

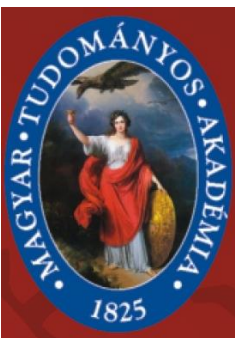
Open Data for Neuroscience

MTA Cloud Workshop

17.02.2017.

András Telcs





András Telcs

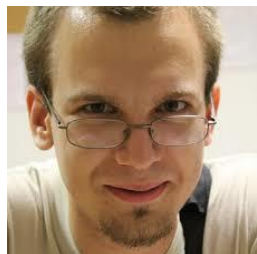
- Member of Computational Brain Research Lab
– WIGNER, head of PATTERN Group



10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111

Members:

Marcell Stippinger (PhD student)
András Telcs (head of the group)
Balázs Benedek Ujfalussy PhD
Lajos Vágó (PhD student)



Associated members:

Attila Gulyás Dr MTA
Gergő Orbán PhD



3



10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111

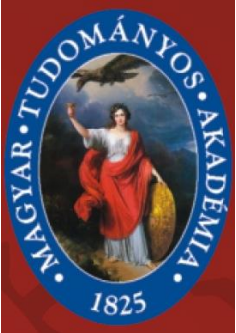
Why cloud is useful for us

(beyond we already have heard)

- Sharing HPC
- Better visibility
- Better networking
- Better collaboration

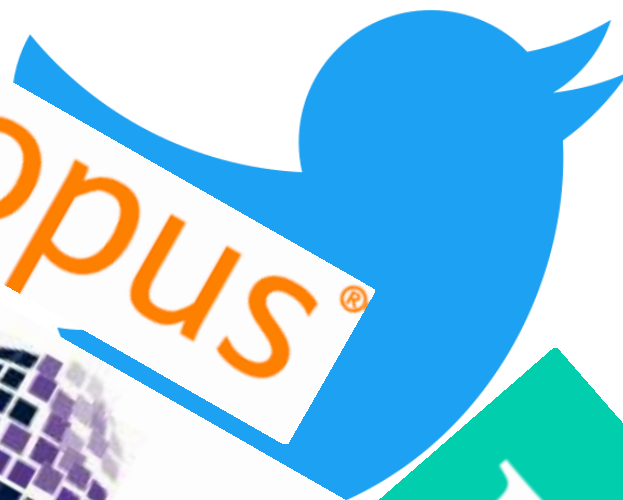
Building collaborative networks





Net 2.0

Scopus



ORCID

Connecting Research
and Researchers

Linker



ISI Web of
SCIENCE

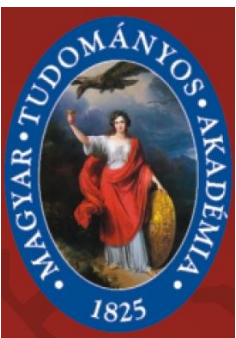
A

Academia.edu



NAP Pattern group

10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111



Net 2.0

CONNECTING PEOPLE

CONNECTING RESEARCH

CONNECTING RESEARCHERS

Connecting Research
and Researchers

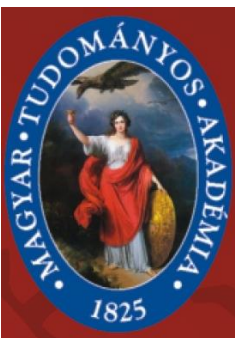
Link



HUNGARIAN BRAIN RESEARCH PROGRAM
NEMZETI AGYKUTATÁSI PROGRAM

NAP Pattern group

10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111



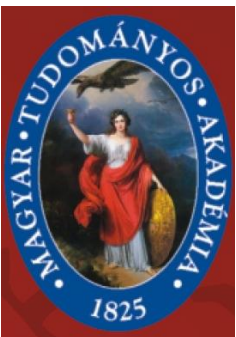
Net 2.0+?

- Connecting research and researchers
- Research = papers ?



10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111

NAP Pattern group

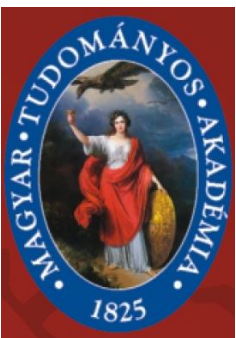


Net 2.0 +?

