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| Abstract: | The user and technical documentations can be found on the Brain Simulation Platform. This Deliverable provides the links to these resources. |
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| Available at: | www.humanbrainproject.eu/ec-deliverables |



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1. The Aim of this Document

The aim of this document is to detail the technical and user documentation available to internal and external users of the Brain Simulation Platform, and to provide a roadmap describing plans for future Platform development.

Public release of a preliminary prototype of the Brain Simulation Platform is the subject of a separate Deliverable (D6.7.4 - Brain Simulation Platform v1), to be published simultaneously with this one.

ADDENDUM: A new version (v2) of the Brain Simulation Platform was released on 26 June 2017. This new version incorporates feedback received from the HBP Review in June 2016. In general, the Platform has been re-organised to be more user-centric and user-friendly, so that users with different neuroscientific and/or technical backgrounds and expertise levels, can use the Platform's capabilities. The navigation of the Platform has also been streamlined.

The Platform is accessible via the HBP Collaboratory web interface at:

<https://collab.humanbrainproject.eu/#/collab/1655/nav/28538>

2. Technical and User Documentation

2.1 Technical Documentation

All technical documentation relating to the use of the Brain Simulation Platform is available on the Platform itself. Please see:

<https://collab.humanbrainproject.eu/#/collab/161/nav/5353>

for the foundation software and

<https://collab.humanbrainproject.eu/#/collab/161/nav/5350> for the web accessible services.

2.2 User Documentation

The following page serves as a general starting point:

<https://collab.humanbrainproject.eu/#/collab/161/nav/5576>

The **Platform Online** and **Model Collabs** sections of the Platform have an overview page that summarises what is available in each Collab. The Platform Online overview page also details maturity levels and the access required, such as a high-performance computing account.

- Platform Online: <https://collab.humanbrainproject.eu/#/collab/161/nav/5707>
- Model Collabs: <https://collab.humanbrainproject.eu/#/collab/161/nav/5709>

Each Collab under the Platform Online and Model Collabs sections has an overview and getting started page. The getting started page guides a user through the Collab, detailing what is available and how to use it (see examples, Figures 1 and 2). Many of the Platform Online Collabs also have a screencast explaining the workflow available.



Navigation ADD ⚙

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- Layer 5 Pyramidal Cell Notebook
- Submit Notebook
- Team
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Workspace

Electrophysiological Model building

Workflow

The general workflow to optimise the parameters of an electrophysiologically detailed model:

- **Collection** of all the **input data** (morphology, eFeature constraints, NMODL mechanisms, ...) in the Collab Storage
- **Creation** of a **Parameter Optimisation Jupyter notebook** that describes the model structure and the optimisation process
- **Running / testing** of the notebook on **inside the Collab**
- **Creation** of a **Submission Jupyter notebook** that submits the optimisation as a task
- **Execution** of the Submission notebook
- Using the Job Manager of the Collab to **monitor the progress** of the task
- **Retrieving** the **executed Parameter Optimisation Jupyter Notebook** and the checkpoint file generated by BluePyOpt
- The **executed notebook** will now contain information about the **results** of the optimisation, and can be **analysed** by the user.

A Youtube webcast explaining this workflow is available here:

HBP Brain Simulation Platform, Use Case 9: Electrophysiology pipe...

Collecting data

The user can use the Neuroinformatics Platform (<https://collab.humanbrainproject.eu/#/collab/47/nav/236>) to retrieve all the experiment. To get the constraints for the model, eFeatures should be extracted from experimental voltage traces. This operation can be performed. An example of such a notebook can be found in this collab: <https://collab.humanbrainproject.eu/#/collab/520/nav/5882>

Creating the model structure and setting up the optimisation

Figure 1: Screenshot of part of the getting started page of the single cell model building Collab in the Platform Online section.

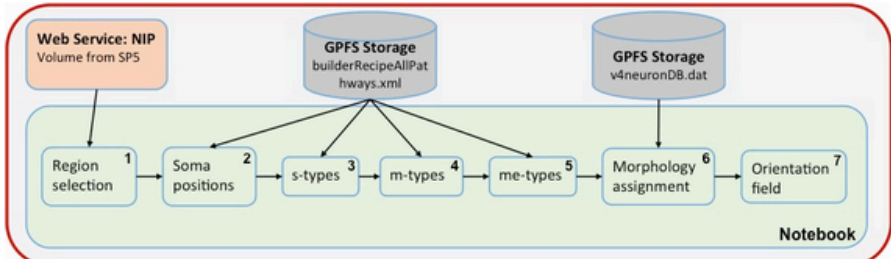
Navigation

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Workspace

Model Overview

The building process follows the pipeline described [here](#).



- 1) Set the region of interest as Hippocampus CA1 and retrieve the correspondent volumetric information from the Neuroinformatics Platform (Allen)
- 2) Generate soma positions (see [here](#) for more information on cell density). The steps 2-5 require a configuration file (i.e. builderRecipeAllPathways)
- 3) Identify excitatory and inhibitory cells (synapse class, s-class) (see [here](#) for more information on EI ratio)
- 4) Identify the morphology-types (m-type) (see [here](#) for more information on cell composition)
- 5) The m-types are further divided into morphoelectrical-type (me-type) (see [here](#) for further details).
- 6) For each m-type, assign the most appropriate morphology (see [here](#) for more information on cell morphologies). This step requires a configuration
- 7) Calculate the orientation field of the morphologies. This step is required to position correctly the morphologies in the space.

Coming soon:

- 8) A connectome is predicted on the basis of vicinity - if two morphologies are located in close vicinity inside the circuit, there is a higher likelihood
- 9) a number of electrophysiological recordings and published data are used to constrain models of single cell.

How to run the model

The model can be run via the [jupyter notebook](#).

The code relies on custom python libraries described [here](#).

REFERENCES

Markram H et al (2015) Reconstruction and Simulation of Neocortical Microcircuitry. Cell. 163(2):456-92.

Reimann MW, Muller EB, Ramaswamy S and Markram H (2015) An Algorithm to Predict the Connectome of Neural Microcircuits. Front. Comput. N

Figure 2: Screenshot of part of the getting started page of the hippocampus Collab in the Model Collabs section.

The user documentation for the **Foundation Software** can be found on the overview page for the section: <https://collab.humanbrainproject.eu/#/collab/161/nav/5348>

2.3 Addendum

The technical and user documentation has all been re-grouped into the Guidebook:

<https://collab.humanbrainproject.eu/#/collab/1655/nav/18580>

The Guidebook is 'living' documentation, which will continuously be updated and expanded as the Platform develops. The Guidebook has also been updated with the information requested from the HBP Review in June 2016.

3. Platform Accessibility

Platform accessibility is documented here:

<https://collab.humanbrainproject.eu/#/collab/161/nav/5992>



4. Help and User Feedback

To obtain user assistance, to provide user feedback or to contribute to the on-going development of the Platform, please contact: bsp-support@humanbrainproject.eu

Alternatively, please use the chat function in the Brain Simulation Platform directly.

5. Future Development of the Platform

Please see Annex F: Backlog (Remaining bugs and new features to be added) of Deliverable D6.7.4 and please see here: <https://collab.humanbrainproject.eu/#/collab/161/nav/5988>