digipaX

Version 1.2.4

User's manual

Table of contents

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

Symbol	Meaning
	Note
	Tip

3 Safety informations

3.1 Hardware

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 can be cleaned with common commercial disinfectants for this purpose.

3.2 System crash

After a failure of the system (blackout or system crash) the tips for restoring the unsaved images are to be followed if necessary (11.12 Problems and solutions).

3.3 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).

3.2 Visual check

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

3.3 Data backup

The weekly backups of all new images on CDs or DVDs are to be made. Media with those backups are to be stored in a separated place from the computer with the image archive (server).

3.4 Check

The annual check of technical safety of the system is to be carried out.

4 Screendesign

Thumbnails: shows all images of a selected patient as a preview (tree structure with the exminations and series)

Image space / viewer: shows an image or more selected images next to each other and one below the other

Movable bars for changing the image division or hiding the windows

Header with installed components and additional modules

Toolbars with the functions

Toolboxes with the functions for processing images (divided into different tabs)

Baseboard with the informations on selected patients and available space in hard disc storage

Histogram of the active image

Screendesign and screen division

A large dialogue – e.g. for creating patient CD
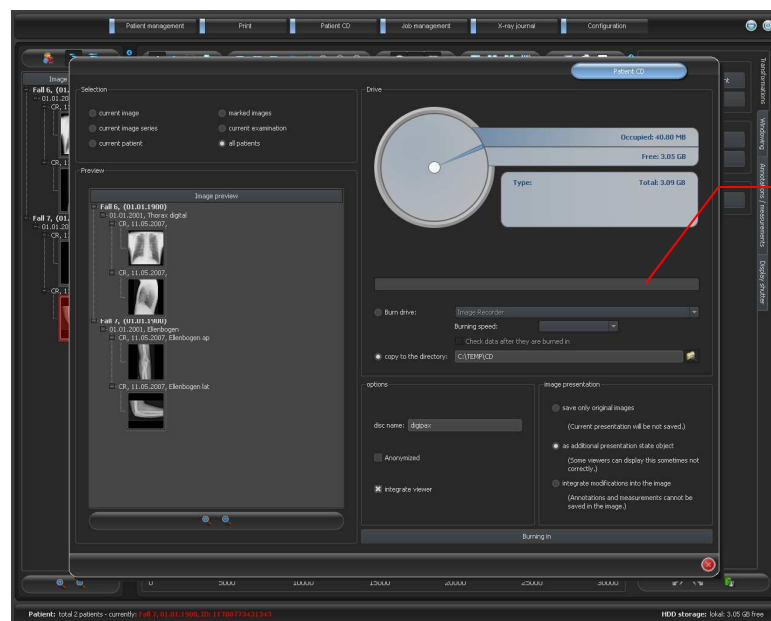
An example for screendesign after activating a component

4.1 Header

Header contains the buttons, with which particular components can be selected. This header replaces menu – so, there is no menu in the system.

Those components are:

- patient management
- printing

- patient CDs
- job management (DICOM Worklist Management)
- X-ray journal
- configuration

4.2 Image space / viewer

On the left bar the thumbnails are shown, in the middle area the selected images are presented in a large format and on the right bar the functions for processing images are available. Furthermore, there is a histogram for the current image below the image view.

4.3 Baseboard

On the baseboard the informations on the patient and available space in the hard disc storage are shown. If more patients are selected, there are number of patients and this at the moment active patient displayed, so the one who the active image concerns.

The drives, which available space has to be shown, can be set in the configuration (max. 3 drives). If any of the drives is not available or the set critical value is undershot, the alert message will be output. If the system slowly comes closer to the critical value (available space is smaller than double critical value), the message will be presented in red bold characters, otherwise normally in black.

This baseboard is seen in all parts of the program.

4.4 Toolbars

On the toolbars the different functions are available, like mouse functions, settings for zoom and overlay, also for image division.

On the monitors in the portrait mode the toolbars are automatically arranged in vertical positions. This setting can be also set up manually in the configuration (category Others).

4.5 Window divider

Between the display spaces adjustable window dividers are placed. By dragging these boards to the left or to the right or to the top or to the bottom the image division can be adapted. Also, windows can be hidden in this way completely.

By using small switches the display spaces can be moved to the top or to the bottom (or to the left of or to the right), by pressing the button they can be closed and restored by pressing the middle button.

5 Viewing images / viewer

The component of viewing images covers the areas of screen selection, image display and image handling or manipulation on image.

Both gray scale and colour images are supported. These can be presented uncompressed, RLE- or JPEG-COMPRESSED.

For gray scale images the informations on presentation, like window adjustment, rotation and image annotations, are stored in the adjusted directory as Grayscale soft CoPy Presentation State (DICOM file). At the next opening of an image these are automatically used again.

5.1 Image selection

The image selection follows in a board on the left edge of a display. This is alterable and also completely hideable in its size (width) by the window divider.

The view is changeable between DICOM tree structure and list view.

In the DICOM tree structure the examinations of the selected patients are presented. The patients form in each case a superordinate node. The nodes of the examinations can be opened and closed and as subnodes are the pertinent series contained. Within the series nodes the thumbnails are displayed.

In the list view also information on each selected patient is displayed in a superordinate node. A list of all available images for this patient is arranged underneath of it (in each case nodes with caption and thumbnail), independently from their affiliation to series and examinations. The criterion for the sorting, the sorting direction and the text, which can be displayed in the node, can be set in the configuration (default: date and time of the image).
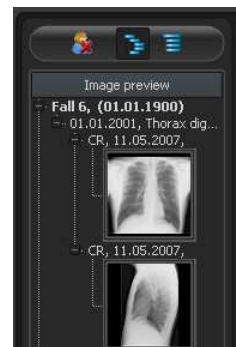
The thumbnails are marked by a red framework, even if this image is displayed in a large image view.

By stops of the mouse over node (patient, examination, series or image) in the tooltip window information on this is displayed.

The size of the thumbnails is adjustable by using two switches Plus and Minus below the tree structure. The size of the images is stored and used at the next program start.

By a double-click on a thumbnail this image can be loaded into the viewer. If there is an image window still free in the viewer (by division of images in the display space of the viewer in for example 2x2 images, more images can be displayed next to each other in the viewer), then it is displayed in this free image window. If no image window is free, then the image is replaced in a current image window.

By drag & drop the thumbnails can be dragged into image window of the viewer. Also within the viewer the image can be exchanged with drag § drop in the image windows. So the user can divide very flexibly the images on his display.

The selection of the patients can be reset with the switch "Empty patient selection" over the preview tree. Afterwards no more patients are selected and the preview tree is empty.

5.2 Image display

The viewer divides into 1 to n image windows and overlying toolbars (if necessary on the left). The active image is marked by a red framework.

5.2.1 Mouse functions
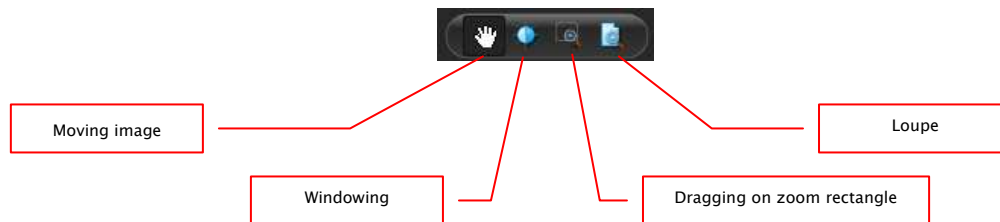
In this toolbar the action for the left mouse button can be selected:
- moving (if display size is larger than image window) – this is a default setting
- windowing (brightness/contrast)
    - ➔ horizontal mouse moving: modifying window center
    - ➔ vertical mouse moving: modifying window width
  In the configuration (category Others) these moves can be also modified
- zoom rectangle
- loupe

The function can be influenced 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:
- Shift + left mouse button: marking image
- Strg + left mouse button: drag & drop for exchanging the images between the image windows
- right mouse button: zoom in / zoom out (during vertical mouse moving)
- middle mouse button or pushed scroll: windowing
- rotating scroll: next or previous image of the images series, examination or the patient (for each setting), if existing

5.2.2 Zoom

Window width

Window height

Window size

Full screen current window

Full screen divided view

Original size (1 : 1)

Zoom out
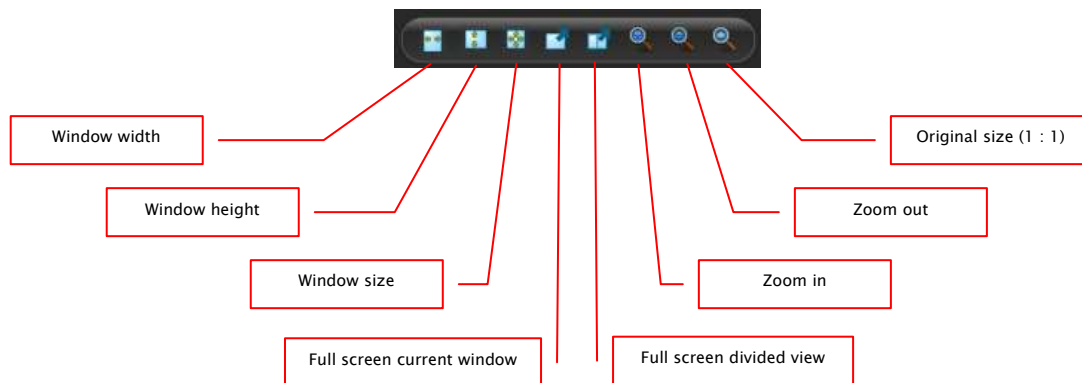
Zoom in

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.

With the exchange of the images between two windows by drag & drop, the zoom factors of the image stay the same.

