



digipax

Version 2.0.3

User`s Manual

1100010101

0000001111100010101

Table of contents

1 General	7
2 Symbols and figures.....	7
3 Safety precautions.....	8
3.1 Software.....	8
3.2 Conditions for use	8
3.3 User profile	8
3.4 Hardware	8
3.5 Redundancy	8
3.6 System failures	9
3.7 Messages	9
3.8 Visual check.....	9
3.9 Data backup.....	9
3.10 Checks	9
3.11 Service life	9
4 Installation and maintenance	10
4.1 Installation.....	10
4.2 Maintenance	10
4.3 Cleaning	10
4.4 Updates	10
4.5 Safety-critical patches	10
4.6 Decommissioning	10
5 Starting the software.....	11
6 Screen layout	12
6.1 Home screen layout and split.....	12
6.1.1 Component bar.....	13
6.1.2 Bottom bar.....	13
6.2 Navigating through the program.....	15
6.2.1 Drag & drop function	15
6.2.2 Double click in Windows Explorer	15
6.2.3 Quick Navigation.....	15
7 Patient management	16
7.1 Table of patients and preview	16
7.2 Selecting patients	17
7.3 Selecting and querying data sources.....	17
7.4 Filters	18
7.4.1 Filtering by name	18
7.4.2 Filtering by date of birth	18
7.4.3 Filtering by date of study	18
7.4.4 Filtering by description of study	18
7.4.5 Filtering by patient ID	18
7.4.6 Filtering by gender.....	18
7.4.7 Filtering by modality	18

7.4.8	Filtering by transferring physician.....	19
7.4.9	Filtering by institution.....	19
7.4.10	Enabling advanced name search	19
7.5	Recording new patients / Changing patient data / Deleting patients	19
7.5.1	Recording data.....	19
7.5.2	Editing patient data (only if no images for a patient exist)	20
7.5.3	Deleting patients (only if no images for a patient exist)	20
7.6	List of studies, series and images	20
8	File browser	21
8.1	Patient CD (DICOMDIR).....	21
8.2	Single files	21
9	Viewing images / Viewer	23
9.1	Selecting images	23
9.2	Image display.....	25
9.2.1	Mouse functions	25
9.2.2	Zoom	26
9.2.3	Overlay.....	27
9.2.4	Splitting images	28
9.2.5	Projections	29
9.2.6	Other functions.....	29
9.2.7	Structured reports.....	30
9.3	Manipulation on images.....	30
9.3.1	Transformations (rotation, flip, inversion).....	31
9.3.2	Windowing	32
9.3.3	Filters.....	33
9.3.4	Annotations / measurements.....	37
9.3.5	Display Shutter.....	40
9.3.6	Cine loop	41
9.3.7	Hanging Protocols.....	42
9.3.8	Quick Tools.....	43
9.4	Scout lines	44
9.5	Histogram.....	44
10	Photos and documents.....	46
10.1	General	46
10.2	Import dialog	46
10.3	Scanning documents	48
11	Export	50
11.1	Selection	50
11.2	Settings.....	51
11.2.1	Filename for exporting images	51
11.2.2	Format for exporting images	51
11.2.3	Exporting as file.....	52
11.2.4	Exporting as an email	52
12	Print	54
13	Patient CD.....	56

13.1 General	56
13.2 Drives / data storage media.....	56
13.3 Options.....	57
13.4 Burning/copying data	58
13.5 Creating patient CD using Disc Producer	59
13.5.1 EPSON PP-100 / PP-100N.....	59
13.5.2 PRIMERA Disc Publisher.....	60
13.6 Feature “Special“	61
14 Label print.....	62
14.1 General	62
14.2 Printers and media.....	62
14.3 Template selection and printing	62
14.4 Printer settings	64
14.5 Creating template	65
14.5.1 Inserting, editing and deleting elements	65
14.5.2 Editing text fields.....	67
14.6 Editing, duplicating and deleting templates	68
14.7 Requirements for information on data media.....	68
15 Job management	69
15.1 Pregnancy status.....	69
15.2 Creating job.....	70
15.3 Managing table of organs and Procedure Codes	71
15.4 Presentation of the job and refreshing job list	73
15.5 Filtering job list	73
15.6 Deleting job	73
15.7 Adding job for a patient.....	74
15.8 Entry in X-ray journal.....	74
16 Stitching.....	75
16.1 General	75
16.2 Acquisition of radiographs.....	75
16.3 Stitching module overview	76
16.4 Automatic stitching.....	77
16.5 Manual stitching	77
16.6 Saving panoramic image	77
17 X-ray journal.....	78
17.1 Viewing X-ray journal	78
17.1.1 Functions	78
17.1.2 Filtering	79
18 Image management	80
18.1 Deleting images	80
18.2 Changing image data	80
18.3 Importing images	81
19 Configuration.....	82
19.1 User section	82
19.2 Admin section.....	88

19.3 Log section	88
20 GDT interface	89
21 Veterinary version	90
21.1 Patient management	90
21.2 Job management	90
21.3 Special measurements (Vet)	91
21.4 Print	93
21.5 Patient CD	93
21.6 Export	93
21.7 Others	93
22 Others	94
22.1 Tables	94
22.2 Tooltips	94
22.3 License	94
22.4 Exiting the program	94
22.5 Hardware shutdown	94



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.

3.4 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). Furthermore, 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.

3.5 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.

3.6 System failures

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

3.7 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).

3.8 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 staff. The instructions into the procedure follow by the system administrator/attendant.

3.9 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 (10 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.

3.10 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).

3.11 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 Safety-critical patches

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

4.6 Decommissioning


For information how to exit the software and shut down the system please refer to chapters 22.4 and 22.5.

The software can be completely uninstalled by your system administrator. After the software is successfully uninstalled, it can no longer be used.

5 Starting the 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 ) 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.

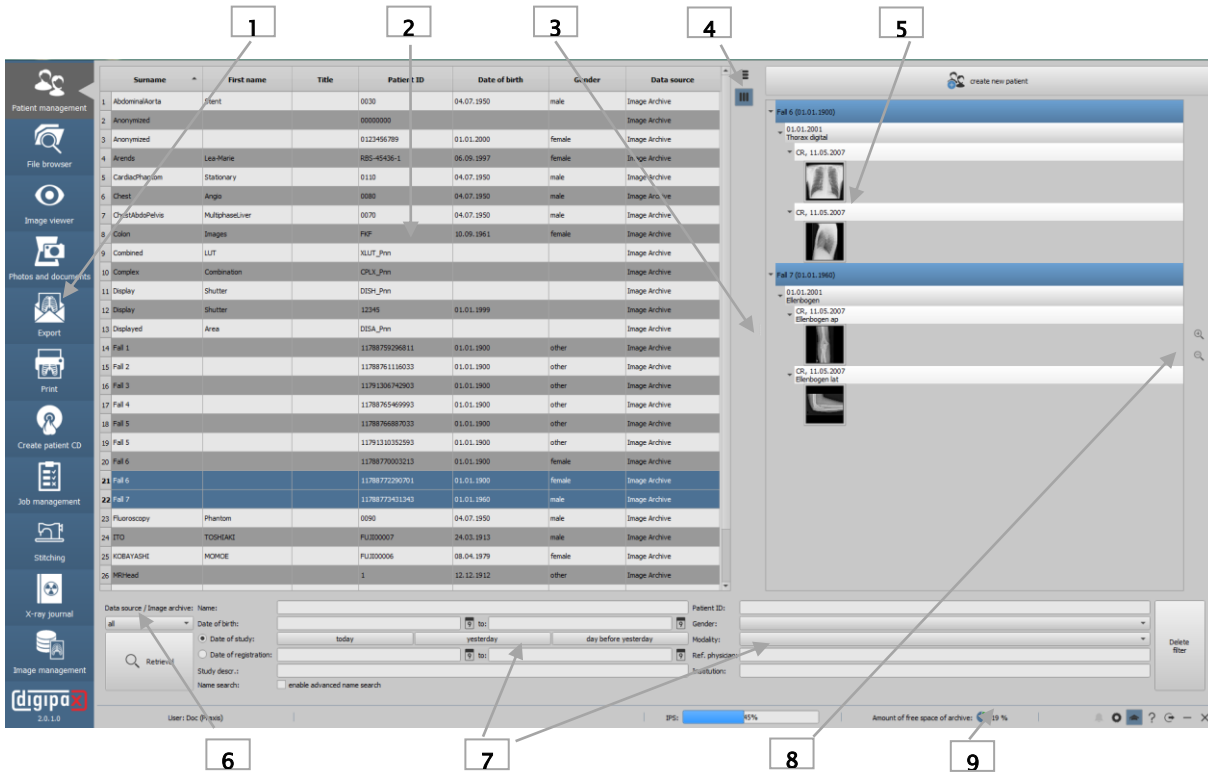
If the program has already been started automatically along with Windows and automatic login, it is minimized to system tray in the bottom right-hand corner.

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 search for a specific 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 symbol in the footer (see chapter 6.1.2). When the symbol 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 (symbol red), the system tries to re-establish the connection every 5 minutes. By clicking on 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 greyed out, there are no messages. As soon as a message arrives, the colour of the icon changes. 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 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.

