

CD Viewer Application

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Vams^{tec}

Issa 3.1. Manual for CD Viewer Application

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Printed: June 2017 in Zagreb, Croatia

Publisher

VAMS TEC d.o.o.

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1 Getting more help

This help system describes functions accessed by **Issa** users as accurately as possible. Whenever there is a contradiction between information in this help and written manual, this help system takes precedence.

For more help, please contact **VamsTec** technical support:

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fax:	+385 1 4880 295
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2 Issa System Overview

Issa is a picture archiving and communication system (**PACS**) designed to maximally meet various requirements of utilization in diverse areas of medicine.

It includes the following options:





- Image acquisition, storing and archiving
- Image-processing tools
- Quantitative measurement tools for measuring various parameters of objects on the images
- Advanced database searching capabilities
- Complete ICD-10 index 85 incorporated into database
- Custom reporting tools

In association with **Pharos** program, **Issa** enables image and data transfer between two remote computers, using telephone and/or Internet connections. Together with **Issa Typist** application, **Issa** enables typing of the recorded voice files, and with **Issa Front Desk** it enables scheduling patients for different modalities.

Exams in **Issa** can be recorded on a CD or DVD medium, together with **Issa CD Viewer** application, which is used to view images and exam data on computers that do not have Issa installed.

2.1 Main toolbar

Main toolbar is located on the left side of the **Issa** window. It is present on all forms.

 Patient	Opens the Patient form for work with the patient data.
 Exam	Opens the Exam form for work with the examination data.
 Search	This button is used to search the CD and DVD drives on the computer for Issa exams.
 Exit	Exits Issa .

2.2 Data organization

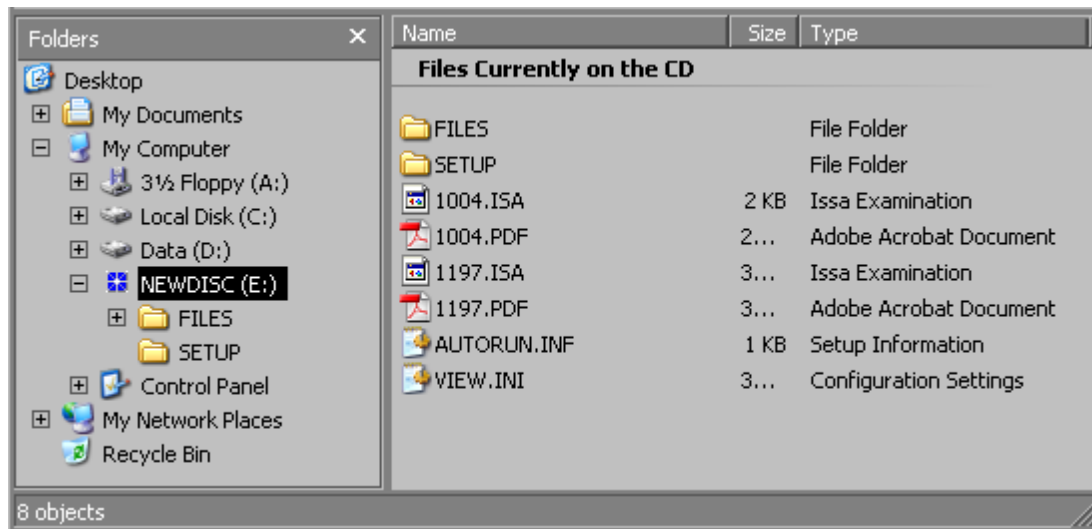
Issa contains two types of data: patient data and exam data.

- Patient data is general information on one patient: name, address, social security number, patient history, etc. Patient data is displayed on **Patient form** in **Issa**.
- Examination data is data collected during exams performed on patients. These data can be images, movie sequences, findings, notes, voice dictations etc. Exam data collected during one exam is displayed in **Issa Exam form**.

One patient can have several exams. Therefore, for one **Patient form**, there can be several exam forms associated with it.