By using the switches for full screen the full screen mode can be activated. The current image or all presented windows (by division of images) are scaled to the full screen size. The full screen mode can be quitted by using the Esc key.

5.2.3 Overlay

Display informations

Display annotations and measurements

Activating display shutter

Display Bitmap Overlays
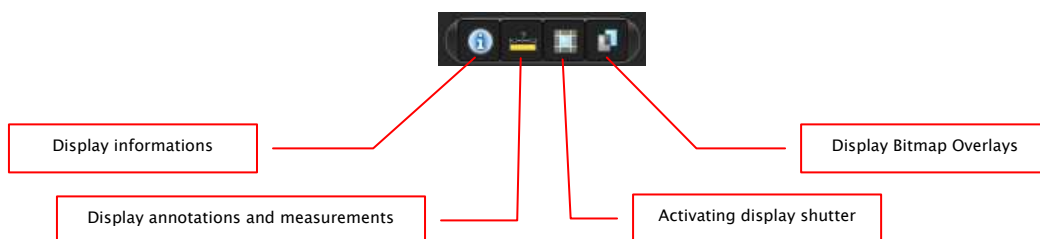
Overlay divides in the following areas:

- informations (in the image corners),
- annotations + measurements (e.g. measured sections or angles),
- „display shutter" (blanking everything outside the selection),
- bitmap overlays (overlay images)

For each of these areas there is a switch 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 switch for "display shutter" is automatically set, so on, and user can turn this off or on using the switch.

5.2.4 Image division
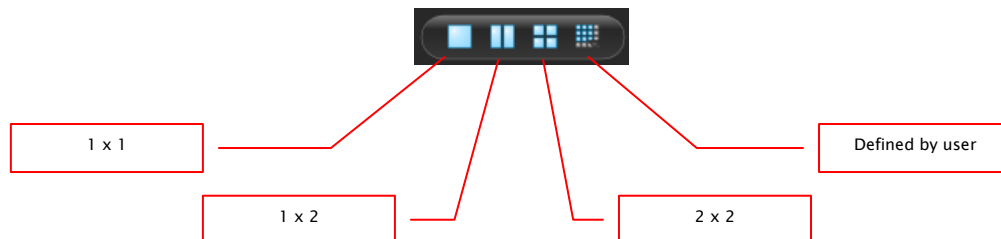
Large image display can present one or more images. How many images will be displayed, this can be selected by using these switches on the toolbar above the image display (1x1, 1x2, 2x2). Additionally the setting defined by user to maximum 6x6 can be selected by using the last switch, which also opens the small window.
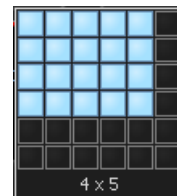
5.2.5 Other functions

5.2.5.1 Exporting images
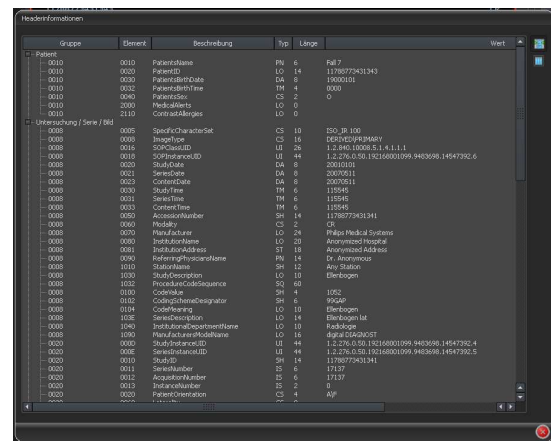
The current image can be also saved as a DICOM file. Select this switch and afterwards the target place in dialogue for saving. The file will be saved at the desired point.

5.2.5.2 Clipboard

By using the switch for clipboard the current image in the current presentation form can be copied to clipboard. This means that the overlay objects (informations 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 it's original size to clipboard.

5.2.5.3 Header informaions (DICOM dump)

By using a switch on the toolbar a dialogue can be opened, in which the DICOM informations (tags) of the current image are displayed. These tags are sorted in groups for a better overview.
All tags, also private, are shown.
A modification of the values is not possible.

5.2.6 Marking images

In the right top of each image a small red field is placed. By clicking into this field (or Shift + left mouse button into the image), a red point appears there or disappears again, if it already existed. Each image with a red point is considered as a marked one. Additionally the marking is clarified by a shading over the entire picture, since the small red point is seen sometimes badly (e.g. if more images are presented or also on diagnostic monitors). Hiding the shading can be deactivated in the configuration (category Others). At the selection of images, e.g. for burning a patient CD, all marked images can be used.

The marked image can be recognized on image selection bar on the left by a small red point, right in the top of the thumbnail.

5.2.7 Image protection (lock)

Moreover, a yellow field is also displayed under each red field. By clicking into this area the images can be protected (locked). Manipulations on images, as described here in this user's manual, do not affect the protected images. A lock symbol in the yellow field informs if the image is protected.

Protected image cannot be recognized in image selection.

5.2.8 Context menu

By right-clicking with the mouse into the image a context menu with important functions can be activated:

- mouse function: moving the image, windowing, dragging on the zoom rectangle, loupe
- zoom: window width, window height, window size, activating or quitting the full screen, zooming in, zooming out, original size (1:1)

- overlay: displaying informations, displaying annotations and measurements, activating display shutter
- examinations: list of examinations of the patients and, as a submenu, each time the image series of this examination (the first image of this image series is activated by activating the menu item)

5.3 Manipulation on images

To the right of the image display there is a window for image processing. Due to large number of image processings these are shared on the tabs, where these are arranged vertically and sorted according to the topics.

For CT images, the operations on images are automatically applied for the entire image series, otherwise each time for the active image.

Below the tabs there are switches for undoing the last actions and restoring the undone actions. Thereby the actions are displayed as text in tooltip. 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 switches therefore are deactivated.

For gray scale 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 on a colour image are getting lost.

By using the last switch „restore original image" all made modifications are deleted after a confirmation question and thus the original image is restored, as it is in the image archive.

5.3.1 Transformations (rotating, reflection, inverting)

The images can be rotated at the touch of a button 90° to the left, 90° to the right or 180°. They can be reflected horizontally and vertically and also inverted.
Each operation can be undone as well as redone by using both arrows in the bottom.
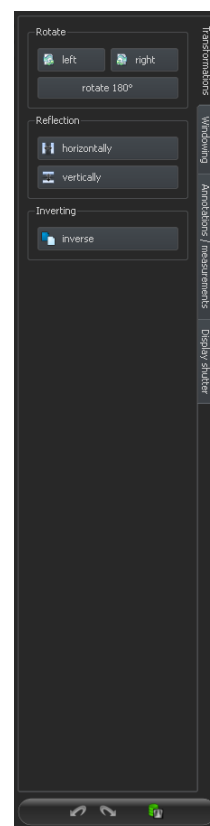
5.3.2 Windowing

Windowing is a usual method for the preparation of grey scale images. For colour images, windowing is deactivated. By entering window center and window width, the grey scale range will be selected, which is to be presented. These values are adjustable each time by using the sliders or input fields. Furthermore, the settings can be used quickly from the list of presets.

The modification of these presets or adding the presets defined by user is possible thereby via dialogue, which appears after the button „Edit presets…" has been pressed on.

Also the contained default settings therein can be modified or deleted by user (they are not write protected).
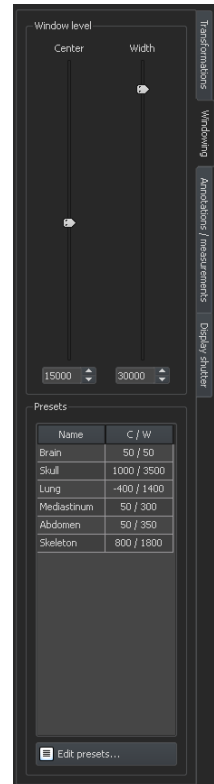
5.3.3 Annotations / measurements

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 switch below the buttons.
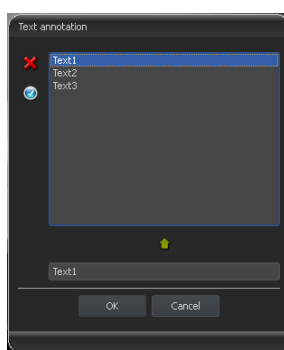
After the text is selected, first a dialogue appears, in which new texts can be added to the list of standard texts (enter text in the input field and then press a green arrow) or the text from this list can be selected (double-click or click and Ok) or desired text can be entered (enter text in the input field and press Ok), which will be then used and placed on the image. You can specify yourself a standard entry which is then already activated, after you activate the dialogue.

Measurement functions exist only if the adequate module is enabled.
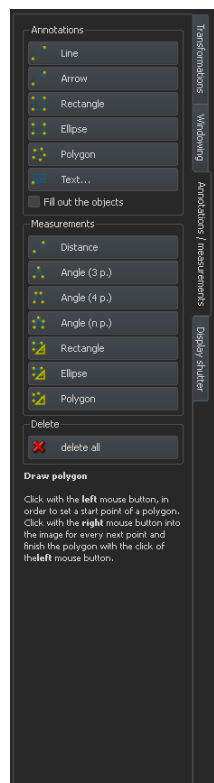
Under measuring comes measuring of the sections and angles as well as measuring of the content of the area of rectangles, ellipses and polygons. The measuring of an angle can follow thereby by entering 3, 4 or n points. For n points, the n angles will be measured.

By clicking the switch „Rectangle", „Ellipse" or „Polygon" at the bottom of the measuring range while pressing the Shift key the densities can be measured. Thereby, an actual average grey scale value from the original pixel values as well as minimum and maximum grey scale value will be required. For colour images, the normal area measurement will be performed.

