digipax

Version 2.1.4

User`s Manual

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1 General

Software digipaX is intended for managing, displaying and exporting DICOM images in different modalities (e.g. X-ray images (CR, DR) or CT images). Furthermore, it offers a wide range of useful tools for daily work with the medical imaging techniques for diagnostic purposes. All technologies and technical procedures (image structure, communication, data storage etc.) are hereby performed in compliance to DICOM 3 standards.

The system can be used as a single workplace with an image archive (PACS). As well it suits the work together with other stations and many archives. It can be easy integrated with the systems of other manufacturers.

Furthermore, by use of worklist the jobs and transmitted data can be interchanged as well as instructions directly form the management systems in the clinics.

2 Symbols and figures

Symbol	Meaning
	Note
	Tip

All figures (digipaX screenshots) show the program windows in Classic Style. This allows the images to look clearer in the documentation. The program is normally set to Black Style, which is more suitable for viewing medical images.

3 Safety precautions

3.1 Software

It is not permitted to introduce any modifications to this software without approval of the manufacturer.

3.2 Conditions for use

This product is designed for use on personal computers in residential and commercial premises. The used hardware must be adapted to the prevailing environment conditions. The user of PC must verify if hardware corresponds to requirements prevailing in location of its installation.

3.3 User profile

This product is designed for use by medical personnel. Persons operating this product must have the following qualifications:

- required professional knowledge,
- training in using the X-ray data,
- computer skills,
- knowledge of one of languages used by this system.

Please also observe further requirements for the user profile when using modules for image acquisition.

3.4 IT security requirements

3.4.1 Measures to maintain IT security

3.4.1.1 Standard measures

IT security is a crucial issue. The following measures should be taken to keep your IT system safe and secure:

- Use of usernames and passwords to log on to PC
- Use of usernames and passwords to log in to application software such as PACS or practice management
- Use of virus scanners and firewalls on all systems that are components of your IT infrastructure
- Regular updates of the virus scanners used
- Regular updates of the operating systems (Windows), particularly the security patches provided by the manufacturer
- Updates of the application software, particularly the security patches provided by the manufacturer (Office, PDF Reader, etc.)
  - Also, for other systems such as practice management, PACS or image acquisition systems, the most recent updates offered by their manufacturers should be installed

- The lifecycle of the devices should be taken into account with regard to availa-
ble updates (particularly upon the end of support by the manufacturer)
- Use of secure WLAN networks encrypted by the up-to-date methods

3.4.1.2 Extended measures

Even though the proportionality and cost-effectiveness of the measures play a role, the fol-
lowing optional measures should be included in the concept of IT security:

- Use of secure WLAN networks encrypted by the up-to-date methods
- Use of extended access and user permissions to operating systems, data and
application software
- Use of access rights to PACS archives
- Network communication encryption
- Encryption of data on data media
- Use of anonymisation functions and encryptions when passing on or sending
data

3.5 Hardware

The used hardware must be provided with CE and it must meet requirements provided in
Electromagnetic Compatibility Directive and Low Voltage Directive. It is necessary to observe
restrictions concerning the use and provisions regarding the maintenance and operation of
the installed hardware according to the manufacturer's information and standard EN 60950-
1.

It is to make sure that the used hardware is installed in a minimum distance of 1,50 m from
the patient (so that coevally touch both the hardware and the patient is impossible). Further-
more, it is to pay attention to a safe standing position of the hardware. Monitors should stand
stable, so that they cannot be accidentally pulled down. Cables are to be laid in such a way
that an accidental getting stuck is avoided.

The hardware shall be located in such a manner to allow for quick and easy disconnection
from power supply in emergency situations. The disconnectable power outlet strips with good
access may be used as possible alternative.

The keyboard, mouse and monitor shall be located on workplace in such a manner to eliminate
their physical impact on environment.

3.6 Redundancy

It remains the responsibility of the user to secure the system redundantly, so that a failure of
one of the units does not involve an unreasonable risk.

**If the failure of the computer, the server or the network could endanger patients,
ensure in advance that an alternative, e.g. a replacement computer, is always
immediately available and check the alternative of using the server as a workstation
in an emergency.**
**If necessary, copy the necessary data (DICOM images) from the network to the local
harddisk of the workstation beforehand so that they are still available in case of a**

network failure. Ask your system administrator about further measures to prevent patients from being endangered by a computer failure.

3.7 System failures

After a system failure (power outage or system crash) unstored images may need to be restored.

3.8 Messages

You have to inform your system deliverer or attendant immediately about the messages from the hardware (beeps) or messages from software systems (error messages from operating system, drivers/controllers or from the software itself).

3.9 Visual check

The daily visual checks of the devices are necessary, in order to guarantee a quality of a display at the diagnostic workstand(s). For this purpose, a special software program or SMPTE testpattern can be used. If the required specification is not fulfilled, then the monitor is to be readjusted or replaced by technical stuff. The instructions into the procedure follow by the system administrator/attendant.

3.10 Data backup

All new images have to be weekly backed up on CD/DVD or other suitable media. Media with the backups are to be stored in a separated place from the computer with the image archive (server). The media are to be stored in such a way that the data are not destroyed by external influences, such as light or electromagnetic radiation etc. When choosing the medium, please keep in mind that the data must be stored over many (1o and more) years. For more read the information from the manufacturer of the medium. Seek advice of your system administrator about a practicable and effective backup and long-term archiving strategy.

3.11 Checks

The annual check of technical safety of the system is to be carried out. Check is also to be carried out in case of any inspection and testing of technical devices being operated (e.g. X-ray equipment).

3.12 Service life

The service life of this product amounts 1 year. After the expiration of this year, a state-of-the-art update of the software is recommended.
The software can also continue to be used without updating in its basic version. Images can still be received, displayed and processed.

4 Installation and maintenance

4.1 Installation

The installation instructions are provided in technical description (Administrator's guide). Persons authorized by the manufacturer only are permitted to conduct operations connected with installation and maintenance. They can be enquired at the manufacturer.

4.2 Maintenance

The hardware being used for operating the software must be checked and maintained according to information given by manufacturers of devices and statutory requirements.

4.3 Cleaning

The installed hardware may be cleaned by generally commercially available disinfecting agents unless the system administrator/supervisor requires otherwise.

4.4 Updates

The customer is eligible for software updates according to scheduled update intervals. The software updates may be performed only by persons authorized by the manufacturer of the software. However, the customer is not automatically eligible for software upgrades, i.e. later software versions (recent product developments with new features).
The update intervals are automatically extended, unless the customer cancels a particular update.

4.5 Security-critical patches

The customer undertakes to install new software versions if the later versions of the software would fix security-critical defects.

4.6 Decommissioning

For information how to exit the software and shut down the system please refer to chapters 23.4 and 23.5.
The software can be completely uninstalled by your system administrator. After the software is successfully uninstalled, it can no longer be used.

5 Starting software

Before you can use this software, the computer on which the license file is installed must be started and the network connections must be operational. The relevant information will be provided by digipaX system administrator. Start your computer and wait for full boot up of Windows. If one or more network switches are used in the practice, they shall be previously switched on. The relevant information will be also provided by system administrator.

Then in the first place switch on the computer on workstation and wait for full boot up of Windows. Log in on computer (if login is required).

Program can be started by clicking the link (icon [X]) on the desktop or from the program menu. Enter username and password. Your system administrator will pass both the username and the password on to you.

If the program has already been started automatically along with Windows and automatic login, it is minimized to system tray in the bottom right-hand corner.

If the program is linked to the practice management software, it can be also automatically started or activated from this software. Possible links can be established in GDT format. These links must be configured by system administrator.

In the event of system crash it shall be restarted by double-clicking some of the links described above or from the practice management.

6 Screen layout

6.1 Home screen layout and split
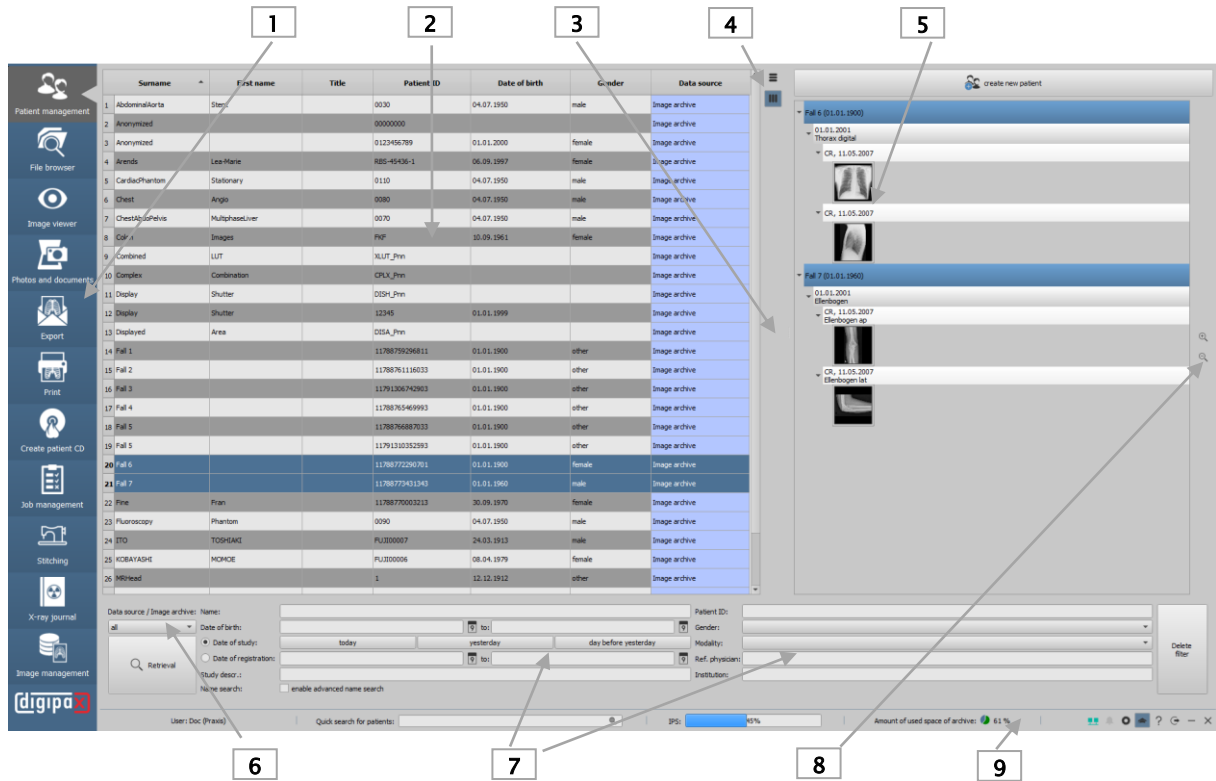
1 – Component selection: available components (number of components depends on purchased software package)

2 – Patient management: managing available patient archives

3 – Split bar: moving window split

⫶ Drag left or right to change window split

4 Adjustment of the list of patients (also for other tables in the program)

≡ Adjust column widths to content

‖‖ Adjust column widths to window

5 Preview tree: view of the thumbnails in a tree structure with studies and series

6 – Selection and query of image archives

🔍 Archive query

7 – General search function: various filter functions for querying archives

🗓 Select date

8 – Zooming in and out the thumbnails

🔍 Zoom in

🔍 Zoom out

9 – Bottom bar: with information on user, additional search box and further functions

🔍 Searching for patients (not in every component available) see chapter 6.1.2.1

🖥 Connection to Service Center established (symbol green) see chapter 6.1.2.4

🖥 Connection to Service Center terminated (symbol red) see chapter 6.1.2.4

🔔 Messages from server see chapter 6.1.2.5

⚙ Accessing configuration see chapter 6.1.2.6

🎩 Expert Mode (enabling/disabling additional functions) see chapter 6.1.2.6

? Service see chapter 6.1.2.6

⇥ Logout for user change, logging out the current user and displaying the login dialog

— Minimize

✕ Exit

The individual components are described in detail in the following chapters.

An important and primary function for operation is "Drag & drop". For example, to upload a patient from the list to the image viewer, just drag the patient from the table with the mouse onto the icon on the left side of the component list. A small number next to the icon indicates that, for example, two patients are already uploaded in the image viewer. The "Drag & drop" function is available for all components. This way single images or series can be dragged from the image viewer to printer or to the patient CD.

6.1.1 Component bar

The component bar is located on the left margin. It makes the available program components accessible. Which components are available depends on the purchased software package and the configuration. Disabled components are not displayed.

6.1.2 Bottom bar

The bottom bar is always visible. It shows the current user and group, an (optional) loading status bar while downloading images, and storage capacity of the image archive. Furthermore, an additional search box is displayed, which is inactive on some tab pages. At the bottom right the buttons Messages, Configuration, Expert Mode, Service Dialog as well as the buttons for minimizing and exiting the program are placed.

6.1.2.1 Search box

The additional search box is available on all tab pages except patient management, file browser and X–ray journal.

You can use the search box to do targeted search for a patient. Just enter at least the first three letters of the name and the system starts at once to search for matches in all available archives. You can also enter the first letter + * ("a*") for the search, and press the Enter key. Select the desired entry by clicking it or by pressing the Enter key. The selected patient is chosen for the component you are currently working on. By means of the combinations Shift + Click or Shift + Enter the patient is added to the patients that are already active in the component, except for components where only one patient may be active, such as Photos & Documents, Creating Job or Stitching. In these components the system switches to the newly selected patient.

6.1.2.2 IPS loading bar

IPS means Intelligent Prefetch System. Depending on the configuration, it has the effect that when a patient is activated, all or some images, series or studies are preloaded in the work memory and are quicker available for displaying. This increases performance. The loading bar is optional and has to be set up by the administrator.

6.1.2.3 Free storage space indicator

The storage capacity indicator shows amount of currently available free storage space on the harddisk for the image archive. If the value approaches a critical size, the graphic indicator of the used storage space first changes to yellow, and then to red.

6.1.2.4 Connection to Service Center

The program always requires a connection to the Service Center. The status of the connection is indicated by a small icon in the footer (see chapter 6.1.2). When the icon is green, the connection is established, when it is red, there is no connection. This may happen, for example, after system reboot or if network problems occur. If the connection is terminated (icon red), the system tries to re-establish the connection every 5 minutes. By clicking the symbol, you can also try to re-establish the connection manually.

6.1.2.5 Messages from server

Here, error messages from the server are logged. These are used for failure diagnosis.
If the icon is grayed out, there are no messages. As soon as a message arrives, the colour of the icon changes, and if there is a warning or error, a dialog with a hint appears in addition (once per session or at the start of the program). In this dialog you can navigate to the details of the messages. There are three categories of messages and colours: info message (green), warning message (yellow) and error message (red).
When messages of different categories are received, the colour of the highest category is displayed. By clicking the icon the messages can be also viewed and, if necessary, the administrator can be informed.

6.1.2.6 Configuration, Expert Mode, Service

The button Configuration opens the dialog for the program settings.
The Expert Mode enables additional functions in various components of the program. For example, when enabled, additional functions are available in the components Patient CD and Print. In the Patient Management, the advanced name search in the image archives is enabled in the Expert Mode to find wrongly spelled or changed names for correction. For X-ray image acquisition, the exposure index calibration tool is activated in the Expert Mode.

The button Service provides help and support. You will find there information on manufacturer and product, link to the User's Manual, information on the software license, contact details of your service partner, and link to remote maintenance.

6.2 Navigation through the program

6.2.1 Drag & drop function

The drag & drop function is used for easy operation throughout the program. Whenever you want to transfer an image, a series, a study, or a patient to another component, you only have to left-click the desired object with the mouse and drag it while holding down the mouse button onto the desired component on the left side of the bar. The corresponding images are transferred and the components are opened. If you do not want the component to open automatically afterwards, do the same action with the right-clicking the mouse. This way you can, for example, easily compile a selection of various images of different patients for printing or patient CD, or for another purpose. If, for example, you wish to print the images of 3 patients, drag them with the mouse from Patient Management onto the component Print. After you have dragged the patients onto the component, a small circle with the number "3" indicates that the images of the 3 patients are ready to be printed. If you move the mouse over this circle, the number changes to a small "x". By clicking it you can clear the compilation.

3 patients are selected in the component

Clear selection

The entire program is run accordingly to this concept. There are additional options for the individual components that are described in detail in the corresponding chapters.

Images with the "dcm" extension can also be dragged and dropped from the Windows Explorer to the image viewer. Open the image viewer and drag the desired files onto the window.

6.2.2 Double click in Windows Explorer

DICOM images can also be uploaded directly from the Windows Explorer to the viewer by double-click with the mouse. The DICOM images must have the "dcm" extension.

For other file extensions you can specify in the Windows Explorer that these have to open automatically with digipaX when double-clicked. For more details please refer to Windows - Help or ask your administrator.

Furthermore, it is possible to open the contents of a patient CD by double-clicking the file "DICOMDIR". This function also works for the images packed in a ZIP archive. By double-clicking the ZIP archive, the images are unpacked and loaded into the viewer.

6.2.3 Quick Navigation

Instead of drag & drop you can alternatively click the object (patient/study/series/image) with the right mouse button. Then a menu opens with the available components in it. Click the component and the program switches to the selected component with the selected object.
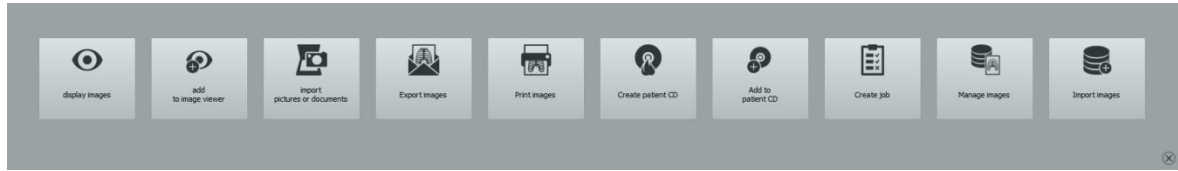
The Quick Navigation can also be accessed in the particular components by right-clicking the image preview.

7 Patient management

After normal starting the program the patient management shows up automatically. Depending on the network and the number of archives and patients, it may take a while to display the data. In the configuration under "User/Other" this procedure can be controlled to some extent. This way it can be set that the list of patients is to be or is not to be updated without the inquiry at the start of the program. Furthermore, the number of displayed patients can be limited.
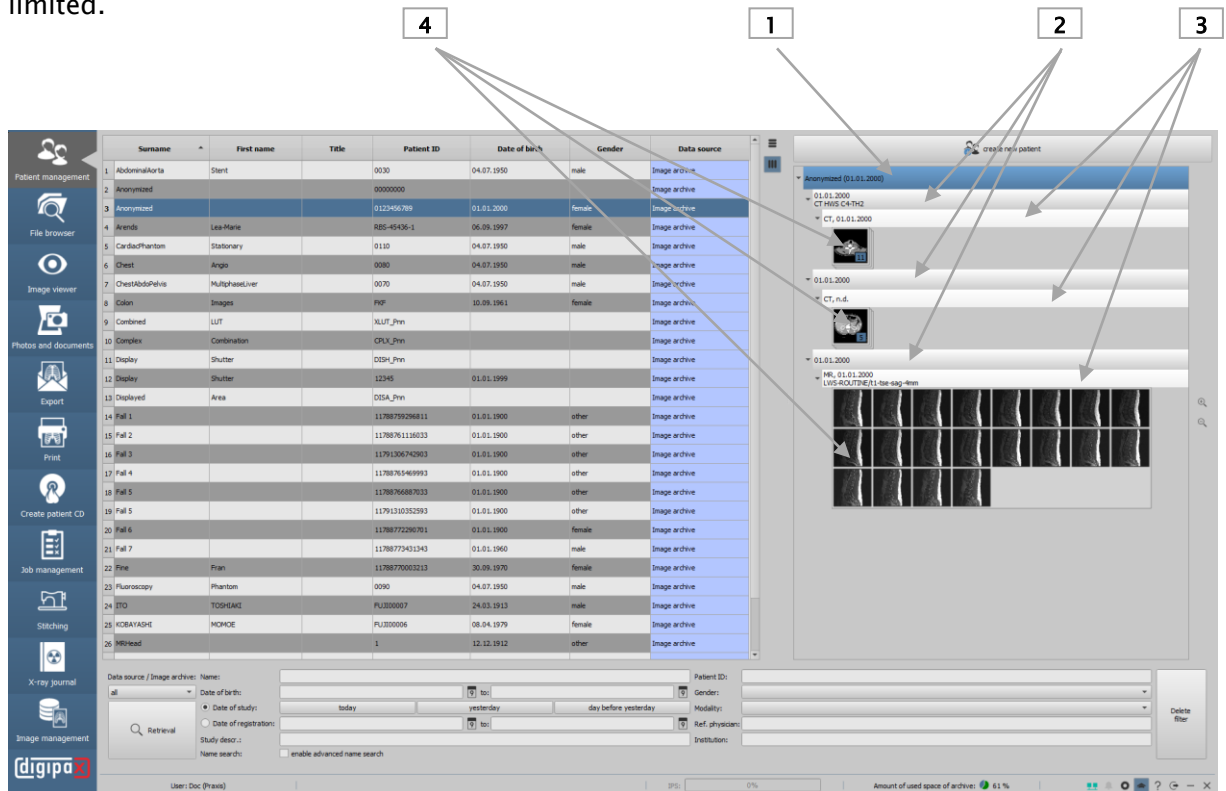
1 – Node Patient

2 – Node Study

3 – Node Series

4 – Node Single image (if stack view, the image displayed on the stack)

7.1 Table of patients and preview

For each patient the following data are displayed in the table:
- surname
- first name
- title
- patient ID
- date of birth
- gender
- data source

Each column can be shown or hidden. To do so, right-click with the mouse the headline of the list of patients and activate or deactivate the desired column. You can also move the columns in their order by dragging them while holding down the left mouse button to the desired position.
The table can be sorted in ascending and descending order by field (column) by clicking the column header.

The administrator can activate additional columns e.g. for address, phone number and re-marks etc. Ask your system administrator about that.
Once you have set the desired columns, you can use the two buttons next to the table to automatically adjust the table to fit the window or the contents.

On the right the thumbnails for each patient are displayed. To display the thumbnails the patient must be selected in the list. The studies consisting of subitem series and thumbnails are collapsed by default and can be expanded individually. The thumbnails can be zoomed in and out with the buttons next to the preview tree.

7.2 Selecting patients

To view the images of a patient, you only need to double-click the row in the table or drag and drop the patient to the image viewer. The program will switch to the viewer and display the images.
If you want to upload just one image, series or study of the patient, expand the preview on the right, click the desired node, and drag the object with the mouse to the viewer. The same action applies for dragging the single objects onto another component for further processing.

7.3 Selecting and querying data sources

Data sources are all configured image archives (PACS) and the locally created data, which are intended for storage in an image archive.

Multiple archives can be configured and the list of patients of the currently selected data source is displayed respectively.

Use the drop-down box "Data source / Image archive" to select the data source to be displayed. When changing the data source and requerying, the displayed list of patients changes accordingly.

Local data is usually only temporary data of patients for whom no image was archived yet. If, for example, a patient is created manually or entered in the system for the first time, the data appears in the table as "local". As soon as an image is archived for this patient, the status changes.

You can display the local data, each single archive or all data sources together. The column "Data source" of the table shows in which archive the patient is stored.