Research:

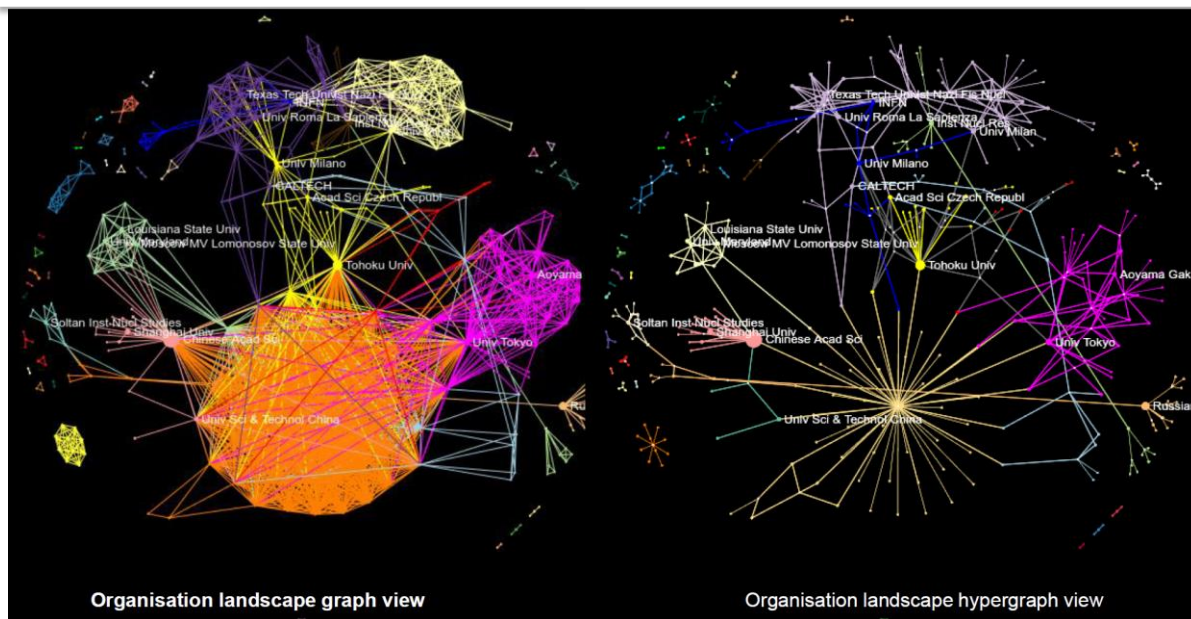
- theory
 - observation
 - theory
- observation
 - Data collection
 - Experiment
 - Analysis
 - Model building
 - Verification
 - And back again





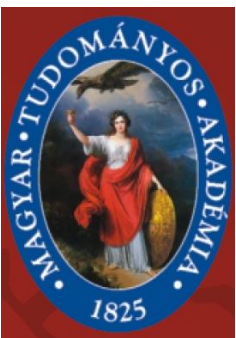
Resources

- Equipment
- Data
- Computation
 - ingenious visualization of -, navigation on data



Organisation landscape graph view

Organisation landscape hypergraph view



Net 2.0+0.1

Shared

- Equipment
- Data
- Computation

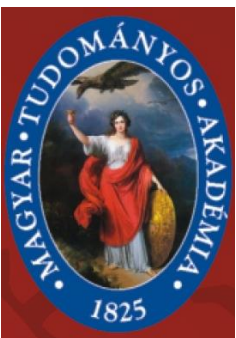


Cloud

navigational/search tools over
data/method/code research and researchers

Build collaborative network





Joint efforts



Human Brain Project





National Brain Observatory

Kavli 6 call for "A Nation
":



On all scales



gy developme
rk :"

THE ROCKEFELLE

Kavli Neural Systems Institute

Coordinating G'

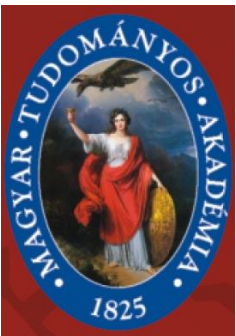
ALLEN INSTITUTE
for BRAIN SCIENCE
Fueling Discovery

data sharing without barriers
rd-alliance.org



MAX PLANCK
FLORIDA INSTITUTE FOR
NEUROSCIENCE

111
011
001
100
101
010
111



Open Data

on all scales



sponsors:



EURODATA
WITHOUT BORDERS

HOME ABOUT NWB: NEUROPHYSIOLOGY CONTACT US

Neurodata Without Borders
Ne

Be

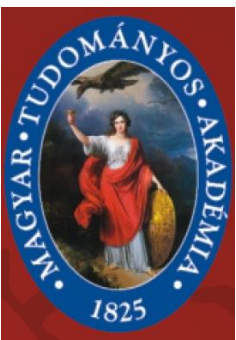
Rea

The Neuroinformatics Platform



NeuroStars

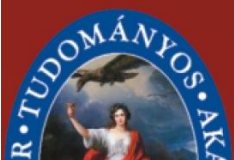
CRCNS - Collaborative Research in
Computational
Neuroscience - Data sharing



Success stories

- Human gene project
- Virtual Observatory – Alex Szalay
- MTA Cloud - ...
- Neuroscience ?





