sirona.
The Dental Company

DICOM Removable Media Plug-in Version 3.7

Operating Instructions

English
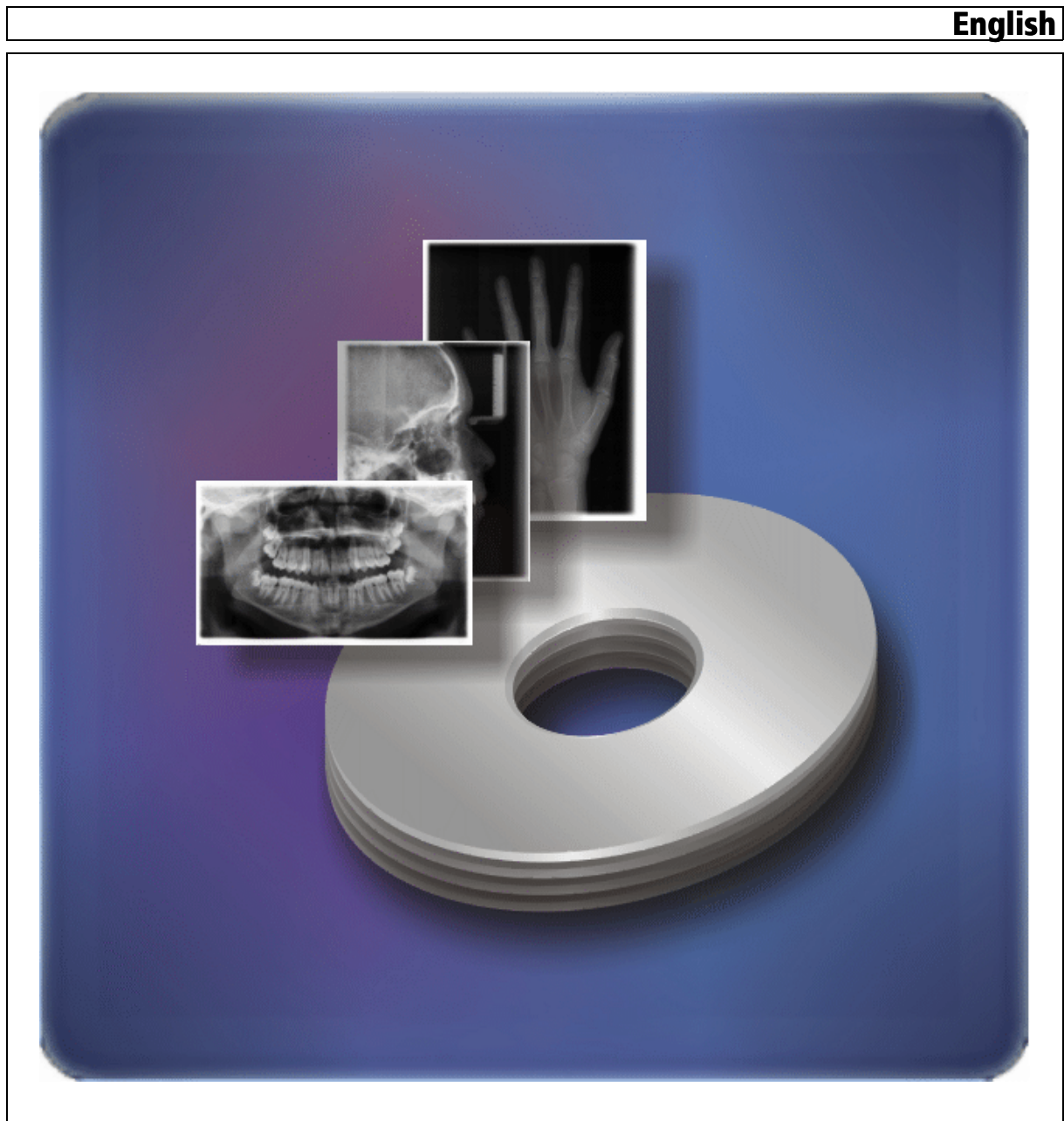
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1 General

DICOM standard

DICOM is an open and future-proof standard for exchanging digital image and patient data between different systems in the field of medicine.

SIDEXIS XG and DICOM

Via the DICOM Removable Media Plug-in, SIDEXIS is extended to include the possibility of reading and writing DICOM directories in a file system. The plug-in is the interface to the DICOM media exchange function.

The following contents can be imported or exported in DICOM format with the DICOM Removable Media Plug-in:

- Examinations with anonymized patient data if necessary

- 2D image data such as X-ray exposures or photos

- 3D volume data as a series of DICOM CT scans, also optimized for third-party software if necessary

Application procedure

The DICOM Removable Media Plug-in primarily consists of two parts: a DICOM data import function which is used to read like an FSR (file set reader) and a DICOM data export function that is used to create a new file like an FSC (file set creator). The application procedure is described in the following:
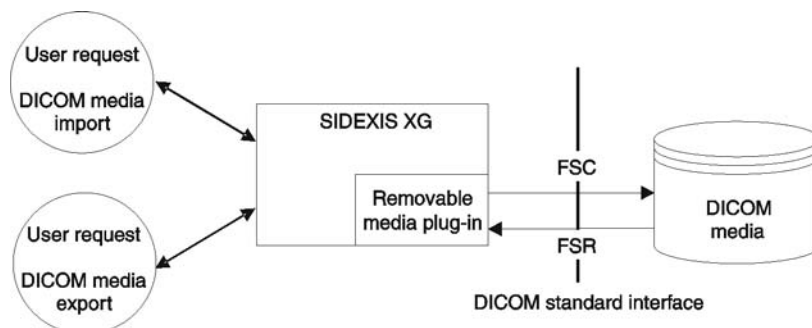
User interface

The DICOM Removable Media Plug-in is operated via the usual SIDEXIS XG user interface. Additional entries are added to the SIDEXIS XG menu bar via the plug-in. The DICOM import and export functions are activated via these entries. Settings can be made e.g. for conversion, selecting the image to be imported or exported and for anonymizing data.