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 Navigating 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, perform the same action with the right-click on 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 empty the compilation.

-  3 patients are selected in the component
-  Empty 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.



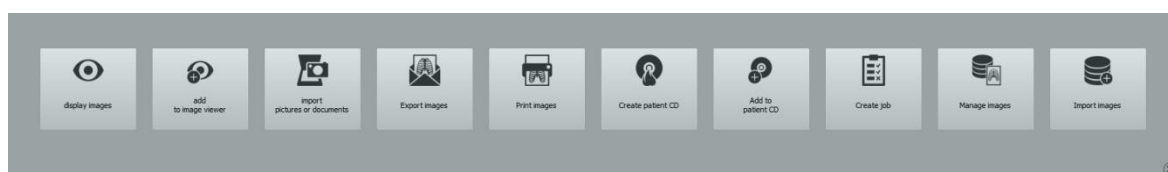
Images with the "dcm" extension can also be dragged and dropped from the Windows Explorer to the image viewer. Open the image viewer and drag the desired files onto the window.

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.

6.2.3 Quick Navigation

Instead of drag & drop you can alternatively click the object (patient/examination/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.

	Surname	First name	Title	Patient ID	Date of birth	Gender	Data source
1	AbdominalAorta	Stent		0030	04.07.1950	male	Image Archive
2	Anonymized			00000000			Image Archive
3	Anonymized			0123456789	01.01.2000	female	Image Archive
4	Arends	Lea-Marie		885-45436-1	06.09.1997	female	Image Archive
5	CardioPhantom	Stationary		0110	04.07.1950	male	Image Archive
6	Chest	Ango		0080	04.07.1950	male	Image Archive
7	ChestAbdominis	Multiphaseliver		0070	04.07.1950	male	Image Archive
8	Colon	Images	FKF	10.09.1961		female	Image Archive
9	Combined	LUT	XLUT_Pfn				Image Archive
10	Complex	Combination	CPX_Pfn				Image Archive
11	Display	Shutter	DDH_Pfn				Image Archive
12	Display	Shutter	12345		01.01.1999		Image Archive
13	Deployed	Area	DSEA_Pfn				Image Archive
14	Fall 1			11788791296811	01.01.1900	other	Image Archive
15	Fall 2			11788761156033	01.01.1900	other	Image Archive
16	Fall 3			11791306742903	01.01.1900	other	Image Archive
17	Fall 4			11788765469993	01.01.1900	other	Image Archive
18	Fall 5			11789766887033	01.01.1900	other	Image Archive
19	Fall 5			1179130332993	01.01.1900	other	Image Archive
20	Fall 6			11788770003213	01.01.1900	female	Image Archive
21	Fall 6			11788772267011	01.01.1900	female	Image Archive
22	Fall 7			11788772431243	01.01.1960	male	Image Archive
23	Fluoroscopy	Phantom		0090	04.07.1950	male	Image Archive
24	ITO	TOSHIGAKI		FUJ00007	24.03.1913	male	Image Archive
25	KOBAYASHI	MOHOE		FUJ00006	08.04.1979	female	Image Archive
26	MRHead			1	12.12.1912	other	Image Archive

- 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 remarks 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 subitems 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 are 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 19 Configuration section Others).

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 freely. 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, are 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 corresponding 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 18.2.

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 the 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 18.1.

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 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.

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 18.3.

8.2 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. 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 displayed at the top of the bar for orientation. Click the 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 *.zip" as filter to exclude possible attempt of importing programs or ZIP 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 the 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
-  Empty 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 on the mouse and use the tool Quick Navigation (see chapter 6.2.3).

You can empty the list of patients by clicking the button “Empty 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.



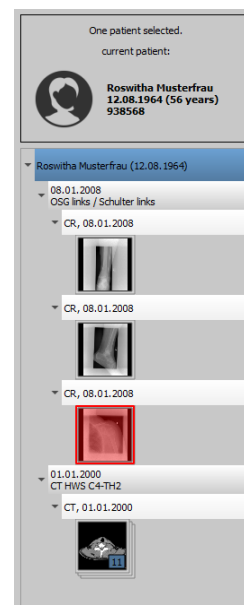
There is an indication shown on the top edge of the images compressed with lossy data compression. Those images are unusable for diagnosis as possibly important information on the image could get lost due to compression.

Changes made to greyscale images are stored in the so-called Presentation State. This means that rotations, flips, 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 image 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. Window split is to be defined in the Configuration (see 19).

The selection of the patients can be reset (emptied) 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

In this toolbar the action for the left mouse button can be selected:

- **Moving (if display size is larger than image window) – this is a default setting**
- **Windowing (brightness/contrast)**
 - ➔ horizontal mouse move: changing window center (brightness)
 - ➔ vertical mouse move: changing window width (contrast)

In the Configuration (category Others) 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)

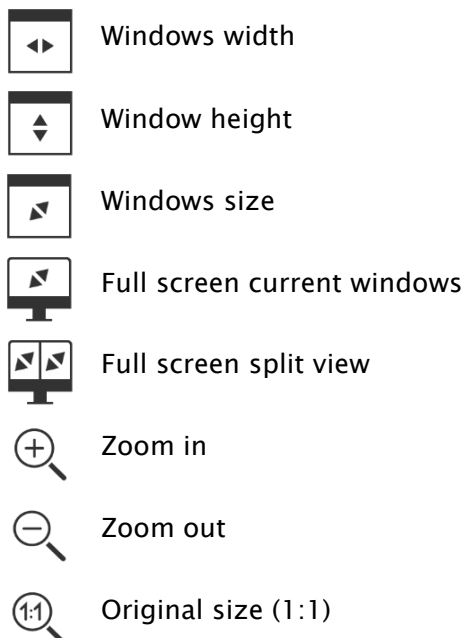
The function can be impacted by the following combinations of keys:

- 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



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 the 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 the 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 exited 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, with which the area can be unhidden or hidden.

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.

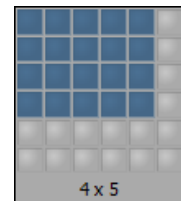
9.2.4 Splitting images

-  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.

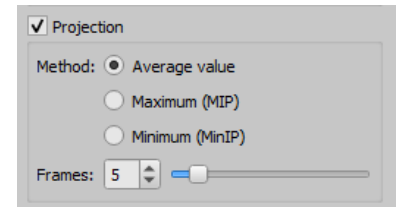
The button “Automatic image grid” can be used to arrange single images of the series automatically arranged into the current slicing. The button “Reset window split” restores the main window.



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

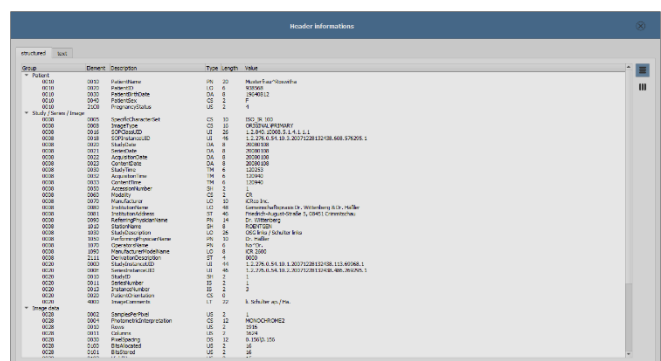
By using the button for clipboard the current image in the current presentation form can be copied to clipboard. This means that the overlay objects (information on image, annotations and measurements as well as display shutter) will be copied in the image too, provided that they are unhidden. If clicking 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 on 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

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.



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.

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 greyscale 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 flipped 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:



Flip horizontally



Flip vertically

Invert:



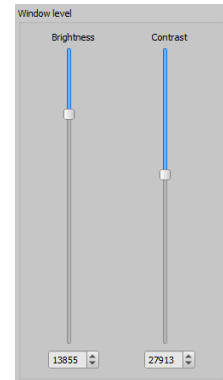
Invert

9.3.2 Windowing

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

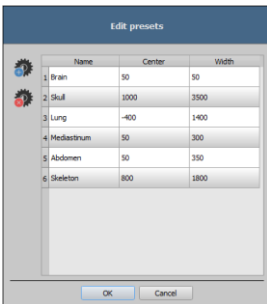


The greyscale range to be displayed is selected by specifying window center (brightness) and window width (contrast). These values are adjustable each time by using the sliders or input fields.



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 that 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 one 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.

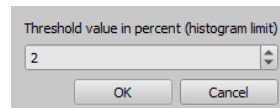


Click on the button while holding Shift key to define the threshold value for this button.



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 on 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 on 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 on 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 grey levels contained in the image is being displayed.

9.3.3 Filters

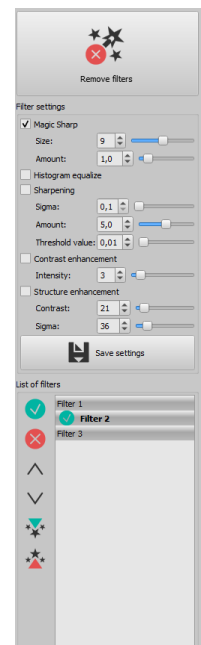
The license module must be enabled to be able to use the filters.

