Before data acquisition -- Start MRI Project Spinoza REC
Version 5

Tinka Beemsterboer,Lukas Snoek

Abstract

Dear researcher,

This protocol gives you the steps to start an MRI project at the Spinoza Centre Roeterseiland.

If you haven't had contact with Steven Scholte or Tinka Beemsterboer, make sure to contact them before completing this protocol.

You can reach us by email:

Steven Scholte: h.s.scholte@uva.nl

Tinka Beemsterboer: t.beemsterboer@uva.nl

If you have any suggestions for improving the workflow, don't hesitate to add comments to the steps in the protocol.

Hope to see you soon!

The Spinoza REC team,

Steven Scholte, Tinka Beemsterboer, and Lukas Snoek

Citation: Tinka Beemsterboer,Lukas Snoek Before data acquisition -- Start MRI Project Spinoza REC. **protocols.io**
dx.doi.org/10.17504/protocols.io.n4mdgu6
Published: 29 Mar 2018

Protocol

Ethical Approval

Step 1.

The MRI project should been approved by an ethical committee before running the pilot.

Ethical approval may take some time, therefore it is the first step in this protocol.

External researchers starting a project at the 3T MRI scanner of the Spinoza Centre UvA REC, may also request EC approval using the Ethical Committee of Psychology of the UvA. Send an email to lab-fmg@uva.nl and t.beemsterboer@uva.nl to request an account for the website for requesting EC approval. Mention in your email that you want to request EC approval for a MRI project at the Spinoza Centre UvA REC, your name, university, and department.

Go to the website: https://www.lab.uva.nl/lab.
Click in the upper right corner on 'Onderzoeker'. Log in and follow the instructions.

Ethical Approval

Step 2.

In order to optain ethical approval you need to inform the Ethical Committee or Medical Ethical Committee about the screening procedure and procedure for incidental findings.

All subjects at the Spinoza REC need to fill out and sign the following:

- **screening** (English or Dutch)
- **GP information** (English or Dutch)

Note: you can find these documents in the Abstract (upper left corner).

All subjects at the Spinoza REC should be informed about the MRI procedure. The Abstract- tab contains the standard **information folder for MRI** (English and Dutch) research at the Spinoza Centre. You need to include this or a somewhat adapted version (depending on your project) to your Ethical Approval.

The Abstract contains a file explaining the **incidental findings procedure** one needs to follow at the Spinoza REC.

There is also a file explaining the MR screening, this is to help you understand the screening form but not something to include in your EC proposal.

User Agreement

Step 3.

The PI of the MRI project completes the User Agreement.

If we did not have contact yet about pricing etc., please contact Tinka Beemsterboer or Steven Scholte.

The budget holder of the project completes and signes the contract.

Before signing a contract, make sure to read the UserPolicy

Send the contract to t.beemsterboer@uva.nl.

Calpendo

Step 4.

Apply for a calpendo User Account.

The *PI and all other researchers, research assistants and interns* of the project should apply for a user account in Calpendo.

Go to the link https://spinozarec.calpendo.com.

Calpendo is the Calendar and user registration system used by Spinoza REC. Apart from booking registrations, Spinoza REC uses Calpendo to register Scan, Safety, Eyelink, EEG, GSR, EMG, fear conditioning and TMS certification, badges and BHV.

Calpendo

Step 5.

The PI of the project applies for a project in Calpendo.

