



Version 2.1.3

Administrator's Guide

Installation and Administration

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1 Introduction

1.1 General



This document is confidential!
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In this document we explain the installation of various components as well as the functions and settings that go beyond the user's documentation. A normal user has particularly limited accessibility to the system settings. The integration of digipaX software in an overall-system comprising numerous DICOM and GDT systems can only be made by competent persons, the administrators.

For administrators and maintenance staff special training is needed. Information on trainings can be obtained from the manufacturer.

Using this documentation and the password at the end of this document the administrators will be able to configure digipaX for specific situations in practice.

1.2 Symbols and illustrations

Symbol	Meaning
	Note
	Tip

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

1.3 Possible risks

To reduce the risk of electric shock please heed the use of the CE marked hardware and keeping of the safe distance of 1.50 m between the installed hardware components and the patient (see Section 2.2.4 Hardware and safety and 2.2.8 Installation and connection instructions). In addition, galvanic isolation should be used when connecting devices with a data cable.

To prevent loss of the entire image archive, multiple and dispersed storage of the image data must be provided. For this purpose, please read Section 2.2.3 RAID system and backup.

The users of the system should be instructed that the failure to follow the operating manual is associated with the risk. In particular, it is imperative that all safety precautions in the User's Manual are observed.

2 Network and hardware

2.1 Data network

2.1.1 Purpose of connection to data network

Purpose of embedding in the data network is availability of central data stock of DICOM images on multiple computers and inter-device data exchange by

- sending/receiving DICOM images via DICOM Communication,
- sending/receiving jobs via DICOM Worklist, and
- recalling/creating/transferring files as e.g. thumbnails, worklist files, XML files, license files etc. through enabling Windows in Microsoft networks.

2.1.2 Properties and features required

- Network topology Ethernet
- Star topology
- Min. 100BaseT, but 1000BaseT or more is recommended

2.1.3 Configuration required

- Network protocol TCP/IP
- Preferably static IP addresses, if dynamic addresses are used, an accurate name resolution of hostnames in the network is required (usage of DNS or WINS, in exceptions by editing the file „hosts“)
- Windows operating systems (see Section 2.2.2.1)
- Windows working groups or domains
- RAID system (RAID1, RAID5 or RAID10) for data

2.1.4 IT security requirements

2.1.4.1 Measures to maintain IT security

2.1.4.1.1 Standard measures

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

- Use of usernames and passwords to log on to PC
- Use of usernames and passwords to log in to application software such as PACS or practice management
- Use of virus scanners and firewalls on all systems that are components of your IT infrastructure
- Regular updates of the virus scanners used
- Regular updates of the operating systems (Windows), particularly the security patches provided by the manufacturer
- Updates of the application software, particularly the security patches provided by the manufacturer (Office, PDF Reader, etc.)

- Also, for other systems such as practice management, PACS or image acquisition systems, the most recent updates offered by their manufacturers should be installed
- The lifecycle of the devices should be taken into account with regard to available updates (particularly upon the end of support by the manufacturer)
- Use of secure WLAN networks encrypted by the up-to-date methods

2.1.4.1.2 Extended measures

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

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

2.1.4.2 Minimum requirements for IT security with digipaX

The PCs and the network must be protected from access by unauthorised persons by means of usernames and passwords. If the network is connected to the internet, it must be protected from any cyber threats from the internet. Most devices accessed online (DSL router, Fritzbox, etc.) already have an internet firewall to protect the network. In order to prevent unwanted communication from the inside to the outside towards the internet, local firewalls can also be activated on the particular PCs.

2.1.4.3 Necessary ports and enablements for data traffic with digipaX

It must be ensured that a smooth flow of network traffic between the stations is not impeded or completely blocked.

The following services and ports are required:

- Port 2400 for Service Center, on the server only (see 3.2)
- Port 3306 for MySQL/MariaDB database (firmly defined)
- Ports for image archives (see 6.4.1)
- Ports for images queries at workstations (see 5.2.1)
- Ports for automatically image receiving at workstations (see 5.2.1)
- Port (2200) of the worklist server or ports of the external worklist server (see 6.4.4)
- Read and write access from all digipaX stations for appropriate users to the shared directory "dpXSYS" on the server

Furthermore, the systems must be protected against malwares by installation of antivirus softwares. Should the above-mentioned ports already be in use, they can be changed. All free ports from 1024 can be used for this.

2.1.5 Other information on communication flow

- Read and write access to digipaX system path dpxsys (Folder sharing)
- Querying job list (Worklist) from server (DICOM Query - C-FIND)
- Accessing images from server (DICOM Query Retrieve - C-MOVE)
- Sending images to server (DICOM Send - C-STORE)
- Querying information on patients, studies and images from server (DICOM Query)
- Poss. exchanging GDT files with third-party systems (folder-enable)

2.1.6 Possible risks if requirements are not met

- Time delays in cases of emergency because:
 - o software does not start (no access to license file)
 - o images cannot be queried or are queried only very slowly
- Other possible limitations that do not impact directly:
 - o creating jobs impossible
 - o querying job list impossible
 - o long waiting times (if network is slow or configured inappropriately)

2.2 Hardware

2.2.1 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.

2.2.2 System requirements

In principle, the digipaX software is available as a 32bit or a 64bit version. A 64bit version requires a 64bit operating system. Only a 32bit version of the digipaX software can be installed on a 32bit operating system.

The modules for image acquisition are available in the 64bit digipaX version only.

It is generally recommended to use a 64bit operating system and a 64bit version of the digipaX software.

2.2.2.1 Supported operating systems

The following Windows Desktop operating systems 32bit or 64bit are supported in the versions Professional, Pro or Enterprise. Windows Home Editions are not supported.

Windows 7 (SP1)

Windows 8.1

Windows 10

Windows 11

The following Windows Server operating systems are supported

Windows Server 2008 R2 (SP1)

Windows Server 2012/2012 R2

Windows Server 2016

Windows Server 2019

Windows Server 2022



When using the digipaX application on Windows Server, it may be necessary to install the "Desktop Experience" feature of Windows. The installation is to be made in server manager above the switch "Add feature".

The maximum number of simultaneous accesses to network shares is limited to 20 in Windows 7/8.1/10/11.



To access server, operating systems corresponding CALs must be present. For more please refer to the license conditions for the operating system and/or ask your system vendor.

2.2.2.2 digipaX server

Recommended system configuration:

Processor	Quad-core processor 2,5 GHz or higher
Main memory	Min. 8 GB RAM or more
Operating system	Windows Server 2019 or higher
Graphics card	Minimum 512 MB DVI (dual), 1280 x 1024
Harddisk	System disk min. 120 GB + additional image store (RAID system)
Network	1000BaseT (Gigabit Ethernet)

Minimum system requirements:

Processor	AMD Athlon 64 or similar min. 2,2 GHz
Main memory	Min. 2 GB RAM
Operating system	Windows Server 2008 R2 (SP1) or higher
Graphics card	On-board graphics, 1280 x 1024
Harddisk	System disk min. 60 GB + additional image store (RAID system)
Network	100BaseT

2.2.2.3 digipaX workstation

Recommended system configuration:

Processor	Quad-core processor 2,5 GHz or higher
Main memory	Min. 8 GB RAM or more
Operating system	Windows 10/11 Pro x64
Graphics card	Minimum 512 MB DVI (dual), 1280 x 1024
Harddisk	Minimum 120 GB
Network	1000BaseT (Gigabit Ethernet)

Minimum system requirements:

Processor	Pentium 4 or similar min. 2,1 GHz
Main memory	Min. 2 GB RAM
Operating system	Windows 7 Professional x86 (SP1)
Graphics card	On-board graphics, 1280 x 1024
Harddisk	Minimum 60 GB
Network	100BaseT



For use of the workstation as an image acquisition station a 64bit operating system is required.



For use of the workstation as an image acquisition station additional 10 GBs of free harddisk space are required.

2.2.3 RAID system and backup

Size of the RAID system depends on the expected number of images.



The image archive data is to be saved on a RAID system, in order to minimize the data loss risk. The use of RAID 1 or RAID 5 is recommended. Use the RAID systems with monitoring functions in order to signal immediately any malfunctions or failures of the RAID components to the user or administrator to allow them a prompt reaction as a failure of another components might cause a breakdown of the RAID and damage of data stored on the system.

In addition, the data is to be put on further hard disks by their mirroring or daily backups (see also chapter 9).

2.2.4 Hardware and safety

The installed hardware must be CE marked and meet the requirements of EMC and Low Voltage Directive.

The restrictions on application as well as maintenance and use instructions for the installed hardware are to be followed according to the manufacturer's information and standard EN 60950-1.

It is necessary to ensure proper functioning of the installed hardware components before the software will be installed and taken in use.

2.2.5 Use within urgent care facilities

The equipment used within urgent care facilities, such as ambulance or hospital emergency department, must meet specific requirements. In these places, prevention against possible malfunction or breakdown during time-critical medical procedures is needed. Computers must be protected against power blackout by uninterruptible power supply solutions, if the urgent care facility is not already protected by any kind of emergency power supply. Permanent availability of image and patient data as well as server services must be assured. This can be obtained by mirroring of image data or any other cluster solutions. Appropriate measures should also be taken in order to prevent failure of the workstations, which means providing a ready to use substitute station. Networks must meet the requirements of IEC 80001.

2.2.6 Noise level

The installed components, in particular fans of the system should meet the current directives in terms of noise level and keep the required noise limits.

2.2.7 Diagnostic display

The diagnostic workstation requires a special diagnostic display according to quality assurance directives for radiographic equipment. In order to ensure the quality of the display, a daily visual inspection is necessary. This can be made via software (e.g. "LUXOR DisplayQ") or by using the SMPTE test patterns. The staff must be trained accordingly.

2.2.8 Installation and connection instructions

While installing and connecting the systems, the specifications and precautions provided by the manufacturers must be followed.

The installed hardware must be CE marked and meet the requirements of EMC and Low Voltage Directive. The restrictions on application as well as maintenance and use instructions for the installed hardware are to be followed according to the manufacturer's information and standard EN 60950-1.

It is to ensure that between the installed hardware components and a patient a distance of 1.50 meters will be kept (so that no simultaneous touch of hardware and patient is possible). Moreover, all the hardware must stand safely. Monitors should also stand safely so that they cannot be pulled down accidentally. Cables are to be so installed that loose hanging is avoided.

The hardware shall be located in such a manner to allow for quick and easy disconnection from power supply in emergency situations. 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.

There are no known interactions between computer hardware and X-ray system. Therefore, no special precautions for their installation are given.

2.2.9 Uninterruptible power supply (UPS)



Check if an uninterruptible power supply of a device is necessary to prevent image loss during data transfer from external appliances and to exclude possible dangers for patients. The instructions of the manufacturers relating to this must be followed.

Please provide also necessary protection for servers and network components when needed (e.g. LAN switches, access points).

2.2.10 Cleaning with disinfectants

The installed hardware can be cleaned in principle with common disinfectants. The hardware components may not get damaged by using such disinfectants. Inform the staff especially if such cleaning of installed hardware is not acceptable.

2.2.11 Software

The same version of the digipaX software is to be installed at all interconnected stations.

Firewall and virus protection system settings have to be adapted accordingly to ensure that they do not impair or block use of the digipaX software.

3 Concept

3.1 General

At every health facility equipped with digipaX software installed system comprises a central server and digipaX workstations. The workstations connect to the server at each startup. digipaX workstations are used by users for signing in. Users can be divided into different user groups according to their tasks. Whichever workstation the user chooses to sign in, always the settings predefined by this particular user will be automatically loaded. This is carried out by a central directory connected to the server, which is responsible for communication and configuration. This directory contains configuration settings for all users and groups, and also further configuration files, e.g. for GDT, Hanging Protocols, Bodies for job management etc. as well as thumbnails and Presentation States etc.

The configuration is also stored centrally on the server, thus any changes made to digipaX settings are effective for all relevant digipaX stations. The only thing needed is to restart digipaX at these stations.

The configuration is set in the Control Center. It can be accessed from every digipaX station.

3.2 Service Center

3.2.1 General

The Service Center is installed only once on the central server. It manages the central directory dpXSYS. It is automatically installed as a service running in the background. The necessary settings for the Service Center are defined in the central configuration file "global.ini" (see chapter 3.3.1).

3.2.2 Service Center commands

For administration after the installation, the Service Center can be managed by various commands contained in the command line.

C:\digipaX\digipaX2\ServiceCenter.exe -exec	->	starts the Service Center as an application
C:\digipaX\digipaX2\ServiceCenter.exe -i	->	installs the Service Center as a service
C:\digipaX\digipaX2\ServiceCenter.exe -s	->	starts the service
C:\digipaX\digipaX2\ServiceCenter.exe -t	->	terminates the service
C:\digipaX\digipaX2\ServiceCenter.exe -u	->	uninstalls the service

Alternate commands:

net start "digipaX Service Center"	->	starts the service
net stop "digipaX Service Center"	->	terminates the service

3.2.3 Service Center services under another account

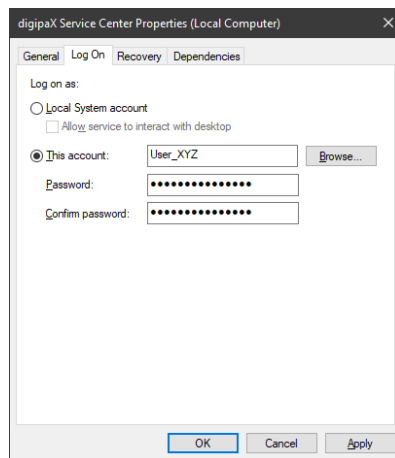
For some functions it is necessary for the Service Center to need write permission to a directory on another station. For example, when GDT responses are to be written to a central directory of the practice management.

The Service Center runs under the system account. With this account, however, it is not permitted within the work groups to write to a share on another station. Depending on the security settings, this may also be the case within domains.

In such cases, it is recommended to make the Service Center run under a user account and assign this user the necessary write permissions to share on another station.

On the local station on which the Service Center runs, however, this user needs administrator rights.

The change of the account for the Service Center is done in Computer Management and "Service and Applications/Services". To do this, the settings of the "digipaX Service Center" service must be changed from "Local System Account" to the corresponding user account.



Where required, the same user account must first be set up on the other station.

3.3 Configuration files

In principle, manual edition of configuration files is not necessary. All changes are made from the Control Center. Only in exceptional cases it may be necessary to implement changes manually.

3.3.1 global.ini

The "global.ini" file is a global configuration file located in the directory "\\SERVER\dpXSYS\cfg". In this file central path for image archives, hostname of the server and port for the Service Center, main language and modalities are defined. These settings apply to all stations connected to the digipaX server.

Example:

```
[Server]
HostName=SERVER
Port=2400
MainLanguage=de
LogLevel=1

[Images]
Path=C:\\digipaX\\Images
LastRouterCleanup=...

[TargetModalities]
TargetModality0\IdentName=...
...
...
```

\\SERVER\dpXSYS\cfg\global.ini

These values are preset at the setup of the server, and can only be changed later by editing the "global.ini". This operation should be carried out with extreme caution because changing an image path could possibly affect all the archives. It is recommended to have this path fixed and already available before installing the server (the RAID, see 2.2.3, must be set up and ready for operation).

Also note that two "\\" must be written for each backslash "\" in the global.ini.

3.3.2 group.ini

This file contains configuration settings of user groups. Each user group has its own configuration file. The path for the "group.ini" is located on the server and looks as follows: "\\SERVER\dpXSYS\cfg\{Group-ID}\group.ini".

The Group-ID is a randomly generated string and replaces the group name for internal processes.

Example:

\\SERVER\dpXSYS\cfg\{ed7b17de-3f49-4f3f-82a5-72ea3ea00f29}\group.ini

This ID is automatically generated along with creating the group, it constitutes then the name of the directories for this group under "\\SERVER\dpXSYS\cfg" and "\\SERVER\dpXSYS\data" and is also used in corresponding configuration files where necessary.

3.3.3 user.ini

There is a configuration file "user.ini" for each user that contains personal settings of the users. This file is located in the user directory. The user directory is located in the corresponding group directory of the group, of which the user is a member, e.g. "\\SERVER\dpXSYS\cfg\{Group-ID}\{User-ID}\user.ini". As with groups, the user is internally replaced by a randomly generated ID.

Example:

```
\\SERVER\dpXSYS\cfg\{ed7b17de-3f49-4f3f-82a5-72ea3ea00f29}\{ae808cb1-39b5-4552-a41f-67c982113938}\user.ini
```

3.3.4 local.ini

The "local.ini" file is only locally responsible for the workstation and contains the settings that are only valid on this workstation, such as the number of monitors used, settings for image acquisition, locally connected devices, etc. This file is located in the digipaX program directory.

Example:

```
C:\digipaX\digipaX2\local.ini
```

4 Installation



For the installation the administrator rights are necessary. User account control as well as use of security software and firewalls may cause problems whilst installing the digipaX software. Settings of such programs may require adjusting (enabling of ports, approval of accession rights to the programs and for the user etc.).

4.1 Guidelines

Process	Page number for information
1. Installation digipaX2 Server <ul style="list-style-type: none"> ▪ Installation digipaX2 Server / Stand-alone ▪ Installation digipaX2 Client 	23
2. Installation of other tools <ul style="list-style-type: none"> ▪ Installation of tool or image for daily visual inspection 	14
3. digipaX configuration <ul style="list-style-type: none"> ▪ Commissioning digipaX (fill information) ▪ Creating users and user groups ▪ Enabling modules and assigning users ▪ Connecting image archives ▪ Connecting worklist server ▪ Adjusting caches ▪ Adjusting X-Ray journal ▪ GDT connection ▪ Setting as veterinary version 	33 33 35 38 46 26 96 77 92

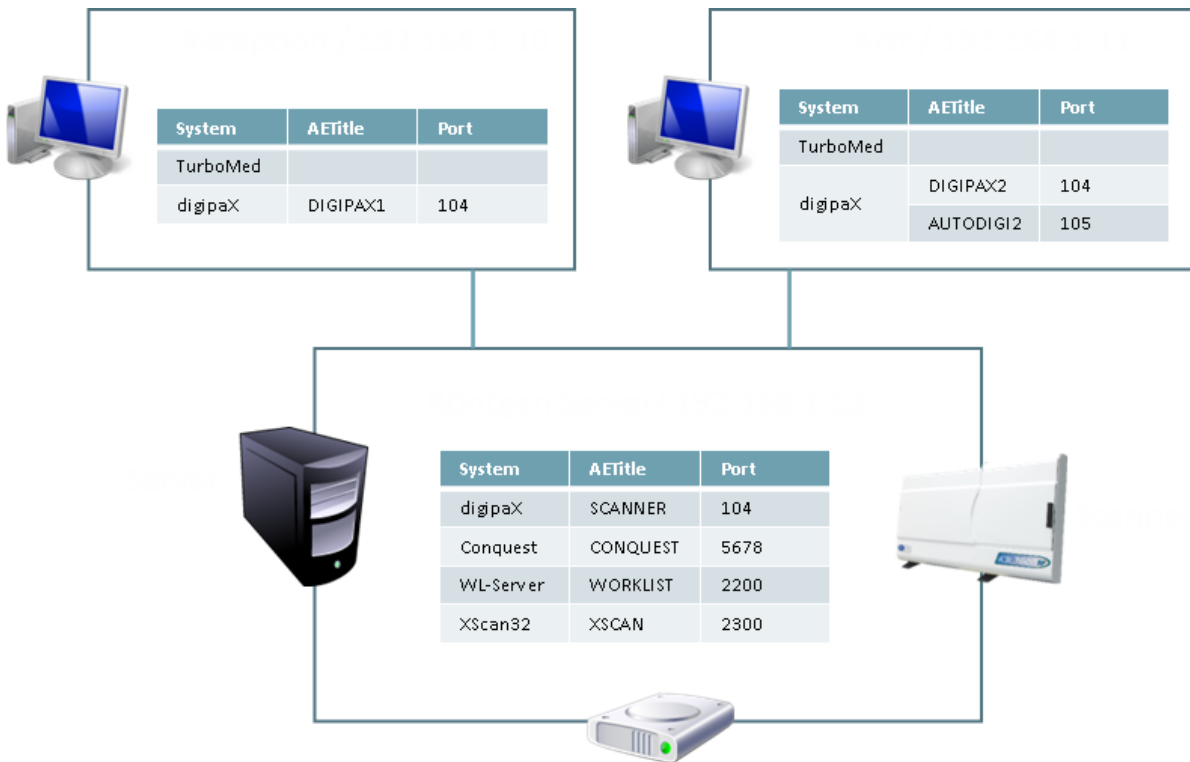
4.2 Completion of overall system

Process	Page number for information
1. Routing setup <ul style="list-style-type: none"> ▪ Enabling image receiving in digipaX ▪ Configure routing rules 	26 41
2. Archiving <ul style="list-style-type: none"> ▪ General ▪ Setting up a backup CD/DVD 	111 114
3. System commissioning <ul style="list-style-type: none"> ▪ Acceptance testing ▪ Completing checklist 	117 117

4.3 Installation and interconnection plan

Especially for larger systems in which DICOM router, worklist server, multiple image archives and even third-party system may be integrated, it is recommended to make an interconnection plan for the systems involved. For each computer, enter its name, IP address and systems which are to be installed. For each DICOM system, specify an AE Title and port, where it will be accessible (for servers – Service Class Provider (SCP)) or which will be used by it for image query as Service Class User (SCU).

Example of a simple system structure:



4.4 Installation of digipaX2

4.4.1 General

In a classic network with multiple digipaX stations installation always begins from the server. The server is the central computer on which the services required for digipaX run and the image archives are stored. It should be sufficiently capable and secure.

For use of a pure stand-alone station the server components are also required. Therefore, the installation procedure of the server does not differ from that of a stand-alone station.

4.4.2 Extended installation

Within the standard installation both the platform (32bit/64bit) and the required components are selected automatically. To manually customize the installation the setup program must be run manually using additional options contained in the command line. Please note that the following is case-sensitive.

- digipaX 32bit Version on 64bit operating system
 - o digipaX2_Installer.exe TargetPlatform=Win32
- Manual selection of components at the setup
 - o digipaX2_Installer.exe ComponentSelection=true

4.4.3 Installation of server / stand-alone

The installation begins as follows:

- Start setup; depending on the operating system the 32bit or 64bit installation will start automatically
- Select Server / Stand-alone for installation of the server
- Select main language (see 4.4.4)
- Follow instructions of the installation program

As paths for the image data and the dpXSYS directory a RAID system is recommended which is to be backed up at least weekly (see chapters Hardware, Archiving and System commissioning).