3 Installing and starting Issa CD Viewer

To view exams recorded on a CD with **Issa CD Viewer**, just put the CD or DVD into your CD or DVD drive. The CD/DVD will start itself automatically, the software will be installed and patients on the CD will be displayed in **Issa CD Viewer** application.



4 Patient form

4.1 Overview

Patient form is designed to display data inherent to a given patient. This form is filled in **Issa**, when a given patient comes for the first time. Data in the **Patient form** cannot be altered in **Issa CD Viewer**.





The **Patient form** is opened when **Issa CD Viewer** is started. To return to **Patient form**, click the **Patient** button on the [Main toolbar](#).

Left part of the form (the [Patient data section](#)) contains patient general data – name, social security number (or some other unique code number), date of birth, patient history, etc.

Right part of the form (the [Patient list](#)) lists patients in the database.

[Command toolbar](#) on top of the window contains commands used in the **Patient form**.

4.1.1 Command toolbar

	Opens the first patient record on the CD.
	Opens the previous record on the CD.
	Opens the next record on the CD.
	Opens the last patient record on the CD.

4.1.2 Patient data section

Patient Data

Code	000228/05
Patient Name	Jim Jones
Date of Birth	15.12.1957
Place of Birth	Rotterdam
Sex	m
ID	424-424-4242
Address	51 Gotterdamering Crescent, Hellville
Telephone	(666) 424-7577
Anamnesis	

Patient data section contains demographic data for the current patient.

Field	Description
Code	Unique patient identification code.
Patient name	Patient name.
Date of birth	Patient date of birth.
Place of birth	Patient's place of birth.
Sex	Patient's sex.
ID	Any other ID number. This field can be used for Social security number.
Address	Patient's address.
Telephone	Patient's telephone number.
Anamnesis	This field contains patient history before the first exam.

4.1.3 Patient lists

Found Exams						
Patient Code	Patient Name	Birth Date	Sex	Exam Number	Exam Date	Exam Type
000001	reb			01167/04	3/24/2004 10:08:03 AM	
62025	CR	10/4/1935	m	1#22	4/1/2004 11:36:20 AM	ABDOMEN

Tab	Description
Found Exams	Lists the patient and exam data for exams that were recorded on the CD or DVD medium.

The layout of all lists can be customized by adjusting the column width.

5 Exam form

5.1 Overview

An exam is associated with a patient, and each patient can have several exams associated to him. All the data collected during one examination of a patient is stored in the **Exam form**.

To open **Exam form**, click the **Exam** button in the [Main toolbar](#).

- [Exam data section](#) contains textual data which the performing doctor or technician enter.
- [Images section](#) displays images collected during the exam.
- [Image comment section](#) contains data associated with one particular image from the exam.

5.1.1 Command toolbar



Print button. Prints the current exam. See [Printing](#).

View button. Opens the **View** module. See [Image Viewer](#).

5.1.2 Exam data section

Exam section contains textual data collected during examination or data associated to the exam. There are five tabs (pages) in this section which contain different data fields:

- [Exam](#)
- [Status](#)
- [Sent From](#)
- [Second](#)
- [Addendum](#)

5.1.2.1 Exam tab

Exam	Status	Sent From	Second	Addendum
Exam Number	000007/05 MR			
Exam Date	29.11.2005 11:24:03			
Physician	Assign to: bos			
Technician	Technician			
Exam Type	MR Foot			
Device	MR			
Note	<div></div>			
Results	<div></div>			
Results Date	<div></div>			
Transcribed by	<div></div>			

Exam tab contains basic exam data.

Field	Description
Exam number	Unique exam number.
Exam date	Date and time when the exam was created.
Physician	Name of physician user who owns the exam or to which the exam is assigned.
Technician	Name of the technician user who performed the exam.
Exam Type	Type of exam.
Device	Name of the imaging device on which exam was performed.
Note	Notes entered by technician or physician type users.
Results	Result for the exam.
Results Date	Date and time when the result was typed or dictated.
Transcribed by	Name of the transcriptionist who typed the Results field in Issa Typist and date and time of the transcription.