User can delete the drawn in annotations and measurements with the switch „Delete all" from the overlay of the image. Deleting or subsequent modifying of particular objects is not possible.

Settings for drawing the graphic objects in the overlay can be set in the configuration, category Overlay.

5.3.4 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.

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

Everything outside this zone, which 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.
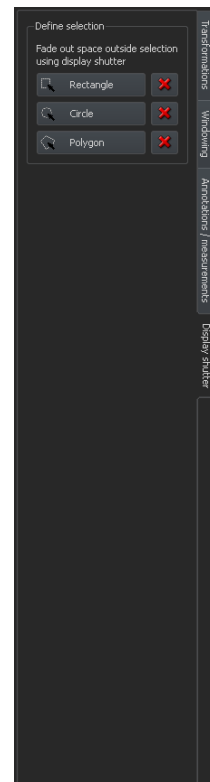
5.4 Histogram

Below the image or the images, there is a histogram window, which displays always the histogram of an active image. By shutting down the histogram window can be also completely hidden.
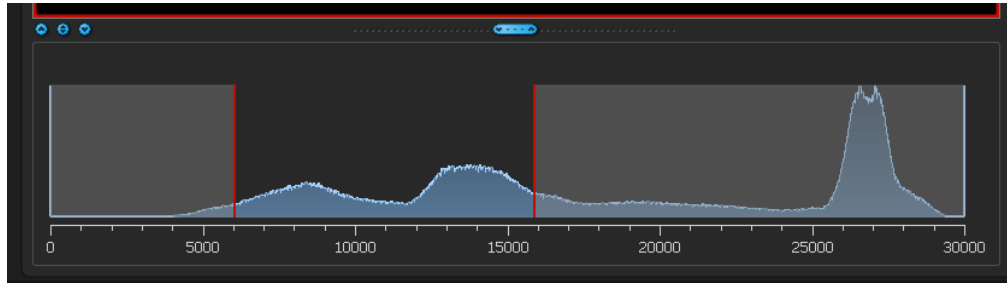
For colour images, a red, green and blue curve for the channels R, G and B of the image are displayed. For grey scale images, a blue curve (like presented on the image above) for spreading of grey scale values is displayed.

In the histogram for the grey scale 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 window can be completely moved by clicking with the mouse into the space between the red lines and then moving 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. With the right-click into the histogram the full size can be displayed again.

Settings for work with the histogram can be set in the configuration, category Histogram.

6 Patient management
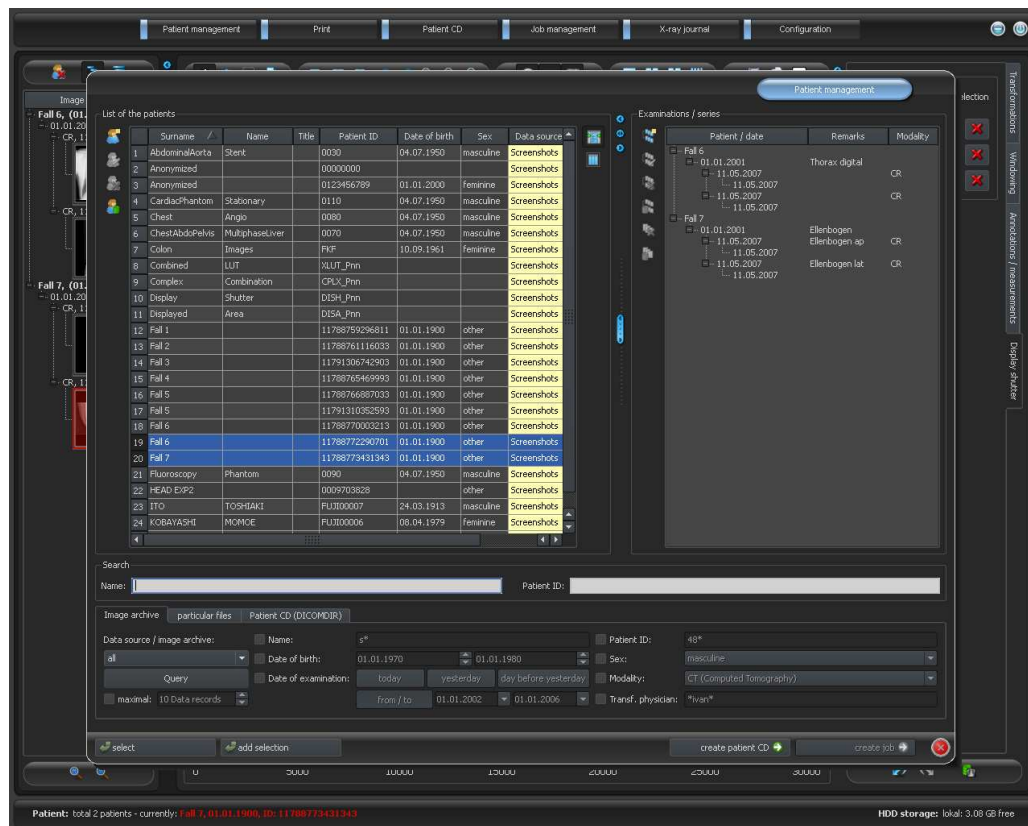
6.1 Patient data

For each patient the following data are displayed in the table:

- surname
- name
- title
- patient ID
- date of birth
- sex
- data source

Furthermore, the number of examinations is a part of each patient data, whereby each series may contain many images.

6.2 Data source

The data from image archive can be queried, as well as local DICOM files can be read. The latter can thereby follow as a scanning for directories or opening single files or importing DICOMDIR, as this is used mostly while burning the patient CDs.

The list of patients shows each time the list of the patients of the currently selected data source, so of the selected tab. If the tab is changed, also the list of the patients displayed overhead will be changed.

After the start of the program the patient management starts automatically if no other action through the GDT connection is required (see 14 GDT interface). User is asked immediately if the list of the patients is to be updated. By „yes" all image archives without filtering are queried (see 6.2.1 Image archive). This can take some time, depending on the number of patients, the network as well as used data base. This behaviour can be changed in the configuration – category Others. In 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. Therewith first the filter will be set and a faster query will be performed.

6.2.1 Image archive

6.2.1.1 Query

On this page for one thing the configured image archives (PACS) can be queried and for another thing the locally set data, which are provided for storing in image archive. Which sources are to be queried exactly, this can be set with a fold box „Data source / image archive". Therein „all" can be selected, in order to query all possible sources, „locally", in order to incorporate only local data or the name of an image archive. Not used image archives (contained in the configuration, but deactivated) are not incorporated in this list and will be not queried.

By clicking the switch „Query" the sources are queried possibly with use of set filters and the list of found adequate patients is updated.

In order to limit the list of data records, the option „maximum" can be activated and the maximal number of displayed patients can be configured. This can be necessary if the archives are very large, in order to increase the speed. 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.

6.2.1.2 Filter

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. The criterions which are to be used for filtering, can be activated or deactivated with a checkbox. Thereby, the filters can be also combined as desired.

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.

6.2.1.2.1   Filtering by name

Enter the beginning of the searched name and a star behind it (i.e. „Sch*"), in order to search all the patients whose names begin with those characters. The star (wildcard) can be also used in other places (i.e. „*mann").

6.2.1.2.2   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.

6.2.1.2.3   Filtering by date of examination

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

6.2.1.2.4   Filtering by patient ID

Enter the searched patient ID or a part of the patient ID. Use wildcards (star „*"), like for the filtering by names.

6.2.1.2.5   Filtering by sex

Filters out all patients of a certain sex.

6.2.1.2.6   Filtering by modality

All possible modalities (procedure for taking image) are listed in a fold box and one of them can be selected there. Subsequently only the patients will be displayed, which contain the images of this modality. This means that also the image series will be filtered and the corresponding series will be shown.

6.2.1.2.7   Filtering by transferring physician

Like for the filtering by names or patient ID, use here wildcards for filtering by names of transferring physician. Possibly it is necessary to set a star both at the beginning and at the end (i.e. „*sch*").

6.2.2 Single files

Using this tab the local DICOM files can be fast imported and viewed. Via selection of a directory or a drive and button „Scan" all files, which meet the filter settings, are being tried to be opened. 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 enter the file name using

wildcards („*" and „?"). Thereby, many possible file names can be separated with blanks. I.e. in the case of filter setting „*.dcm CT*" for the option „only these files" all files with the file end dcm and all files with the names beginning with CT will be found. If you activate the option „not these files" and use as a filter i.e. „*.exe *.zip" you eliminate the possibility that the programs or ZIP archives will be co-imported.

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

If the file, which meets the filter settings, cannot be imported, this will be minuted in the log, which can be optionally viewed if any errors occur.

The selected directory will be stored, so that it can be always selected again fast from the fold box. A new directory can be selected with the switch „…".

By touching the button „Add DICOM files…" the single files can be directed opened. Multiple selection of files is thereby possible with the buttons Shift and Strg.

By clicking the button „clean / empty the list" this data source will be emptied. All therein contained images will be then deleted from the system. **The files will be thereby not deleted.**

6.2.3 Patient CD (DICOMDIR)
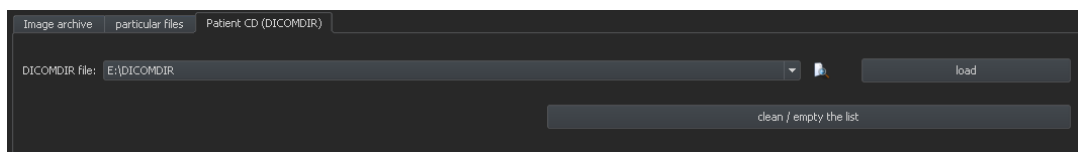
Often the directories for DICOM files are created in so called DICOMDIR files. Mostly this occurs while creating a patient CD. Such a patient CD can be fast imported to the system using this tab.