To increase query speed of large archives, the number of data records displayed is limited. If the searched patient is not contained in the list, because the list is cut off, the limiting by filter must follow or the maximum data records must be increased. In the configuration, it is possible to set up the number of data records displayed or deactivate this limitation (see chapter 0

Configuration section Other).

7.4 Filters

The list of patients can be filtered according to different criterions. By filtering all patients which do not meet the filter settings, are dismissed from the list. It is also possible to combine various filters randomly. All active filters can be reset with the button "Delete filters".

Local data, so the patients locally set in the system or newly transferred via GDT, is not filtered. These do not appear in the result lists, even when they meet the search criterions.

7.4.1 Filtering by name

Enter the beginning of the searched surname (e.g. "Sch") to find all patients with surnames beginning with "Sch". You can use the asterisk (wildcard) in the first position (e.g. "*mann") to find all patients with names containing "mann". You can also enter surname and first name separated by a comma (e.g. Sch, Ma). All patients, whose surnames start with "Sch" and the first names start with "Ma", will be displayed.

7.4.2 Filtering by date of birth

At the touch of a button the patients can be filtered, whose date of birth is included between the entered dates.

7.4.3 Filtering by date of study

At the touch of a button the patients can be filtered, which contain the studies with the date or period of time entered. Thereby the studies will be automatically filtered. This means that only one study, which meets the search criteria, will be shown for the patient.

7.4.4 Filtering by description of study

Here you can search the archive for images of specific studies (e.g. all images with "knee" or "wrist" etc.). You just need to enter "*knee*" when searching for knee etc.

7.4.5 Filtering by patient ID

You can search specifically for a patient-ID by putting it in the field and then clicking Enter or "Query". Enter first characters of the searched patient ID or search for a part of this patient ID using wildcards (asterisk "*") as for filtering by names.

7.4.6 Filtering by gender

Filters out all patients of a certain gender.

7.4.7 Filtering by modality

All possible modalities (procedure for image acquisition) are listed in a drop-down list box and one of them can be selected there. Subsequently only the patients will be displayed that contain the images of this modality. This means that also the image series will be filtered and the matching series will be shown.

7.4.8 Filtering by transferring physician

Like for the filtering by names or patient ID, use here wildcards for filtering by name of the transferring physician. You may need to insert an asterisk at the beginning as well as at the end of the 3 letters of the name (e.g. "*sch*").

7.4.9 Filtering by institution

Here you can search for all images that originate from a specific another doctor's practice, e.g. images from extraneous patient CDs that have been imported to the archive. To search for e.g. "Practice Dr. Smith" enter "*smith*".

7.4.10 Enabling advanced name search

If Expert Mode is enabled (see 6.1.2.6), the advanced name search is available. By ticking the checkbox, incorrectly assigned images, wrongly spelled or changed names (after marriage) can be found.

If the patient is not displayed in a normal archive query without filtering, this function helps to find him or her. Example for the surname Simpson: enter the name (Simpson), or the first or last letters of the name (S* or *son), or the letters from the middle of the name (*imps*) in the search box and click Query. All studies in the archive that match these search criteria will be listed.

7.5 Recording new patients / Changing patient data / Deleting patients

7.5.1 Recording data

Usually, the data in digipaX does not have to be entered manually as the program is directly linked to the practice management and the data is automatically transferred to digipaX. If you work without this link, the data must be entered manually in digipaX at the patient's first appointment at the practice.

To create a new patient select the button "Create new patient".

Create new patient

It opens the input mask for entering the data. Enter all required data.

The following characters are not allowed in the patient's name or ID: \ / : * „ " ' ? < > |.

Generally special characters shall be avoided, such as ^ ° : * ? < > | @ € µ ~ ² ³ !. Just use the real name of the patient.

Another important item is the patient ID. It must always be unique for each patient.

Use a simple and effective format for the ID. The best way is to use consecutive numbers with several digits and to start with "000001".

Another possibility is to have the ID always formed automatically from the name and date of birth of the patient. Then you do not have to enter any information for the ID. Seek advice from your system administrator which variant would be the most suitable for you.

Using PESEL Number (for Poland only):

If the system is set to usage of the PESEL Number as patient's ID, the PESEL Number is verified and the date of birth and gender are derived from it when you record patient data manually. Enter the 11-digit number in the field of the patient's ID and jump to next input field. If the entered number is valid, then the date of birth and gender are automatically put in the field, otherwise an error message appears and you can rectify the incorrect entry.

Save

When you have entered all data completely, confirm with "Save". The new data record is created locally. Local means that no images exist yet for this patient.

7.5.2 Editing patient data (only if no images for a patient exist)

Local patient data can always be edited. Therefore, as long as no images for a manually created patient have been stored in the image archive, the patient's data can be changed. To edit, just select the appropriate row of the patient in the table of patients. On the right you can adjust the data and save them again.

After an image of the patient has been saved in the archive, you will only be able to edit the patient's data using a special edit feature, this can be done in the tab page Image Management. For more details please refer to the chapter 19.2.

7.5.3 Deleting patients (only if no images for a patient exist)

Deletion of patients is only possible for local patients at this point, that is, for patients who do not yet have an image in the archive. Click button "Delete patient" and the patient is removed from the list.

Delete patient

Patients who are already stored in the image archive can be deleted from the system in the tab page Image Management, please refer to the chapter 19.1.

7.6 List of studies, series and images

Parallel to the list of patients the studies of the selected patient or patients are displayed. Studies, series and images are presented as a tree structure. Recording, remarks and modality for the series are presented each time. Many patients can be selected at one time – in the tree structure the top nodes are then the information on patient and thereunder his/her studies.

8 File browser

File browser provides quick search for DICOM files on the PC to open them in digipaX for further processing or transfer them to the archive.

Local or external data carriers, removable media (CD/DVD/USB stick) or connected network drives can be searched.

8.1 Favourites

By means of favourites, you can save different source directories and quickly reaccess them with just a simple click. The favourites are permanently saved as buttons in the top bar. Optionally, you can assign an icon to each button. The icons can be JPEG, bitmap (BMP) or PNG images.

To add a favourite, click the plus sign, navigate to the required directory, enter a name and select an icon file (optional).

New favourite

Path: Search for directory

Icon: Search for file

Remove favourite

To remove a favourite, click the minus sign, select the required favourite and click "OK".

8.2 Patient CD (DICOMDIR)

Often the directories for DICOM files are created in so called DICOMDIR files.

This is the case when creating a patient CD. If such a DICOMDIR file is recognized in a directory, a dialog opens automatically and requests loading the data. Optionally, the images can also be loaded by double-clicking the file "DICOMDIR".

Patient CDs can be imported into the system. If a patient CD is inserted while the application is open, it will be read and uploaded to the viewer. Once the images have been uploaded to the viewer, you can drag the images to the component Image Management and import them into the system. For more information on importing data into the archive please refer to the chapter 19.3.

8.3 Single files

The left navigation bar shows all drives of the PC and the folder structure they contain. Navigate left to the desired drive or subdirectory. Alternatively, you can search the PC and the network using the search function at the top in the right-hand part.

Search for directory (search PC or network)

One folder up (moves up one level in the folder structure)

If you select a drive or folder on the left, the contents are displayed on the right. If you double-click a folder on the right it opens and its content is displayed. The current path is always indicated at the top of the bar for orientation.

If the images are stored in a ZIP archive, they can be loaded by double-clicking the archive.

Click button "Browse current directory" to search for DICOM files in this path.

Optionally, you can apply search filters and include subdirectories.

Filters for the files, which are not to be opened and for the files, which are not to be imported, can be set. First activate the desired filter and specify filenames using wildcards ("*" and "?"). Thereby, many possible file names can be separated with blanks. For example, if the filter setting is "*.dcm CT*" for the option "These files only", all files with the file extension dcm and all files with names beginning with CT will be found. Activate the option "Not these files" and use e.g. "*.exe *.rar" as filter to exclude possible attempt of importing programs or RAR archives.

If the option "Include subdirectories" is activated all found subdirectories and their subdirectories will be scanned.

If a file that matches the filter settings cannot be read, it is logged in the log and an error message is displayed.

After the completion of the searching the DICOM files found are displayed in the list of patients at the bottom along with the thumbnails.

If you only want to load certain files select these files at the top right corner. Multiple selection of files is possible by holding the Ctrl or Shift key. Then click button "Load selected files" and the files will be added to the list of patients at the bottom. The data can now be further processed in digipaX.

	Browse directory with filter
	Load selected files
	Clear list of patients
	Adjust column widths to fit the content
	Adjust column widths to fit the window size
	Zoom in preview
	Zoom out preview

Double-clicking the patient in the list or preview results in displaying the images of this patient in the image viewer.
The patients can be dragged by drag & drop from the list or the preview to another component, e.g. Print. Multiple selection is also possible here by holding the Ctrl or Shift key.
Instead of using drag & drop you can also right-click the mouse and use the tool Quick Navigation (see chapter 6.2.3).

You can clear the list of patients by clicking button "Clear list of patients". **The files will be not deleted though.**

9 Viewing images / Viewer

The component Viewing Images comprises the areas of image selection, image display and image editing or manipulations.

Both greyscale and colour images are supported. These can be presented uncompressed, RLE- or JPEG-compressed.

⚠️ **There is an indication shown on the top edge of the images compressed with lossy data compression. Those images are unusable for diagnosis as possibly important information on the image could get lost due to compression.**

Changes made to grayscale images are stored in the so-called Presentation State. This means that rotations, mirroring, windowing changes, filters, annotations and measurements, zoom changes or shutters are saved when closing the image, and are available when the image is opened again. All changes can also be deleted later and the original images can be restored. Changes to colour images are not saved and are lost when closing the image.

9.1 Selecting images

The images are selected in the preview at the left margin of the screen. The width of the preview can be changed by the window splitter and the preview can also be completely hidden.

At the top of the preview area detailed information on the current patient is displayed. The tree view below contains the studies of the selected patient. The patients form in each case a superordinate node. Thereunder the nodes of the existing studies are presented that can also have a number of subitems: image series and images. All these nodes can be expanded and collapsed. In the nodes of the series the thumbnails are displayed. The series are displayed as stacks, therefore only one thumbnails can be seen on which the number of images of this series is stated. In the

Configuration under image preview a setting can be made to display each image individually in the preview, even for the series. The exception are multiframe series that are always displayed only as a single thumbnail. Multi frame series are the image series packed in a DICOM file. In the top right corner of the thumbnail the currently presented frame number and the number of frames are displayed.
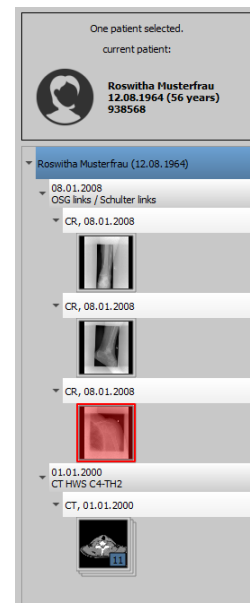
The thumbnails are marked by a red framework, even if this image is displayed in a large image view.

When stopping the mouse over a node (patient, study, series or image) information on it is displayed in a tooltip.

The size of the thumbnails can be set by using two buttons Plus and Minus below the tree structure. The size of the images is stored and used at the next program start.

By clicking a thumbnail this image will be uploaded to the viewer. If there is an image window still free in the viewer (by splitting images in the display area of the viewer in for example 2x2 images, more images can be displayed next to each other in the viewer), it is displayed in this free window. If no image window is free, the image is replaced in a current image window.

Thumbnails can also be dragged and dropped to an image window of the viewer. This allows you to flexibly split the images on the monitor.

When you click the node of a study the images of this study are automatically uploaded to different windows of the viewer according to the modality of the images. Multiple monitors can also be used for this action. Window split is to be defined in the

Configuration (see 0).

If there are multiple monitors, the nodes can also be dragged and dropped onto the desired monitor so that the images of the study are only hung on this monitor. This allows viewing different studies at the same time. Simply click the node of the study and drag it to the desired monitor.

The selection of the patients can be reset (cleared) by clicking the small number on the icon of the image viewer. Afterwards no more patients are selected and the preview tree is empty.

9.2 Image display

In the viewer images are displayed. The viewer can be sliced in many even pieces, which allows displaying multiple images one beside the other. Simultaneous display of 1 to 36 images is possible. These pieces can be split into subsections to present single images of the series in one grid.

For the viewer, there are many functions for image representation available.

These functions are placed in the toolbar that can be displayed by using the button at the top right. These functions are described in next sections.

9.2.1 Mouse functions

Moving

Windowing

Magic Sharp

Dragging on zoom rectangle

Loupe

Scrolling

Show position and grayscale value

In this toolbar the action for the left mouse button can be selected:
- **M**oving (if display size is larger than image window) – this is a default setting
- **W**indowing (brightness/contrast)
    - ➔ horizontal mouse move: changing window center (brightness)
    - ➔ vertical mouse move: changing window width (contrast)

In the

Configuration (category Other) these moves can be also modified
- **Magic Sharp Filter (size/sharpness)**
    - ➔ horizontal mouse move: changing size
    - ➔ vertical mouse move: changing sharpening amount

For detailed description of the filter functions please refer to chapter 9.3.3.1 Magic Sharp.
- **Zoom rectangle**
- **Loupe**
- **Scrolling** (scrolling through the series)
- **Position and grayscale values** (shows coordinates and grayscale value of the current image point)

The function can be impacted by the following combinations of keys:
- Alt + left mouse button: Windowing
- Alt + Shift + left mouse button: Dragging on zoom rectangle
- Alt + right mouse button: Loupe

Further mouse functions:
- right mouse button: zooming in / out (with vertical mouse movement)
- middle mouse button or pushed scroll: Windowing
- Rotating scroll: next or previous image of the images series, study or the patient (for each setting), if existing
- Ctrl + Shift + left mouse button held down: Magic Sharp Filter
- left + right mouse button held down: Magic Sharp Filter

9.2.2 Zoom

◀▶	Windows width
▲▼	Window height
↘	Windows size
↘	Full screen current windows
↘ ↘	Full screen split view
⊕	Zoom in
⊖	Zoom out
1:1	Original size (1:1)

The options for zooming images refer in each case to currently active image.
According to the standard the image display in a window is initialized in this way, that the image is scaled to the window size. If the size of the window changes in this option, e.g. by division of the image, the zoom factor is adapted accordingly, so that always the full image is seen.
The full screen mode can be activated by simply pressing the Enter key or by double-clicking the image, or Shift + clicking the preview image, or clicking button "Current window in full screen". The current image is now scaled to the full screen size. If you press Shift + Enter or Shift + double-click, or click button "Split view in full screen", all displayed slices (when window sliced) are scaled to the full screen size. The full screen mode can be exit by pressing the Esc key or double-clicking.

Key combinations at a glance:

Enter key:	Active image in full screen (red frame)
Double-clicking the image:	Image in full screen
Shift + clicking thumbnail:	Image in full screen
Shift + Enter key:	Split view in full screen
Shift + double-click:	Split view in full screen
Escape key:	Exiting full screen
Double-click:	Exiting full screen

9.2.3 Overlay

Show information

Show annotations and measurements

Activate display shutter

Activate bitmap overlays

Show scoutlines

Show information of Hanging Protocols

Overlay divides in the following areas:
- Information (in the image corners),
- Annotations + measurements (e.g. measured sections or angles),
- Display Shutter (blanking everything outside the selection),
- Bitmap overlays (overlay images)
- Scout lines (presentation of the position of particular sectional images in CT und MRT series)
- Information on Hanging Protocols

For each of these areas there is a button in the toolbar. Use it to unhide or hide the area.
If an image is opened, in which a selection was set, or if a selection range is set by user, then the button for "Display Shutter" is automatically set, so on, and user can turn this off or on using the button.

9.2.4 Splitting images

Series grid: 1 x 1

Series grid: 1 x 2

Series grid: 2 x 2

Series grid: user-defined

Image grid: 1 x 1

Image grid: 1 x 2

Image grid: 2 x 2

Image grid: automatic

Image grid: user-defined

Reset window split

The image window can be split into even pieces to arrange particular series of a study in one grid. These pieces of the series can also be sliced to display single images in one grid.

To split the series of a study into a grid, use the buttons for a series grid (see above). You can choose between 1x1, 1x2, 2x2 and user-defined up to 6x6 grid. To slice one of the pieces, click this piece and use the buttons for image grid (see above) with the same functionality.

The button "Automatic image grid" can be used to arrange single images of the series auto- matically arranged into the current slicing. The button "Reset window split" restores the main window.
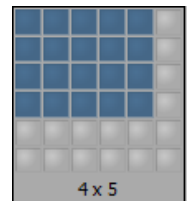
9.2.5 Projections

In reconstruction of images, intensity of the same pixels of the consecutive images is evaluated and from these values a new output image is generated and visualized. For example, if there are five images, for each pixel of the output image a new intensity value is calculated from the five values.

- – Average intensity: an average intensity value is calculated
- – Maximum (MIP): a maximum intensity value is calculated
- – Minimum (MinIP): a minimum intensity value is calculated

- – Frames: amount of evaluated images
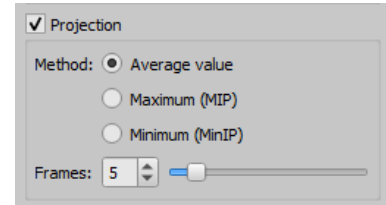
9.2.6 Other functions

	Copy image to clipboard	See chapter 9.2.6.1
	Header information (DICOM-Dump)	See chapter 9.2.6.2

9.2.6.1 Clipboard

By using the button for clipboard the current image in the current presentation form can be copied to clipboard. This means that the overlay objects (information on image, annotations and measurements as well as display shutter) will be copied in the image too, provided that they are unhidden. If clicking this button is accompanied by coevally press on the Shift key, the image will be copied in its original size to clipboard.

9.2.6.2 Header information (DICOM Dump)

By using the button in the toolbar a dialog can be opened, in which the DICOM information (tags) of the current image are displayed. These tags are structured in groups for a better overview.
All tags, also private, are shown.
A modification of the values is not possible.
In the first tab "structured" of the window, individual data from the header can be
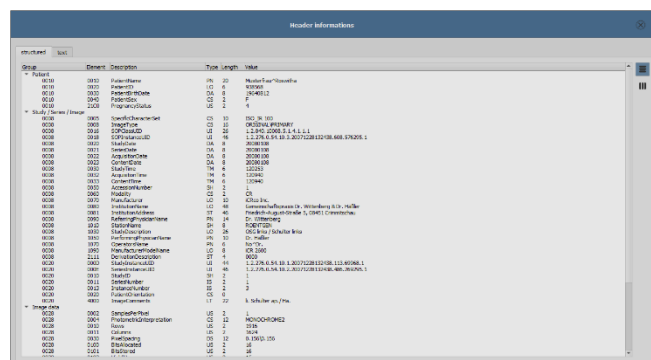
copied to the clipboard by using the Copy function and pasted in another application (e.g. text processing). To do this, double-click the element required and right-click the Copy button. For the multiframe series, it should be noted that these series have only one header for the entire series, in which the information on single images is contained.
In the second tab "text", entire parts or a complete header can be copied to the clipboard. To do this, check the desired rows with the mouse or the complete header with the Ctrl+A keys

and copy the text to the clipboard. From there the data can be pasted into a text file or a Word document etc.

9.2.7 Structured reports and Encapsulated PDF

9.2.7.1 Structured reports

Structured reports are various types of reports stored along with the patient in the archive or on patient CDs in DICOM format under the SR modality. These reports are displayed as icons in the image preview.

9.2.7.2 Encapsulated PDF

Another form are DICOM files with integrated PDF documents (Encapsulated PDF). These files are also displayed as ucons in the image preview. To open them, a corresponding PDF viewer program must be installed. Most web browsers support pewsentation of PDF documents. Ask your administrator for assistance.

9.2.7.3 Opening reports

Click the icon in the preview or drag it with the mouse to the image viewer, then double-click the large icon in the viewer and the report will be opened in a separate window or program.

9.3 Manipulation on images

On the right side of the image display the tools for editing images are placed. These tools can be hidden or unhidden by using particular buttons . They are arranged vertically and sorted according to topics.

Below the tools the buttons for undoing the last actions and restoring the undone actions are placed. The actions are displayed as text in tooltips. The actions refer each time to the active image. I.e., if the image is changed, one cannot undo the actions for it considering the circumstances and the buttons therefore are deactivated.
The last button "Restore original image" is used to undo all modifications performed. Before undoing the system requests confirmation and the original image is then restored just as it is stored in the image archive.

For CT and MRT images as well as multi frame series, the operations on images are automatically applied to the entire image series, otherwise always only for an active image.

For grayscale images the modifications on the images are stored. For colour images the modifications are not stored, but they are only temporary. I.e., if you change the patient or close the program, the adjustments/modifications to a colour image will be lost.

9.3.1 Transformations (rotation, flip, inversion)

The images can be rotated by using the button 90° left, 90° right or 180°. They can be
mirrored horizontally and vertically, and also inverted.
Each operation can be undone as well as redone by using both arrows at the bottom.

Rotate:

Rotate left

Rotate right

Rotate 180°

Flip:

Mirror horizontally

Mirror vertically

Invert:

Invert

9.3.2 Windowing

Windowing is a usual method for the preparation of grayscale images. For colour images windowing is deactivated.

The grayscale range to be displayed is selected by specifying window center (brightness) and window width (contrast). These values are adjustable each time by using the sliders or input fields.
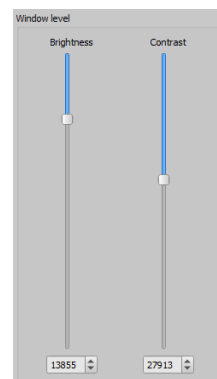
Edit presets

Furthermore, the settings can be used quickly from the list of presets.
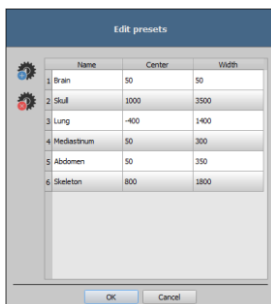
The modification of these presets or adding the user-defined presets is possible through a dialog which is displayed when the button "Edit presets…" is used.

With the automatic windowing, additional special default settings can be defined, which will be then applied to the open image just by a single-click.

Configurable buttons 1 to 3 are intended to determine automatically appropriate values for windowing using calculation algorithm based on the histogram. For this algorithm, a threshold value must be defined.
Click the button while holding Shift key to define the threshold value for this button. In a subsequently opening dialog you can enter values between 1 and 49. The higher is the value entered, the sharper the image will be. In this way, you can define default setting for each of the 3 buttons. With one click the appropriate button the algorithm for calculation and the values obtained out of it for windowing applies immediately to the image.
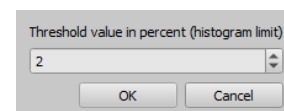
The button "Set ROI" (ROI = Region of Interest) is used to draw a rectangle in the image (ROI). From this rectangle the optimum values will be calculated and applied to the image. To do this, first click the button and then set the rectangle with two clicks on the image. The values will be immediately calculated and applied to the image.

The next button is an interactive rectangle (ROI). Click the button and draw the rectangle along the image. The optimum value is determined automatically inside the rectangle and displayed throughout the entire image. When you have found the appropriate representation, click again to apply the value to the image. With the mouse wheel you can increase or decrease the rectangle size. With Control (Ctrl) or Shift keys pushed additionally, the rectangle size can be modified, either in its width or height. You can cancel the process with Esc key.