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-click on this icon and with another mouse click again activated. In this way, you can compare images with and without the filter. Double-click on 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 greyscale 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

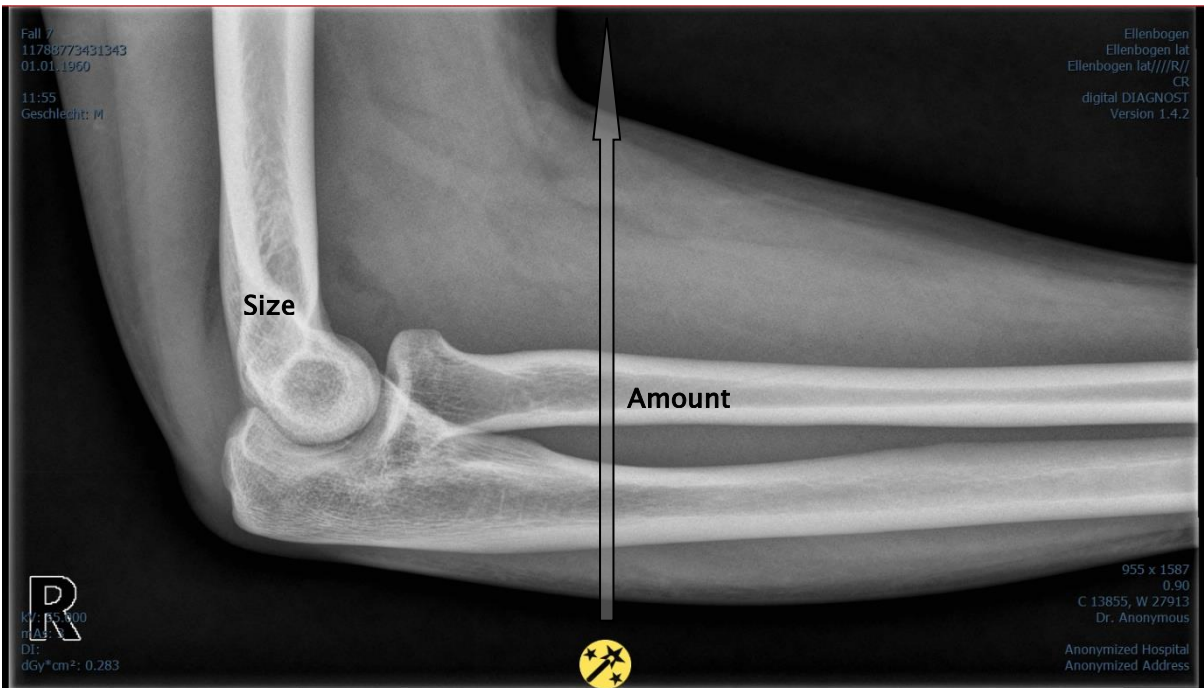
set in a range from 0.1 to 10. Values smaller than 1 lead to unsharpness, values larger than 1 increase the contrast. If the value is equal 1, the resulting image is identical as the original image.


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 grey levels of the areas of interest will be extended to greyscale and the less frequently used grey 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 the 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 emphasized 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 functionality.

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

With the list of filters, various filter settings may be stored and re-used easily. In order to save filter settings, click “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.

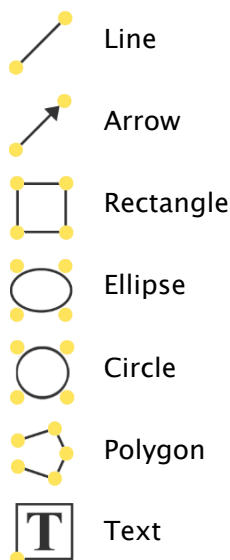
However, misalignments may be also caused by an exposure – particularly if conventional radiography (CR, DX) e.g. of pelvis or ilium is considered. The distance of the exposed part of the body from the imaging plate / detector skews the presentation of length on a 2D radiograph. Also, if a scale (sphere) 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.

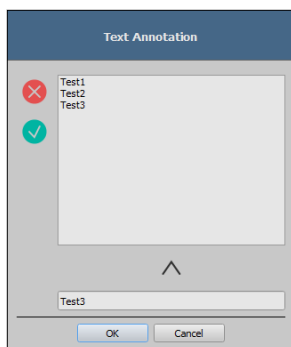
If details for pixel size in the images are not specified then the measurement results follow in pixels.



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.



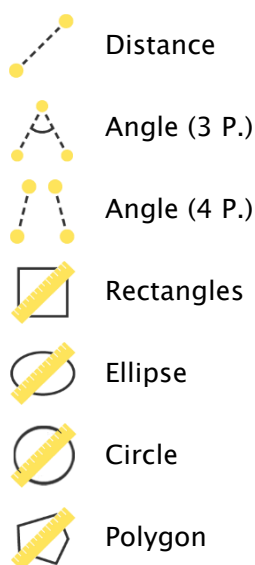


After the text is selected, first a dialog appears, in which new texts can be added to the list of standard texts (enter text in the input field and then press the arrow symbol), or the text from this list can be selected (double-click or click and Ok), or the desired text can be entered (enter text in the input field and press Ok), which will be then used and placed on the image. You can determine your own standard entry, which is then already activated after you open 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.



When measuring rectangle, ellipse, circle or polygon, the area and densities are measured as well. The actual average grey level out of original pixel values as well as minimum and maximum grey 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 with one click the 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 21.3).

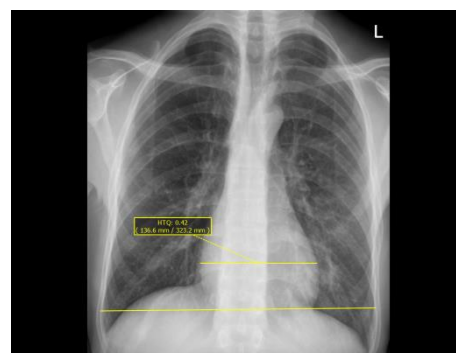
When you click the button for a measurement a routine for this measurement will be activated. A short instruction for steps to be performed is shown at the bottom edge of the image. First you must perform all the steps as described until all points and lines for the measurement given are set. Thereafter 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.

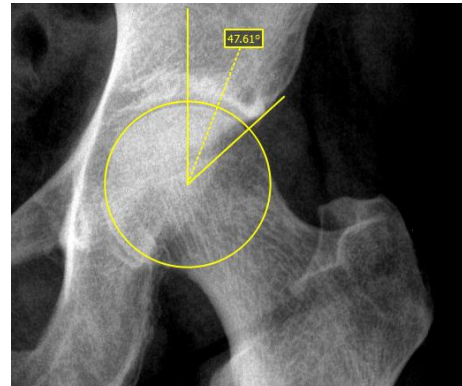


CE measurement (central–edge angle of Wiberg)

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.

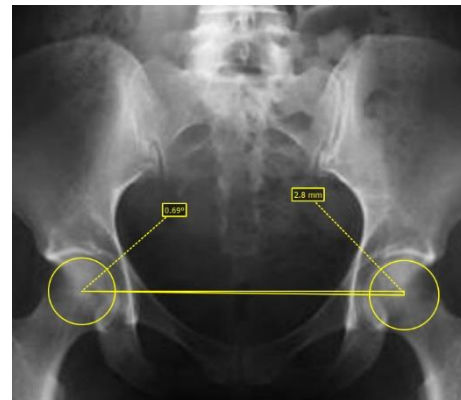


Pelvic obliquity measurement

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).

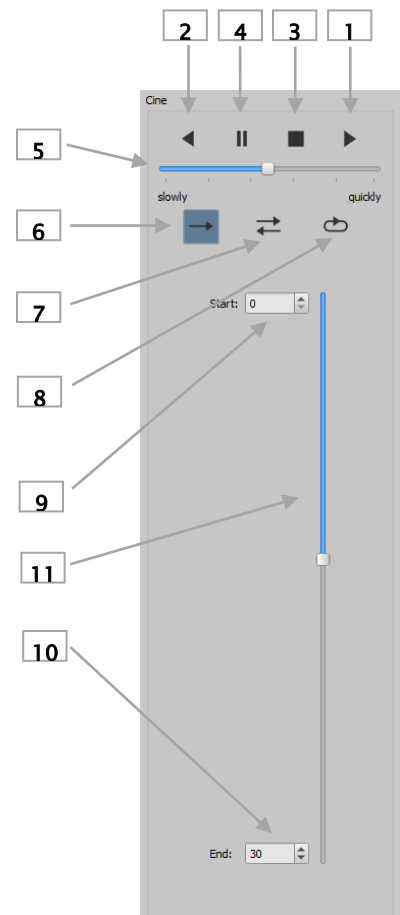
The objects can be individually deleted again.

9.3.6 Cine loop



With this function, the image series can be played automatically. Dabei stehen verschiedene Steuerungsfunktionen wie z.B. Abspielrichtung oder Geschwindigkeit zur Verfügung. 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.