Integration

The plug-in is fully integrated in SIDEXIS and does not have to be installed separately.

2 DICOM data export

2.1 Overview

Prerequisites

In order to export images of a SIDEXIS examination to the DICOM format, you must first register a patient and open an existing exam.

> **NOTICE**
>
> Make sure that none of the information superimposed on the image or the examination is exported. Special 3D information is an exception to this rule if the images are reimported to a SIDEXIS / GALAXIS environment. No other applications can evaluate this information.

Export options

- **Export a complete examination**

  > In the menu bar *"Exam" / "Export"* select the menu item *"Export DICOM Media"* .

  See the section titled "Export to DICOM format [→ 4]".

- **Export an image as a dcm file**

  > In the menu bar *"Image" / "Export"* select the menu item *"Export"* .

  See the section titled "Export images [→ 9]".

- **Export a volume for a third-party manufacturer**

  > In the menu bar *"Image" / "Export"* select the menu item *"3rd party volume in DICOM-Media"* .

  See the section titled "Export volume for third-party software [→ 11]".

2.2 Export exam

2.2.1 Export to DICOM format

Explanation

This function can be used to save all of the data collected for the examination of a patient in the DICOM format.

In order to exchange complete data records with 3D data between two SIDEXIS stations, you must export and import complete examinations/studies.

Export

Start

➤ In the menu bar *"Exam" / "Export"* , select the menu item *"Export DICOM Media"* .

    ↳ The *"DICOM exam export"* window opens with the Export tab.
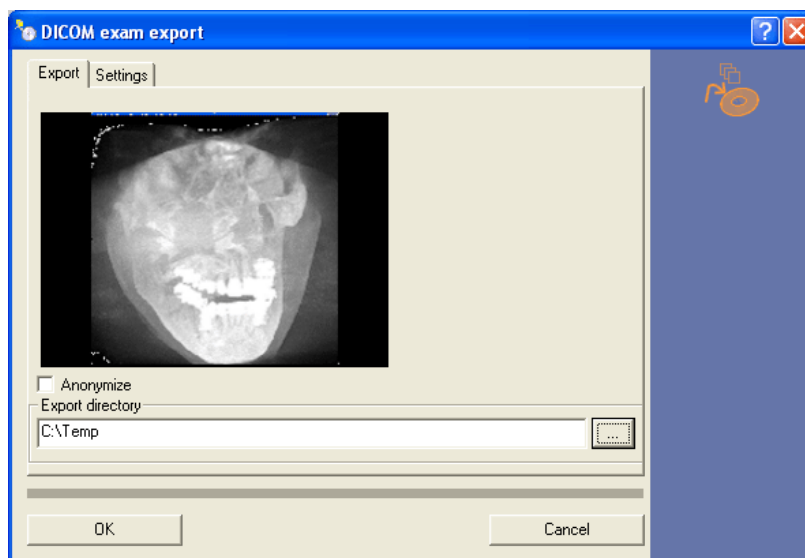
Configuration

1. Place a checkmark in the *"Anonymize"* check box to replace the patient name with an ID. For more information, please refer to the section on "Anonymization" [→ 17].

2. Select a storage location in the *"Export directory"* field.

3. Select the *"Settings"* tab to change the export options.
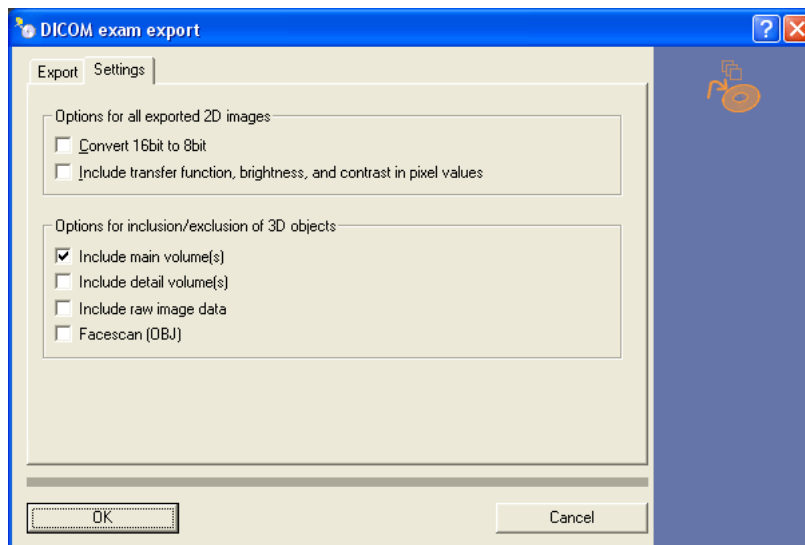
"Options for all exported 2D images" configuration group box

- *"Convert 16bit to 8bit"* check box

  If the *"Convert 16bit to 8bit"* check box is checked, this can prevent DICOM viewers made by other manufacturers from causing problems because some of them are not able to process 16-bit images.

- *"Include transfer function, brightness, and contrast in pixel values"* check box

  If the *"Include transfer function, brightness, and contrast in pixel values"* check box is checked, this means that the values for the transfer function, brightness and contrast are converted to pixel

values. Otherwise they are converted to DICOM windows (center/width) or to VOI LUTs, depending on whether they have a nonlinear conversion function in SIDEXIS.

> **NOTICE**
>
> The *"Convert 16bit to 8bit"* and *"Include transfer function, brightness, and contrast in pixel values"* functions increase the compatibility with DICOM viewers from other manufacturers. However, these conversions cannot be undone.
>
> If these functions are switched off, the pixel data are left in their original state, so that only filters that are used are converted to pixels.