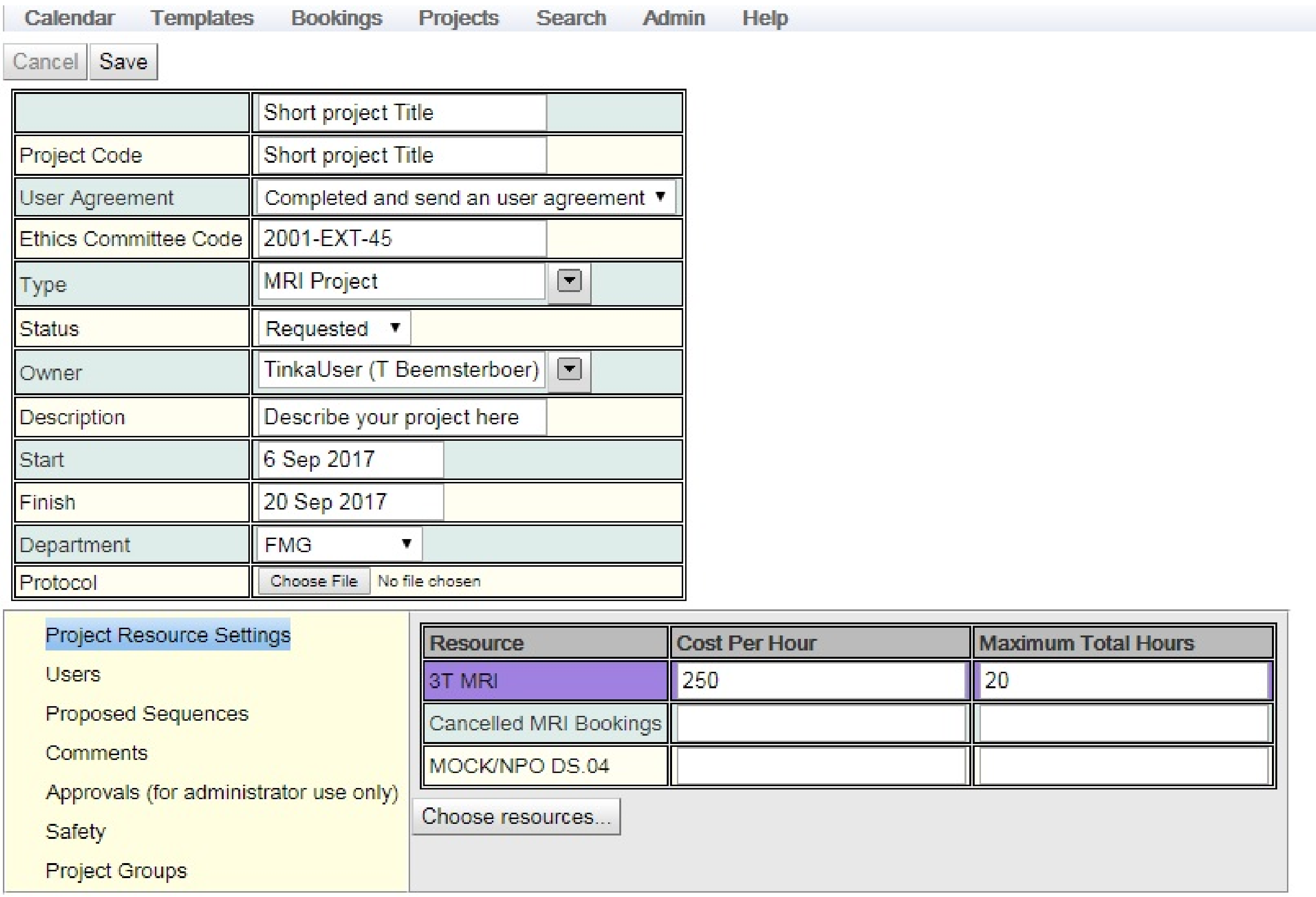
After the user accounts have been approved, the PI of the project can apply for a project in Calpendo.

Please follow the following workflow to request the project:

- In Calpendo press Projects, **Create Project;**
- Choose for **Project Code** the unique short name for your experiment as specified in the contract;
- **Upload the protocol** as known by the Ethics Committee, at Protocol
- In **Project Resource settings** choose the Resources needed for the project.
  Include the number of hours per resource and the costs per hour for use of the MRI scanner as

specified in the contract.