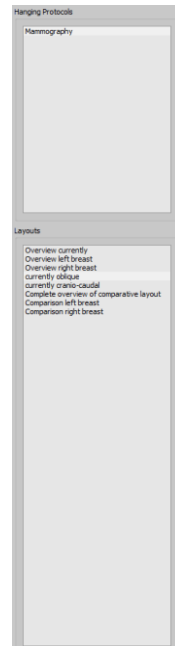
Hanging Protocols are a means of defining how specific types of images should be displayed according to predefined split on one or multiple monitors. A classic example of this is presentation of mammographic images. There are also various layouts, i.e. images of the most recent or the last study, or 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 19), 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 19), Hanging Protocols can also be activated for these monitors. Layout is then automatically distributed to the active monitors.



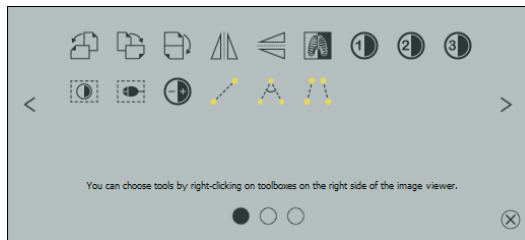
When using Hanging Protocols, only the types of images are presented for which the protocol with the layout is defined. If there are existing other images for the patient in question, they need to be opened manually via preview tree. Dies können z.B. Bilder mit einem anderen Strahlengang oder einer anderen Modalität (CR, US) sein. 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.

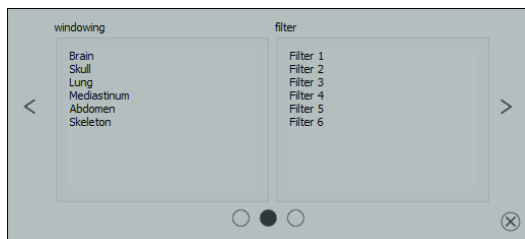
9.3.8.1 Tab page Quick access to tools

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.

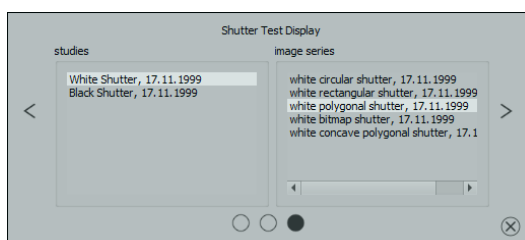
9.3.8.2 Tab page Windowing and filter

In the chapters 9.3.2 Windowing and 9.3.3.7 List of filters 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 Deliberate image retrieval

On the third tab page you can deliberately retrieve 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.



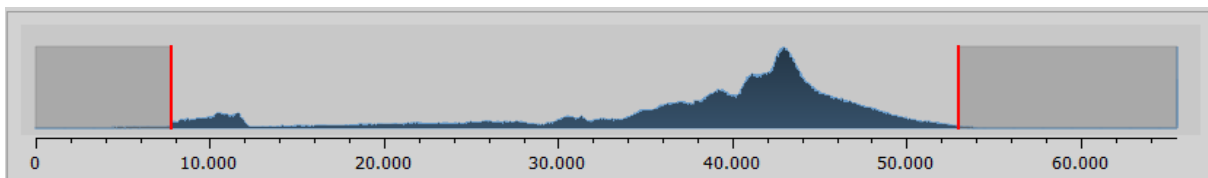
In presentation as projection lines, they do not provide information on angle under which two layers are crossing. These lines do not indicate if two layers are perpendicular or inclined to themselves. Therefore, you can not draw conclusions to mutual position of two layers on the base of projection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

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 "Page up" and "Page down" buttons. 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 19 Configuration.

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 multi frame 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 greyscale images, a blue curve (like presented on the image above) for spreading of greyscale values is displayed.

In the histogram for the greyscale 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 19. 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 greyscale 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

The screenshot displays the software's import dialog. On the left, a document titled "GUIDANCE ON INTERPRETING TEST RESULTS" is previewed. The document contains a table with columns for "RESULT", "INTERPRETATION", and "RECOMMENDED ACTION". The table is divided into sections for "VIRAL TESTING", "ANTIBODY TESTING", and "BOTH".




RESULT	INTERPRETATION	RECOMMENDED ACTION
VIRAL TESTING (Looking for recent infection)	Positive Most likely you DO have an active COVID-19 infection and can give the virus to others.	Stay home and follow COVID-19 guidance on when to look if you are sick. If you are a healthcare worker or critical infrastructure worker, notify your work if your test result is positive. If you have symptoms, you should keep monitoring symptoms and seek medical advice about staying home and if you need to get tested again.
Antibody Testing (Looking for past infection with the virus)	Positive You likely have had a COVID-19 infection.	If you have symptoms, you should get tested again only if your medical provider confirms another infection. You may have had the infection (have immunity), but this cannot be said with certainty. Scenarios can include they may have been previously infected. Take steps to protect yourself and others.
Antibody Testing (Looking for past infection with the virus)	Negative You likely have never had a past infection with COVID-19.	You should get COVID-19 testing again only if you are sick.
BOTH (Looking for recent and past infection)	All of Positive, Antibody Positive Most likely you DO have an active COVID-19 infection and can give the virus to others.	Stay home and follow COVID-19 guidance on when to look if you are sick. If you are a healthcare worker or critical infrastructure worker, notify your work of your test result.
	All of Positive, Antibody Negative Most likely you DO have an active COVID-19 infection and can give the virus to others.	Stay home and follow COVID-19 guidance on when to look if you are sick. If you are a healthcare worker or critical infrastructure worker, notify your work of your test result.
	Most of Positive, Antibody Positive You likely have had and RECOVERED FROM a COVID-19 infection.	You may have had the infection (have immunity), but this cannot be said with certainty. Scenarios can include they may have been previously infected. You should get tested again only if your medical provider and/or symptoms tell you to. Take steps to protect yourself and others.
	Most of Positive, Antibody Negative You likely have had and RECOVERED FROM a COVID-19 infection.	You should get COVID-19 testing again only if your medical provider and/or symptoms tell you to. Take steps to protect yourself and others.

On the right side of the interface, patient information is displayed, including a patient ID and name. Below this, there are fields for "study" (add to existing study, set up a new study), "modality" (Other (OT), another modality), "node" (all images into one series, each image in its own series), "date" (28.08.2020), "time" (14:27), "referring physician", and "performing physician". There are also checkboxes for "grayscale images" and "compress the images (JPEG lossless)".








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

The 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 the 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 emptied again 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
-  Flip horizontally
-  Flip 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, please highlight the option “Add to existing” and select the required study from the drop-down list box. For the latter Option, please 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 “Others” 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 greyscale 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.

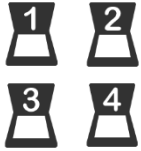
10.3 Scanning documents

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 several TWAIN units are 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 clicking the 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.

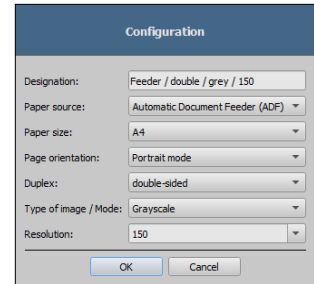


Auto Scan buttons 1 to 4

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.



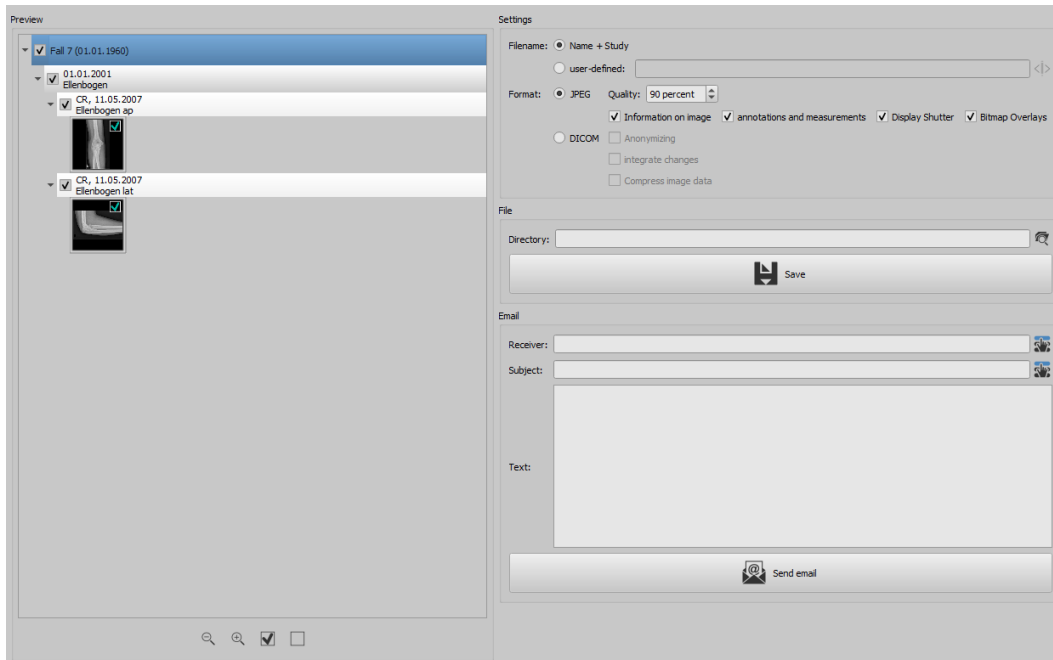
After you have imported all images, you can use the button "Image viewer" in the top right corner to switch directly to the viewer and view the documents.