5.1.2.2 Status tab

Status tab contains general data on patient before the examination.

Field	Description
Current Disease	Data on the disease known before the examination.
Status	General data on the patient before the examination.

5.1.2.3 Sent from tab

Fields on this tab display information on referring physician, sent from field, clinical diagnosis and previous exams.

Field	Description
Referring Physician	Displays the name of the doctor who sent the exam or ordered it. Only Issa users which are registered as referring physicians can be listed here.
Sent From	Contains the name of the hospital department or institution which ordered the exam.
Clinical Diagnosis	Contains the diagnosis given by the sender.
Preceding Exams	Contains data on the exams that took place before the patient's current exam.
Doctor (SF)	Contains the name of the doctor who conducted the examination received.
Date (SF)	Contains the date and time when the examination was received.

5.1.2.4 Second opinion tab

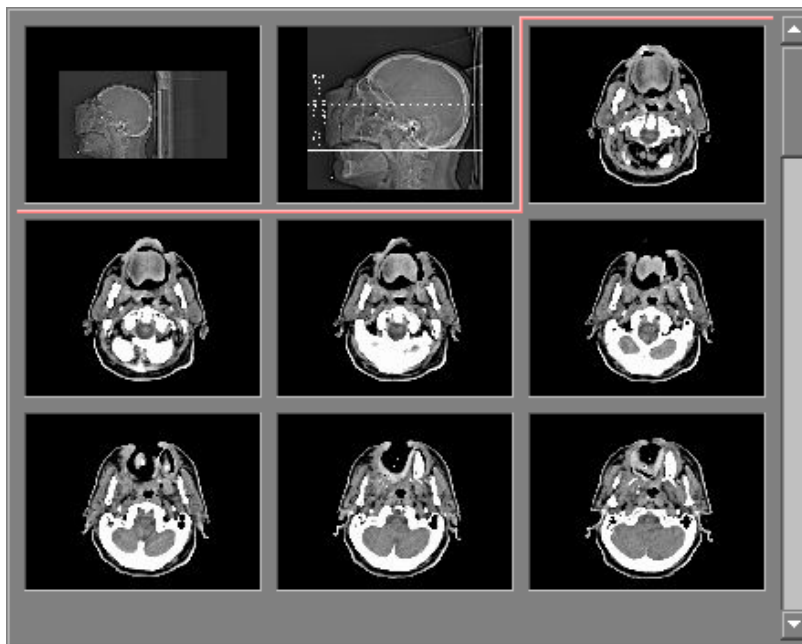
Fields from this tab contain a second opinion on current examination.

Field	Description
Second Opinion	Second opinion text. Second opinion can only be added if the second opinion is assigned to the current user.
Doctor (SO)	Name of the doctor who gave the second opinion.
Date (SO)	Date and time when the second opinion was given.

5.1.2.5 Addendum tab

Addendum tab contains comments to an exam that has already been finished (marked with **Finished** flag and locked for edit)

5.1.3 Image section



This section of the **Exam form** contains images collected during the exam.

5.1.4 Image comment section

This section contains comments and relevant data on currently active images. It is composed of three pages, each represented by its corresponding tab.

- **Image Data** tab contains specific data relevant for the currently active image: image code, image comment and the number of images in the exam.
- **Documents** tab lists non-image documents associated to a current examination.

5.2 Opening an exam

To open the exam of a selected patient:

1. Select the patient in **My Patients** list or select an exam in **Found Exams** list.
2. Click the **Exam** button in [main toolbar](#). Or double click on the patient's entry in the list in **Patient form**.