With the button "Entire area", the entire visible area from the minimum to the maximum of grayscale levels contained in the image is being displayed.

9.3.3 Filters

The license module must be enabled to be able to use the filters.

The filters: Magic Sharp, histogram equalization, sharpening, contrast enhancement and structure enhancement are available. They can be used individually or in combination. To use a filter, tick the relevant box.

With the button "Remove filters" all filters are disabled and the values reset.

As soon as the filter is activated, a small icon is shown on the lower edge of the image. The filter may be deactivated by single-clicking this icon and with another mouse click again activated. In this way, you can compare images with and without the filter. Double-clicking the icon removes the filter.

Various filter settings may be stored in the list of filters. These filters may be then quickly applied for other images. You can export and import this list at another working station. Thus, various filter presets may be easily shared with many stations.
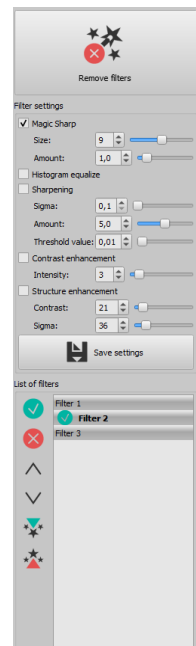
9.3.3.1 Magic Sharp

This filter will have no effect for colour images. It may be used only for grayscale images.

The algorithm of this filter will automatically adjust image contrast and the adjustment will be made individually for partial areas of the image. In this way, the contrast will be optimized for individual partial areas of the image, which usually leads to better results than contrast adjustment to the entire image. The size of each partial area is adjusted with the parameter "Size". This value can be set in a range from 2 to 16. The higher the set value, the smaller the partial areas of the image. The value of 5 stands for 1/5 of the image while 10 stands for 1/10 of the total image size. Thus, the higher the value, the more visible small structures will become. The parameter "Sharpening amount" defines intensity of the effects. This value can be set in a range from 0.1 to 10. Values smaller than 1 lead to unsharpness, values larger than 1 increase the contrast. If the value is equal 1, the resulting image is identical as the original image.

9.3.3.2 Mouse function "Magic Sharp"

With this function the Magic Sharp filter can be set by dragging the mouse over the image. This function is activated with the mouse functions that are described in chapter 9.2.1. The easiest way is to press right and left mouse button simultaneously. This will start only the "Magic Sharp" filter. Other filters will remain inactive.

Enable the function using one of the methods described. By dragging the mouse horizontally from left to right, the value increases from minimum 2 to maximum 16, and by dragging the mouse from right to left, the value decreases back. To adjust the value for sharpening amount, drag the mouse vertically from bottom to top to change the value in a range from 1 to 10.
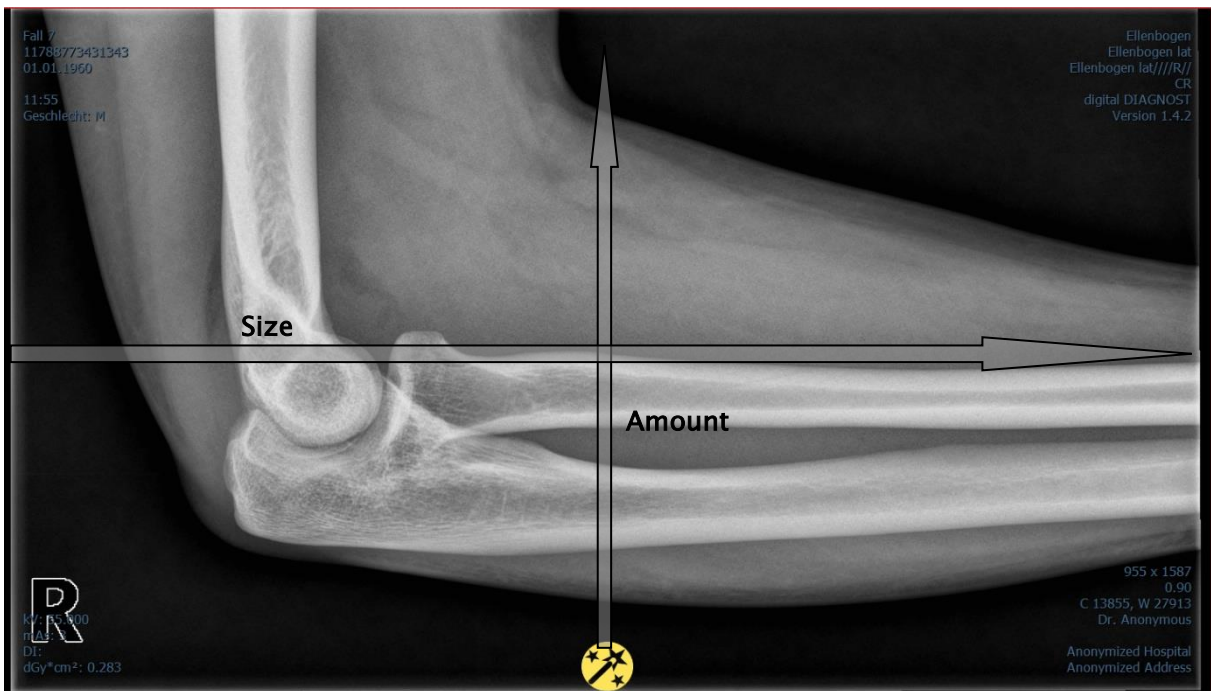
Filter active

Filter inactive

9.3.3.3 Histogram equalizing

With histogram equalizing grayscale levels of the areas of interest will be extended to gray-scale and the less frequently used grayscale levels will be narrowed. Thus, the structures in the image areas of interest will be highlighted.
Tick the box to activate or deactivate this filter. This filter has no further settings.

The changes that results by use of the histogram equalizing will not be reflected in the histogram itself because in the histogram, always the values of original image are represented without the filters applied to it.

9.3.3.4 Sharpening

With sharpening the differences in brightness are highlighted making the image "sharper". The sharpening is calculated in pixels. The "sigma" parameter specifies size of structures to be sharpened. The larger this value is, the more coarse structures are sharpened.
The parameter "Sharpening amount" defines how much the image is to be sharpened. Higher values lead to intensifier sharpening. The parameter "Threshold value" is set in order to avoid simultaneous refining smooth areas in the image. In order to sharpen all areas of the image, set this parameter to 0. In order to sharpen only the high contrast areas, increase the threshold value.
Select the image area that is to be studied. Zoom the image in this area in if needed. Start with a higher value for strength and then increase the sigma value until the structures are empha-sized well enough. The sharpening amount may then be reduced again.

9.3.3.5 Contrast enhancement

With contrast enhancement the differences between bright and dark areas in the image can be yet stronger distinguished. Bright image areas are then presented yet brighter and dark areas yet darker. An enhancement factor of 1 (slight) to 25 (very strong) can be set for this func-tionality.

9.3.3.6 Structure enhancement

Structure enhancement helps to make structures in the image better emphasized. The values for contrast and sigma can be changed between 1 and 255. A small value for contrast leads to a strong enhancement of the structures. The smaller is the value for sigma, the stronger coarse structures are smoothed.
When setting this option, start with the maximum values for both parameters. Decrease the value for contrast gradually and then decrease the value for sigma until the desired level of detail is achieved in the image display.

9.3.3.7 List of filters List of filters

With the list of filters, various filter settings may be stored and reused easily.
In order to save filter settings, click button "Save settings".

Save settings

A new entry will be added to the list of filters. Enter the name of the new filter. Thus, a number of filter settings may be saved in the list of filters.

A filter from the list of filters may be set as the default filter. If a filter is set as the default filter, it will be automatically applied to every image unless another filter has been set for this particular image. In order to deactivate the default filter, uncheck the Default definition.
With the export function you can export filter settings as a configuration file and import them to another station using the import function.

Set as default / Suspend default setting

Delete filter

Up

Down

Import list of filters

Export list of filters

9.3.4 Annotations / measurements

Misalignments of length and angle measurements may be caused by modality or image acquisition!
Evaluations are based on information for pixel size saved in the DICOM image. However, misalignments may be also caused by an exposure – particularly if conventional radiography (CR, DX) e.g. of pelvis or ilium is considered. The distance of the exposed part of the body from the imaging plate / detector skews the presentation of length on a 2D radiograph. Also, if a scale (sphere) has been x-rayed withal, a misalignment is possible, insofar as the scale was placed not exactly at the same level with the measured part of the body at the exposure.
If details for pixel size in the images are not specified then the measurement results follow in pixels.

For the possible deviations listed above the annotations and measurements available in the program are not suitable for surgical plannings or making prostheses. For these purposes additional special planning systems with scale and reference standards are necessary.

Under the annotations come lines, arrows, rectangles, ellipses, polygons and text. Thereby the rectangles, ellipses and polygons can be also drawn filled out. Explanations how the objects are to be drawn using the mouse, are each time displayed after the selection is made, i.e. after clicking the button, in the bottom right corner. The drawn objects can be yet modified afterwards in all directions or relocated to get the form and to be placed in the position desired. In addition, the objects are shown in a list to the right and can be hidden or shown by single clicking the eye symbol. Particular objects can be deleted by clicking Recycle Bin icon or pressing "Delete" key on the keyboard.

Line

Arrow

Rectangle

Ellipse

Circle

Polygon

Text
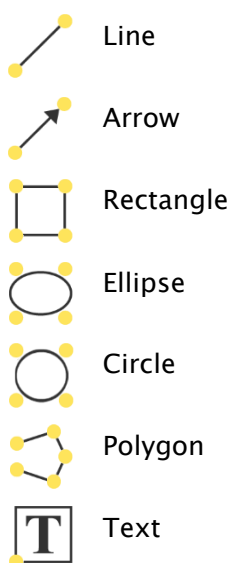
The switch "create multiple annotations or measurements in a row" effects that the selected drawing object remains active. Then e.g. multiple distance measurements can be drawn one after the other without the need for re-clicking for every single measurement. After you have drawn all measurements you can quit this modus by double-clicking the image area or pressing the ESC key.
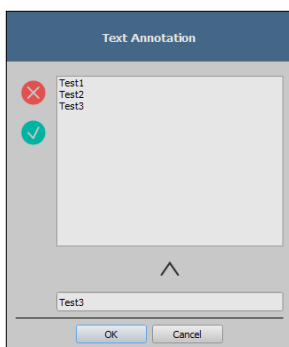
After the text is selected, first a dialog appears, in which new texts can be added to the list of standard texts (type in the text in input field and then press the arrow symbol), or the text from this list can be selected (double-click or click and Ok), or the desired text can be typed in (type in the text in input field and press Ok), which will be then used and placed on the image. You can determine your own standard entry, which is activated upon opening the dialog.

Measurement functions exist only if the adequate module is enabled.

Under measuring comes measuring of the sections and angles as well as measuring of the content of the area of rectangles, ellipses and polygons. The measuring of an angle can follow thereby by entering 3 or 4 points. When measuring the angles, external angle is represented in brackets.

Distance

Angle (3 P.)

Angle (4 P.)

Rectangles

Ellipse
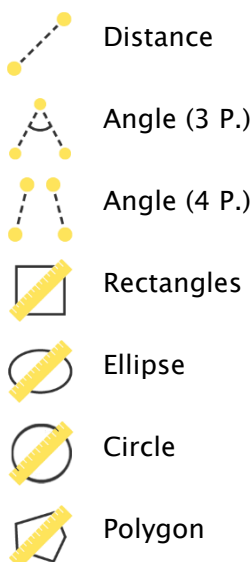
Circle

Polygon

When measuring rectangle, ellipse, circle or polygon, the area and densities are measured as well. The actual average grayscale level out of original pixel values as well as minimum and maximum grayscale level are shown next to the figure. For colour images only a normal area measurement is done. For CT series values of these objects are expressed in Hounsfield units (HU).

During drawing the measurements current measured data are shown live. As for annotations, the drawn objects can be yet modified afterwards in all directions or relocated to get the form and to be placed in the position desired. The field with measured values can also be moved to another place in the image.

The measurements are shown in a list to the right and can be hidden or shown by single clicking the eye symbol. Particular objects can be deleted by clicking Recycle Bin icon or pressing "Delete" key on the keyboard. All annotations and measurements can be deleted by single-clicking button "Delete all" on the bottom right.

Object visible

Object hidden

Delete object or Delete all

Graphic objects of third party systems or earlier digipaX versions (Version 1.4.5 or earlier) cannot be changed.

Settings for drawing graphic objects in overlay can be set in the

Configuration (category Overlay).

9.3.4.1 Special measurements

There are more buttons for special measurements existing. Some of these buttons are used only for veterinary purposes and therefore only available if digipaX is configured for veterinary use (see section 22.3).

When you click the button for a measurement a routine for this measurement will be activated. A short instruction for steps to be performed is shown at the bottom edge of the image. First you must perform all the steps as described until all points and lines for the measurement given are set. Thereafter you can correct the measurement and adjust the objects accordingly. If you wish to cancel the measurement process e.g. in order to start it once again from the beginning, just press the Escape key.

CTR (Cardiothoracic Ratio)

Evaluation of cardiac size

X-ray image: thorax in p.a. projection

Click the button and draw the line for measurement of the heart (maximum transversal diameter of the heart silhouette) first. Thereafter draw the line for the measurement of the thorax (maximum transversal internal diameter). Both lines can be still readjusted by moving their end points.
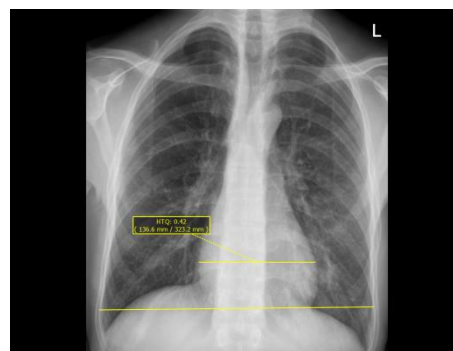
CE measurement (central-edge angle of Wiberg)

The measurement calculates the angle between the line drawn from the center of the femoral head to the outer edge of the acetabular roof, and a vertical line drawn through the center of the femoral head.

X-ray image: pelvis in a.p. projection

Click the button and drag the circle on the femoral head. Start with a mouse click the central point and then drag the circle to the outer edge. Afterwards, drag the angle on the acetabular roof.
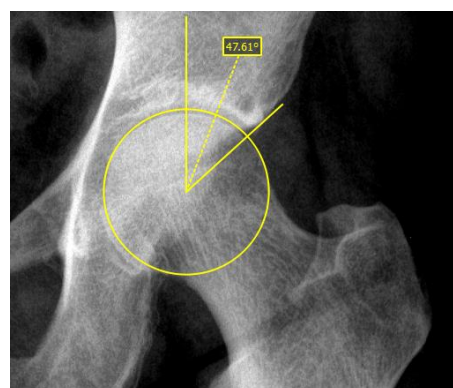
Pelvic obliquity measurement

The measurement calculates the angle between the horizontal line and the line drawn between the centers of the femoral heads.

X-ray image: pelvis overview

Click the button and drag the circle on each of the femoral head. Start with a mouse click the central point and then drag the circle to the outer edge.
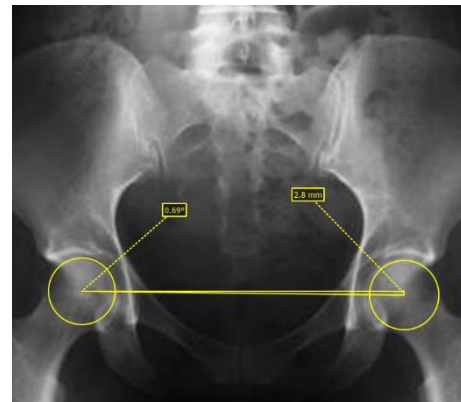
9.3.5 Display Shutter

For each image, the different selections zones in the form of a rectangle, ellipse or polygon can be defined. Thereby, for each type exactly one object is possible, whereby the types can be also used together. Explanations for drawing using the mouse are displayed below the buttons, after the adequate button is pressed on.

Rectangle

Circle

Polygon

Delete Shutter

Setting up the selection zone of a certain type replaces a potentially already existing selection zone of this type.

Everything except for the zone that has been defined in this way, can be hidden and unhidden by using the switch in the toolbar ("Display Shutter" in the overlay options).

The objects can be individually redeleted.

9.3.6 Cine loop

With this function, the image series can be played automatically. Various control func-
tions are available thereby, such as playback direction or speed. The speed can be set
with special controllers. With "Start" and "End" you can determine from which image of the
series the play is to be started and on which one it is to be ended. With the vertical scroll bars,
individual images can be also selected manually.

 1 – Play forward

 2 – Play backward

 3 – End

 4 – Pause

 5 – Play speed

 6 – Play once only

 7 – Automatic play forward/backward

 8 – Endless loop

 9 – Start play from this image

10 – End play with this image

11 – Manual selection of individual images
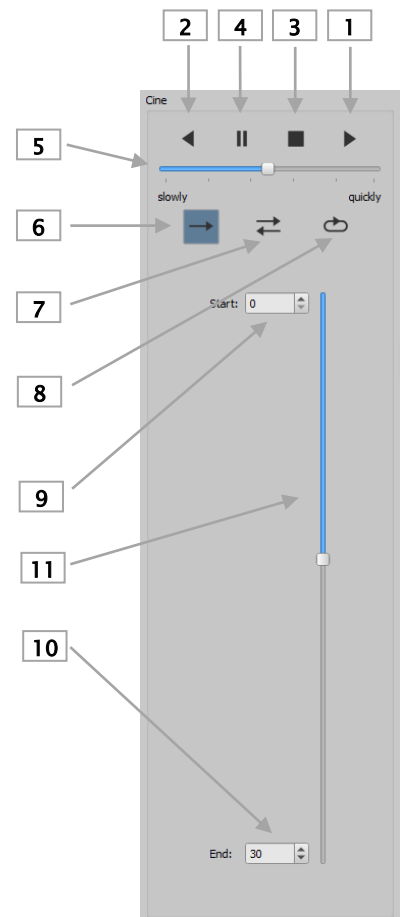
9.3.7 Hanging Protocols

The module is available only if it is enabled in the license configuration. After activating the module required protocols need still to be defined and installed by the system administrator.

Hanging Protocols are a means of defining how specific types of images should be displayed according to predefined split on one or multiple monitors. A classic example of this is presentation of mammographic images. There are also various layouts, i.e. images of the most recent or the last study, or images of the left and right side can be automatically presented next to each other.

Clicking a study node in the preview tree allows to present the images according to predefined Hanging Protocols in the image viewer. The first protocol with the first layout is automatically used. In the right toolbar the protocols defined for this type of image and below it the related layouts are shown.

If the option for automatic presentation of the current study is activated in the configuration (see section "Window split / HP" in chapter 0), the images are presented according to the protocol already at the time of loading of the patient.

In order to change a protocol or a layout click it and the images are then presented accordingly. You can scroll layouts within the protocol by using left and right cursor keys while you hold down the Ctrl key (Ctrl + left cursor key or Ctrl + right cursor key). You can also select first 9 layouts directly by using the number keys 1-9.

If the image viewer is active on multiple monitors (see section "User interface" in chapter 0), Hanging Protocols can also be activated for these monitors. Layout is then automatically distributed to the active monitors.
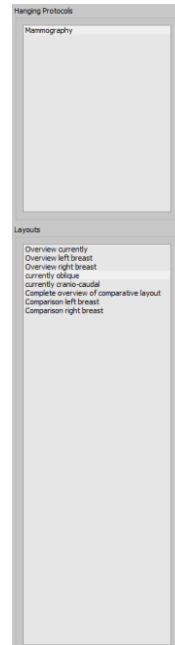
When using Hanging Protocols, only the types of images are presented for which the protocol with the layout is defined. If there are existing other images for the patient in question, they need to be opened manually via preview tree. These can be, for example, images with a different beam path or a different modality (CR, US). Check also filter settings in the patient management that no filter is active and all studies of this patient are presented.

Only for types of images for which the Hanging Protocol is defined the protocols with related layouts are shown in the right toolbox. Toolboxes for all other images are empty.

9.3.8 Quick Tools

The "Quick Tools" make frequently used tools or performed actions quickly accessible just by the right-click.
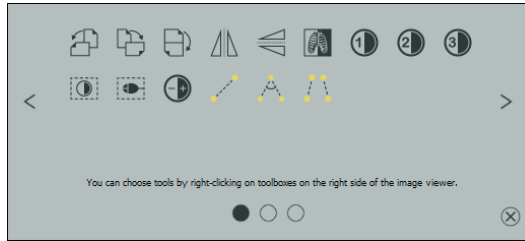
You can get to Quick Tools by right-clicking with the mouse in the viewer. There are 3 tab pages displayed in the window. For more details please refer to the following sections.

9.3.8.1 Tab page Quick access to tools

The first tab contains the tool icons for quick access. By default some tools are already activated in the "Quick Tools". You can manually add or remove all other tools of the viewer from the list.

To do so, expand the toolbar and right-click the toolbar. A configuration menu opens. Click the icon of the desired tool to activate it for the "Quick Tools". When you access the "Quick Tools" again, the tool will be displayed in the list and therefore quickly available. You can remove the icon from the list in the same way.

9.3.8.2 Tab page Windowing and filter

In the chapters 9.3.2 Windowing and 9.3.3.7 the way how to create and manage presets for windowing and lists of filters is described. These presets and lists of filters are automatically displayed in this tab page.

9.3.8.3 Tab page Targeted image retrieval

On the third tab page you can retrieve targeted studies on the left and series on the right of the current patient.
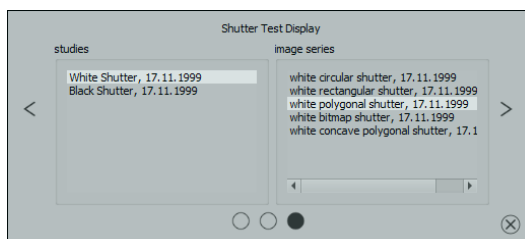
9.4 Scout lines

By the scout line (localizer line) the cut edge of two layers (planes) and the position of particular sectional images of the CT and MRT series are presented. The position of images of any other image series in relation to the active image is thereby visualized.

In presentation as projection lines, they do not provide information on angle under which two layers are crossing. These lines do not indicate if two layers are perpendicular or inclined to themselves. Therefore, you cannot draw conclusions to mutual position of two layers on the base of projection lines only.

The better idea on mutual position of planes may be obtained in presentation as planes due to the 3-dimensional image. The required presentation form may be set up in configuration User::Overlay / Scout lines by setting the type in group "Scout lines / Localizer".

Before you open a series, you should modify the image split so that you can view the particular series next to each other. Then open each series in a field. If the presentation of scout lines is activated, the scout lines will be shown automatically. Click the series and scroll with the mouse wheel through the images of this series. Alternatively you can use buttons "Page up" and "Page down". The position of the current image is shown in another series as a projection line or as a plane. You will find the settings for the presentation of scout lines in the section Overlay / Scout lines in the chapter 0

Configuration.

If multiple monitors are used, the scout lines are automatically displayed on the monitors on which related series are displayed. The lines of the active series (red frame) are displayed normally on the current monitor and the lines of the active window of the other monitor are displayed dashed.