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

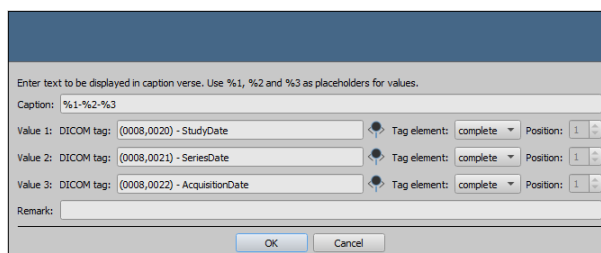
11.2.1 Filename for exporting images

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, please select “User-defined”. With the 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.



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 multi frame 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

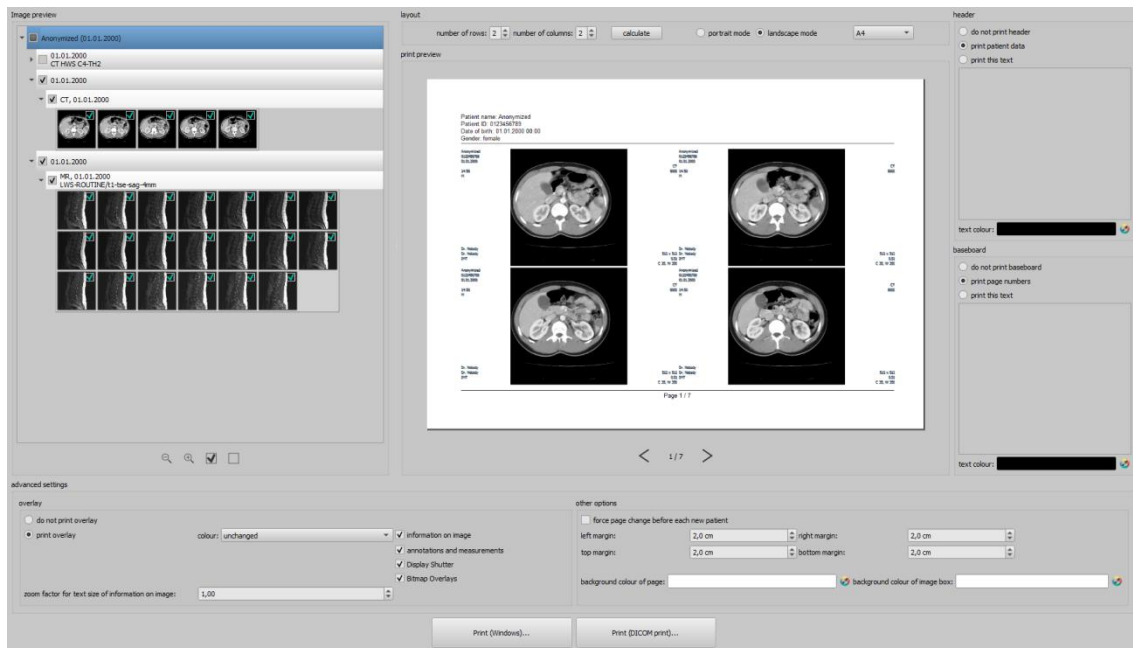
The email program opens and the data is applied automatically. The corresponding images are attached to the message. You can also specify the data for receiver, subject and text yet in your email program and e.g. use the address book and text formatting of your email program. If all data and information 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: moving 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 presented 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 the 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 the 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 the button "Cancel". After the print job is finished, an adequate message appears.

13 Patient CD

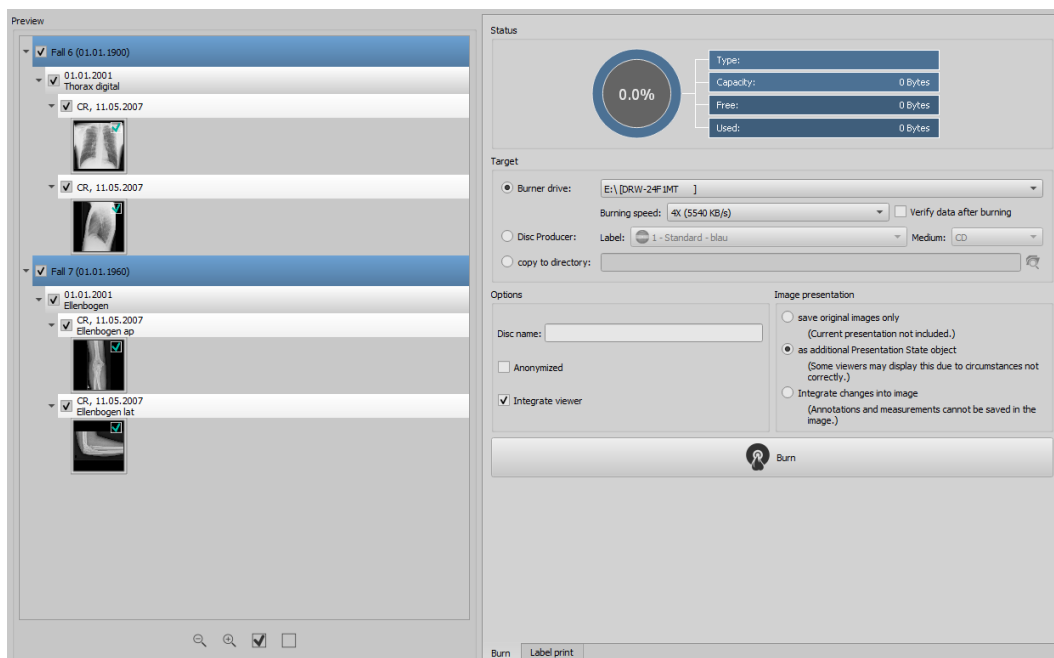
13.1 General

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 the “Burn” button, 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 re-deleted 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 the “Burn” button, 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 priority 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 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 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 instance, to remove the older viewer versions. The files required are re-transferred upon the next use.

The DICOM files for burning orders are re-deleted 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 administrator. 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 the "Patient CD" button and select the "Label print" tab.

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 the "Label print" tab as an available feature for printed media.

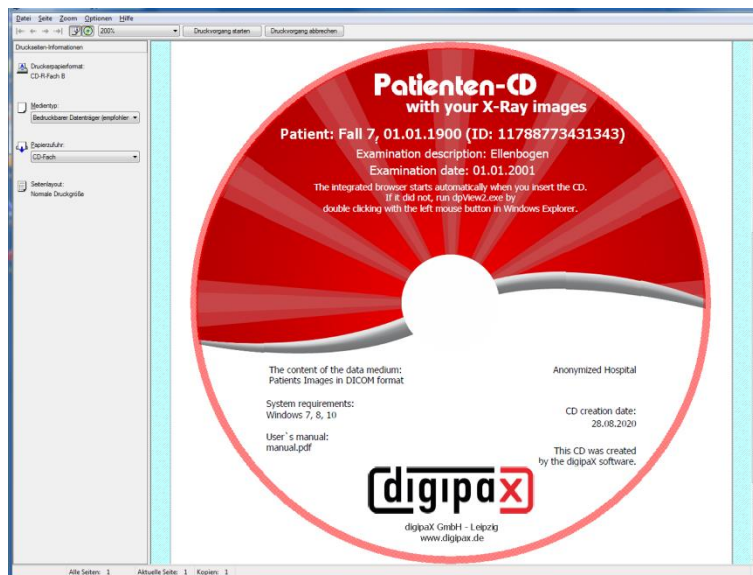
By clicking with the mouse the left and right side of the thumbnails, you can browse different templates. They are sorted alphabetically. Names are displayed at the bottom.



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.



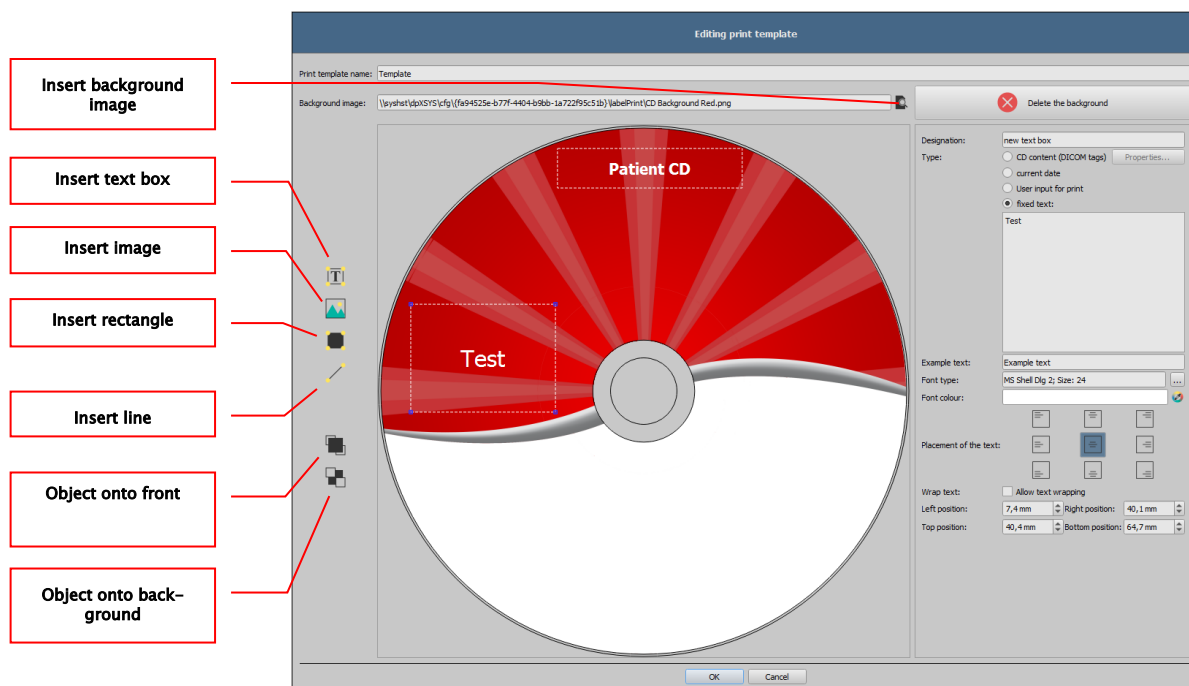
Sample values:

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

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.

