

Tutorial BIDS Manager:

Brain Imaging Data Structure (BIDS) is a standardized way to organize and describe neuroimaging, electrophysiological and behavioral data. This organization has been adopted by a multitude of neuroscience labs around the world to facilitate sharing and analysis (<https://www.nature.com/articles/sdata201644>).

BIDS Manager software described in this manual is a tool that allows various users to easily import and explore databases in BIDS format.

This document will guide you to import your data in BIDS format and explore your BIDS Dataset.

Manually driven processes for data storing can lead to human errors, which cannot be tolerated in the context of a research/clinical datasets. BIDS manager offers a secure system to import and structure subject and patient datasets.

BIDS MANAGER aims to achieve the following objectives:

- Provide a software for clinicians and researchers with a user-friendly interface,
- Define the appropriate directory for the dataset corresponding to a study,
- Select required data,
- Select the data to be imported,
- Provide a monitoring and reporting system for data importation and storage.

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1. Before starting

For more information on BIDS Manager implementation and goals, please refer to Roehri et al., submitted. A tutorial video is also available at: <https://youtu.be/HvJir6WZNQA>

1.1. BIDS Manager in few words

BIDS Manager (BM) is a tool to organize, convert, rename, and store neuroimaging data in a structured way. Figure 1 summarizes the functionality of BIDS Manager. BIDS Manager requires some specific files that will be explained in section 2. The first step is to design the structure that one wants to achieve (e.g. the type of data of interest, the label of the recording sessions, the task names). This informs BM how to link the input files and the BIDS structure. BM then converts the data in an open format, renames them according to the user input and finally store the data in a structured way.

1.2. Requirements

BIDS Manager runs on Windows and Linux systems, and requires python 3.7. Moreover, two software programs are mandatory to convert the data in the appropriate formats:

- [AnyWave](#) for the electrophysiological data, and
- [dicm2nii](#) for the neuroimaging data from Xiangrui Li.

For now, only these two programs are supported as converters.

1.3. Installation

BIDS Manager does not need to be installed, the downloaded folder contains the software as an executable file.

How to launch the software: Once the folder [BIDSMANAGER] with its subfolders are stored onto the computer, double-click on BIDS_manager.exe. A terminal pops up at startup (black window), then the main interface is displayed.

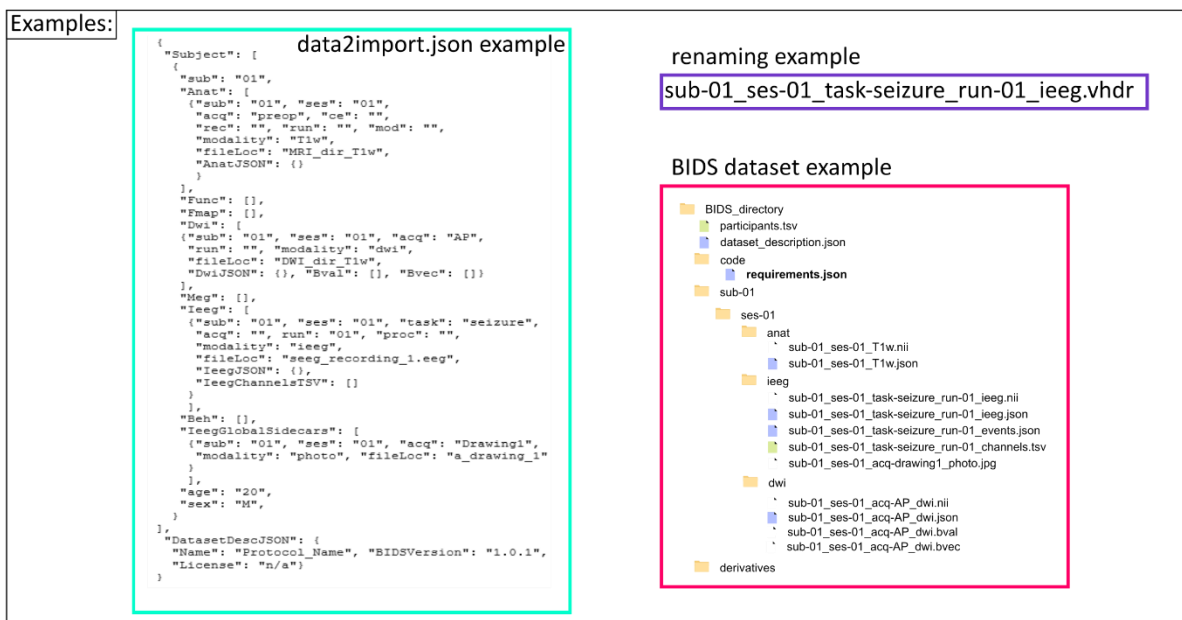
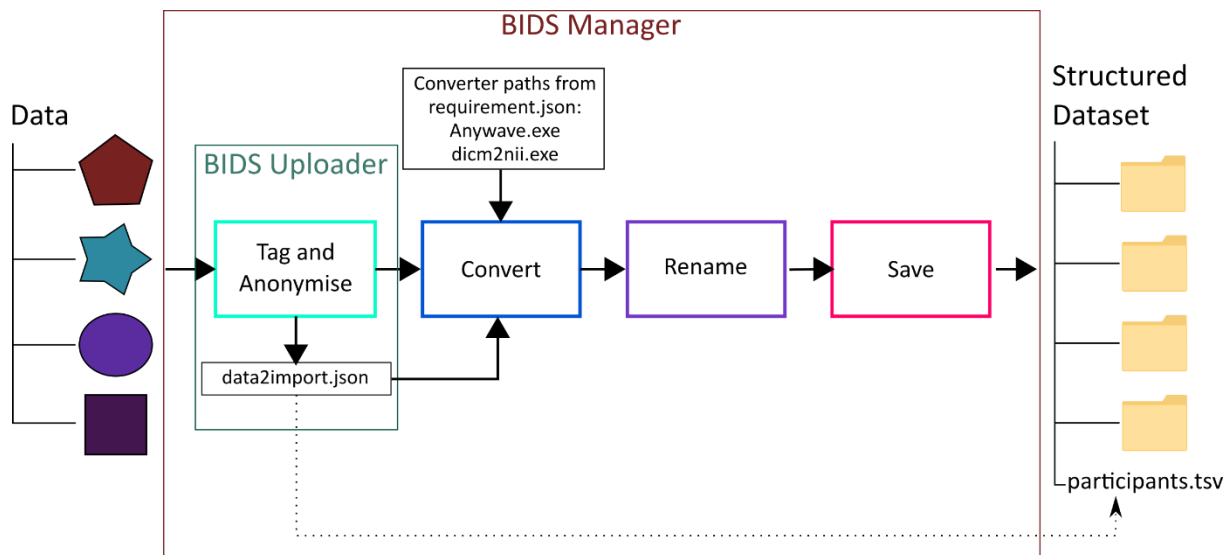


Figure 1: BIDS Manager schema

2. Dataset description

2.1. Supported File Formats:

Input	FORMATS
Subject Information	All relevant information for your dataset
Neuroimaging data	<ul style="list-style-type: none">- Anatomical images in dicom data- Functional images in dicom format- Fieldmap data in dicom format- Dwi data in dicom format
Neurophysiology data	<ul style="list-style-type: none">- Intracranial Electroencephalography (SEEG, ECoG) in different formats: Micromed, EDF+/BDF+, Brainvision Analyser- Electroencephalography (EEG), same format as SEEG
Electrodes implantation	<ul style="list-style-type: none">- Pictures or file displaying the electrode position (pdf, jpg, png)- Implantation file with electrode coordinates (tsv file)
Supplementary files	<ul style="list-style-type: none">- Pictures (jpg, png)- Process data (nifti, mat, tsv, vhdr)

2.2. Dataset preparation

Brain Imaging Data Structure (BIDS) is “a simple and intuitive way to organize and describe your neuroimaging and behavioral data” (<https://bids.neuroimaging.io/>). This organisation has been conceived by Krzysztof J. Gorgolewski and developed by the neuroscience community (Gorgolewski et al., 2016). The goal was to determine a consensus on how to organize and share data. At the beginning, it has been developed for neuroimaging datasets mainly, then it has been extended to all neuroscience data.

BIDS is inspired by the format used in OpenfMRI repository (<https://www.openfmri.org/>). The data are structured by subjects. In each subject folder can be found modality folders where the data is stored in an open format determined by the community. The name of each file is made of a series of key-value containing information on the subject and the acquisition.

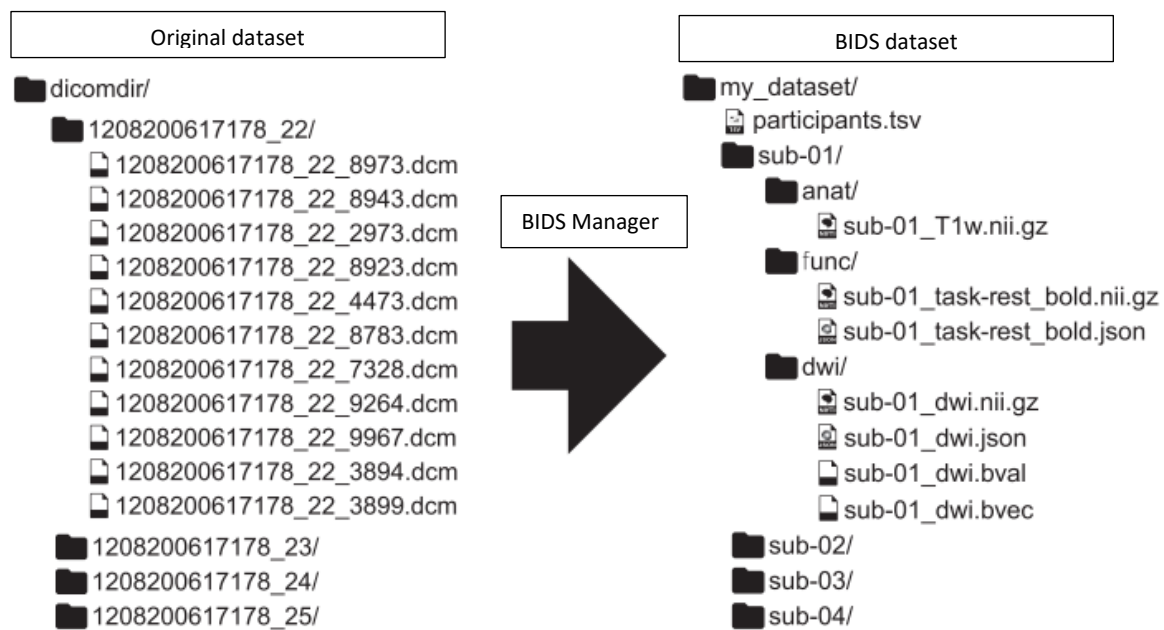


Figure 2: Bids structure dataset (Gorgolewski et al. 2016)

For more information on BIDS structure, please read the publication from Gorgolewski et al., 2016.