9.5 Histogram

Below the image or the images the histogram window with the histogram of an active image is displayed. When shutting down the histogram window can be also completely hidden.
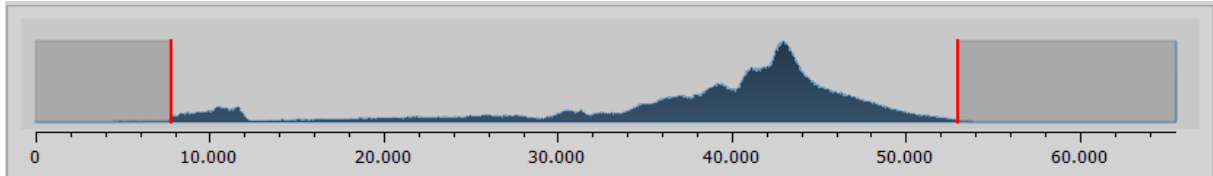
For multiframe series, a histogram of a currently displayed frame is shown.

For colour images, a red, green and blue curve for the channels R, G and B of the image are displayed. For grayscale images, a blue curve (like presented on the image above) for spreading of grayscale values is displayed.

In the histogram for the grayscale images the current setting for windowing is always displayed and can be here also modified. The left and right zones of the visible window space are thereby lightly coloured, so that this is clarified. The red lines show the edges and are coincidentally the sliders, for modifying window edges. The performance of windowing can be improved with a higher histogram smoothing. The smoothing can be changed in the

Configuration page User section/Histogram. See chapter 0. The window can be completely moved by clicking the space between the red lines with the mouse and then moving it using the mouse.

A zoom rectangle for zooming in the histogram can be dragged on by dragging with the mouse with Shift + left mouse button. Right-click the histogram to return to full size display.

Settings for work with the histogram can be set in the

Configuration, category Histogram.

10 Photos and documents

10.1 General

Both pixel graphics from image files and images (through TWAIN interface) can be scanned for the active patient in the import component. Scanning functions are only available when the TWAIN module is enabled.

> ⚠️ **The import of images through TWAIN interface is not designed for import of X-ray diagnostic images. The designed purpose of use is restricted to import of photographs and documents which will be further assigned to patients in DICOM format and then they will be available together with other patient's image data.**

Import of image data through TWAIN interface supports colour images with 32-bit colour depth and grayscale images with 8-bit (256 levels of grey) colour depth as well as pure black and white images (binary images with 1 bit per pixel).

10.2 Import dialog
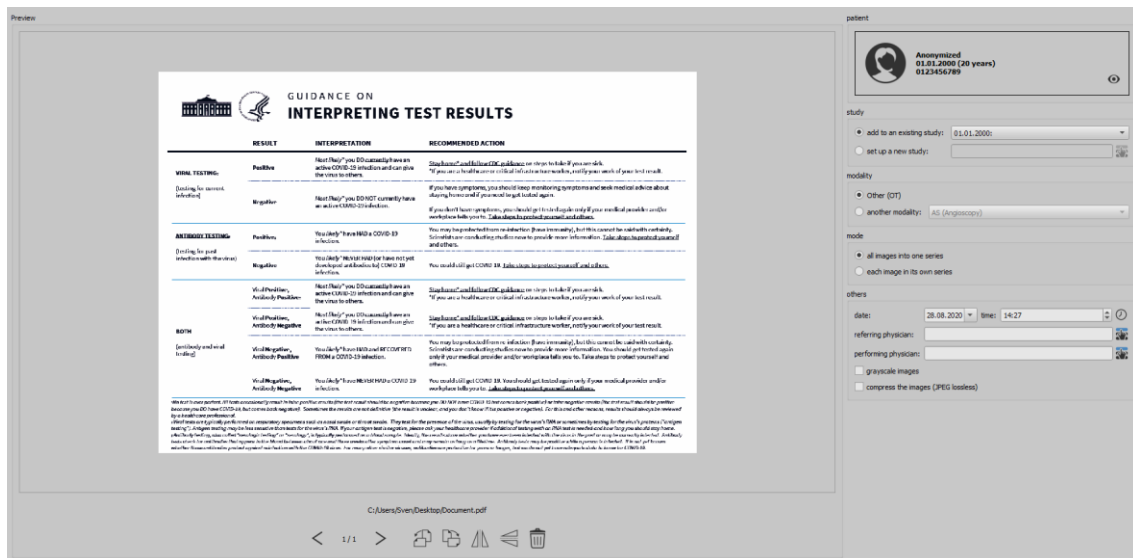
Only one patient at a time can be uploaded to this component. The patient is displayed in the top right corner.

Button "Loading files..." is used to open one or more image files. These are imported not immediately, but they are first stored on a list. The Scan buttons are used to retrieve the images in the scanner via TWAIN interface. The images are also first added to the list. Using button "from clipboard" you can add to the list images from other image processing programs by copying them to the clipboard.

The list can be cleared with the button "Delete all".

Loading files...

From clipboard

Delete all

On the left side the added images to the list are displayed as a preview. You can navigate throughout the images with the arrows. Each image can be rotated and reflected separately as well as deleted from the list with the buttons in the toolbar.

Previous image

Next image

Rotate left

Rotate right

Mirror horizontally

Mirror vertically

Delete image

On the right side the settings for the import of those images are made. The images can be either added to an already existing study of the patient or resided in a new study. For the first option, highlight option "Add to existing" and select the required study from the drop-down list box. For the latter option, select "Set up new study" and enter description for this study in the input box standing behind. Here you can also set up and then use your own defined list with the descriptions.

Select modality (type of images), that should be entered for new images. Usually "OT" should be used but you can select other modalities, which correspond with the opened images.

Specify in the group "Mode", whether all images should be saved in one series (recommended) or each image should be saved in a separate series.

Define under "Other" date and time, that should be entered for the point of time of creating in the DICOM files, as well as referring and performing physicians who will be entered if a new study setup involved. Optionally you can convert all images explicitly in grayscale images before they will be saved. To save storage space in the archive and transfer the images quicker, the images can be compressed lossless by activating the option "Compress images" in the import. No information is subsequently lost.

Select from list

Select time

Saving the images follows by "Importing". Withal all images existing in the list will be converted in DICOM files (according to options) and sent do image archive. All successfully saved images will be deleted from the list.

Import

The 8-bit DICOM images are created while importing. From the images, which already have 16-bit format (DICOM, TIF), 16-bit DICOM images are created while importing.
If set up by admin, a GDT file will be created after the import, that can be i.e. loaded into the management system of the clinic in order to generate also an entry in patient's file.

10.3 Scanning documents

The options of manual and automatic scanning are available in four programmable buttons. If "Manual scanning..." option is selected, the scanner dialog is opened and it is possible to define manually the required settings for resolution, colour, etc., prior each scanning process. This dialog is not the component of digipaX software, it belongs to scanner software. You shall read the scanner documentation to obtain more detailed information. If more than one TWAIN unit is installed or the given equipment is provided with several TWAIN drivers, it is possible to select the specific device or driver holding down the Shift button and simultaneously click-ing button "Manual scanning…".

Manual scanning…

There are furthermore four buttons available, to which different settings may be assigned. Such parameters will be then automatically transmitted in printing to the scanner and documents will be automatically scanned with such settings.
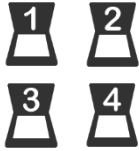
Auto Scan buttons 1 to 4

In this case it is enough to set once the required parameters, such as colour, resolution, etc.
In order to set parameters for the automatic scanning button it is necessary to push simultaneously the given button and Shift button. Then you must provide description of such button and set the required parameters. It can happen that your equipment does not handle all functions and some parameters may be unavailable. If several devices are used it is necessary to select with "Manual scan" button – according to above description – device, for which the automatic scanning buttons will be used. Scanner, which was selected in this setting box as the last, is always activated.
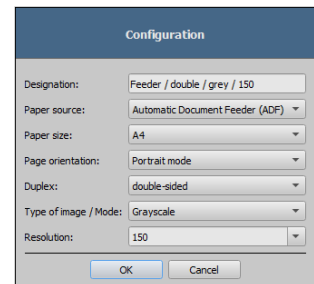
After you have imported all images, you can use the button "Image viewer" in the top right corner to switch directly to the viewer and view the documents.

Image viewer

11 Export

The component Export is used for exporting images or entire series from the program or sending them per email. The images can be exported as the JPEG graphics or in the DICOM format. Once you have started the export operation, you can proceed with work elsewhere in the program. This means that if you need to export large amounts of data, for example, to a network directory, you only need to start the action and the program will perform the task in the background.
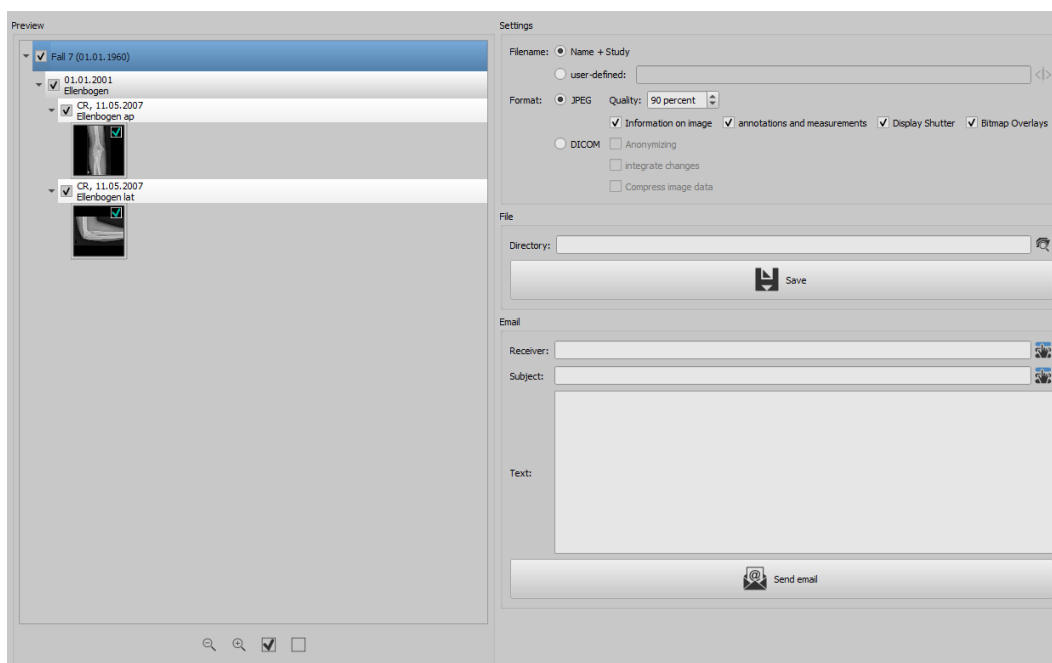
11.1 Selection

Transfer the desired data to the component Export by drag & drop or right-click using Quick Navigation. Then go to this component. The current compilation is displayed on the left side of the component. If you want to add more data, the procedure includes the same steps.

In the preview tree the single elements (patient, study, series, image) can be activated and deactivated by ticking the relevant checkboxes. Deactivated elements are skipped in the action.

11.2 Settings

11.2.1   Filename for exporting images
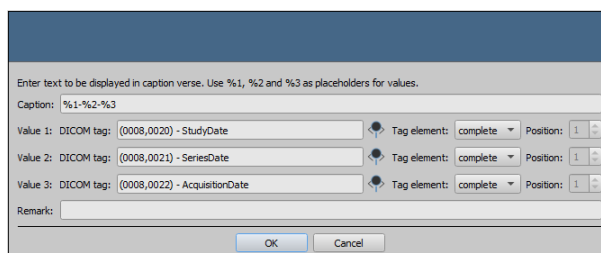
With the option "Name + Study", the filename is built automatically from the name of the patient and description of the study plus an incremental number (e.g. Smith-John-Elbow-1.jpg).

If you wish to use different filenames, select "User-defined". With button "Edit" you open a dialog. You can use there a free text or other information from the image (e.g. date of acquisition) as a filename.

Edit

If you wish to use a free text, just enter this text in the line for the description. Every exported image obtains then this filename and an incremental number at the end (e.g. Image-1.jpg).

You can also use up to three values from the image information. Select out the values desired from the DICOM tags. Enter %1 for the value %1, %2 for the value %2 and %3 for the value %3 in the line for description. The filenames are then built automatically from this information. The order can be chosen freely. If you separate the values in the line with dashes, the dashes will be placed at this place in the filename as well.

It should be noted that the characters \ / : * ? „ " < > | are not allowed in filenames in the MS-Windows©.

11.2.2   Format for exporting images

11.2.2.1 Exporting as JPEG

You can export images either in JPEG format or as DICOM image. The data amount can be reduced in the case of JPEG images by change of the quality. The images are compressed at that. It can be useful if the images are to be sent as an email. The higher percentage value, the better quality. File size increases then too.

You should keep in mind that multiframe series are saved in only one DICOM file. Thus an entire series is always exported even if only one single image was selected and many single JPEG images arise accordingly.

Furthermore, it can be defined whether the image information, annotations and measurements, display shutter and bitmap overlays are to be also exported.

11.2.2.2 Exporting as DICOM file

The next option is exporting images as a DICOM image. The images are then exported in original directly as a DICOM file as it is with a patient-CD.

Here too, the patient data can be anonymized.

With the option "Integrate changes" the rotations, inversions, windowing, filters and display shutter are permanently integrated in exported images. The annotations and measurements cannot be exported with the image in DICOM format.

In veterinary version, an additional option "DICOM veterinary standard" is available. With this option, the internally used patient data are saved in DICOM tags provided for this purpose in accordance with the standard. This ensures compatibility with other DICOM systems.

11.2.3   Exporting as file

If you wish to export images as a file, for example on a USB stick, you have to specify a path directly or navigate to a target directory. Press on "Save" and the images will be stored accordingly to the options set in the target directory.

Search for directory

Safe

11.2.4   Exporting as an email

You can also transfer images directly to your email program and send them per email. For this it is necessary to have an appropriate email program installed and configured on the PC. These can be such programs as Outlook, Outlook Express or Windows Mail etc. If you send your emails directly via internet website, you have to export the images first as a file as described in the previous section and afterwards send them via your email supplier.

If you have an appropriate email program, you can use the function offered here.

Specify the receiver's email address in the line "Receiver", enter the subject in the line for subject and write your message in the text field.

Afterwards, click "Send email".

Select receiver or subject from the list

Send email

The email program opens and the data is applied automatically. The corresponding images are attached to the message. You can also specify the data for receiver, subject and text yet in your email program and e.g. use the address book and text formatting of your email program. If all data and information is correct, you can send the email.

> **The provisions of law require that messages sent by electronic means which include information on patients or their personal data must be coded. Therefore, electronic mail software must be so configured that data is coded and only its receiver can read such data. There are special extensions for electronic mail programs which provide the message coding.**

"The GNU Privacy Guard" is a free cryptographic software. It may be downloaded and installed from http://www.gnupg.org site. Such installation and configuration shall be made by professional.

12 Print
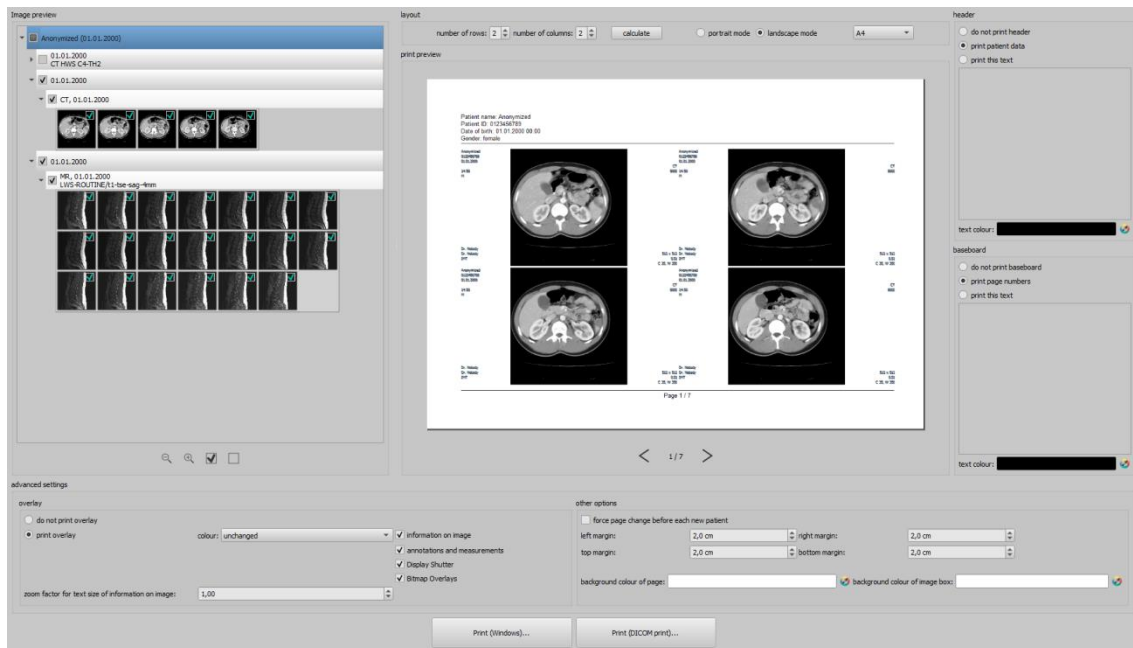
Mode:

In standard mode, only the most important print functions are displayed. For advanced functions activate the button for Expert Mode in the bottom bar of the main window (see 6.1.2.6).

Image preview:

In the image preview you can select the images you wish to print. For a user-defined selection, select the corresponding node for patient, study, series or single images. Exceptions are multiframe series. For these no specific image selection is possible and all frames of a multiframe series are always printed.

Layout:

Multiple images can be printed on one page. Number of lines and columns can be set up to maximum 6x6 in the group "Layout". Number of lines and columns as well as page change is automatically calculated appropriately to images selected in the image preview.

Print preview:

All changes made during setting up affect immediately the presentation in the print preview. Number of pages is currently updated. You can navigate with cursor keys between the pages. All settings are saved so that they can be re-used at the next call-up of the print components (after the program reboot as well).

The particular thumbnails can also be windowed (changing of brightness and contrast), zoomed or moved. Modifications of thumbnails are at once applied on the print results.

Controlling all three functions goes in the same way as for the image viewer:

- Right mouse button: zooming in / out (with vertical mouse movement)
- Central mouse button or scroll wheel pressed: windowing (brightness and contrast)
- Left mouse button: mowing zoomed image

Header:
The header, if activated, will be always printed at the top edge of the page, in a fixed defined size and fixed defined font type. These cannot be modified. Standard image information with the patient data can be printed as well as self-defined text. Colour of the text is selectable.

Footer:
The footer, if activated, will be always printed at the bottom edge of the page, in a fixed defined size and fixed defined font type. These cannot be modified either. Number of pages can be printed as well as self-defined text. Colour of the text is selectable.

Advanced settings:
Overlay:
For overlay, it can be selected, whether this is to be printed over the image or images, or not. Overlay objects can be possibly difficult seen if printed, so it can be selected, whether overlay is to be printed black, white or unmodified. Unmodified means hereby that overlay will be printed in such way, like it is presented on the monitor. Display shutter will be always pre-sented in the set colour (

Configuration). Bitmap overlays will be presented in the same colour like on the screen.
If the images of different patients are to be printed, the changing page before each new patient can be required (recommended). In this way, it cannot come to mistaking as patient data of the patient, which belongs to the first image on the page, are always displayed. Thus on each page the correct patient data is shown.
You can adjust the text size of the information on the image by use of the zooming factor.

Other options:
In other options you can define page layout and margins as well as colour of background of a page or background of image boxes in that the images are inserted.

Print:
Printing is performed by use of button "Print (Windows)…" on one of the common Windows printers. The printer can be selected in the print dialog. In the print dialog you can also select pages to be printed if the print job contains many pages.
Printing is performed by use of button "Print (Windows)…" on one of the common Windows printers. This button is only available if the DICOM print module is enabled. The desired printer, film size and medium type can be selected in the print dialog. Also the pages are printed on the selected DICOM printer.

During the preparation and transfer of print data a progress bar is displayed. If many pages are to be printed, this process can be cancelled with button "Cancel". Once the print job is finished, an adequate message appears.

13 Patient CD

13.1 General

digipaX offers multiple possibilities for creating patients CDs/DVD/BDs (BD=Blue-ray Disc). The most common way is to directly burn data to a CD or DVD, less common BD.

Another possibility is to use the Disc Producer With the help of the Disc Producer, CD/DVD (possible also BDs) can be automatically burned and automatically printed. The module for connecting a Disc Producer must be enabled separately and contains in addition the module "CD label print".

The third option is simple copying data into a target directory or into an external data medium such as a USB stick.

In the preview the images are displayed in a structured tree view (divided into patients, studies and series).
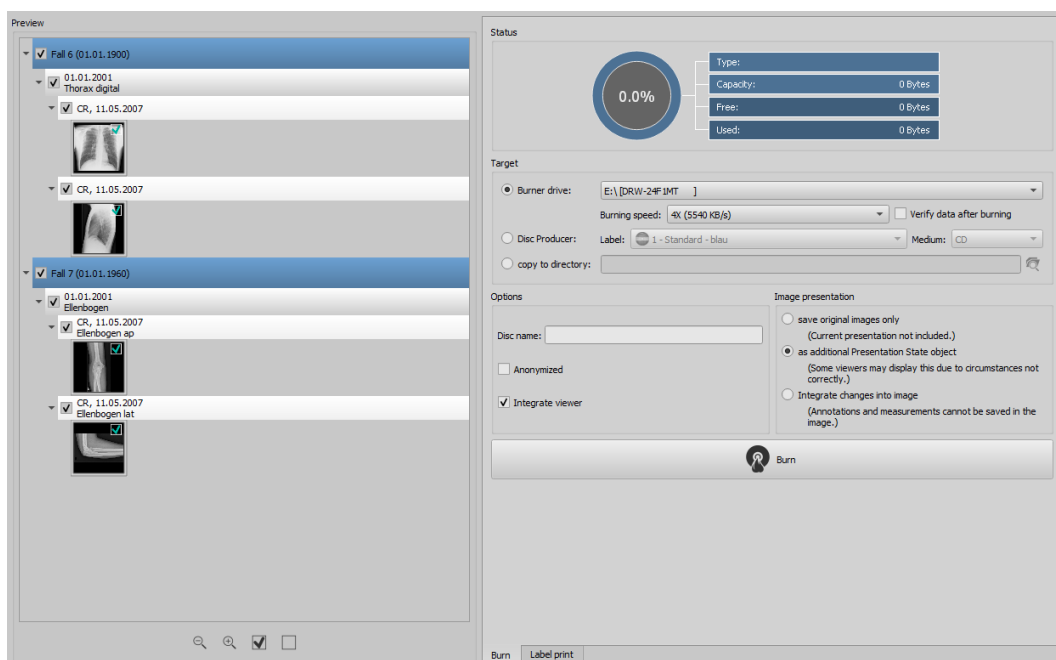
13.2 Drives / data storage media

On the right you select the corresponding target drive. For burning drives, the available burning speeds are determined automatically. You can adjust these before starting the burning operation. The available speeds depend on the burning drive and media used. If you choose the option "Verify data after burning", the burned data is verified after burning is completed.

If the Disc Producer is available, you can select it here. In addition, the label must be selected to be printed on the medium, and the type of storage media. The possible labels are created and edited in the "Label print" tab and subsequently they are immediately available to the Disc Producer. Chapter 14 Label print describes how to create and edit your own label. Usage of the Disc Producer is described in chapter 13.5.

