## Creating a Study Structure

### Introduction

Most clinical MRI studies are well defined before they are started and follow a basic design pattern based on the following criteria:

* number of participants
* number of visits
* control/participant groups
* MRI protocols
* persons working on the study, radiographers, principal investigator, post-docs
* data analysis
* final report generation

Therefore, one can design a data directory structure based on this knowledge and fill it in beforehand with place-holder files for the subsequent data analysis. This idea has been developed by people studying the brain and aids with data sharing and multi-site projects as data can be expected to be in certain directories. For more information see their web-site <http://bids.neuroimaging.io/>. We have attempted to follow their ideas for use in analysing T2 data via EPG methods.

The principle idea is to describe the study and data directory structure in a study template file which can be used by the data analysis software to verify the study and the results. The study template file is typically a YAML or JSON file that is a human readable text file that is structured in a way that it can be read in by programs written in python for example to create a dictionary structure that describes the project and data directory.

Advantages to this approach are many and become more numerous and beneficial with time.

* controlled vocabulary of description words for use in file names
* automated generation of file names
* automated generation of template files, for example Region of Interest files
* defined directory structure to store original data and result files
* similar studies use the same template directory structure and file-naming conventions
* long time studies can be be easily understood in terms of where things are
* processing scripts can be simplified and used between similar but different studies
* changes in personnel working on the study can be tracked over time

### Study Description File

The study description file contains different types of information:

* details of the study
  + study name
  + number of participants in the study
  + number of visits
  + participants grouped in terms of healthy controls and patients and sub-groups based on the number of visits
  + information on staff involved in the study, name, email, job description
* the MRI protocols used
  + protocols used, T2, dixon, diffusion
  + imaged regions of the body, leg, arm, head
* analysis of the images
  + slices used in the analysis
  + ROIs associated with which imaged region
  + ROI label names

The order of the different parts of the study description file is not important. Related information is grouped together, however since most of the file is generated by a program, it is saved in alphabetical order in terms of description items.