BIDS Manager helps to convert the original dataset into BIDS dataset.

2.3. Specific files and supplementary tool

To run properly, BIDS Manager needs information contained in several files that characterize each dataset. These files are required for the importation and the management of the dataset. This section describes the requested files and the procedure for generating them.

2.3.1 Requirements file

The first file is a specific file named “requirements.json”. This file can be created by BIDS Manager or manually by the user. This json file contains the information and data that should be present in the database. The requirements file is specific to a given protocol. It provides the participant characteristics (e.g. sex, age, study group) that should be present in participants.tsv, and the type of

```
{
  "Requirements": {
    "Subject": {
      "keys": {
        "age": "",
        "sex": ["F", "M", "U"],
        "handedness": ["R", "L"],
        "anat_lesion": "",
        "comment": ""
      },
      "required_keys": ["age", "sex"],
      "Anat": [
        {
          "type": {"ses": "01", "acq": "preop", "modality": "T1w"},
          "amount": 1
        },
        {
          "type": [
            {"ses": "01", "modality": "CT"},
            {"ses": "01", "acq": "postimp", "modality": "T1w"}
          ],
          "amount": 1
        }
      ],
      "Ieeg": [
        {
          "type": {"ses": "01", "acq": "_", "task": "seizure",
"run": "_", "modality": "ieeg"},
          "amount": 1
        }
      ]
    },
    "Anat": {
      "keys": {
        "ses": ["preimp", "postimp", "postop"]
      }
    },
    "Ieeg": {
      "keys": {
        "ses": ["postimp"],
        "task": ["seizure", "baseline", "ccep"]
      }
    }
  }
}
```

Participant characteristics that will be present in the participants.tsv and the MANDATORY one

Type of data REQUIRED in the dataset

Modalities that can be present in the dataset with the possible keys

Figure 3: Requirements file

data that must be present in the database. This file allows BIDS Manager to verify if the different subjects in the database have the required data and are ready or not for further analysis.

2.3.2 Data2import file

Each time a new entry is made in the database, BM must be informed about the data to be imported. For this purpose, it is required to provide the data2import.json file. This file must be present in the folder containing the data to be imported.

Note: It is highly recommended to copy in a dedicated folder all the data that will be imported. This folder will be deleted after the importation.

This data2import.json file contains all information needed by BIDS Manager to organize the data. Four sections are present in this file:

- *Subject* section: contains all the information about the subject: the participant characteristics and modalities of interest for the dataset. For each modality, different attributes are given to create the file name (tag) and the location of the original file is mentioned.
- *derivatives* section: indicates the files to import in the dedicated derivatives folder. This section is not yet fully developed, users are not encouraged to use it at this time.
- *DatasetDescJSON* section is similar to the “dataset_description.json” of the BIDS folder. This section is critical to ensure that BM imports the files into the correct directory. The most important is the name, which describes the protocol. BIDS Manager will compare this name with the one written in the dataset_description.json of the BIDS directory. If these names are different BIDS Manager will not import the data.
- *UploadDate* section informs about the date and time of the file creation.

Figure 4 represents an import directory and Figure 6 represents the associated data2import.json. Please note that there is a picture in this folder.

```
import_dir
|-- data2import.json
|-- seeg_recording_1.eeg
|-- seeg_recording_2.trc
|-- MRI_dir_T1w
|   |-- MRI_dir_T1w_1.dcm
|   |-- MRI_dir_T1w_2.dcm
|   :
|   |-- MRI_dir_T1w_N.dcm
|-- DWI_dir_T1w
|   |-- DWI_dir_T1w_1.dcm
|   |-- DWI_dir_T1w_2.dcm
|   :
|   |-- DWI_dir_T1w_N.dcm
|-- a_drawing_1.jpg
```

Figure 4: Import directory example

Pictures are considered as “sidecar” files in BIDS Manager because they can contain complementary information on a modality acquisition parameters. This picture is to be stored in the associated modality folder. In this illustration, the picture is associated with SEEG modality (i.e leegGlobalSidecars in the data2import.)

Using the data2import.json, the importation process can be run by BIDS Manager. In order to avoid incorrect importation, BIDS Manager follows the pipeline described in Figure 5.

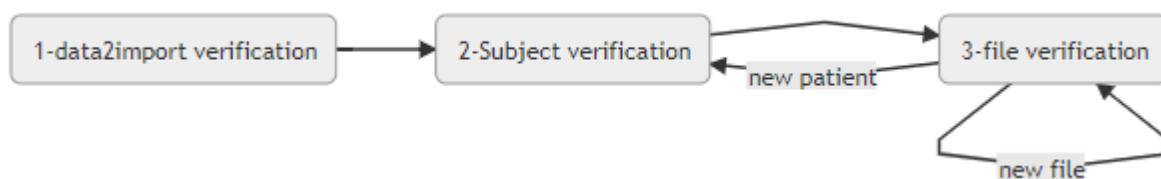


Figure 5: Diagram explaining the verification steps for importation

This pipeline includes several verifications on the subject and files. For more information on the verification procedure, please go to the annex.

```

{
  "Subject": [
    {
      "sub": "01", }   Subject ID
      "Anat": [
        {
          "sub": "01", "ses": "01", "acq": "preop", "ce": "",
          "rec": "", "run": "", "mod": "", "modality": "T1w", }   Attributes to create the
          "fileLoc": "MRI_dir_T1w",                               filename, and the sub-folders
          "AnatJSON": {}                                           in the subject directory
        }
      ],
      "Func": [],
      "Fmap": [],
      "Dwi": [
        {
          "sub": "01", "ses": "01", "acq": "AP", "run": "", "modality": "dwi",
          "fileLoc": "DWI_dir_T1w", "DwiJSON": {}, "Bval": [], "Bvec": []
        }
      ],
      "Meg": [],
      "Ieeg": [
        {
          "sub": "01", "ses": "01", "task": "seizure", "acq": "",
          "run": "01", "proc": "", "modality": "ieeg",
          "fileLoc": "seeg_recording_1.eeg",
          "IeegJSON": {},
          "IeegChannelsTSV": []
        },
        {
          "sub": "01", "ses": "01", "task": "seizure", "acq": "",
          "run": "02", "proc": "", "modality": "ieeg",
          "fileLoc": "seeg_recording_2.trc",
          "IeegJSON": {},
          "IeegChannelsTSV": []
        }
      ],
      "Beh": [],
      "IeegGlobalSidecars": [
        {
          "sub": "01", "ses": "01", "acq": "Drawing1", "modality": "photo",
          "fileLoc": "a_drawing_1"
        }
      ],
      "age": "20", }   characteristics of this subject. Values that will
      "sex": "M",     be present in the participants.tsv
    }
  ],
  "DatasetDescJSON": {
    "Name": "Protocol_Name", "BIDSVersion": "1.0.1", "License": "n/a"
  }
}

```

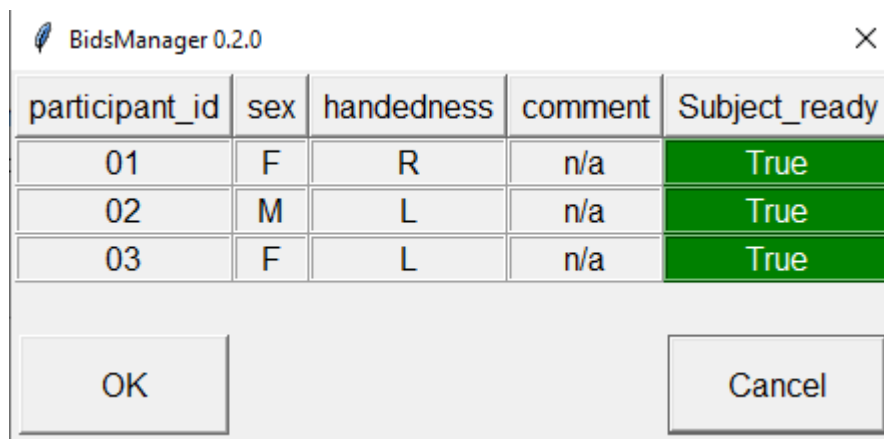
Location of the imagery in the import folder

Figure 6: data2import.json example

2.3.3 Participants file

Participants file is required by BIDS specifications. This document contains the “id” of all participants in the dataset. Moreover, for each participant, their characteristics are provided. The values displayed in this file will depend on the values specified in the requirements file. BM also incorporates various indications as to whether participants’s dataset have all the required data.

According to the modalities required in the dataset, the participants.tsv table will have column dedicated to those modalities and display ‘ready’ or not for each corresponding cell. There is a general column to notify if the participant is ready: “Subject_ready” and there are several other columns corresponding to the modalities in the requirements.json file.



The screenshot shows a window titled "BidsManager 0.2.0" with a close button (X) in the top right corner. Inside the window is a table with the following data:

participant_id	sex	handedness	comment	Subject_ready
01	F	R	n/a	True
02	M	L	n/a	True
03	F	L	n/a	True

Below the table are two buttons: "OK" on the left and "Cancel" on the right.

Figure 7: Participants tsv file showing by BIDS Manager

In this example (figure 3), the modalities required for each participant are one anatomical image, one iEEG recording, one iEEG implantation file. The participants.tsv (figure 8) have thus the three corresponding columns (i.e. Anat_ready, leeg_read, leegGlobalSidecars_ready). It also contains

Anat_ready	leeg_ready	leeg_integrity	leegGlobalSidecars_ready
True	True	False	True
True	True	False	True
True	True	False	True
False	True	False	True
False	True	False	True

Figure 8: Column describing if the participant's data are ready

another one (leeg_Integrity) which states whether in all iEEG files the electrodes have the same name as the ones found in the leegGlobalSidecars electrodes.tsv.