DICOMDIR file (filename: „DICOMDIR" without filename extension) can be selected with „…". Already used storage places are taken up again in the fold box and can be selected there fast again. By clicking on „load" this DICOMDIR file is loaded and therein contained informations on patient or patients and storage place of related images are taken up to the data source.

By clicking the button „clean / empty the list" this data source is emptied here again. All therein contained images will be then deleted from the system. **The files will be thereby not deleted.**

Patient CDs can be imported automatically to the system. If a patient CD is placed while application is opened, the patient CD will be read in on demand from digipaX system. After these data have been read in, they can be optionally immediately stored in image archive.

6.3 Searching for patients

The table can be sorted ascending or descending after each field (column) by clicking the column head.

In the search fields for the name (surname is compared) and patient CD each time the search term can be entered. The first found patient in the list of patients will be selected each time when the text in any of input fields changes.

If the text is entered in any of the search fields, the text in another one will be again deleted. The search fields are green coloured if at least one match is found, otherwise they are red coloured.

6.4 Recording new patient / modifying patient data

Creating new patients as well as editing patient data is possible only for data source of the image archive. So, this tab must be selected.

While recording new patient, data of this patient are entered in a dialogue. If this dialogue is quitted with „Yes", the new patient is recorded locally. This means that the patient is still not available in the image archive, because only transfer of complete images and not single data to the DICOM archive is possible. So, when the examination, series and image exist for this patient, all can be transferred together as a new DICOM object to the image archive.

Editing patient data is possible only for the local patients. As soon as the data are transferred to a server (image archive), this is not possible any more.

If there is set in the configuration, that an identification (i.e. physician number or company number) is to be added to each patient ID, this identification will be automatically added do your entered patient ID (separated with „–"). If there is set in the configuration, that the patient ID is to be automatically created by the system (from the patient data), the input field for patient ID in the dialogue for recording patient data is deactivated.

6.5 Deleting patient

Deleting patients is basically available for all data sources. However, in the case of source of the image archive only local patients can be deleted. Patients, which already are stored in the image archive, must be deleted directly at the image archive.

In the case of data sources for single files and patient CDs, marked patient or patients are always removed from the list. **The concerned files are thereby not physically deleted.**

6.6 Sending patients` images to image archive

Sending images is possible in all data sources.

If there are many image archives (PACS servers) configured and activated, a target archive is to be selected in the dialogue. All images of the patient (all examinations including all series) will be sent to this archive. If necessary, the list of patients (data source image archive) is to be updated, in order to make all modifications visible.

6.7 List of examinations, series and images

Parallel to the list of patients the examinations of the selected patient or patients are displayed. Examinations, 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 informations on patient and thereunder his/her examinations.

6.8 Processing examinations and series

Creating, editing and deleting examinations and image series are basically possible only for patients of the image archives.

Examinations can be created as well for patients, which have been retrieved from an image archive, as for local patients. Mark the node of a patient, to whom the examination is to be added, in the list of examinations and use the switch „Create new examination", in order to add this new examination. In this way, a new local examination for this patient is formed, which can be further modified by using the switch „Edit examination data" or again deleted by using „Delete examination". Examinations, queried by server, can be neither modified nor deleted. Locally created image series can be again removed with the switch „Delete series".

All images of an examination or all images of a series can be sent to image archive. If there are more images configured and activated, then a target archive is to be selected subsequently.

6.9 Quitting patient management

Selection of a patient follows by clicking an adequate row in the table. By a double-click into the table or with the button „select" patient is selected, dialogue closed and viewer according to image data of this patient conditioned. Furthermore, a multiple selection in the table is possible, so that more patients can be processed at one time.

With a double click to a study in the study list you can open exclusively this study for the patient.

Patients can be also added to a current patient selection. Use the button „Add selection" for this.

If the Shift key is pressed, the dialogue will be not closed if you press the switch „Add selection". The patient will be added to the selection and the dialogue stays opened. So, many patients can be searched for and selected.

Alternatively, the following buttons can be used in order to get directly to another component after activating the patient:

Create patient CD ➔ burning patient CD (many patients can be selected)

Create job ➔ creating a new job in job management (possible only for single selection)

7 Printing
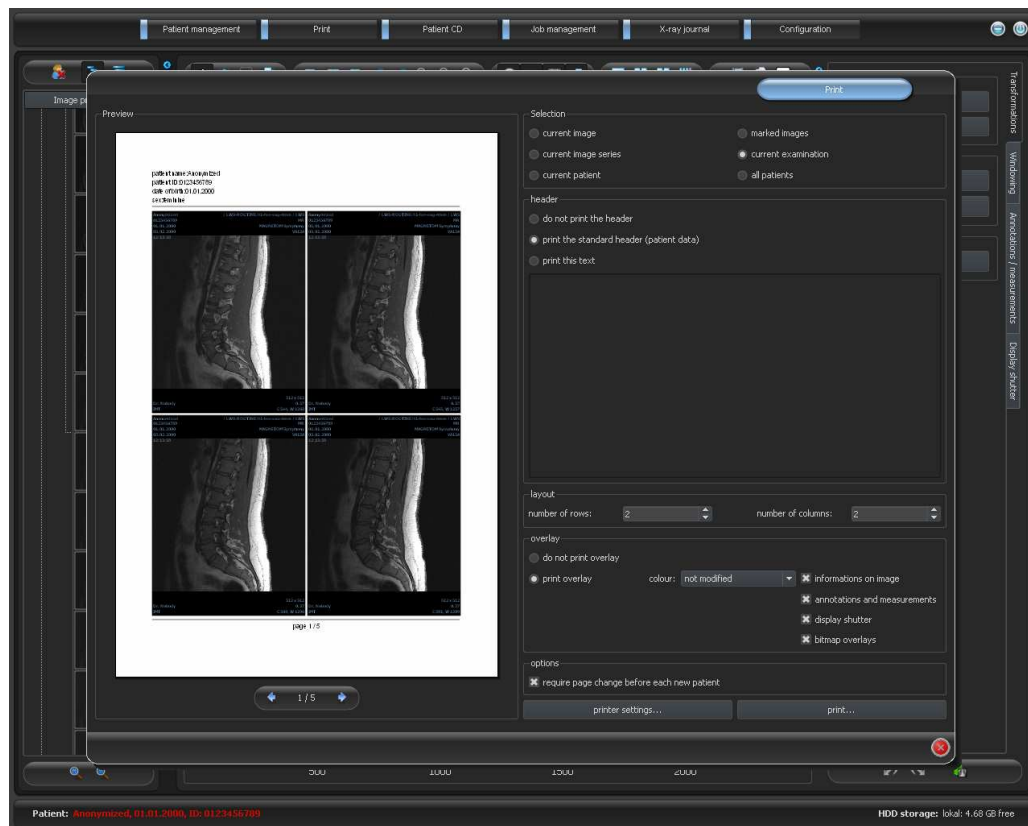
If about printing, current image and many images can be printed at a time as well. This is determined in the group „Selection".

The header row, if activated, will be always printed at the top edge of the image, in a fixed defined size and fixed defined font type. These cannot be modified. Standard image informations with the patient data can be printed as well as self defining text.

In a baseboard, the series number and the number of pages are displayed. Furthermore, an information on software is emitted, with which this printout has been created.

Many images per page can be printed. Number of rows and columns can be set thereby in the group „Layout".

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 are shown.

All modifications made on the right side of settings, act immediately on the presentation on the left side of the preview. Number of pages is always updated too. You can navigate with the arrow-switches between the pages. All settings are stored, so that these settings will be used equally at the next selection of printing components (also after restarting the program). With the button „Printer settings…" the printer can be selected and configured as well as the paper format adjusted. With the switch „Print…" the actual printing is performed. Also here the printer can be again modified. If the print order contains many pages, the pages which are to be printed can be selected optionally.

During the preparation and transferring 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 order is ready, an adequate message appears.

8 Patient CD

Direct burning patient CDs / DVDs is possible only if the software „Nero" of „Nero AG" is installed. Otherwise, only the option for copying data to target directory is available. They can be burned from over there using an external tool.
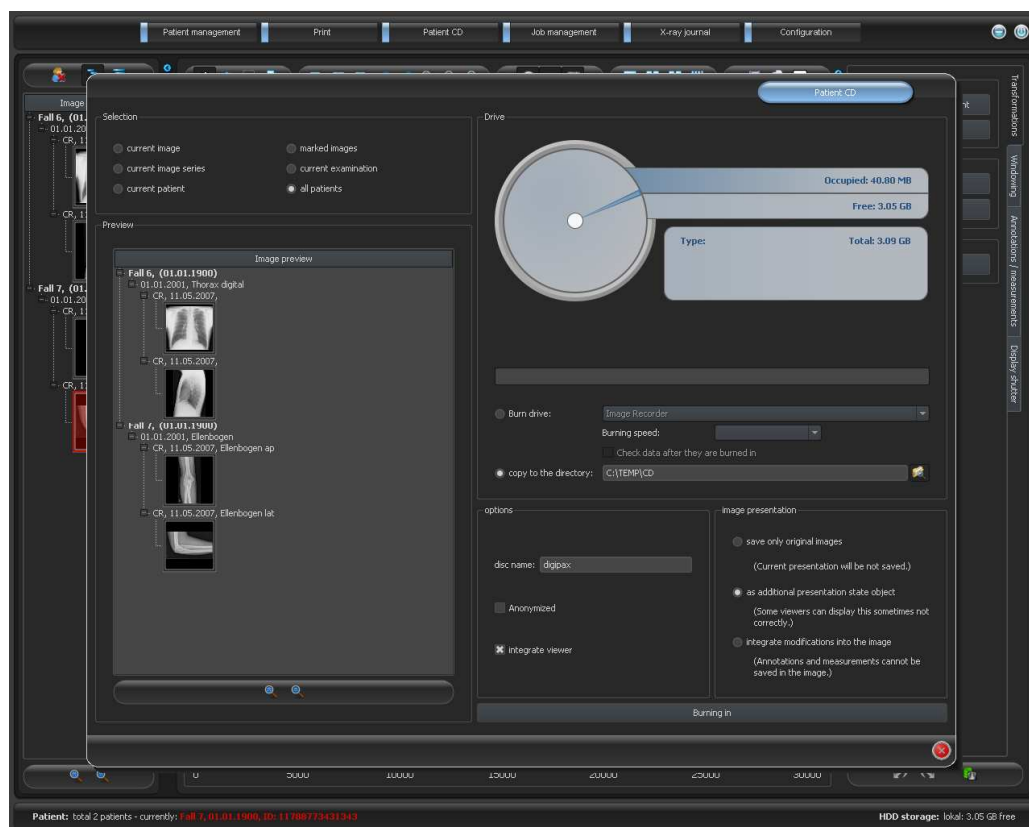
In the group Selection it can be selected which images are to be burned on CD / DVD. In the preview below the images, which have been selected in the selection, are presented once again in a structurized preview (divided in patients, examinations and series).