The MariaDB database system on port 3306, the worklist server on port 2200 and the digipaX Service Center on port 2400 are automatically installed, and the necessary services for them are set up and started. The necessary firewall rules are also set on the server.

Furthermore, all digipaX program components including Control Center are installed.

After installation the server is immediately ready for use and can be used as a stand-alone workstation along with the digipaX components. As soon as the Control Center is started the configuration of the stand-alone workstation begins.

The Control Station is also installed on each client station. Almost all configuration settings can be made from the Control Center.

If there is an environment with multiple client stations, the administrator can configure the system directly on the server or, optionally, from each client station.

4.4.4 Main language

Main language is the global system language. Among others, the Control Center, the sign-in dialog box and dialog boxes before the user is signed in are displayed in the main language. The main language is defined during the installation of the server, but can be changed later in the "global.ini" (see 3.3.1) under the section "[Server]".

MainLanguage=xy

- Supported languages are:
 - de = German
 - en = English
 - pl = Polish
 - uk = Ukrainian

4.4.5 Installation of workstation

Once the server is installed, you can proceed with the installation of the clients. The installation begins as follows:

- Start setup; depending on the operating system the 32bit or 64bit installation will start automatically
- Type in hostname of the digipaX server
- Follow instructions of the installation program

All digipaX program components and the Control Center are installed.

As described above, the system can be configured from any station using the Control Center.

4.5 Xadmin

If needed, the tool Xadmin can also be used to support some administrator's tasks. Currently Xadmin supports acquisition of already existing data (DICOM images from previous system), modifications of tags in batch mode and creation of X-ray journals from the tags of the DICOM files. For more, read the Xadmin user's manual. The program starts through Xadmin.exe. Conquest image is based on database system MySQL/MariaDB.

4.6 Backup

This tool is necessary for creating image files backup on CD / DVD.

4.7 Ghostscript

Ghostscript is required for importing the PDF documents with the import module.

4.8 Presentation of Encapsulated PDF

For presentation of DICOM files with "Encapsulated PDF", a corresponding PDF program must be installed (e.g. Adobe or Foxit Reader). Most web browsers such as Microsoft Edge or Firefox also support presentation of PDF documents.

5 Configuration of administration area

5.1 General

5.1.1 Administrator login

To log into the configuration page and to choose another license file at the startup of the program as well as to call up the license viewer, please provide the following (predefined) password:

digi4admin

The system here distinguishes between uppercase and lowercase letters. Password can be changed in the Control Center on the page "Service Partner".

The software can be started by Program parameters /a Password (e.g. /a digi4admin) to get administrator rights at once without having to sign in. This option should be enabled only during the administration or maintenance works.

The password is used to protect the software from unauthorized and erroneous setting changes. It should therefore be shared only with the persons responsible for managing the system.

The password can also be used to delete entries from the X-ray journal, or to delete or edit patient data.

If you lose your password, digipaX can reset it and set a new password.

5.1.2 Control Center

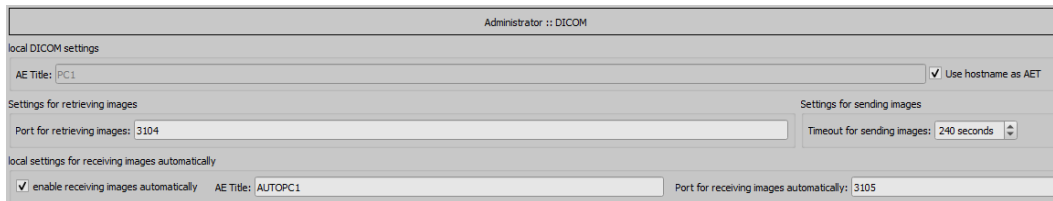
This button will lead you to the Control Center for the central configuration of the digipaX system, see chapter 6.

5.2 DICOM

5.2.1 Local DICOM settings

Each digipaX station requires a unique AE Title for communication with the image archive. For new installations hostname is automatically predefined as the AE Title where only the local part of the hostname without the domain extension is used (from pc1.praxis.local only pc1 is used). However, the AE Title must not have more than 20 characters. If the hostname is longer the characters at the end will be deleted.

The option "Use hostname as AET" is enabled and the port set at each station for quick configuration.



For manual configuration you need to enter the requested AE Title in the input field "AE Title". The AE Title you have entered will be used for DICOM communications with the archive. Transfer of images can take several seconds depending on the existing network and the size of the image files.

If the network is slow or problems with connections occur it may be necessary to set a longer timeout in order to avoid a premature connection termination.

If, for example, the images are to be sent to another location a slow upload is often a problem. Automatic image download is for routing functions and is described in chapter 6.4.3. The setting "local (temporary) data" is for use without surgery management resp. without GDT 6.6.1.5.

5.2.2 Cache of DICOM images

DICOM images must be saved in a local cache so that you can use them.

If monitoring function is enabled, the cache grows up to the specified cache size and is then automatically emptied by half. This prevents the harddisk from filling up.

For the cache size values around 5.0 GB are useful.

Alternatively, if there is very little hard disk space available, the cache can be deleted automatically when exiting the program.

The cache processes can be viewed in the cache log.

5.3 Action control

For the GDT record types 6302 and 6311 actions can be customized. For both record types it is possible to A: always start a predefined action, B: start an action which is requested from a characteristic field, or C: always open the quick navigation bar for the user to be able to select an action.

5.3.1 GDT: new study (record type 6302)

The default action is usually "Create job" to start a new study. The following settings can be made:

- Fixed actions:
 - o Create job
 - o Import pictures or documents
 - o Import patient CD

- Accordingly to characteristic field:
 - o Starts the action requested on the configured characteristic field (recommended 8402 or 8410)
 - o Possible action controls, see chapter 6.6.1.4
 - o Use of another GDT field is possible, but does not comply with the GDT standard

- Quick navigation:
 - o Quick navigation is always started for record type 6302

5.3.2 GDT: Showing images (record type 6311)

The default action is usually "Show images" to display the images of a patient in the image viewer. The following settings can be made:

- Fixed action:
 - o Show images
 - o Export images
 - o Print images
 - o Burn patient CD

- Accordingly to characteristic field:
 - o Starts the action requested on the configured characteristic field (recommended 8402 or 8410)
 - o Possible action controls, see chapter 6.6.1.4
 - o Use of another GDT field is possible, but does not comply with the GDT standard

- Quick navigation:
 - o Quick navigation is always started for record type 6302

5.4 System

5.4.1 Operating on Terminal Server

This option is for operating on a terminal server. digipaX is installed as an application on the server and is available to users who sign into the server through a terminal session / remote desktop session.

The configuration is set from a separate card (see chapter 5.6).

The activation and the configuration card are only available if the module for "Terminal Server" is enabled in the license.

5.4.2 System directory

This is the central system directory on the digipaX server that all stations access.

5.4.3 System tray icon

In order to have digipaX active permanently, you can activate this option on the configuration page Administrator / Others which minimizes digipaX to the system tray icon when exiting the program (red X).

When the application is minimized to the system tray, images are still received in the background, the cache is monitored and the "awakening" by GDT is faster than restarting the program. Through the context menu of system tray, you can reopen the main window, or close the application.

If along with the clicking on the red X to close the application you press one of the Shift or Ctrl control keys, then the application will actually closed completely.

The computer can be normally shut down or restarted without closing digipaX. In such a case, digipaX will be properly closed during the shutdown process.

5.4.4 Automatic start

Also on the configuration page Administrator / Others you can activate the option of an automatic start. With this option enabled, digipaX launches automatically at Windows startup and is stored on the system tray. When the desktop icon is double-clicked or at startup from another system (GDT), the window only needs to be activated, which makes software boot extremely rapid.

With setting of initializing delay the auto boot of digipaX can be delayed e.g. to wait for start of the Windows and network services.

5.5 Image acquisition

Image acquisition system for a local station is enabled by typing a right check mark.

- System = All digipaX 2 systems defined in the Control Center are available in a drop-down list (see 6.5.5). Only one system can be enabled.
- Prepare system = By tapping this button all necessary software and driver files for the selected system can be copied to the local station (if required) and installed, where needed. Depending on the connected hardware additional dialogs or programs can be opened during the system preparation.
- Working directory = Local directory for saving the images in backups and storage of the final files in a temporary, local database.
- Storage = Period of time during which the newly acquired images are temporarily stored until they are discarded (min. 30 days). No images, however, are deleted from the archives. Depending on the amount of data expected, the directory should be moved to where enough storage space is available. As soon as the free storage space drops below 10 GB, a warning message pops up when at program startup, the image acquisition is blocked and will not be rereleased until at least 10 GB free storage space is available again.
- Number of backups = Number of image acquisitions that are backed up during the acquisition in order to enable their re-load later on when necessary

5.6 Terminal server

After activation all local settings are moved from the "local.ini" under "C:\digipaX\digipaX2" to a new "local.ini" in the user profile on the terminal server under the path "%UserProfile%\AppData\Roaming\digipaX GmbH\digipaX 2". Each user signing into the server have therefore their own settings.

However, some settings have to be customized separately for each user of the terminal. These include the DICOM settings of digipaX, the image cache and the GDT settings.

When doing so, the corresponding values on the configuration page and in the Control Center are overwritten.

- Each user of the terminal must have their own AE Title and port for local receiving images
- Furthermore, each user of the terminal must have their own directory for the image cache. We recommend subdirectories in the cache directory, e.g.:
 - o C:\digipaX\digipaX2\Caches\Images\TS-User1
 - \TS-User2
 - \TS-User3
 - \etc...

5.6.1.1 Special GDT settings for client

The GDT settings must also be customized separately for each user of the terminal.

Some practice management systems support only one transfer path for the GDT transfer to digipaX for all users. In these cases it is recommended to establish a share on the digipaX server with individual image cache-like subdirectories:

- o [\\Server\GDT\TS-User1](#)
 - \TS-User2
 - \TS-User3
 - \etc...

Each user connects then his or her own directory as a network drive under the path "X:". This path is the same for all the users and can be set up in the practice management.

5.7 Log

5.7.1 Global log level settings

The log level for the Service Center, Control Center and all stations is defined in the "global.ini" in the section "[Server]". To change the log level, a corresponding value must be specified behind "LogLevel=".

0 = Trace	4 = Warning
1 = Debug	5 = Error
2 = Info	6 = Fatal
3 = Success	

If the entry is not present, the default value "1" is used for "Debug". After changing the value, the Service Center and all stations must be restarted.

5.7.2 Log window

In the configuration there is a "Log" tab that allows to view the processes of the current session, divided into workstation and server, each of which is divided into various program groups (categories).

Furthermore, the outputs can be filtered in several 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 failures are displayed at this level. The recommended levels are "Info" or "Debug".

By ticking the checkbox "select all" or "select none" you can enable or disable all log categories.

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

Other buttons are "Update log window", if the 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.

In the installation directory, the corresponding files "digipax.log" on each workstation and "ServiceCenter.log" on the server are written that are constantly updated throughout all sessions. Furthermore, the "ControlCenter.log" file is written on each workstation. This file cannot be viewed in the program but only using an editor.

Regardless of the settings of the log windows, all processes are written to the log files at the level according to the set level in the "global.ini". For a temporary log output in the "Trace" level, the corresponding component can be started with the /tl option (e.g. digipax2.exe /tl). The value in the "global.ini" is ignored.

5.7.3 Size of log files

If any of the log files is larger than 50 MB, it is compressed and archived in the installation directory in the subdirectory LogArchives as a zipped file. Afterwards, the process proceeds with a new empty logfile. The operation will be performed at program startup, which can be slightly delayed as a result.

5.7.4 Server messages

Clicking button "Server messages" at the bottom right of the footer allows viewing further error messages from the Service Center.

If the symbol is grayed out, there are no messages. As soon as a message is received, the colour of the symbol changes. There are three categories of messages, info message (green symbol), warning message (yellow symbol) and error message (red symbol).

If messages of different categories arrive at the same time, the color of the highest category is always displayed. Click on the symbol to view the messages.

6 Control Center

The central configuration tool is the Control Center. The Control Center can be started from any digipaX station. All administrative settings can be configured and controlled from the Control Center. Only the personal settings of the users and a few workplace-dependent settings need to be set directly at the individual workstations.

6.1 Client

6.1.1 Institution

6.1.1.1 Institution

Name / Designation: Name or designation of the surgery, clinic etc.
Address: Postal address

6.1.2 Service partner

6.1.2.1 Service partner

This card provides information for customers who to ask for assistance if they have queries or troubles concerning the system. Customers can view this information by opening the service dialog in the footer.

Enter the data in the appropriate lines and inform your customers where they can retrieve this data.

6.1.2.2 Administrator password

Here, a global administrator password for the system is defined.

This password is required for all administrative operations in the system.

6.2 User management

Different user groups can be created and different users can be set up for each group. By default, this feature is disabled for multiple user groups and there is only one default group. However, multiple users can be assigned to this group.

6.2.1 User

To create a new user, use the appropriate button at the bottom right. In the following dialog box enter all required data, select the program language for the user, and confirm with OK.

To change or delete user data use the appropriate buttons at the bottom right.

6.2.2 User groups

For large practices or group (team) practices it may be necessary or reasonable to organize users into different groups. Only as many user groups can be used as are enabled in the license, by default it is always just one group. Each additional group must be purchased and enabled in the license file.

To enable the function for multiple user groups single-click button "Enable user groups". The default group "Default" shows up. It can be renamed.

Now further groups can be managed in the left part, and the users belonging to the group can be managed in the right part.

There are also three buttons Create, Edit and Delete, based on the same principle as for users. Create the desired groups and name the group. The default group can be renamed. Select a group on the left side, and on the right side you can manage the users for this group. All changes apply at once to the system.

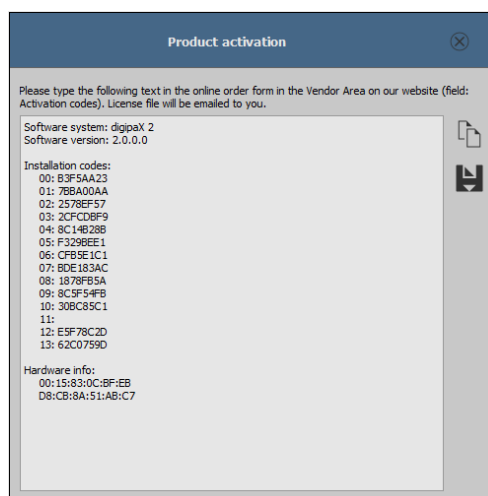
6.3 License and modules

To run digipaX the software must be enabled. The program is installed on base of a standard, full-featured trial license, which expires after 30 days. Within those 30 days a new license file must be installed in the system. The application for new license file is possible just already during configuration of the server and hence the product activation can be done prior to delivery of the system.

6.3.1 Product activation flow

Start the Control Center and select "License and modules"

1. Select group and user
2. Click the button "Product activation ..."



3. Copy the data using the appropriate button to the clipboard or text file.
4. Log in on the website www.digipax.eu and enter the vendor information.
5. Fill out an order form in the vendor area, paste text copied from the product activation and submit the order.
6. The company digipaX sends back to the email address provided the license file which must be copied back onto the server.
7. If the license file was copied in another location, the path must be adjusted accordingly.

6.3.2 License assignment

A license is assigned to each user. If a standard configuration is set, all users use the same license file. It is possible for different users to use different license files.

The license files must be generated by the manufacturer and then copied to the system directory "\\SERVER\dpSYS\Lic".

After that, the corresponding licenses are assigned to the users in the Control Center. First select the user group, then the desired user, and then select the desired license file.

Available modules can be assigned individually to each user.

It depends on the size and structure of the entire installation whichever option is most useful for the organization of the users and groups and thus the assignment of the licenses.

6.3.3 Extension of update period

When the update period expires, it must be first extended before new updates can be installed. A new/updated license file must be requested from the manufacturer.

6.3.4 Enabling modules

The desired modules of the station are enabled / disabled on the configuration page "License".

6.3.5 Errors while checking license

If the license checking fails at the program launch, an error message with the error code is displayed. The following table presents the meaning of these codes:

Code	Meaning
0	Licence Passed
1	Licence Demo Mode
2	Lic File Not Registered
3	Module Is No
16	Licence Expired
17	Demo Licence Expired
32	Too Many Module Users
64	User Is Deactivated
128	No Lic File Access
129	No Registry Access
256	Module Not Found
257	Key Already Used
258	Key Not Readable
512	Invalid Licence
1024	Invalid Inst Code
2048	Invalid Lic File
3001	Webservice Error
4096	No User
4097	No Item
4098	Entry Not Found
4099	Invalid Type
4100	Module Exists
4101	Invalid Parameter
4102	Insufficient Licence
5000	User Cancel
8192	Unsupported Version
8193	Unknown Language
8194	Not Implemented
16382	Sysdate Changed
16383	Lic Tampered
16384	Unhandled Error

If, for example, the license file has been moved, a new path can be set up using switch "Select new license file".

Another reason for an error when checking the license can be that the PC has been replaced and the new computer has now a different computer name or the computer name has been simply changed in Windows only. Then, the old computer name is still activated in the license file and there is no license for the new computer name left. If this is the case, then you can open license viewer using switch "License viewer" and deactivate the old name in the list. Afterwards, the license is available again and will be allocated to the new name after restart of digipaX.

The license viewer does not open if no license file is selected or the license does not belong to the system (Code 1024), or is damaged.

6.4 Network / DICOM

6.4.1 Image archives

These settings can be defined separately for each user group.

One or more archives can be set up and used simultaneously, and a distinction is made between internal and external archives. Internal archives are all archives that are installed, configured and controlled from the digipaX Control Center. External archives are external archives outside the digipaX system that can only be connected for sending and receiving images.

Designation	AE Title	Host/IP	Port	Use	External
Archive 1	CQ01	SYSGT	5671	yes	no
Archive 2	CQ02	SYSGT	5672	yes	no
Archive 3	CQ03	SYSGT	5673	yes	no
Archive 4	CQ04	192.168.1.20	5674	yes	yes
Archive 5	CQ05	192.168.1.20	5675	yes	yes

6.4.1.1 Installation of internal archive

Use the button "Install archive" to install a new internal archive. Except for the archive specifications, the process is automatic. All required components are installed on the server in the path "C:\digipaX\digipaX2\Archives\{UID}" (Example UID: {9f16fa60-5469-43f1-8c48-d0c328d3ff3b}). In the configuration file "global.ini" the central path to the archive data is defined. Under this path a subdirectory with identical UID is created for each archive. The images are stored in this directory (Example: "C:\digipaX\MAGS\ArchiveImages\{UID}").

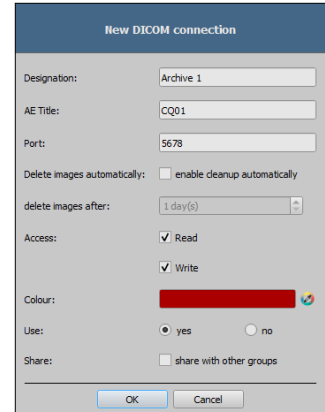
Next steps, such as creation of the necessary MariaDB database, initialization as well as installation as a service and start of the archive are automatically carried out on the server.

If you click on the buttons "Change", "Delete" and "Test" the tasks corresponding to the button are performed. When deleting, the image data of the archive will NOT be deleted. They are retained and must be deleted manually.

6.4.1.2 Edition of internal archive

Each internal archive is to be added by clicking on "Install archive..."; archive specifications are to be set up in the dialog box.

- Designation: Name of the archive that will be displayed later in the list of archives
- AE Title: AE Title for the DICOM communication
- Port: Port for the DICOM communication
- Delete images: Images are redeleted automatically
- Delete after: Time period in days, after that delivered images are deleted from the archive
(NOTE! The Cleanup process is only done once a day – Changes do not take effect until the next day)
- Colour: In this colour the archive will displayed later in the list
- Use: Enabling or disabling this archive
- Share: Establishing share of the archive with other user groups, if existing



Some details about communication:

A port that is to be indicated for each archive is the port for DICOM communication (e.g. DICOM C-FIND). For retrieving the images (DICOM C-MOVE), the port in local settings provided is used. Normally, a common port 104 for DICOM is used. This port is often already assigned, so digipaX uses port 3104 by default. When using "Hostname as AE Title" (see 5.2.1) the port must be the same at these stations.

6.4.1.3 External archives

Use the button "Establish connection" to establish connection to an external archive. For this connection all settings required by the external archive (similar as for internal archives described in 6.4.1.2) have to be specified.

Designation:	Name of the archive that will be displayed later in the list of archives
AE Title:	AE Title for the DICOM communication
Host/IP:	Hostname or IP address of the external archive
Port:	Port for the DICOM communication
Level:	If supported by the archive, then retrieval at the level "PatientRoot", otherwise "StudyRoot"
Terminate:	For better performance, the connection's idle-timeout period of several seconds (default setting = 20 seconds) is to be set to prevent the connection from constant dropping and reestablishing for every data record
Colour:	In this colour the archive will displayed later in the list
Use:	Enabling or disabling this archive
Share:	Establishing share of the archive with other user groups, if existing

The external archive is entered in the system along with the selected group. Please note that the stations that are supposed to access the external archive may need to be entered in the external archive.



With most archives, however, several connections are possible but too many opened connections at the same time also decrease the performance. For this reason, the system should work without disconnections only in exceptional cases. Not all DICOM systems can handle multiple simultaneous connections. Therefore, it can occur that the systems might be blocked by late or failed disconnection.

6.4.2 Router

These settings can be defined separately for each user group.

In this card routers can be installed to forward images to other archives or DICOM nodes. This is e.g. necessary in group practices (chapter 10) with only one acquisition station (detector etc.) and separate image archives.

The routing rules are defined in the next card "Automatic routing".

Install router	-> Installs a new router
Change	-> Changes settings of the router
Uninstall	-> Deletes a router
Test	-> Tests availability of the router

As for the archives, a designation, the AE Title and the port must be defined.

The routed images also remain stored in the router, where they are no longer needed after successful forwarding. They are deleted from the router after a specified period of time.