2.3.4 Integrated tool for importation: BIDS Uploader

BIDS Manager integrates complementary tool named “BIDS Uploader”, which prevents the user from generating the data2import.json manually, which can be time-consuming and source of error. This tool creates an import directory, copies inside the original data (possibly anonymizes them) and generates the corresponding data2import.json. To call this tool, the requirements file must be present in the BIDS directory. Moreover, it must be completed with all sections (e.g. subject information, modalities required, and possible modalities). BIDS Uploader reads the requirements file to offer the complete specific information of the current BIDS dataset.

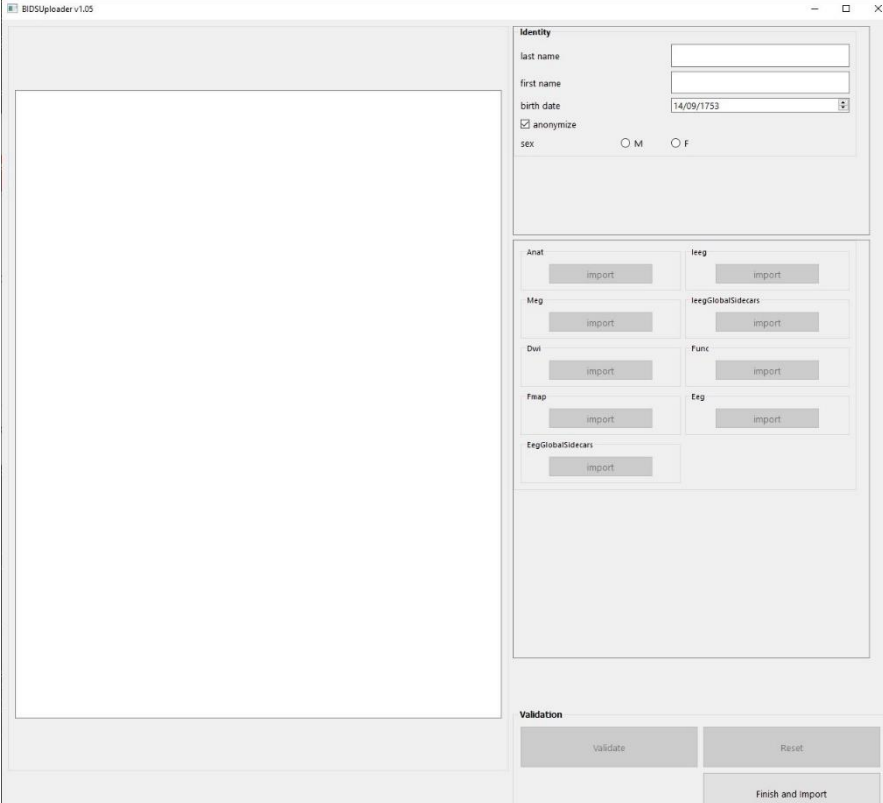
The screenshot shows the BIDSUploader v1.05 application window. It features a large empty rectangular area on the left for file selection. On the right, there is a form for subject information under the 'Identity' section, including fields for last name, first name, birth date (set to 14/08/1753), an 'anonymize' checkbox, and radio buttons for sex (M and F). Below this is a grid of 'import' buttons for various modalities: Anat, Meg, Derf, Fwarp, EegGlobalSidecars, leeg, leegGlobalSidecars, Func, and Eeg. At the bottom right, a 'Validation' section contains 'Validate', 'Reset', and 'Finish and import' buttons.

Figure 9: BIDS Uploader interface

For each subject, their characteristics (e.g. sex, age), modalities to be imported and file locations have to be specified and validated. The data2import is generated and data are copied in a temporary folder.

More explanation will be given on the GUI in the section functionality (4.2.1).

3. Software interface

3.1. Interface Overview

The main interface of BIDS Manager offers four drop-down menus.

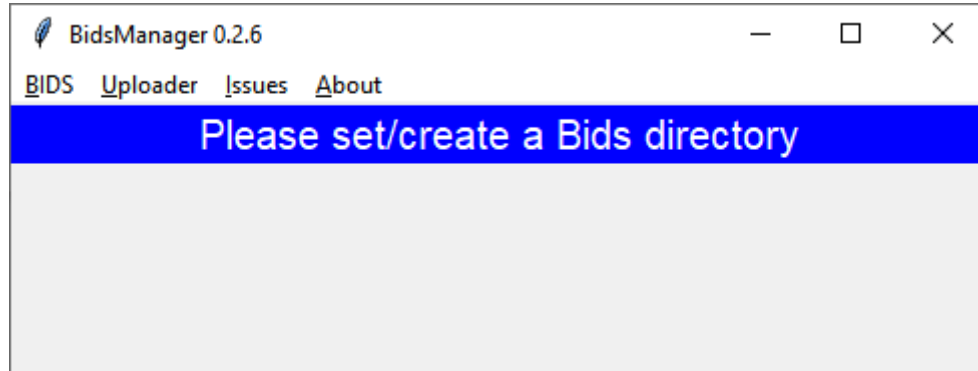


Figure 10: BIDS Manager main interface

BIDS menu will be used to set and explore the BIDS directory.

The menu *Uploader* allows to import data in BIDS format.

If there are issues during the importation, menu *Issues* is here to help the user.

The *About* menu gives information about BIDS Manager Licence and how to cite the software.

3.2. Windows description

According to the menu selected in BIDS Manager, different windows can be displayed. Most of the time, the main window will not change, and other windows will be opened, but in some cases the main window changes its configuration (e.g. when *Issues* menu is selected, see Section 5).

3.2.1 Window to show JSON files

This window displays the content of json files. The keys are displayed in the left column whereas the values are displayed in the right columns. If a key is mandatory according to BIDS specifications, it will be displayed in red. Figure 12 shows an example with the dataset description file.

3.2.2 Window to show TSV files

This window displays the content of tsv files. It appears as a table. The header of the tsv files are displayed as buttons whereas the content is displayed as boxes. In some cases, the background color can be red or green. The green color means good or ready while red means bad or not ready. Figure 6 shows an example with the participants.tsv file.

3.2.3 Window to explore the dataset

This window displays the elements in the selected BIDS Dataset. On the left column can be found the keys and on the right the values. If the value is a directory or a file and thus openable, it will be displayed in a blank box. A double-click will pop-up a menu with different actions if it is a file, or a

new window will be opened to display the content if it is a directory. Figure 29 shows an example with one BIDS dataset.

3.2.4 Window to display issue

In that case, the main window is displayed but its configuration changes. The main window is divided in two list panels: the right one displays the issues, the left the chosen actions. Two buttons appear on the right, one to apply, the second to delete the actions. Figure 36 illustrates an example with importation issues.

4. Procedure

This section describes step by step how to create the BIDS Directory, import data and explore a dataset.

4.1 Create the BIDS dataset

BIDS Manager allows the user to create the BIDS directory that will be needed to store the data with associated files. To start, user should click on “create new BIDS Directory” in the BIDS menu (see figure 11).

It will ask to select an empty folder, then, a window will appear to create the dataset description file (Figure 12).

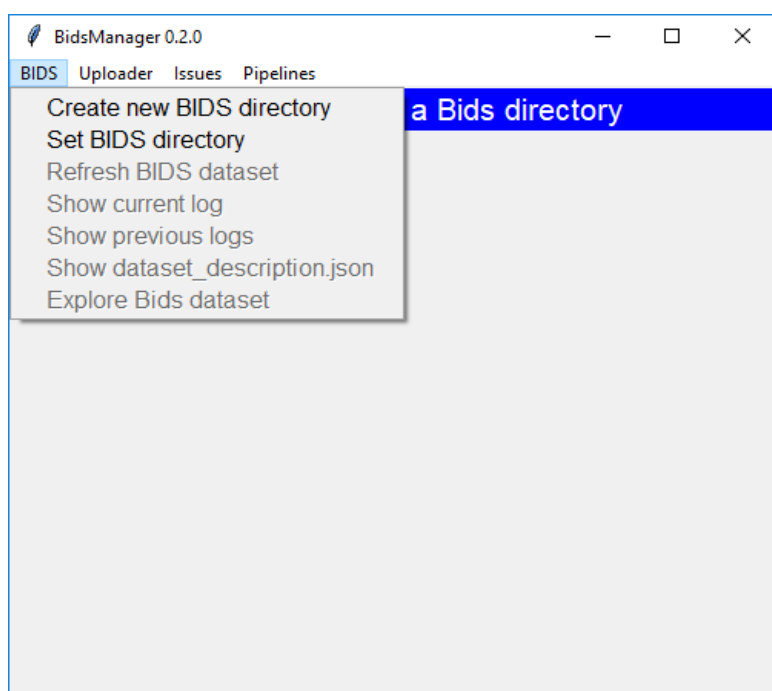
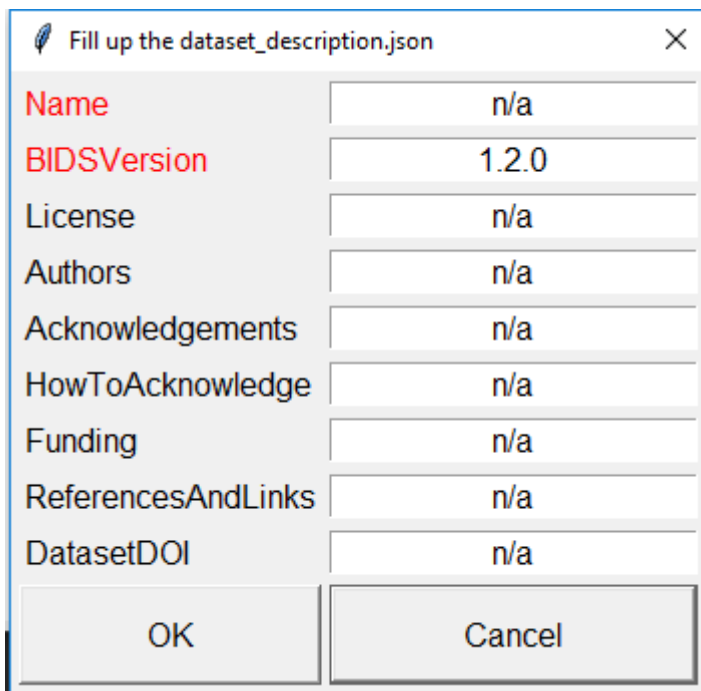


Figure 11: BIDS Menu – BIDS Manager

4.1.1 Dataset Description



Field	Value
Name	n/a
BIDSVersion	1.2.0
License	n/a
Authors	n/a
Acknowledgements	n/a
HowToAcknowledge	n/a
Funding	n/a
ReferencesAndLinks	n/a
DatasetDOI	n/a

