



#### NIC Kolloquium

### An Introduction to the XNAT Data Management

December 10<sup>th</sup>, 2020

Philipp T. Neukam, Christian Löschen, Dirk K. Müller & the SFB940/INF Project

### Resources at the NIC homepage

#### https://nic-tud.de/research/ressourcen/IT-services/

#### IT AND DATA SERVICES

#### **NIC Data-Management Manuals**

- **▼** NIC Data Management Overview
- **±** Uploading DICOM files (zip-file) to the XNAT (German)
- **★** Uploading non-DICOM files (e.g. logfiles) to the XNAT

#### Specific NIC Software Tools

Python script to parse the NIC-specific DICOM file paths -> nic\_path.py

#### Naming Conventions at the NIC

- **±** Logfile Naming (ideally)
- ★ MRI Sequenz (Series) Naming

#### Resources within the TUD VPN (restricted access)

- Access to the VPN (Virtual Private Network) and shared drives (German only)
- Granting temporary access to TUD WLAN
- ▶ Neuroimaging Center Python Pipeline (NICePype)
- NIC XNAT Database
- ▶ PaMS
- Redcap Study Database at the ZIH

#### **Open Science Resources**

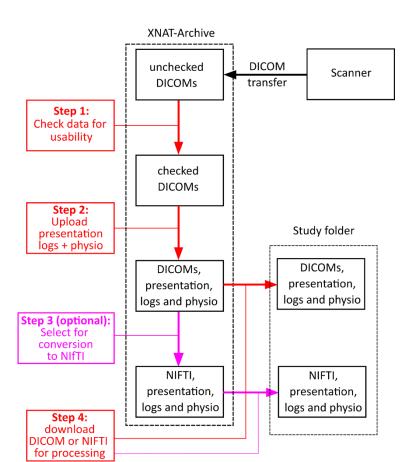
- Open Access Repository and Archive (OpARA)
- Open Science Initiative der Fakultät Psychologie der TUD (OSIP)
- Open Science Framework (OSF)

https://nic-tud.de/research/ressourcen/data-management-manual/

#### **NIC Data-Management Manual**

#### **Procedure for study staff:**

Click on the individual steps for detailed instructions.