In the group Drive a CD or DVD burn drive can be selected as well as the information on this medium can be displayed in a graphic form: medium type (CD, DVD), size (total available

storage), free storage space and occupied storage space after burning with currently selected images. These informations are being updated during the burning process.

If data are copied only to the target directory, then the value „Total" shows the total free storage space of the adequate drive, the value „Occupied" the storage space, which can take in new data and „Free" the remaining storage space thereafter. In this case no type is displayed.

For the direct burning on CD or DVD the burning speed can be set and by activating the option „Check data after burning" subsequent check of burned data can be set.

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
- Sex: 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

Optionally the digipaX viewer can be also burned on CD / DVD, so that after placing the CD in computer this viewing program will be automatically performed for the stored images.

In the group Image presentation one of the following 3 options can be selected:
1. Original images
   The images are burned 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 (Grayscale Softcopy Presentation State) for each grey scale image will be added to the original image, which contains the informations on windowing, rotating, reflexion, inversion, graphic annotations and display shutter. Not every DICOM viewer can interpret in this way correctly. Use this option if you

have burned the viewer on CD or you know that the CD recipient uses the software, which can evaluate this form correctly.

3. Integrating modifications
For each image a new image is created and modifications are transferred (windowing, rotation, reflection, 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 into the patient CD.

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

After the button for burning is pressed, the files are assorted (images are compressed and anonymized if necessary). Now the statements for the occupied storage space also can be updated. If the option for burning is activated, data are written on CD / DVD and this is ejected, otherwise these are copied to a specified target directory. The progress is always displayed in progress bar while running the process.

9 Job management

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.
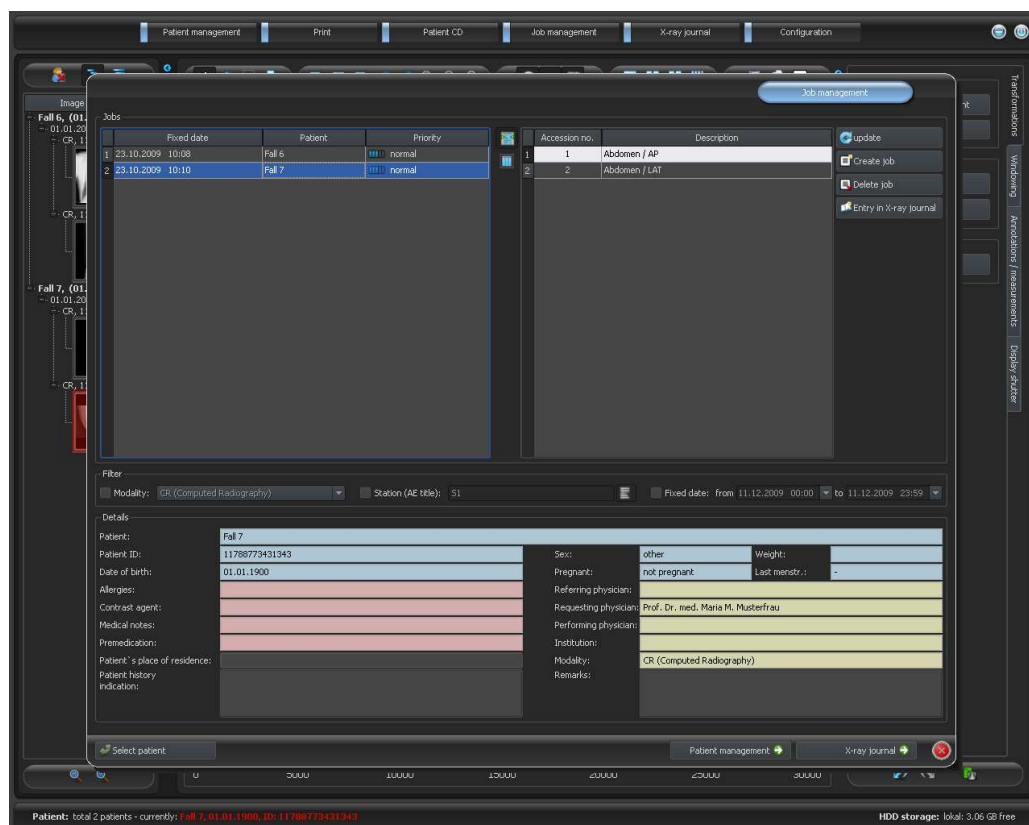
9.1 Presentation of the job and update of the job list

The list will be updated according to time interval which is set in the configuration (category Job management – available only for administrators). In the configuration this automatic updating can be also deactivated.

By using the switch „update" the update of 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. Thereby each job has it's unique accession number.

9.2 Filtering the 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 examination 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 „update" (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.

9.3 Creating a job

A new job is always created for at present selected, current patient in the system. If many patients have been selected in patient management, no new job can be created.

The data of the patient, for whom the job is just now being created, are displayed in header zone of the dialogue, however they cannot be modified.

On the left side of the dialogue there is an input field for defining the jobs. Part of the body and levels can be defined also through the image on the right side of the dialogue. For this, move the mouse over the image to the desired region of the body till this is colour-marked. Click wit the left or right mouse button into this region, in order to display the menu of possible refinements. Select the desired refinement and activate desired levels (ray paths) in the opening submenu. You can mark many levels at once and confirm the selection with the menu item „Ready". Thereupon the selected part of the body, selected refinement and selected level are taken over to the list on the left side of the dialogue. You can add the entries to the list manually, too. For this, click per double-click into the next free entry in the list and enter the desired organ. In the same way, you can edit already existing entries in the list (only if the Procedure Code is backed). Entries can be removed from the list by a small red X (at the top on the right by the side of the list). Per switch underneath „Select from the list" predefined entries or descriptions can be selected from a stored list. In this dialogue for selection of the description new descriptions can be also added to the list.

If you click the background zone of the image, a menu with all available parties of the body will appear. This list contains possibly further definitions, which none regions of the body are assigned to. Refinements always form submenus.

If you click into the context menu into the menu item „Manage…" you can adjust the lists of the refinements und ray paths (see for this the chapter 9.4 Managing organ tables and Procedure Codes).
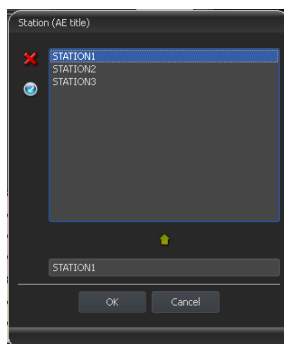
By using the small switches behind the input fields you get each time to a dialogue, in which the defined terms can be fast used again. These can be added with the green arrow to the list, deleted with the red X or selected for use per double-click.

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 dialogue will be activated. For the patient names, this happens in the same way.
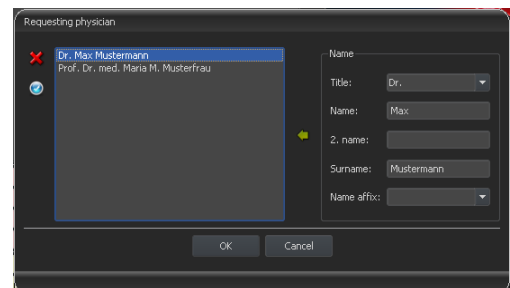
When the dialogue for creating the job is confirmed with „Ok", the job is transferred to the set worklist server. If more worklist servers are configured, the desired one is to define in the selection dialogue. If more levels have been entered, one job will be created for each level. This is necessary, because the images are taken on also singly and for each one a new entry is performed in the digital X-ray journal.

9.4 Managing the table of organs and Procedure Codes

In the context menu of the image you reach via menu item „Manage..." to the dialogue for processing the table of organs. The dialogue 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 on the switch „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 switch „Add ray path". Also for this specify the desired designation. Using the switch „Delete selected element" the active node, including possibly contained subelements, will be deleted. The nodes for the parts of the body cannot be deleted thereby.