Designation:	Name of the router that will be displayed later in the list of archives
AE Title:	AE Title for the DICOM communication
Port:	Port for the DICOM communication
Delete after:	Time period in days, after that delivered images are deleted from the router
Colour:	In this colour the router will displayed later in the list
Use:	Enabling or disabling this router
Share:	Establishing share of the router with other user groups, if existing

6.4.3 Automatic routing

6.4.3.1 General

When routing, images sent to a router or archive are automatically forwarded to another archive or to the workstations' cache. Sending images to the cache of a workstation has that advantage that the images do not have to be requested from the server for later viewing. This increases **speed and efficiency**.

6.4.3.2 digipaX configuration

In digipaX, activate the automatic image receiving on the configuration page "DICOM". To do this, an AE Title and a port must be defined. The default settings at all stations are AE Title "AUTO%HOSTNAME%" (e.g. "AUTOSTATION1") and port "3105". Please refer to chapter 5.2.1.



The port for the auto image receiving must be different from the port for image request.

6.4.3.3 Control Center configuration

For each routing rule a source and a destination must be defined.

The sources can be defined for all internal archives (for "internal" see chapter 6.4.1) or routers available in the Control Center. All stations with enabled automatic receiving images, all archives or external DICOM nodes can be specified as destinations. Depending on the purpose of the routing rule, further options can be defined.

6.4.3.3.1 Stations

In the left part all stations with enabled automatic receiving images and all internal archives are already listed. These entries cannot be changed. They result from the existing settings in the Control Center or at the stations. If images are to be forwarded to an external DICOM node, this node must first be added to the list manually using the "Add station" button. With the appropriate buttons "Edit station" or "Delete station" the external nodes can be edited or removed from the list. Only the "Compression" option can be changed at the predefined entries. The default setting is always "Un" for uncompressed.

6.4.3.3.2 Routing rules

In the right part the routing rules are defined.

Archive/Router:	=	The node that forwards received images (Called AE)
Modality:	=	The rule applies to the selected modality only (* = all modalities)
Station name:	=	The rule applies only if in the image the tag "0008,1010" is set to this value
Sender:	=	The node the images come from (Calling AE)
Filter:	=	Filter for routing rule (e.g. Patient ID at the end "-1" or "-2")
Destination:	=	Destination node (AE Title)
Condition:	=	Condition or time limitation when the images are routed

Filter examples for routing within group practices on the basis of the number attached to the Patient ID:

- ImagePat LIKE '%-1'
only images with -1 at the end of the Patient ID are forwarded to archive A
- ImagePat LIKE '%-2'
only images with -2 at the end of the Patient ID are forwarded to archive B
- ImagePat NOT LIKE '%-1' AND ImagePat NOT LIKE '%-2'
images with neither - 1 nor - 2 at the end of the Patient ID are forwarded to archive C

Examples of conditions for routing between archives at different locations:

All conditions and commands are separated by semicolon + space

- ifequal "%u","SERVER2"; stop; # if the image comes from SERVER2 do not route further
- between "9", "17"; defer; # between 9 and 17 hrs; defer (wait)

Both combined to synchronize two archives only in the time between 17:00 and 9:00 hrs:

- an SERVER1: ifequal "%u","SERVER2"; stop; between "9", "17"; defer;
- an SERVER2: ifequal "%u","SERVER1"; stop; between "9", "17"; defer;

For more information please refer to the "windowsmanual.pdf" file in the archive installation directory.

6.4.3.4 Settings for manual routing in dicom.ini

Settings for manual routing are only useful in exceptional cases. If the "dicom.ini" of an archive has been edited manually and the archive is customized later in the Control Center, the previously manual changes may be lost.

The same applies to the "acrnama.map" file (the list "Known DICOM providers"). This file may have to be changed manually, because all routing destinations must also be available in "acrnama.map" of the corresponding archive/router.

The number of retry attempts is always preset to "0" for unlimited. To change this, the value "MaximumExportRetries = 0" must be adjusted accordingly.

Example of automatic routing to a station:

```
# Configuration of forwarding and/or converter programs to export DICOM slices

ForwardAssociationLevel      = IMAGE
ForwardAssociationCloseDelay = 5
ForwardAssociationRefreshDelay = 3600
ForwardAssociationRelease    = 1

ExportConverters = 1
ExportModality0 = *
ExportConverter0 = forward to DPCSTORESCP

ForwardCollectDelay          = 600
MaximumExportRetries         = 5
MaximumDelayedFetchForwardRetries = 0
```



This section does not initially exist in the dicom.ini and needs to be added completely.

DPCSTORESCP must be replaced with an appropriately used AE Title.

The configuration for several redirections could look like in the following example:

```
# Configuration of forwarding and/or converter programs to export DICOM slices

ForwardAssociationLevel      = IMAGE
ForwardAssociationCloseDelay = 5
ForwardAssociationRefreshDelay = 3600
ForwardAssociationRelease    = 1

ExportConverters = 2
ExportModality0 = *
ExportConverter0 = forward to AUTODIGI1
ExportModality1 = *
ExportConverter1 = forward to AUTODIGI2

ForwardCollectDelay          = 600
MaximumExportRetries         = 5
MaximumDelayedFetchForwardRetries = 0
```

To improve performance (e.g. when importing patients' CDs), it is better to send all the images in the archive first, and then distribute them in one pass among stations in one round. Images can be transmitted thereby by series, studies or entirely for the patient. In order to do this first you need to change the row for export converter.

ExportConverter1 = forward SERIES to ...	forwards by series
ExportConverter1 = forward STUDY to ...	forwards by studies
ExportConverter1 = forward PATIENT to ...	forwards all images of the patient

In the case of the "forward PATIENT to" option it is necessary to consider that even when for a patient only one new image comes in addition, there are always transferred all images of the patient. This could overload the network. Hence, forwarding by studies is certainly the most reasonable solution for most systems.

Furthermore, the row "ForwardAssociationLevel =" should also be adjusted. Also here the rule: series, study or patient applies.

The waiting time is set in the row "ForwardCollectDelay =" in seconds.

If there are forwardings with waiting time the configuration, for example, could look like this:

```
# Configuration of forwarding and/or converter programs to export DICOM slices

ForwardAssociationLevel      = STUDY
ForwardAssociationCloseDelay = 5
ForwardAssociationRefreshDelay = 3600
ForwardAssociationRelease    = 1

ExportConverters = 2
ExportModality0  = *
ExportConverter0 = forward STUDY to AUTODIGI1
ExportModality1  = *
ExportConverter1 = forward STUDY to AUTODIGI2

ForwardCollectDelay          = 600
MaximumExportRetries         = 5
MaximumDelayedFetchForwardRetries = 0
```

In addition, the entry "QueueSize =" for the waiting queue of export converters should be adjusted. According to the Conquest manual, each entry in the waiting queue requires 1.5K pro export converter. So, if you want to import a patient CD with 500 MRT images and distribute them to 2 stations, you will need $1.5K \times 500 \times 2 = 1500 + \text{buffer}$.

Example: QueueSize = 2000

For more information read the Conquest manual. Restart the Conquest server after these changes.



With the bottom "Save configuration" on the Conquest configuration page the file dicom.ini will be newly written by Conquest and possibly brought into a new structure. After that it can be checked in the file if the changes were accepted.

6.4.3.4.1 Special routing

In special cases, it may be necessary to forward only selected images to another station. For instance, this could be the case in a situation, when only the DX images are sent from the acquiring station (e.g. the DROC or Fuji system) to the station, where the X-ray journal is maintained.

```
# Configuration of forwarding and/or converter programs to export DICOM slices

ForwardAssociationLevel      = IMAGE
ForwardAssociationCloseDelay = 5
ForwardAssociationRefreshDelay = 3600
ForwardAssociationRelease    = 1

ExportConverters             = 1
ExportModality0              = DX
ExportCalledAE0              = CONQUEST
ExportCallingAE0             = DROC
ExportFilter0                = *
ExportConverter0             = forward to AUTO-XRAY-JOURN
```

```
ExportConverters      = 1           # number of recipients
ExportModality0       = DX          # only this modality
ExportCalledAE0       = CONQUEST    # AE Title of image archive
ExportCallingAE0      = DROC        # AE Title of acquiring station
ExportFilter0         = *           # filter not needed here
ExportConverter0      = forward to XRAY-JOURN # AE Title of receiving station
```

Optionally, the station name entered on the image in the DICOM header by the acquiring station can be used:

```
ExportStationName0 = DROC      # Station AE Title in TAG 0008,1010
```

6.4.3.4.2 Test

For a test purposes you must send an image from another source via DICOM to the Conquest server. As well in the server log (page "Server status") as in the log of the digipaX system (category "DICOM") the entries must exist, that the file was forwarded and received automatically.

6.4.4 Worklist

These settings can be defined separately for each user group.

6.4.4.1 General

A distinction is made between internal worklists and connections to external worklist servers. The installation of the internal worklist components is already done when the digipaX server is installed. After installation the internal worklist must still be set up. Each user group can have its own worklist.

The communication path for the job files is the same for all lists and is predefined. The path is located under "\\SERVER\dpXSYS\data\WLDataBase". It is not necessary to change the path. In exceptional cases, it can be adapted in the "group.ini" of the corresponding user group.

It is also possible to connect external worklist servers. With external connections, only the functions "Query" and "Read" are available, but not changing or deleting the jobs.

The rows in the job list are presented in the colour selectable here. If more job lists are configured, particular lists in the job management can be optically easily distinguished by use of different colours. Using the option "Use" (yes or no) you can enable or disable the list.

6.4.4.2 Configuration of internal worklist

For an internal worklist a new list must be installed.

Designation: Name of the worklist that will be displayed later in the list
AE Title: AE Title for the DICOM communication
Colour: In this colour the worklist will displayed later in the list
Use: Enabling or disabling this worklist
Share: Establishing share of the worklist with other user groups, if existing

6.4.4.3 Configuration of external worklist

For an external worklist a new link to the corresponding list must be created.

Designation: Name of the worklist that will be displayed later in the list
AE Title: AE Title for the DICOM communication
Host/IP: Hostname or IP address of the external archive
Port: Port for the DICOM communication
Colour: In this colour the worklist will displayed later in the list
Use: Enabling or disabling this worklist
Share: Establishing share of the worklist with other user groups, if existing

6.4.5 Printer

These settings can be defined separately for each user group.

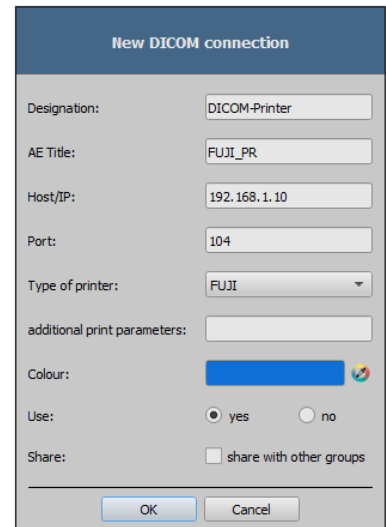


DICOM Print is available only when the appropriate module is active.

6.4.5.1 General configuration

DICOM printers are connected in the similar way as external image archives and worklist servers. Select the "New link..." button. You get to the dialog box for connecting a new DICOM printer (see figure on the right).

- Designation: Name / designation of the printer
- AE Title: AE Title for the DICOM communication
- Host/IP: Hostname or IP address of the printer
- Port: Port for the DICOM communication
- Colour: In this colour the printer will displayed in the list
- Printer type: Manufacturer or model
- Parameters: Optional additional parameters for print jobs (e.g. 2x2 image split)
- Use: Enabling or disabling this worklist
- Share: Establishing share of the worklist with other user groups, if existing



The printer type refers to the desired device to be connected. The "Printers.cfg" file in the "dpXSYS\cfg" directory indicates which types of printers are available (see 6.4.5.2 Supported DICOM printers) With the additional parameters you can customize the printout (see 6.4.5.3 Additional print parameters).

6.4.5.2 Supported DICOM printers

There is a configuration file "printers.cfg" on the server in the subdirectory "dpXSYS\cfg". In this file, the entire series of DICOM printers are preconfigured. Because different models are appropriate for different settings and different types of film, you must enter them in the configuration file. This "printers.cfg" file is openly editable and can be freely extended for further printers. As a template, existing configured printers can be used. All keys are explained in the upper part of the file. With the help of these explanations and printer manufacturers information (technical data, DICOM Conformance Statement) other devices can also be connected.

6.4.5.3 Additional print parameters

You can use a number of additional parameters for print. It should be noted that not all printers will have all the DICOM print capabilities.

Details on the significance of the parameters can also be adopted from the DICOM standard, part 3 (BASIC FILM SESSION PRESENTATION MODULE ATTRIBUTES, BASIC FILM BOX PRESENTATION MODULE ATTRIBUTES, IMAGE BOX PIXEL PRESENTATION MODULE ATTRIBUTES).

6.4.5.3.1 Trim (border) options

```
--trim
  set trim on

--no-trim
  set trim off

--default-trim
  use printer default (default)
```

6.4.5.3.2 Print presentation LUT options

```
--default-plut
  do not create presentation LUT (default)

--identity
  set IDENTITY presentation LUT shape

--plut [l]lut identifier: string
  add LUT l to print job

--inverse-plut
  render the inverse presentation LUT into the
  bitmap of the hardcopy grayscale image

--illumination [v]alue: integer (0..65535)
  set illumination to v (in cd/m^2)

--reflection [v]alue: integer (0..65535)
  set reflected ambient light to v (in cd/m^2)
```

6.4.5.3.3 Basic film session options

```
--copies [v]alue: integer (1..100, default: 1)
    set number of copies to v

--medium-type [v]alue: string
    set medium type to v

--destination [v]alue: string
    set film destination to v

--label [v]alue: string
    set film session label to v

--priority [v]alue: string
    set print priority to v

--owner [v]alue: string
    set film session owner ID to v
```

6.4.5.3.4 Annotation options

```
--no-annotation
    do not create annotation (default)

-a --annotation [t]ext: string
    create annotation with text [t]

+pd --print-date
    prepend date/time to annotation (default)

-pd --print-no-date
    do not prepend date/time to annotation

+pn --print-name
    prepend printer name to annotation (default)

-pn --print-no-name
    do not prepend printer name to annotation

+pl --print-lighting
    prepend illumination to annotation (default)

-pl --print-no-lighting
    do not prepend illumination to annotation
```

6.4.5.3.5 Overlay options

```
+O --overlay [f]ilename : string, [x] [y] : integer
    load overlay data from PBM file f and display at position (x,y)

+Og --ovl-graylevel [v]alue: integer (0..4095)
    use overlay gray level v (default: 4095 = white)
```

6.4.5.3.6 Other print options

```
-l --layout [c]olumns [r]ows: integer (default: 1 1)
    use 'STANDARD\c,r' image display format

--filmsize [v]alue: string
    set film size ID to v

--magnification [v]alue: string
    set magnification type to v

--smoothing [v]alue: string
    set smoothing type to v

--configinfo [v]alue: string
    set configuration information to v

--resolution [v]alue: string
    set requested resolution ID to v

--border [v]alue: string
    set border density to v

--empty-image [v]alue: string
    set empty image density to v

--max-density [v]alue: string
    set max density to v

--min-density [v]alue: string
    set min density to v

--img-polarity [v]alue: string
    set image box polarity to v (NORMAL or REVERSE)

--img-request-size [v]alue: string
    set requested image size to v (width in mm)

--img-magnification [v]alue: string
    set image box magnification type to v

--img-smoothing [v]alue: string
    set image box smoothing type to v

--img-configinfo [v]alue: string
    set image box configuration information to v
```

6.4.6 Paths / IPS

6.4.6.1 General

These settings can be defined separately for each user group.

All data paths are already preset and do not need any prior setup. They can be found on the server in the appropriate subdirectories of the user directories ("**{Group-ID}**") under "dpXSYS\data".

It is recommended that the system directory "dpXSYS" is located on the RAID of the server and is backed up regularly along with the RAID.

If it is still necessary, the paths can also be customized manually by entering another path.

6.4.6.2 Paths

Path thumbnails:

The default path is "dpXSYS\data**{Group-ID}**\thumbs\".

The thumbnails are automatically created for each image that arrives in one of the internal archives. The corresponding group is also included in this operation. This means that in the thumb directory of group A only thumbnails of the archives of group A are created. For group B, only thumbnails of the archives of group B are generated.

Path Presentation States:

The default path is "dpXSYS\data**{Group-ID}**\ps\".

Information about displaying greyscale images is stored in the Presentation State files.

6.4.6.3 Backup paths

Backup path for deleted images:

The default path is "dpXSYS\data**{Group-ID}**\ImgMng\delete\".

The images deleted by the deletion function are saved in this directory before deletion. A subdirectory consisting of date and time is created for each deletion operation. Example: "2010-01-01-09-30-45".

Backup path for modified images:

The default path is "dpXSYS\data**{Group-ID}**\ImgMng\edit\".

The images modified by the edition function are saved in this directory before being modified. A subdirectory consisting of date and time is created for each edition operation. Example: „2010-01-01-09-30-45“.

6.4.6.4 Intelligent Prefetch System (IPS)

IPS allows you to load images of the chosen patient, depending on the working memory option selected in the background, making them quickly accessible. It is useful, for instance, in the case of CT or MR series. The loading status is optionally displayed as a progress bar in the footer.

Automatically load remaining images of a series:

With this option, the remaining images in this series are automatically loaded into RAM after clicking on an image (without waiting time when scrolling through the CT or MR series).

This function can be combined with the following.

Automatically load images of the newest study:

After activating the patient, images from the newest study are immediately and automatically loaded to RAM.

Ticking the checkbox "**download only**" means that the images are only loaded into the local cache (harddrive) and not immediately into the RAM.

Automatically load all images:

All images of the selected patient are automatically loaded into RAM.

It is recommended to enable this feature only on the diagnostic stations and equip them with a sufficient RAM.

Ticking the checkbox "download only" means that the images are only loaded into the local cache (harddrive) and not immediately into the RAM.

Show progress bar:

Optionally, the progress bar can be shown or hidden in the view (footer).

6.5 Image acquisition systems

Here, devices and accessories are configured for image acquisitions. For image acquisition the general system requirements as stated in chapter 2.2.2 must be met. Further requirements may apply for particular devices. Check these in the corresponding chapters of this Guide and in the documentations of the device manufacturers.

6.5.1 License modules for image acquisition

The following modules with the listed features are available:

Digital X-ray

- Detector connection
- Post Processing
- Exposure Index as per EN 62494-1
- Image post processing (image crop, image transformations)
- Saving images (DICOM-Send)

Radiography Plus

- Saving images in multiple archives at the time
- Grid line suppression

Generator control

- Direct control of generators with integrated console

Image enhancement

- Applying special filters for image enhancement (Post Processing)

6.5.2 Devices and accessories

In each of the following device groups, new devices can be added or removed with the corresponding button. Only devices supported by digipaX can be used. These are listed in the drop-down lists "Type". Select the needed type for the device and assign a customized designation to it.

Identification:

- Designation: = Freely selectable designation (for each device)
- Type: = List of supported devices

6.5.2.1 Generators



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



Please make sure that the set maximum exposure time of the selected generator lies within the active time window for receiving radiation of the selected detector to avoid any unnecessary radiation exposure to the patient.



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



It is recommended to use a trigger cable instead of the AED mode, wherever possible.

6.5.2.1.1 Generator simulation

This is a simulation device for demo and testing purposes.

The triggering of the radiation is simulated by pressing a button while acquiring the image:

- Space / Enter: Normal acquisition
- Buttons 1 to 5: Diverse fault conditions

6.5.2.1.1.1 Configuration

Connection type:	=	Simulates direct or indirect generator control (through integrated console or transfer of Procedure Codes from worklist tag 2 to a separate console).
Exposure time:	=	Simulates exposure time during image acquisition with the 1- and 2-point technique

6.5.2.1.2 GENESIS DT/DTs

6.5.2.1.2.1 Manufacturer

Josef Betschart AG

6.5.2.1.2.2 Supported devices

GENESIS DT/DTs

6.5.2.1.2.3 System requirements

COM port + serial cable for direct generator control. COM port configuration as per manufacturer's instructions.

6.5.2.1.2.4 Restriction on use

None.

6.5.2.1.2.5 Configuration in ControlCenter

Connection type:	=	Simulates direct or indirect generator control (through integrated console or transfer of Procedure Codes from worklist tag 2 to a separate console)
COM port:	=	Serial COM port to which the generator is connected (for direct connection only)
Device numbers:	=	Assignment of the device numbers used in the generator settings to the detectors (for direct connection only) – for more, please refer to the manufacturer's documentation
Communication:	=	Directory for the transfer of the Procedure Codes to the generator console (for indirect connection only)

6.5.2.1.2.6 Installation at image acquisition station

Connect the device to the PC via a serial data cable as per manufacturer's instructions.

6.5.2.1.2.7 Special features

None.

6.5.2.2 Detectors



Please make sure that the set maximum exposure time of the selected generator lies within the active time window for receiving radiation of the selected detector to avoid any unnecessary radiation exposure to the patient.

6.5.2.2.1 Configuration (model-independent)

The following configuration options are the same for all detector models but can be defined differently for each model.

Image crop:	=	Crops away defined pixels from the top, bottom, left or right edges of the acquired image
Rotation:	=	If the detector rotated by 90°, 180° or 270° is installed, the images are corrected accordingly.

The following information on the detector used is stored in the header of the images:

Manufacturer:	=	0008,0070 Manufacturer
Model:	=	0008,1090 ManufacturerModelName
Serial number:	=	0018,1000 DeviceSerialNumber:

6.5.2.2.2 Detector simulation

This is a simulation device for demo and testing purposes.

