RadPlanBio - Administrator Documentation

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Contents

1 Overview of RadPlanBio

The RadPlanBio platform is a web-based solution for exchanging and sharing medical cancer treatment research data in order to allow multi-centric studies. The idea is to deliver a study management and electronic data capture system with special extensions dedicated to safe upload of medical DICOM files.

This platform integrate togehter a bunch of open source solutions in order to deliver a full set of features. An overview of currently used systems inside the platform is the following:

- OpenClinica: Clinical Trial Management (CTM) and Electronic Data Capture (EDC)
- Conquest: research PACS server
- Mainzelliste: patient identity management (PID pseudonym generator)
- RadPlanBio-portal: unified web access and systemintegration portal
- RadPlanBio client/server: providing desktop solution to pseudonymise and upload DICOM data

2 RadPlanBio-client

RadPlanBio desktop client is one component of RadPlanBio platform. Its main purpose is to provide local DICOM data pseudonymisation and secure DICOM data upload functionality. It also links the uploaded data to study subjects registered in RadPlanBio. This section explains how the local administrator on the partner site can download, install and configure the client so the medical personnel can use this tool to upload DICOM data to the RadPlanBio.

2.1 Obtaining RadPlanBio-client software

Prepared archives of RadPlanBio-client software (for different platforms) are available for download directly via from RadPlanBio-portal, see Fig. 1.

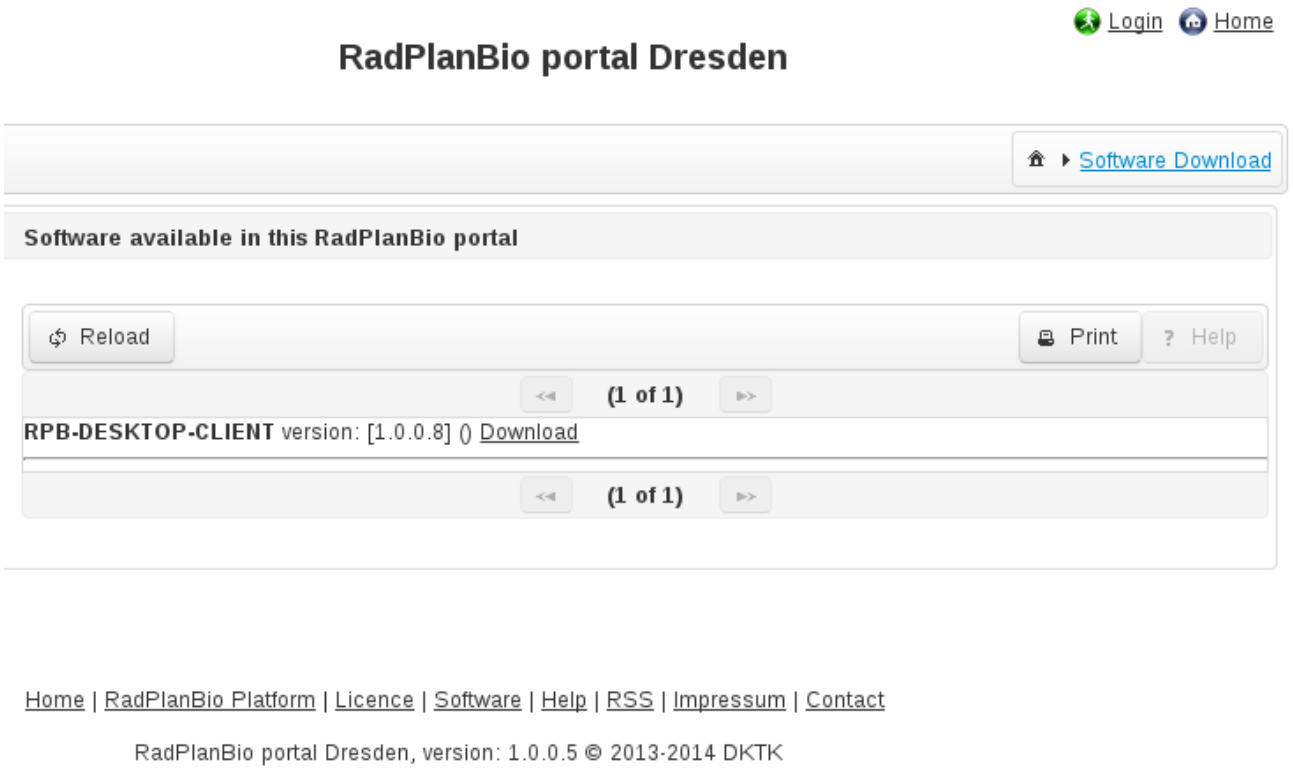

Figure 1: Download RadPlanBio desktop client.