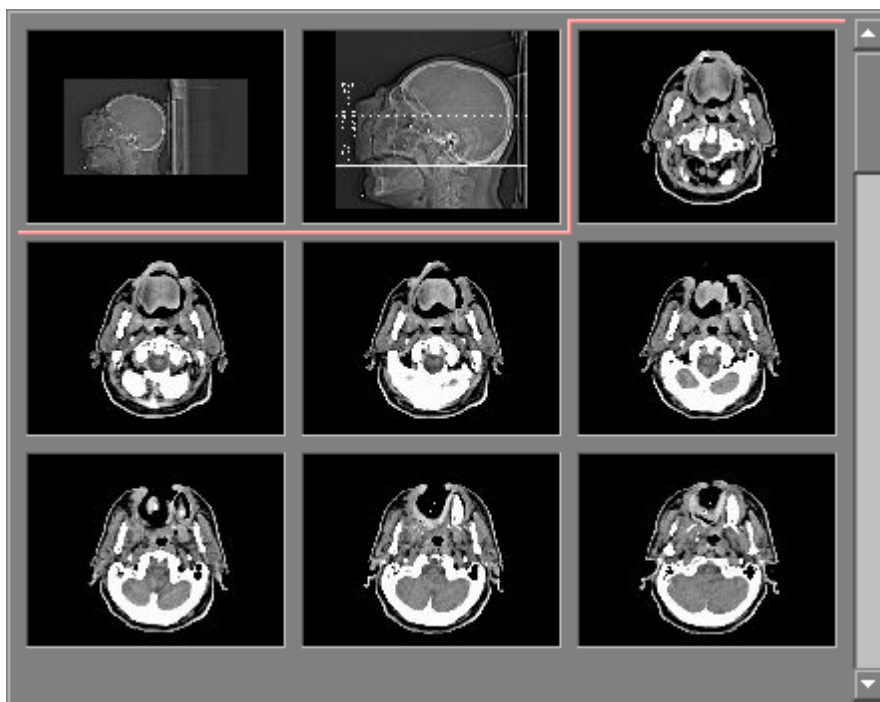
5.3 Printing

To be able to print from **Issa CD Viewer**, you must have Adobe Reader or any other pdf reader installed on your computer.

To print exam data, click **Print** button in the [command toolbar](#) in exam form. Exam data will be displayed in a .pdf document which can be printed.

6 Handling images

6.1 Overview



Images of each exam are displayed in the **Exam form**, in its **image section**.

Active (selected, current) image	Image to which all the operations apply. Whenever you enter the Exam form , Issa makes the first image of the current exam active. In some operations, several images can be active.
Activating (selecting) an image	To make an image active, click on the image. A blue frame appears around the image indicating that the image is active.
Activating multiple images	If there are several active images, this means that operations would apply to all of them. A light blue frame then surrounds these images.

There are a few ways to activate several images:

To select a sequence of neighboring images in the form:

- Click on the first image in the sequence, and then, holding the <Shift> key, click on the last image in the sequence.

To select several non-neighboring images:

- Hold the <Ctrl> key while clicking the images you want to select.

To select all the images from the current examination:

- Right-click on the image section of the **Exam form** and select the **Select All Images** option from the pop-up menu.

6.2 Full screen image viewing (using double-click)

One image from the image section of the **Exam form** is enlarged to full screen view by double-clicking it.

To have several images viewed in full screen mode:

1. Select images you want to view
2. Hold the <Shift> key and double-click on any of the selected images.
3. First of the selected images will be displayed in full size, while the others will be displayed as thumbnails. Any of the thumbnail images can be shown in full size by clicking on it.
4. To exit the full-screen view, press the <Esc> key or double click anywhere on the image.

Right clicking on the image while in full screen view opens a pop-up menu with several more options:

Option	Description
Fit to window	When active, maximizes image over the whole screen. When this option is inactive, image is displayed in its normal size.
Zoom to...	Zoom to submenu specifies the magnification of the image (25, 50, 75, 100, 150, 200 %).
Tool Magnifying glass	This option activates/deactivates the Magnifying glass tool. See Magnifying glass tool .
Custom magnifying glass	This option opens the submenu which enables you to specify the parameters of the Magnifying Glass tool - its size and magnification factor.
Tool pan	Activates the Pan tool (hand) which enables you to drag the image if only part of it is visible on the screen.
Tool center-width	Activates the Center-Width tool, used to change center and width of the window in which image is viewed. <ul style="list-style-type: none"> • hold the left mouse button and move the mouse up/down to change the window center.