- **Users:** add all users of the project who have permission to manage MRI bookings for the project.
- **Safety:** set true at the stimulus equipment that will be used for the project.
  Note that the researcher of the project needs a certificate for using the Eyetracker, TMS, EGI and electrical stimulator.
  For more information about certification on stimulus equipment, contact Tinka Beemsterboer.



Calpendo

Step 6.

Send an email to Tinka Beemsterboer (t.beemsterboer@uva.nl) once you have requested a project in Calpendo and mention which stimulus equipment (as described in the Safety tab) you intend to use.

MRI Data export

Step 7.

Apply for a storage folder.

In order to export MRI data from the scan computer, you need access to an 'fMRI Projects' (for researchers affiliated with the UvA FMG) or 'Dropbox' (external researchers) folder on our data-server.

Instructions:

- UvA FMG researchers (link)
- External researchers (link)

How to access the dropbox FTP-server is explained here.

Introduction Meeting

Step 8.

Schedul an introduction meeting.

Spinoza REC offers the possibility to have a meeting with Tinka Beemsterboer, Lukas Snoek and Steven Scholte to discuss the project. To set up a meeting, email Tinka Beemsterboer (t.beemsterboer@uva.nl).

Examples of what to discuss during the intro meeting

- Choice of scan sequences
- Set-up of the experiment
- Informatio about our automated preprocessing pipeline and quality control (see also step 13)
- MR-course for the MR-operator
- Safety certification of assisting researchers
- Planning of the project
- Expectations and questions from both parties

We strongly advice to make use of this oppurtunity and prepare accordingly, because it is our experience that small details, which are easily overlooked, often result in failed pilots and the loss of valuable scanning time.

Prepare the Pilot

Step 9.

Schedule and prepare for running a pilot.

We strongly recommend running a pilot session with an experienced subject.

In the next section, we'll outline a checklist with things to think about before running a pilot session.

Prepare the Pilot

Step 10.

Make sure to have a working paradigm that waits for the first start pulse of the scanner

With each BOLD-MRI volume (excluding dummy scans), a trigger is sent to the stimulus computer. These enter the system as the letter **t** (a keyboard response). Make sure your paradigm doesn't start until it registers the first keyboard **t** response.

The following stimulus programs are installed on our stimulus-computer:

- Presentation (for which we offer technical support)
- E-Prime
- Matlab (Psychtoolbox)
- PsychoPy
- (For other programs, contact Tinka Beemsterboer for the possibilities)

The way to set up registration of external triggers in Presentation:

Select Use response button event:

Select Use fMRI (on the right side of buttons) after you selected the letter **t**:

If the setup was successful, you should see '**Keyboard: T**' at Button.

Prepare the Pilot

Step 11.

Make sure your experiment interfaces properly with the response buttons of our button boxes.

Check the image below for the mapping of the buttons to the registered reponses on the stimulus-computer (e.g., a reponse with the left index finger of the left hand will be registered as a keyboard **e** response).

We also offer the use of the MRI compatible mouse and joystick. Let us know when you want to use these.

Prepare the Pilot

Step 12.

Decide on the specific scan sequences that you want to run.

We advise you decide on which and how many sequences you want to run, including structural scans (T1-weighted, T2-weighted), functional scans (EPI-based), diffusion-based (DWI) scans, and fieldmap scans (e.g., B0-based phase-difference fieldmaps or 'top-up' fieldmaps). Also, calculate the duration of the scans with regard to the duration of your paradigm/tasks.

If you intend to use other sequences than the basic sequences, let us know in time so we can set this up before the pilot (ideally, in the introduction meeting).

Prepare the Pilot

Step 13.

Decide on whether to use our Preprocessing Pipeline and QC pipeline offered by Spinoza REC

Info about BIDS-format and the Spinoza BIDS converter tool

In order to run the QC and/or preprocessing pipelines (MRIQC and fmriprep, respectively), we need to convert the raw data from the scanner to the BIDS-format.