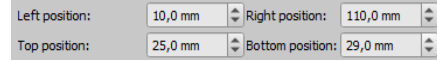
To create your own background images you can use the template Photoshop CD–Template.psd from the "Label print" folder in the digipaX system directory.

Press the “Find file” button and navigate to the desired image. The selected background image will be automatically inserted into the template.

Press the “Remove background” button and you can delete the image. The background is then back to white.

Insert a text field:

Click the “Insert text box” button. 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 millimeter accuracy using the properties page.



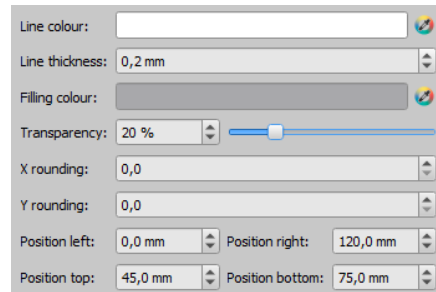
Insert image:

As with the background, you can insert any image. Click the “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.

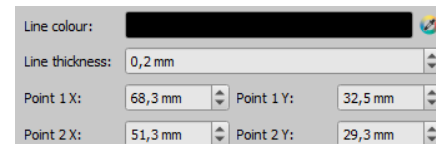
Using editing elements, you can change the properties of the rectangle. There, you can customize the colour and thickness of the border, fill colour, opacity and round corners. The position and size can be customized with millimeter accuracy.



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 accuracy.



Delete elements:

Click the element you wish to delete and click the “Delete” button 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
- the 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:

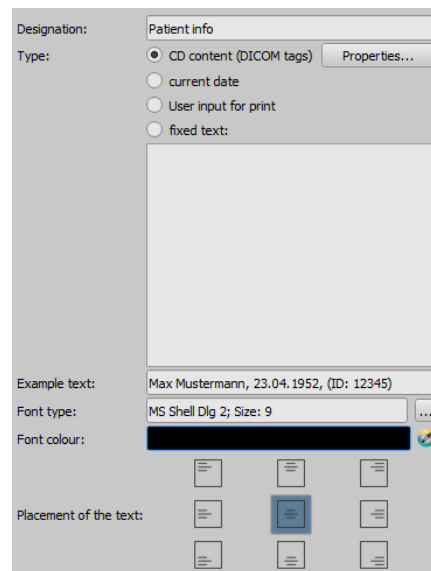
- adjusting type, colour and size of font

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



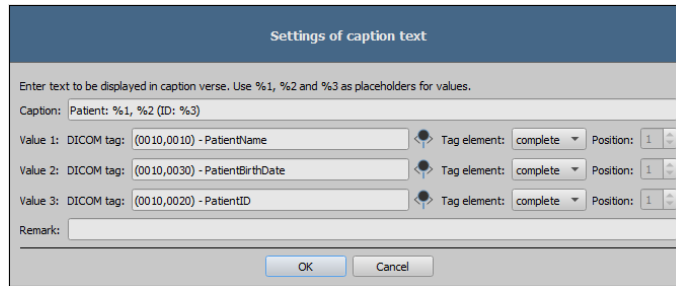
14.5.2.2 Guidelines and properties of the CD contents (DICOM tags) in the text box



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.

The “Duplicate” button 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



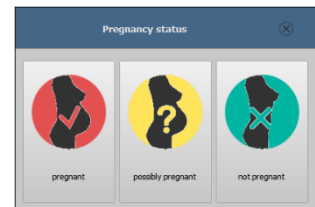
REMEMBER!

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.

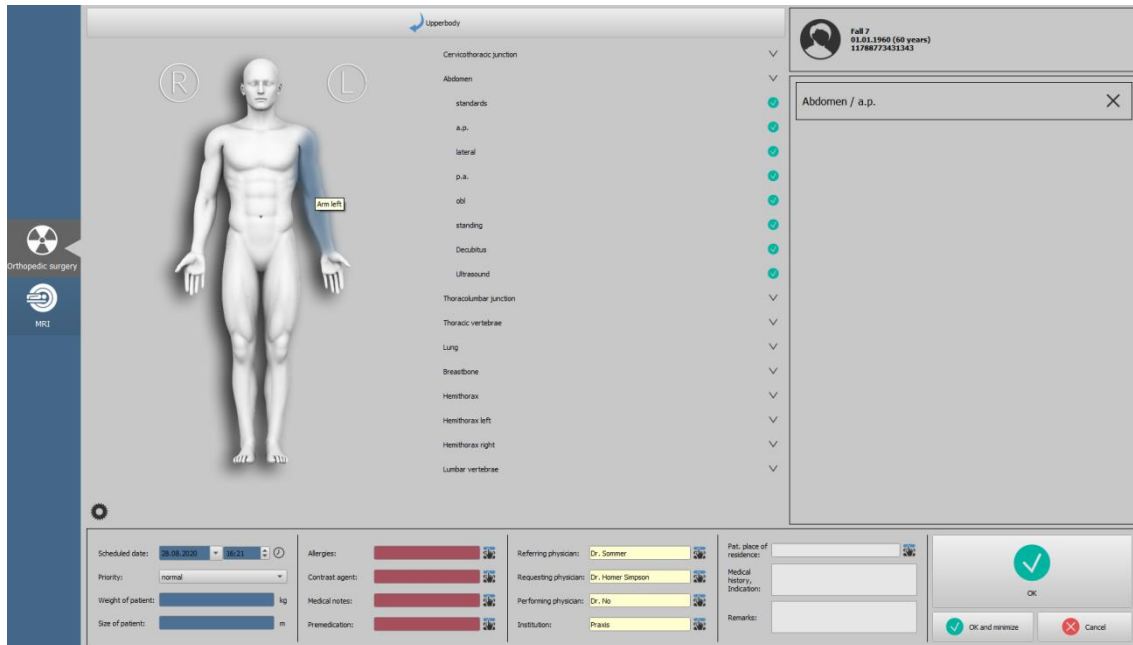
15.1 Pregnancy status

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").



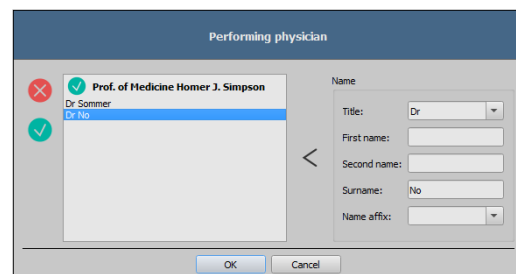
On the right side of the tab page you can see the list of selected jobs. Patient data is displayed above it.

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 central part of the tab page. There you can select the desired beam projection by 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.

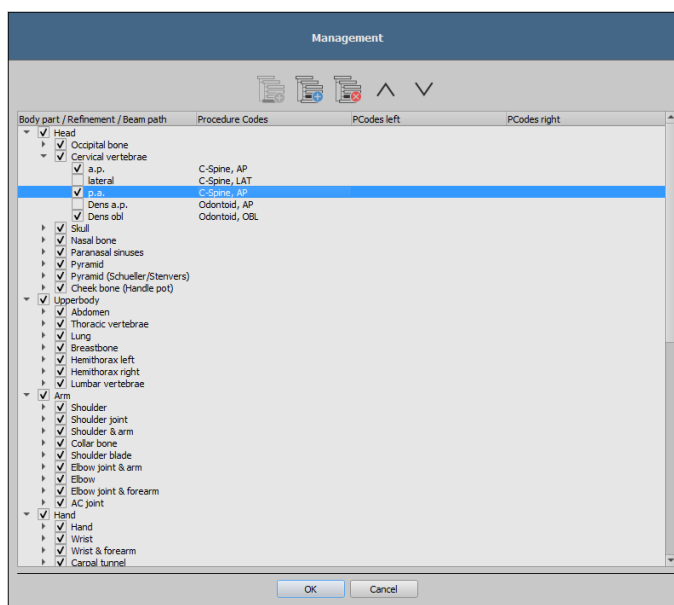
When the dialog for creating the job is confirmed with “OK“, the job is transferred to the set worklist server. If more worklist servers are configured, the desired one is to define in the selection dialog. After the job is created, the program can be minimized to taskbar or system tray by clicking “OK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

15.3 Managing table of organs and Procedure Codes

Use the 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 the 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 the 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.