OK Cancel

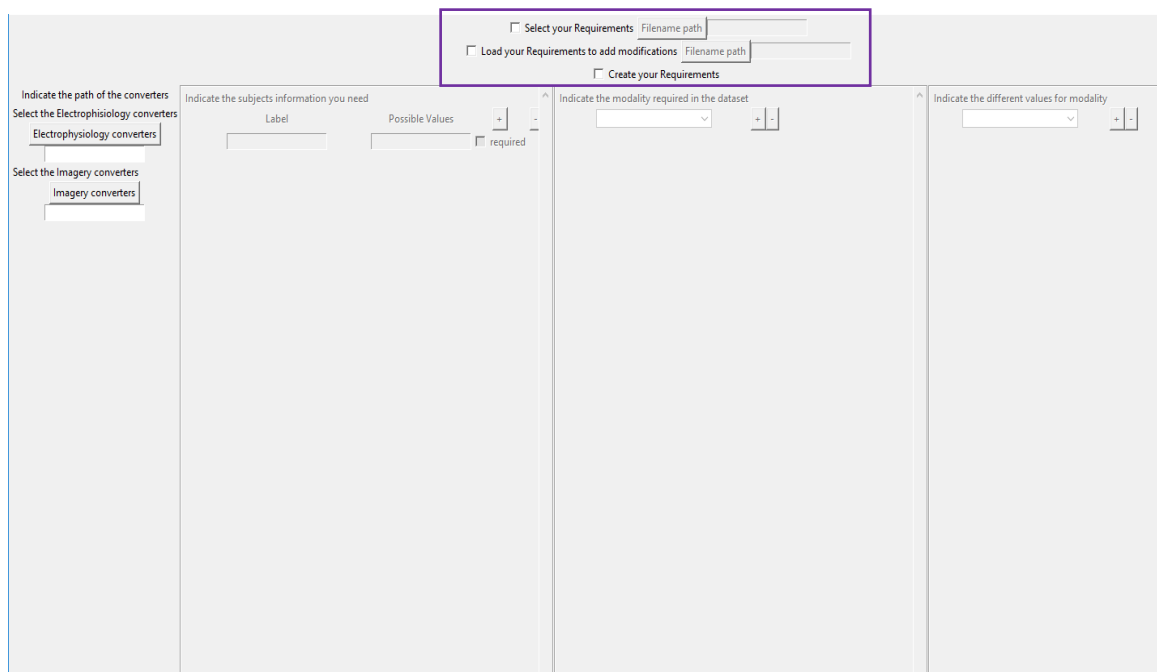
The value in red are very important, if the “Name” is not informed, an error will occur. The “Name” corresponds to the protocol name. It allows to verify that subjects are imported in the right BIDS directory.

Figure 12: Dataset description

The second step is to inform the value for the requirements file.

4.1.2 Requirements

The interface will guide the user to create the requirements file or to load an existing requirements file.



☐ Select your Requirements

☐ Load your Requirements to add modifications

☐ Create your Requirements

Indicate the path of the converters

Select the Electrophysiology converters

Electrophysiology converters

Select the Imagery converters

Imagery converters

Indicate the subjects information you need

Label	Possible Values
<input type="text"/>	<input type="text"/> <input type="checkbox"/> required

Indicate the modality required in the dataset

Indicate the different values for modality

Figure 13: Graphical Interface to create requirements.json

The first three buttons offer the following option:

- select an existing requirements.json,
- load a requirements.json and modify it by adding elements using the GUI,
- and create a new requirements.json thanks to the GUI.

By selecting “Create your Requirements” or “Load ... to add...”, three frames will be displayed.

Figure 14: Interface to inform participant information

The first frame is designed to fill the type of participant characteristics required in the participants.tsv.

Label corresponds to the name of the participant information (ex: age, sex, handedness) and cannot be empty. **Possible values** represent the list of the values that the label can take (e.g. F, M), it can stay empty. The values in “possible Values” must be separated by a comma.

The checkbox **required** is used to indicate whether the information is mandatory.

There are two buttons to the right of the frame to add (+) and remove (-) lines. It is possible to add as much information as necessary.

Figure 15: Interface to indicate the data required in the dataset

This second frame: “Indicate the modality required in the dataset” permits to inform which type of data are mandatory in the dataset.

The drop-down list is used to select a modality type (e.g. Anat or iEEG) and the (+) button add it. Then, the user can inform the specificity of the data (e.g. session, modality). For instance, the user could require an T1w MRI from session 1. The (-) button can be used to delete the last modality added.

For the modality part (in Figure15: T1w, T2w, T1rho, ...), several modalities can be selected. However, if the user selects multiple ones, it

means that all the selected modalities are required in the dataset. If none are selected, it means that one modality is required but the type does not matter. For the other keys, if the user does not add a specific value but want the key in the name, the user should write “_”.

The user can add as much information as needed. However, be careful by selecting the type of data required because all subject folders must contain them.

Figure 16: Interface to inform possible attributes for each modality

The third frame: “Indicate the different values for modality” is set to indicate the specificity of each modality type. By modality type, the user indicates the possible values of the different keywords used to name the data (e.g. ses = preimp, postimp). The values must be separated by a comma. The difference with the second frame is that these modalities are not mandatory in the database but the possibility to have them is offered. The user should add all the modalities that he/she can have in a given database with all possible keys.

The last part is used to indicate the path of the software programs used to convert the electrophysiological and imaging data. For now, only AnyWave and dicm2nii are validated converters.

Figure 17: Interface to inform converter paths

Once the user clicked “Ok”, the ‘requirements.json’ is created/saved in the folder Code, and the ‘dataset_description.json’ and the ‘participants.tsv’ are created in your BIDS directory.

4.2 Import data in the BIDS dataset

Once a BIDS directory has been specified to BIDS Manager either by using the option “Create new BIDS directory” or by using the option “Set BIDS directory”, data can be imported in the dataset. There are two manners to import data with BIDS Manager. Both options are available in the menu *Uploader*.

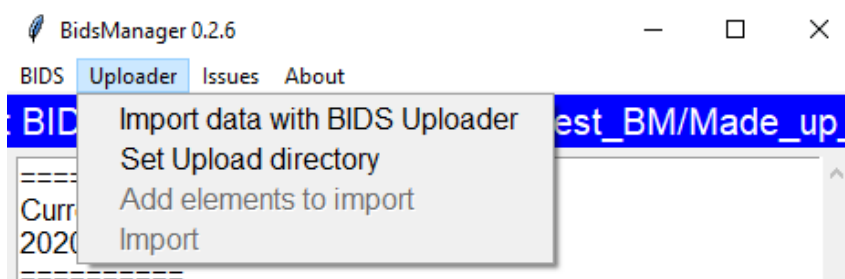


Figure 18: Uploader Menu - Bids Manager

The first option ‘Import data with BIDS Uploader’ launches BIDS Uploader to create the data2import file. The second option “Set upload directory” is used when a folder with the data to be imported already contains a data2import file. The following sections describes these two options.

4.2.1 Import data with BIDS Uploader

By clicking on this option, BIDS Manager opens “BIDS Uploader”. BIDS Uploader permits the user to indicate, for a given subject, the data to be imported, to tag the data, copy them in a specific directory and anonymize them, and create the data2import.

The screenshot shows the BIDS Uploader v1.05 application window. The interface is divided into a large left-hand area for a log and a right-hand form area. The form area includes an 'Identity' section with fields for last name, first name, birth date (set to 14/09/1753), an anonymize checkbox, and sex radio buttons (M, F). Below the identity section is a grid of data type categories, each with an 'import' button: Anat, Meg, Dwi, Fmap, EegGlobalSidecars, leeg, leegGlobalSidecars, Func, and Eeg. At the bottom right, there is a 'Validation' section with 'Validate', 'Reset', and 'Finish and import' buttons.

Figure 19: BIDS Uploader interface

This GUI is made according to the requirements file. The requirements file informs the uploader on which type of data can be imported and the subject information to fill in. If the requirements file has not been created, we suggest doing it now before going further.

The main frame of the uploader (left-hand side of Figure 19) is the log.

The *identity* frame is to fill in the subject information. Once the name, sex and date of birth are informed, a new window pop-up with the subject characteristics requested for the BIDS database. The anonymize checkbox allows to anonymize the subject data by creating a hexadecimal ID key.

Figure 20: Participant characteristic interface - BIDS Uploader

The * indicates the required information.

The other frames are used to import the modalities. Clicking on “import_<modality>” opens a new window with the attributes to be informed. To import a file, select the attributes of the file and click

Figure 21: Modality interface - BIDS uploader

on “Import”. The file explorer will pop-up for the user to select the file. Several files/folders can be selected at once if they have the same attributes, and only the run number changes.

At each step, the log is updated, and the user can see what has been done. He can also verify or modify these steps.

By double clicking on the first line (the one for the subject information), the user will be able to review or modify these characteristics. If the user clicks on “modify”, the frame “identity” will be available again.

Figure 22: Main frame - BIDS Uploader

The last step is to click on *Validate and format*. If some lines in the log are still in red, it means BIDS Uploader found a mismatch between the identity entered by the user and the identity found in the header of the file. The user has to “Check” the file by right-clicking on it and forcing the verification in case of a pre-anonymized data or delete the file otherwise. When all the lines in the log are green or yellow, the user can validate again, and it will create the data2import for this subject and reset BIDS Uploader. New subjects can be added. Once, all subjects have been done, the window of BIDS Uploader can be closed, and BIDS Manager will import these data in the BIDS directory.

4.2.2 Import data by setting an upload directory

For this option, an upload directory with one data2import.json must exist. By clicking on “Set Upload Directory”, the path of the upload directory can be informed.

Once the folder is selected, BIDS Manager reads the data2import and asks the user to verify the files that need to be imported.