Open Data



Human Brain Project on all scales

Co-funded by
the European Union



[ABOUT](#) [ACHIEVEMENTS](#) [SUBPROJECTS](#) [PARTICIPATE](#) [NEWS](#) [DOCUMENTATION](#) [CONTACTS](#) [BLOG](#)

Search



Platform Release

[Platform Release](#)

[Key Results](#)

[Publications](#)



The six HBP Platforms are:

- The **Neuroinformatics Platform:**
- The **Brain Simulation Platform:**
- The **High Performance Computing Platform:**
- The **Medical Informatics Platform:**
- The **Neuromorphic Computing Platform:**
- The **Neurorobotics Platform:**

the registration, search, and analysis of neuroscience data.

the reconstruction and simulation of the brain.

computing and storage facilities to run complex simulations and analyse large datasets.

searching real patient data to understand similarities and differences among brain diseases.

access to computer systems that emulate brain microcircuits apply principles similar to the way the brain learns.

testing virtual models of the brain by connecting them to simulated robot bodies and environments.

HBP Platforms



[ABOUT](#) [ACHIEVEMENTS](#) [SUBPROJECTS](#) [PARTICIPATE](#) [NEWS](#) [DOCUMENTATION](#) [CONTACTS](#) [BLOG](#)

Search

Neuroinformatics Platform

Neuroinformatics Platform

The Neuroinformatics Platform serves as the Human Brain Project's search engine for distributed data,



Co-funded by
the European Union

[ABOUT](#) [ACHIEVEMENTS](#) [SUBPROJECTS](#) [PARTICIPATE](#) [NEWS](#) [DOCUMENTATION](#) [CONTACTS](#) [BLOG](#)

Search

High Performance Analytics and Computing Platform

[Neuroinformatics Platform](#)

[Brain Simulation Platform](#)

[High Performance Analytics and Computing Platform](#)

[Medical Informatics Platform](#)

[Neuromorphic Computing Platform](#)

[Neurorobotics Platform](#)

High Performance analytics and computing Platform

The High Performance Analytics & Computing Platform (HPAC) comprises supercomputing capabilities at Forschungszentrum Jülich (Germany), the Swiss National Supercomputing Center (CSCS) in Lugano, the Barcelona Supercomputing Center (BSC, Spain), and the Consorzio Interuniversitario del Nord Est italiano per il Calcolo Automatico (CINECA, Italy) in Bologna.

The Platform also provides access to high-fidelity visualisation systems at two locations in Germany (RWTH Aachen University in Aachen and the Institute of Information Technology in Garching), Switzerland (EPFL in Geneva) and cloud storage with a dedicated capacity of 3 Petabytes at the Karlsruhe Institute of Technology (Germany), which will also contribute R&D work to complement these resources.

All of these systems are connected logically through UNICORE (Uniform Interface to Computing Resources) and physically through the high-speed PRACE (Partnership for Advanced Computing in Europe) network, with a bandwidth of up to 100 Gbit per second, and other secure connections. These high-speed connections mean that the users can run larger and more complex workflows than previously possible, and will increase the speed at which the work can be performed.

HBP Neuroinformat Platforms



The [Dataspace](#) is the name given to all the federated data sources, including archival data repositories, active data repositories and third-party curated data repositories.



The [KnowledgeGraph](#) lies at the heart of the Neuroinformatics Platform. It is a database in which the key metadata for all data artefacts (biological or from simulations) can be registered. It is built around a data model called HBP-CORE, derived from [W3C PROV-O](#).



[Brain atlases](#) consist of a template brain dataset which provides the spatial coordinates, brain parcellations which define brain region/structure volume boundaries, and an ontology which provides a structured naming system for the brain parcellations. Datasets can be integrated with these atlases both semantically (with a brain region name), spatially (by assigning specific x,y,z coordinates), and aligned to the specific brain template by specifying a transformation to map the dataset to the brain atlas coordinate system.



The [KnowledgeSpace](#) is a community-based encyclopedia that links brain research concepts with data, models and literature from around the world. It is an open project and welcomes participation and contributions from members of the global research community.

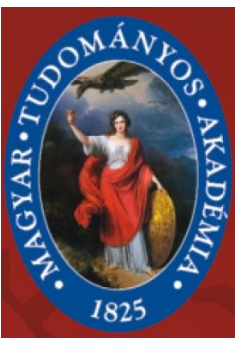


The key functionalities of the Neuroinformatics platforms are exposed via standard web services and [REST-based APIs](#).