	<ul style="list-style-type: none"> hold the left mouse button and move the mouse left/right to change the window width.
Default center-width	Applies the default values for center and width, as specified in the DICOM headers of the current image.
Select center-width	Applies the selected pre-defined center/width values (values can only be predefined on the server).
Show data	Toggles whether Issa displays image data in full-screen view.
Properties	Opens the image Properties dialog which contains the information about the active image.

Further options:

- Roll the mouse wheel to change the zoom magnification.
- Hold the <Ctrl> key while rolling mouse wheel scroll through images of the current exam.

7 Image Viewer

7.1 Overview

The **Image Viewer** window, which spans over the full screen, is used to view and edit images in **Issa**.

To view exam images in the **Image Viewer**:

- Select the exam containing images to view.
- Click the **View** button on the [command toolbar](#).



Most of the screen area is occupied by one or more viewed images arranged in a rectangular grid. The image that is currently active is marked with a colored frame around it.

Various viewing options can be set from the **view toolbar**:

- [grid configuration](#)
- [zoom](#)
- [magnifying glass tool](#)
- [hand tool](#)
- [window level tool](#)
- [view setup](#)

The [scout bar](#) displays the scout image in the exam if the scout exists. This bar is not displayed if the exam does not contain a scout image.

The [thumbnail bar](#) displays thumbnails of the images opened in the viewer. The frame marks the active thumbnail image. Use this bar to select which images to view.

The [series bar](#) displays the series album of the images in the exam if there is more than one series. This bar is not displayed if the exam contains only one series. Use this bar to select which series to view.

[Editing toolbar](#) on top of the images offers various image editing tools.

7.1.1 Series bar

The **series bar** displays all the series in the exam if there is more than one series. This bar is not displayed if the exam contains only one series.

This bar can be used to select which series to view. Clicking on a particular series will show first images from that series in the image grid (eg. first 4 images from the selected series will be shown if the grid configuration is 2x2).

7.1.2 Thumbnail bar

Thumbnails of all the images from the current exam are listed in the **thumbnail bar**. If the exam has more than one series, images from different series are separated by a red line.

To change image shown in the active frame:

- Click the thumbnail of the desired image in the **thumbnail bar**.

Active frame is marked by a colored frame around it. Click on an image in the grid to make it active.

Furthermore, you can right-click on a thumbnail image to replace current images in the grid with the sequence of images starting with the one you clicked.

7.1.3 Scout bar

The **scout bar** displays the scout image in the exam if the scout exists. This bar is not displayed if the exam does not contain a scout image.







The scout options are accessed by right clicking the scout image in view. A pop-up menu with the following options appears:

Option	Description
Show Large Window	Shows the scout image in a large window which can be moved or resized according to preferences.
Show All Lines	Shows all lines of slices on the scout image.
Show Current	Shows only the line of the current slice on the scout image.