13.3 Options

Additional options can be set for the patient CD. To be able to use these, you need to go to the Expert Mode (see 6.1.2.6) by clicking the button in the bottom right corner of the taskbar to get access to the functions. The settings you make here will remain stored when the Expert Mode is deactivated, and will be automatically applied in the background for every patient CD.

Disc name:

This function determines name of the CD/DVD/BD media. This name is displayed in Windows Explorer when the disc is inserted. The maximum number of characters is limited by medium type. The disc name is only used for CD/DVD/BD media. The disc name is ignored for USB sticks, flash cards or hard drives etc.

Anonymized:

Data can be stored anonymized. This means that data are exchanged in the following way:

- Name: "Anonymous" or "Anonymous1", "Anonymous2" etc. if there are many patients
- Date of birth: 01.01.2000
- Gender: O (other)
- ID: 0 or number if there are many patients

The following tags are deleted while anonymizing:

- Patients Address
- Patients Telephone Numbers
- Referring Physicians Name
- Referring Physicians Address
- Referring Physicians Telephone Numbers
- Referring Physician Identification Sequence
- Performing Physicians Name
- Performing Physician Identification Sequence
- Operators Name
- Operator Identification Sequence
- Requesting Physician
- Scheduled Performing Physicians Name
- Scheduled Performing Physician Identification Sequence
- Institution Name
- Institution Address
- Institution Code Sequence
  Institutional Department Name

Integrating viewer:

Optionally the digipaX Viewer can be transferred to the medium, so that the data can be viewed on another PC without digipaX.

Image presentation:

In the group Image presentation one of the following 3 options can be selected:

The images are burned like they are stored in the archive.

1. Original images
   The images are transferred like they are stored in the archive. This means like they have been created primary by recording unit.
2. Additional Presentation State Object
   Additionally a DICOM file (Greyscale Softcopy Presentation State) for each greyscale image will be added to the original image, which contains the information on windowing, rotating, mirroring, inversion, filters, graphic annotations and display shutter. Not every DICOM viewer can interpret in this way correctly. Use this option if you integrate the viewer to the medium or if you know that the receiver uses a software that can correctly interpret this form.
3. Integrating modifications
   For each image a new image is created and modifications are transferred (windowing, rotation, mirroring, filters, display shutter). The image type is set on "SECONDARY" and new SOP Instance UID is generated for this new image. The new created image is stored and transferred to the medium.

As far as possible, variant 2 with additional Presentation State files is recommended.

Set filters:

When using the option of "Additional Presentation States" or "Integrate changes" the filters set will be also saved. However, they cannot be interpreted by other systems. If the filters are to be presented on the patient-CD, the digipaX viewer must be integrated on the patient-CD, as only it can use the filter settings in a right way.

13.4 Burning/copying data

After the button for burning is pressed, the files are assorted (images are compressed and anonymized if necessary). In the top part information on type, storage capacity, and free and used space of the current media or target drive is displayed. During the process, status is displayed and the information on media refreshed.

13.5 Creating patient CD using Disc Producer

13.5.1   EPSON PP-100 / PP-100N

13.5.1.1 General

When data for recording on a CD/DVD is compiled and you press button "Burn", a job is being sent to the Disc Producer. The Disc Producer is able to receive several jobs and processes them autonomously one after another. The jobs are managed by software included in the delivery of the Disc Producer. The software must be priory installed and configured. Furthermore, it is necessary to configure special settings in digipaX in order to be able to use the device.
Call in the attendant of your digipaX system to install and configure the device and read the appropriate manufacturer's documentation.
The device must be turned on before the first job will be created. Otherwise, the job will be cancelled with an error and it will not appear on the job list of "EPSON Total Disc Monitor".

13.5.1.2 Creating a patient CD

In the dialog for creating patient CDs, select the option "Disc Producer". The label to be used is to be selected from a drop-down list, as well as type of the data storage medium.
The possible labels are created and edited in the "Label print" tab and subsequently they are immediately available to the Disc Producer.
After everything is ready, push the button "Burn". Thereupon, data is being compiled and transferred to the Disc Producer (that is, copied to the transfer directory). The viewer files are stored in the "SharedData" folder and reused, so that they do not have to be copied repeatedly.

Please note:
To ensure proper completion of the job, digipaX waits for processing of the job files. Processing of these job files by EPSON software takes place always subsequently and not simultaneously. As a result, in the case of simultaneous creation of burning jobs at different stations or quick generating the jobs, this verification may take a longer time. This happens certainly rarely but leads to waiting time lasting up to 60 seconds (depending on the job size and computer performance).

13.5.1.3 Job management

"EPSON Total Disc Monitor" or "Total Disc Net Administrator" programs allow for reviewing the job list. Here, it is possible to withhold or delete the jobs as well as to change their order (only Disc Monitor). The "Net Administrator" is available only for device type PP-100N; however, it can be used on all stations.

13.5.1.4 Deleting data

In the transfer directory set, job files as well as data to be burnt on the CD/DVD are stored. In this directory, the digipaX software creates the "SharedData" folder in that the files needed for the viewer are stored automatically. The folder can be deleted manually, if needed, for instance, to remove the older viewer versions. The files required are re-transferred upon the next use.

The DICOM files for burning orders are redeleted automatically. The check takes place upon starting the digipaX stations. Data folders, that are already older than 2 hours, are deleted. This is the same period of time which is also used by the EPSON system for deletion of old job files from this folder.

13.5.2   PRIMERA Disc Publisher

13.5.2.1 General

When data for recording on a CD/DVD is compiled and you press button "Burn", a job is being sent to the Disc Producer. The Disc Producer is able to receive several jobs and processes them autonomously one after another. The jobs are managed by software included in the delivery of the Disc Producer. The software must be priory installed and configured. Furthermore, it is necessary to configure special settings in digipaX in order to be able to use the device.

Call in the attendant of your digipaX system to install and configure the device and read the appropriate manufacturer's documentation.

The device must be turned on before the first job will be created. Otherwise, the job will be cancelled with an error.

13.5.2.2 Creating patient CD

In the dialog for creating patient CDs, select the option "Disc Producer". The label to be used is to be selected from a drop-down list, as well as type of the data storage medium.

The possible labels are created and edited in the "Label print" tab and subsequently they are immediately available to the Disc Producer.

After everything is ready, push button "Burn". Thereupon, data is being compiled and transferred to the Disc Producer (that is, copied to the transfer directory). The viewer files are stored in the "SharedData" folder and reused, so that they do not have to be copied repeatedly.

Please note:

To ensure proper completion of the job, digipaX waits for processing of the job files. Processing of these job files by PRIMERA software takes place always subsequently and not simultaneously. As a result, in the case of simultaneous creation of burning jobs at different stations or quick generating the jobs, this verification may take a longer time. This happens certainly rarely but leads to waiting time lasting up to 60 seconds (depending on the job size and computer performance).

13.5.2.3 Deleting data

In the transfer directory set, job files as well as data to be burnt on the CD/DVD are stored. In this directory, the digipaX software creates the "SharedData" folder in that the files needed for the viewer are stored automatically. The folder can be deleted manually, if needed, for in-stance, to remove the older viewer versions. The files required are retransferred upon the next use.

The DICOM files for burning orders are redeleted automatically. The check takes place upon starting the digipaX stations. Data folders, that are already older than 2 hours, are deleted.

13.6 Feature "Special"

With this additional feature, data for patient CD can be transferred to an external program for further processing. Special data media or special drives can be examples for this.

This feature is available only if it has been activated and configured by your system adminis-trator. Also the name "Special" can be changed by the administrator.

Please ask your system administrator about functionality of the feature.

14 Label print

Label print is possible only when the associated module has been activated.

14.1 General

Using the "Label print" tool, you can print patient information on the CD/DVD, such as patient's name, date of birth, patient ID, etc. This information is automatically read from images (DICOM header) and does not need to be entered manually.

There are different templates available for use. These templates can be modified and you can also create your own templates.

To get to this module press button "Patient CD" button and select tab "Label print".

14.2 Printers and media

It is necessary to have a special printer that can print directly on CDs, such as the Canon PIXMA. These types of printers are offered by many manufacturers. There are no special recommendations for your printer model. The only requirement is that the printer is compatible with the Windows operating system. A printer driver must be installed for the appropriate operating system. Additional software is not required.

Printable media are also offered by various manufacturers. You can use both CD and DVD.

On the part of digipaX, there are no specific recommendations on storage media. It may be that not all media is supported by your printer model. Please refer to your printer documentation. The "Label print" module is dedicated exclusively to direct CD/DVD printing. The system does not support sticker labels.

14.3 Template selection and printing

The prerequisite is to have the correct printer driver installation and a fully functioning printer. Described here are examples of prints made using the Canon PIXMA iP4000 printer.

Included with the installation of digipaX, various CD templates are installed with the images of one patient and for the CD, images of several patients.

Select the patient and click the patient CD. Usually first you burn the patient CD with the desired images and the desired settings. Then you go to tab "Label print" as an available feature for printed media.

By clicking with the mouse the left and right side of the thumbnails, you can browse different templates. They are sorted alphabetically. Names are displayed at the bottom.

Select the chosen template and click "Print".

A dialog opens to choose a printer. There, select the correct printer, through the "Properties" you can activate the preview dialog and then continue by pressing "Print".

In the next dialog a preview of the data media is displayed. Here you can see how the patient data are automatically loaded from images and applied. This preview may look differently depending on the printer model.
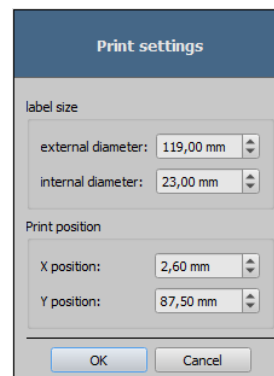
After pressing "Start printing" the data media is printed with the information.

14.4 Printer settings

At this point, you can set the size and position of the data media.

The size of the label refers to the size of the data media. The outer diameter of the printed surface of the CD is usually 118 or 119 mm. The inner diameters of the unprintable area are different. Depending on the manufacturer and version of the media the correct value must be set.

The print position varies depending on printer model and must be set only once, so that while printing on the medium would be exact. By changing the value, the printed image can be shifted to the left / right (item X) and up / down (position Y). With the help of the preview, you can move the printed image with millimetre precision into the right place.

Sample values:

Printer model	Position X	Position Y
Canon PIXMA iP4000	2,60 mm	83,60 mm
Canon PIXMA MG5250	2,60 mm	87,50 mm
Canon PIXMA iP4850	2,80 mm	87,50 mm
Canon PIXMA iP4950	2,60 mm	87,50 mm
Canon PIXMA iP7250	1,60 mm	57,50 mm
Canon PIXMA TS8300	1,30 mm	1,30 mm

14.5 Creating template

By pressing "New", a new blank print template opens up. First, at the top line you must enter a name for your new print template.
You can set a background image, insert images (or symbols), text boxes, rectangles and lines.
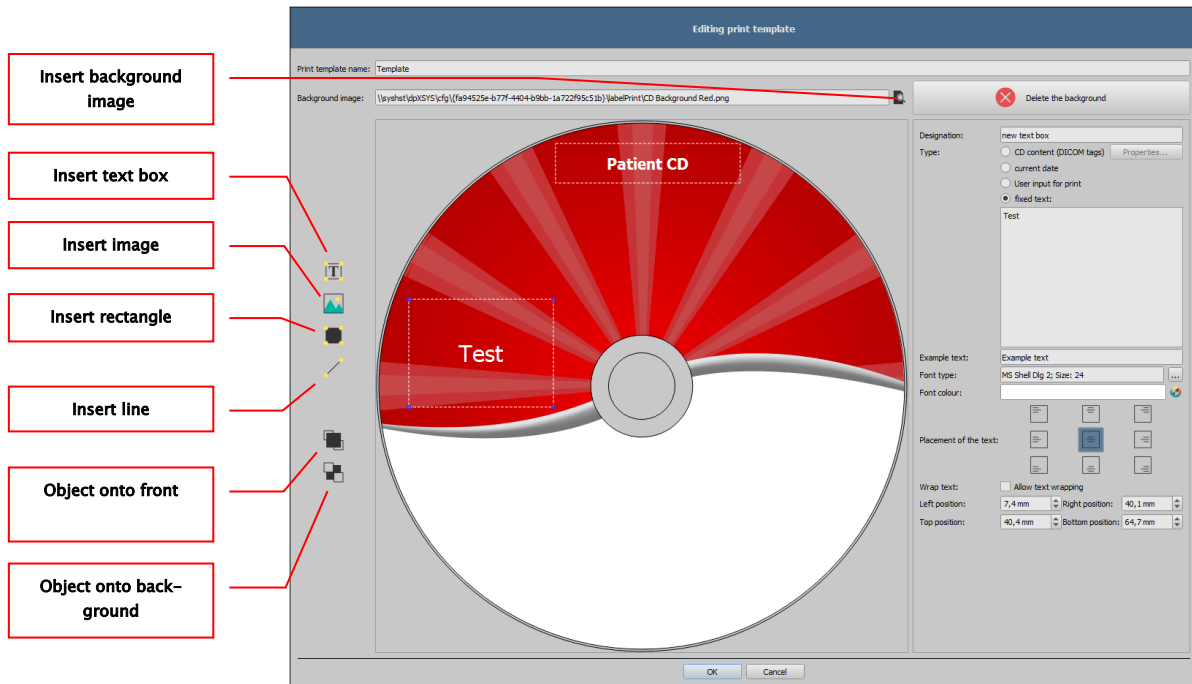
14.5.1   Inserting, editing and deleting elements

The label can have various graphic elements. These elements are always placed and positioned using the mouse. On the right side of the dialog a page with the properties of the active element is always displayed. Changes in properties are immediately visible on the image. By left-clicking with the mouse an element is activated.

Background image:

As a background image, you can use any graphic. Recommended graphics are in the "png" format with size of min. 500 x 500 pixels.
To create your own background images you can use the template Photoshop CD-Template.psd from folder "Label print" in the digipaX system directory.
Press the "Find file" button and navigate to the desired image. The selected background image will be automatically inserted into the template.
Press button "Remove background" and you can delete the image. The background is then back to white.

Insert a text field:

Click button "Insert text box". Then click wherever the template and drag the text box to the required shape and size. Using the mouse, you can also move an object in all directions. The text box functions are described in detail later in this manual, under Point 14.5.2 Editing text fields. Position and size can also be adapted with milli-meter accuracy using the properties page.

| Left position: | 10,0 mm | Right position: | 110,0 mm |
| Top position: | 25,0 mm | Bottom position: | 29,0 mm |

Insert image:

As with the background, you can insert any image. Click "Insert image" and navigate to the desired image. Using "Open" the graphic is applied. With the mouse you can move the object in all directions and adjust the size.

Insert rectangle:

Inserting a rectangle is an operation just like inserting a text box. Click "Insert rectangle" and drag a rectangle with the mouse. You can also move the rectangle in all directions and scale with the mouse.

Using editing elements, you can change the properties of the rectangle. There, you can customize the colour and thickness of the border, fill colour, opacity and round cor-ners. The position and size can be customized with milli-meter accuracy.

Line colour:		
Line thickness:	0,2 mm	
Filling colour:		
Transparency:	20 %	
X rounding:	0,0	
Y rounding:	0,0	
Position left:	0,0 mm	Position right:	120,0 mm
Position top:	45,0 mm	Position bottom:	75,0 mm

Insert line:

Click "Insert line" and drag the mouse on the template.
On the page with the properties, you can set the colour and thickness of the line and move the line with millimeter ac-curacy.

Line colour:		
Line thickness:	0,2 mm	
Point 1 X:	68,3 mm	Point 1 Y:	32,5 mm
Point 2 X:	51,3 mm	Point 2 Y:	29,3 mm

Delete elements:

Click the element you wish to delete and click button "Delete" to remove that element.

14.5.2 Editing text fields

14.5.2.1 Functions

Description

– Serves only to describe the text field, it is not printed (it may be displayed on the edited picture)

Type

– Contents of the CD (DICOM tags): content tags are automatically transferred when printing on the field, properties: see point 14.5.2.2 Guidelines and properties of the CD contents (DICOM tags) in the text box.

– Current date: into the text box the current date is placed

– Data entered by the user when printing: request to enter text before printing

– Fixed text: defined static text is placed in the field

Example text:

– Enter sample text, for example, what will be displayed on the label preview

Font type and colour:

– Adjusting type, colour and size of font

Placement of the text:

– Placement of text inside the text box (e.g. left or right justify)

Word wrap:

– When this option is enabled, automatic line wrapping at the end of the text field will be applied, otherwise the text is truncated at the front, rear or both sides
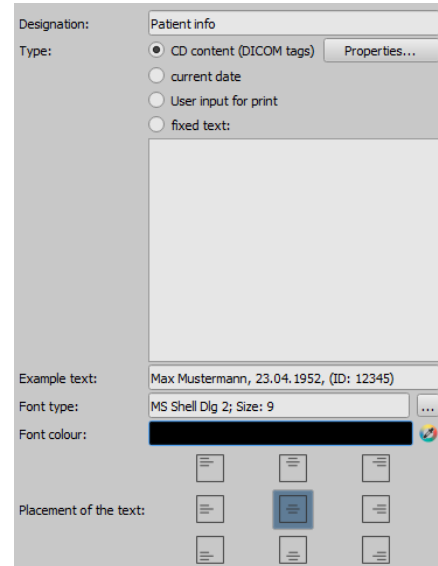
14.5.2.2 Guidelines and properties of the CD contents (DICOM tags) in the text box
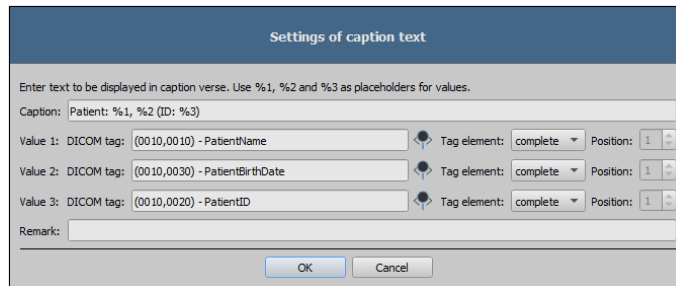
Every DICOM image contains information about patient, study and image. All those information is in the so called tags in the DICOM Header of each image. The contents of those tags such as patient name, study, institution are also displayed in the image corners. The DICOM tags are numbered (e.g. tag "0010,0010" for patient name). How the information can be displayed, is described in the chapter 9.2.6.2 Header information (DICOM Dump).

In the text field you can use values from different tags. If, for example, a name, date of birth and patient ID are entered, then tags (0010.0010) (0010.0020) and (0010.0030) must be loaded. To do this, set the tags for values 1 to 3. Some tags have more elements (e.g. first name, last name, title). If you want to display only one specific element, you can set this option in the tag element. In the signature line, enter the text to be displayed. Where the %1, % 2 and % 3 act as variables. They are replaced with the actual contents of the tag.

In the example below, the text box looks as follows: Max Mustermann, 01.01.1960, ID: 12345

You can create lists for the values of multiple images. This is needed, for example, if there are to be the names of all patients who were saved to a media. For this, the LIST keyword is used on the signature line.
Syntax:

$$LIST\{<DICOM\ tags>|<separator>\}$$

The value for <DICOM tags> is compiled the exact same way as described above for a single row. <Separator> is inserted between each individual data. You should use:
- "nl" for the new line
- "tab" for tabs
- any other character, such as a semicolon or a comma

The row looks like the following example: LIST{%1, %3, ID: %2|nl}.

14.6 Editing, duplicating and deleting templates

In order to edit a template, you must find it, then click "Edit". Editing is done in the same manner as creating a template.
Button "Duplicate" creates a copy of the template. The copy has the original name with the addition of "Copy 1" at the end of the name. A copy can be modified and its name changed. The "Delete" button removes the template from the system. Please note: this action is irreversible.

14.7 Requirements for information on data media

It is recommended to note on the medium the name and date of birth of the patient, the patient ID, the date the medium was created, the dates of the studies stored on the medium and the name of the institution where the medium was created. If the medium contains data on more than one patient, we recommend to also indicate this on the outside of the medium.

15 Job management

> ⚠️ **REMEMBER!**
>
> **To avoid unnecessary X-ray screening and any unnecessary radiation exposure to the patients, you should ask the patients if they don't have any previous X-ray images before creating a new job**

Via job management (DICOM-Worklist-Management) the jobs can be exchanged between different DICOM systems. MPPS (Modality Performed Procedure Step) for using the job status is thereby not supported.

15.1 Pregnancy status

During pregnancy, radiation can pose a higher risk, so pregnant patients should not undergo diagnostic X-ray procedure or have X-rays only with limited radiation exposure. Hence pregnancy status must be asked prior X-raying. If the system recognizes on the basis of data (gender and date of birth) that the patient is female aged between 10 and 60 years, a dialog for pregnancy status is displayed (if activated) prior creating the job. The pregnancy status selected in the dialog is saved max. 24 hours or until reboot of digipaX software, so that the status for this patient is not inquired again in next steps of the study as image acquisition or entry in X-ray journal. If the dialog is closed without giving information on pregnancy status, the status is regarded as not inquired or not answered – so unknown – and will be inquired again in next steps of the study if need be.
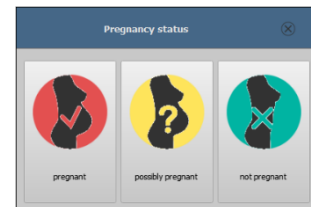
15.2 Creating job

Only one job for one patient can only be created at a time. Drag the desired patient to the job management or right-click the Quick Navigation (menu item "Create job").
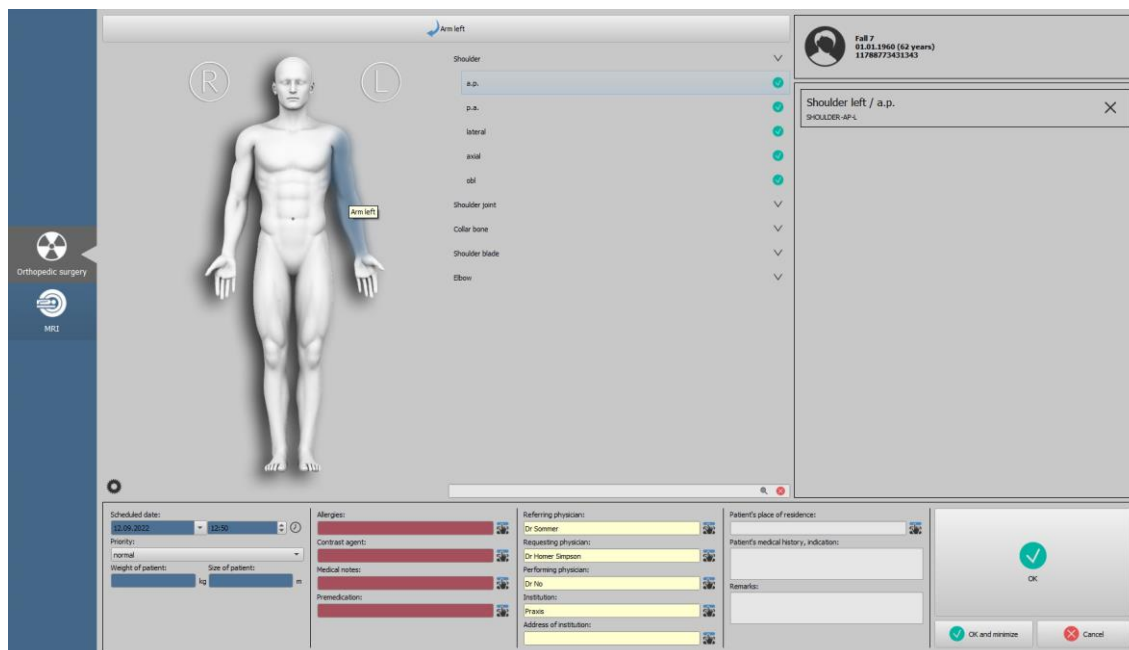
On the right side of the tab page you can see the list of selected jobs. Patient data is displayed above it.