"Options for inclusion/exclusion of 3D objects" configuration group box

- *"Include main volume"* check box

  Activating the check box *"Include main volume"* can be helpful when exchanging data with implant planning software.

- *"Include detail volume(s)"* check box

  Activating the check box *"Include detail volume(s)"* exports the detail volumes of a 3D data record.

- *"Include raw image data"* check box

  Activating the check box *"Include raw image data"* exports the raw data of a 3D data record. The raw data should also be exported whenever a renewed reconstruction is to be enabled, e.g. for subsequent exports for third-party manufacturers. Note that raw data can be processed only by SIDEXIS XG.

- "Facescan (OBJ)" check box

  Activating the "Facescan (OBJ)" check box concurrently exports the facescan data record to the selected directory.

> **IMPORTANT**
>
> **Restricted export**
>
> If the "Facescan (OBJ)" check box is checked, an OBJ export will only be performed for the active image.
> However, the DICOM directory (DICOMDIR) itself contains **all** facescan scans.

Completion

➤ Click the *"OK"* button to start the export with the settings which have been made.

 ↳ The *"Status SIDICOM RM"* window opens. It displays the progress of the export.

2.2.2 Export to EPDF format

Explanation

This function can be used to save all of the data collected for the examination of a patient in the EPDF format (DICOM encapsulated PDF).
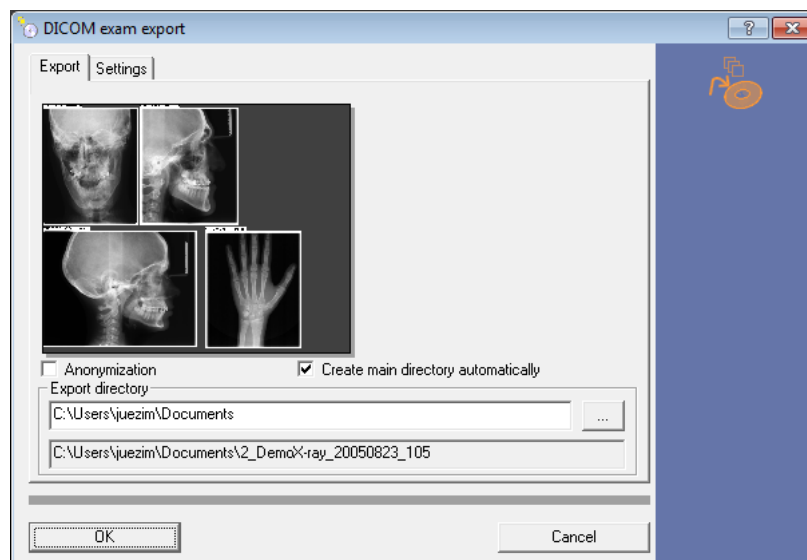
Scope

If the exam has a physical resolution (e.g., reporter reports), this is used during the export.

Otherwise, the settings made here apply.

Export

Start

➤ In the menu bar *"Exam"* / *"Export"* , select the menu item *"Epdf"* .

    ↳ The *"DICOM exam export"* window opens with the Export tab.

Configuration

- *"Create main directory automatically"* check box

    The *"Create main directory automatically"* option creates the named directory for the user.

    – It is automatically created in the specified target directory.

    – The entire path incl. the main directory is displayed below the path name.

    – Where possible or available, the patient name is used to create the main directory name.

- *"Anonymize"* check box

    Place a checkmark in the *"Anonymize"* option to replace the patient name with an ID. For more information, please refer to the section on "Anonymization" [→ 17].

1. Select a storage location in the *"Export directory"* field.
2. Select the *"Settings"* tab to change the export options.
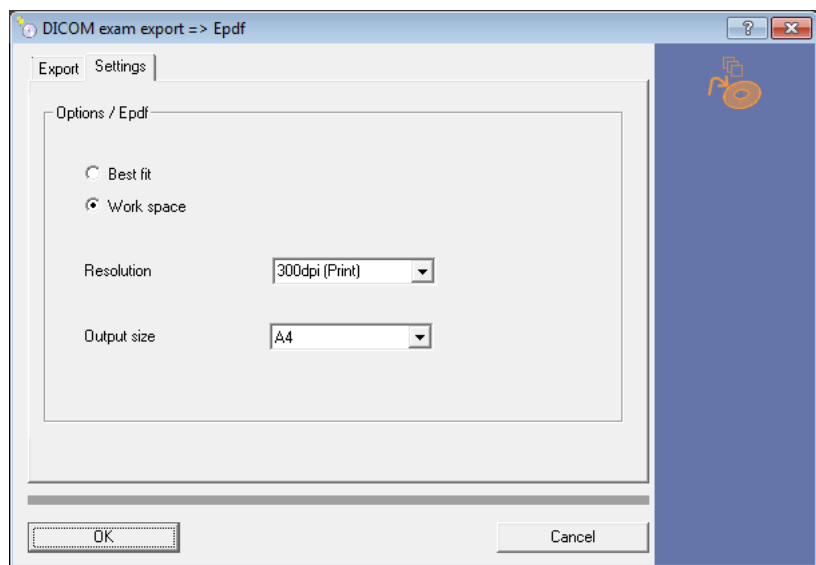
"Options / Epdf" configuration group box

- *"Resolution"* list field

  Depending on the application in question, select the optimized resolution (in dpi (dot per inch)).

  - 96dpi

    Optimized for web representation.

  - 150dpi

    Optimized for screen representation
    (>17 inch screen diagonal)

  - 300dpi

    Optimized for printing

  - Freely adjustable

- *"Output size"* list field

  Adjustment of the exam to the selected paper format.

  - A3

  - A4 (standard selection (not for US selection)

  - US letter (standard selection (for US selection)

- Option buttons

  - *"Best fit"*

    Adjustment of the exam to the selected paper format.

  - *"Work space"*

    The settings made here apply for the paper format.

IMPORTANT
The last saved settings are offered during the next export.