The BIDS-format is a specification of the format and naming of files associated with neuroimaging experiments. We have developed a tool (bidsify) that is able to automatically convert MRI data and associated files from our scanner to the BIDS-format, such that we can use the aforementioned pipelines.

Our **BIDS-conversion tool** works, in principle, with all standard scans in our repository (i.e., it doesn't work with custom sequences) *given that you've given the correct names to your scans*.

During the pilot, the MR-operator will help you with the correct naming, but the responsiblity for correct naming lies, ultimately, with the researcher.

Prepare the Pilot

Step 14.

Folder structure in BIDS (in case you want to use the automated preprocessing or Quality Control Pipeline).

Not using the preprocessing of qc pipeline? Skip this step!

Every day at 11pm, we will check the export folders (fMRI Projects or Dropbox) corresponding to the currently active experiments at our centre. If we find 'new' data, we will copy it to our server and start BIDS-conversion and QC (and, if desired, preprocessing). In order for our tools to 'find' your data, we expect it to be organized in a particular way. In all cases, we expect that you export the data to a subfolder in your export folder called 'raw'. Then, we expect each subject to get its own subdirectory in the 'raw' directory, with the subject name as folder-name (e.g., *sub-01CON*). Optionally, if you have multiple sessions, each session will get its own subdirectory in the subject-directory, with the session name as folder-name (e.g., *ses-01*). For example, suppose you plan to scan 20 subjects, each two sessions, and your export folder is called 'fMRI Project ExampleExp'. You should export the data from subject *sub-01_ses_01* to the following location:

```
fMRI Project ExampleExp

└── raw/
    └── sub-01
        └── ses-01
            ├── sub-01_ses-01_T1w.PAR
            ├── sub-01_ses-01_T1w.REC
            ├── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.PAR
```

└── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.REC

If you don't have multiple sessions, you may export all files directly to the subject-directory, e.g.:

fMRI Project ExampleExp

```
└── raw/
    └── sub-01
        ├── sub-01_ses-01_T1w.PAR
        ├── sub-01_ses-01_T1w.REC
        ├── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.PAR
        └── sub-01_ses-01_task-Nback_acq-SeqMm3_bold.REC
```

Note that you cannot create directories within your export folder from the scan-computer; you can use the 'scan-assistant' computer (right of the scan-computer) for that. Then, after 24 hours or so (depending on the desired parameters used in the preprocessing pipeline), we will copy the BIDS-converted data, quality control results, and preprocessing results to your export folder, using the following structure:

fMRI Project ExampleExp

└── raw

└── bids

└── qc

└── preproc

Prepare the Pilot

Step 15.

Decide on whether to use additional stimulus equipment.

For example:

- Auditory stimuli;
- PPU (cardiac signal) and respiratory belt. This is free of charge and it is not necessary to book extra time for this;
- Eye tracker;
- EEG;
- Skin conductance;

- EMG;
- Electro-stimulator device (pain stimulation)

Ideally, mention if you plan on using extra stimulus equipment during the introduction meeting.

Prepare the Pilot

Step 16.

Estimate the time needed for one participant.

Below you find an approximation of the scan time needed per participant depending on the stimulus setup; note that the duration of the scans should include communication to the participant, set up of the scans, shimming and survey scan. Furthermore the time needed per participant is dependent on the type of participants and the experience of the researcher.

- Simple protocol, possibly including PPU and Resp: duration of the scans + 10 minutes.
- With GSR or EMG measurements: duration of the scans + 20 minutes.
- With eye tracker measurements: duration of the scans + 20 minutes

Of course, this estimation may be adjusted after the pilot or during your experiment.

Prepare the Pilot

Step 17.

Read the Protocol on running an MRI pilot at Spinoza REC so that you will be even more prepared for the pilot.

Let us know if you have any questions before coming to the pilot!