2.2 Installation process

The installation process consists of compression of the downloaded archive to the location where you want to store RadPlanBio-client software. The resulting folder than contains all the necessary libraries, configuration and executable files. For the administrator it is important to notice just two of them:

- RadPlanBio-client.exe: executable which starts the client software. It is possible to create a shortcut and place it on the desktop to make it easier to start the application for end users.
- radplanbio-client.cfg: this is the configuration file which specifies details about client connection to RadPlanBio-server. The local administrator should verify the configuration and if necessary change it.

2.3 Configuration

The configuration is rather straightforward. RadPlanBio-client communicates with RadPlanBio-server via HTTPS connection (port 443). So it is necessary to specify:

- host: RadPlanBio server host name or IP address
- port: standard port is 443 for HTTPS connection
- application: specifies the PACS server used to import sending DICOM data (the default one is serverieDD)

Example of how the configuration file should look like is shown below:

```
[RadPlanBioServer]
host = radplanbio.uniklinikum-dresden.de
port = 443
application = serverieDD

[Proxy]
enabled = bluefalse
host = proxy
port = 80
noproxy = somedomain.de

```

```
[Proxy-auth]
enabled = bluefalse
login = test
password = test

[DICOM]
replacepatientnamewith = pid
retainstudyseriesdescriptions = True
allowmultiplepatientids = False
retainpatientcharacteristicsoption = True
retainseriestime = True
retainstudydate = True
retainstudytime = True
retainseriesdate = True
autortstructmatch = True
constpatientname = XXX

[SanityTests]
patientGenderMatch = True
patientDobMatch = True

[General]
startupupdatecheck = True

[GUI]
main.width = 800
main.height = 600
```

2.4 Technical description of client work-flow

The client is using REST web services API to communicate with RadPlanBio server and SOAP web services API to communicate with OpenClinica (CTM, EDC solution). The user will be asked to login with his RadPlanBio login credentials and afterwards can browse through clinical studies in RadPlanBio. In order to upload DICOM data, it is necessary to select the concrete study/site/subject/event/DICOM study item via the client graphical user interface GUI (for details please refer to the user manual where this process is described together with screenshots).

The last step is selection of DICOM study which should be pseudonymised, uploaded and associated with selected study/site/subject/event. Pseudonymisation is semi-automatic and consists of the following:

- systems checks the consistency of DICOM data
- system ask the user to provide DICOM RT Struct mapping of ROI (using standardised organ names) in order to ensure that DICOM data in research PACS are using the same set of harmonised names.
- DICOM data is automatically pseudonymised, using the unique PID of selected study subject instead of Patient ID DICOM tag and randomly generated DICOM study UID tag.
- according to ***DICOM Supplement 142*** (Clinical Trial De-identification) the original values from following DICOM tags encrypted and stored within newly created pseudonymised DICOM data:
  - Frame Of Reference UID
  - Patient ID
  - Patient name
  - Patient birth date
  - SOP Instance UID
  - StudyInstance UID
- System automatically created 32 bytes long key for AES-256 encryption and it will be stored in ***key.pkl*** file in the RadPlanBio-client folder. If there is a valid ***key.pkl*** present in a folder the system will use it instead of creating the new one. Only with this key (which stays locally on partner site) it is possible to decrypt the encrypted DICOM tag values.
- Pseudonymised DICOM data is uploaded to RadPlanBio research PACS and connection link to this data is stored in special purpose DICOM eCRF in OpenClinica (PID and DICOM study UID is stored in eCRF).