Completion

➤ Click the *"OK"* button to start the export with the settings which have been made.

    ✎ The *"Status SIDICOM RM"* window opens. It displays the progress of the export.
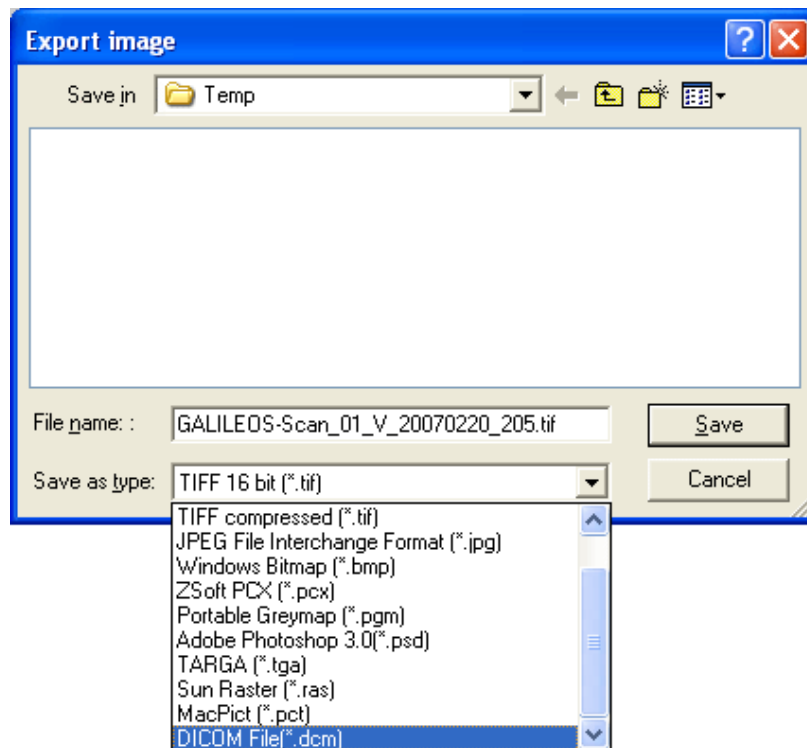
2.3 Export images

Explanation

This function can be used to save 2D images in DICOM format. The file is written out with a dcm extension.
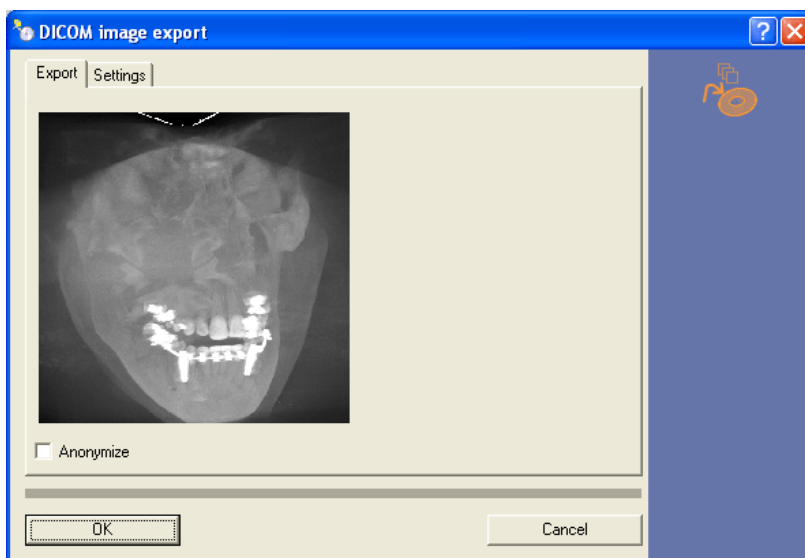
Export

Select DICOM file (*dcm)

✔ The image or volume image to be exported is opened in SIDEXIS XG.

1. In the menu bar *"Image"* / *"Export"* , select the menu item *"Export"* .
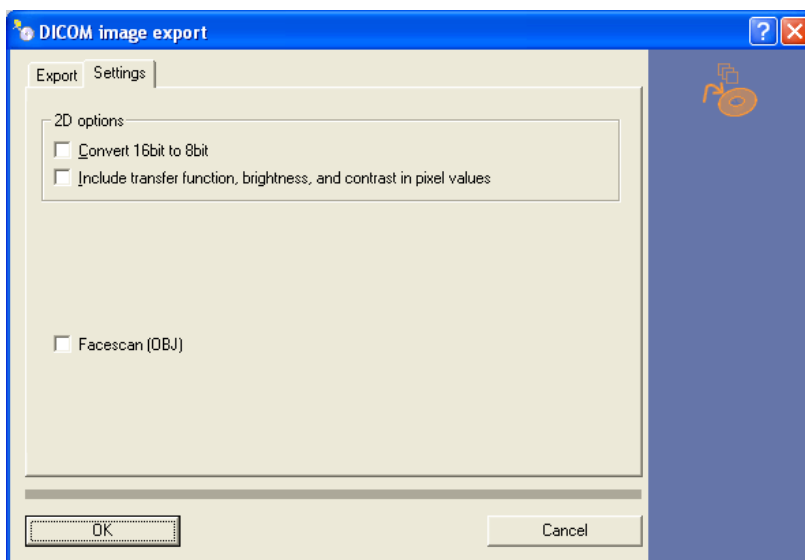
    ✎ The *"Export image"* window opens.

2. Select the storage location (optional: Automatic path selection (see configuration)).

3. Select "DICOM File" (*dcm) as the file type in the popup window.

4. Confirm your entry with the *"Save"* button.

    ✎ The *"DICOM image export"* window opens with the Export tab.

Configuration

1. Place a checkmark in the *"Anonymize"* check box to replace the patient name with an ID. For more information, please refer to the section on "Anonymization" [→ 17].

