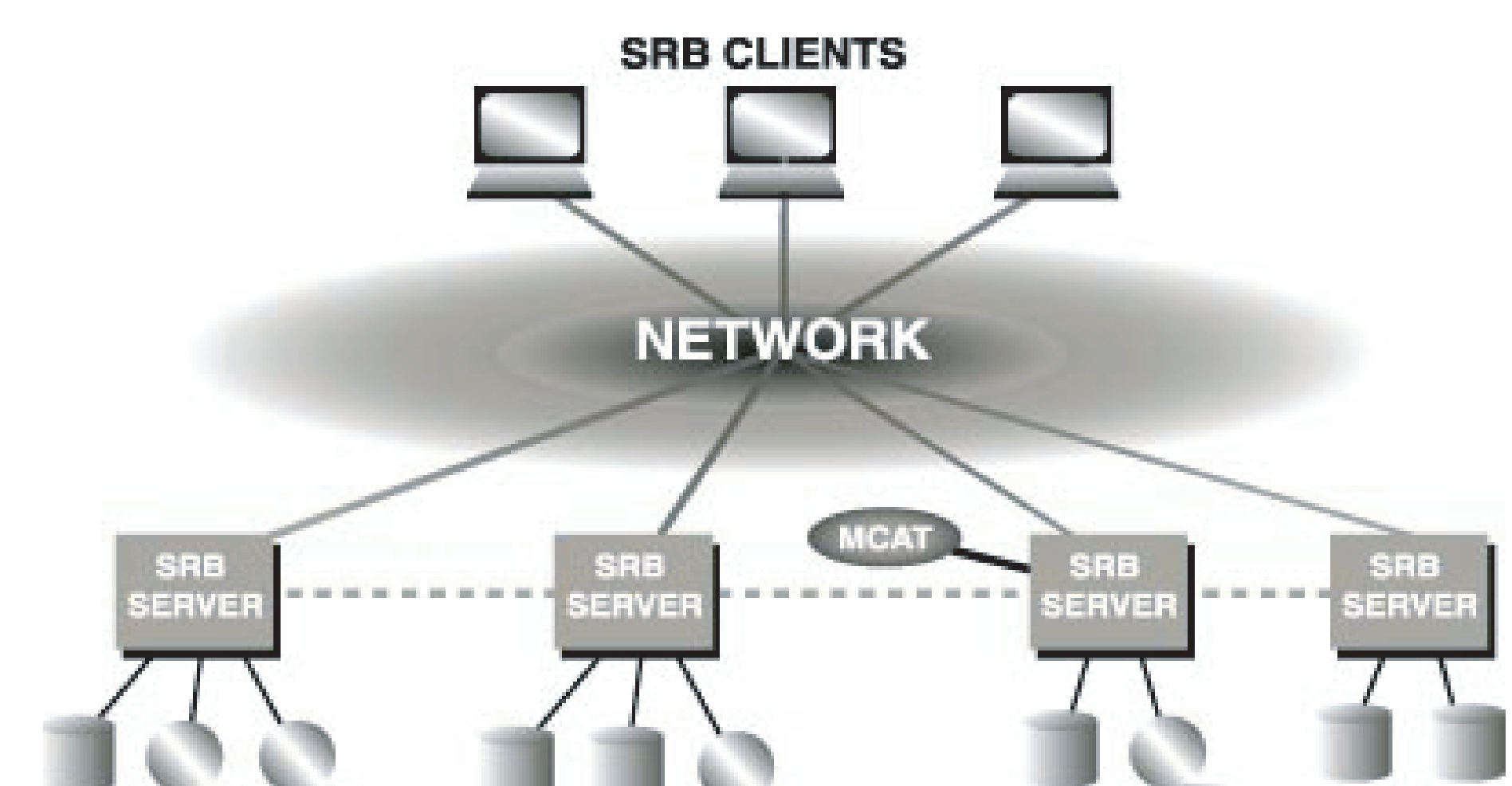


## JHU-MGH BIRN Pipeline



## Storage Resource Broker (SRB)

The Storage Resource Broker (SRB) will be the repository for all BIRN image and analysis data. Each BIRN site will maintain equipment for the storage of local data which will be shared among all partners through a distributed Oracle database.



References:

<http://www.nbirn.net/>, <http://cis.jhu.edu/>, <http://mri.kennedykrieger.org/>

\* Director, E.M. Kirby Research Center for Functional Brain Imaging at Kennedy Krieger Institute.

Center for Imaging Science <http://cis.jhu.edu>

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