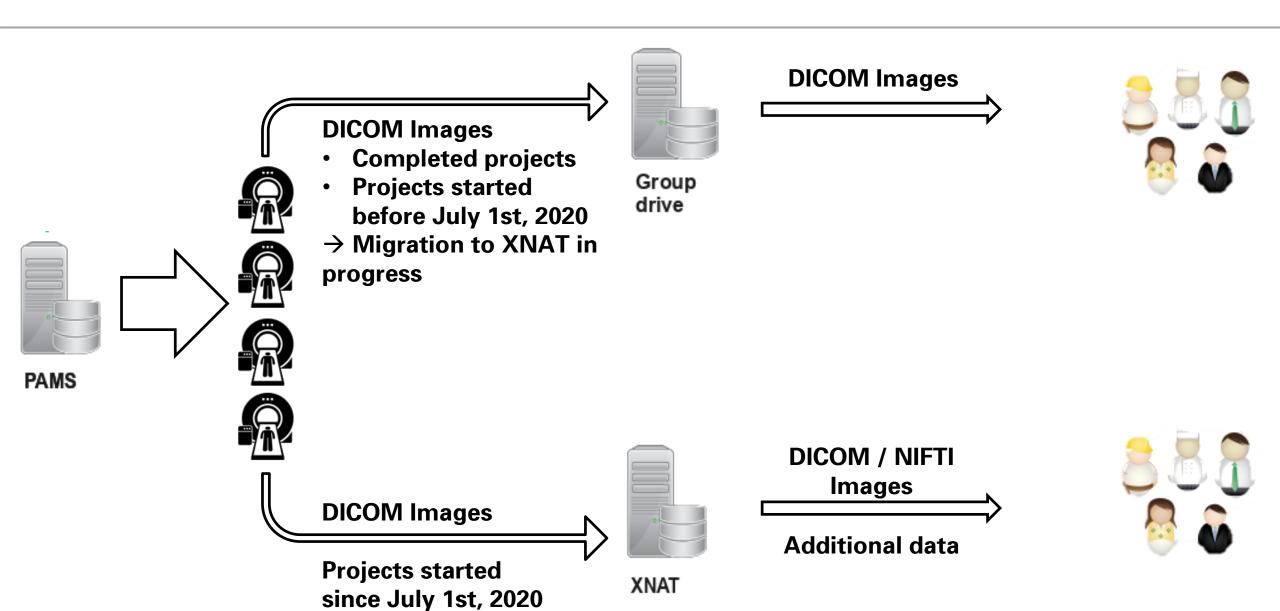


Please send feedback to mrphysik@msx.tu-dresden.de

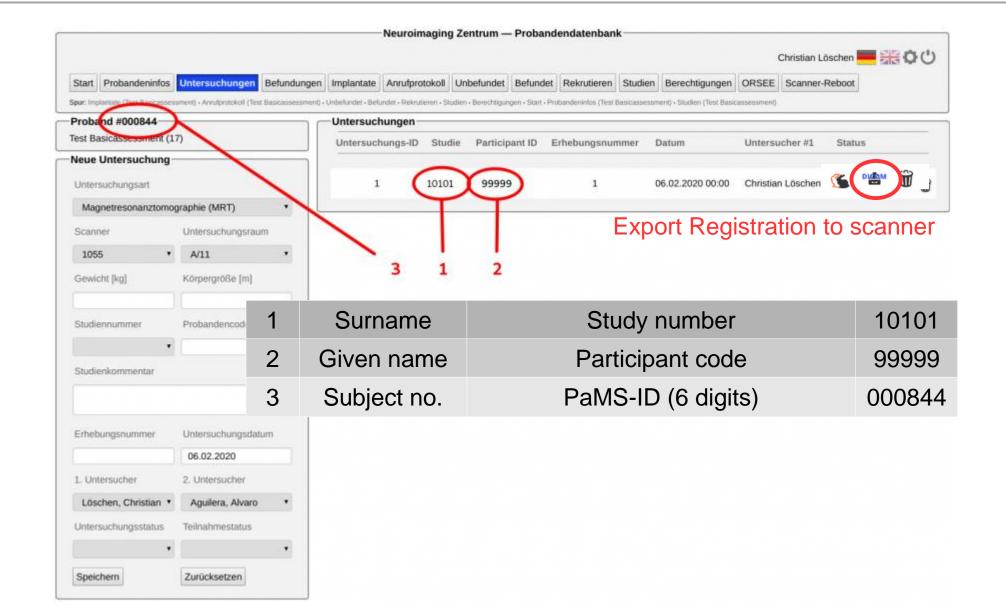
### **Outline**

- > MRI data flow
- Quality flags for sequences
- Upload of additional data
- > DICOM→NIFTI Converter
- Download data
- User groups (Owner, Member, Collaborator)
- Outlook: Automatic image processing software: NICePype