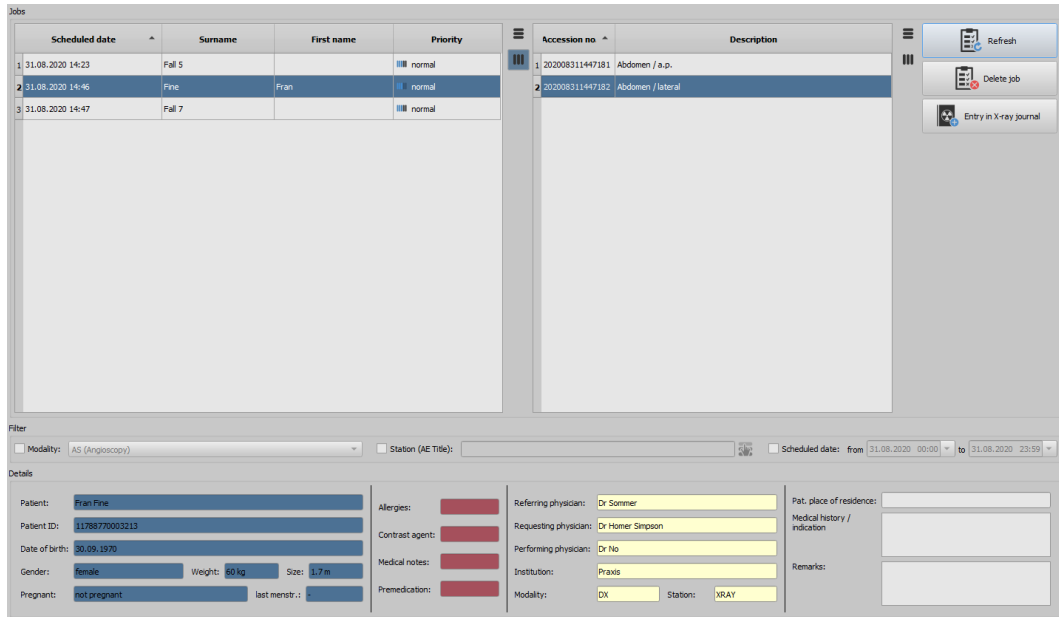
The entries can be sorted by using the buttons with the arrows.

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. 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.

15.4 Presentation of the job and refreshing job list



The screenshot displays the digipaX interface. On the left, a table lists jobs with columns for Scheduled date, Surname, First name, and Priority. The right side shows a detailed view of a selected job, including Accession no. and Description. Below the job list, there is a filter section with options for Modality (AS (Angioscopy)), Station (AE Title), and Scheduled date. At the bottom, a 'Details' section provides patient information such as Patient name (Fran Fine), Patient ID, Date of birth, Gender, Weight, Size, and various medical notes and physician information.

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 are set up, the table contains an additional column in which the respective list is displayed.

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

By using the 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 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 the button “Delete job“ without a confirmation message.

Furthermore, the jobs can be automatically deleted after a certain period of time is run out. Deleting 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. To do so, first mark the job in the list and then click the 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 X-ray journal.

16 Stitching

16.1 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.

16.2 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.



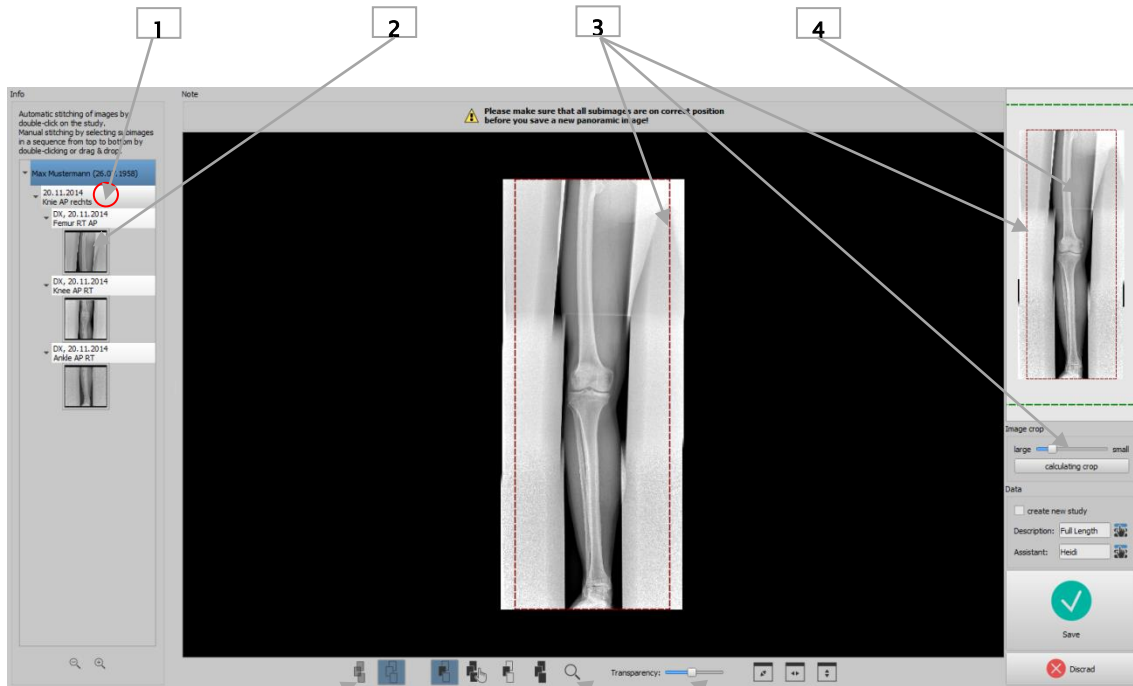
Radiographic markers (lead balls) or rulers can also be used as reference to combine the panoramic image.

16.3 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 fields
- 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

16.4 Automatic stitching

Double-clicking a study node will start automatic stitching. The software then tries to automatically merge subimages, based on gray 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 16.5. When all images are correctly positioned follow section 16.6.

16.5 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. When all subimages are on correct positions follow section "Saving panoramic image".

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

16.6 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.



17 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.

17.1 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.

17.1.1 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 the 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. Select the row to edit the required entry and then click saving button.



Delete entries – Deleting one, several, or all entries

Select the row or rows and then click deletion button.

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, the entries will be saved, which also be displayed in the table.

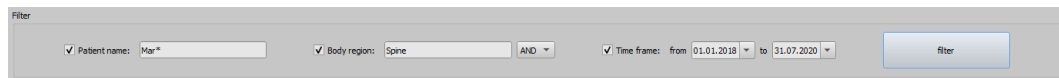
On demand, you can open immediately the exported file with the standard software provided (i.e. Excel) and process further or print out.



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.

17.1.2 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.

17.1.2.1 Patient name

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

17.1.2.2 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).

17.1.2.3 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.

18 Image management

In this tab page you can manage DICOM images from different sources. This includes the functions "Change image data" and "Delete images from archives". For both functions, "Edit" and "Delete" module must be enabled for the user by the administrator in the license management. The user must also have a login password.

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

The individual 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.

18.1 Deleting images

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 on the wide "Delete" button. Now, enter your username (login name) and your login password, and click on 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 on 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.

18.2 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 the images to be changed. Current patients are displayed in grey in the table under "Stored data". You have three options to enter new data:

1. Enter all new data manually in the table under target data.

2. Use the search for target data in all available image archives. To do this, enter at least the first three letters of the patient's surname in the search box or use the filter function as described in chapter 7.4.1.

3. Search for the target data in the last 10 GDT files. GDT files are files that are automatically generated in the background when you open digipaX from your practice management program, e.g. when creating a job or when you want to view images of a patient. The patient data is transferred 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.

If all data is correct, enter your name (name of the performing person) and reason for data change. Then click on the "Change patient data" button. Now, enter your username (login name) and your login password, and click on 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 on OK.

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.