6.5.2.2.2.1 Configuration in ControlCenter

Simulations:	=	Functions that are to be simulated
Initialisation error	->	Simulates that detector is not found
Calibration error	->	Simulates that device was not calibrated
Activation error	->	Device cannot be activated while acquiring image
AED Mode	->	Simulates AED mode (auto trigger)
Sleep Mode	->	Simulates the low-power state to extend battery life
WiFi Model	->	Simulates a wireless device with a battery
Temperature query	->	Simulates temperature check of the detector
Thumbnail	->	Delivers a thumbnail at image acquisition
Sleep m. wait. time:	=	Time after which the detector switches to low-power state
Battery charge level:	=	A value specified here is displayed in the program
Temperature:	=	A value specified here is displayed in the program
Signal strength (WiFi):	=	A value specified here is displayed in the program
Active time window::	=	Time window (milliseconds) in which the detector receives radiation
Image type:	=	Type of the simulated radiograph
		- Image with grid lines
		- Unprocessed image
		- Processed image

Pixel height: = Simulates height in μm of pixels of the detector
Pixel width: = Simulates width in μm of pixels of the detector

6.5.2.2.3 Pixium

6.5.2.2.3.1 Manufacturer

Thales / Trixell

6.5.2.2.3.2 Supported devices

Pixium 4143C, 4143G, 2430EZ, 2430EZg, 3543EZ, 3543EZg, 3543EZe, 3543DRcs, 3543DRgs, 3543DRcx, 3543DRgx, 4343RC, 4343RG, 4343Rec, 4343REg, 3543EZx, 2430EZchd, 3543EZ-chd, 4343EZchd

6.5.2.2.3.3 System requirements

Processor	Dual Core Intel Xeon 2.80 GHz or higher
HDD	Min. 20 GB free storage space
Main memory	Min. 2 GB RAM or more
Network	Free Ethernet Port
Operating system	Windows 7 / 10 64bit (Business/Pro)
Portable devices with WiFi	Separate access point compatible with 802.11/a/b/g/n Standard

6.5.2.2.3.4 Restrictions on use

- Mode "Autonomous mode" (Saving images for later retrieval) is not supported, images cannot be downloaded with the software.
- Mode "Satellite" is not supported.
- Function "Patient ID" (with barcode reader at the detector) is not supported.
- Only mode "rad" or "rad.autotrigger" possible.
 - o The following models can be operated only in the mode "rad", thus a direct generator connection is required:
Pixium 4143C, 4143G, 4343RC, 4343RG, 4343Reg

6.5.2.2.3.5 Configuration in ControlCenter

Model: = Selection box of the connected models
Serial number: = Here the serial number must be specified
Mode: = Synchronisation mode

rad -> Synchronisation performed by the digipaX software (required that the generator is also connected to the digipaX software)

rad.autotrigger -> Detector automatically detects radiation

Sensitivity: = -> Sensitivity in the mode "rad.autotrigger" (not by all models supported)

6.5.2.2.3.6 Installation at image acquisition station

Preparation:

The following information and preparations are required:

- Connection cable between Pixium and host must be plugged in
- Switch Pixium on
- IP address of Pixium must be known (default setting = 192.168.1.3/24)
- IP address of the local host must be in the same address range as that of Pixium
- SSID and password of Access Point must be known where applicable



Please keep in mind the correct configuration of Firewall in order to enable the establishment of the connection to the detector.

Activation of the image acquisition system:

Start digipaX and open configuration:

- Activate image acquisition under "Administrator/Image acquisition"
- Select image acquisition system
- Click "Prepare system" (start the program Pixrad IPConfig and configure detector, see the next section)
- Type in the IP address of the detector and the local host IP address in the following dialog
- Restart digipaX

Tool "Pixrad IPConfig":

(C:\digipaX\digipaX2\drivers\Pixium\pixrad-ipconfig.exe)

- Select model
- Type in the IP address of the detector
 - o Default IP address = 192.168.1.3
 - o Default connection type = "active"
 - In the mode "active" the detector is linked with the set host IP address
 - In the mode "passive" a detector of all IP addresses in the network can be used, and the detector can obtain the IP address from a DHCP server
 - Switchover to the mode "passive" requires changes in the dpXSYS directory on the server (see section "Configuration file")
 - Switchover to the mode "passive" should occur only if it is really needed ("active" mode = recommended)
- Type in the set local IP address in CIDR notation, e.g. 192.168.1.5/24
- Continue with "Next >", accept firewall adjustment if required
- Change the IP address of the detector if needed, e.g. 192.168.37.2
- Type in the corresponding future host IP address in CIDR notation, e.g. 192.168.37.5/24
- For WiFi: type in the appropriate SSID and password (otherwise skip this step)

- Set the WiFi connection on "Enable" or skip the step
- Apply

Configuration file:

More settings in the configuration file of the detector "DetectorXXXXXX.ini" under \\SERVER\dpXSYS\drivers\cfg\Pixium (XXXXXX = serial number):

- According to the mode selected in the Control Centre, the time window for receiving radiation can be set in the following sections by adjusting the value "detector.mode" (for values, see comments in this file.)
 - o [modes.application.1.rad]
 - detector.mode = ...
 - o [modes.application.2.rad.autotrigger]
 - detector.mode = ...
- If the detector has been switched to "passive" mode for network communication, the following values must be adjusted:
 - o [harware]
 - local.path = 192.168.x.y
 - Comment out by semicolon
 - ;local.path = 192.168.x.y
 - o [configuration]
 - ;connection.passive = yes
 - Remove semicolon, change "no" to "yes" if necessary
 - connection.passive = yes
- If the detector has to obtain the IP address from a DHCP server:
 - o [configuration]
 - ;dhcp.disable = no
 - Remove semicolon, change "yes" to "no" if necessary
 - dhcp.disable = no

6.5.2.2.3.7 Calibration

The calibration is done through the info dialog of the device within the image acquisition card in the digipaX software. Click the detector icon at the top edge of the image and then the button "Perform calibration". Follow the instructions.



In the mode "rad", the radiation must be triggered in the time window provided for this purpose. To do so, press the preparation switch (hand switch) when this is indicated in the software. Then trigger the acquisition as soon as this is signalled in the software. So please pay close attention to the icons and indications in the software during calibration.

Calibration should be performed whenever it is necessary, but at least once a year.

6.5.2.2.3.8 Special features

For devices in WiFi operation, the supplied backup cable for image recovery should always be at hand (with additional extension cables where necessary) and the staff should be appropriately trained on what to do if the last image from the detector has to be recovered after a connection loss. The use of the cable after a connection loss for the WiFi detectors is indicated in the software.

6.5.2.2.3.9 Image enhancement means

- Change of the filter after image acquisition
- Use of the tool X-Ray Admin (see chapter 8)

6.5.2.2.4 DRTech EVS

Manufacturer

DRTECH Corporation

6.5.2.2.4.2 Supported devices

EVS4343A, EVS4343AG, EVS4343W, EVS4343WG, EVS4343WP, EVS3643A, EVS3643AG, EVS3643W, EVS3643WG, EVS3643WP

6.5.2.2.4.3 System requirements

Processor	Intel Quad or higher
HDD	Min. 500 GB free storage space (additionally 128 GB SSD recommended)
Main memory	Min. 8 GB RAM or more
Network	Free Gigabit Ethernet port
Operating system	Windows 7/8/8.1/10 32bit or 64bit (Business/Pro)
Portable devices with WiFi	Separate access point compatible with 802.11 /a/b/g/n Standard

6.5.2.2.4.4 Restrictions on use

- No CR mode support
- Only trigger mode AED and software trigger (along with the generator connection) supported

6.5.2.2.4.5 Configuration in ControlCenter

Serial number: =	Here, the serial number must be specified
Mode: =	Synchronisation mode
AED	-> Detector automatically detects radiation
Software	-> Synchronisation performed by the digipaX software (required that the generator is also connected to the digipaX software)
Active time window: =	Time window (milliseconds) in which the detector receives radiation
Image crop: =	Crops away defined pixels from the top, bottom, left or right edges of the acquired image
Rotation: =	If the detector rotated by 90°, 180° or 270° is installed, the images are corrected accordingly

6.5.2.2.4.6 Installation and image acquisition station

Preparation:

The following information and preparations are required:

- For LAN connection, make the wire connection between the detector, POE adapter and local LAN interface at the host
- For WiFi connection, set up the WLAN connection between the access point and the detector using the documentation provided by the manufacturer and connect the access point to the local LAN interface
- For local LAN interface, set the IP address 192.168.250.100/24
- A program for reading PDF files must be installed

Activation of the image acquisition system:

Start digipaX and open configuration:

- Activate image acquisition under "Administrator/Image acquisition"
- Select an image acquisition system
- Click "Prepare system"
- When a dialogue for installing Visual C++ 2008 appears, install the package (if it is already installed, skip this step by clicking "Cancel")
- The instructions provided by the manufacturer are opened
- Restart digipaX
- If an error output occurs, follow the manufacturer's instructions (e.g. set environment variable "KMP_DYNAMIC_MODE=thread_limit")

6.5.2.2.4.7 Calibration

When installing detectors, the calibration files are downloaded from the detector. These are stored locally and also on the server in "dpxsys\devices\data\DRTech EVS". When recalibrating a detector, a backup of the old files is created locally. The new calibration file is saved on both, local drive and server. If you change the acquisition PC, the current files from the server are used and the system is immediately ready for use.

Calibration is performed by means of the info dialog of the device within the image acquisition tab in the digipaX software. Click the icon for the detector at the top of the screen and then the "Perform calibration" button. Follow the instructions.

Calibration should be performed when necessary, but at least once a year.

6.5.2.2.4.8 Special features

The detectors switch to sleep mode if the mouse remain unmoved for a longer period of time. Therefore, a timer runs backwards during the acquisition. If the timer is at 0, the acquisition is blocked because the detector then switches to sleep mode.

Certain models, such as the WiFi detector EVS4343W, require a warm-up phase for optimal image quality. This is displayed as a warning in the software as long as it is running (when starting software and when starting acquisition).

6.5.2.2.4.9 Possible action to optimize the image

- Change of the filter after image acquisition

6.5.2.3 Use of the X-Ray Admin tool (see section 8)DAP

6.5.2.3.1 DAP simulation

This is a simulation device for demo and testing purposes.

6.5.2.3.1.1 Configuration

Unit:	=	Unit in which the simulated DAP device delivers a value
Value:	=	Value provided by the simulated DAP device

6.5.2.4 Grid

6.5.2.4.1 General

According to the settings and values provided here, the grid line suppression can be applied during image acquisition.



In principle, the use of moving grids is preferable to fixed grids as they do not cover any structures in the image.



For the suppression of the grid lines by the software, grids with a maximum resolution of 70 lines per cm or 178 lines per inch are supported.

If the option of the grid line suppression is activated (see 6.5.3.6.1.2.2), the program automatically detects during image acquisition whichever of the configured fixed grids is inserted and eliminates the lines from the image. If no grid lines are detected by the program (use of a moving or fixed grid with unsupported high resolution), no grid line suppression is performed (no image changes).

The specifications for the mode (fixed or moving grid) and the resolution directly affect the postprocessing following the radiogram acquisition. All other values are optional and are only saved in the DICOM header of the images. The information on the detected grid or the grid assigned to the detector (see 6.5.3.6.1.1) is stored in the DICOM header.

6.5.2.4.2 Configuration

Type:	=	Here the mode is defined, whether it is a moving or a fixed grid, and its type (focused, parallel, crisscross)
Specification:	=	Resolution settings and unit of measurement in lines /cm or lines/inch as well as the ratio
Material:	=	Here the absorption material and the interspace to the lamellas are specified
Focus distance	=	Here the minimum and maximum distance to the focus are specified, the mean is obtained and transferred to DICOM tag as this only provides a value in millimetres

6.5.3 Modalities

According to the number of modalities enabled in the license they can be defined and configured here. These settings are global and apply to all user groups and users. A maximum of 10 modalities are possible.

6.5.3.1 Identification

One physically existing device is assigned to each modality.

- Designation: = Designation of the device for this modality
- System: = Here the image acquisition system used is defined.
This can be a system from another manufacturer or an acquisition system integrated in the digipaX2.
 - o Modality (Type): = DICOM modality of the selected system or
 - o Type: = Type of the digipaX2 acquisition system
- Station name: = AE Title of the device

Modality and station name of the device are optional entries. The data entered here are then automatically written into each worklist job for this device.

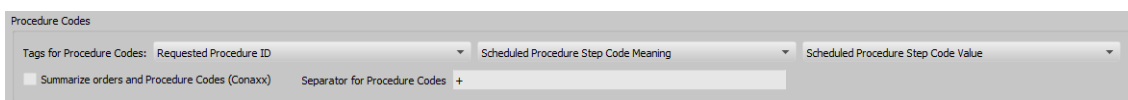
It is recommended to enter this data, since manual customization of the modality and station name when creating the worklist jobs is not possible.

6.5.3.2 Study Instance UID:

When creating jobs for a patient, all the jobs get the same Study Instance UID by default (per generation process).

If the jobs are processed by another system, it can happen that those systems display then always the first job only (e.g. Carestream). It can be set up for such cases that each job gets a separate Study Instance UID. However, each image lands in a separate study as a consequence. If a third-party system should allocate the UID by itself, the UID can be released at the creating the job as a further possibility.

6.5.3.3 Procedure Codes



Each Procedure Code is transferred in a separate tag. This tag is set by using three drop down lists. Where required, you also have to follow the instructions of the manufacturers of the devices that receive the jobs and analyse the Procedure Codes.

The Procedure Code tag set in the configuration must also be defined in the device configuration on the target computer as a Procedure Code tag.

CONAXX

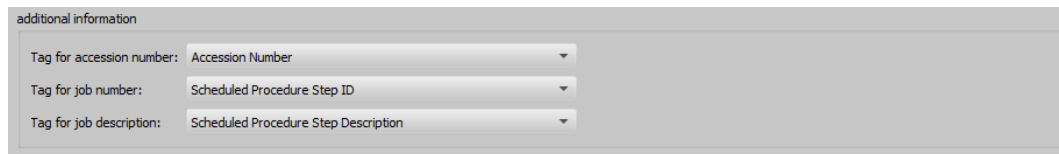
While acquiring images by use of the „CONAXX“ system, the option „Consolidate jobs and Procedure Codes“ must be activated. Several jobs for the one patient are then consolidated in the one job, in which the Procedure Codes are transferred in one line separated by a separator (e.g. C000.008.020.000+C000.008.020.003). This separator is defined in CONAXX in the menu under „Configuration/Import/DICOM Worklist“ and must be identically set in digipaX as

well. On identical configuration pages (in both systems) the tag for the Procedure Codes is set up. This tag must be also the same in both systems.

6.5.3.4 Additional information

If through the GDT the job number and/or job description are also sent, they will be sent to the job of the worklist. For this purpose, 2 of 5 tags are required, which are also used to transmit Procedure Codes. For Procedure Codes only 3 tags are available. Furthermore, for identification of jobs for each worklist job is generated a unique accession number by the digipaX system. This number is independent from the job number. Initially the following tags are normally pre-set:

AccessionNumber	(0008, 0050)
ScheduledProcedureStepID	(0040, 0009)
ScheduledProcedureStepDescription	(0040, 0007)



6.5.3.5 DICOM tags

The following tags are saved for a job:

The optional items can be enabled and disabled in the configuration under Administrator/Patient data (see 6.8.2.2).

SpecificCharacterSet		(0008, 0005)
PatientsName		(0010, 0010)
PatientID		(0010, 0020)
PatientsBirthDate		(0010, 0030)
PatientsBirthTime	(optional)	(0010, 0032)
PatientsGender		(0010, 0040)
OtherPatientIDs	(optional)	(0010, 1000)
OtherPatientNames	(optional)	(0010, 1001)
PatientsAddress	(optional)	(0010, 1040)
PatientsTelephoneNumbers	(optional)	(0010, 2154)
EthnicGroup	(optional)	(0010, 2160)
LastMenstrualDate		(0010, 21D0)
PatientComments	(optional)	(0010, 4000)
StudyInstanceUID		(0020, 000D)
RequestedProcedureDescription		(0032, 1060)

The following fields can be enabled and disabled in the configuration page Job management / Fields in the Control Center.

ScheduledProcedureStepStartDate	(0040, 0002)
---------------------------------	--------------

ScheduledProcedureStepStartTime	(0040, 0003)
Modality	(0008, 0060)
ScheduledStationAETitle	(0040, 0001)
RequestedProcedurePriority	(0040, 1003)
PatientsWeight	(0010, 1030)
PregnancyStatus	(0010, 21C0)
ContrastAllergies	(0010, 2110)
RequestedContrastAgent	(0032, 1070)
MedicalAlerts	(0010, 2000)
PreMedication	(0040, 0012)
ReferringPhysiciansName	(0008, 0090)
RequestingPhysician	(0032, 1032)
ScheduledPerformingPhysiciansName	(0040, 0006)
InstitutionName	(0008, 0080)
InstitutionAddress	(0008, 0081)
CurrentPatientLocation	(0038, 0300)
AdditionalPatientHistory	(0010, 21B0)
CommentsOnTheScheduledProcedureStep	(0040, 0400)

Each job gets a unique accession number. It is typically saved on the following tag:

AccessionNumber	(0008, 0050)
-----------------	--------------

The following tags are selectable for transferring Procedure Codes:

RequestedProcedureID	(0040, 1001)
ScheduledProceedureStepCodeMeaning	(0008, 0104)
ScheduledProceedureStepCodeValue	(0008, 0100)
ScheduledProcedureStepDescription	(0040, 0007)
ScheduledProcedureStepID	(0040, 0009)

When setting the tags take care that the set Procedure Codes in chapter 6.5.3.3 do not interfere with those described in the Additional information in chapter 6.5.3.4. Each tag can be selected once only.

When creating a job, further tags without value are stored that are not described here, in order to ensure compliance with the DICOM standard.

6.5.3.6 Configuration of digipaX2 system

According to the selected type in the drop-down list, next configuration section is activated at the bottom of the page.

6.5.3.6.1 Type „digital X-ray (DX)“

6.5.3.6.1.1 Devices

Here the devices connected in the digipaX2 are assigned.

Generator:	=	Used generator
Table detector:	=	Detector for acquisition on the table
Table grid:	=	Used grid at the table
Wall stand detector:	=	Detector for acquisition at the wall stand
Wall stand grid:	=	Used grid at the wall stand
Free acquisition detector:	=	Used detector for free acquisitions
DAP:	=	Used dose area product measuring device



When using a swivel bracket system, assign the used detector only to the configuration for "Table detector".



When using a WiFi detector, assign it to all used positions (table, wall stand, free acquisition).

6.5.3.6.1.2 Others

6.5.3.6.1.2.1 Defaults

Incorporate beam path:	=	When saving the images, the beam path is incorporated in the study description (AP, lateral etc.)
Images for X-Ray Admin:	=	When active, for each Procedure Code the last 10 acquisitions are stored for the tool X-Ray Admin for image enhancement (see chapter 8)

Threshold values for deviation index (exposure index)

Here, the threshold values for the deviation index for the exposure index are set. During image acquisition, a coloured arrow shows up according to the calculated deviation if the determined deviation index deviates from 0 by the threshold values set here. The threshold values are set to indicate from when the deviation index lies outside the accepted tolerance and the arrow is coloured green (ok), yellow or red.

- much too low	=	Deviation index deviates more than this value downwards ➔ Red arrow down
- too low	=	Deviation index deviates more than this value but not more than the value for "much too low" downwards ➔ Yellow arrow down
- too high	=	Deviation index deviates more than this value but not

- much too high = more than the value for "much too high" upwards
→ Yellow arrow up
- Dose ok = Deviation index deviates more than this value upwards
→ Red arrow up
- Dose ok = Deviation index lies between „too low“ and „too high“
→ Green arrow to the right
- Dose area product unit: = Configures the unit for the display and input of the dose area product
- Remove completed jobs: = Completed jobs are automatically removed once the images are saved (only if the internal digipaX worklist is used)

6.5.3.6.1.2.2 Röntgen Plus

- Suppress grid lines = Activates/deactivates the elimination of grid lines globally for all detectors
- Automatic image crop = Image crop according to detected collimation
 - o Global addition = Zooming in or out cropped image from -100 to +100 pixels

6.5.4 Studies

6.5.4.1 Tables of organs

6.5.4.1.1 General

On this card predefined types for creating jobs in human and veterinary version can be installed, uninstalled or edited, including visual selection of organs and Procedure Codes. Thereby, various specialities (ENT, urology etc.) or various animal species in the veterinary version can be selected in several languages. Furthermore, the Procedure Codes for various devices are available. Possibly, the Procedure Codes not for all organs and beam projections may be available. These can later be added manually in the program in the job management.



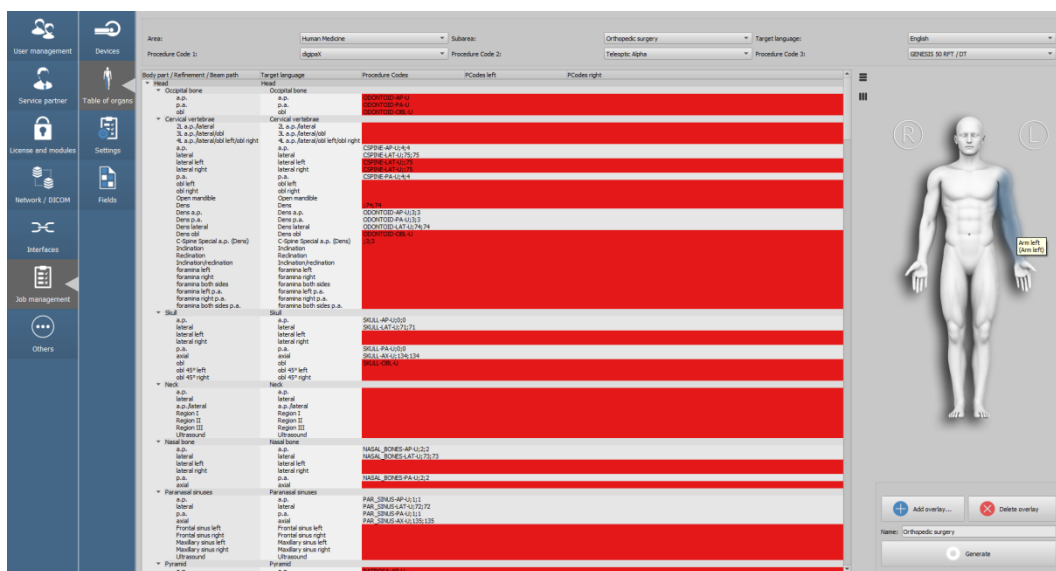
Generated tables of organs with the Procedure Codes serve only as templates. Therefore, correctness of the Procedure Codes must be verified before they are put into service.

6.5.4.1.2 Adding and removing

Click "add" or "remove" to create or delete a new table of organs. Newly created tables of organs must be then assigned to a user group. When removing, the corresponding assignments to the user groups are automatically removed (see chapter 6.5.5).

6.5.4.1.2.1 Selection of area, subarea and language

Once the configuration page is open, the selection begins on the top left with "Area". The areas of human and veterinary medicine are available. Depending on the selection made here, next possible selections are available in the field "Subarea". That means various specialities in the case of human medicine and various animal species in the case of a veterinary version can be selected. In the third field the target language for output data can be selected.