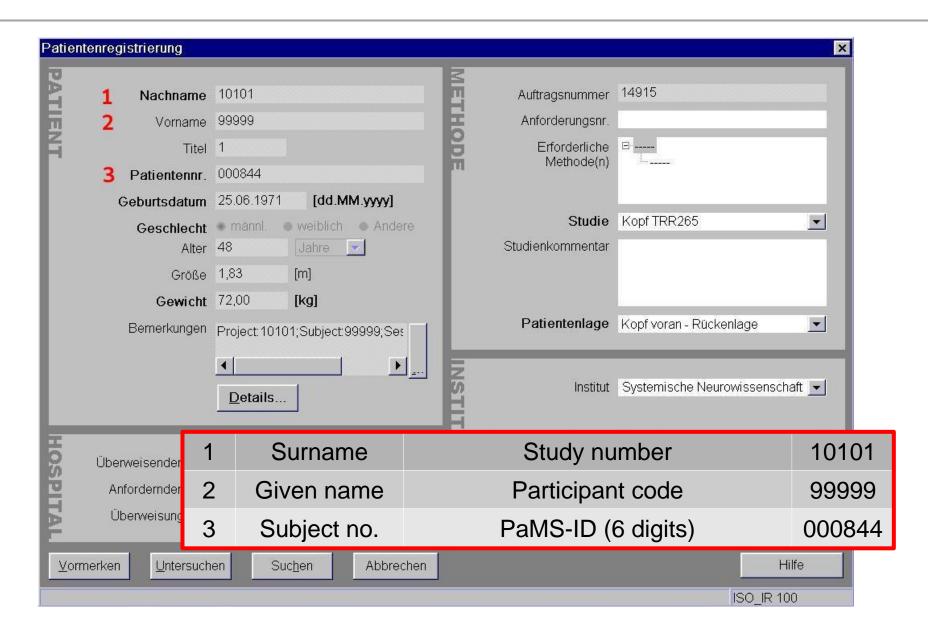
### **MRI Data Flow**



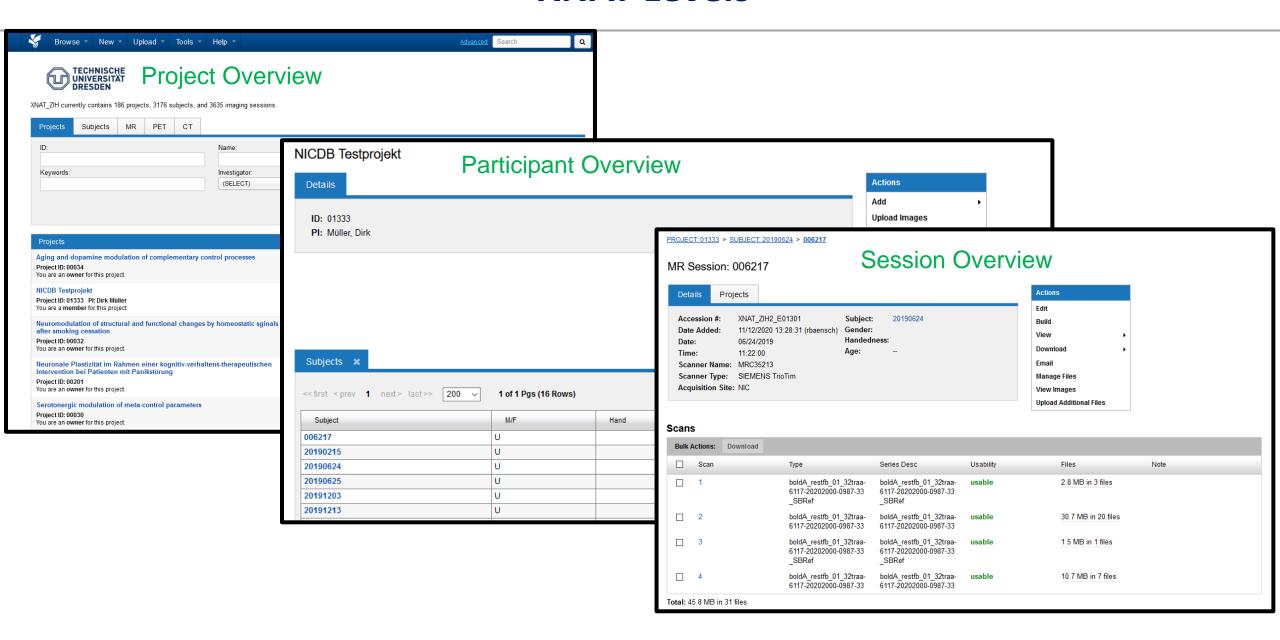
### MRI Data Flow: PaMS registration



### Automatic import to the scanner console



#### **XNAT Levels**

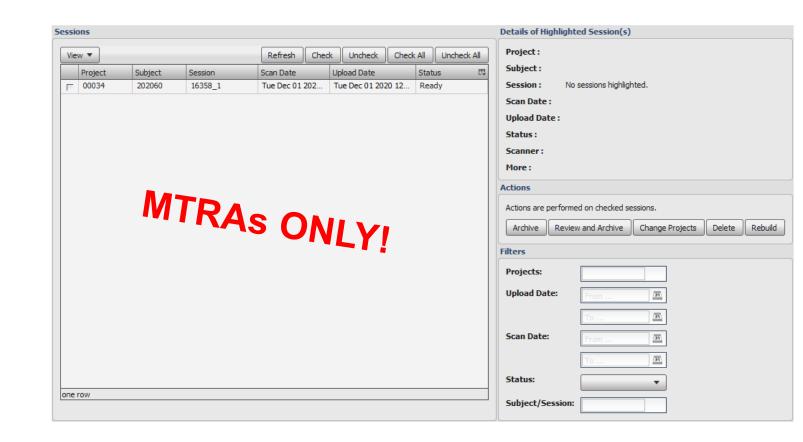


#### **Pre-Archive**

 Data are automatically transferred from the MRI to the Pre-Archive

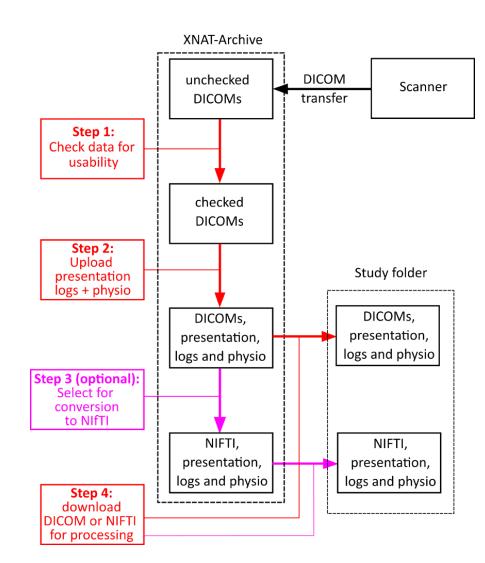
- Images are *exclusively* evaluated by the MTRAs for completeness
- Complete data sets are sent to the project archive and marked as unchecked

Study personal ought to work only with the transferred data in the respective project archive!



## **Step 1: Quality flags - Handling incorrect or unwanted data**

- Scans for positioning the subjects
  - → AAScout
  - → Localizer
- > Data from unwanted reconstructions
  - → T1 thick film
  - → DTI
- Scan aborts at the request of the subjects and repeated measurements



