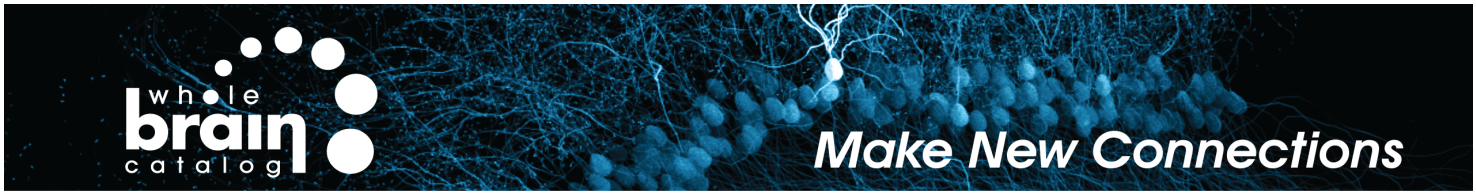

MEDIA BACKGROUNDER

The Whole Brain Catalog™
The Flagship of the Whole Brain Project™
www.wholebrainproject.org and www.wholebraincatalog.org

Introduction

The Whole Brain Catalog™ is a free, groundbreaking, open-source tool for neuroscientists to integrate their data and view it within context in a multi-scale, 3D virtual brain model. With the Catalog researchers can make new connections with the international neuroscience community and interact with new data to rethink and bring clarity to the mysteries of brain. UC San Diego neuroscientists and developers unveiled the Whole Brain Catalog™ (beta version 0.7) at the 39th annual meeting of the Society for Neuroscience in October 2009.

The Whole Brain Catalog™ is an online tool designed to broadly and rapidly facilitate wholesale integration of the newest knowledge pertaining to structure and function of the mouse brain. The mouse brain is an extensively-studied animal model system for investigations of human disease.

Development and success of the Whole Brain Catalog™ is driven by a community of both software developers, who contribute code, and scientists, who contribute their data. The structure and engineering of the Whole Brain Catalog™ allows researchers to integrate their own data as well as their own data analysis, annotation and modeling tools.

The Whole Brain Catalog™ situates data within 3D mouse brain anatomy atlases, analogous to how Google Earth™ allows world-wide users to cross borders and have access through a single source to a wide variety of information and tools via the internet.

The Whole Brain Project™ was conceived, designed and developed by a team of researchers from the Center for Research in Biological Systems (CRBS) at the University of California, San Diego. Projects such as the Neuroscience Information Framework (NIF) and Cell Centered Database (CCDB) are core infrastructural components of the Whole Brain Catalog™. The Waitt Family Foundation, a charitable organization based in La Jolla, California, provided funding to enable the Project.

Situation Analysis

Despite rapid progress in development of new experimental methods, the ability to simultaneous study the brain across multiple scales remains quite limited. Experimental methodologies available today reveal only limited views of nervous system organization. Many research groups are now working to expand data acquisition and computational methods to facilitate more wide spread use of multi-scale data in biomedical research. They are engaged in the arduous and challenging process of adapting and assembling neuroscience data at all scales of resolution and across disciplines into computerized databases, ensuring that they are accessible to the wider community.

These cooperative facilities pool and integrate data allowing researchers to generate and test hypotheses that involve brain systems spanning molecular to tissue scales and to analyze and study the nervous system across spatial dimensions spanning nanometers to centimeters. However, efforts to integrate multi-scale data from

different methods using a common spatial framework were hampered by incomplete descriptions of the microanatomy of nervous systems.

Moreover, while new experimental technologies, including new microscopy methods, reveal deeper insight of organization within these scales, the development of software tools to synthesize these data into more coherent models of brain structure and function has lagged.

Summary of the Whole Brain Catalog™

A challenge in developing databases for diverse neuroscience data is to provide the means to inter-relate the data acquired by different techniques, across vastly different scales and by geographically-distributed resources. The Whole Brain Catalog™ offers a consolidated strategy for integrating neuroscience data in a multi-scale and spatial framework in which elements of neuroscience knowledge can be located and relationships explored among them from any network-linked computer.

The client-server platform allows researchers to upload their own data into a standard anatomical framework using many customary formats such as 3D meshes of subcellular scenes and brain region territories; large 2D image data sets from electron microscopy and light level microscopy; as well as simulated clusters of neurons, neuron reconstructions, and solved protein structures.

The Whole Brain Catalog's ™ advanced visualization methods and software tools build representations of complete brain cells and their microenvironments, targeting gaps in spatial and temporal domains, so as to enable the construction of a continuous framework onto which one may "hang" or associate information accruing from the diversity of brain research activities. This open and accessible software environment is intended to broadly and rapidly facilitate the integration of knowledge pertaining to brain structure and function across spatial and temporal scales.

The Catalog's models can be easily modified, rotated, panned and zoomed in real time allowing interactive exploration. Zooming into the brain reveals further detail such as 3D representations of neurons, 3D representations of cellular substructure and more. It provides a multi-scale structural framework for construction of models allowing users to test hypotheses not amenable to direct experimental analysis using software tools for a range of computational simulations.

The Cell Centered Database (CCDB), developed at the UC San Diego National Center for Microscopy and Imaging Research (NCMIR), hosts both public and private data that can be viewed within the Whole Brain Catalog™ environment. The Neuroscience Information Framework (NIF), an extensive and integrated source of neuroscience information, supported by the NIH Blueprint for Neuroscience, provides key infrastructure and semantic knowledge to the Whole Brain Catalog™. NIF's dynamic lexicon of neuroscience concepts, NeuroLex, was built on top of the same wiki software that runs Wikipedia. From any perspective of the 3D brain, and at any focus level, a user can "right click" on objects in the environment to search NIF and be spatially and semantically linked to known and cataloged information pertaining to the site within the brain that is in their viewing window.

The Whole Brain Catalog™ tool is available for download to a personal computer at www.wholebraincatalog.org

Key People:

Dr. Mark Ellisman, professor of neurosciences and bioengineering, director of the CRBS, and lead scientist on the Whole Brain Project™. 858.534.2251 * mellisman@ucsd.edu

Dr. Maryann Martone, professor-in-residence in the Department of Neurosciences, co-director of NCMIR, and principal investigator of NIF and CCDB. 858.822.0745 * mmartone@ucsd.edu

Steven Peltier, executive director of both CRBS and NCMIR. 858.534.5637 * speltier@ucsd.edu

Stephen Larson, PhD candidate in UC San Diego's neurosciences graduate program and researcher in CRBS. He leads a team of developers building the Whole Brain Catalog™. 347.878.3679 * slarson@ucsd.edu

For More Information Contact:

Sarah Maynard, biomedical ontology research associate managing communications for the Whole Brain Catalog™. 619.940.6432 * smaynard@ncmir.ucsd.edu