On the left a graphic for the visual organ selection is placed. There can be multiple graphics installed for different medical specialties. For selection, click the corresponding icon on the left blue margin.

For organ selection, move the mouse over the image to the desired region of the body until it is highlighted in colour. Left-click this region to display the menu of body parts/organs for this region in the middle part of the card. Alternatively, you can search for body parts in the search field directly below the organ selection. For example, for knee, simply enter the first 3 letters "kne" and all search results containing the word "knee" will be displayed. You can also combine your entry by entering "kne ap". Then all results containing knee and AP will be displayed. Now, you can select the desired beam projection by a single-click.

The selected body part / organ and beam projection will be applied on the right side. If there is no submenu for beam projections (e.g. MRI) in the table of organs, just click the desired body part/organ. To delete an entry, click the X in the respective box.

If needed, fill in the remaining fields with information on the jobs. By using the small buttons behind the input fields you get each time to a dialog, in which the defined terms can be fast used again. These can be added with the green arrow to the list, deleted with the red X or selected for use per double-click.
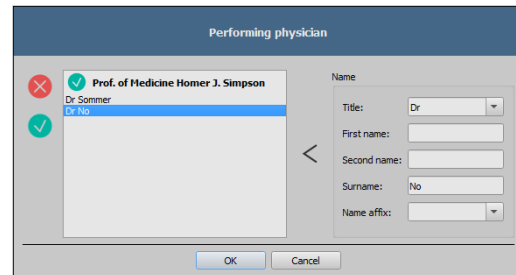
One of the entries can be defined as a default one. This is then already entered in the adequate input field for the job definition, when the dialog will be activated. For the patient names, this happens in the same way.

When the dialog for creating the job is confirmed with "OK", the job is transferred to the set worklist server. If more worklist servers are configured, the desired one is to define in the selection dialog. After the job is created, the program can be minimized to taskbar or system tray by clicking "OK and minimize".

15.3 Managing table of organs and Procedure Codes

15.3.1 Settings by user

Use button "Manage" (left below the graphic) to get to the dialog for editing the visual table of organs. The dialog shows the hierarchically arranged elements for part of the body, refinement and ray path. Both latter can be thereby deactivated. Deactivated entries are not displayed in the context menus for the selection of organs.

The elements for refinements or ray paths can be freely added or deleted. For adding refinement, activate the adequate part of the body or already existing refinement within this part of the body and click button "Add refinement". A new node will be put on and you can process the designation of the node. For adding a new ray path, activate the adequate refinement or already existing ray path therein and press button "Add ray path". Also for this specify the desired designation.
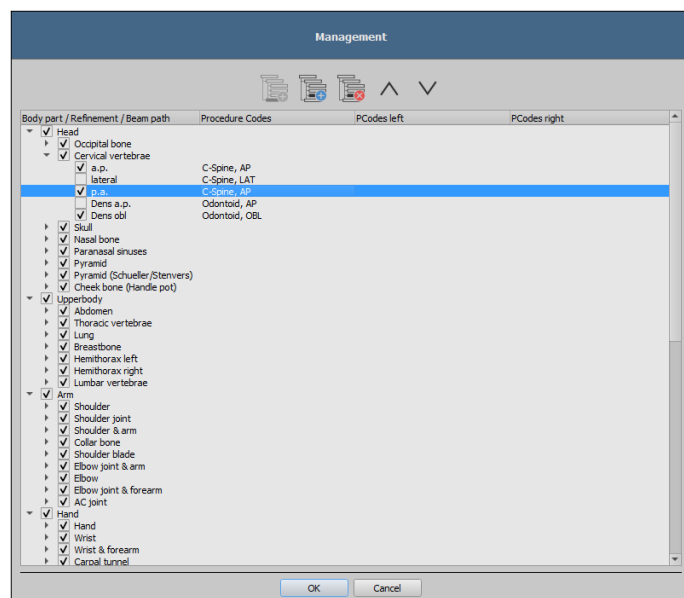
Some organ tables do not require beam projections (e.g. MRI). Beam projections can be omitted or deactivated in those organ tables. Ask your system attendant about that matter if need be.

Using the button "Delete selected element" the active node, including possibly contained sub-elements, will be deleted. The nodes for the parts of the body cannot be deleted thereby. The entries can be sorted by using the buttons with the arrows.

For each ray path so called "Procedure Codes" can be specified. These are transferred during the transmission and are again accordingly evaluated at the target station. These Codes must be thereby adjusted to the target station as each manufacturer uses his own Codes for the accession to his predefined settings. By double-clicking the adequate cell right in the tree structure you can define the Code for the ray path of this row. Maximal three Codes can be entered for each ray path. The Codes thereby are to be separated with a semicolon (;). You have to pay attention that as well before as behind the semicolon no blanks are entered, unless these belong to the Code. Thus the Codes can be coevally transferred to many devices. The procedure codes for digipaX must always be saved in the first place. If needed, a distinction can be made according to the position of the body part / organ (left, right, or front or back in animals). If no Procedure Code is available for a device for a beam path, a comparable code can be used (possible example: knee / AP for patella / axial). If there are no different codes for the positions left/right, a general code can be used for both sides (possible example: hand / AP for hand left / AP or hand right / AP). If the code for left and right is the same, the code needs to be entered only once in the general field (first column). The configuration of the transfer of these Codes and the setting or linking to adequate devices is performed by your administrator.
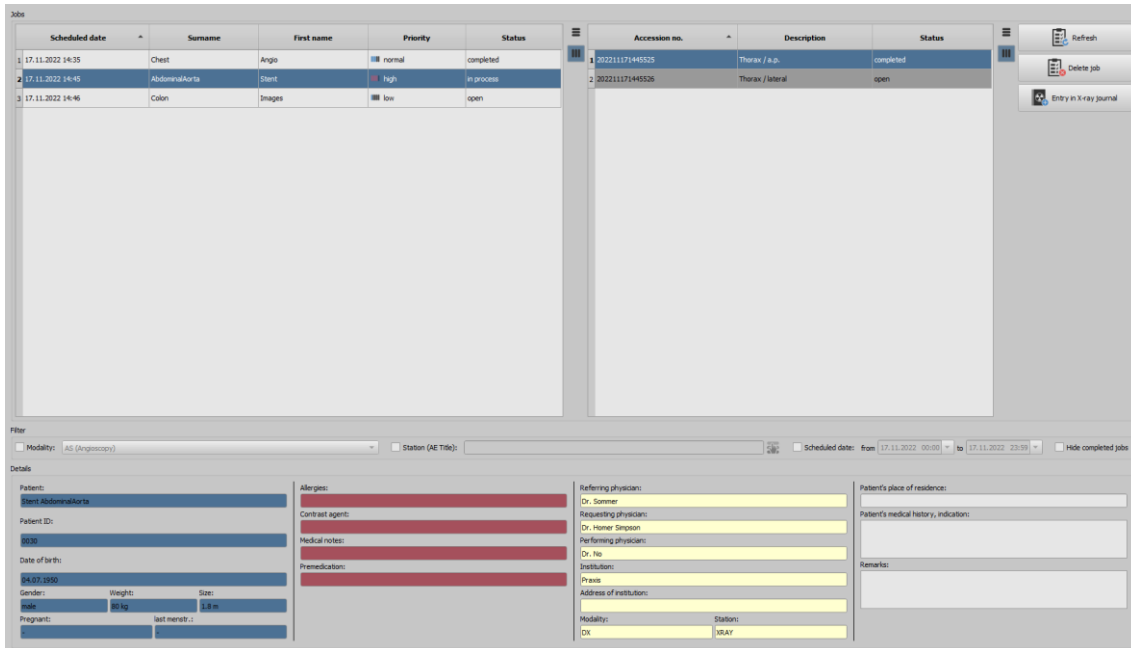
In the dialog for creating job the Procedure Code is displayed in the job list.

15.3.2 Settings by the administrator

The following settings can only be made by the administrator.

All organs, beam paths and Procedure Codes that are to be available for image acquisition with digipaX must also be available in the central database and configured accordingly. If necessary, they must first be added. Macros or mappings can also be created.

15.4 Presentation of the job and refreshing the job list

One or more job lists can be configured and coloured representation of the lists can be modified. These settings are adapted by the system administrator. If more than one list is set up, the table contains an additional column in which the respective list is displayed.

According to the settings made by the administrator, the status for each patient and job may also be displayed. The status can be "open", "in process" or "completed".

The lists are refreshed in the time intervals specified in the configuration. In the configuration this automatic refreshing can be also deactivated.

By using button "Refresh" the refreshing the list is required.

In the left list all patients are displayed, for which at least one job exists. If you select a patient from this list, then all the jobs for this patient will be displayed on the right side of the list.

Columns can be shown or hidden by right-clicking with the mouse the head of the table.

15.5 Filtering job list

You can select a desired modality as a filter, so i.e. CR for X-ray images or US for ultrasound images, or an AE title of the station, at which the job is to be performed, or a fixed date, on which the study is to be performed. For this, first activate the selection field and then select the desired modality or enter the desired station name or define the beginning and end date.

By using the "Hide completed jobs" button, these required jobs can be hidden from the list (only available with the corresponding settings by the administrator).

By using button "Refresh" (at the top on the right) the job list is recalled, whereby only the jobs, which meet the filter settings, are queried. The settings are saved and will be used again at the next selection of the worklist components.

15.6 Deleting job

The selected (marked) job in the list can be deleted with button "Delete job" **without a confirmation message**.

Furthermore, the jobs can be automatically deleted after a certain period of time is run out. Deletion of the jobs can be performed only by digipaX systems (depending on the set worklist server) and therefore cannot be performed in certain circumstances at the station at which the jobs are performed, so the images are made, this is a reasonable option in order to automatically delete the jobs. The period of time is thereby to select in this way that all jobs can be surely done in this time.

15.7 Adding job for a patient

Drag the patient from the job list left to the component bar for job management or right-click the patient in the job list and select "Create job" in the Quick Navigation.

15.8 Entry in X-ray journal

Optionally, if so configured by the administrator, the X-ray journal entries can be made directly from the job management. This should only be done after the image acquisition when all jobs are completed. First mark the job in the list and then click button "Entry in X-ray journal" on the right. The data of the patient and the job are automatically applied. Enter the remaining data in the corresponding rows and click ok to create the entry in the X-ray journal. In the following dialog you can again delete the job directly thereafter.

16 Acquisition of radiographic images

16.1 General

This card is only available if an image acquisition system is activated on the local station.
For image acquisition only the module for radiographic image acquisitions is currently available.
When the radiographic image acquisition module is activated, the additional card is displayed. It consists of the sections Planning, Acquisition, Backups and History. The upper part of this card shows the connected devices (see chapter 16.4). Below these the control buttons are arranged.

16.2 Safety instructions

Radiographic image acquisition may only be performed by qualified and competent employees provided with a proper trining. Further requirements for the staff are contained in the chapter 3.3.

When installing the devices, always ensure that the cables are laid safely to avoid accidents or damage to the technology. Foot switches operate at low voltage and do not pose a hazard.

Make sure that at least 10 GBs of free space are always available on the drive used as the working directory. Ask your administrator whichever drive is set up for this purpose (default: drive C).

16.3 Job planning

When using component "Job management", select a patient in it in the patient list for whom you want to do next acquisitions. Switch to the image acquisition by double-clicking the patient's name. Alternatively, you can open the quick navigation by right-clicking the entry in the job list and then switch to the image acquisition using the corresponding button or by dragging and dropping the patient's name onto the component.
Without using "Job management", select the patient in "Patient management" or create a new patient there. The selection of the patient for the image acquisition is also done by right-clicking and following quick navigation or by drag & drop.
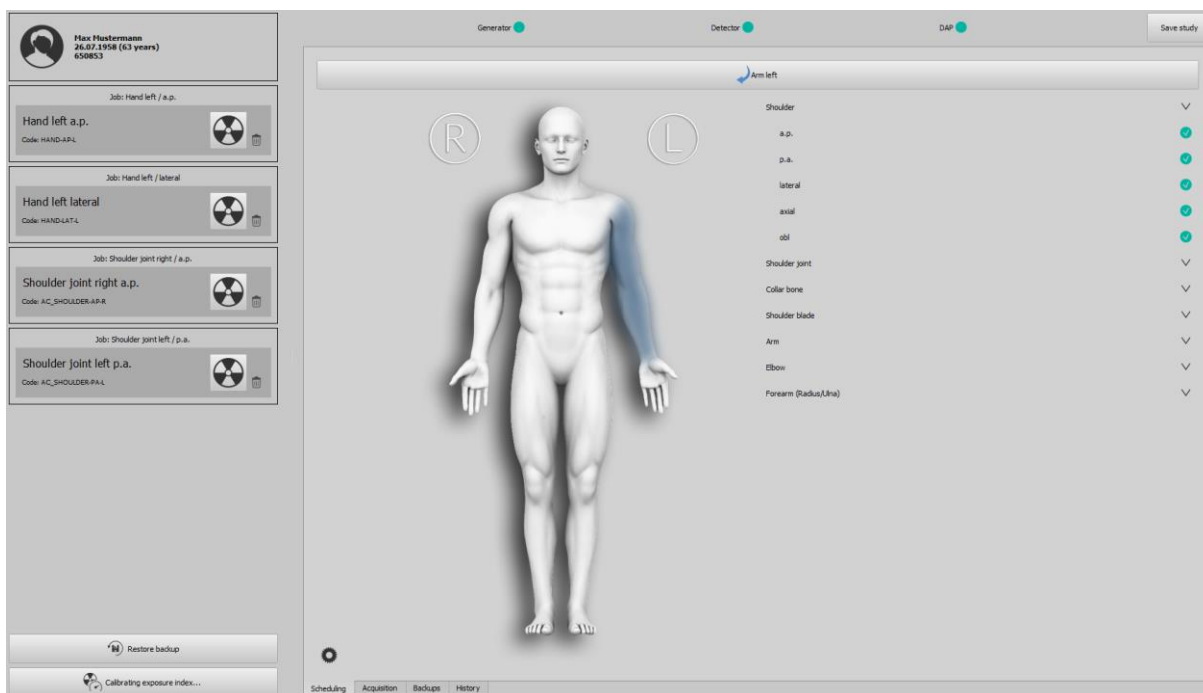
The patient is selected and the program switches to image acquisition, and the information on the patient as well as the assigned jobs are displayed in a list on the left.

Enter the right pregnancy status if it is prompted. The query only appears for female patients between 10 and 60 years of age, and only if the query is activated in the system. If the pregnancy status was already specified while creating the job (see chapter 15.1) it is not queried again. The indicated status as well as height and weight (if indicated in the job) are displayed in the upper left corner of the patient label.

The job descriptions and the Procedure Codes used are displayed. Procedure Codes are special codes that are transmitted to the X-ray unit in the background. By means of these codes, the system recognises which organs and beam paths are used and the necessary settings of the system are already preset. Whichever settings these are depends on the equipment used, such as the generator or detector. The names of the individual images can be changed manually. To do this, click the text.

You can also add more jobs directly in the job planning. The same organ types are available here as in the job management. The procedure for selecting a body part and organ for creating a job is the same as described in chapter 15.2. However, no additional information can be entered here. If other values or further details are required, use the order administration to add another job. The management of the tables of organs and Procedure Codes can also be done in the job planning (see chapter 15.3).

You can delete the individual jobs using the trash can icon.

16.4 Connected devices

Multiple devices, such as up to three detectors, an X-ray generator or a dose area product measuring device can be connected to the system. These devices are displayed in the upper part of the image acquisition card. By clicking the respective device, various information on the type, manufacturer, model, serial number, status, battery level etc. can be displayed, depending on the device.

Devices such as a generator or dose area measuring device automatically transmit new values to the system or the system cyclically retrieves values from the devices.

16.4.1 Battery charge level and signal strength of WiFi detectors

The battery level indicator and WiFi signal strength indicator are only displayed if detectors are operated wirelessly by WiFi and the functions are supported by the device.

–   Battery level yellow   =   Battery capacity is critical
–   Battery level red   =   Battery capacity is too low

If the battery level is too low (red indicator) no more image acquisitions are possible with this detector. First recharge the battery to full level or replace it with a charged battery!

Depending on the signal strength detected, between zero (no signal) and four bars (very good signal) are displayed. Place the WiFi router in a location where sufficient coverage (optimally four bars) is always available.

–   0 bars =   no coverage
–   1 bar =   poor coverage
–   2 bars =   acceptable coverage
–   3 bars =   good coverage
–   4 bars =   excellent coverage

16.4.2   Temperature of detectors

The display monitors the temperature of connected detectors if this function is supported by the device. If the temperature of the device is too low, the symbol is displayed in blue, and if the temperature is too high, it is displayed in red. The recommended operating temperature can be found in the corresponding manufacturer's documentation.

–	Symbol blue	=	Temperature too low
–	Symbol black and white	=	Temperature normal
–	Symbol red	=	Temperature too high

16.4.3   Calibration of detectors

Contact your system administrator/ supervisor to do a calibration of a detector.

16.4.4   Special features of devices and safety instructions

Special features of devices and safety instructions described in this chapter are to be observed!

16.4.4.1 Generator Josef Betschart AG

Supported devices:
GENESIS DT/DTs

Safety instructions:

Before each acquisition, check on the display of the generator console / operating software whether the values for the acquisition are correct and change them if necessary.

16.4.4.2 Detector Thales/Trixell

Supported devices:
4143C, 4143G, 2430EZ, 2430EZg, 3543EZ, 3543EZg, 3543EZe, 3543DRcs, 3543DRgs, 3543DRcx, 3543DRgx, 4343RC, 4343RG, 4343Rec, 4343REg, 3543EZX, 2430EZchd, 3543EZ–chd, 4343EZchd

16.4.4.3 Detector DRTech

Supported devices:
EVS4343A, EVS4343AG, EVS4343W, EVS4343WG, EVS4343WP, EVS3643A, EVS3643AG, EVS3643W, EVS3643WG, EVS3643WP

16.4.4.4 Safety instructions:

When using the WiFi panel, the battery charge level must be observed. It is displayed as a symbol in the upper header. If the battery level is low, change the battery before acquisition or recharge it first.

When devices are used in a WiFi mode, the supplied backup cable for image recovery should always be at hand. It is needed to restore the last image acquired by the detector if connection gets lost. Make sure that the cable is long enough and, if necessary, have an extension wire ready.

If the image quality is insufficient, the Procedure Codes must be checked. Contact your system administrator.

If 2 or 3 devices are in use, make sure that the correct device (1=table, 2=wall stand or 3=free acquisition) is selected before triggering the acquisition.

16.5 Course of radiographic image acquisition

Course of the image acquisition may differ from the steps described here depending on the system. The exact course depends on the combination of the X-ray system, the image acquisition technology, the connected devices and the software and settings used. If you have any queries, please contact your system administrator. In principle, however, the steps follow those described here. Once the patient is selected, the acquisition can begin. Select the desired job and click the acquisition symbol.

If a acquisition box is shown in red, the Procedure Code for this acquisition is missing. Delete this job, add the missing code to the table of organs (see chapter 15.3) and create the job once again. If necessary, ask your system administrator for assistance.

16.5.1   Generator control

The direct generator control via the integrated generator console is only available for veterinary, demo and test systems.

If the generator is not connected to digipaX, the values are only displayed and must be set manually on the generator. If you are operating a generator that uses Procedure Codes for the presets and the transmission of these codes is supported by digipaX, the values are already preset.
If the generator is directly controlled with digipaX, the generator settings are made by the software but can be changed manually before image acquisition. Direct generator control is an additional module and must be enabled by the administrator in the licence administration.

According to DIN regulations, in systems with directly connected and controlled generator each completed image acquisition must be alerted with an acoustic signal (beeping). For this, a specific hardware for sound reproduction, such as a sound card and integrated monitor loudspeakers or separate loudspeaker boxes, is required.

Adjustment to the patient's stature:

Child   skinny   normal   massive
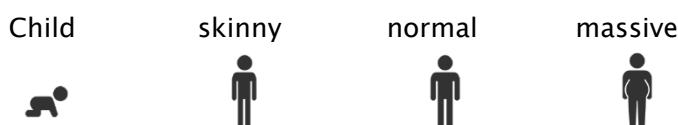
Selection of acquisition technique:

Auto   =   1-point-technique (only kV value is set)

mAs   =   2-point-technique (kV and mAs values are set)

mA
ms   =   3-point-technique (all values are set, mAs value is automatically calculated from mA and ms)

Generator values:

| 70 kV | 25.6 mAs | 80 mA | 320 ms | 0 Dens |
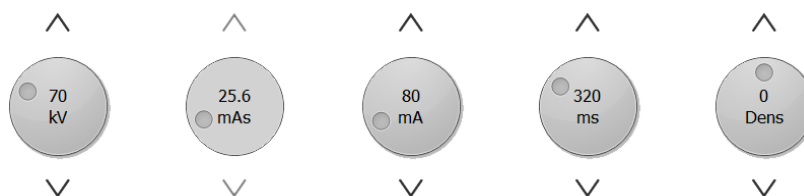
Turn the controllers for mAs or ms fully to the right and release the mouse button to increase the range of values for this parameter.
The "Dens" controller is used to set the degree of density.

Selection if multiple detectors are used:

If separate acquisition devices are used for the table and the wall stand or maybe also a third one for free acquisitions, the correct device still has to be selected. This is usually done automatically by the system.

Detector in the table	Detector in the wall stand	Mobile detector

Grid:

Use grid

Do not use grid

The setting whichever grids are to be used is made by the system administrator. The information on grids is stored in the DICOM header of the acquisition.

Focus:

Large focus   Small focus

Activation of ionisation chambers:

Left ionisation chamber   Centred ionisation chamber   Right ionisation chamber

Check all values and settings, correct them if necessary and save the values for future acquisitions.

Saving or resetting settings:

resets all values of the acquisition to the default values from the database

stores manually adjusted values for future acquisitions in the database

16.5.2 Performing radiographic image acquisition

Starting acquisition...

You can start the image acquisition by clicking lower wide button "Starting acquisition...". The system switches to the acquisition mode. Wait until the system is ready for the acquisition. This is indicated by the green symbol

Ready for image acquisition

This is displayed in the right part of the card. In the left part all acquisition parameters are summarised once again.

> **Make sure that the correct detector is selected, that the correct grid is inserted if you are using a grid, and check all parameters again to make sure they are correct before you start acquisition. If not, terminate the exposure and correct the settings.**

When the image is scanned, it is assigned to the corresponding job and displayed as a small thumbnail in the job and large in the window.
The images are assigned to a new study and each is stored in its own series.