2.5 Backup and reuse of the private key

The private key generated during the fist upload of DICOM data should be stored on a save place and it is a responsibility of local partner site administrator to make a proper backup of this key. Without the key it is impossible to decrypt the original DICOM tags like (SOP Intance UID, ...), however if the partner site is using RadPlanBio provided PID generator for registering the patient, it will by always possible to take PID from pseudonymised DICOM Patient ID tag and query the patient identity management system (Mainzelliste) to get back the real identity of the patient.

Once the private key is generated in one client. And you would like to have multiple installation of client software it is possible to simple copy the ***key.pkl*** file and place it in the folder with new client installation. This way you can reuse one private key for whole organisation/department/research group etc.

3 Appendix

The pseudonymisation procedure defines three actions which could be done with original DICOM value in addition the patient name is replaced with XXX or patient pseudonym (depending on the client configuration):

- randomise: replace the original UID value with randomly generated one
- remove: delete the original value
- replace: replace the original value with default one (depending on VR type, for DA 19000101, for TM 000000.000000, for SQ new SQ for the rest empty string is used)

1. Randomise UID: 'Concatention UID', 'Context Group Extension Creator UID', 'Creator Version UID', 'Device UID', 'Dimension Organization UID', 'Dose Reference UID', 'Failed SOP Instance UID List', 'Fiducial UID', 'Frame of Reference UID', 'Instance Creator UID', 'Irradiation Event UID', 'Large Palette Color Lockup Table UID', 'Media Storage SOP Instance UID', 'Palette Color Lookup Table UID', 'Referenced Frame of Reference UID', 'Referenced General Purpose Scheduled Procedure Step Transaction UID', 'Referenced SOP Instance UID', 'Referenced SOP Instance UID in File', 'Related Frame of Reference UID', 'Requested SOP Instance UID', 'Series Instance UID', 'SOP Instance UID', 'Storage Media Fileset UID', 'Synchronization Frame of Reference UID', 'Template Extension Creator UID', 'Template Extension Organization UID', 'Transaction UID', 'UID'.

2. Remove: 'Acquisition Comments', 'Acquisition Context Sequence', 'Acquisition Protocol Description', 'Actual Human Performers Sequence', "Additional Patient's History", 'Admission ID', 'Admitting Date', 'Admitting Diagnoses Code Sequence', 'Admitting Diagnoses Description', 'Admitting Time', 'Affected SOP Instance UID', 'Allergies', 'Arbitrary', 'Author Observer Sequence', 'Branch of Service', 'Cassette ID', 'Comments on Performed Procedure Step', 'Confidentiality Constraint on Patient Data Description', "Content Creator's Identification Code", 'Content Sequence', 'Contribution Description', 'Country of Residence', 'Current Patient Location', 'Curve Data', 'Curve Date', 'Curve Time', 'Custodial Organization Sequence', 'Data Set Trailing Padding', 'Derivation Description', 'Detector ID', 'Digital Signatures UID', 'Digital Signatures Sequence', 'Discharge Diagnosis Description', 'Distribution Address', 'Distribution Address', 'Ethnic Group', 'Frame Comments', 'Gantry ID', 'Generator ID', 'Human Performers Name', 'Human Performers Organization', 'Icon Image Sequence', 'Identifying Comments', 'Image Comments', 'Image Presentation Comments', 'Image Service Request Comments', 'Impressions', 'Institution Address', 'Institutional Department Name', 'Insurance Plan Identification', 'Intended Recipients of Results Identification Sequence', 'Interpretation Approver Sequence', 'Interpretation Author', 'Interpretation Diagnosis Description', 'Interpretation ID Issuer', 'Interpretation Recorder', 'Interpretation Text', 'Interpretation Transcriber', 'Issuer of Admission ID', 'Issuer of Patient ID', 'Issuer of Service Episode ID', 'Last Menstrual Date', 'MAC', 'Medical Alerts', 'Medical Record Locator', 'Military Rank', 'Modified Attributes Sequence', 'Modified Image Description', 'Modyfying Device ID', 'Modyfying Device Manufacturer', 'Name of Physician(s) Reading Study', 'Name of Intended Recipient of Results', 'Occupation', 'Original Attributes Sequence', 'Order Callback Phone Number', 'Order Entered By', 'Order Enterer Location', 'Other Patient IDs', 'Other Patient IDs Sequence', 'Other Patient Names', 'Overlay Comments', 'Overlay Data', 'Overlay Date', 'Overlay Time', 'Participant Sequence', 'Patient Address', 'Patient Comments', 'Patient State', 'Patient Transport Arrangments', "Patient's Birth Name", "Patient's Birth Time", "Patient's Institution Residence", "Patient's Insurance Plan Code Sequence", "Patient's Mother's Birth Name", "Patient's Primary Language Code Sequence", "Patient's Primary Language Modifier Code Sequence", "Patient's Religious Preference", "Patient's Size", "Patient's Telephone Numbers", "Patient's Weight", 'Performed Location', 'Performed Procedure Step Description', 'Performed Procedure Step ID', 'Performed Procedure Step Start Date', 'Performed Procedure Step Start Time', 'Performed Station AE Title', 'Performed Station Geographic Location Code Sequence', 'Performed Station Name', 'Performed Station Nmae Code Sequence', "Performing Physicians' Identification Sequence", "Performing Physicians' Name", 'Person Address', 'Person Telephone Numbers', 'Physician Approving Interpretation', 'Physician