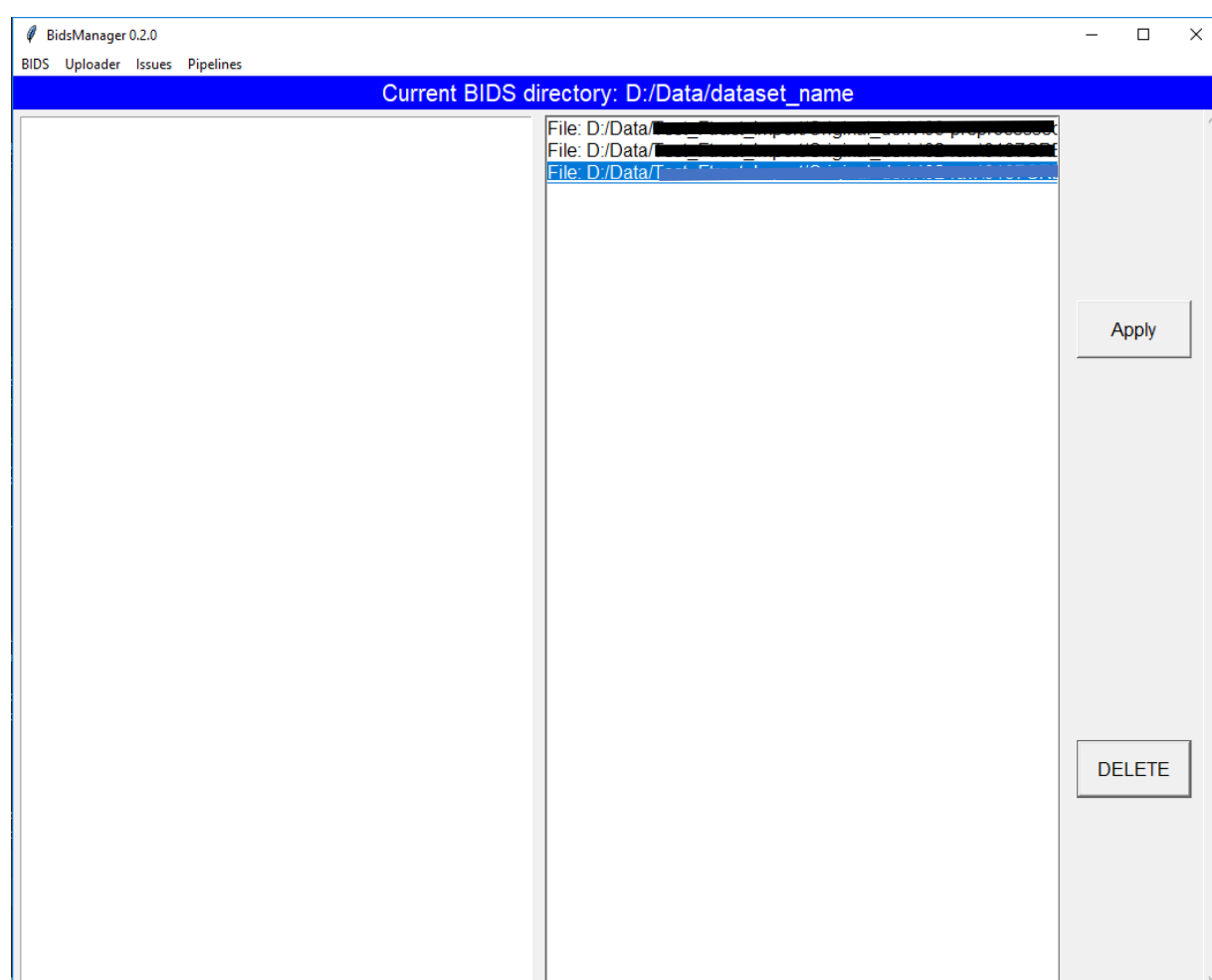


Figure 23: Verification interface - BIDS Manager

The reconfiguration of the main window (Figure 23) allows the user to run some verifications and apply some actions. The main window displays: “/import directory/fileLoc is not verify”. By double clicking on this line, a drop-down menu appears to select the adequate actions.

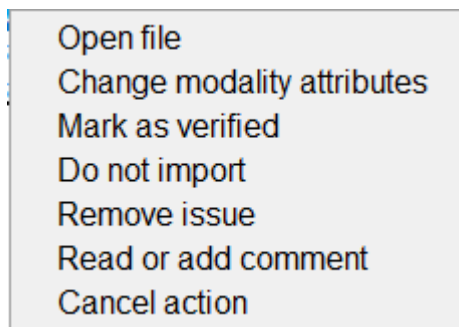


Figure 24: Action Menu

To run the importation, files must be “mark(ed) as verified”. This step is set to ensure that the importation of the file is made with the corresponding attributes and that the file is not corrupted.

However, before applying this action, the user can do other actions: add comment or open the file. The action “Change modality attributes” allows the user to modify some attributes before import. Thus, a new window is displayed with the attributes corresponding to the modality. (figure 25).

The attributes in **red** are required.

For some attributes, a drop-down list is present with the possible values. Those values are the ones already present in the database. The one present in the data2import can be modified for each data file and BIDS Manager will modify the data2import.json file.

Figure 25: Interface to modify attributes

Once the user has specified the actions to be performed on the data, he/she can either apply these actions or delete those actions. Once all data have been verified, they can be imported.

However, if the user has forgotten some data, he/she can add it by selecting the corresponding directory and the data2import. To do this, the option "add items to import" must be used. It can be found in the *Uploader* menu which becomes enabled when a download directory is selected.

Data2Import: bla	
Name	bla
BIDSVersion	1.0.1
License	n/a
Authors	n/a
Acknowledgements	n/a
HowToAcknowledge	n/a
Funding	n/a
ReferencesAndLinks	n/a
DatasetDOI	n/a
Subject	c44d6e9626f5
Derivatives	
<div> <div>OK</div> <div> <div>Add Subject</div> <div>Add Derivatives</div> <div>Cancel</div> </div> </div>	

Figure 26: Interface to add elements in data2import

This new window permits to select the subject for the new elements (figure26). By double clicking on the subject's code, a new window appears that allows indicating the characteristics of the subject and selecting the new modality to add (Figure 27).

Multiple windows pop-up to fill the attributes of the file with its location (Figure 28).

For some attributes, a list is available in order to select a value that already exist in the dataset.

Once the user validates the upload directory and data2import, he/she can click on "Import" in *Uploader* menu and BIDS Manager will import the data in the appropriate folders.

The main window will display the progress of the importation and whether an error occurs. The progress can be retrieved in the log file located in derivatives/log of the BIDS directory.

Subject: c44d6e9626f5

sub	c44d6e9626f5	
age	28	
sex	F	
handedness	L	
anat_lesion	n/a	
comment		
age_first_seizure		
epilepsy_type		
Anat		Add Anat
Func		Add Func
Fmap		Add Fmap
Dwi		Add Dwi
Meg		Add Meg
Eeg		Add Eeg
leeg	B1011_3mA_1Hz_1000us_1.mat	Add leeg
Beh		Add Beh
leegGlobalSidecars		Add leegGlobalSidecars
Scans		Add Scans
OK		Cancel

Figure 27: Interface to add elements in data2import

F23_3mA_1Hz_1000us_1.mat

sub	c44d6e9626f5	
ses		
task		
acq		
run		
proc		
modality	ieeg	
fileLoc	F23_3mA_1Hz_1000us_1.mat	
leegJSON		Modify leegJSON
leegChannelsTSV		Modify leegChannelsTSV
leegEventsTSV		Modify leegEventsTSV
OK		Cancel

Choice list

Figure 28: Interface to add elements in data2import

4.3 Explore BIDS Dataset

Once the BIDS directory has been filled, it is time to explore what is present in this directory. In the BIDS menu, there is the option: “Explore BIDS dataset”.

The figure 29 shows a new window pop-up displaying the information present in the dataset_description.json, the subject folders, derivatives folders, and the participants.tsv file.

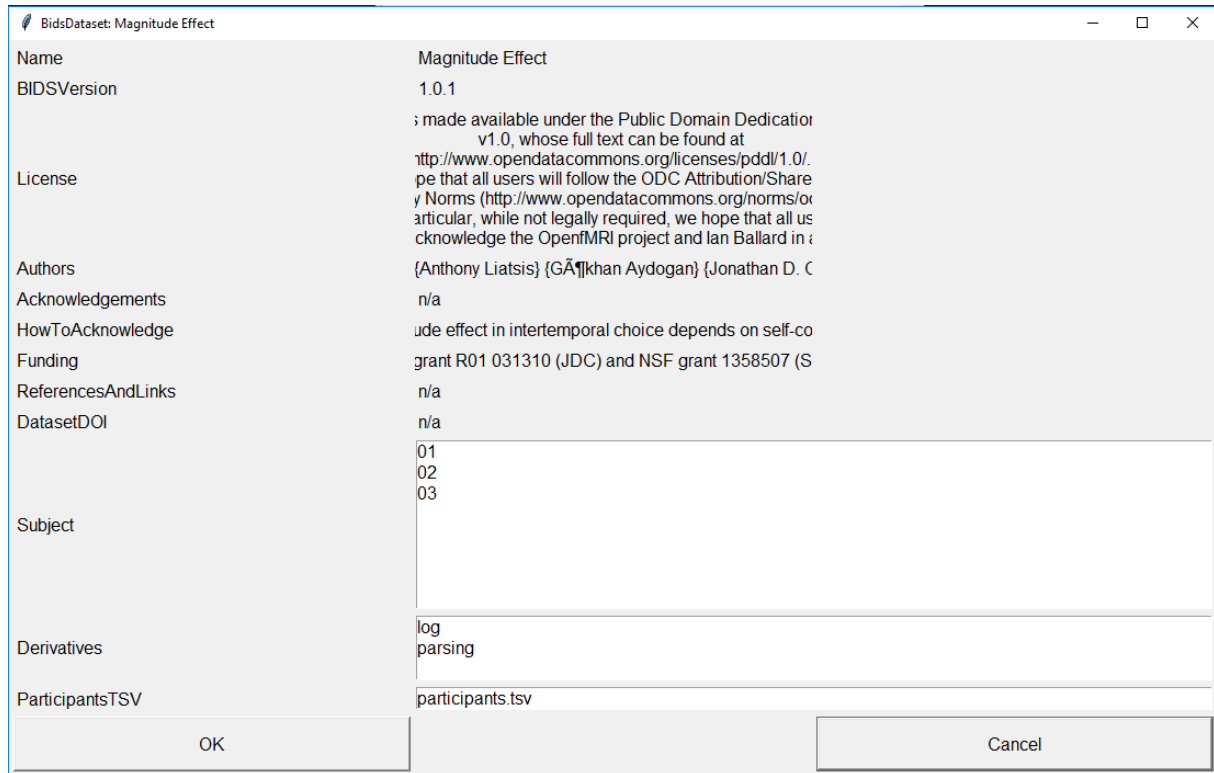


Figure 29: Explore Bids Dataset

By double clicking on one subject or one derivative, a new window appears to show the data present and the subject information.