The entries can be sorted by using the switches 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 thereb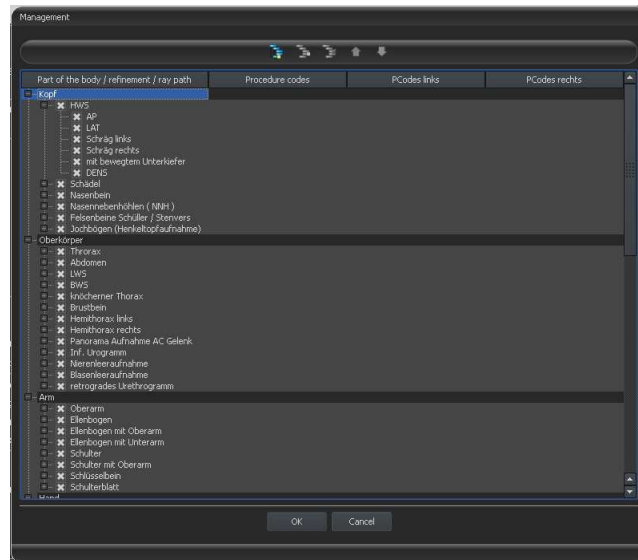y adjusted to the target station as each manufacturer uses his own Codes for the accession to his predefined settings. By a double-click on the adequate cell right in the tree structure you can define the Code for the ray path of this row. Maximal three Codes can be entered for each ray path. The Codes thereby are to be separated with a semicolon („;"). You have to pay attention that as well before as behind the semicolon no blanks are entered, unless these belong to the Code. Thus the Codes can be coevally transferred to many devices. The configuration of the transfer of these Codes and the setting or linking to adequate devices are performed by your administrator.

In the dialogue for job creating the Procedure Code is displayed as a tooltip of the entry in the job list (is displayed if you hold the mouse over that without clicking it). The description of the job cannot be modified in this case. If you enter the jobs manually, so without selecting in the image, you cannot forward any Procedure Codes.

9.5 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.

9.6 Entry in X-ray journal

If there is no X-ray journal activated in this system, the switch for a new entry is missing.

In the dialogue for creating new entry in X-ray journal the values can be already transferred, in order to simplify the work and to obviate the mistakes. According to set configuration 3 different modes are possible:
1. takeover of data from the worklist job
2. takeover of data from the automatically received images
3. no takeover of data

Furthermore, takeover of data of a connected generator is possible. If the system is accordingly established by the administrator, the generator values can be taken over by a double-click from the table of received values.

9.6.1 Data from worklist job

First mark a job, for which you want to create an entry in the X-ray journal. As far as this is possible the data, like i.e. patient's name and date of birth, are already taken over from the job and entered in the fields of the dialogue for recording entry. The remaining fields are to be filled out accordingly and the entry is to be taken over to the journal by clicking Ok.

9.6.2 Data from received images

As well as for creating a new entry directly in the X-ray journal (see 10 X-ray journal) the automatic image receipt must be activated and correctly configured. New images are forwarded from the image archive to this station and can be used over here as a template for the entry in the journal. First select from the list of the newly taken images an image, for which the entry is to be created. All possible, already in DICOM image existing data are taken over to the dialogue. Also here the remaining data are to be filled out and the dialogue is to be quitted with Ok, in order to take over the data to the journal.

9.6.3 Without taking over the data

The dialogue with the mask for creating a new entry is fully empty in this case. All data are to be completely entered and to save with Ok in the X-ray journal.

9.7 Display of received images

If image routing is correctly set as well in the image archive as at the digipaX station, the digipaX station can automatically receive the taken images in the background. If this is the case and the option „Mark with the colour the column with number of received images and entry in the list when image comes in" in the configuration for job management is activated by the administrator, you will get as user the possibility to control the processing of the jobs. If at the station, which makes the images, no jobs can be deleted, this is a reasonable

possibility to recognize, when the jobs are processed ready. If the jobs are deleted at the station (digipaX), which takes on the images, these fall out automatically from the list on this station.

9.8 Quitting the job management

If you have marked a patient in the list of patients, you can use the option „Select patient" bottom left (or also per double-click into the entry in the list of patients), in order to take over the marked patients to the patient selection (the old selection will be replaced thereby) and subsequently to close the component. If this patient does not exist yet in the list of your patients (data source image archive) he will be created newly and locally.

Moreover, you can jump over directly to the patient management from over here. If you have before selected a patient in the list, this patient will be also selected first as an active patient.

If the X-ray journal is installed and activated, you can jump over directly to the journal. No patient will be selected thereby.

10 X-ray journal

10.1 New entry

While adding a new entry to the X-ray journal the value from a received image can be taken over if the image receipt is correctly configured in the background. For this, select from the list of images an image, for which the entry is to be created. In the dialogue for recording values the fields are then pre-occupied accordingly with the values from the image. If no image has been selected or the image receipt is not established, all fields are empty. Enter the values in the fields provided and confirm with OK, in order to take on the entry to the journal.

If the generator is connected directly to the system and the settings have been accordingly established by the administrator, the received values of the generator from the table, which is displayed additionally in the dialogue, can be taken over per double-click or with the symbol of an arrow in the input fields. Already used values pairs of the generator are not displayed again at the next activating of this dialogue.

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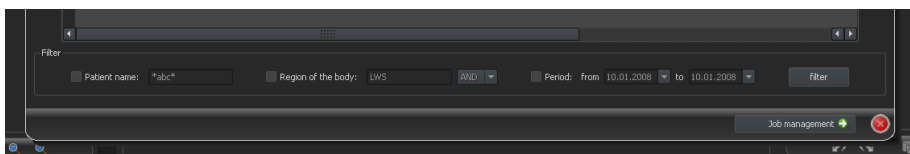
In the bottom of the dialogue you can set the filter for patient names, parts of the body and record date. Each time you activate the desired control box (many control boxes can be activated), in order to apply the filter.

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.

10.2.1 Patient name

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

10.2.2 Region of the body

Specify one or more terms or parts of words in the input field for regions of the body. In the fold 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).

10.2.3 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.

10.3 Exporting

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.

10.4 Emptying (deleting)

For emptying the journal entering the deleting password is necessary.

Password: digipax

Enter the password and subsequently <u>all entries</u> will be deleted from the X-ray journal.

11 Recording the image (scanning)

11.1 General

If the module for recording images is activated, an additional toolbox „Scan" on the right side will be displayed. This contains additional functions for recording images. At the op of this tab the connected devices are shown. These fields are temporarily colour-marked during receiving the values (yellow during receiving, green after successfully closed receipt, red if receipt failed).

Also additional tabs are installed below the image viewer, which are important for the work during recording of images. For one thing, the job list for a current patient, if job management is activated, for another thing, a saving tab for recording all informations for records and transfer to the image archive.

If image recording is activated, this is impossible to select many patients at a time. You can select only one patient each time, for which a new record is to be performed. You have also here all possibilities for printing or creating the patient CDs available.

11.2 Course of image recording with the job management

Select from the component „Job management" a patient, for which you would like to perform the next records. For this, mark the patient name in the list of patient, get the overview of the details of requests at the bottom of the dialogue and press the switch „Select patient".
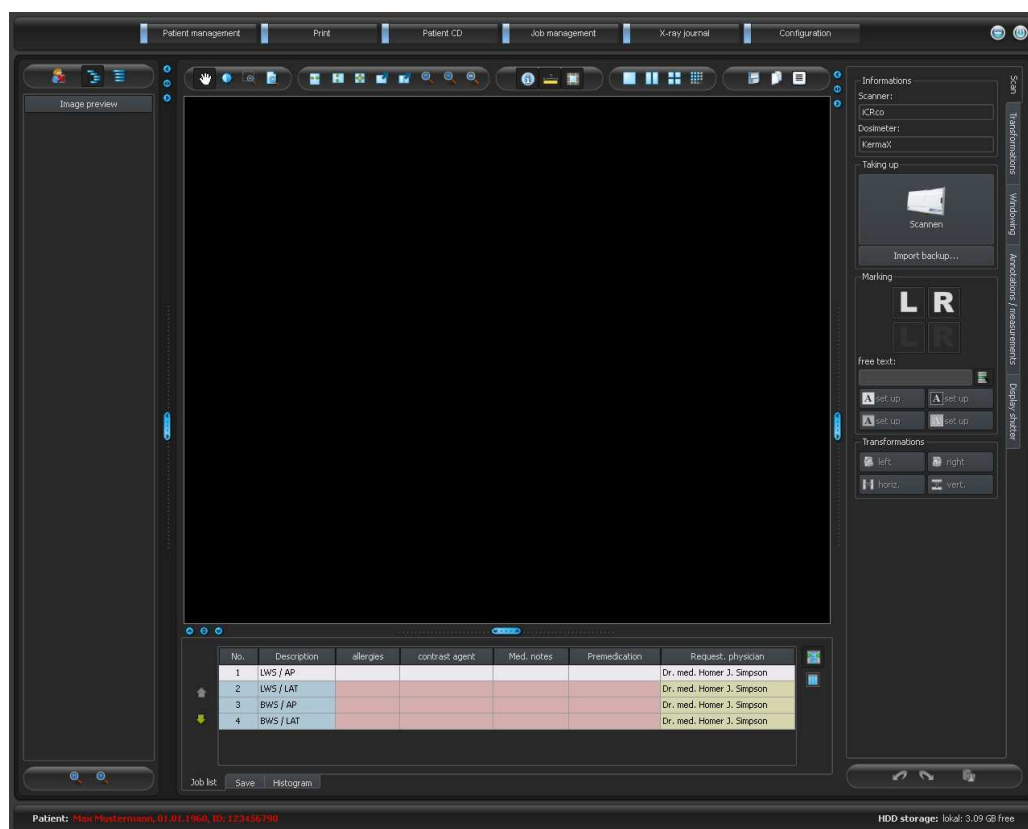
The patient must be activated now und you see the jobs assigned to him listed below. Holding the mouse over the entries (without clicking it) you can view all details for this job in a tooltip. Now sort the jobs in the order, in which you would like to perform the records.

As soon as you have imported the first image, you cannot sort the jobs any more.