> **If, despite correct settings, the quality of the acquisition is repeatedly insufficient, the Procedure Code used must be checked and adjusted if necessary.**

16.5.3   Postprocessing

Before the images are saved, they can be edited with various tools. Read the next chapters for more information. With the arrow buttons on the right in the toolbox you can undo changes you have made as long as the images have not yet been finally saved and transferred to the archive.

16.5.3.1 Functions and tools

For post-processing, various tools are available as in the image viewer. These include mouse functions, zoom, transformations and automatic windowing, see chapters 9.2.1, 9.2.2, 9.3.1 and 9.3.2).

Furthermore, the toolboxes on the right-hand side contain the sliders for windowing, including presets, and the tools for display shutter (see chapter 9.3.2 and 9.3.6).

Rotations, mirroring, windowing etc. are saved directly in the image and transferred to the archive. These changes are then immediately displayed again at other stations where the image is retrieved.

16.5.3.2 Image enhancement

If the image quality is not optimal despite the correct acquisition parameters, you can try to process the image with another filter. To do this, click the button "Adjust image filter". In the following dialogue you can compare the different filter options. Select the desired filter in the upper drop-down box and check the result. Thereafter, you can save the change either for the current image only or for all future images of the current organ and beam path.

16.5.3.3 Image crop

Before images are saved, they can be cropped to cut off the edges. This has the following advantages:

- only the interesting part of the image is visible immediately, without having to zoom into the image first
- less memory usage
- faster data transfer
- faster image display and image processing (e.g. windowing)

Automatic image crop:

This function is only available with the additional module "Röntgen Plus". Ask your administrator or dealer for more information.

If automatic image crop is available, the images are automatically cropped according to the detected collimation. The necessary settings are defined by the administrator.

If the automatic image crop is not optimal, you can remove the crop with the button "Undo crop" and reset it manually (see next section).

Undo crop

Setting rectangle for image crop manually:

To crop the displayed image, first press button "Select area". Then click with the left mouse button the image and drag the mouse to select the desired area. You will now see a preview of the area to be cropped. You can still move the selected area or correct it by moving the corner points. Click the red cross to unmark the area so that you can deselect it.

Select area

Check and accept:

Check this preview again to see if important image information is cut off by cropping. Click the green tick to confirm the crop and the operation is done.

The original image is only available as a backup in the list of newly acquired images. If the cropped image is saved in the image archive, the cropped edges cannot be reproduced for this image.

16.5.3.4 Markings

The marks are virtual lead letters (L or R) which are saved in the image. Select one of the virtual lead letters by clicking with the left mouse button and then move the mouse over the image. By turning the scroll wheel of the mouse or using the plus and minus keys on the keyboard, you can adjust the size. Drag the letter to the desired position in the picture and place it there by clicking again with the left mouse button. The symbol is then burned into the image and is thus firmly connected to the image.

Furthermore, texts can also be inserted into the images. To do this, enter the desired text in the input field or select it from the list of already defined texts. Using the 4 buttons for setting below the input field, you have the option of placing black text on a white background, white text on a black background, black text without a background or white text without a background on the image, depending on which setting is suitable for the current image. The text field can also be resized in the same way as the virtual lead letters.

After saving the images, the markings and texts can no longer be removed.

16.5.3.5 Exposure index obtained from an image

If the exposure index deviates from the target value, the deviation index (DI) becomes smaller or larger than zero. The deviation is represented by a yellow or red arrow.

↘ (red)	-	Dose very low	=	Red arrow down
↘ (yellow)	-	Dose low	=	Yellow arrow down
↗ (yellow)	-	Dose slightly increased	=	Yellow arrow up
↗ (red)	-	Dose greatly increased	=	Red arrow up
→ (green)	-	Dose okay	=	Green arrow rightwards

If the dose is all right, a green arrow is displayed. If the DI occasionally deviates, the mask for detection should first be checked and corrected if necessary. To do so, click the button with the arrow or go to the toolbox "Mask adjustment" on the right.

16.5.3.5.1 Exposure index in accordance with EN 62494-1

The tool mask adjustment helps you to adjust the settings of the X-ray unit to achieve optimal image quality with the lowest possible radiation exposure to the patient. If the deviation index (DI) deviates strongly from zero after an image acquisition, you should use this tool to analyse the cause and then take appropriate countermeasures.

Before saving the image, click toolbox "Mask adjustment". A mask is placed over the image and the values Exposure Index, a fixed Target Exposure Index, the Deviation Index and the determined grayscale value are displayed. The deviation indicator is calculated from the target value and the exposure index. The grayscale value is the average grayscale value of the pixels within the displayed mask (related to the unprocessed raw image).

When opening the toolbox, the calculated collimation as well as the calculated mask is displayed as an overlay on the object.

Check the correct position of the mask here.
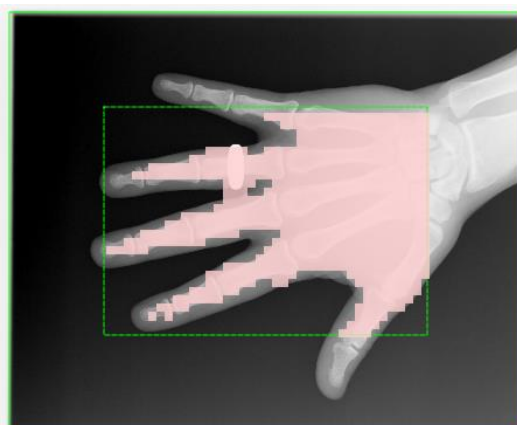
The overlay is automatically determined by the system (solid green line). The predefined edge is added to this (dashed green line). The edge must be large enough so that no areas outside the overlay are included, but it should not crop the object itself. A mask is placed over the object to indicate which areas of the image will be used to calculate the exposure index. The mask must only cover the x-rayed object.

If there are any deviations, you can readjust the areas with the two sliders. In doing so, the values for the calculations are changed accordingly.

You can also reselect the area for object recognition. To do so, click button "Reselecting area..." and set a new rectangle in the image. In the example image, the edge must be changed until the hand is completely inside the edge.
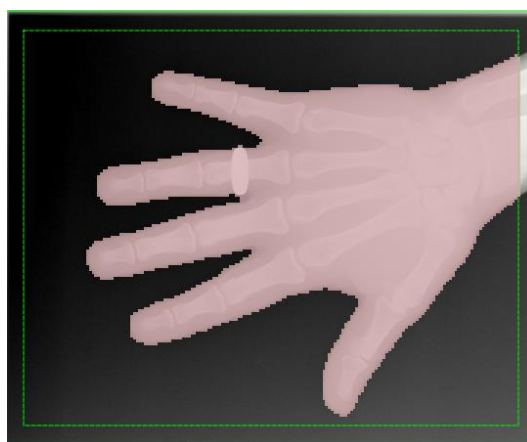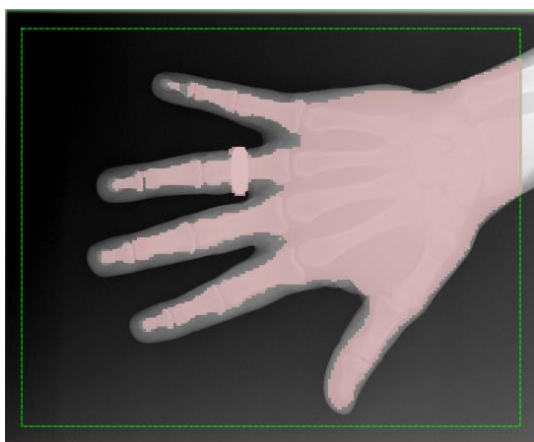
Use controller "Exactness" to refine the grid of the mask and controller "Selection" to reduce or enlarge it so that the object is optimally covered by the mask.

Also check the target value, ask your system administrator if necessary.

If the values are acceptable, you can save the image.

If you have a deviation indicator that is far from zero despite correct settings for edge and mask, you should adjust the dose accordingly when acquiring the image. If the indicator goes far into the plus range, you should reduce the dose; if, conversely, the value goes far into the minus range, you should increase the dose if the image quality is not sufficient. A low dose with good image quality is optimal. If the images are acceptable with a negative value, it is not necessary to increase the dose.

If the exposure index repeatedly deviates from the target value, even though the X-ray parameters have been set well and the mask and target value are correct, the exposure index or even the entire X-ray system should be recalibrated. For this purpose, contact your technician or carry out the calibration yourself (see chapter 16.716.5.3.5.2).

16.5.3.5.2 Exposure index calibration

Periodically but at least once a year the exposure index must be recalibrated.

To do this, switch to the X-ray image acquisition card. A patient does not have to be selected. Click button "Calibrating exposure index...". The button is only available if the Expert Mode is activated in the footer (see chapter 6.1.2.6). There are separate instructions for carrying out the calibration, which you can obtain from the administrator. Take the instructions and carry out the following steps.

16.5.3.6 Acquisition parameters

After image acquisition, the acquisition parameters used and the values received from the dose area measuring device (if connected) are displayed. If all values are correct, nothing further needs to be done. If necessary, the values in the table can be adjusted again.

16.5.3.7 X-ray journal

If the X-ray journal module is activated, new entries are made in the journal once the study is saved. The X-ray journal entry is generated automatically. Optionally, here the entry can be complemented with some values that are to be entered in the journal for this study. Add the missing entries.

Which values are transferred to the X-ray journal during the image acquisition and which of them are mandatory or optional can be set by the administrator/system administrator.

16.5.3.8 Accepting or rejecting images

When the postprocessing is completed, click "Accept". The finished job is marked with a green dot and the image with a green tick in the upper right corner. Carry out this step for all images.

Individual images can also be rejected. I.e. they are not transferred to the image archive but deleted. Click the thumbnail in the job box and then "Reject" in the lower right corner of the toolbox. A confirmation prompt appears, which must be answered with "Yes". This will also delete generator values or values from the dose area measuring device. To delete the empty job, click the recycle bin icon in the job.

To discard all unsaved images at once (e.g. after tests), hold down the Shift or Control key (Ctrl), click "Reject" and enter the administrator password in the following dialog (this function is reserved for the system administrator).

16.5.4   Saving study

Once you have completed all jobs and accepted all acquisitions, click "Save study" in the upper right corner. A dialog shows up in which data can be rechecked and corrected if necessary. In addition, optional information can be added. To change or add data, simply click the corresponding field. The name of the study is automatically created by the jobs or you can enter a name manually. Enter the name of the radiographer / radiographer's assistant.

When all data is complete, you can finish the process. To do this, click "Save" or "Save + desired action". The images are sent to the archive and the patient selection is cleared or the program switches to the desired component according to the selection.

16.6 Backups

For each image acquired, a backup is created first before it is processed further.

To restore an image from the backup, first activate the patient to whom these images are to be assigned. Then use button "Restore backup" at the bottom left. The list shows the thumbnails of the images, the patient's name (for whom this image was acquired) and the date and time of the image.

Select the image to be imported and confirm with a double click. The image is imported as if you had just read it in. A new job is created in a new study. If you are still working on an unsaved study, the study will be added to it. Once you have acquired all images or imported them from the backups, save the complete study with the button in the upper right corner.

16.7 History

Next to the image acquisition card there is a history. All acquired images are temporarily stored there for a set period of time and can be opened and viewed at any time. Open the desired image with a double click or drag the image into the viewer with the mouse.
The images will be deleted from this history after a period of time set by the administrator. This is only a cache and no images are deleted from the image archives.

16.8 Grid line suppression

If you use a detector and a fixed scatter grid in your X-ray system, grid lines may be visible in the images. These halftone lines can optionally be suppressed with an algorithm. To do this, the corresponding function must be activated by the administrator.
The suppression then takes place automatically during image acquisition. Whether the half-tone lines were suppressed in an image can be checked afterwards in the DICOM header of the image. The DICOM tag 0018,1166 is used for this purpose.

0018,1166 = empty or not present   -> No grid lines suppressed
0018,1166 = FIXED   -> Grid lines suppressed

17 Stitching

17.1 General

This feature can be used to form a full-spine or full-leg panoramic image from a series of "stitched" subimages.
The feature must be enabled for use by your administrator.

17.2 Acquisition of radiographs

Firstly, all subimages must be consecutively acquired. The patient must not move during the examination. If necessary, use proper immobilisation methods to assure that the patient does not move, or make it possible to the patient to hold on to something during X-raying.
The distance between the tube and the image receptor should be as large as possible. The subimages must be acquired or displayed in such a way that their edges overlap slightly. These overlap fields are then used by the software as reference for generating the panoramic image.

Radiographic markers (lead balls) or rulers can also be used as reference to combine the panoramic image.

17.3 Stitching module overview

Please check once again if all subimages are on correct positions before saving the panoramic image. The tool for transparency will be helpful here.

Select the images for the component Stitching by dragging and dropping them to the component (optionally the entire study or the entire patient).
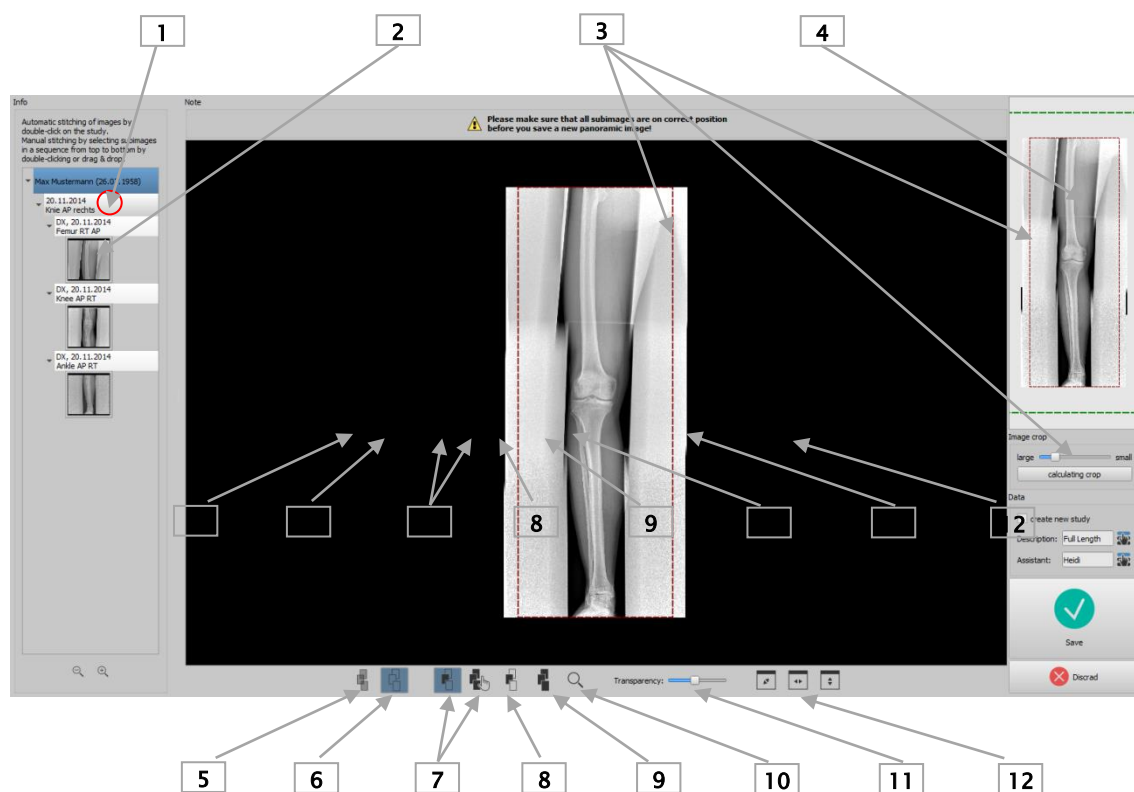
1 – Double-click study node for automatic stitching
2 – Double-click subimage or dragging it for manual stitching
3 – Tool and frame for cropping
4 – Preview of panoramic image with displayed current subimage
5 – Transparent presentation of images to present overlap
6 – Superimposing images (creates panoramic image with smoothed transitions between subimages)
7 – Moving subimage or panoramic image
8 – Adjusting window level of a subimage
9 – Adjusting window level of panoramic image
10 – Zoom
11 – Transparency change (effective for transparent presentation only, see button 5)
12 – Adjusting image to window

17.4 Automatic stitching

Double-clicking a study node will start automatic stitching. The software then tries to automatically merge subimages, based on grayscale levels, remarkable points in the image, and the time of the image acquisition that is stored in the image.

All subimages are displayed transparently to make the overlap fields at their edges visible.

If the acquisition is good with sufficient overlaps, the images should automatically be on correct positions. If this is not the case, you need to place the subimages manually as described in section 17.5. When all images are correctly positioned follow section 17.6.

17.5 Manual stitching

Place consecutive subimages by dragging them into the work area, starting with the very top image. Position the images so that the overlapping fields match accurately, using tissue or bone structure, or embedded lead markers or the lead ruler as reference.

There are supportive tools available, such as transparency, window level, and zoom. Zoom is also available with held down the right mouse button and moving the mouse up or down. Move the individual images until all images are in the correct position and continue with "Saving panoramic image".

You can delete all images from the work area using the "Reject" button and start the procedure from the beginning.

17.6 Saving panoramic image

If the result is acceptable, you can smooth transitions between adjacent images using the "Overlap images" button (6), and create and check the panoramic image.

If necessary, you can also adjust windowing for the panoramic image using the (9) button. Finally, crop the left and right edge of the panoramic image.

If you want to save the result in a new study, insert the tick symbol.

Name the image and type in the name of the assistant.

Click "Save" to save the panoramic image in the image archive.

18 X-ray journal

The X-ray journal is optional and must be enabled by the administrator.
You can open the X-ray journal from the left component bar. The entries are usually generated automatically. If entries are automatically generated, the corresponding thumbnail is also displayed in the right margin. This option is not available for manual entries.

18.1 Viewing X-ray journal

Open the journal as described above using the button. The content of the X-ray journal is shown. The entries are sorted newest to oldest.

18.1.1   Functions

Refresh - Refreshing the list

If a new entry is added while viewing the X-ray journal, the view must be updated. To do this, click button "Refresh" on the top left.

New entry – Manual creating a new entry

Enter the values in the fields provided and confirm with OK to apply the entry to the journal.

Edit entry - Changing data of an entry

If entries are incomplete or contain incorrect values, you can use this button to edit the corresponding entry. You can edit an entry by marking the line and then clicking the icon or just double-clicking the line. Then click button "Save".

Delete entries – Deleting one, several, or all entries

Select the row or rows and then click button "Delete".
Deletion of entries requires entering the user password. Enter your password and click "Ok". The selected entries are deleted from the X-ray journal.

Empty X-ray journal - Deleting all entries in the X-ray journal (button only in Expert Mode available, see 6.1.2.6)

Export X-ray journal (CSV file) – Exporting the journal into a file

You can export complete journal as a CSV file (text file with semicolon as separator between the values), in order to i.e. read in to Excel.

If you have set a filter, this will be applied also for exporting. In this way, only entries will be saved, which also be displayed in the table.

Before the export, a dialogue is displayed in which you can choose whether the unit of the dose area product should be converted into another unit. digipaX2 uses the unit dGy*cm² within the X-ray journal, which corresponds to the international DICOM standard. Select the unit into which you want to convert and decimal separator (comma or point), and click "ok".

1 dGy*cm²	=	10	µGy*m²
	=	100	mGy*cm²
	=	10	cGy*cm²

On demand, you can open immediately the exported file with the standard software provided (i.e. Excel) and process further or print out.

Import X-ray journal (CSV file) – Importing the journal from a file

You can import an X-ray journal, which was previously exported to another system, location or from an earlier digipaX1 installation, into the current system. The data is added to the current X-ray journal. The number and order of the columns must be identical to the current journal and the semi-colon is always used as separator. The first line of the file is skipped as a header line at import.

18.1.2 Filtering
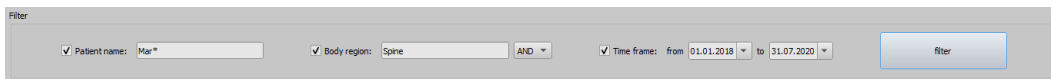
In the bottom of the dialog you can set the filter for patient names, parts of the body and record date. Each time you activate the desired control box (many control boxes can be activated), in order to apply the filter.

Deactivate all control boxes and press the button "Filter", in order to display again the full list of all entries.

The settings are saved and used again for filtering at the next activating the X-ray journal.

18.1.2.1 Patient name

Enter a part of searched name using wildcards ("*") as place holders (i.e. "Sch*").

18.1.2.2 Region of the body

Specify one or more terms or parts of words in the input field for regions of the body. In the drop-down list box behind it you can determine, if the description of a region of the body must contain all terms (AND) or only one term (OR). By pressing the button "Filter" the entries of the X-ray journal are filtered and only entries are displayed, which contain the determined term(s).

18.1.2.3 Period of time

Specify in the field "from" the date, on which the filtered list should begin and in the field "to" the end date of the entries. After pressing the button "Filter" only the entries are displayed, which X-ray date is larger, equal to the start date and lesser, equal to the end date.

19 Image management

In this tab page you can manage DICOM images from different sources. This includes functions to delete, modify and import the images, move the images between the archives and send the images. For functions to delete and modify the images, the "Edit and delete functions" module must be enabled for the user by the administrator in the license management. furthermore, the user must have a login password.

These both functions are besides only available for the internal archives with write access. External archives from third party manufacturers are not supported. Please ask your administrator for further assistance.

Particular functions are described in the following chapters.

Prior to launching of this operation make sure you have a current backup of your data. After the operation, update the backup again to apply the changes there.

19.1 Deleting images

This function is used to delete particular images from an image archive.

Drag the patient who you want to delete images of into the tab page "Image management" or use Quick Navigation. Now select the subcategory "Delete" in the component.

Delete

Tick the checkboxes next to the images to be deleted in the image preview and enter your name (name of the performing person) and reason for deletion. Then click the wide button "Delete". Now, enter your username (login name) and your login password, and click OK. If you do not have permission to delete images, please contact a person with the necessary rights. This person must then enter their own login details and click OK.

Selected images will be backed up, thereafter the images will be deleted from the archive and a log entry will be created in the list for the operation.

If more than one archive are linked, only the images of the archive from which the images were retrieved will be deleted.

19.2 Changing image data

A reason for changing data of a patient may be change of the patient's name (e.g. after marriage) or correction of a wrongly spelled name.
Another scenario is that the data of a study or image series must be changed, for example, because it was inadvertently assigned to the wrong patient while saving.

To change the data, drag the patient to the tab page "Image management" or use the Quick Navigation. Now select the subcategory "Change" in the component.

Change

Tick the checkboxes of images to be changed.
Make your changes to the patient data (see 19.6 Adjusting patient data).
If all data is correct, enter your name (name of the performing person) and reason for data change. Then click the "Change patient data" button. Now, enter your username (login name) and your login password, and click OK. If you do not have permission to change image data, please contact a person with the necessary rights. This person must then enter their own login details and click OK.

19.3 Selected images will be backed up, followed by change of the images in the archive, and creation of a log entry in the list for the whole action.Importing images

Images from patient CDs or individual DICOM files can be transferred to an image archive by use of this function so that they remain permanently available in the system.

Drag the images you want to import into the tab page "Image management" or use the Quick Navigation. Now select the subcategory "Import" in the component.

Import

Tick the checkboxes of the images.
Make your changes to the patient data (see 19.6 Adjusting patient data). In particular ensure correct assignment of the patient ID..

If all data is correct, click "Import images" button, select the target image archive, and click "OK".