NAP Pattern group

10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111



The bottom line

User engagement opportunities

Date	Event type	Location	URL	Contact Person
July 1 2016	Cells, Circuits and Computation: Expanding the Horizons of Big Data Analysis (workshop)	copenhagen, Denmark	https://education.humanbrainproject.eu/web/hbp-education-portal/fens-2016	Elisabeth Wintersteller

Further development

One of the main goals of the Neuroinformatics Platform is to drive Predictive Neuroinformatics, i.e. to reliably predict the characteristics of neurons, synapses, etc. from existing data without the need to directly measure billions of neurons with huge numbers of complex molecular interactions.

Some preliminary methods for this have already been developed within the HBP and the aim is to extend this to create new predictive methods for more types of data, such as the course of long-range axonal projections from specific types of neurons to their targets elsewhere in the brain.

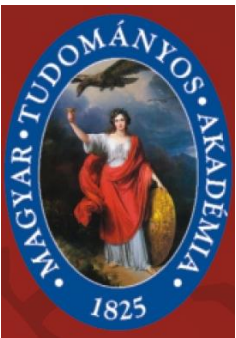
Find out more

For further information visit the [HBP Collaboratory](#)



NAP Pattern group

10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111



Next step



Human Brain Project

 Username 

 Password 

Login

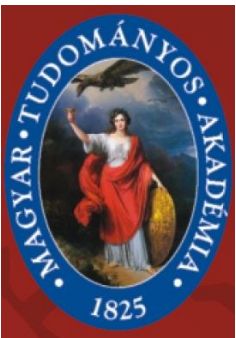
Request an Account

[Forgot username?](#) [Forgot password?](#) [Support](#)



10P110100110111
00A011000001011
10T001010111001
01T100101110100
00E111001001101
00R010110000010
10N110100110111

NAP Pattern group



404



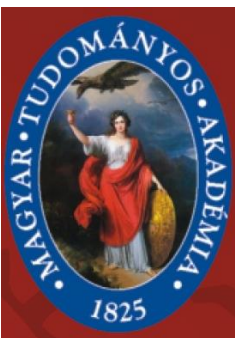
HTTP ERROR 404

Problem accessing /oidc/account/request. Reason:

Not Found

Powered by Jetty://





Smaller steps



- Feasible plan
- Realistic horizon/scale
- Bottom up approach
- User driven actions
- Lessons from best practices
 - human genom
 - stellar atlas/database
 - CERN – Wigner Data Center storage and share data of accelerator experiments

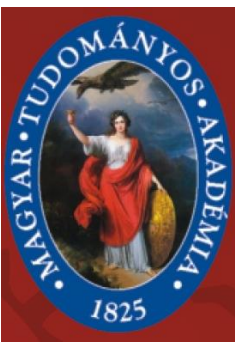
MTA Cloud mini projects for the
Hungarian neuroscience community

HUNGARIAN BRAIN RESEARCH PROGRAM
NEMZETI AGYKUTATÁSI PROGRAM

NAP Pattern group

10110100111111
00011000000111
1010010111001
0110010111100
0001100100101
00010110000010
10110100110111

What we need?



- CPU

- memory

- storage

- which

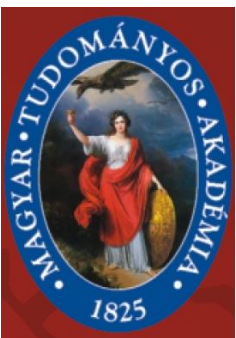
- which OS

- which development/collaborative platform

Please share your suggestions, needs!

Questioner comes soon.

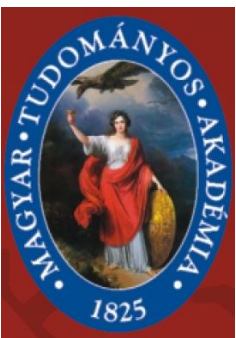




Plan for HBRP Open Data

- Open data
 - using metadata
 - from publication
 - experiment setup
- Registration in major meta-databases
 - (e.g. Neuroinformatics, Neuroscience Information Framework)





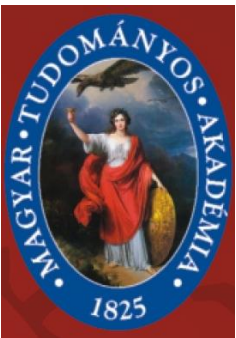
Plan for HBRP collaborative platform

- selection of 2-3 popular platforms,
- creation of ready to use of user friendly scalable environments

furniture with

- analytic tools
- development environment





Thanks for the attention