6.5.4.1.2.2 Device selection (Procedure Codes)

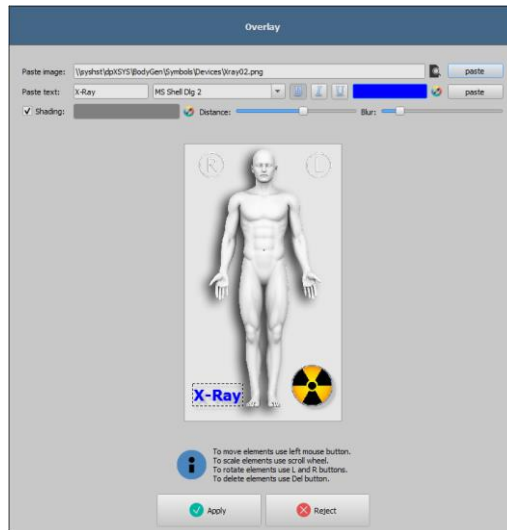
The Procedures Codes for up to three devices can be passed into the organ table. Usually please select the requested device beginning from the left. The order of the Procedure Codes selected here must then also be set in the Control Center / Job management / Devices (Modalities).

6.5.4.1.3 Main window and preview

After the device has been selected, the corresponding Procedure Code appears in overview window behind the beam projection. If more devices are selected, the Codes are separated with semicolons. Rows marked in red indicate that there is no Procedure Code or the Procedure Code not for all selected devices for this beam projection is available. It is an important issue later for the generating. In the left column the body parts, organs / details and beam projections in the language of the program are shown, in the right column those are displayed already translated into the target language. In the right preview window an image for visual organ selection is displayed. By moving with the mouse over the body, its areas are displayed in the language of the program and in the target language as well.

6.5.4.1.4 Body2.ini settings

6.5.4.1.4.1 Inserting overlay



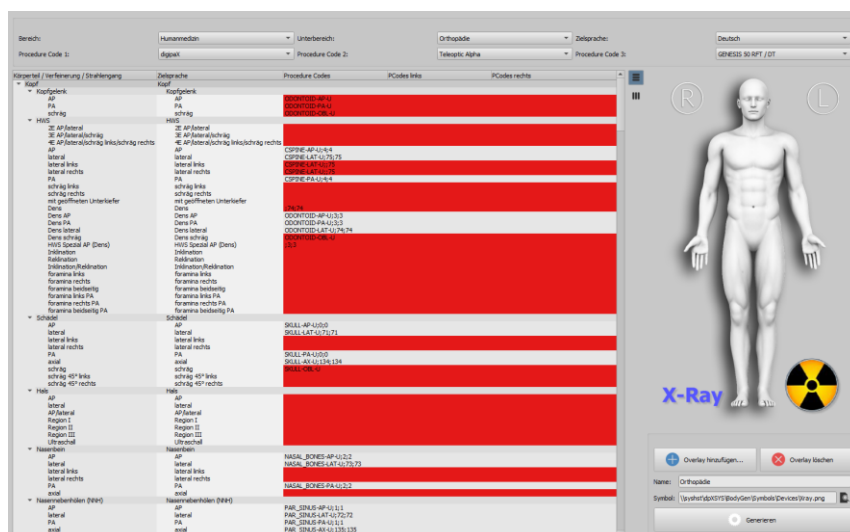
For optical shaping of visual organ selection overlays can be inserted, which will be then co-displayed. You may insert any symbols and text.

Click overlay to add it. Select a symbol and click "Insert".

Using the mouse, the symbol is moved to a desired location. In the same way you can insert a text. Using the mouse wheel, text and symbols can be made larger or smaller, rotated with the keys L and R on the keyboard, and deleted by pressing on "Delete" ("Del" key). By pressing on "Apply" the overlay is inserted.

6.5.4.1.4.2 Name, output destination, generating Body

In the field "Name" a name of the type and in the field "Symbol" a symbol image is selected. Both are then displayed in digipaX in the job management. The pre-installed symbol templates are located on the server in the path "dpXSYS\bodygen\Symbols". You can also use your own symbols. These must be in PNG format and have a size of 64x64 to 100x100 pixels.



The output destination is the directory `\\Server\dpXSYS\cfg\body\{Random-ID}`. Click "Generate". In most cases a dialog in the form of questions follows, asking whether items without matching Procedure Codes are also to be applied. Please note that with "No" only the elements will be applied for those a Procedure Code at all selected devices is available. All items marked in red will not be applied. In the destination path the selected folder will then be created and all configuration and image files will be saved in it.

6.5.4.1.5 Editing table of organs and Procedure Codes

In the right part of the card you can edit the elements. The table shows the hierarchically ordered elements for body part, refinement and beam path. The latter two can be activated and deactivated. Deactivated inputs are not shown in the organ selection menus.

The elements for refinements or ray paths can be freely added and deleted. To add a refinement, activate the corresponding body part or an already existing refinement within this body part, and click the button "Add refinement". A new node is created and you can edit the designation of the node. To add a new beam path, activate the corresponding refinement or an existing beam path in it, and press the button "Add beam path". Specify your own designation for it as well.

For some tables of organs (e.g. MRI) no beam paths are required and can be omitted or deactivated in these tables. If necessary, ask your system administrator for assistance.

Use the button "delete selected element" to delete the activated node including any subelements it may contain. The nodes for the body parts cannot be deleted.

The inputs can be sorted with the arrow buttons.

6.5.4.1.5.1 Procedure Codes

For each beam path Procedure Codes can be specified. These are transferred along with the transmission and are reevaluated accordingly by the destination station. These codes are displayed along with every job in the dialog for creating jobs. In this way it can be checked which code is transferred to the destination station.

The codes may need to be adapted as each manufacturer uses their own codes for presets. By double-clicking the corresponding cell on the right in the tree structure, you can define the code for the beam path of this row. Up to three codes can be specified for each beam path. The codes must be separated by a semi-colon (";"). Make sure that there is no space on either side of the semicolon, unless they belong to the code itself. This allows to transfer the codes to multiple devices at the same time.

For extremities a distinction is made between the positions left or right, and for animals additionally between fore and hind.

The various manufacturers have not predefined suitable Procedure Codes for all organs and beam paths. In such cases, it is recommended to use a comparable code. For example, the code for "Knee / AP" could also be used for "Patella / Axial". If there are no different codes for the left/right, a general code for both sides can be used (possible example: "Hand / AP" for "Hand left / AP" or "Hand right / AP"). If the code for left and right is the same, the code only has to be entered once in the field of the first column.

6.5.4.1.5.2 Procedure Codes for digipaX

Procedure Codes for digipaX must always be stored in the first place. All organs, beam paths and Procedure Codes that are to be used for image acquisition with digipaX must also be present in the central database and configured accordingly, see chapters 6.5.4.2 and 6.5.4.3. To change the settings for a Procedure Code, mapping / macro or to add data, click the corresponding field of the table of organs with the right mouse button. Depending on the selected code, you can choose in the context menu whether you want to edit the settings of the Procedure Code or mapping or create a new Procedure Code or mapping with this designation. The Control Centre automatically switches to the required card and starts the right action.

6.5.4.1.5.3 Filtering list

With this function you can check whether all Procedure Codes / mappings and macros are written correctly and are present in the X-ray database. By activating the check mark, the X-ray database is read out, the data is compared with the table of organs, and the values appear in different colours accordingly.

- | | | |
|---|----|---------------------------|
| - Inputs without Codes (empty fields) | -> | No presentation in colour |
| - Unknown Codes (typing errors possible) | -> | Red font |
| - Known Procedure Codes (all fine) | -> | Green font |
| - Known mappings/macros (all fine) | -> | Blue font |

By ticking, the corresponding categories can be hidden and shown. Doing so, you can do a targeted search for errors.

6.5.4.2 Radiographic image acquisition

Here, the detailed generator settings and other parameters for each individual Procedure Code are configured for the generator control and X-ray image acquisition integrated in the digipaX. All settings are stored in the central database in the dpXSYS directory on the server.

In the list on the left, all Procedure Codes are listed that are kept in the database.

In the right part, the designation as well as the corresponding settings and parameters of the Procedure Code selected on the left are shown. The adjustment of the values is done in the right part.

Further self-defined Procedure Codes can also be added or cancelled by use of the respective buttons.

Example:

After the initial installation, there are no settings for the acquisition "Shoulder joint / lateral" yet. For this study to be added to the system, it must first be added to the table of organs with the self-defined Procedure Code (see chapter 6.5.4.1.2 above).

Add the following item to the table of organs:

Arm -> Shoulder joint -> lateral SHOULDER_JOINT-LAT-L SHOULDER_JOINT-LAT-R

"SHOULDER_JOINT-LAT-L" and "SHOULDER_JOINT-LAT-R" are the self-defined Procedure Codes here. The codes are selectable at random and could also be "12345" and "67890". However, only ASCII characters without umlauts are allowed.

Then the code must be added to the list under radiogram acquisition. Click "Add Procedure Code". A dialog opens. Type in the self-defined code (e.g. SHOULDER_JOINT-LAT-L) in the upper line and select an already existing equivalent Procedure Code (e.g. SHOULDER-LAT-L) in the lower selection box and click ok. Alternatively, you can click the newly defined Procedure Code in the table of organs with the right mouse button and select the input "Creating Procedure Code..." in the context menu.

Now you only need to adjust the corresponding acquisition parameters in the right part. The new study is from now on available in the system.

6.5.4.2.1 Description

Designation: = Freely selectable designation of the radiogram acquisition

6.5.4.2.2 Anatomy (optional)

Body Part Examined: = Designation of the body part or superordinate region, which is written in the DICOM tag 0018,0015 when saving (e.g. for the thigh, the region is LEG)

Image Laterality: = "left", "right" or "both" for limbs or "unpaired" for body parts such as abdomen or head

View Position: = Beam path (selectable at random)

6.5.4.2.3 Acquisition settings

Here, the generator settings are defined to suit children or adults (skinny, normal or massive).

Place of performance: = Depending on the available devices, it can be chosen between table, wall stand or mobile detector

Mode/Technique: = Selection of acquisition technique (1-point, 2-point or 3-point)

kV/mA/ms/mAs: = Settings of the generator values (depending on the acquisition technique)

Density: = Value of the density degree

Ionisation chambers: = Selection of the active ionisation chamber(s) during the acquisition

Focus: = Small or large focus

Grid: = Use of a grid (yes/no)

Filter: = Application of a filter (child filter)

Distance: = Film-Focus-Distance (Source-Image-Distance) in cm

Target value: = Target value for exposure index

6.5.4.2.4 Transformation

Optionally, images can be automatically rotated or mirrored.

Rotation: = Automatic rotation by 90°, 180° or 270°

Mirroring: = Automatic horizontal or vertical mirroring

6.5.4.3 Mappings / Macros

6.5.4.3.1 Macros

With a macro, multiple exposures are bundled in a Procedure Code (e.g. the macro "Hand left / 2 projections" with the code "HAND-2E-L" is formed from the two acquisitions "Hand left / AP" with the code "HAND-L-AP" and "Hand left / lateral" with the code "HAND-L-LAT"). In this way, the worklist jobs for recurring standard routines can be created with just one click during the X-ray image acquisition.

Click "Add" and enter the new code for the macro, then select the corresponding codes of the digipaX from the list on the right, and add them by clicking the arrow icon << or by double-clicking. Codes can also be selected more than once. You can also remove particular inputs from the list of the already assigned codes by clicking the arrow icon >> or by double-clicking. The new code for the macro may still have to be added at the appropriate place in the table of organs (see chapter 6.5.4.1.5).

6.5.4.3.2 Mapping

Mapping allows to convert Procedure Codes from other systems into the digipaX Procedure Codes (e.g. "Hand left / AP" with the code "12345-67890" in the job becomes "Hand left / AP" with the code "HAND-AP-L" at the image acquisition).

Click "Add" and enter the code of the other system, then select the corresponding code of the digipaX from the list on the right and add it by clicking the arrow icon << or by double-clicking. You can also remove particular inputs from the list of the already assigned codes by clicking the arrow icon >> or by double-clicking. This procedure must be repeated for all Procedure Codes of the other system.

6.5.5 Assignments

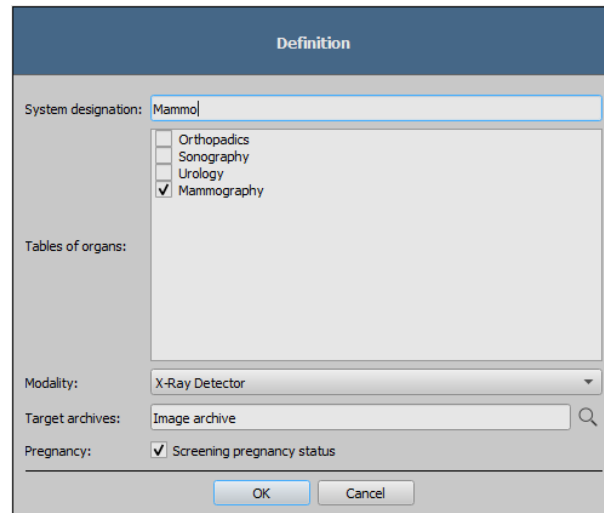
Here the modalities defined in chapter 6.5.3 are assigned to the corresponding tables of organs created in chapter 6.5.4.1.

	System designation	Tables of organs	Modality	Target archives	Screening pregnancy status
1	Mammo	Mammography	X-Ray Detector	Image archive	yes
2	Ortho	Orthopedics	X-Ray Detector	Image archive	yes
3	Uro	Urology	X-Ray Detector	Image archive	no
4	Sono	Sonography	Sono Device	Image archive	no

Multiple tables of organs can be assigned to each modality. One device, e.g. an X-ray detector, can therefore be used for different specialties. The order of the systems defined here is then also applied in the program. The sequence can be moved by arrow keys to the left.

One or more tables of organs are assigned to a modality with the button "new assignment...".

Using the „new assignment...“ button one or more tables of organ are assigned to a modality (new system).Using the "Target archives" button, for each type the corresponding archives can



be defined, in which the images acquired with digipaX2 are stored (not available for modalities manufactured by other manufacturers).For each system (assignment) it can be defined separately whether the pregnancy status is to be requested when creating a job.



If more systems are installed, but there is no need to query about pregnancy status for all systems (e.g. for ultrasound scan), note that if the user wants to create a job using quick navigation or drag & drop, the first system set in the list is automatically activated in the job management. If query about pregnancy status is active for this system, the status is queried, even if the user then selects a different system in the list.

The designation is selected at random. The systems can be changed or removed using the buttons "Edit assignment" and "Delete assignment".

The individual systems can be moved up and down in the list. The systems are also displayed in the order selected here when creating the job in digipaX.

6.6 Interfaces

6.6.1 GDT

These settings can be defined separately for each user group.

GDT tagging:

The system uses GDT interface version 2.1.

GDT filenames consisting of the abbreviations and the set file extension are supported. The default file extensions are *.gdt (fixed file extension) or *.001 to *.999 (incremental file extensions).

Optionally, incremental or fixed filenames can also be used. However, these options do not comply with the standard and should be used in exceptional cases only. The selection of the file type for import and export can also be defined differently, which also differs from the standard, but makes the configuration options very flexible.

6.6.1.1 Communication

6.6.1.1.1 Identification

GDT-ID:

The GDT ID is the ID of the destination station to which the GDT file was sent and is transferred to GDT field 8315. The ID can be defined by the user. According to the GDT standard, each station could have its own ID and so all stations could monitor the same GDT directory. Then only the station with the matching ID would always react. This possibility is only supported by very few practice systems, so that usually the same ID is used for all stations but each station monitors its own directory. The IDs entered here are used consistently on all digipaX stations.

- Our GDT ID: = Consistent GDT ID of the digipaX stations, when empty, the ID can be any
- Their GDT ID: = GDT ID of the other software (usually practice management, only necessary when ID is requested)

Abbreviations:

According to the GDT standard, the name of a GDT file comprises 8 characters and the file extension. The first 4 characters constitute the abbreviation of the target software and the last 4 characters constitute the abbreviation of the sending out software. The abbreviations can be defined by the user. With the GDT response the abbreviations are then exchanged accordingly. Example:

- Our GDT abbreviation: = Abbreviation of digipaX
- Their abbreviation: = Abbreviation of the other software (usually practice management)

6.6.1.1.2 Communication

Import directory:

In the import directory digipaX expects the GDT files. The directory is monitored by event and cyclically checked for new GDT files (polling procedure). The files, which could not be read or which are addressed to other recipients remain in the directory and are not read the second time (until you restart the application). All other files are imported, processed appropriately, and then the file is deleted, as required by the standard.

Export directory:

The response files are written to the export directory. This directory is monitored by the other software (usually the practice management).

File type import and import file:

File type import:	Constant GDT file extension („.gdt“)	Incremental file extension („.001“ - „.999“)	Incremental file names („.0000“ - „.9999“)	Constant file names („.xxxxx.xxx“)
Import file:	DIGIxxx.gdt	DIGIxxx.0003	DIGI0003.gdt	import.abc
Description:	<ReceiverAbbreviation><SenderAbbreviation>.gdt	<ReceiverAbbreviation><SenderAbbreviation>.<IncrementalNo>	<ReceiverAbbreviation><IncrementalNo>.gdt	<AnyFileName >.<AnyFileExtension>
GDT Standard:	yes	yes	no	No

File type export and export file:

File type export:	Constant GDT file extension („.gdt“)	Incremental file extension („.001“ - „.999“)	Incremental file names („.0000“ - „.9999“)	Constant file names („.xxxxxxx.xxx“)
Export file:	xxxxDIGI.gdt	xxxxDIGI.017	0017DIGI.gdt	export.xyz
Description:	<ReceiverAbbreviation><SenderAbbreviation>.gdt	<ReceiverAbbreviation><SenderAbbreviation>.<IncrementalNo>	<ReceiverAbbreviation><IncrementalNo>.gdt	<AnyFileName >.<AnyFileExtension>
GDT Standard:	yes	yes	no	no

Readout delay:

In some other systems, it may be that the GDT is not written in one sequence. In such cases, you can enter a delay for reading the GDT. The value is given in milliseconds.

Data reconciliation:

When this option is enabled, it is checked during the GDT transfer whether the patient's name in the practice management matches the archive. If the name has changed, e.g. after marriage or spelling was corrected, the discrepancies will be shown in an information dialog box. Date of birth is checked as well.

To instantly adjust data at this point, you need to enable the Edit and delete function (see capture 6.3.4) and inform staff on the use of this feature.

Log:

For the purpose of testing and analysis of the contents of GDT files (incoming and outgoing) a log can be recorded (category GDT).

6.6.1.2 Response file

In principle, the response should be automatically provided by the Service Center when new images are stored in the archive. This requires a polling server of the practice software. If the practice software does not support this feature, but expects a response directly after a GDT request, the response must be generated directly from the workstation.

If a GDT response from the Service Center to a directory is to be written at another station the Service Center needs write permission for this directory and might also need to be adjusted (see chapter 3.2).

6.6.1.2.1 General settings

Character set:

You can select the character set used to create a GDT response file.

Two character sets are supported. The GDT-compliant character set is "IBM CP 437 (DOS)" and the other character set is ISO 8859-1 (ANSI).

In the GDT standard there is also the 7-bit character set for communication via COM interfaces. This is not supported by digipaX.

Removing physician number:

You can use this option to remove the physician number/company registration number from the patient ID in GDT responses in systems used by joint medical practices.

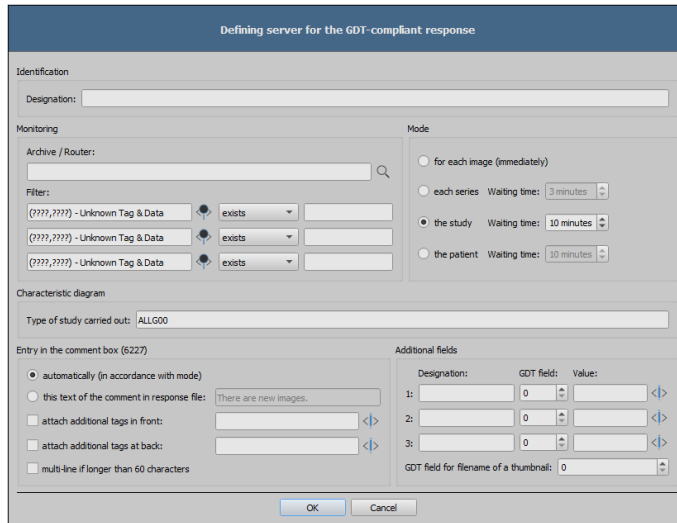
This removes all characters following the last hyphen and the hyphen itself (e.g. from abc-xyz-007-123, "-123" is removed).

This function is only needed if an identifier is added to the GDT transfer file. For more please refer to section 6.8.2.1.

6.6.1.2.2 Generating response on the server

New definition:

- Creates a new rule for a GDT response from the Service Center



Identification:

- Description: = Description of the rule (e.g. GDT response after arrival of an image from a detector)

Monitoring:

- Archive/Router: = Return entries for incoming images in this archive or router
- Filter: = Up to three DICOM tags can be used as conditions For defining a return entry (e.g. Modality equal DX, StationName equal DROC)

Without filter, a response is always generated for incoming images according to the mode, e.g. also when importing a patient CD. If this is not desired, a suitable filter must be defined.