Now, take on the first image and import it using the button „Scan". After that the scan program of the respective manufacturer opens, with which the image data can be transferred.

Caption and Symbol on this button can differ on your installation. It depends on the system configuration.

The read in image is assigned to the next job. While reading out and transferring image data, next record can be already performed in certain circumstances. Software for reading out the image data (not digipaX) is to be closed after each record.

After the transfer of the first image data a new examination and a new image series are created automatically by the system. In this image series a new image is stored and displayed zoomed in in the image viewer. Moreover, the saving tab (at the bottom close to job list) is automatically activated. For the record there are the record parameters and the name of X-ray assistant to specify. By clicking the button „Save" the new image is transferred to the image archive.

According to settings of the system the job is subsequently deleted, automatically or on demand.

11.3 Course of image recording without job management

If you work without job management, select the patient in patient management. Perform the first desired record. Click into the large button Scan and transfer image data using the opening manufacturer's software to the system. The new image opens automatically zoomed in in the image viewer. Now specify an examination description on the tab „Save" below the large image, which will be valid for all performed records of this patients. So, use a general description, like „LWS, BWS". Add a detailed designation for each record as a comment for particular images, like i.e. „LWS ap". Further, enter the further parameters of the record, like name or abbreviation of the X-ray assistant. By clicking on „Save" the image is transferred to image archive.

Take the next image on and do all in the same way. If necessary, you can already start performing of the next record at the device while the data of the previous record are being read in.

11.4 Image transformations / windowing

You can subject the newly scanned images to the transformations before saving them. Rotations, reflections, windowing etc. are saved directly in the image and co-transferred to the archive. These modifications are immediately displayed at other stations, at which the image is recalled.

In the configuration (page „Recording images") the automatic rotations and reflections can be set, which then are used immediately for all new images.

11.5 Markings

Markings are available only if the adequate module has been activated.

Before saving an image, the markings can be made on it (in the configuration on page „Recording images" the markings must be activated). Select i.e. one of virtual lead characters (L or R) by clicking with the left mouse button and move then the mouse over the image. You see the image of the character, which can be modified in it's size using the mouse scroll or the keys plus and minus on the keyboard. Move the symbol to a desired position in the image and place this there by new clicking the left mouse button. The symbol will be then solidly burned into the image and will be solidly bounded with it. You can undo the operation directly ongoing (buttons with arrows below the toolboxes) – if the image is saved, the marking cannot be removed again.

You can burn also the texts into images. For this, enter a desired text in the box „free text" or select the text from the list of already defined texts. With the 4 buttons for set up you have the possibility to place black text on white background, white text on black background, black text with no background or white text with no background, depending on that which setting is offered for the current image. Also the text field can be modified in it's size in the same way like virtual lead characters.

11.6 Exchanging images

Not yet saved images can be exchanged in the preview tree on the left side. This may be necessary if the cassettes i.e. are changed by mistake. For this, click with the left mouse button into one of both images in the preview and drag this holding the left mouse button pressed into the another of both images (drag & drop). There release the left mouse button and the images will be exchanged. The other values, like i.e. data from the job or possibly received data of devices, stay at their primary place and are assigned to another image each time in this way.

11.7 Rejecting images

Images can be rejected. This means that they are not transferred to image archive, but deleted. For this, press the button „Reject" on the saving tab. A confirmation message appears, which is to be answered with „Yes".

11.8 Additional devices

If necessary, the further devices, like i.e. X-ray generator or dose area measuring device can be connected to the system. These transfer automatically new values to the system or the system asks the devices cyclically, if new values exist. As soon as new values are available, a new „image" is automatically put on and the values are assigned to it. This new „image" contains no image data yet and is shown as a black box in the preview tree. The next image data, which will be imported, will be assigned to this „image" and the image can be normally saved. The values do not need to be entered manually in the dialogue, but they are always already assigned to the right image.

11.9 Backups

For each image, which will be scanned, creating backup is the first action before the image will be further processed. If there are connected the additional devices, their values will be also co-saved in the backup.

For restoring an image from the backup, first activate a patient, to whom these images are assigned. Next use the button „Import backup…" below the switch for scanning. In the dialogue the thumbnails as well as date and time of the record will be displayed. Select the record, which is to be imported, and confirm with „Ok". The image is imported like you would just scan it. A new examination is created if no other records have been done, the image is added and shown zoomed in in the image preview. As usually, fill out the saving tab with the needed values and transfer the image by pressing „Save" to the image archive.

11.10 X-ray journal

If the module X-ray journal is activated at the station, at which new records will be read in, each time after saving a new entry in the journal is made. This follows automatically according to configuration, if all necessary data are already available. Otherwise, a dialogue for recording data for a new entry appears. The data fields are to be filled out and the dialogue is to be confirmed with „Ok".

11.11 Tips for preview tree

On the left in the preview bar each time new records are co-displayed. New records are marked with a floppy disc symbol in the bottom left corner of the thumbnail. If the record is saved, this floppy disc symbol has additionally a green small tick mark.

If job management is activated and new records have been done within new jobs, the job number will be co-displayed each time in the bottom left corner of the thumbnail.

If you activate a patient (in the job management or patient management), the examinations, which already exist for this patient, will not be opened in the thumbnail (node in the hierarchy), as not the already existing images are important, but new records have priority in this case.

As usually, you can open the zoomed in images per double-click or drag & drop in the image viewer, no matter if these are saved or not. Also the old records can be viewed as usually.

11.12 Problems and solutions

What to do when the cassettes have got mixed up and the order of images is not correct?

Images can be exchanged per drag & drop in the preview tree (see 11.6 Exchanging images). Thereby only image data are exchanged, additional informations like data from the job or connected devices, will stay in their primary positions.

What happens if a false patient was still activated?
If new images have been assigned to a false patient, they can be first deleted (rejected). Next, the right patient will be opened and one of the last records will be imported by using the switch „Import backup…". See 11.7 Rejecting images and 11.9 Backups.
If the images have been already saved, you can also import these for a new patient from the backups and save once again, false saved images of the first patient must however be deleted from the image archive by your system attendant or administrator.

What happens if the device data have been already transferred before the patient is opened?
Device data are also protected in backups. Therefore, first activate a desired patient and import the device data from the backups. Next read also the image data as usually in and save them.

What happens if it is tried to exchange a patient or close a program although not all images of the active patient are saved?
A message appears, that first all images of the active patient are to be saved or rejected. The patient cannot be exchanged and the program cannot be closed if the unprotected images still exist.

What happens if the system has a crash during a recording process?
Start the application again. If you are not sure, if possibly already started saving has been closed successfully, activate the patient from the patient management and check the images of this patient.
First open the list of backups and check if the image or images exist as a backup, in order to restore not saved images. If yes, then import the backup for already correctly selected patient and perform the saving once again. If there are no backups, then on next click on image recording button a dialog is shown which allows to import this images once again. If you select import than existing images are imported and can be saved normally. If no image data are imported, the user's manual of the device is to be used, in order to restore the image data, and contact the system attendant (service), if necessary.

12 Configuration
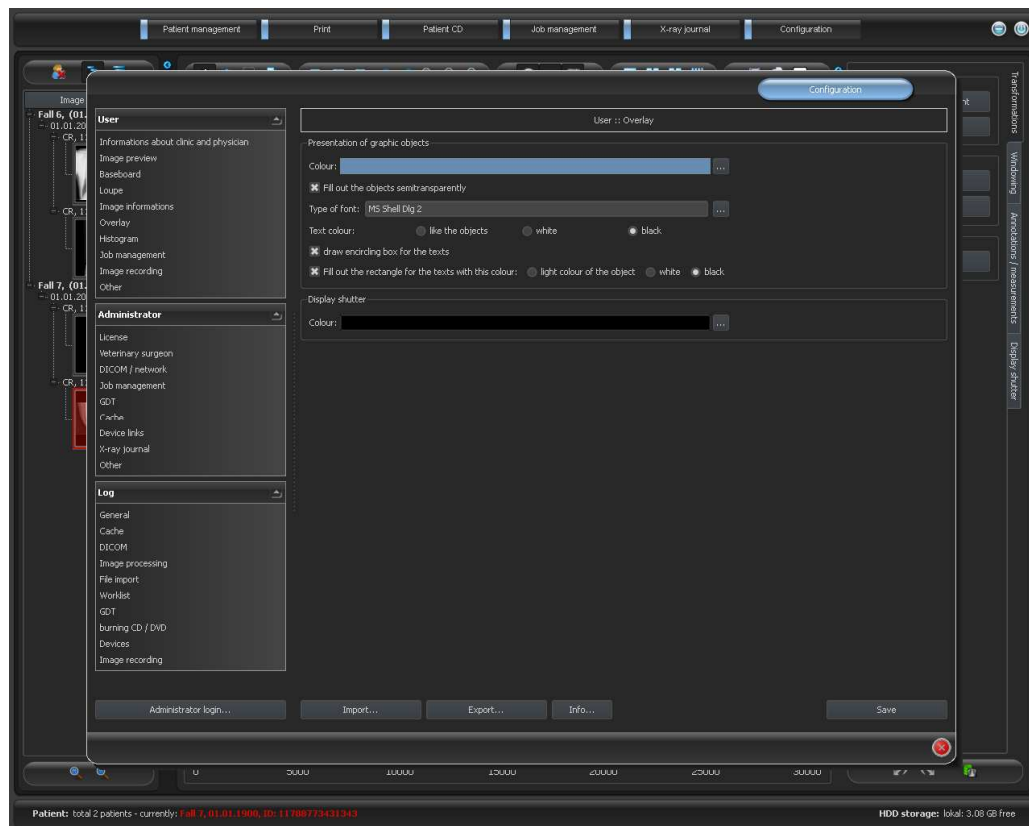
There is a central place for the program configurations. The configurations and also the different log outputs are thereby divided in adequate groups user, administrator and log. Configurations for the group administrator are modifiable only with the administrator rights. The administrator must log in at each selection of these components using the „Administrator login…". Users, which are logged in as administrators, can load the full configuration or it's part from INI file or save in such a file by using „Import…" or „Export…". By using the switch „Info…" the informations on product can be displayed.