2. Select the *"Settings"* tab to change the export options.

2D options configuration group box

- *"Convert 16bit to 8bit"* check box

  If the *"Convert 16bit to 8bit"* check box is checked, this can prevent DICOM viewers made by other manufacturers from causing problems because some of them are not able to process 16-bit images.

- *"Convert 16bit to 8bit"* check box

  If the *"Include transfer function, brightness, and contrast in pixel values"* check box is checked, this means that the values for the transfer function, brightness and contrast are converted to pixel values. Otherwise they are converted to DICOM windows (center/

width) or to VOI LUTs, depending on whether they have a nonlinear conversion function in SIDEXIS.

NOTICE

The *"Convert 16bit to 8bit"* and *"Include transfer function, brightness, and contrast in pixel values"* functions increase the compatibility with DICOM viewers from other manufacturers. However, these conversions cannot be undone.

If these functions are switched off, the pixel data are left in their original state, so that only filters that are used are converted to pixels.

Completion

➢ Click the *"OK"* button to start the export with the settings which have been made.

  ↳ The *"Status SIDICOM RM"* window opens. It displays the progress of the export.

2.4 Export volume for third-party software

2.4.1 Explanation

This function can be used to export one or more optimized 3D volumes to certain third-party software in the DICOM format. The resolution and level of detail of the volumes can be decreased to enhance their compatibility. The use of volume data in full resolution is therefore recommended for diagnostic purposes.


NOTICE

If you perform an export for third-party software, you must first generate the specific volume in GALAXIS. It is then sufficient to export only the small 3D volume (symbol with small yellow cube in large white cube) for the export. However, this export cannot be imported to SIDEXIS, but only to third-party software.

2.4.2 Step 1

Start

✔ The volume to be exported is opened in SIDEXIS XG.

➢ In the menu bar *"Image"* / *"Export"* , select the menu item *"3rd party volume in DICOM-Media"* .

  ↳ The " *"Third-Party Volume"* " window opens.
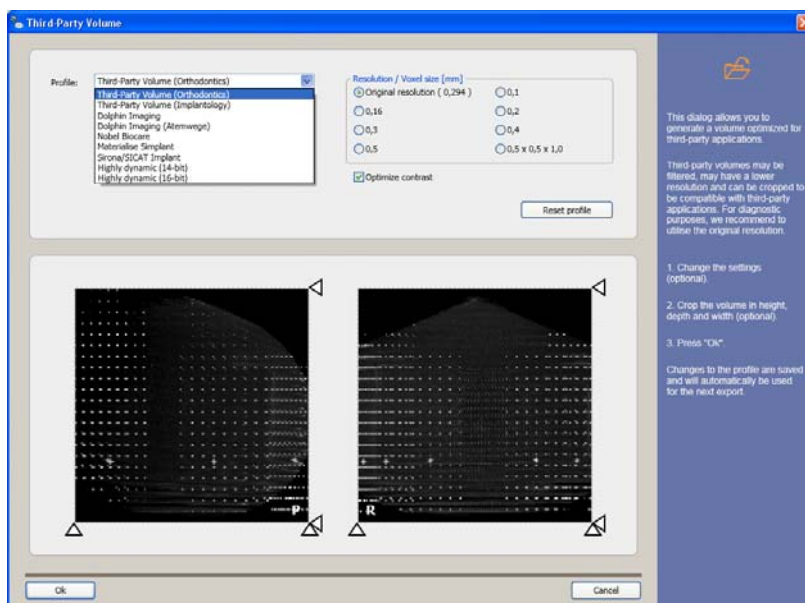
Reduce amount of data

Bottom part of the *"Third-Party Volume"* window

You can limit the volume to its essential amount in order to reduce the amount of data required.

➢ Move the triangles at the edges of the images.

Configuration

Top part of the *"Third-Party Volume"* window

1. Click the desired third-party manufacturer in the *"Profile"* pop-up menu.
2. Select the size of the volume elements in the *"Voxel size"* option field.
3. Place a checkmark in the *"Optimize contrast"* check box to activate the contrast enhancement.
4. Optionally: Click the *"Reset profile"* button to to reset the settings.
5. Click the *"OK"* button.
   ↳ The *"DICOM volume export"* window opens.

2.4.3 Step 2
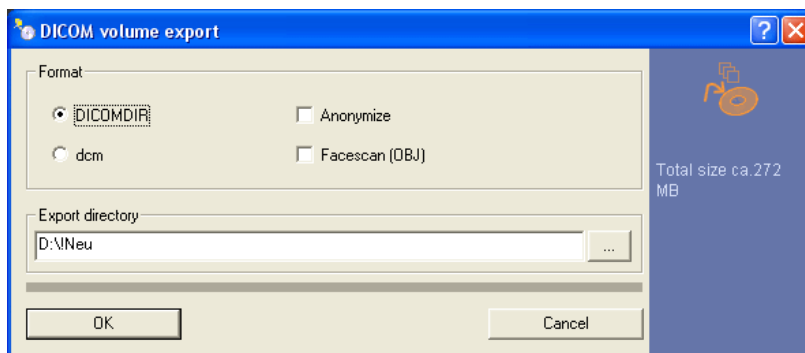
Configuration

- "DICOMDIR" and "dcm" radio buttons.

  The volume data can be exported to a DICOMDIR directory without file extensions or, alternatively, with a dcm extension. Export with a

dcm extension leads to a flat structure with all of the files in a single directory.

Select one of the two options.

- *"Anonymize"* check box

  Optionally: Place a checkmark in the *"Anonymize"* check box to replace the patient name with an ID. For more information, please refer to the section on "Anonymization" [→ 17].

- "Facescan (OBJ)" check box

  Only if the "DICOMDIR" radio button is selected:

  Optionally: Activate the "Facescan (OBJ)" check box in order to export the facescan data record to the selected directory parallel to the DICOM data.