To see what data are present for one subject, double-click on the chosen subject ID and a window will appear with the files present for this subject, classified by modality. (Figure 30)

By double clicking on one file, one menu will appear offering different actions:

- Open file
- Show attributes
- Remove file

Open file will open the file with the appropriate software. Show attributes open a new window to display the specificity of the selected file and its sidecar files (e.g. events, channels). (Figure 31)

Attribute	Value
sub	01
sex	F
Anat	sub-01_T1w.nii.gz
Func	sub-01_task-mag_run-01_bold.nii.gz sub-01_task-mag_run-02_bold.nii.gz sub-01_task-mag_run-03_bold.nii.gz
Fmap	sub-01_dir-opposing_run-01_epi.nii.gz sub-01_dir-opposing_run-02_epi.nii.gz
Dwi	sub-01_acq-AP_dwi.nii
ieeg	sub-01_acq-seizure_run-01_ieeg.edf sub-01_acq-seizure_run-02_ieeg.edf sub-01_acq-seizure_run-03_ieeg.edf
ieegGlobalSidecars	sub-01_acq-preimp_photo.jpg sub-01_space-T1w_coordsystem.json sub-01_space-T1w_electrodes.tsv
Scans	

OK Cancel

Figure 30: Subject's dataset

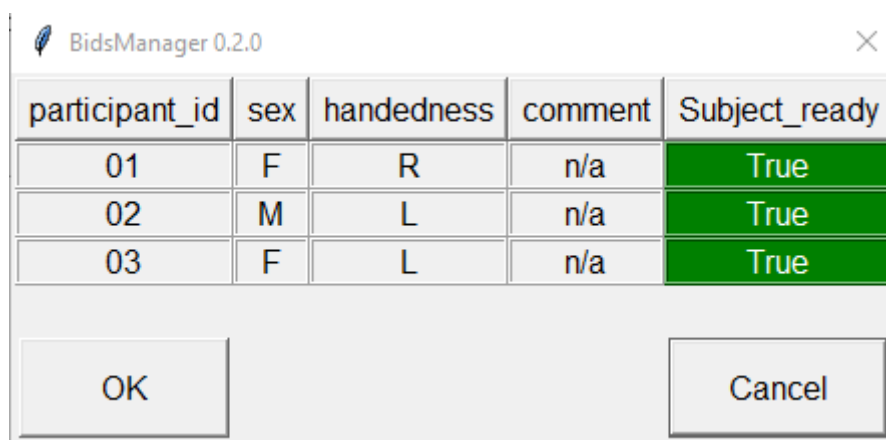
The window shows the attributes of the file, its location, and the different sidecar files. For example, for an iEEG file, three files are written: the channels, the events and the json file. It is possible to open these files in BIDS Manager.

sub	01
ses	
task	
acq	seizure
run	01
proc	
modality	ieeg
fileLoc	sub-01\ieeg\sub-01_acq-seizure_run-01_ieeg.edf
ieegJSON	ieeg.json
ieegChannelsTSV	channels.tsv
ieegEventsTSV	events.tsv

OK Cancel

Figure 31: Attributes of one iEEG file

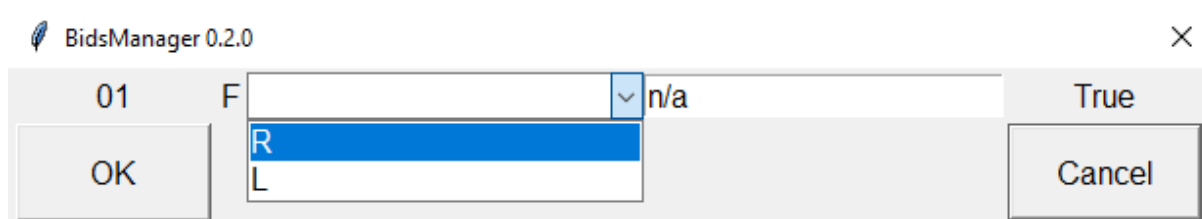
Double clicking on the sidcar file opens the file. Some tsv files have the particularity to be modified from BIDS Manager GUI. The files concerned are participants.tsv and channels.tsv (file for the electrophysiological modalities).



participant_id	sex	handedness	comment	Subject_ready
01	F	R	n/a	True
02	M	L	n/a	True
03	F	L	n/a	True

Figure 32: Participants.tsv file opened with Bids Manager

For the participants.tsv, one line can be modified by double clicking on the participant_id of the subject and select “Modify the participant’s line”. A new window opens with the line selected and the elements that are possible to modify. If values are fixed in the requirements, the user must choose from the list.



01	F	<div>▼</div>	n/a	True
----	---	--------------	-----	------

Figure 33: Interface to modify a line of the participants.tsv

It is also possible to open the subject dataset by double clicking on the participant_id and select “Open subject dataset”.

The way to open and modify channels.tsv is pretty similar to participants.tsv except that only the status of the electrodes can be turned in bad or good by double clicking on it.

BidsManager 0.2.0 ×

name	type	units	low_cutoff	high_cutoff	sampling_frequency	notch	group	reference	description	status	status_description
.Sp1	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp2	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp3	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp4	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp5	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp6	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp7	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp8	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp9	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp10	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp11	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp12	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp13	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp14	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp15	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp16	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp17	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Sp18	OTHER	n/a	n/a	n/a	512	n/a	.Sp	n/a	EEG	good	n/a
.Wp1	OTHER	n/a	n/a	n/a	512	n/a	.Wp	n/a	EEG	good	n/a
.Wp2	OTHER	n/a	n/a	n/a	512	n/a	.Wp	n/a	EEG	good	n/a

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PreviousNext

OKCancel

Figure 34: iEEG channels file opened in Bids Manager

Explore BIDS dataset is a good way to visualize what is inside the dataset and if necessary, do some modifications.

5. Issues

If an issue is prompted during the importation, it can be fixed by selecting the *Issues* section. This menu can fix three main issues. The first one is the verification of the content of the folder to be uploaded, the second is an importation issue, and the third is derived from issues with the channels or the electrophysiological data.

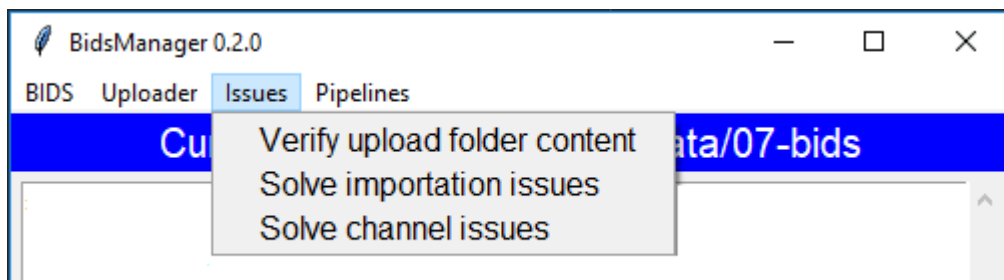


Figure 35: Issues Menu - BIDS Manager

5.1 Verify Upload folder content

This menu is useful when the option “Set Upload directory” is selected instead of “Import data with BIDS Uploader”. It allows verifying the content of the upload folder to avoid importing incorrect files and modify the data2import if necessary (see Section 4.2.2). Each file present in the folder must be ‘marked as verified’ to be able to import the folder.

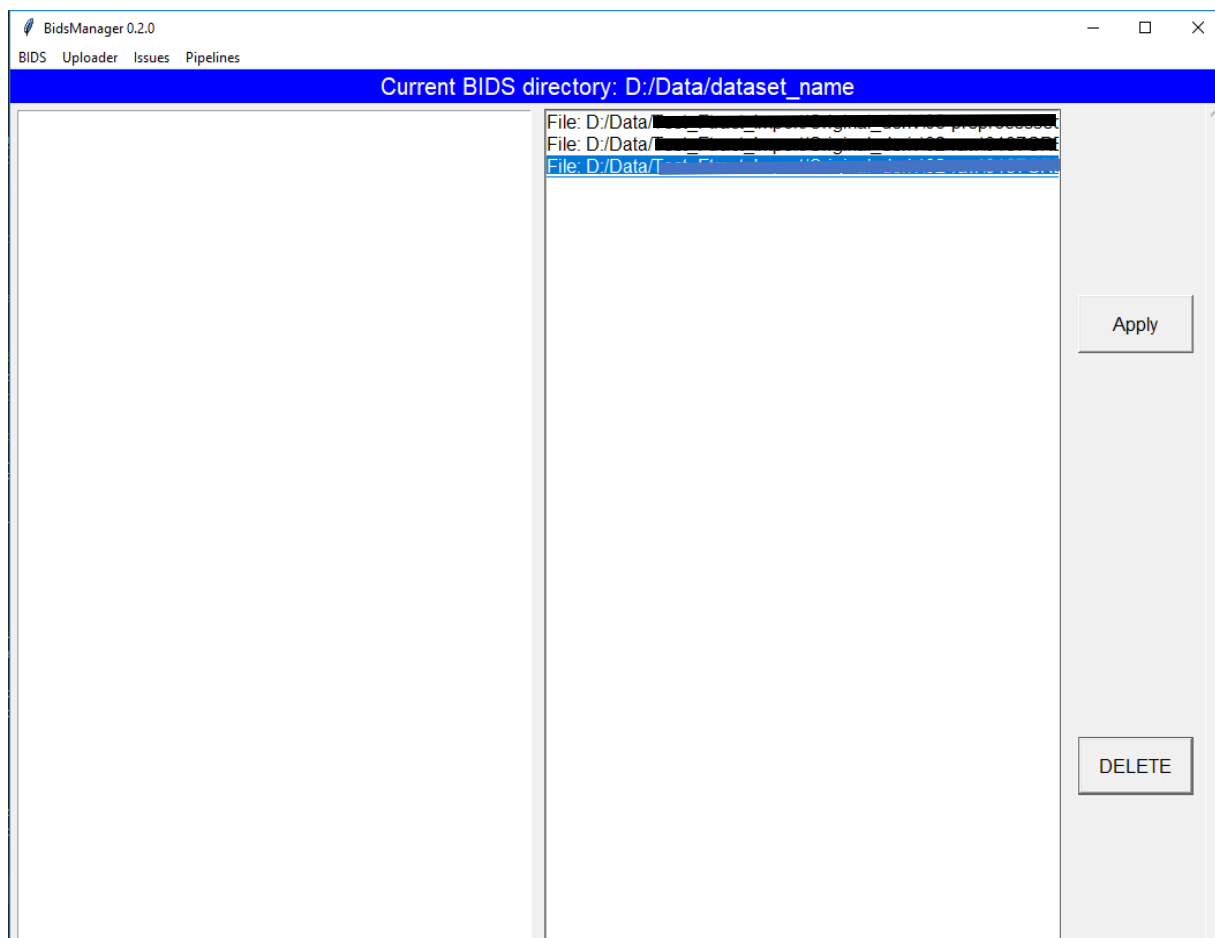


Figure 36: Verify upload folder content interface

By double clicking on the line of the file, there are several possibilities (see below, Figure 37).