# **Step 1: Archive: Set Quality Flag**

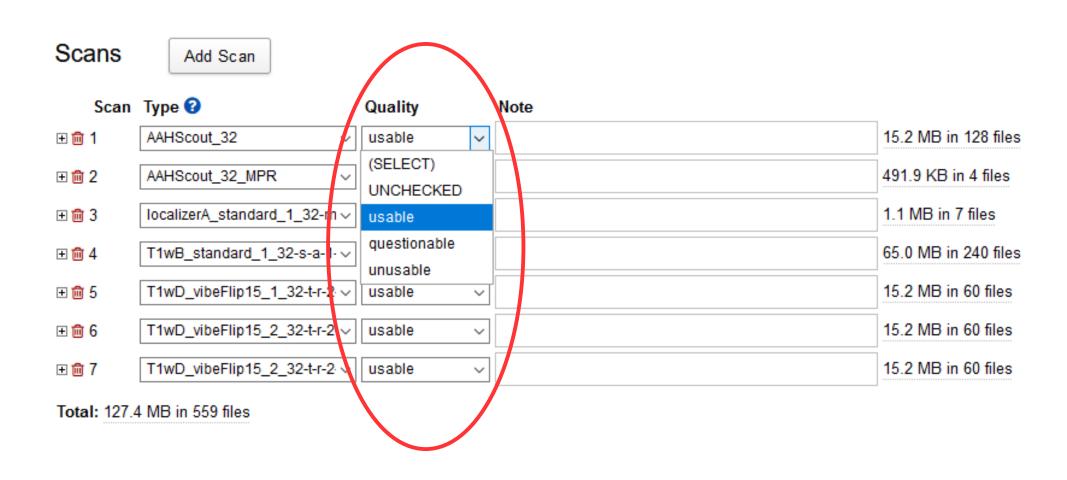


#### Scans

Bulk	Actions: Download					
	Scan	Туре	Series Desc	Usability	Files	Note
	1	ep2d_bold_rsfMRT_Pha ntom	ep2d_bold_rsfMRT_Pha ntom	UNCHECKED	4.1 MB in 11 files	
	2	ep2d_bold_rsfMRT_Pha ntom	ep2d_bold_rsfMRT_Pha ntom	UNCHECKED	55.8 MB in 150 files	
	3	boldA_restfb_01_32traa- 6117-20202000-0987-33 _SBRef	boldA_restfb_01_32traa- 6117-20202000-0987-33 _SBRef	UNCHECKED	1.5 MB in 1 files	
	4	boldA_restfb_01_32traa- 6117-20202000-0987-33	boldA_restfb_01_32traa- 6117-20202000-0987-33	UNCHECKED	384.0 MB in 250 files	
	5	boldA_TRR-rest_1-1_32- t-a-1-6-1-8-24242400-38- 869_SBRef	boldA_TRR-rest_1-1_32- t-a-1-6-1-8-24242400-38- 869_SBRef	UNCHECKED	1.1 MB in 1 files	
	6	boldA_TRR-rest_1-1_32- t-a-1-6-1-8-24242400-38- 869	boldA_TRR-rest_1-1_32- t-a-1-6-1-8-24242400-38- 869	UNCHECKED	263.1 MB in 250 files	

Total: 709.5 MB in 663 files

## **Step 1: Archive: Set Quality Flag**



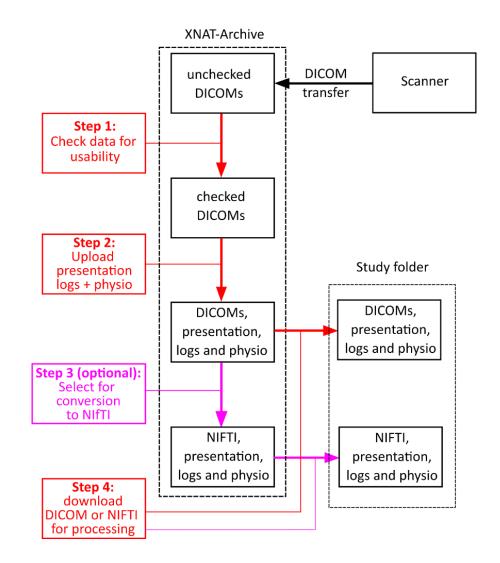
# **Step 1: Archive: Set Quality Flag**

Usable: data remain in archive and can be used for further processing

 Questionable: data remain in archive but should be reviewed before further processing

Unusable: data will be removed from the project archive but can be recovered if necessary

- Paradigm logging files
- Pulse oximetry
- > Electrodermal activity
- > ...