- *"Export directory"* text field

  Select a storage location in the *"Export directory"* text field.

> ⚠ **CAUTION**
>
> Remember that a complete GALILEOS 3D scan with a single volume and corrected raw data requires approx. 700 MB storage space.

Start export

➤ Click the *"OK"* button to start the export with the settings which have been made.

    ↳ The *"Status SIDICOM RM"* window opens. It displays the progress of the export.

3 DICOM data import

In order to import a study, series or image to SIDEXIS XG, you first have to check out the current patient in SIDEXIS.

Based on the imported data, a new patient will then be created with a new examination, including all of the imported images

3.1 Import exam

This function can be used to import all of the patient information and images of an examination which are available in the DICOM format.
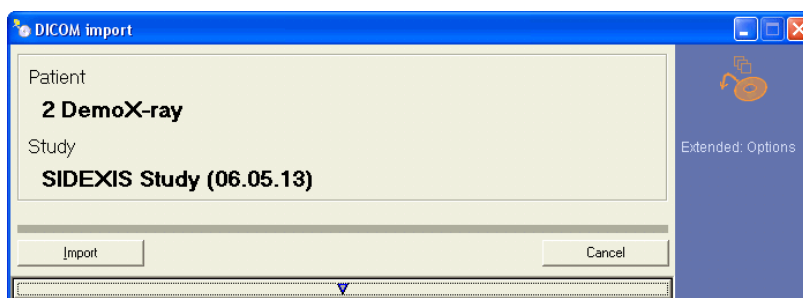
Select the DICOM file

1. In the menu bar *"Exam"*/*"Import"*, select the menu item *"Import DICOM Media"*.
   - ✺ The *"Open DICOM file to import"* window opens.
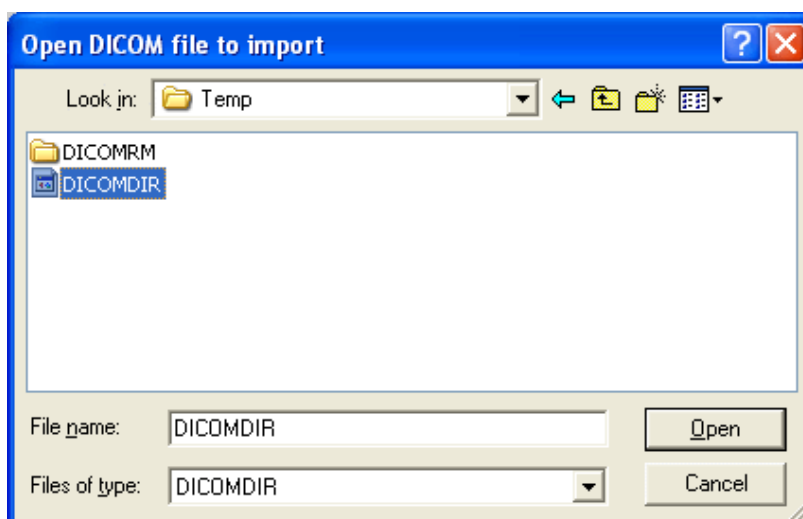
2. Select the DICOM file to be imported. Confirm your selection by pressing *"Open"*.
   - ✺ The *"DICOM import"* window opens.

### Collapsed display (only when there is "one" patient and "one" study in a DICOM file)

The collapsed version of the *"DICOM import"* window appears if there is only "one" patient and "one" study.

This indicates to the user that it is better to import the data record as a whole.

- If you want to import the data record as a whole, press the *"Import"* button.

- If you do not want to import the data record as a whole, press the broad button at the bottom with the arrow symbol pointing downwards.

Selection
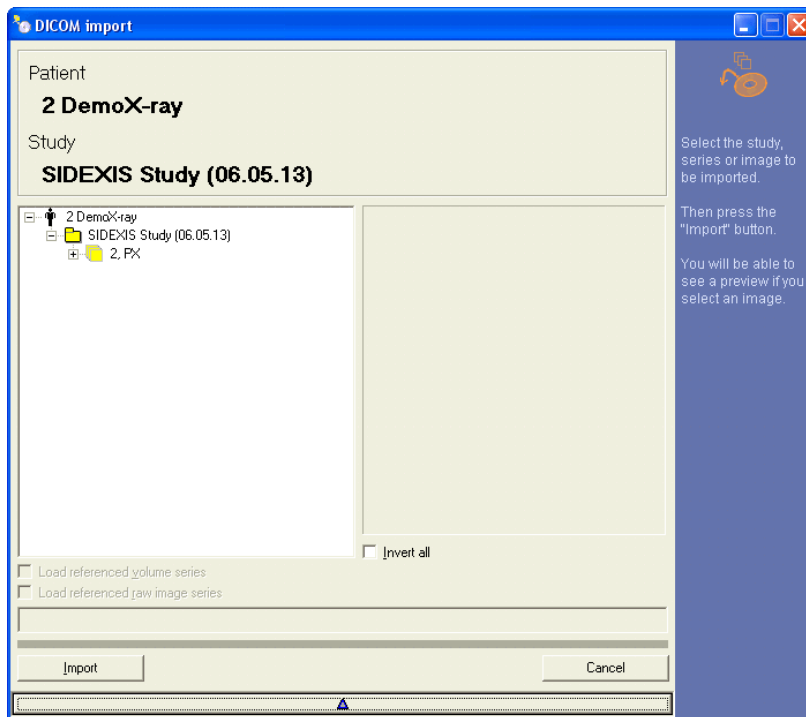
The entire directory is displayed in a tree formation. Its branching corresponds to the structure typical for DICOM: Patient / Study / Series / Image.

The following information is displayed if available:

- patient name

- study description and study date

- series description, series number and modality

- instance number, SIDEXIS take type without number and content time

If you select an image in the tree, a preview image is then displayed.

➢ Select a study, series or image for import. Confirm your selection by pressing *"Import"*.