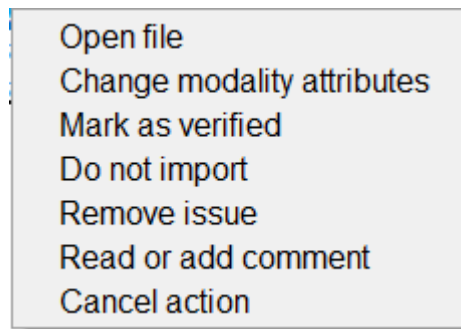


Figure 37: Menu to change issue in folder content

5.1.1 Open file

This option allows to open the file with the application marked as default on the computer.

5.1.2 Change modality attributes

This option is used to modify the attributes of the file. For instance, change the session from “01” to “02” or the task “rest” to “sleep”. BIDS Manager will modify the data2import.json file with the values entered by the user for this specific file. However, be careful because if BIDS Manager notices that this specific file is already present in the dataset, an issue will occur during the importation.

5.1.3 Mark as verified

This option allows the user to do a double verification on the files to be imported and is mandatory before the importation when “Set Upload directory” option is chosen as mentioned in section 4.2.2.

5.1.4 Do not import

This option allows removing a file of the data2import so BIDS Manager will not import. It can be used after an importation error, either the “already present” or the “source file with the same name”. This option does not remove the file from the upload folder, only from the data2import file.

5.1.5 Remove Issue

Sometimes, while an error occurred during the importation, some issues that have been solved stay in BIDS Manager. This option has been created in this purpose, the issue can be removed from the dataset issues and the importation can be done.

5.1.6 Read or add comment

This option is useful when different users manipulate the BIDS dataset. Users can write a comment to the issue and wait for a discussion before applying an action.

5.1.7 Cancel action

This option is used to cancel a previous action. For example, if the action of “Mark as verified” is applied, by using “cancel action”, the issue will be back to its original state.

5.2 Importation Issue

After the importation is over, it is possible that the program finds mismatches between the dataset and the data to import. The encountered issue can be:

- Wrong protocol: Not the same dataset name
- Wrong subject characteristics: The attributes of the patient are different between the one in the dataset and the ones in the importation file
- Same source data: the subject's folder already contains a source data with the same name
- Files with same attributes: the user is trying to import a file with the same attributes as a file already in the dataset

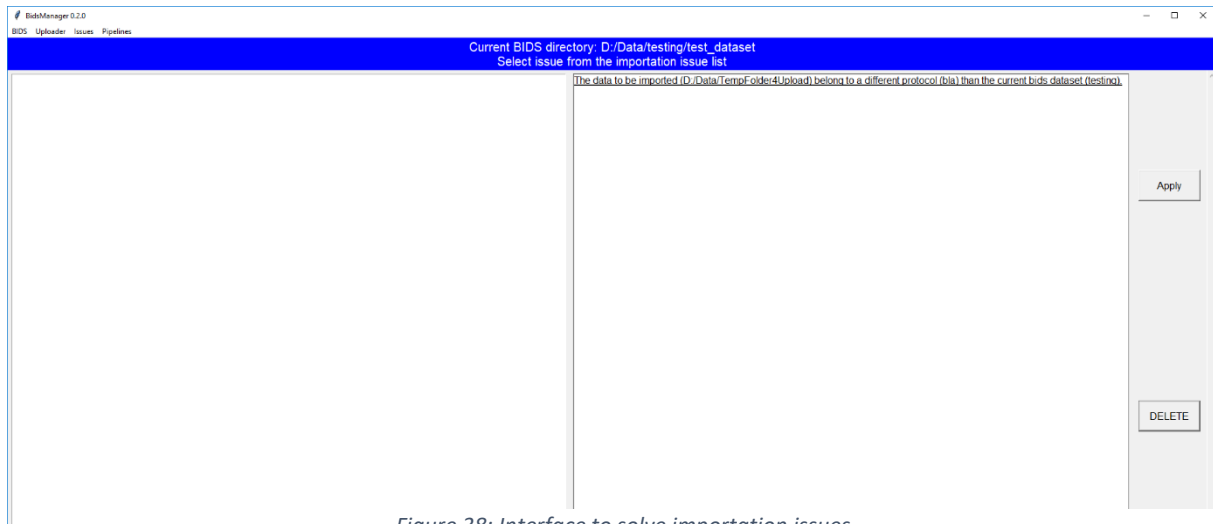


Figure 38: Interface to solve importation issues

Clicking on “Solve importation issues” will display the different issue in the main windows as it can be seen in figure 36. Different actions can be applied depending on the issue.

5.2.1 Wrong protocol

This issue is due to an incoherence between the protocol name of the BIDS directory (dataset_description.json) and the name given in the data2import (DatasetDescJSON).

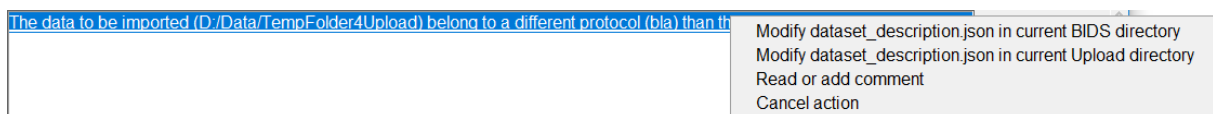


Figure 39: Possible action to apply to solve importation

By double clicking on the issue, BIDS Manager offers to do some modifications. The protocol name of either the BIDS dataset or the data2import.json file can be changed. Comment can also be added which will not solve the issue but can be useful to let another user know about the problem.

5.2.2 Wrong subject characteristics

This issue is due to a mismatch between the participant characteristics in the dataset and the one entered in the data2import file. The method to apply the action is similar to the precedent one. There

are two options: modifying the data2import with the value in the dataset or modifying the value in the dataset.

5.2.3 Same source data

This issue states that the user is trying to import data that are already in the dataset. User can decide not to import this file by double clicking on the issue.

5.2.4 File with same attributes

This issue shows that a file with the same attributes as the one the user is trying to import is already in the dataset. The attributes of the file can be changed in the data2import to solve the issue by double clicking on 'Change modality attributes' (section 5.1.2).

Once none of the above issues remain, you can launch the importation procedure again via the 'Set Upload directory' (section 4.2.2).

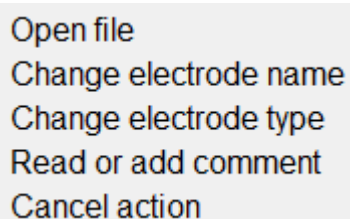
5.3 Channels Issues

The importation went well but some warnings appeared concerning the channels of electrophysiological files.

BIDS Manager verifies inside the subject's dataset (for a given session) that all IEEG/EEG files have the same electrode names as in electrode.tsv tables, it also verifies the type of the electrode. The possible issues are:

- Channel type is not conformed
- Channel name is not conformed

Clicking on the function "Solve channel issues" will display the channels issues in the main window. If the name or type of the electrode is wrong, the user will have the following message: "In file X of subject X, {electrode name} does not match electrodes.tsv reference."



Open file
Change electrode name
Change electrode type
Read or add comment
Cancel action

Double clicking on the issue will offer two options, changing the name or the type of the electrode. Then, it will open a new window and suggest the channel name or type.

Figure 40: Menu to apply action on channels issue

6. Error handling

This section will describe the possible errors that users could encounter by using BIDS Manager and give the solution to solve them.

6.1 Errors with requirements

Once requirements have been loaded or created, the user has to indicate the paths of the electrophysiological and imaging converters. Otherwise, the error in figure 41 will appear. To solve it the user is required to add the path in the left part of the GUI.

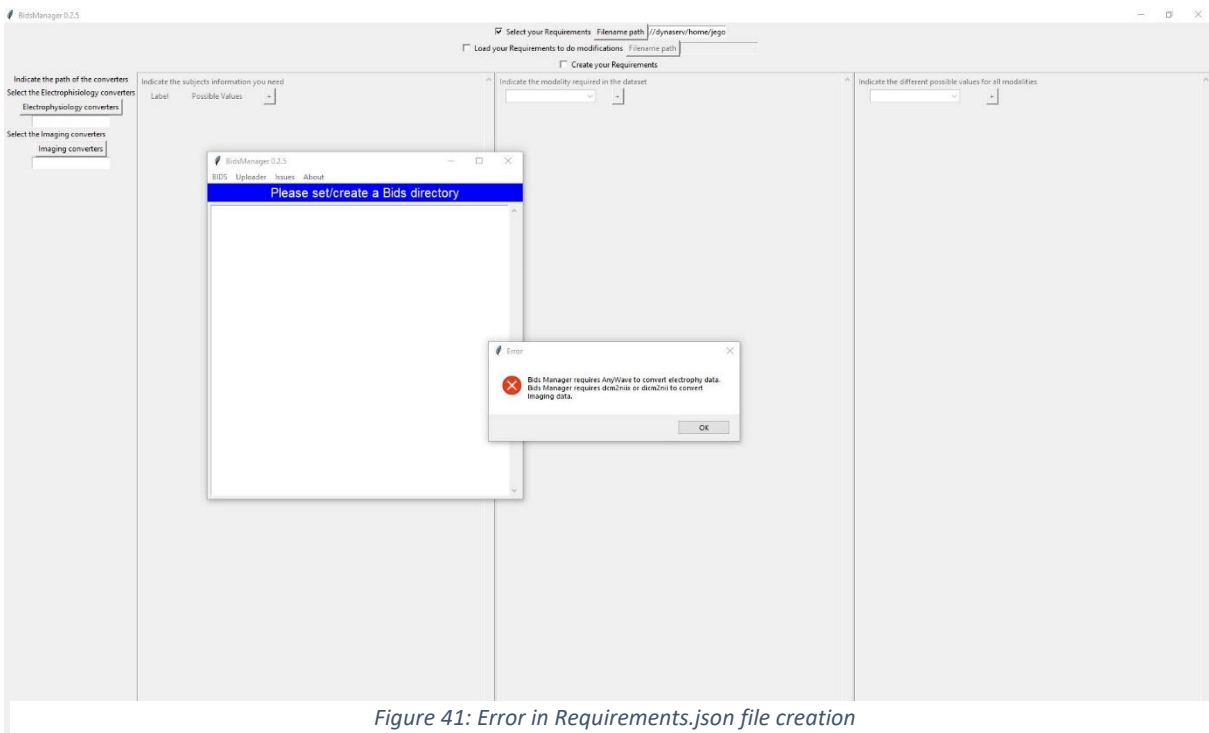


Figure 41: Error in Requirements.json file creation

6.2 Error with importation

During the importation of the data, some errors, which are not expected as the issues described above, can occur. The following sections will detail the procedure to overcome these errors.