Mode:

- Each image (immediately): = Response immediately for each received single image
- Each series: = Response for each received series
 - o Waiting time: = Response only if after this period of time no further image for this series was received
- The study: = Response for each received study
 - o Waiting time: = Response only if after this period of time no further image for this study was received
- The patient = Response for received patient's images
 - o Waiting time: = Response only if after this period of time no further image for this patient was received

Characteristic field:

- Type of study carried out: = GDT field 8402, the value to be transferred can be determined at random
Default = ALLG00 for general studies

Comment field entry (6227):

automatically: = Content of the DICOM tag of the image according to the mode

- o Each image (immediately): = Image Comment 0020, 4000
- o Each series = Series Description 0008, 103E
(tag of the first image of the series)
- o The study = Study Description 0008, 1030
(tag of the first image of the study)
- o The patient = Series Description 0008, 103E
(tag of the first image of each series separated by a comma)

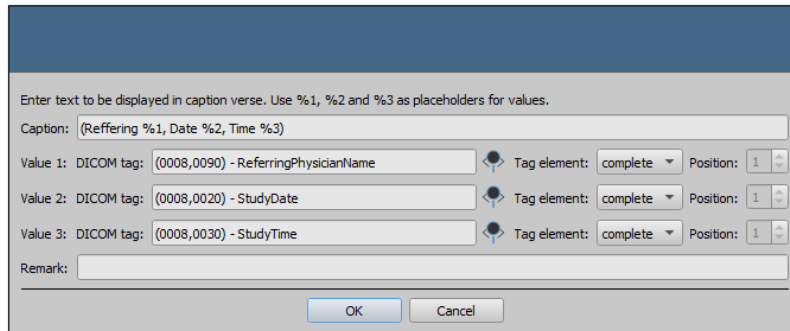
Comment text: = Text specified here is always written in the GDT field 6227 written

Add tags before: = Contents of up to three tags can be added before an entry in the field 6227

Add tags behind: = Contents of up to three tags can be added behind an entry in the field 6227

Multiline: = If content exceeds 60 characters, a new line is written every 60 characters for the field 6227

Examples for tags added before and behind:



Additional fields:

1-3: = Three freely selectable GDT fields can be configured on that whichever value (fixed text) and/or the values of DICOM tags (max. three tags per GDT field) are written for the response. The settings are made as for comment field 6227 (see above)

Thumbnail: = Optionally the filename of the thumbnail can also be written in the response / e.g. the Vet software can be configured in such a way that the thumbnails are displayed in the index card and the corresponding images can be requested in the digipaX just by double-clicking them

Edit definition:

- Edits an existing rule for a response from the Service Center

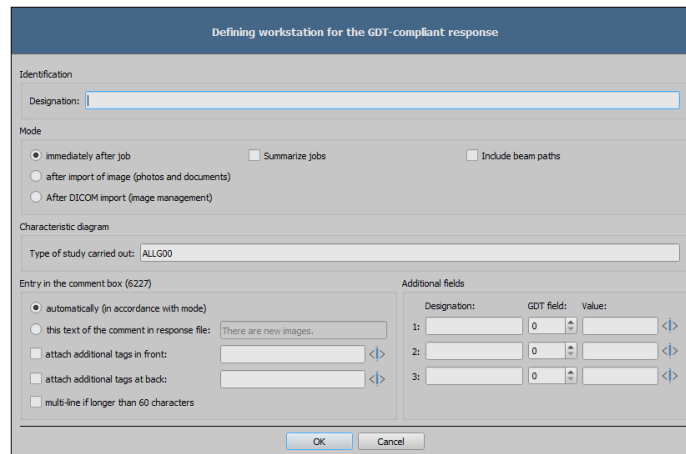
Delete definition:

- Deletes a rule

6.6.1.2.3 Generating response on a workstation

new definition:

creates a new rule for a GDT response from the workstation



Identification:

Description: = Description of the definition (e.g. response after worklist job)

Mode:

- immediately after job: = Response immediately after the worklist job
- collect jobs: : = Several jobs of the patient collected in one response
- incorporate beam projection:= In the written response beam projections of the jobs are incorporated (e.g. Femur left (LAT))
- after image import: = Response after import of the pictures and documents
- after DICOM import: = Response after import of the DICOM images through the component Image management

Characteristic field:

- Type of study : = GDT-Feld 8402, the value to be transferred can be determined at random
Default = ALLG00 for general study

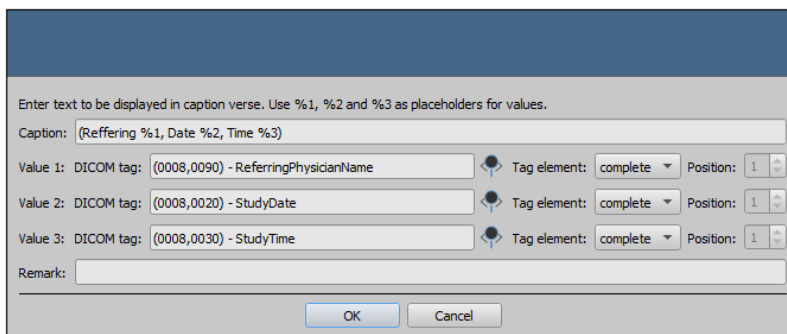
Comment field entry (6227):

automatically: = Content of the DICOM tag of the job according to the mode

- o immediately after job = Requested Procedure Des. 0032, 1060 (body part only e.g. Femur left)
- o collect jobs: = Requested Procedure Des. 0032, 1060 (body parts only e.g. Femur left, Patella left)
- o incorporate beam projection: = Requested Procedure Des. 0032, 1060 (e.g. Femur left (LAT), Patella left (AP))
- o after image import = Study Description 0008, 1030

- Comment text: = Text specified here is always written in the GDT field 6227 written
- Add tags before: = Contents of up to three tags can be added before an entry in the field 6227
- Add tags behind: = Contents of up to three tags can be added behind an entry in the field 6227
- Multiline: = If content exceeds 60 characters, a new line is written every 60 characters for the field 6227

Examples for tags added before and behind:



Additional fields:

- 1-3: = Three freely selectable GDT fields can be configured on that whichever value (fixed text) and/or the values of DICOM tags (max. three tags per GDT field) are written for the response. The settings are made as for comment field 6227 (see above)

Edit definition:

- Edits an existing rule for a response from the Service Center

Delete definition:

- Deletes a rule

6.6.1.2.4 Shutting down server

If the server and thus the Service Center is shut down and not all GDT response files have been written (for the options Series, Examination or Patient with the set waiting time), these files are automatically written when the Service Center is exited.

6.6.1.3 Field assignment (mapping)

6.6.1.3.1 Customizing field assignment (mapping)

Patient data:

If the patient data is transferred from the practice software (non GDT-compliant) to other GDT fields, the fields can be adjusted accordingly and the import can be set to the different fields. When exporting, the data is restored back from the customized fields.

Control area:

If the clinic management system sends the job number and a description of the job, you can configure the appropriate fields. Further processing of this data is done through job management. See chapter 6.5.3 section Additional information.

Three additional fields are available: StudyInstanceUID, SeriesInstanceUID, and SOPInstanceUID. If the appropriate field is configured, it is analysed instantly when the GDT feature "Show images" is called up, and the corresponding study, series or image is displayed. When acquiring images or sending GDT response after automated image receipt, these UIDs, if configured here, are automatically written into the GDT response.

When GDT response is written following Worklist job, these fields are ignored, as UIDs are only generated when the image is acquired – so they are unknown at the time the job is being created.

Veterinary area:

This area is used for customizing the veterinary version. For this purpose, see section 6.8.3.5. Standard fields

With the help of the „Set standard GDT fields“ button, the field numbers are reset to the initial values.

6.6.1.4 Action control by digipaX

6.6.1.4.1 GDT 8402 or 8410 field

In the GDT file record type 6302 ("Request a new study") or record type 6311 ("Show study data"), you can use the 8402 field "Tools and process characteristics map" or 8410 "Test-Ident", in order to pass instructions for a particular action. Optionally, the characteristics map can also be defined at random, but this does not comply with the GDT standard and should therefore be used with caution. These settings can be customized in the digipaX configuration under Administrator/Action Control, as shown in chapter 5.3.

The following table shows the possible settings of action control:

Record type	Value	Description	Controlling area
6302	WL	WORKLIST	Accessing the worklist module to start creating a job
6302	IMP	IMPORT	Accessing the module Pictures and Documents to import pictures or scan documents
6302	CDI	CD-IM-PORT	Accessing a patient to import a patient CD for this patient
6311	SHW	SHOW	Accessing the image viewer to display images of a patient
6311	EXP	EXPORT	Accessing the export module to export or email images of a patient e.g. as JPEG
6311	PRN	PRINT	Accessing the print module to print out images of a patient
6311	CDE	CD-EX-PORT	Loading the patient's CD module for creating patient's CD of the selected patient

6.6.1.5 Work without being connected to GDT

digipaX can also be operated without being connected to the GDT as opposed to being connected to the clinic management system and perform basic patient management functions. It does not, however, have a local database of patients. This means that patient data are saved only when the image is in the archive.

However, you can temporarily save the patients created locally. This option can be enabled in the Control Center under Others / Patient data area. This data is stored centrally on the digipaX server and used by all stations. Thanks to this, patients who do not yet have images in the archive are also available to all other stations.

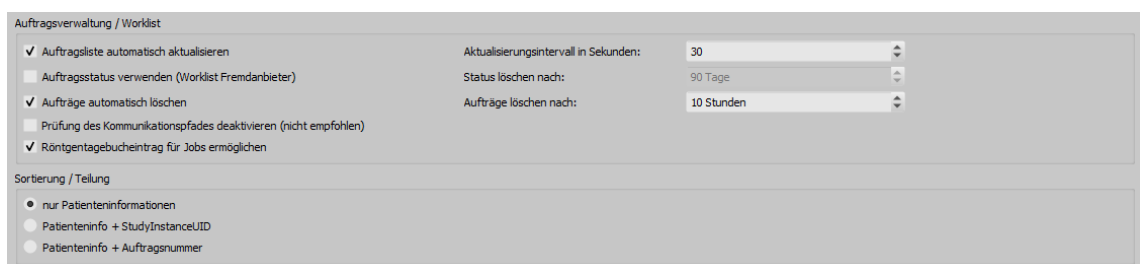
6.7 Job management

6.7.1 Settings

These settings can be defined separately for each user group.

6.7.1.1 Job management / Worklist:

- "Automatically update job list" (recommended) – the job list is automatically updated without the user having to click Query again
- "Update interval" (default = 30 seconds) – time in seconds after that the job list



is cyclically updated

- „Use job status (third-party worklist vendor)" – shows the status of jobs from an external worklist.
- „Delete status after" (default = 90 days) – deletes the status of a job from the database after a specified period of time
- "Automatically delete jobs" – jobs are deleted after a specified period of time
- "Delete jobs" – time in hours until the jobs are automatically deleted
- "Enable check of communication path" (not recommended) – when connecting an external worklist without communication directory the check should be disabled
- "X-ray journal entry for jobs" – directly after creating a job an X-ray journal entry with the data from the job can be created (additional button in the job management)

6.7.1.2 Sorting / Splitting:

- "information on patient only" (default) – all jobs are grouped in the left part of the job list by patients, in the right part the jobs corresponding to a selected one are presented
- "info on patient + StudyInstanceUID" – in the left part the jobs are grouped by this information – meaning that if the jobs of a patient have different UIDs they are presented in the left part in multiple rows (the patient is listed multiply)
- "info on patient + job number" – in the left part the jobs are grouped by this information – meaning that if the jobs of a patient have different job numbers they are presented in the left part in multiple rows (the patient is listed multiply)

6.7.2 Fields

These settings can be defined separately for each user group.

6.7.2.1 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.

6.7.2.2 Colours

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).

6.8 Others

6.8.1 Disc Producers

6.8.1.1 Disc Producers

These settings can be defined separately for each user group.

digipaX supports connections to Disc Producers. This enables patient CDs to be burned and printed automatically. Settings for the devices can be found in the Control Center under "Others / Disc Producers". Only devices shown in the drop-down list on "Disc Producer type" are supported, currently only Epson PP-100/100N and Primera Disc Publisher. A detailed description for the connection and configuration can be found in chapter 7.4.

6.8.1.2 Specials

Activating checkbox "Specials" activates an additional feature in the dialog box for patient CDs.

Thereby, the data of patient CD are copied into a target directory and can optionally undergo further processing by an external program. This can be necessary if e.g. special drives or special data storage media are used.

- **Caption:**
Under this indication a function appears in the dialog box for creation of patient CDs
- **Target directory:**
A directory which the data of the patient CD is copied into
- **Clean up target directory priorly:**
All data in the target directory are priorly deleted (no overwriting of existing data is possible, this means that no new data can be copied if data of the previous patient CD is still contained in the target directory)
- **Program to be called up:**
This program is called up after data is copied (e.g. a special batch file that processes data subsequently)
- **Attach disc name as a parameter:**
The disc name from the dialog box for patient CD is transferred as a parameter upon program start-up.

6.8.2 Patient data area

These settings can be defined separately for each user group.

6.8.2.1 Patient ID

Building next patient ID always as a new one (last name–first name–date of birth):

With this option the patient ID is always automatically built as a new one, regardless of whether the data is delivered per GDT or the patient data is recorded manually. The ID is always built as the last name–first name–date of birth.

Adding identifier to the patient ID:

For forwarding the patient ID via GDT or manual quotation of the patient ID you can specify whether an identifier is to be added to the patient ID. This may be required e.g. in joint practices with data separation where, for example, one router forwards images with "Patient-ID-001" to the archive A and images with "Patient-ID-002" to the archive B.

If, following the GDT transfer, the station also writes the GDT response (e.g. directly after the job), the ID attached here is automatically removed from the response.

Further configuration options are described in section 6.6.1.2.1.

Identification of the patient:

This setting specifies whether e.g. the first and last name, date of birth and patient ID or only the patient ID is to be used for an unambiguous identification when calling the patient via GDT.

The "only patient ID" option may be necessary if the patient's name and date of birth in the practice management are not identical to the data stored in the image archive, and consequently, correct patient assignment is impossible. This may happen when data has been prior transferred from an older archive.

Using PESEL Number (Poland):

When this option is activated, the PESEL Number is used as the patient ID. The PESEL Number is a 11-digit number of the Universal Electronic System for Registration of the Population in Poland. The number has the form of YYMMDDZZZXQ with the date of birth, personal identification number, gender and a check digit encoded in it. If you record the patient data manually through the patient management the validity of ID is verified and the date of birth and gender are automatically derived from it and put in the dialog box.

Registering patient's title:

If this option is deactivated, patient's titles, such as Doctor or Professor, are not included when recording patient data. Titles in names are not common in some countries.

Registering patient's birth date:

If this option is deactivated, patient's birth date is not included when recording patient data.

Registering patient's middle name:

If the option is activated, patient's middle name can be included when entering new patient data.

6.8.2.2 Additional fields

Additional fields can be activated for additional information on patients. These fields are then available at the manual recording of the patient data and can be shown as additional columns in the patient management. The columns can be shown and hidden with the right click on the head of the table. When acquiring the image this information is saved in the DICOM header. In order to be able to use these fields the data base scheme of the image archive needs to be extended.

If a field is activated, the table header of the patient management displays the corresponding DICOM tag designation in the selected user language (OtherPatientID = other patient ID). Optionally, the designation can be adapted. It should be noted that this adapted designation will not be translated for users with a different program language.

6.8.3 Veterinary area

digipaX system can be used for veterinary purposes.

6.8.3.1 Veterinary version

Activate Veterinary version:

Turning on and off veterinary system.

Adjusting DICOM tags:

The system can be adjusted for use of the veterinary version. Fields which are inactive here are also not available in the creating of a new patient dialogue.

Designation	DICOM tag	Tag element	Position	Level
<input checked="" type="checkbox"/> Owner Name	(0010,0010) - PatientName	First name	1	Patient
<input type="checkbox"/> Owner Birthdate	(????,????) - Unknown Tag & Data			
<input type="checkbox"/> Owner Sex	(????,????) - Unknown Tag & Data			
<input checked="" type="checkbox"/> Animal Name	(0010,0010) - PatientName	Surname	1	Patient
<input checked="" type="checkbox"/> Species	(0010,0010) - PatientName	Second name	1	Patient
<input checked="" type="checkbox"/> Race of Animal	(0010,0010) - PatientName	Name affix	1	Patient
<input checked="" type="checkbox"/> Color	(0010,0010) - PatientName	Title	1	Patient
<input checked="" type="checkbox"/> Birthdate of Animal	(0010,0030) - PatientBirthDate	complete	1	Patient
<input checked="" type="checkbox"/> Sex of Animal	(0010,0040) - PatientSex	complete	1	Patient
<input checked="" type="checkbox"/> Pedigree	(0008,1040) - InstitutionalDepartmentName	complete	1	Study
<input checked="" type="checkbox"/> Tattoo / Chip	(0010,1030) - PatientWeight	complete	1	Study
<input type="checkbox"/> Breed registry number	(????,????) - Unknown Tag & Data			

The patient data in the veterinary system can be stored flexibly on different DICOM tags. If images from other manufacturers already exist or if the configuration must be customized to make digipaX able to work with these systems, the tag tags used in digipaX must be adapted to the tags of the third-party supplier.

If the cooperation with the systems of other suppliers is not needed, the tags can be selected at random. It should be noted that above all, you must choose the tags for the names of animals and animal species that will be available on the server when searching for C-FIND. By double clicking on a row in the veterinary configuration table, the entry can be changed. Inactive entries are not used by the system (not all entries can be deactivated – some must be used by the system). If the selected tag is the patient's name (tag type PN), then you can choose whether all or only a part of the tag is to be used. Then, the selected tag can have more entries (multiplicity). The level will be used to determine where on the Query-Retrieve-Level the information will be found. This means that if you select a tag level "series" (e.g. Series Description 0x0008,0x103e), then to determine the information a patient must first be searched for in all studies, and then all the image series, so that the server's response is searched for a specified tag (images are not transferred, but only database entries). This may lead to a significant system slowdown. Therefore, it is recommended to always use patient level tags or, when necessary, the study level. We do not recommend the series or image level. For tags that are not available on the server in searching C-FIND (on any of the levels), or for private tags you should provide the patient's level as the level, so as not to send unnecessary queries to the server.

Also, when reading DICOMDIR (patient's CD) there, the system tries to find information about the relevant tags. However, in DICOMDIR there is much less information than in the databases, so most of the information is relatively unused compared to being shown directly.

Viewing the information about the images on the overlay should be modified using selected settings (configuration page "Information on image"). Alternatively, change to the appropriate modality (modalities) settings which have already been entered, and enter new rows to display the requested information about the animals. Use the same tag settings as in the veterinary medicine configurations.

6.8.3.2 Settings in accordance with DICOM standard

We recommend the following definitions according to the DICOM standard.

Designation	Tag	Tag element	Position	Level
Owner's name	0010,2297 (ResponsiblePerson)	Complete	1	Patient
Name of animal	0010,0010 (PatientsName)	First name	1	Patient
Animal species	0010,2201 (PatientSpeciesDescription)	Complete	1	Patient
Breed	0010,2292 (PatientBreedDescription)	Complete	1	Patient
Animal's gender	0010,0040 (PatientsSex)	Complete	1	Patient

6.8.3.3 Self-defined settings

If compatibility with other systems is necessary, you can make your own settings yourself. We recommend the following definitions:

Description	Tag	Tag element	Position	Level
Owner's name	0010.0010 (PatientsName)	First name	1	Patient
Name of animal	0010.0010 (PatientsName)	Surname	1	Patient
Animal species	0010.0010 (PatientsName)	2. First name	1	Patient
Breed	0010.0010 (PatientsName)	Name affix	1	Patient
Animal's gender	0010.0040 (PatientsGender)	Complete	1	Patient

Features such as owner's date of birth, owner's gender, colour, animal's date of birth, pedigree, tattoo / chip and breeding number should be used only if they are actually needed. First of all, in the 0010.0010 (name of patient) tag, "Title" tag element should be used, and then the appropriate tags from the study level, on which you can skip the actual content in practice. The following tables provide a guide regarding the tags on different levels, which are generally suitable for use and are available on the DICOM server in the standard version of the Conquest system (conquest can accept additional tags to the database with appropriate configurations). When using another PACS, Conformance Statement should be searched for available and appropriate tags.

Level Patient:

Tag	Description	Type	Multiplicity
0010.0020	PatientID	Long String	1
0010,0010	PatientsName	Person Name	1
0010,0030	PatientsBirthDate	Date	1
0010,0040	PatientsGender	Code String	1

Level Study:

Tag	Description	Type	Multiplicity
0008.0020	StudyDate	Date	1
0008,0030	StudyTime	Time	1
0020,0010	StudyID	Short String	1
0008,1030	StudyDescription	Long String	1
0008,0050	AccessionNumber	Short String	1
0008,0090	ReferringPhysicianName	Person Name	1

0010,1010	PatientsAge	Age String	1
0010,1030	PatientsWeight	Decimal String	1
0008,0061	ModalitiesInStudy	Code String	1 – n
0008,1010	StationName	Short String	1
0008,1040	InstitutionalDepartment- Name	Long String	1

Level Series:

Tag	Description	Type	Multiplicity
0020,0011	SeriesNumber	Integer String	1
0008,0021	SeriesDate	Date	1
0008,0031	SeriesTime	Time	1
0008,103E	SeriesDescription	Long String	1
0008,0060	Modality	Code String	1
0018,5100	PatientPosition	Code String	1
0018,0010	ContrastBolusAgent	Long String	1
0008,0070	Manufacturer	Long String	1
0008,1090	ManufacturersModelName	Long String	1
0018,0015	BodyPartExamined	Code String	1
0018,1030	ProtocolName	Long String	1

Level Image:

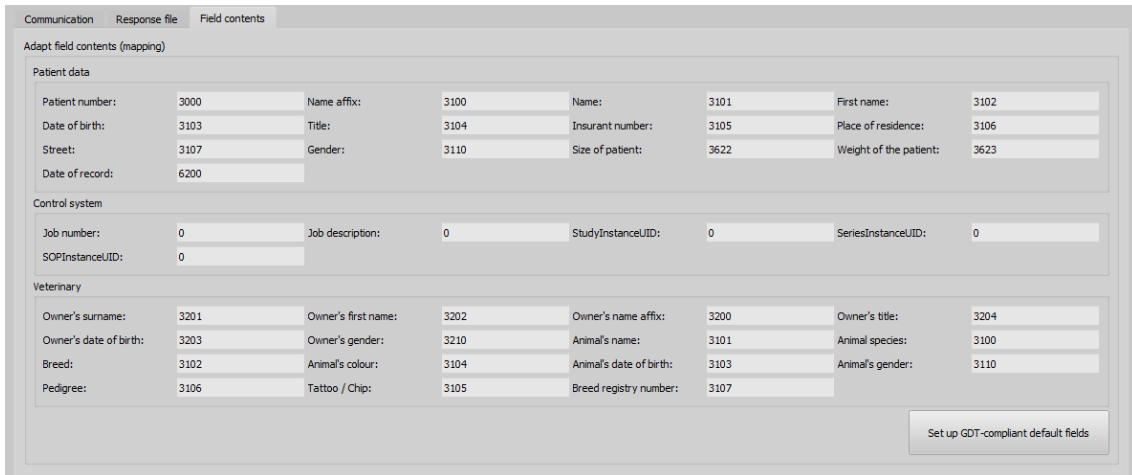
Tag	Description	Type	Multiplicity
0020.0013	InstanceNumber	Integer String	1
0008,0023	ImageDate	Date	1
0008,0033	ImageTime	Time	1
0018,0086	EchoNumbers	Integer String	1 – n
0008,0022	AquisitionDate	Date	1
0008,0032	AquisitionTime	Time	1
0018,1250	ReceiveCoilName	Short String	1
0020,0012	AquisitionNumber	Integer String	1
0054,0400	ImageID	Short String	1

6.8.3.4 Adjusting tags in association with worklist

When adjusting tags for veterinary application, special care must be taken that no collision with tags used in the job management or Procedure Codes occurs (see chapter DICOM tags). If one of the tags that are used there must be compulsorily used for one of the characteristics of the animal, then the other tag in the job management must be configured in another way accordingly.