    ↳ All of the images in the **selected branch**, including the patient information, are imported into a SIDEXIS examination.

> **NOTICE**
>
> **The images are only temporarily saved in SIDEXIS XG until you save the examination.** In this step, additional image data tests are performed in order to prevent conflicts with previously existing data.

> **NOTICE**
>
> The appropriate contrast, brightness and transfer functions are assigned to the DICOM window (center/width) and VOI LUTs during the import operation.

3.2 Specific features of 3D import
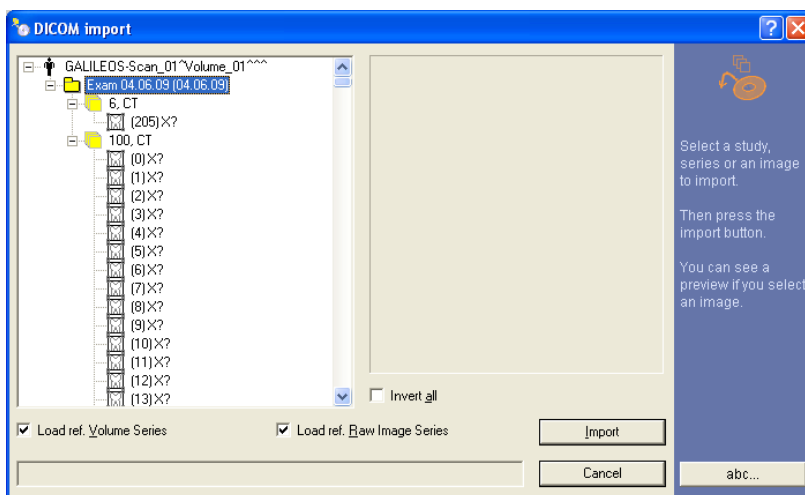
When importing 3D data, it is advisable to select and import the corresponding study. Make sure that the *"Load ref. Volume Series"* and *"Load ref. Raw Image Series"* options have both been selected. If you select only DICOM series or images, the 2D views of the scan will be imported without giving you the possibility of starting GALAXIS later on.

> **NOTICE**
>
> Complete CT section series cannot be imported to SIDEXIS directly as images, but only in the context of the overlying study. They are designated with numbers "100, CT" and so on. Individual CT overview scans (e.g. 6, CT) also can be imported.

> **NOTICE**
>
> It is not possible to import 3D data which do not have a 2D image view that can be displayed in a SIDEXIS examination. This view is required as a container for 3D data. Please remember this when exporting data.

4 Anonymization

DICOM data exchange is often used in connection with other persons, hospitals or practices. In such cases, it is often necessary to anonymize the patient data.

NOTICE
Always bear in mind that only the patient name stored in DICOM is anonymized. Make sure that no patient-related data can be found in the examination name, in the findings or in other text fields! The date of birth must remain for medical purposes.

NOTICE
You will require DICOM Removable Media Version 3.1 or higher for encoding and decoding purposes.

The patient name is replaced by "Anonymous[Patient ID]". The [Patient ID] comes from the exporting SIDEXIS system. The ID helps the "exporter" associate the patient with the original data record in order to clear up any possible questions with the "importer".

5 Corrective action

5.1 Manually adding a plug-in

Standard scenario

The DICOM Removable Media Plug-in is fully integrated in SIDEXIS and does not have to be installed separately.

Fault scenario

If the appropriate entries of the DICOM Removable Media Plug-in are missing in the SIDEXIS XG menu bar, you can add the plug-in manually in the *"Plug-in manager"* .

Add the plug-in

1. Use the *"[V]iew"* menu bar to select the *"[C]ustomize..."* menu item.
2. Select the *"Plug-in manager"* tab.
3. Press the *"Plug-in manager"* button.
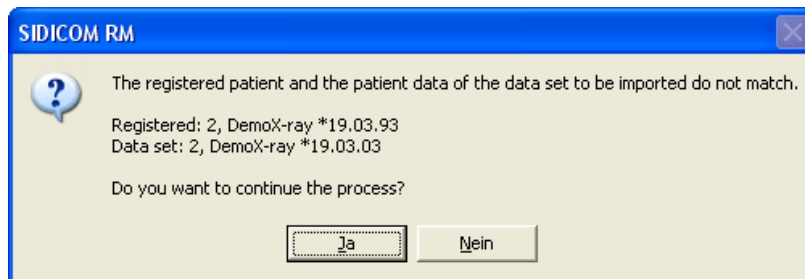   > ↳ The *"Plug-in manager"* window opens.
    > If the DICOM Removable Media Plug-in is installed, the *"Export DICOM Media"* and *"Import DICOM Media"* entries are displayed in the *"Plug-in manager"* .
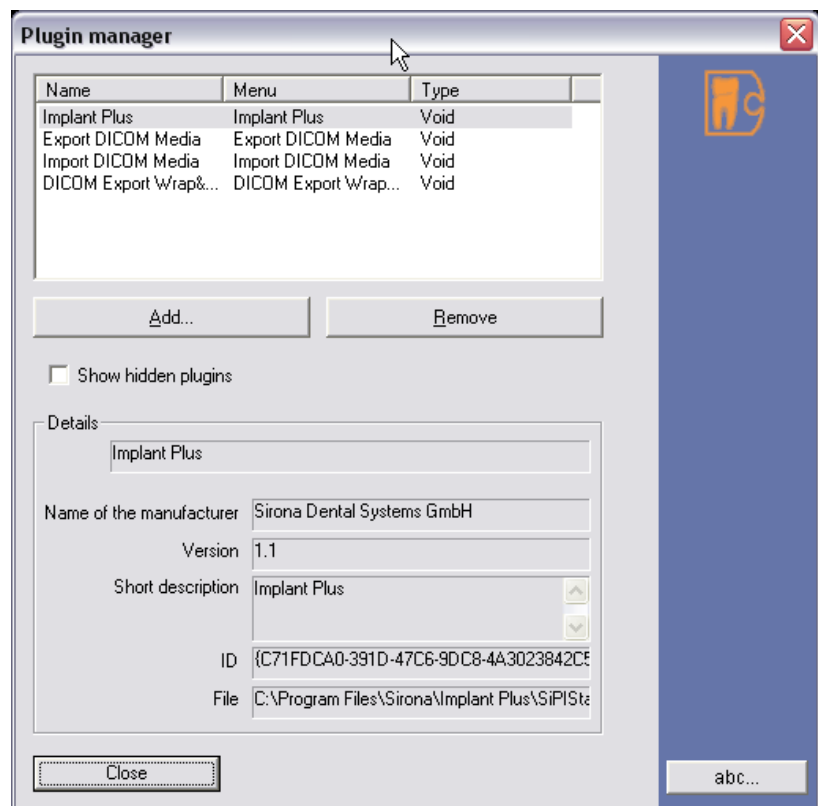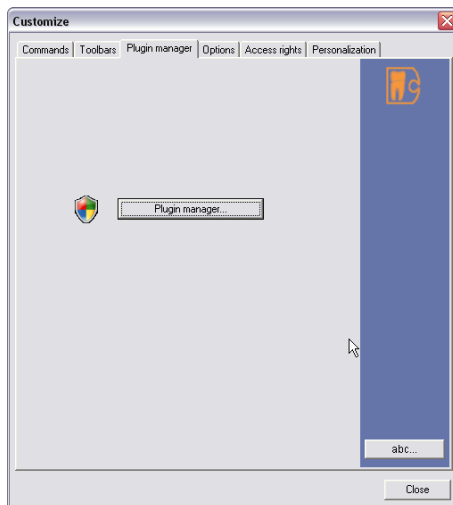
4. For more information on plug-ins and the configuration, please refer to the SIDEXIS XG document *"Operator's Manual"* .