PROJECT: 01333 > SUBJECT: 20200527 > 15133 1

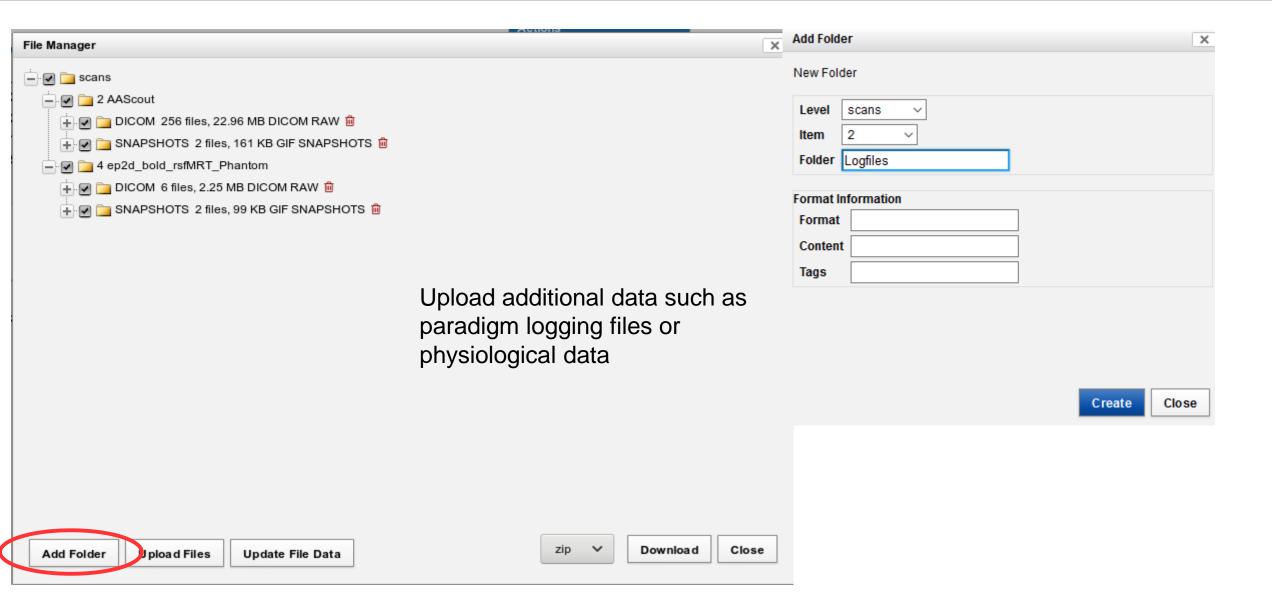
MR Session: 15133\_1

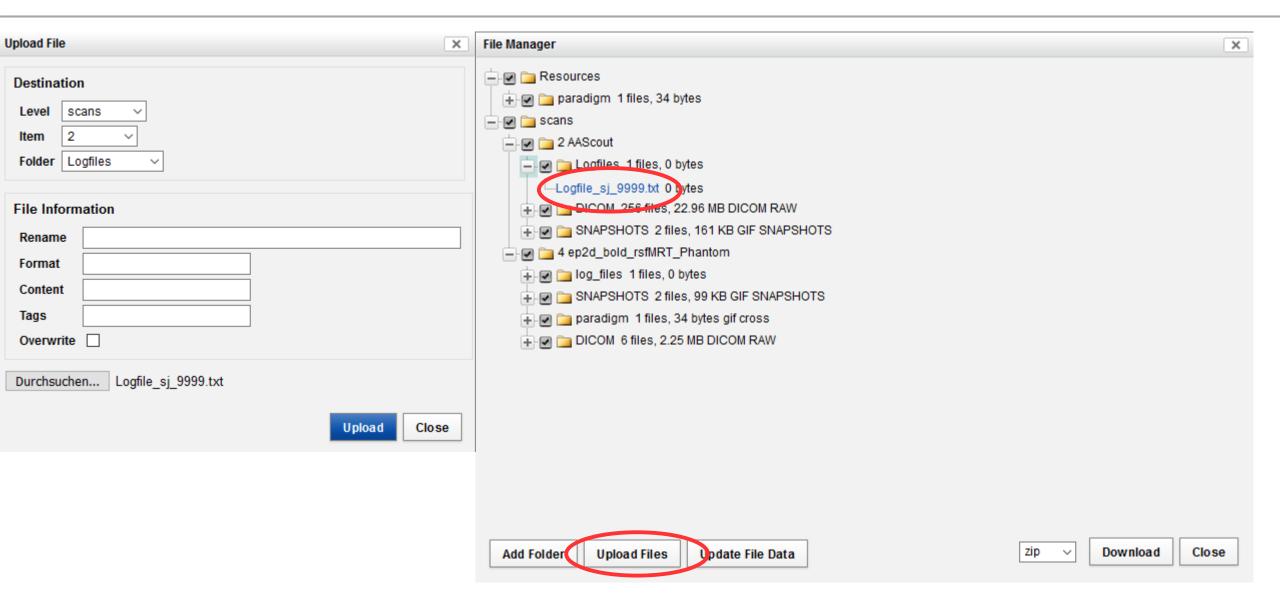


#### Scans

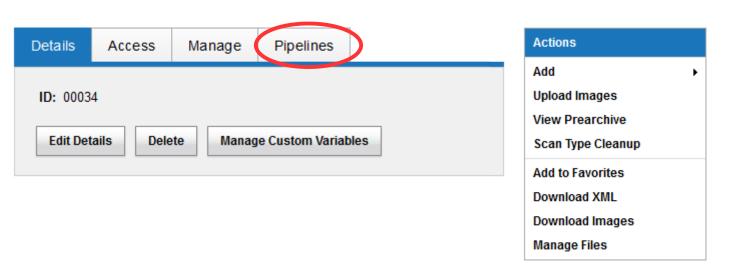
Scan	Туре	Series Desc	Usability	Files	Note
± 2	AAScout	AAScout	usable	23.0 MB in 256 files	
<b>±</b> 4	ep2d_bold_rsfMRT_Phantom	ep2d_bold_rsfMRT_Phantom	usable	2.3 MB in 6 files	