19.4 Moving images

Images can be moved between two image archives by use of this function. This can be useful if another archive is used for receiving images from other facilities. As different patient IDs are usually used in these images, an adjustment of the patient data is also possible here.

Drag the images you want to import into the tab page "Image management" or use the Quick Navigation. Now select the subcategory "Move" in the component.

Move

Tick the checkboxes of images to be moved.
Make your changes to the patient data (see 19.6 Adjusting patient data). In particular ensure correct assignment of the patient ID. If all data is correct, click "Move images" button, select the target image archive, and click "OK".

19.5 Sending images

This function is used to send images from any sources (archive, patient CDs or particular DICOM files from a data browser) to an image archive. Destination may also be in any other facility. No data adjustment is involved in this process.

Drag the images you want to send into the tab page "Image management" or use the Quick Navigation. Then select the subcategory "Send" in the component.

Send

Tick the checkboxes of images, select the target archive you are going to send the images to, and click "Send".

19.6 Adjusting patient data

In the table under "Stored data" current patients are shown in grey. You have three possible ways to enter new data by:
1. entering all new data manually in the table under target data;
2. using the target search for data in all available image archives. To do this, enter at least the first three characters of the patient's surname in the search box or use the filter function as outlined in chapter 7.4.1 above;
3. using the target search for data in the last 10 GDT files. GDT files are files that are auto-matically generated in the background when you open digipaX from the practice management program, e.g. when creating a job or when you want to view images of a patient. This involves transferring the patient data from the practice management to digipaX. The data of the last 10 of these predecessors is displayed in the list. At the end the selected target data is displayed in the table.

20 Configuration
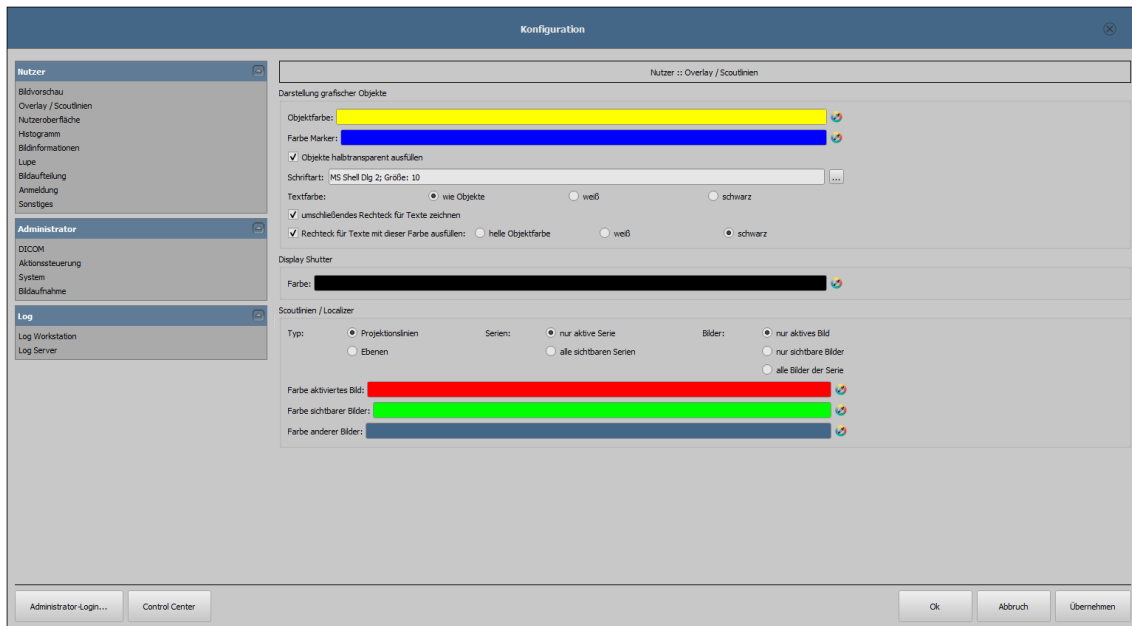
There is a central place for the program configurations. The configurations and also the different log outputs are thereby divided in adequate groups user, administrator and log. Configurations for the group administrator are modifiable only with the administrator rights. The administrator must log in at each selection of these components using the "Administrator login…". Following settings can be made in the configuration:

20.1 User section

- Image preview
  - Drop-down mode :
    - *expand latest study:* only images of the latest study are being expanded
    - *expand all:* after a patient is selected, all study nodes and image series nodes are being expanded in the tree structure, in this way all images of the patient are displayed in the preview
    - *collapse all:* all study nodes are being collapsed and no image preview is displayed – it will be directed the study and image series selected, which is to be viewed
    - *new studies first:* sorting order in the thumbnail preview so that the latest studies are displayed on the top
    - *old studies first:* sorting order in the thumbnails preview so that the oldest studies are displayed on the top

– Display mode image series:
  o alternatively, all images of one image series are displayed in a preview tree or only one image of the series is displayed (this is adjustable separately for each type of image) – first select on the left an adequate modality, i.e. CT, and then on the right, which settings for this type of image are to be applied (all images or only the first, middle or last image of the series)

▪ **Overlay / scout lines**
  – Presentation of graphic objects:
    o *Object colour:* colour for drawing graphic objects
    o *Marker colour:* colour of markers (corner and end points, central points etc.) for editing the objects
    o *Fill out the objects semitransparently:* while drawing filled out image objects, these will be drawn semitransparently, if this option is activated, so that you can recognize the image behind it, otherwise they will filled out fully with the above colour
    o *Font type:* font type, which is to be used for text objects
    o *Text colour:* with the above selected colour, white or black
    o *Draw encircling rectangle for texts:* if this option is activated, an encircling rectangle for the texts in the above selected colour for graphic objects will be drawn; thereby these can be better read in certain circumstances
    o *Fill out rectangle for text with this colour:* if this option is activated, the encircling rectangle for text objects will be filled out with the selected colour (the above selected semitransparency will be also used), otherwise the rectangle will not be filled out an the image will be seen; the same colour can be used like fort he objects (lighter), white or black
  – Display Shutter:
    o *Colour:* colour with which the hidden areas are to be overlaid
  – Scout lines / Localizer:
    o *Type:* "Projection lines" – with this option, only intersection lines of the images resp. projections of edges are presented; "Plane" – with this option the images are shown as sectional plane three-dimensionally.
    o *Series:* "Only active series" – with this option, only projection lines resp. planes of an active series are shown; "All visible series" – with this option projection lines resp. planes of all visible series are shown – Please note: This option works not until the option "Visible images only" or "All images of the series" is activated.
    o *Images:* "Active image only" – with this option, only projection lines resp. planes of an active image are shown; "Visible images only" – projection lines resp. planes of all visible images are shown; "All images of the series" – all projection lines resp. planes of all visible images of all series are shown.
    o *Colour:* colour in which the active image and colour in which the other images are displayed.

▪ **User interface**

The module for use of multiple monitors must be licensed and enabled separately. After enabling the number of usable monitors depends on the hardware. Without a license digipaX can only be displayed on one of the available monitors.

- Monitor: settings and display arrangement
  - o If more than one monitor are active, they can be here enabled or disabled
  - o Only one monitor can be defined as work monitor, other monitors may be only used to display the image viewer with preview and tools
  - o Option "Image split" is used to define whether a particular monitor is to be included when determining layouts (Hanging Protocols or hanging studies based on defined window split)
  - o Display arrangement can be adapted to physical arrangement of the workplace by means of buttons between the monitors
- Design:
  - o *Black Style:* for dark program presentation
  - o *Classic Style:* for bright program presentation
- Toolbox height (window placing):
  - o *automatic:* toolbox height according to screen format
  - o *short toolbox:* for portrait format monitors and correspondingly wider bottom work bar (histogram)
  - o *long toolbox:* for landscape format monitors and correspondingly longer toolbox at the right edge of the screen
- Font:
  - o *Font:* setting up font size and type for descriptions of the buttons and windows as well as for tables, tips and information etc. in the program
- Symbol size:
  - o *automatic:* symbol size according to screen resolution
  - o *manually:* symbol size of program buttons in pixels

▪ **Histogram**
- Shorten margins:
  - o *Shorten left and right:* with these options, the values in the left and right edge of the histogram will be set on the maximum value between them, so that the display of the whole histogram is well possible in the window. If the important areas will be thereby cut off or the values between these limits are still presented too small, the size can be accordingly reduced or enlarged.
- Smoothing:
  - o *Sooth histogram for display:* smooths the histogram for displaying with the set number of runs. The images will be not smoothed thereby. This is used only for better presentation of the histogram.
- Values:
  - o *Used or possible values only:* on the x-axis only the values will be shown, which are actually used in the image, or all values, which could appear based on the colour depth of the image
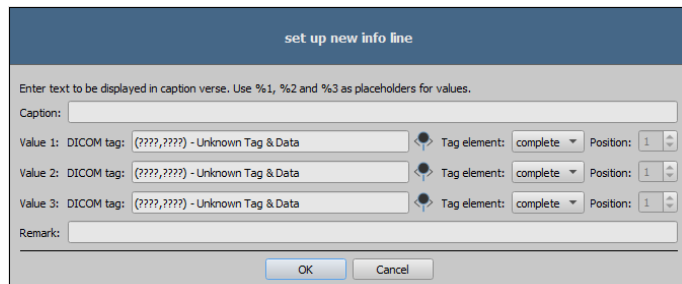
▪ **Information on image**

- Text formatting:

  o *Text colour:* colour with which the information in the image corners are to be shown

  o *Font type:* font type for presentation

  o *Shaded:* the writ can be possibly poorly seen on the images with the white background, so with this option a shadow can be backed – if the images are black or dark, this is not hardly seen

- Elements:

  o for each type of image (modality) you can determine which information are to be shown in the overlay corners. First select the desire type and next the option "Use these settings", if the default settings are to be used. Click the desired box, in order to determine the corner of the displaying and next the button "New entry in active field", in order to add an element to this box. In the caption row you can enter any desired text, which should appear on the images. Use %1, %2 and %3 as "Variables" (place holders). These will be exchanged by the defined DICOM tags in the display. You can also let display only a part of the tags if needed, i.e. a part of the person name or the value at the determined place for tags, which allow many values (multiplicity). By double-clicking the entry in the list fields or with the button "Process active entry" you can delete these. Use the button "Delete active entry", in order to remove

  this from the list. If you want to move or copy the entries within a list field or between the list fields, you can move these with the pressed left mouse button (drag & drop).

For this, hold the Shift key pressed on, in order to move the entry. Without Shift this will be copied.

- **Loupe**
  - Loupe shape / Loupe size:
    - o *Automatic size:* width and height of the rectangle or diameter of the circle will be set for a third of a current window width or window height of the image window, depending on that which value is smaller
    - o *Rectangle:* usage of a rectangle loupe in the viewer with the specified pixel measures or automatic size
    - o *Circle:* usage of a circle loupe in the viewer with the specified diameter or automatic size
  - Zoom:
    - o *Zoom factor:* zoom factor for the image
    - o
    - o out, which is presented in the loupe (referring to original image)

- **Image split**
  - Enabling:
    - o the series of the most recent study are automatically displayed in the image viewer at opening of a patient; window is automatically split by default and each series is "hung" in a subwindow: when double-clicking the node of the study, the series of this study are hung, too and the window split is adjusted automatically; if the Hanging Protocols module is enabled, it is first checked whether a protocol is defined for type of images in the study – if so, the images are automatically "hung" in accordance with the defined protocol; this also applies when double-clicking the study.
  - Window split:
    - o *Select modality:* for each modality an individual setting can be selected
    - o *Window split:* automatically means that the window is split automatically correspondingly with the number of the series that are to be displayed, otherwise the image viewer is split always in the lines and columns set up
  - Hanging Protocols (optionally):
    - o *Colour:* colour selection for the description fields of the images of the current or selected study, and colour selection for the description fields of the prestudy
    - o *Font type:* setting for the description fields of images
    - o *Description:* when ticked the description of the appropriate images or images list is additionally displayed

- **Login**
  - Automatic login:
    - o Enter username and password for automatic login when starting digipaX, the user specified is then logged on always along with starting the program without further requesting any information on the user by the system

▪ **Image acquisition**
- Image type for marking:
  - o *Type:* select the image type for virtual lead letters, which can be burned into the images during X-ray imaging
  - o *Font for text markings:* select the font type for free text, which can be burned into the images during X-ray image acquisition

▪ **Others**
- Mouse function windowing:
  - o *Mouse properties:* horizontal move changes the value for center / vertical move changes the value for width (synchronous with histogram) or the other way – vertical move changes the value for Center / horizontal move changes the value for width
- MagicSharp filter:
  - o minimum and maximum values for MagicSharp filter can be limited (in this ways, strong tile effects can be avoided)
  - o min. size = 2 to max. size = 16
  - o min. amount = 1,00 to max. amount = 10,00
  - o contrast enhancement can be activated automatically with the amount defined here using the mouse function
- Scroll mode images:
  - o images can be changed with mouse scroll or the "Page up" and "Page down" keys. This setting specifies, whether thereby only one image series can run, change also over the limits of an image series can follow and therefore all images of an study can run or even over all images of a patient, so over the limits of an study to the next study
- Presentation of zoomed images:
  - o if this option is activated, the pixels will be zoomed in and no smoothing follows (the images operate pixelated, details can be seen better in certain circumstances); if the option is activated, the strongly enlarged images will be smoothed (the images operate milder; details can blur in certain circumstances)
- Units of measurement:
  - o use this option to set whether the measurement values to be used are in "mm/mm²", or "cm/cm²"
- Patient management:
  - o *maximum number of match result:* setting of the maximum num-ber of data records that will be displayed at archive query (standard value is 500, a too high value may slow down the archive query); when this option is deactivated, all match results are shown

20.2 Admin section

Please ask your administrator for assistance to adjust the settings in this section.

20.3 Log section

This section is also for the administrator. The log output can be used in the event of possible program errors to look for exact causes of the errors.

The processes of the current session divided to workstation and server, and these subdivided to various program groups (categories), can be reviewed.

Furthermore, the outputs can be filtered in multiple levels. The highest level is "Trace". At this level all actions of the activated categories are displayed in the window. The lowest level is "Fatal". Only serious program errors are displayed at this level. The recommended levels are "Info" or "Debug".

With the marker ☑ „select all" or ☐ „deselect all" all log categories can be switched on or off.

The automatic update of the log window can also be temporarily disabled by ticking the appropriate checkbox.

Other buttons are "Refresh log window", if automatic update is disabled, and "Delete log window".

All changes made here apply only to the current session and are not saved. The next time you open the log window, all settings will be reset.

21 GDT interface

GDT identification: GDT-D-11

Anytime, so as well at the program start as during the operation, a GDT file can be forwarded to the program. The forwarding follows thereby in the set communication directory and in the set format. The settings are made by your system administrator.

GDT record type	Action
6301: delivery of master data	▪ patient to the GDT file forwarded is set up locally, if he does not yet exist in the set image archive ▪ at the program start or if no other components are opened, the patient management will be opened
6302: request for a new study	▪ first, a patient is set up locally, if he does not yet exist in the system ▪ next, he will be selected for work and: ▪ A) the worklist component has been started and a dialog for creating a new job is activated ▪ B) the component Photos and Documents is opened to import pictures, or ▪ C) the component Image Management is opened to import a patient CD for the selected patient
6311: show study data	▪ patient is also here first set up locally, if necessary, and selected ▪ subsequently the images are selected, and: ▪ A) the images of the patient are displayed in the image viewer (if there are any), or ▪ B) the component Export is opened to export or email images of the patient, or ▪ C) the component Print is opened to print images of the patient, or ▪ D) the component Patient CD is opened to create a patient CD with images of the patient

Data can be also passed back to other systems, i.e. when the study is ready. This follows also via GDT files in the set communication path.

22 Veterinary version

The system can operate as a veterinary version. Thereby the special settings will be made by your administrator and you can work with animals as patients. Thereby data of animal and its owner will be recorded, modified and displayed as your patient data.
Hereafter the parts of the program are explained, which change by doing this. Basically structure of the program stays the same.

Remark: The special settings will be made by your administrator, in order to save the values of other DICOM tags. The images, which will recorded in this way, are therefore not or only conditionally "compatible" with other systems (i.e. animal name or animal species will not be displayed correctly in another system ort his value will appear in another place in the system). However, operative performance of the systems is not endangered.
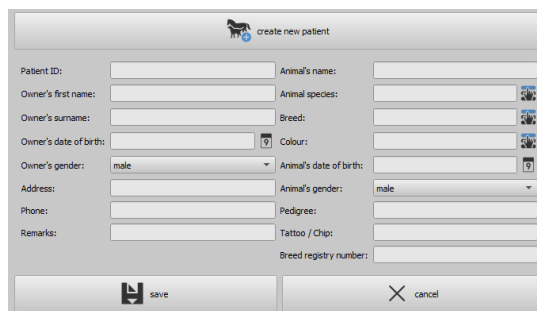
22.1 Patient management

The table of patients contains the following columns: animal name, owner's name, animal species, patient ID, owner's date of birth and data source.
The following search fields can be used, in order to search for a patient in the table: animal name, owner's name and patient ID.

For the data source "Image archive" it cannot be filtered by gender of a patient, like in a normal program version, but by animal species. Enter animal species in this input field, like you use it also for recording the animals and next use button "Query", in order to update the table of patient.

While recording or modifying the patients as well owner's data as animal data are queried. Maybe some fields are not available on your system. These have been disabled by your administrator, as they are irrelevant and the system is easier in operating.

22.2 Job management

In the table of patients of the upcoming jobs animal name (owner's name) and animal species are displayed. So, the owner's name is in the brackets behind the animal name. In the detailed view for a job the further animal data are shown.

22.3 Special measurements (Vet)

HD (Hip Dysplasia)
Measurement of Norbert angle

X-ray image: ventrodorsal view of hips (rear limbs fully stretched)

When doing this measurement, graphic objects are automatically placed in the image first. These objects are to be adjusted to the image accordingly. In order to do this, drag the circles over femoral heads first and then the lines to the corners of the acetabulum.
The angles are automatically updated and displayed in the measurement fields.
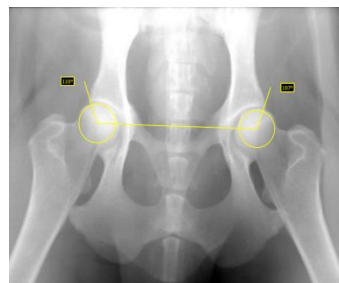

VHS (Vertebral Heart Score)
Evaluation of cardiac size

X-ray image: thorax lateral (image done at the inspiration)

Drag the line for longitudinal axis of the heart and the other line for width of the heart. Thereafter set a point on the edge of thoracic vertebra (T4) and a point on the edge of thoracic vertebra (T9).
Lengths of the heart axes are drawn in the vertebral column. The measurement results are expressed in vertebral units (VU).
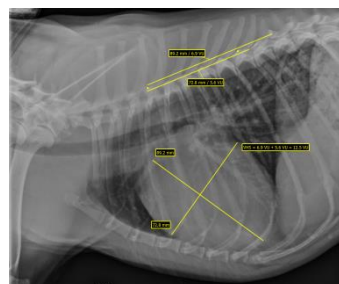

TTA (Tibial Tuberoses Advancement)
Determination of TTA distance

X-ray image: lateral image of a knee

Place by a single-click with the left mouse button a central point of the circle on the femur and then by a next click a central point of the circle on the tibia. Thereafter place a point at the patella top and a next one at the tuberositas tibiae. Finally correct the circles and points. The circles should touch each other.
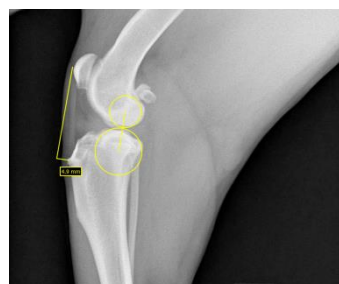
TPA (Tibial Plateau Angle)

Determination of tibial plateau angle for TPLO (Tibial Plateau Leveling Osteotomy)

X-ray image: lateral image of a knee with hock

Place one point on the cranial and one point on the caudal edge of the tibial plateau and then two points for the line through eminentia intercondylaris and a central point of the talus.


DI (distraction index) for PennHIP testing method

The distraction index is a ratio of the linear distance between the center of the femoral head and the center of the acetabulum to the radius of the femoral head.

X-ray image: hip ventrodorsal (X-ray in distraction)

Place each of circles up to the edge of the femoral head and the acetabulum. Start from each center on and drag up the circle.
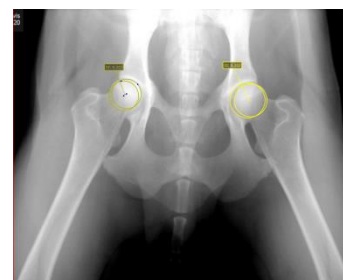
22.4 Print

For print, a standard header is accordingly adapted. Always a patient ID is shown. The remaining values depend on data fields, which are activated in configuration. If animal's gender has been activated by your administrator, this row will be output with the standard header at the printing.

22.5 Patient CD

If you have selected the option for anonymizing for creating patient CD, first the values will be exchanged like in a normal program version (see 13 Patient CD) and next as follows:
- owner's name: "AnonymOwner" or "Anonymous1", "Anonymous2" etc. if there are many patients
- owner's date of birth: 01,01,2000
- owner's gender: O (other)
- animal name: "AnonymAnimal" or "AnonymAnimal1", "AnonymAnimal2"

If the viewer is to be integrated with the patient CD, the setting for veterinary version will be forwarded to it. So, the viewer uses the same settings like the ones used in your system.

22.6 Export

For export an additional option is available that allows for exporting DICOM images in the DICOM veterinary standard (see also 11.2.2.2 Exporting as DICOM file).

22.7 Other

Information, which will be shown in so called tooltips (short info fields shown with the mouse without clicking it after a short waiting time), contain as well owner's data as animal data. These tooltips are used in the preview tree of the selected patient (left) and in the tree views for studies. The preview tree shows also animal name and owner's name in brackets.

23 Other

23.1 Tables

Many tables can be adapted. By dragging a column head the columns can be changed. By right-clicking the entry in a head row the columns can be unhidden or hidden in displayed context menu.

23.2 Tooltips

The most buttons, data or configuration fields contain so-called "tooltips". If you move the mouse over a field without clicking it, after short while a small help-window at the mouse position appears. In this way you receive the information on this field, action, which can be performed via this field or meaning of the configuration possibilities.

23.3 License

The software is protected by a license protection. Activation of the system follows by administrator. The administrator requests a license file from a manufacturer and brings it in into the system.

23.4 Exiting the program

You exit the program by pressing the symbol X in the right upper corner or by pushing Alt + F4 keys.

If your system is set to only minimize to the system tray when shut down, you have to hold one of the control keys (Shift or Ctrl) in addition to the actions described above, or right-click the icon ⊠ in the system tray in the bottom right corner and then click "Exit".

You can safely let the application run in the background and do not have to exit it before you shut down your computer.

23.5 Hardware shutdown

It is necessary for full system shutdown to disconnect devices and computer from power supply. The disconnectable power output strips may be used for this purpose.

The Windows system must be correctly shut down prior switch-off of the computer. Otherwise, system may be damaged and become useless.

Product: digipaX

Manufacturer: digipaX GmbH
                       Arno-Nitzsche-Str. 45
                       04277 Leipzig
                       Germany

This product is CE approved: CE 0494

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