6.8.3.5 GDT field assignment / mapping

When connecting using GDT to the veterinary clinic's management systems, the GDT connection fields should be adjusted. For example, on the 3110 field, patient's gender is transferred. In the veterinary version, this field often is the gender of the animal that is transferred. If and which fields do you need to adjust depend on the clinic's management system. These fields can be modified under GDT configuration / Field assignment (mapping) / Veterinary medicine. See section 6.6.1.3 „Field assignment (mapping)“.



Communication		Response file		Field contents	
Adapt field contents (mapping)					
Patient data					
Patient number:	3000	Name affix:	3100	Name:	3101
Date of birth:	3103	Title:	3104	Insurant number:	3105
Street:	3107	Gender:	3110	Size of patient:	3622
Date of record:	6200			Weight of the patient:	3623
Control system					
Job number:	0	Job description:	0	StudyInstanceUID:	0
SOPInstanceUID:	0			SeriesInstanceUID:	0
Veterinary					
Owner's surname:	3201	Owner's first name:	3202	Owner's name affix:	3200
Owner's date of birth:	3203	Owner's gender:	3210	Animal's name:	3101
Breed:	3102	Animal's colour:	3104	Animal's date of birth:	3103
Pedigree:	3106	Tattoo / Chip:	3105	Breed registry number:	3107
Set up GDT-compliant default fields					

These settings are effective only with an active veterinary version and partially annulled settings for patient data. The place of residence is taken in accordance with settings from the patient data, if it exists.

6.8.3.6 Viewer

Settings for the veterinary version are stored in the vet2.ini file. Along with burning the patient's CD (DVD), they are transferred to the viewer. Thus, the viewer uses the same settings. Change of the settings in the digipaX viewer is not possible.

6.8.4 X-ray journal

The X-ray journal is activated and deactivated by the license setting.

These settings can be defined separately for each user group.

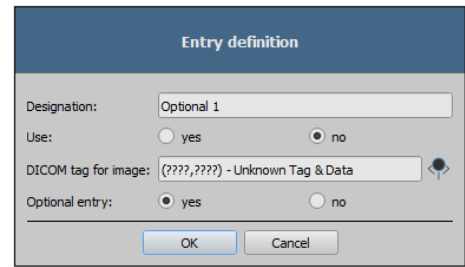
The X-ray journal entries are automatically completed in the Service Center for incoming images. For this to happen, the settings in the Control Center must be customized.

Optionally, the entries can be entered manually by the user.

6.8.4.1 Entries of the X-ray journal

Entry settings:

In the first column of table, the used entries are marked with a check mark. Double clicking on an entry in the table allows for modification of the field to the X-ray journal. A term creates a name in the header of the journal table and it is also used in the mask for the new entries. Some entries can be deactivated. Some fields, such as date and name of the patient, are mandatory fields and cannot be deactivated.



Optional entries:

Some entries are optional and must be predefined. These are Child filter, Density gradient, Optional 1-3 and Remarks. If they are to be used and stored in the image at the use of the X-ray image acquisition, unused free tags must be used. The tags should be of type SH (Short String) or ST (Short Text). If only the entries in the journal are to be made, no tags need to be defined.

6.8.4.2 Generating:

Automatic entry for received images:

The entries for images that have arrived in the archive are automatically completed in the background. For this to happen, the option must be enabled and the desired archive must be selected in the list. It is also possible to select more archives. It should be noted that all required details must already exist in the image and no entry will be made, even for mandatory fields, if there is a lack of data in the image. Missing data can be only supplemented later manually by the user.

Filter:

3 tags can be defined for filtering. This means that an entry can only be made if the conditions in the filter list are met. This aims to allow an entry only if e.g. the modality, AE Title of the acquiring station and the name of the institution in the tag match all the values specified here. If the tag has a different value, or any of the tags in the header is missing, no entry is generated. The goal is to prevent creating the X-ray journal entries from images that were imported through a patient CD or from another institution into the archive. These settings can be defined for up to 3 modalities (filters 1-3).

6.8.4.3 Storage location

The location is in the user's group directory under "dpXSYS\Data\{Group-ID}" and the filename is "XRay.sqlite". The path and filename are fixed and cannot be changed.

The X-ray journal can be viewed and edited at all stations.

6.8.4.4 Backup

The system directory dpXSYS should be stored on a RAID and backed up regularly. The X-ray journal is then backed up along with the RAID.

7 Other configurations

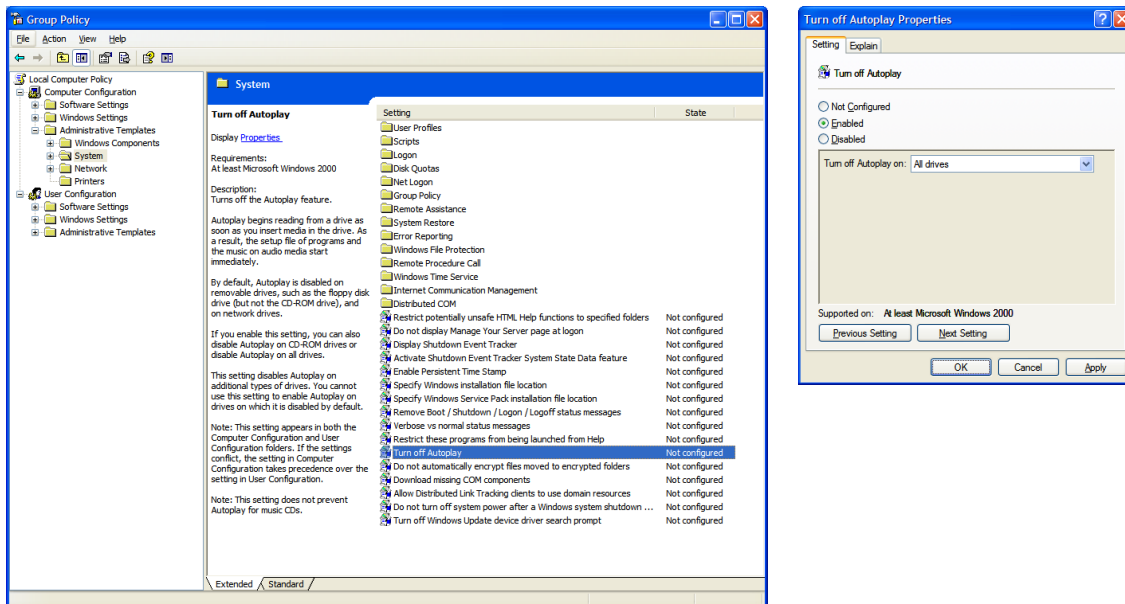
7.1 Disabling CD/DVD AutoPlay

In order that the Windows dialog box does not appear permanently when inserting data medium in the disc burning driver, the Windows AutoPlay function can be disabled in the local group policies.

7.1.1 Method Windows XP

Through "Start", then "Execute" with the "gpedit.msc" command the Local Group Policies are opened.

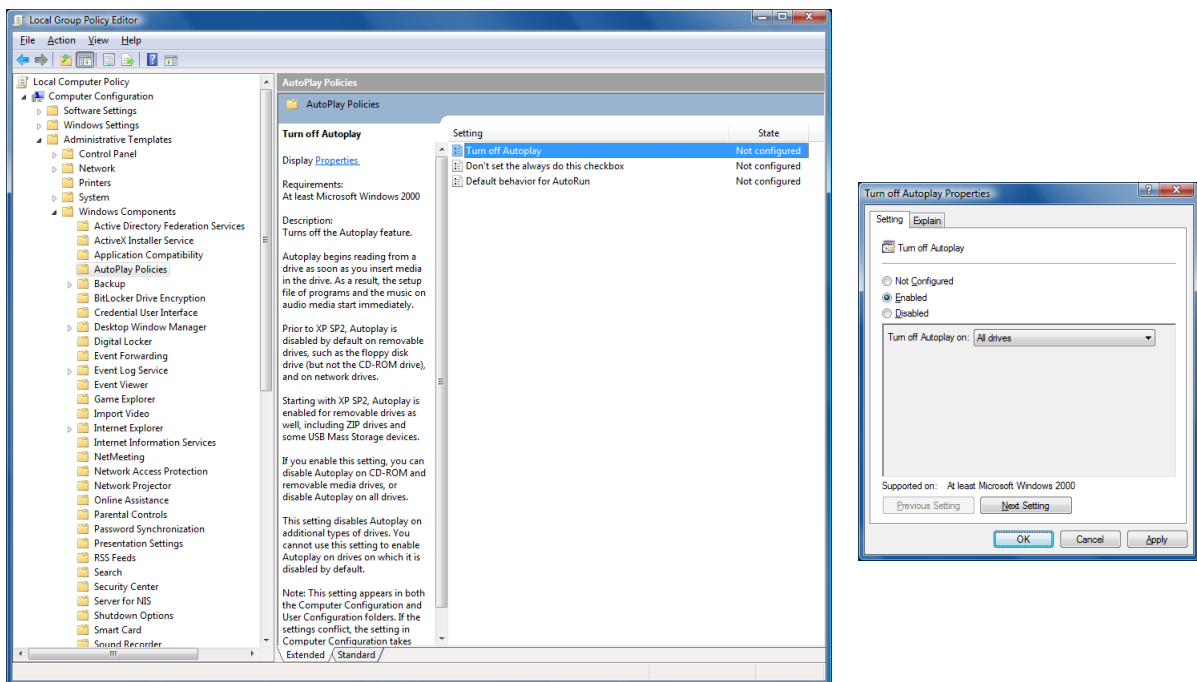
In the subdirectory "\Computer configuration\Administrative templates\System" open "Disable AutoPlay" and set on "Activated/All drives".



7.1.2 Method Windows Vista/7/8/8.1/10/11

Through "Start" (with the right mouse button for Windows 8/8.1/10 and 11) and then "Execute", or through "Start" and then "All Programs/Accessories/Prompt" with the "gpedit.msc" command the Local Group Policies are opened.

In the subdirectory "\Computer Configuration\Administrative Templates\Windows Components\AutoPlay Policies" open the entry "Disable AutoPlay" and set on "Activated/All drives".



Changes will be effective only after Windows reboot and they apply to all users of that computer. For computers that are members of Windows domain, the domain policies are binding. If other settings were done there, the settings done here are ineffective. In such a case, the group policies of the domain must be adjusted on the domain controller

7.2 Label print

Templates, background images and graphics for printing labels can be found on Server in the directory "\\SERVER\dpxSYS\cfg\{Group-ID}\LabelPrint". Each template is in a separate sub-directory.

7.3 Hanging Protocols

The module is available only if it is enabled in the license configuration.

The Hanging Protocols can be configured only through edition of the protocol files in the directory "\\SERVER\dpXSYS\cfg\{Group-ID}\hp". A separate file must be created and configured for each Hanging Protocol. The number of possible protocols is unlimited. The filename for a protocol file is selectable at random, the file extension must be "hp" (example: mammo.hp) and the file content is text-based in the XML format. Edition in an UTF-8 capable text editor is necessary.

When starting digipaX loads the available protocols. If an error occurs during this process, digipaX produces a warning message. For error analysis you can take a look in information in the log "Hanging Protocols". After rectifying in the protocol digipaX must be restarted in order to reload the protocols.



Adjusting and extending protocol files must be done cooperatively with the manufacturer only.



The user must be informed of any modifications, extensions or innovation carried out in the Hanging Protocols. Additionally, the user must be informed that not all images might be automatically presented in the layouts and that further images need to be activated manually from the preview tree.

7.4 Connecting Disc Producer

The settings for connecting a burner can be found in the Control Center under Others / Disc Producers.

7.4.1 Connecting Epson Disc Producer PP-100/PP-100N

The Disc Producer is either connected via USB to the server or added via network interface to a network.

Through an enabled folder on the server burning jobs are transmitted from particular digipaX stations. The software of Epson Disc Producer takes over the execution of jobs and provides the tools for their control. This can be effected by means of PP-100N model from each station using the browser.

7.4.1.1 Installation

The following software systems are to be installed on the server (or at any other station, e.g. reception desk):

- Total Disc Maker (full)
- TD Bridge

Both systems are included in the delivery. Install the systems following the guides of the manufacturer.

The software "Total Disc Maker" is a generic interface for using the device. Using the software "TD Bridge" other applications, as the digipaX software in this case, can forward burning and printing jobs to the system.

7.4.1.2 Configuration

7.4.1.2.1 Total Disc Maker

Start the application "EPSON Total Disc Setup" in order to get to the configuration of the PP-100N model. Select the device and subsequently the function "Start Total Disc Net Administrator". A standard browser with a Login mask opens. This configuration is to be called-up at each workplace through the shown address (URL). While calling this site the first time, you will be asked to register as Admin. After you have successfully logged in, you can access to the settings of the device.

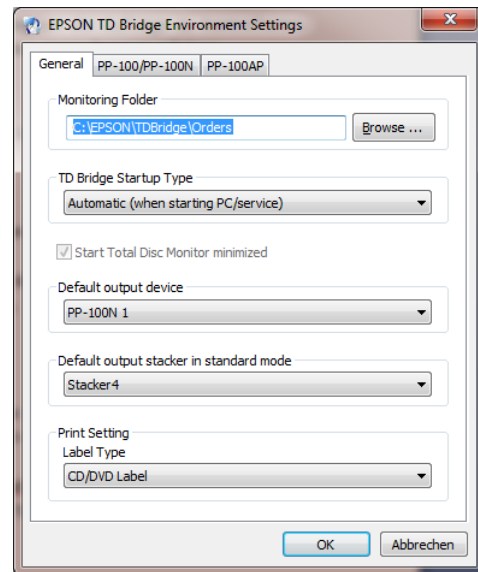
The device got two so-called staplers for blank disks. They can be filled with various types of media (CD, DVD or DVD-DL). The types used are determined in the configuration.

While creating a patient CD in the digipaX, the medium type is indicated and while burning, the appropriate stapler is automatically accessed.

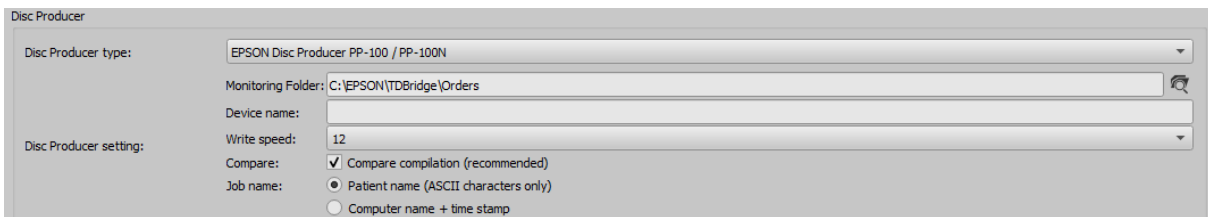
7.4.1.2.2 TD Bridge

You reach these configurations calling-up the program "EPSON TD Bridge Environment Settings". The "Monitoring folder" selected here, and so the folder through which the jobs and data are exchanged, shall be shared in the network, so that all other users are able to write in it.

Additionally, set in the configuration the option "TD Bridge Startup Type" on "Automatic (when starting PC/service)". In this way, after computer boot all is ready for use of the device with the digipaX.



7.4.1.2.3 digipaX



In the Control Center on the configuration page "Others / Disc Producers" the settings required for proper use of the device with digipaX are defined.

First select the Epson Disc Producer as burner type. Enter the same **Monitoring Folder** as in the settings for TD Bridge resp. folder shared in the network.

If you use several devices, you can indicate a target device for this station by indicating the **Device name**. Leave this box blank if you have registered only one device in the network.

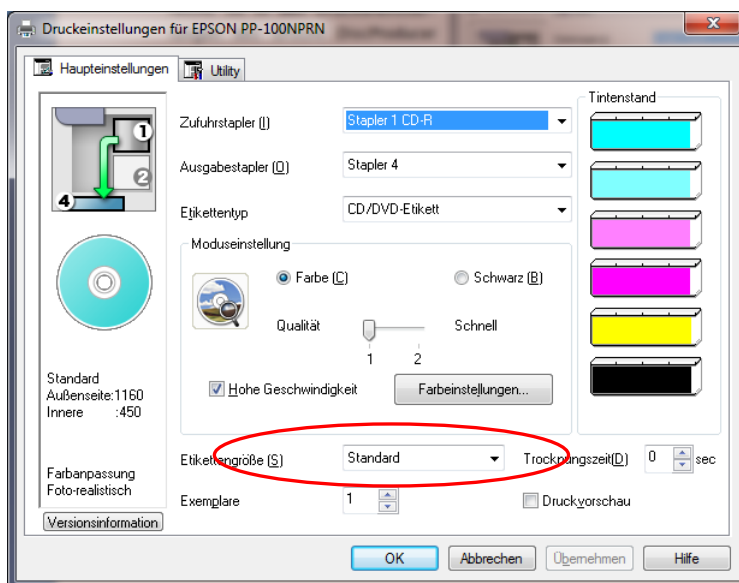
Specify burning speed that will be used in the setting **Writing speed**.

It is recommended to activate the option **Compare** in order to detect errors in burning process. If error occurs, a wrong image will be printed on the disc and a new disc will be automatically produced.

In the job management of burning jobs these are listed by **Job name**. It is recommended to activate the option "Patient name" here so that it is easily recognized in the list of jobs, which patient-CDs will be burned. In addition, always a serial number is yet attached, as job names must be unique. However, job names must be converted into ASCII characters which can be impossible for some defined character sets in the system. In this case, resulting job names are no more easily readable and it is recommended to switch over to option "Computer name + timestamp".

7.4.1.2.4 Printer

Size of printable space is to be set in the print settings of the EPSON DiscProducer. In order to do this, call up the dialog box "Print properties" from the context menu of the printer "EPSON PP-100"/"EPSON PP-100N". Select "User-defined" as the label size. A dialog box for setup of circle diameter opens. Set digipaX as the name and specify inner and outer diameter in millimetres x 10. Confirm with OK and subsequently select digipaX as the label size.



7.4.2 Connecting PRIMERA Disc Publisher

The device is connected via USB to the server.

Through an enabled folder on the server burning jobs are transmitted from particular digipaX stations. Software of the PRIMERA Disc Publisher undertakes processing of the jobs.

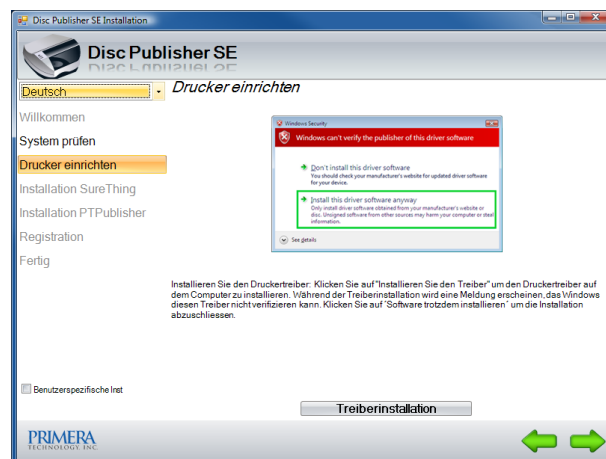
The following models are supported: Bravo XRP, Bravo XR, Bravo II, Bravo Pro, Bravo SE, Bravo Pro Xi and Bravo 4100.

7.4.2.1 Installation

The following software systems are to be installed on the server (or at any other station, e.g. reception desk):

- driver
- PTBurnService
- PTPublisher

The installation begins with the driver CD delivered by the manufacturer. Insert the CD and execute the steps up to and including "Printer setup".



Next, PTBurnService and PTPublisher are to be installed. These are provided on the digipaX homepage in the download area. Versions of both programs must harmonize with each other. On the CD PTPublisher is delivered only, however, it might be that it has another version and does not work with the PTBurnService provided on the homepage.

Optionally, SureThing can be installed. This is a software delivered by the manufacturer for editing CD labels, however, it is not to be used for the labels on patient CDs.

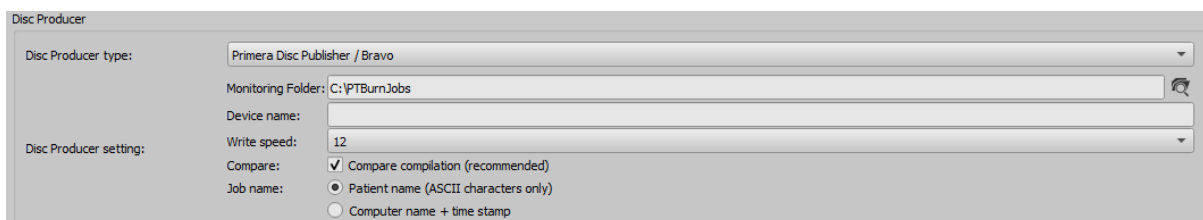
After the installation is completed, reboot the computer. Leave at that PRIMERA on and connected. After reboot drive of the device will be installed automatically.

7.4.2.2 Configuration

7.4.2.2.1 Monitoring Folder

During the installation, a transfer folder for data is set up and configured in the software of the device. The default path is "C:\PTBurnJobs". This path can be changed. To do this, the line "LocalPath=C:\PTBurnJobs\" in section "SHARED FOLDER" of "PTSETUP.INI" of the PTBurnService must be adjusted accordingly. This file is in the directory "C:\Program Files\Primera Technology\PTBurnService". After a change is implemented, the service "PTBurnService" must be re-booted. In order that the other digipaX stations in the network can use Primera, the folder must be enabled with write permissions, so that those stations can store the jobs there. Further settings for PRIMERA software are not required.

7.4.2.2.2 digipaX



In the Control Center on the page "Others / Disc Producers" the settings required for proper use of the device with digipaX are defined.

First, select Primera Disc Publisher as a burner type. On the station, on that the device is connected, enter the same **Monitoring Folder** as in the settings of PTSETUP.INI. On the other stations select a network path for enabling (e.g. \\SERVER\PTBurnJobs).