Following settings can be made in the configuration:

▪ **informations on clinic and physician**
 Institution: name of a clinic, hospital etc.
 Address: location of the clinic
 Physician name: name of the physician of this station
 Physician number / company identification number: identification number of the physician in the case of clinics or company identification number (may be empty)

▪ **image preview**
 List view preview tree: selection of tags, according to which the images are to be sorted, sorting direction and definition of a displayed text in image nodes (the same principle as for informations on image)

The following tags can be used for sorting or displaying:

0x0008, 0x0016	SOPClassUID
0x0008, 0x0018	SOPInstanceUID
0x0020, 0x0013	InstanceNumber
0x0008, 0x0023	ContentDate
0x0008, 0x0033	ContentTime
0x0028, 0x0008	NumberOfFrames
0x0008, 0x0022	AcquisitionDate
0x0008, 0x0032	AcquisitionTime
0x0028, 0x0002	SamplesPerPixel
0x0028, 0x0010	Rows
0x0028, 0x0011	Columns
0x0028, 0x0101	BitsStored
0x0008, 0x0008	ImageType
0x0054, 0x0400	ImageID

Opening mode: open all: after a patient is selected, all examination nodes and image series nodes are opened in the tree structure, in this way all images of the patient are displayed in the preview; close all: all examination nodes are closed and no image preview is displayed – it will be directed the examination and image series selected, which is to be viewed; automatically: without activated image record the nodes are opened and all thumbnails are displayed, if image record is activated the examination nodes are closed and only newly created examination is opened

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)

▪ **Baseboard**

Monitoring: with the tick mark monitoring for this drive can be switched on or off; select any directory for the drive on the disc, which is to be monitored (this can be also network path); with the prefix a displayed text in the baseboard can be preceeded; if the free capacity of the drive exceeds a critical value, a warning is emitted once a session, if the capacity is lower than the double critical value, the value is signaled in red, otherwise normally black

Update interval: interval in seconds, in which the displayed free storage space is to be updated

▪ **Loupe**

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

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

Zoom factor: zoom factor for the image cutout, which is presented in the loupe (referring to original image)

- **Informations on image**

  Text colour: colour with which the informations in the image corners are to be shown
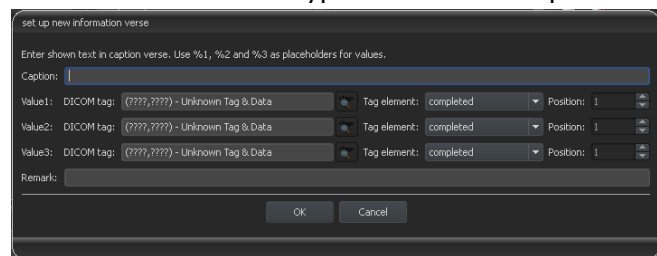
  Font type: font type for presentation

  Zoom factor: with it font type can be adapted (font size adapts also automatically to window size)

  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

  Group elements: for each type of image (modality) you can determine which informations 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 into the desired box, in order to determine the corner of the displaying and next the switch „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 a double-click into the entry in the list fields or with the switch „process active entry" you can delete these. Use the switch „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.

- **Overlay**

  Presentation of graphic objects:

  Colour: the colour for drawing the graphic 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: the colour, with which the hidden areas are to be overlaid

- **Histogram**

  Shorten left and right: with this 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.

  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: 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

- **Job management**

  Fields of the job management: select all fields, which you want to use during the work with the jobs. Deactivate the fields, which you do not want to use.

  Application range: the application ranges are the ranges, in which the job data can be recorded or displayed. You can define here, for which of these ranges your above selection is to be used. In the ranges, which are not activated here, all data fields will be displayed.

  Use colour-marking of the fields: if this option is activated, the data fields will be backed in the different application ranges according to their meaning. If this option is deactivated, no colours will be used (white).

- **Image record**

  Mode image series: creating all new images in an image series or an own series each time

  Automatic image transformations: for each new recorded image these transformations are made automatically

  Markings: activating markings; selecting image types of virtual characters; setting font type for free texts

  Entry in X-ray journal: showing data once again or automatically generating the entry, if all necessary data are available

  Delete worklist job: with the query or automatically after saving the belonging image

  Status message saving: setting the display duration of a message (seconds) or entering 0, in order not to display the message (status message show informations about the performed operations for the just saved image)

  Backups: number of the backups which are to be created (the eldest one will be always deleted, when this number will be exceeded)

  Others

  User interface: different possibilities for presentation

  Position of toolbars: for the monitors in portrait mode the placing on the left is recommended – this happens automatically or can be determined explicitly

  Toolbox height (window placing): for the monitors in portrait mode a short toolbox and wider bottom working bar (histogram) is recommended – this happens automatically or can be determined explicitly

  Archive data: after opening the program this setting is used for retrieving the list of patients (Initialising) and if an update of the data is needed

Mouse function windowing: synchronic with the below displayed histogram or transposed, in order to retain the usage from another system

Scroll mode images: images can be changed with mouse scroll. 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 examination can run or even over all images of a patient, so over the limits of an examination to the next examination

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)

Presentation of marked images: showing or not the blur for marked images (if not, only a red point in the top right corner)

Informations / messages: for some actions the tips in a small window in the bottom right monitor edge are output – display duration can be set here or these messages can be deactivated completely

For the view of the log outputs select in the group „log" the desired category. After that the log outputs of this category are displayed on the right of the window. The outputs in the log window can be marked with the mouse and Strg + A and copied to clipboard with Strg + C. Then they can be inset again and also saved there in any editor. Moreover, a log file global.log is led in the installation directory, in which all activities of the application are minuted.

13 Exiting the program

You exit the program with the symbol ⚛ in the top right corner of the headline or with the red X in the Windows frame for closing the main window (depending on configuration). Thereby the application is minimized only to a System Tray Icon, which you find on the bottom right (red X as a symbol), unless otherwise set by the administrator. The application is still active in the background and can be opened again via context menu of the System Tray Icon. Via this context menu the application can also be explicitly completely exited.

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

If you hold any of the control keys (Shift, Strg or Alt) pressed on while closing the main window (red X in the top right corner), then the application will be immediately completely closed and not reduced to the System Tray Icon. The same happens if closing with Alt + F4.

14 GDT interface

GDT identification: GDT–D–11

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

GDT record type	Action
6301: delivery of master data	▪ patient to the GDT file forwarded is set up locally, if he does not yet exist in the set image archive ▪ at the program start or if no other components are opened, the patient management will be opened
6302: request for a new examination	▪ first, a patient is set up locally, if he does not yet exist in the system ▪ next, he will be selected for work ▪ at the program start or if no other components are opened: A) only the patient is activated, if the module image record is activated and the record thereby is performed directly at this or B) a worklist component has been started and a dialogue for creating a new job is activated, if the image record is not activated ort he application has been started with /w as a parameter
6311: show examination data	▪ patient is also here first set up locally, if necessary and selected ▪ no component is started, but all available examinations of this patient are displayed in a preview tree and can be viewed immediately in a viewer ▪ the first image of examination is displayed (if a date of examination has been forwarded and an examination with this date will be found)

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

15 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 it's 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.

Note: saving data of animals is not provided by international DICOM standard (on which the architecture of the system bases). Hence the special settings will be made by your administrator, in order to save the values of other DICOM tags. The images, which will recorded in this way, are therefore not or only conditionally „compatible" with other systems (i.e. animal name or animal species will not be displayed correctly in another system ort his
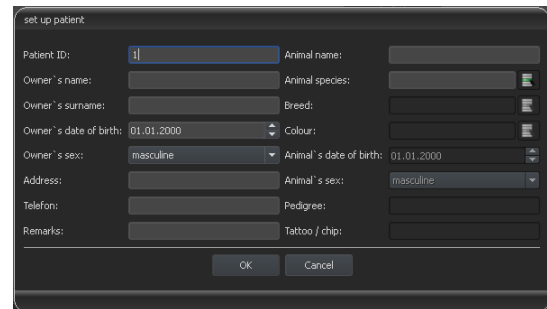
value will appear in another place in the system). However, operative performance of the systems is not endangered.

15.1 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 sex 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. Some fields can be deactivated thereby and cannot be used. These have been disabled by your administrator, as they are irrelevant and the system is easier in operating.

15.2 Job management

In the table of patients of the upcoming jobs animal name (owner's name), animal species and number of received images, if necessary, 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.

The dialogue for creating job does not show an image for organ selection, unless separately established. Entering data follows therefore fully manually as a text.

15.3 Printing

For printing, 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 sex has been activated by your administrator, this row will be output with the standard header at the printing.

15.4 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 8 Patient CD) and next as follows:

- owner's name: "AnonymOwner" or "AnonymOwner1", "AnonymOwner2" etc. for many patients
- owner's date of birth: 01.01.2000
- owner's sex: 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.

15.5 Others

Informations, 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 examinations. The preview tree shows also animal name and owner's name in brackets.
Also animal name and owner's are shown in brackets on a baseboard.

16 Others

16.1 Tables

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

16.2 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 informations on this field – action, which can be performed via this field or meaning of the configuration possibilities.

16.3 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.

Product: digipaX

Manufacturer: digipaX GmbH
                      Bitterfelder Str. 12
                      04129 Leipzig

This product is CE approved.

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