5.2 Error messages

Error message during individual image imports

This message appears if the patient data for the patient registered is different from the patient data for the individual image import.

Error messages for the DICOM Removable Media Plug-in

The error messages for the DICOM Removable Media Plug-in and the solutions recommended in response to them are listed in the following table:

Error message	More exact description	Recommended solution
"SIDEXIS PlugIn interface bears version X.x. This interface version is not compatible with this PlugIn. Please update."	The plug-in has discovered a wrong "direct dental" interface from SIDEXIS.	Please check whether you have a suitable version of SIDEXIS XG. (The version displayed is the interface version, and not the SIDEXIS version.)
"SIDEXIS patient data cannot be accessed."	The plug-in cannot read the patient data.	Please contact the Support Department.
"Before DICOM Media Import, please close all open exams."		Close the currently opened examination and the current patient before importing the DICOM data.
"Before DICOM Media Import, please check out the active patient."		Close the currently opened examination and the current patient before importing the DICOM data.
"Failed to create an exam."	DRMP cannot create a new exam during the import operation.	This is a SIDEXIS direct dental error; please contact Support.
"Failed to create a patient."	DRMP cannot create a new patient during the import operation.	This is a SIDEXIS direct dental error; please contact Support.
"The active take frame has already an image."		This is an internal error; please contact the Support Department.
"Failed to create image."	DRMP cannot create a new image during the import operation.	This is a SIDEXIS direct dental error; please contact Support.
"Failed to create take frame."	DRMP cannot create a new exposure frame during the import operation.	This is a SIDEXIS direct dental error; please contact Support.
"The selected DICOMDIR or DICOM file is invalid. Please select another one."	The DICOMDIR/file selected during the import operation is invalid and cannot be read.	Try to select a valid DICOMDIR or to import the DICOM images as individual files.
"Incompatible version of the exam import."	The exam to be imported was created with an incompatible version.	Please check whether the two exchange partners have mutually compatible versions. Please contact the Support Department for a possible update of the plug-in. It should in any case be possible for you to import at least 2D DICOM images. Try to import one series or one image.

5.3 Questions and answers

Question: In previous versions, you could set a variety of different options in the export dialog box with the tree structure. Where are these options located now?

Answer: These options are now divided among several menu items, i.e.
"Exam" | "Export" | "Import DICOM Media"
"Image" | "Export" | "Export"
"Image" | "Export" | "Volumen in DICOM-Media"
"Image" | "Export" | "3rd party volume in DICOM-Media"

Question: Where is the volume generated for third-party manufacturers stored in SIDEXIS/GALAXIS?

Answer: It is no longer stored. It exists in the form of files/directories only in the locations where it has been exported.

Question: Why does it take so long?

Answer: If you export a complete 3D data record, approx. 700 MB must be converted to data. This takes several minutes, depending on the computer system and spot-film device. If exchange of the 2D images or 2D views of a 3D scan suffices, simply deactivate the option *"Include raw image data"* . Then the export process will not take so long.

Question: I do not think the image resolution information has been transferred to the DICOM archive correctly. How do I check this?

Answer: In accordance with the DICOM standard, image resolution information is transmitted in various tags.

- Secondary capture (SC) format

  The image resolution information for the secondary capture (SC) format is contained in the pixel spacing tag (0028,0030).

- DX format

  The image resolution information for the DX format, however, is contained in the imager pixel spacing tag (0018,1164).

  Please make sure your viewer tag (0018,1164) is also processing accordingly.

5.4 Support

Customer service center

In the event of technical queries, please use our online contact form at www.sirona.com. In the navigation bar, go to the menu commands *"CONTACT"* | *"Customer Service Center"* and then click the *"CONTACT FORM FOR TECHNICAL QUESTIONS"* button.

Please inform us of your environment and the data to be imported and exported to simplify our troubleshooting efforts.

We reserve the right to make any alterations which may be required due to technical improvements.

Sirona Dental Systems GmbH   **Contact in the USA:**

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