If you use several devices, you can indicate a target device for this station by indicating the Device name. Leave this field blank if only one device is used.

With the setting **Write speed** you define burning speed to be used.

It is recommended to activate the option **Compare** in order to detect errors in burning process. If error occurs, a wrong image will be printed on the disc and a new disc will be automatically produced.

In the job management of burning jobs these are listed by **Job name**. It is advisable to activate the option "Patient name" here, so that you can easily recognize in the job list (file list) which patient CDs are to be burned. In addition, always a serial number is yet attached, as job names must be unique. However, job names must be converted into ASCII characters which can be impossible for some defined character sets in the system. In this case, resulting job names are no more easily readable and it is recommended to switch over to option "Computer name + timestamp".

8 X-Ray Admin

With the X-Ray Admin, the individual settings of the postprocessing can be defined for each individual Procedure Code and each individual type (skinny, normal, massive, child) and for each individual detector type used. For this, the option "Store images for enhancement with X-Ray Admin" must be activated in the Control Center (see chapter Configuration of digipaX2 system). Up to 10 images are available for each code. This can make the required storage space for the image enhancement very large. The path is defined in the file local.ini in the group "System". It can be adjusted manually.

The settings include:

- parameter for collimation calculation
- filter parameter
- settings for Window Level
- parameter exposure index mask calculation

8.1 Selection and image download

Select the detector on the left, then the stature (child, skinny, normal, massive) and the Procedure Code. Find the best image and click the corresponding thumbnail to load the radiogram. The image is now displayed in four panes.

Left top and bottom:	Result of the last step (at the first step this is still the raw image)
Right top:	Result with the currently stored values
Right bottom:	Result with the currently adjusted values

By double-clicking an image, it is displayed in full-screen mode and by using Escape or double-clicking it again it is again displayed in split view.

Mouse functions:

- Right mouse button: Zoom out / zoom in (moving mouse vertically)
- Scroll wheel pressed: Windowing

8.2 Top toolbar

Layout:



Hiding or showing left column



Hiding or showing top row

View:



Hiding or showing information on image

Windowing:



Determining values for windowing on the basis of the histogram (with varying degrees of contrast).



With switch "entire area" the entire visible area from the minimum to the maximum grayscale values contained in the image.

Synchronisation:



When activated, the windowing of the both left or right images is applied synchronously (see Mouse functions in section Selection and image download above).



When activated, the zoom is applied to all 4 images synchronously.

8.3 Image enhancement

In the right-hand toolbar there are tools for enhancement of X-ray images. Go through all the tools one by one from top to bottom until you get an optimal result.

8.3.1 Grid line suppression

This is the first step. In the left part the original image is displayed, and in the right part the result with or without activated grid line suppression of the grid defined in the Control Centre. Here you can only activate or deactivate the grid line suppression. The protocol shows whether and what kind of grid was detected.



8.3.2 Collimator detection

Now, the result from the previous step (grid line suppression) is presented in the top left and bottom left. This is the initial image for the detection of the collimator. For this purpose, an enhanced intermediate image is generated from the result of the grid line suppression, which is displayed in the right part. This image is generated only for this step and is discarded later.



Here, too, the result based on the current system settings is presented at the top, and the result based on the settings modified here is presented at the bottom right.

Activation:

The detection of the collimation can be activated or deactivated individually for each Procedure Code. If detection is deactivated, the complete image is always used (no automatic cropping and full image size for calculation of the exposure index).

Image enhancement:

Based on this threshold value for the histogram, the enhanced intermediate image for detection is generated.

Collimator detection:

The threshold values are to be adjusted in such a way that the detected collimation (shown as a green frame with a solid line) lies as optimally as possible on the actual collimation.

Minimum area:

The minimum area indicates the size (as a percentage of the entire image) that is assumed to be the minimum collimation. If, due to poor exposures or other problems, the collimation cannot be determined or can only be determined with difficulty, at least this area will be used.

Edges:

The value for the addition inside should be chosen in such a way that only the object area and the background are actually visible, i.e. without parts of the collimation. The value for the addition outside should be chosen in such a way that the complete collimation is also visible within this area. Both areas form the basis for further calculations.

View:

Options for adjustment of the presentation in the viewer.

8.3.3 Image intensifier

With image intensifier, the structures in the image are optimised. In the viewer, the original images (raw images, if necessary with suppressed grid lines) are displayed on the left and the images optimised with the respective filter settings on the right.

**Filter:**

Selection of the corresponding filter file. The drop-down box is preset with the file currently assigned to the Procedure Code. Each filter file contains parameters for the weighting and smoothing of individual structural components.

Weighting:

With slider it is set whether more fine structures (bones) or more coarse structures (tissue) are to be highlighted. The weighting begins with "fine structures" on the left and goes to "coarse structures" on the right.

Smoothing:

The corresponding structure area is smoothed in a similar way where smoothing begins with "fine structures" on the left and goes to "coarse structures" on the right. For example, noise can be reduced with smoothing #0.

Save setting in the new filter file:

The changes made here can be saved in a new filter file. Click the button, type in a name for the new filter and click ok.

Please note that only the filter file is created, but no assignment to the Procedure Code is done. This assignment of the currently selected filter file is done with the button "Save / Apply..."

8.3.4 Window level calculation

With window level values the brightness and contrast of the image can be adjusted. These values can be calculated or obtained in different ways.



Algorithm:

- 1- Calculates the window level values from the collimation detected before
- 2- Calculates the window level values from the set minimum area
- 3- Calculates the window level values from the histogram of the entire image
- 4- Sets the window level values in relation to the entire grayscale of the image

Scaling:

Possibilities to increase or decrease the determined values for brightness and contrast.

View:

Display of the detected regions of the collimation for visual control.

8.3.5 Exposure index mask calculation

For calculation of the exposure index it is necessary to determine the exact object area. The parameters to be used for the calculation are set in this step and can be verified in the viewer on the right side of the image.



Mask detection:

With these parameters the exactness of the selection and the size of the selection can be set. With settings for median filter and for filling holes, unwanted detections in the background or holes in the detection of the object area can also be eliminated.

8.4 Save / Apply and Reset

Click button "Save / Apply..." to transfer all current settings in the toolbar to the database. In future, all acquisitions for this Procedure Code will be processed with the new values.

With button "Reset" the last saved values are reapplied.

If no further enhancements are needed, the option in the Control Centre for storing images can be switched back off, see chapter 6.5.3.6.1.2.1.

9 Archiving

9.1 General



The image archive data must be stored on a RAID system to guarantee data security. Every day, data should be protected on a separate disk, and once a week or every 14 days is to write new data to a CD or DVD.

Archiving of images is done by mirroring all incoming objects on a second and even a third data media. For this purpose, USB drives with appropriate size are suitable for this. The NTFS file system must be set on them (typically FAT32).

The method described in this manual uses the "robocopy.exe" tool for data mirroring capabilities of image archives. You can also use a different solution, such as special software used for backing up.

In addition, once a week or every 14 days, you should archive image data on CD/DVD manually.

9.2 Backup strategy and media

Art of data backup and choice of suitable media should be carefully considered. A short-term data backup is aimed at quick data recover without big effort after a system crash or moving data to a different system. For this purpose an external data medium or similar is usually sufficient.



A long-term archiving, however, has different requirements. It is important to keep in mind that the data must remain well secured over many (10 and more) years. For that to happen, you need media able to store the data secured over such a long period of time. Moreover, you need to secure technology that will enable reading the today's media in 10 or 20 years. Technology improves very quickly, you cannot be sure if today's drives still exist in 20 years, or if interfaces for today's drives are still available in the future. It may happen that the data need to be moved onto newer media in a few years time. Media storage is also an important aspect so that the data are not destroyed in course of time by external influences such as light or electromagnetic radiation etc.

Please follow the instructions of the manufacturer of the medium in this matter. Please explain the used method and possibly necessary procedures in the future to the user.

9.3 MySQL/MariaDB database backup



Just the backup copy of the MySQL/MariaDB database, without archived images is useless! Therefore, you must immediately secure the images.

As a rule, securing the MySQL/MariaDB database is not strictly necessary, because it contains only references to the actual data (images). In the case of data loss in the system, it is sufficient to restore the image archive and create a new database in the Conquest using the button "(Re) initiate the database". However, the duration of creating a new database will depend on the system performance and the amount of data, from several seconds to several hours. To secure the database use the MySQL/MariaDB mysqldump.exe tool. With the help of a batch file and the Windows task scheduler, you can program periodic database backups.

Here a template for the batch file:

MySQL_Backup.bat:

```
@echo off
setlocal

set hostname=localhost
set username=root
set password=root
set port=3306
set backup_file=C:\digipaX\MySQL_Backup.spf

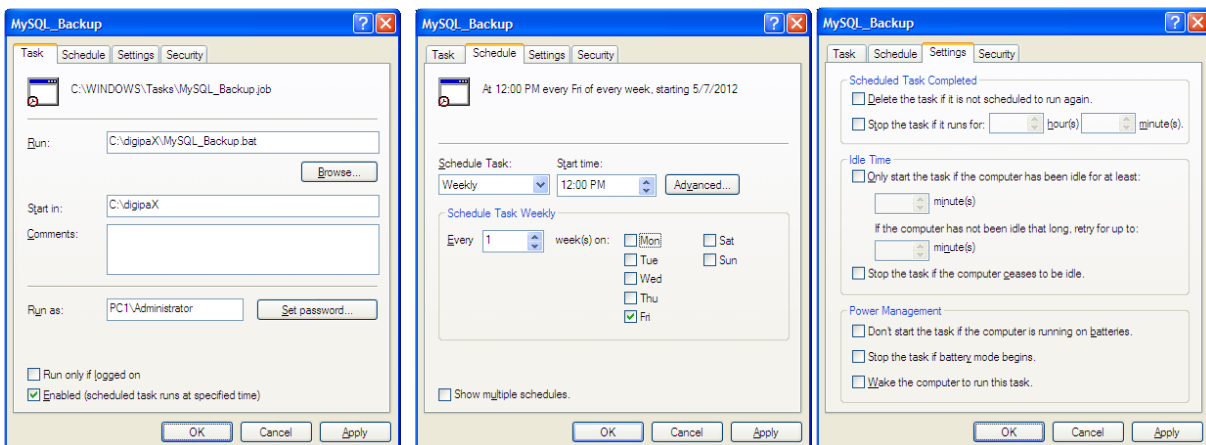
set database1=conquest1
set database2=conquest2
set database3=...

mysqldump --host=%hostname% --user=%username% --password=%password% --port=%port% --databases "%database1%" "database2" ... > %backup_file%

endlocal

@echo off
setlocal
```

Here, only the variables listed as a "set" have to be adjusted to the current system. Then you must add a new task to the task scheduler and select the batch file as the application, and set the desired schedule and extended settings for this task.



After a system crash, you first must restore Conquest, restore the backup database on the MySQL/MariaDB server and upload the images from the last backup created before the failure,

back to the archive. Restoring the database can be done with the help of MySQL/MariaDB workbench, or through the command line, e.g.:

```
mysql --user=root --password=root <MySQL_Backup.spl
```

9.4 Mirroring archive data

To perform data mirroring of the Conquest DICOM server, you can use "robocopy.exe". Since Windows Vista, this tool is already a component of the operating system. Mirroring of the Conquest data directory "data" is performed. For this purpose, empty "Data" directory is created on the destination data medium. To make a mirror image of the data, e.g. "C/digipaX" to "E/backup" the following command must be executed on the command line:

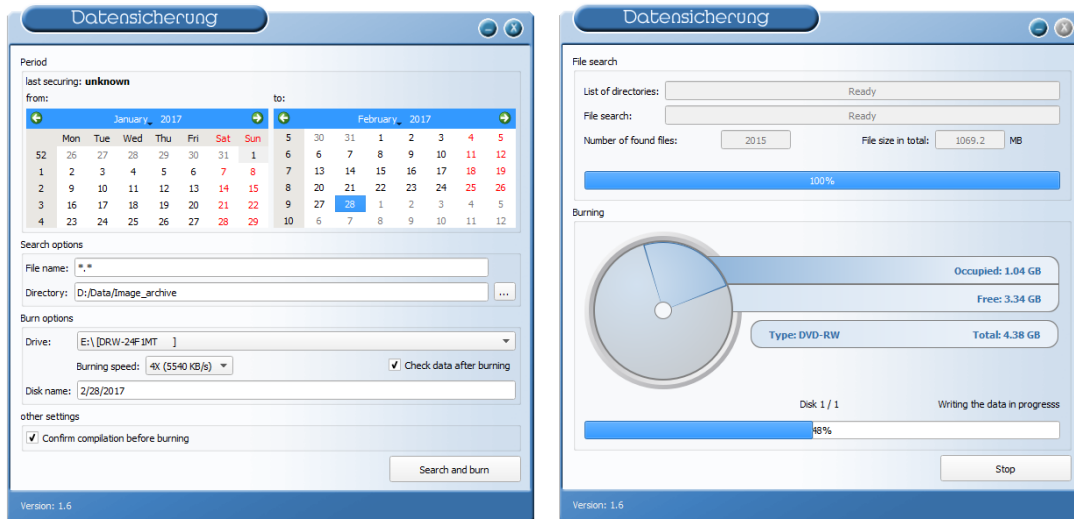
```
robocopy C:\digipaX\Conquest\data E:\Backup\data /mir
```

The details of the path to other systems are to be adjusted accordingly (the drive that the mirroring is to be saved on). To automate the mirroring you need to create a task in the task scheduler as described above in Section 9.3 MySQL/MariaDB database. These tasks can also be combined, simply by adding the command line to the local batch file.

Through this configuration all incoming data are additionally secured on the selected drive and eventually also deleted when data deleting follows in Conquest. The folder structure is thereby the same as for original data.

9.5 Software „Data backup”

With the help of the software "Data backup", which is also available from digipaX, you can search the files by date and automatically burn to CD / DVD. Up to version 1.4 it is required that the software "Nero" is installed on the same computer. From the "Data backup" version 1.5 the IMAPI burning engine integrated in Windows is used and Nero is no longer required.



The selected date is used to find files (from, to) and the type of files, directory, the burner and the name of the CD / DVD. Settings are saved automatically and you do not have to enter them again. The end date becomes the start date next time the program starts. The ending date is always the current date.

If you want to check the compilation again before burning and correct it if necessary, activate the option "Check data after burning".



Therefore, to this tag no further images should be added (in other cases, selected as the end date, the date for the previous day)!

For the appropriate drive, insert a blank data media and using the "Search and burn" change the display. Files are searched and automatically secured on one or more data media (without directory structure). At the end, a message appears on successful completion of burning, or in case of an error – an error message.

It is recommended to automatically start the program using the Windows task scheduler. Respective to the influx of data and the used media (CD/DVD) you can set the backups every week or every 14 days.

10 Tips for group medical practices (team practices)

In the following sections guides are provided on the configuration of the systems for medical group practices, when a single apparatus for imaging is used, but the data are stored in separate archives.

10.1 General rules of conduct

It is recommended to use a Router to transmit incoming DICOM images to various archives. For transferring, an identification tag is sent (ID number, e.g. physician number or company number), which is added to the patient ID. At the receiving station, the DICOM router is given as the archive target.

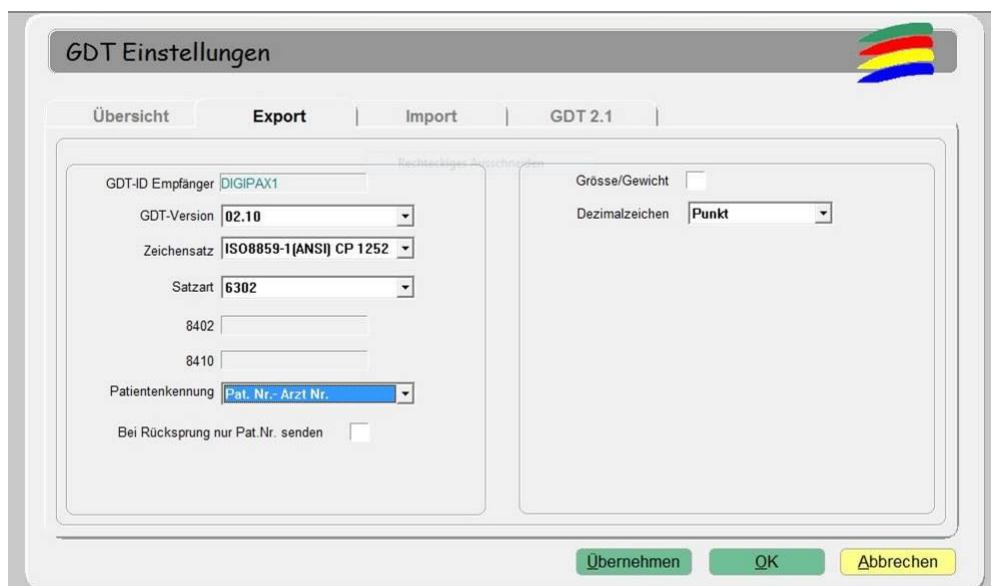
10.2 Adding physician identification tag to the patient ID

10.2.1 Without GDT

In the Control Center on page "Others / Patient data area", you can add any identification to each patient ID. Neither the number nor the option activation can be subsequently changed.

10.2.2 With GDT

In some clinic management systems, such as TurboMed, you can specify in the GDT device configuration, that the GDT export files will have the physician ID added to the patient's number.



Additionally, you can also here use the same options as described in section above, without connecting the GDT. Thanks to this, the number is also added in patients created directly in digipaX. The number must match the physician's number set in the clinic management system.

10.3 DICOM router configuration

In the chapter "Automatic routing" the corresponding routing rules must be defined. At the imaging station, e.g. the X-ray apparatus, as the archive destination the router is given. It should be given an appropriate AE Title, such as "DCMROUTER". The following settings can be made by means of the setting for automatic routing in the Control Center or in the dicom.ini file of the router:

```
# Configuration of forwarding and/or converter programs to export DICOM slices

ForwardAssociationLevel          = IMAGE
ForwardAssociationCloseDelay     = 5
ForwardAssociationRefreshDelay   = 3600
ForwardAssociationRelease        = 1

ExportConverters                 = 3
ExportModality0                  = *
ExportFilter0                    = ImagePat LIKE '%-1'
ExportConverter0                 = forward to ARCHIVE1
ExportModality1                  = *
ExportFilter1                    = ImagePat LIKE '%-2'
ExportConverter1                 = forward to ARCHIVE2
ExportModality2                  = *
ExportFilter2                    = ImagePat NOT LIKE '%-1' AND ImagePat NOT LIKE '%-2'
ExportConverter2                 = forward to TRASH

ForwardCollectDelay              = 600
MaximumExportRetries             = 0
MaximumDelayedFetchForwardRetries = 0
```

Connections used for AE Titles must be given in the "Known DICOM providers" card in the router.



Conquest Archive, which is used as a router, cannot use the DBASE database, it can only be based on a MySQL/MariaDB database, otherwise the SQL-Statement "ImagePat NOT LIKE '%-1' AND ImagePat NOT LIKE '%-2'" will not work properly.

Each image sent to the archive is checked. If the patient ID ends in "-1", the image is transferred to the archive ARCHIVE1. If the ID ends in "-2", it is transferred to ARCHIVE2. All other images, which indicate an error, as it was not possible to use any assignment of ID, are transferred to TRASH. When the images are lost, you need to use the TRASH archive, and from there manually send them to the appropriate archive. The values "-1" and "-2" are to be adjusted to the actually used physician number as well as the AE Title of the target archives.

The forwarding of the routers is monitored. If images could not be delivered, no clean-up of the corresponding router follows until all images have been forwarded successfully.

By deleting the file "ExportFailuresxxx_x" in the router directory, the forwarding of the still open routing jobs can be cancelled, e.g. if the routing destination is permanently offline. Afterwards, the clean-up follows according to the settings.

10.4 Tips for worklist

If the receiving station system supports the downloading of worklist jobs from different worklist servers, you should also use separate worklist queues as with different AE Titles (see Chapter Worklist).

If the receiving system supports only the retrieval of jobs from one server, then you would have to always choose between the two lists of jobs, which is very inconvenient and uncomfortable. Here, it is recommended to use a common worklist and use different station names, if no station name is to be used as a filter on the receiving station. When creating jobs for list 1, understandable station names should be used, for example, "PHYSICIAN1" and for list 2, "PHYSICIAN2." When using the image acquisition system all jobs are displayed without filtering. In the case of physician 1's system, the station name "PHYSICIAN1" is entered as a filter for worklist jobs so that only his/her jobs are received. In the case of a physician 2, "PHYSICIAN2" should be entered accordingly.

11 System commissioning

11.1 Acceptance testing

After completing all the work related to installation and configuration, you should carry out an acceptance test. A separate document exists for the acceptance test.

In the acceptance test, the entire process in practice is checked, from creating a job to viewing of the completed image. The test should confirm proper operation of the workflow.

If necessary, this document can also be signed and given to the client as a confirmation of its proper operation.

11.2 Checklist

Based on the checklist, which is also available separately, you should check that you have fulfilled all the conditions necessary for proper usage of the system.

You should check and mark all the points of the checklist. Upon request, this document can also be signed and given to the client.

12 Others

12.1 Saving and restore settings

The configuration is saved by backing up the complete digipaX system directory dpXsys (see chapter 3.3). For a restore, the backed up dpXsys folder must be copied back to the configured location in the system.

12.2 Decommissioning / Uninstallation

12.2.1 Uninstalling client

The program is uninstalled normally from "Programs and Features" in Windows. Personal data like caches or configuration files are not deleted.

The following data and directories as well as registry values must be deleted manually:

- C:\digipaX
- %USERPROFILE%\AppData\Roaming\digipaX GmbH

- HKEY_CURRENT_USER\Software\digipaX GmbH

12.2.2 Uninstalling server

First, all archives and routers are uninstalled on the server from the Control Center. All archive data (DICOM images) remain on the system and must be deleted manually.

MariaDB and digipaX can then be uninstalled from "Programs and Features" in Windows. The following data and directories as well as registry values must be deleted manually:

- C:\digipaX
- dpXSYS
- Archives
- ArchiveImages
- Routers
- RouterImages

- %USERPROFILE%\AppData\Roaming\digipaX GmbH

- „HKEY_CURRENT_USER\Software\digipaX GmbH“

Product: digipaX

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

The product is CE marked: CE 0494

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