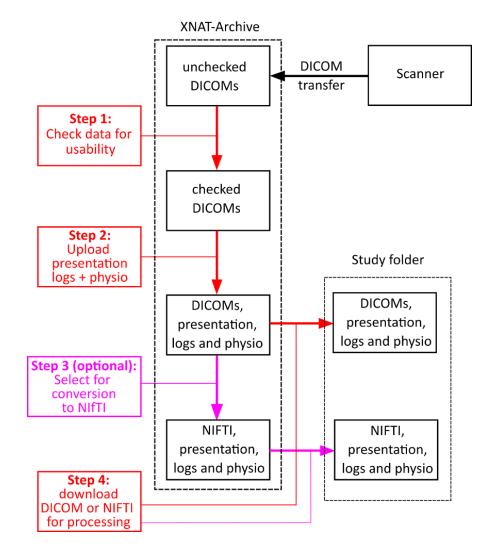
Total: 25.2 MB in 262 files





# **Step 3: XNAT pipelines**

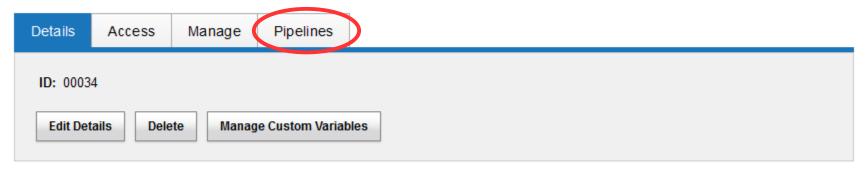




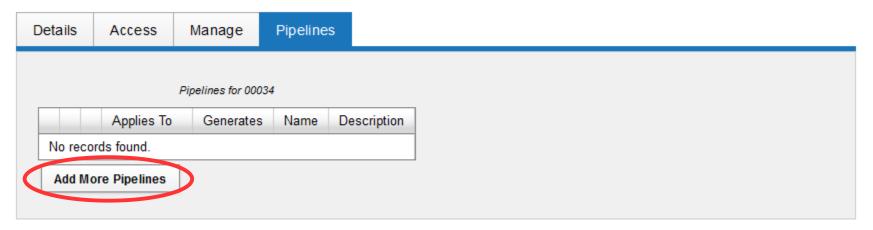
#### **Project owners only!**

### **Step 3: XNAT pipelines**

Aging and dopamine modulation of complementary control processes



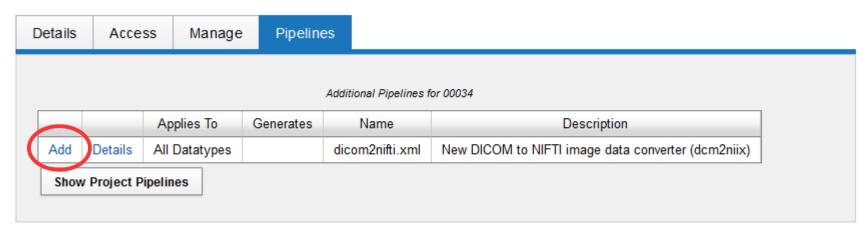
Aging and dopamine modulation of complementary control processes