18.3 Importing images

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

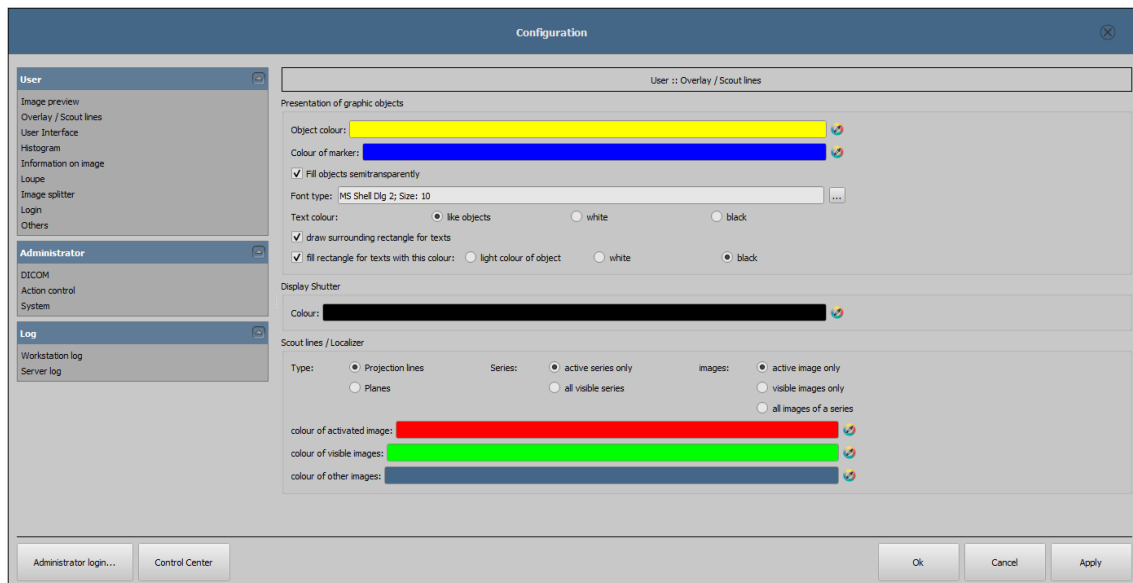
Tick the checkboxes of the images to be imported. Current patients are displayed in grey in the table under "Stored data". You have three options to adjust data before importing:

1. Enter all new data manually in the table under target data.
2. Use the search for target data in all available image archives. To do this, enter at least the first three letters of the patient's surname in the search box or use the filter function as described in chapter 7.4.1.
3. Search for the target data in the last 10 GDT files. GDT files are files that are automatically generated in the background when you open digipaX from your practice management program, e.g. when creating a job or when you want to view images of a patient. The patient data is transferred 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.

If all data is correct, enter the name, your login password and reason for the data change. Then click the button "Import images".

19 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:

19.1 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: 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:
 - *Object colour*: colour for drawing graphic objects
 - *Marker colour*: colour of markers (corner and end points, central points etc.) for editing the objects
 - *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
 - *Font type*: font type, which is to be used for text objects
 - *Text colour*: with the above selected colour, white or black
 - *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
 - *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:
 - *Colour*: colour with which the hidden areas are to be overlaid
- Scout lines / Localizer:
 - *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.
 - *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.
 - *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.
 - *Colour*: colour in which the active image and colour in which the other images are displayed.

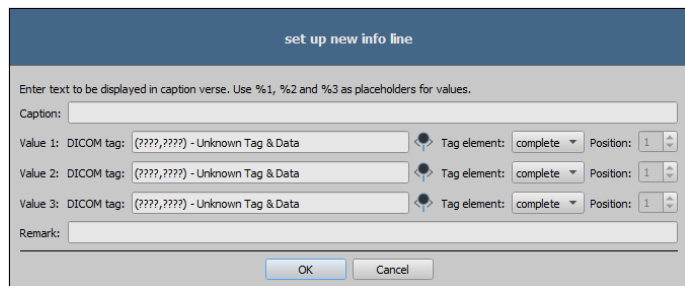
- **User interface**

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
 - If more than one monitor are active, they can be here enabled or disabled

- Only one monitor can be defined as work monitor, other monitors may be only used to display the image viewer with preview and tools
- 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)
- Display arrangement can be adapted to physical arrangement of the workplace by means of buttons between the monitors
- Design:
 - *Black Style*: for dark program presentation
 - *Classic Style*: for bright program presentation
- Toolbox height (window placing):
 - *automatic*: toolbox height according to screen format
 - *short toolbox*: for portrait format monitors and correspondingly wider bottom work bar (histogram)
 - *long toolbox*: for landscape format monitors and correspondingly longer toolbox at the right edge of the screen
- Font:
 - *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:
 - *automatic*: symbol size according to screen resolution
 - *manually*: symbol size of program buttons in pixels
- **Histogram**
 - Shorten margins:
 - *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:
 - *Sooth histogram for display*: smoothes 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:
 - *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:
 - *Text colour*: colour with which the information in the image corners are to be shown
 - *Font type*: font type for presentation

- *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:
 - 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:
 - *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
 - *Rectangle*: usage of a rectangle loupe in the viewer with the specified pixel measures or automatic size
 - *Circle*: usage of a circle loupe in the viewer with the specified diameter or automatic size
 - Zoom:
 - *Zoom factor*: zoom factor for the image cutout, which is presented in the loupe (referring to original image)

 - **Image split**
 - Enabling:
 - 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:
 - *Select modality*: for each modality an individual setting can be selected
 - *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):
 - *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 pres-tudy
 - *Font type*: setting for the description fields of images
 - *Description*: when ticked the description of the appropriate images or images list is additionally displayed

 - **Login**
 - Automatic login:
 - 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

 - **Others**
 - Mouse function windowing:
-

- *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:
 - minimum and maximum values for MagicSharp filter can be limited (in this ways, strong tile effects can be avoided)
 - min. size = 2 to max. size = 16
 - min. amount = 1,00 to max. amount = 10,00
 - contrast enhancement can be activated automatically with the amount defined here using the mouse function
- Scroll mode images:
 - 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:
 - 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:
 - use this option to set whether the measurement values to be used are in "mm/mm²", or "cm/cm²"
- Patient management:
 - *maximum number of match result*: setting of the maximum number 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

19.2 Admin section

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

19.3 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.

20 GDT interface

GDT identification:

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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ first, a patient is set up locally, if he does not yet exist in the system ▪ next, he will be selected for work and: <ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ patient is also here first set up locally, if necessary, and selected ▪ subsequently the images are selected, and: <ul style="list-style-type: none"> ▪ 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.

21 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 be 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 or its value will appear in another place in the system). However, operative performance of the systems is not endangered.

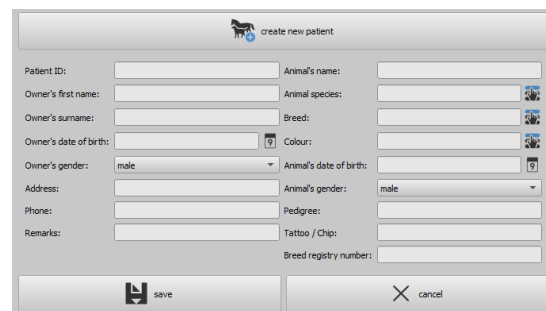
21.1 Patient management

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 the 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.



The screenshot shows a 'create new patient' dialog box with the following fields:

- Patient ID: [text box]
- Animal's name: [text box]
- Owner's first name: [text box]
- Animal species: [dropdown menu]
- Owner's surname: [text box]
- Breed: [text box]
- Owner's date of birth: [date picker]
- Colour: [text box]
- Owner's gender: [dropdown menu, set to 'male']
- Animal's date of birth: [date picker]
- Address: [text box]
- Animal's gender: [dropdown menu, set to 'male']
- Phone: [text box]
- Pedigree: [text box]
- Remarks: [text box]
- Tattoo / Chip: [text box]
- Breed registry number: [text box]

Buttons: [save] [cancel]

21.2 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.

21.3 Special measurements (Vet)

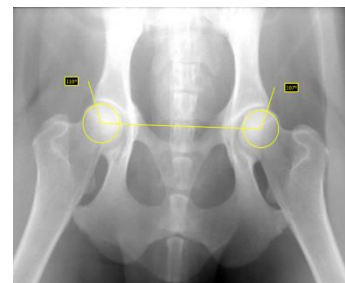
HD (Hip Dysplasia)

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.



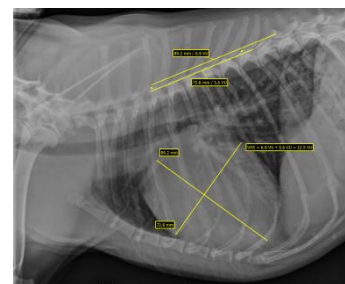
VHS (Vertebral Heart Score)

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).

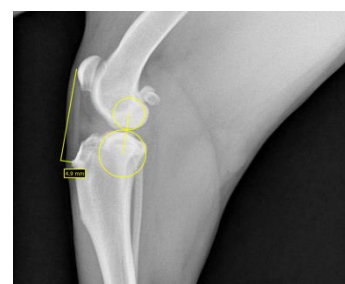


TTA (Tibial Tuberoses Advancement)

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.

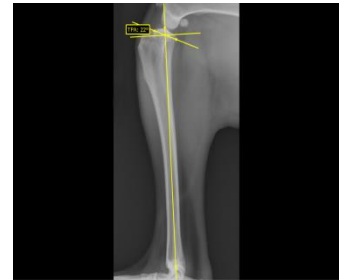


TPA (Tibial Plateau Angle)

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.

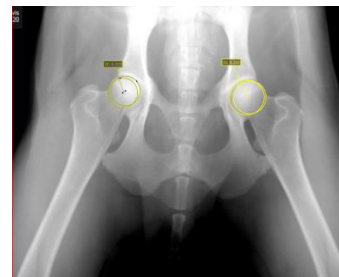


DI (distraction index) for PennHIP testing method

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.



21.4 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.

21.5 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.

21.6 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).

21.7 Others

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.

22 Others

22.1 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.

22.2 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.

22.3 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.

22.4 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.

22.5 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

Last revision of the User`s Manual: 15.03.2021