Reading Study Identification Sequence', 'Physician(s) of Record', 'Physician(s) of Record Identification Sequence', 'Plate ID', 'Procedure Code Sequence', 'Pre-Medication', 'Pregnancy Status', 'Reason for Imaging Service Request', 'Reason for Study', 'Referenced Digital Signature Sequence', 'Referenced Patient Alias Sequence', 'Referenced Patient Sequence', 'Referenced Performed Procedure Step Sequence', 'Referenced SOP Instance MAC Sequence', 'Referenced Study Sequence', "Referring Physician's Address", "Referring Physician's Identification Sequence", "Referring Physician's Telephone Numbers", 'Region of Residence', 'Request Attributes Sequence', 'Requested Contrast Agent', 'Requested Procedure Comments', 'Requested Procedure ID', 'Requested Procedure Code Sequence', 'Requested Procedure Location', 'Requesting Physician', 'Requesting Service', 'Responsible Person', 'Results Comments', 'Results Distribution List Sequence', 'Results ID Issuer', 'Scheduled Human Performers Sequence', 'Scheduled Patient Institution Residence', 'Scheduled Performing Physician Identification Sequence', 'Scheduled Performing Physician Name', 'Scheduled Procedure Step End Date', 'Scheduled Procedure Step End Time', 'Scheduled Procedure Step Description', 'Scheduled Procedure Step Location', 'Scheduled Procedure Step Start Date', 'Scheduled Procedure Step Start Time', 'Scheduled Station AE Title', 'Scheduled Station Geographic Location Code Sequence', 'Scheduled Station Name', 'Scheduled Station Name Code Sequence', 'Scheduled Study Location', 'Scheduled Study Location AE Title', 'Series Description', 'Service Episode Description', 'Service Episode ID', 'Smoking Status', 'Source Image Sequence', 'Special Needs', 'Study Comments', 'Study Description', 'Study ID', 'Study ID Issuer', 'Text Comments', 'Text String', 'Timezone Offset From UTC', 'Topic Author', 'Topic Key Words', 'Topic Subject', 'Topic Title', 'Verifying Organization', 'Visit Comments'

3. Replace: 'Accession Number', 'Acquisition Date', 'Acquisition Date Time', 'Acquisition Device Processing Description', 'Acquisition Time', "Content Creator's Name", 'Content Date', 'Content Time', 'Contrast Bolus Agent', 'Device Serial Number', 'Filler Order Number of Imaging Service Request', 'Graphic Annotation Sequence', 'Institution Code Sequence', 'Institution Name', "Operators' Identification Sequence", "Operators' Name", 'Patient Sex Neutered', "Patient's Birth Date", 'Person Identification Code Sequence', 'Placer Order Number of Imaging Service Request', 'Protocol Name', "Referring Physician's Name", 'Requested Procedure Description', 'Reviewer Name', 'Series Date', 'Series Time', 'Station Name', 'Study Date', 'Study ID', 'Study Time', 'Veryfing Observer Identification Code Sequence' 'Veryfing Observer Name', 'Veryfing Observer Sequence'