#### **Project owners only!**

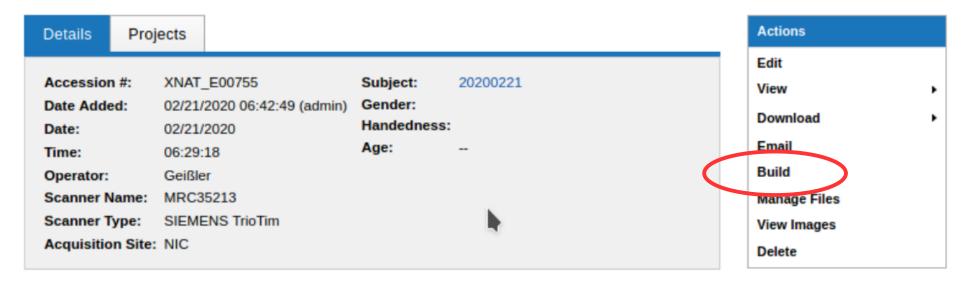
# **Step 3: XNAT pipelines**

Aging and dopamine modulation of complementary control processes



PROJECT: 01303 > SUBJECT: 20200221 > 15012 1

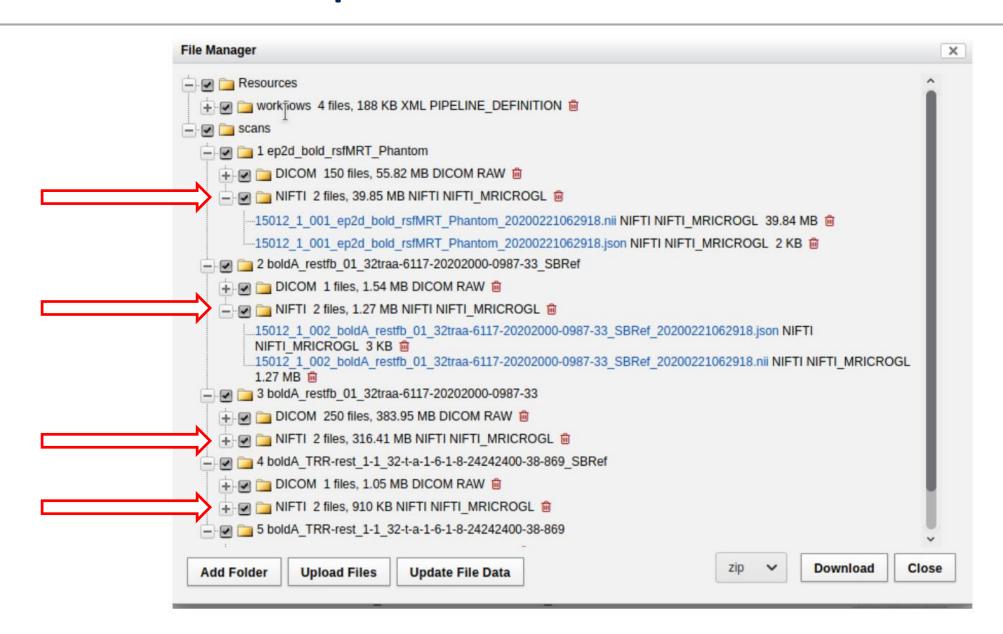
MR Session: 15012\_1





New DICOM to NIFTI image data converter (dcm2niix) for 15012\_1

Name	Value	
scanIDs	■1 ■2 □3 □4 ■5	
sessionID	XNAT_E00755	
sessionName	15012_1	
projectID	01303	
subjectID	XNAT_S00649	
compress	n	
notify	0	
	line in-process? s workflow entries for pipeline execution?	
Close	Submit	



#### **Download Data**

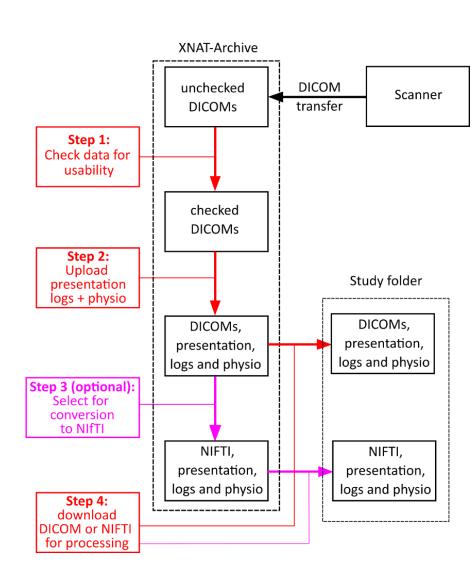
MR Session: 006217



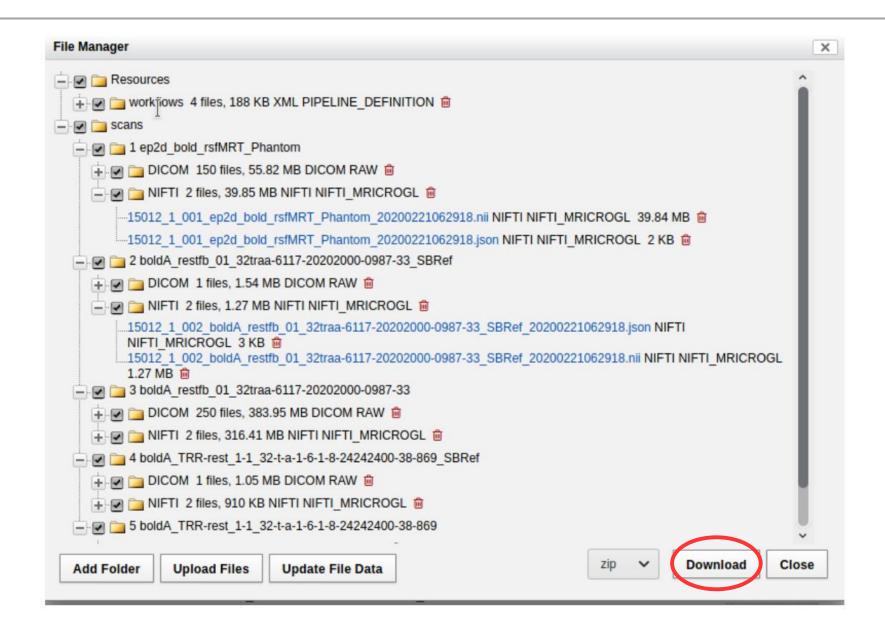
#### Scans

Bulk Actions:		Download					
	Scan		Туре	Series Desc	Usability	Files	
	1		boldA_restfb_01_32traa- 6117-20202000-0987-33 _SBRef	boldA_restfb_01_32traa- 6117-20202000-0987-33 _SBRef	usable	2.8 MB in 3 files	
	2		boldA_restfb_01_32traa- 6117-20202000-0987-33	boldA_restfb_01_32traa- 6117-20202000-0987-33	usable	30.7 MB in 20 files	
	3		boldA_restfb_01_32traa- 6117-20202000-0987-33 _SBRef	boldA_restfb_01_32traa- 6117-20202000-0987-33 _SBRef	usable	1.5 MB in 1 files	
	4		boldA_restfb_01_32traa- 6117-20202000-0987-33	boldA_restfb_01_32traa- 6117-20202000-0987-33	usable	10.7 MB in 7 files	

Total: 45.8 MB in 31 files



#### **Download Data**



# **User rights management**

#### **Understanding User Roles and Permissions**

By default, XNAT defines three common project roles: **Owners**, **Members**, and **Collaborators**. As a project owner, you have the ability to add specific users to your project within these roles. These users will then have the permissions associated with their defined role (which overrules the default accessibility permissions).