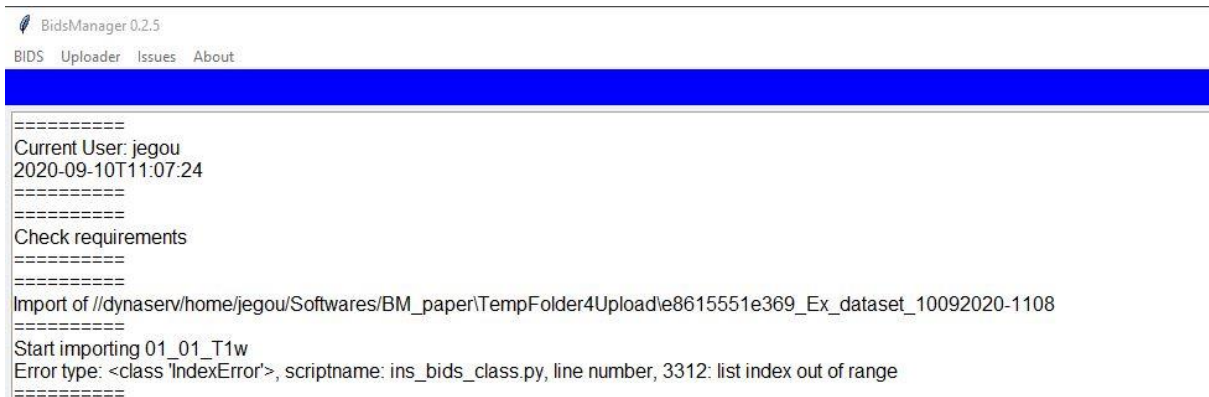


Figure 42: Error during importation

6.2.1 Error with the converters

An error can come from the converters used. If BIDS Manager gives the error illustrated in figure 42, it means that the converters didn't convert the data properly and BM cannot find the converted file. To solve it, the user should change his converter. For the imaging converter, make sur to use the *dicm2nii.exe* provided on the Github (https://github.com/Dynamap/BIDS_Manager). For AnyWave, the problem can also come from the version so do not hesitate to use a previous version (if you have one) or contact us at: christian.benar@univ-amu.fr

The antimalware or firewall can also block the conversion, the user must give the permission to the converters, in the corresponding software, to execute it on the computer.

6.2.2 Errors import anatomical data

If the imaging converter cannot convert the DICOM folder, it is possible that some NIFTI files are present in the DICOM folder. The NIFTI files must be removed for successful conversion.

6.2.3 Errors with 'Importation Issue'

Sometimes after an importation that failed or stopped, the Importation Issues keep some information about this importation. This can be problematic. Removing those issues by using BIDS Manager menu Issues/Solve Importation issue (see section 5.1.5) will fix it.

6.3 Manual Errors

In some cases, if the dataset has been modified manually, an error will occur in ~~BIDS~~BIDS Manager. For example, a file has been erased or modified manually. To solve the error, a "Refresh BIDS dataset" must be done. If the BIDS Dataset cannot be opened at all due to a bad parsing of the data, the parsing files must be erased in the folder *derivatives/parsing*, then another parsing will be done on the dataset once the BIDS directory is set.

⚠ It is important to avoid any manual changes, it is better to do it through BIDS Manager.

6.4 Error "already in use"

BIDS Manager has been created to minimize errors in manipulating the dataset. One of the implementations is to ensure that only one user at a time has access to the BIDS dataset. If another user tries to access to one specific BIDS dataset and it is already used by someone else, a pop-up window will appear a signal which user is working on the BIDS dataset (figure 43).



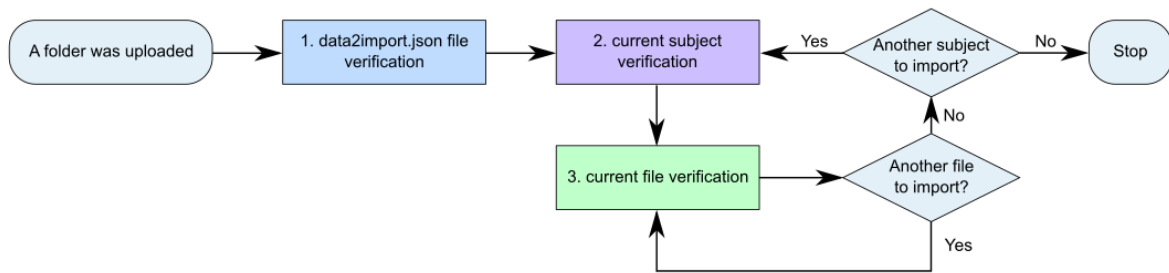
Figure 43: Error access

This error can also occur if BIDS Manager has been unexpectedly closed. To solve the problem, and if the user is certain that no one is using the dataset, the file *access.json* in */derivatives/log* folder has to be removed.

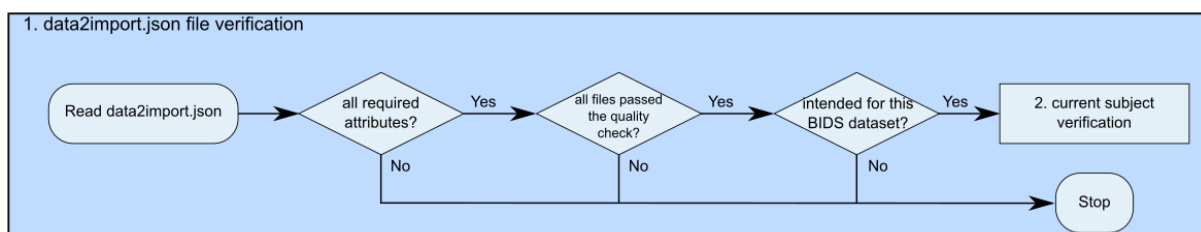
References:

- Gorgolewski, K. J., Ghosh, S. S., Das, S., Calhoun, V. D., Hanke, M., Poldrack, R. A., ... Schaefer, G. (2016). The brain imaging data structure, a format for organizing and describing outputs of neuroimaging experiments. *Scientific Data*, 3, 160044. <https://doi.org/10.1038/sdata.2016.44>
- Roehri, N., Medina Villalon, S., Jegou, A., Colombet, B., Giusiano, B., Ponz, A., & Bénar, C. G. (under review). Transfer , collection and organisation of electrophysiological and imaging data for multicenter studies.

Annex:

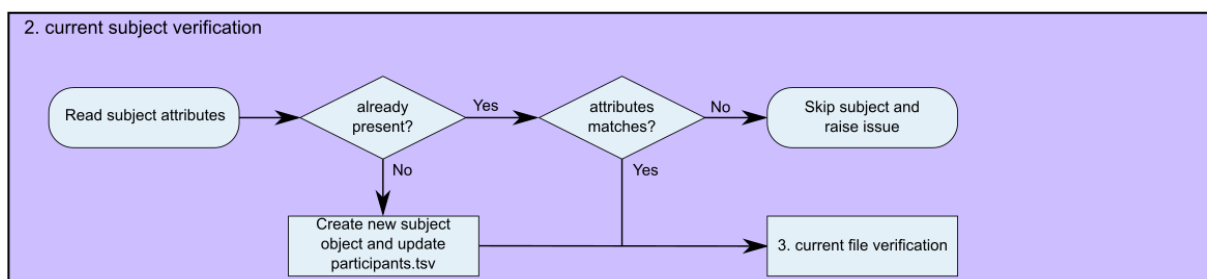


This part illustrates how the file importation works with BIDS Manager. The first diagram schematizes the main steps of the process while the following diagrams detail each step. The first step is the verification of the *data2import* file, the second the verification of the subject to be imported, and the third the verification of the files.

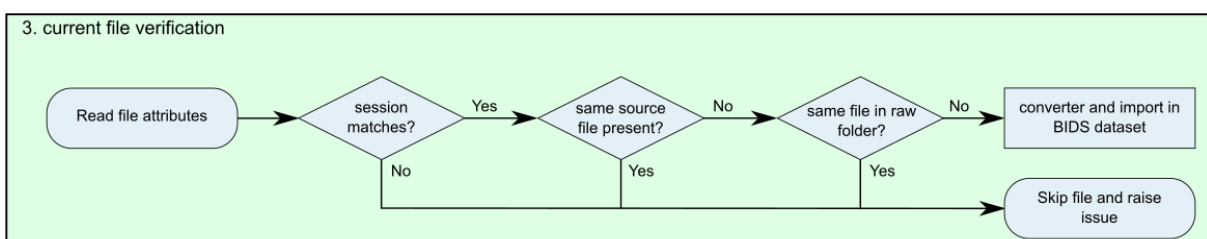


As described by the diagram, many verifications are done to check the *data2import* file. First, the attributes of the file must be consistent with the ones in BIDS Manager. Secondly, the files must be set to 'verified' by the user. Thirdly, the protocol name in *data2import* must be the same as the one in the BIDS dataset. Finally, if the verification is completed without raising an issue, it goes to the second step.

Once the *data2import* verifications are completed, the subjects to be imported are verified.



The subject present in *data2import* are compared to the subjects already present in the BIDS dataset. If the subject is already present, BIDS Manager checks the attributes (age, sex, etc. depending on the requirements file). If the attributes are not the same, the subject is not imported. If there are the same, BM go to the next step, "file verification".



In this part, the modalities that should be imported are verified. As the precedent steps, their attributes are verified then the file location is compared to the source data present in the BIDS dataset. If the original name of the file is similar to an already present file, the import file is skipped. Otherwise, it continues and compares the attributes to create the filename. If a file with the same name is already present in the BIDS dataset, the file is not imported. Finally, if everything is correct, the file is converted in the appropriate format and imported in the expected folder.