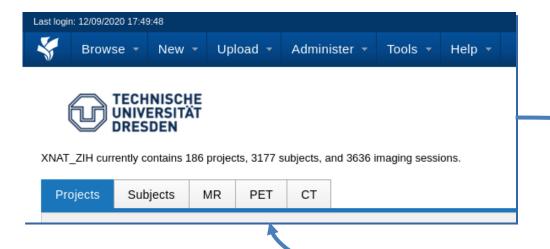
Role/Activity	Project Owners	Project Members	Project Collaborators
Create Data	С	С	
Read/Download Data	R	R	R
Update Data	U	U	
Delete Data	D		

#### The "CRUD" model of permissions

- Project Owners: If you define additional project owners, they will have all of the permissions on your project that you do. They can read, insert, modify, and delete anything (and everything) associated with your project. They can also add additional users to your project and modify the data types associated with your project.
- **Project Members**: Members have the ability to manage the data in your project. They can read, insert, and modify subjects and experiments in your project. They cannot modify the project users and data types.
- **Project Collaborators**: Collaborators have read-only access on all of the data in your project. They cannot insert or modify data owned by your project. They can download your data and use it within their projects.

# **Outlook: Automatic MRI Data Preprocessing: NICePype**

#### Currently under development for the TRR265

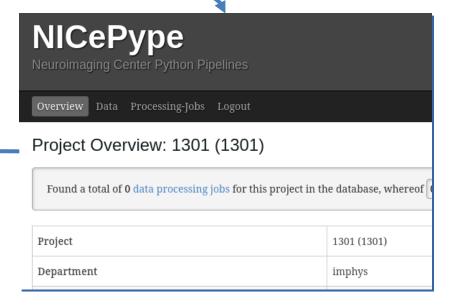


Automatic download of imaging data

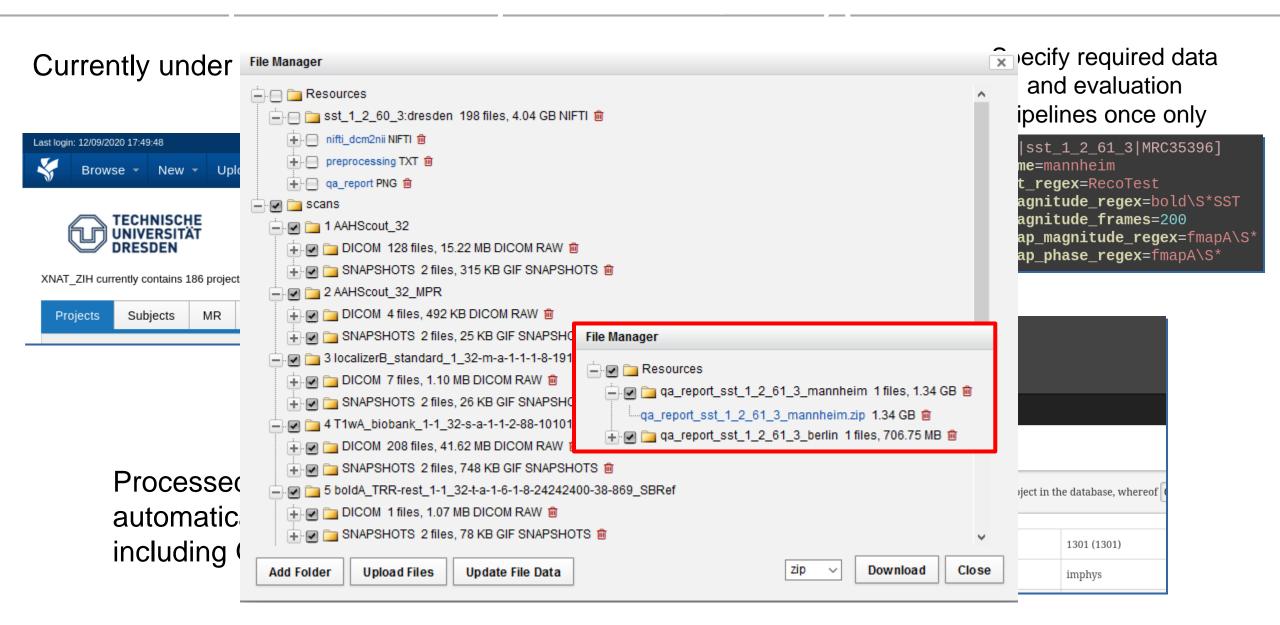
Specify required data and evaluation pipelines once only

[10101|sst\_1\_2\_61\_3|MRC35396]
dir\_name=mannheim
subject\_regex=RecoTest
fmri\_magnitude\_regex=bold\s\*SST
fmri\_magnitude\_frames=200
fieldmap\_magnitude\_regex=fmapA\S\*
fieldmap\_phase\_regex=fmapA\S\*

Processed data will be automatically uploaded, including QA



# **Outlook: Automatic MRI Data Preprocessing: NICePype**



# Thank you

#### Ressources

Contact: <u>sfb940-inf@groups.tu-dresden.de</u>

mrphysik@msx.tu-dresden.de

NIC homepage:

https://nic-tud.de/research/ressourcen/

XNAT webpage:

https://xnat.zih.tu-dresden.de

Select "TU Dresden" as Login and use your ZIH Login