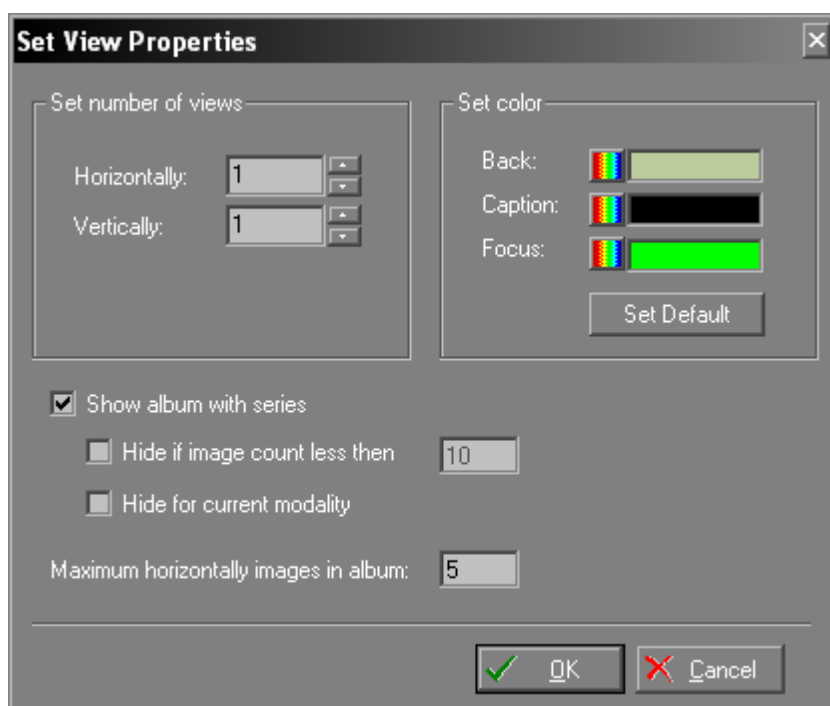
7.2 Grid configuration

Image viewer can split the screen into a grid to show more than one image at a time. Grid can be anything from 1x1, 2x2 up to any configuration specified by user.

Viewer configuration is changed from the view toolbar, using the following buttons:

-  1x1 configuration (single image on the whole screen).
-  1x2 configuration.
-  2x1 configuration.
-  2x2 configuration.
-  2x3 configuration.
-  3x2 configuration.
-  Custom configuration and [view setup](#).

7.2.1 View setup



Option

Set number of views

Horizontally

Vertically

Set color

Back

Caption

Focus

Set Default

Show album with series


Hide if image count less than


Hide for current modality


Maximum horizontally images in album

Description

Sets the horizontal number of images in the grid.
Sets the vertical number of images in the grid.

Select the color of the back in view by clicking the  icon.

Select the color of the caption in view by clicking the  icon.

Select the color of the focus frame in view by clicking the  icon.

Sets the default colors in view.

Shows image series in the series bar separately from the image thumbnails (if the exam contains more than one series).

Hides the series bar if the exam contains less than this fixed number of images.

Hides the series bar for all exams in the modality of the exam that is currently active.

Sets the maximum number of images horizontally in the thumbnail bar.

7.3 Zoom

By default, the images viewed in the **Image Viewer** are displayed in their actual size (100% magnification). When images from a certain modality are viewed, the zoom factor will be saved from the last viewing (eg. if you view CT images with 25% zoom, next time you view CT images the zoom will be saved at 25%). The zoom factor is saved separately for each modality.

To change magnification of an image:

- Select the desired magnification factor from the zoom combo box. Fit option means that the image is scaled to fit in the grid.

If the **All** radio button is checked

- the zoom affects all the images displayed in the viewer even if another image is selected for viewing.

If the **Series** radio button is checked

- zoom affects only the current series.

If the **Selected** radio button is checked


- the zoom affects only the selected image.

To cancel the zoom, select the magnification factor of 100%.

Note that the magnification factor does not change when you change the viewer configuration. Images will remain with their previous magnification and if an image cannot fit its grid box it is displayed only partially. Exception from this rule is when images are scaled to fit the grid (i.e. when the **Fit** option is selected as the magnification factor).

7.4 Magnifying glass tool


Instead of magnifying the whole image, you can view just a part of the image enlarged, as with a magnifying glass.

1. Click on the **Magnifying glass tool** icon  in the **viewer toolbar**.
2. Click on the part of image you wish to enlarge.

You can change size and magnification of the magnifying glass tool by right clicking on the tool in the **viewer toolbar** and selecting the desired magnification and size from the pop-up menu.

7.5 Dragging images (Pan tool)

If a viewed image cannot fit its grid box, you can drag the image inside the box to view all parts of the image. The procedure is as follows:

1. Click  icon (**Pan tool**) on the **viewer toolbar**. The mouse pointer changes to a hand when you move it over the images.
2. Place the mouse pointer on the viewed image. Press and hold the left mouse button to 'pin' the pointer on the image.

3. Move the pinned mouse pointer to drag the image inside their grid box.

If the **All** radio button is checked

- all viewed images get moved accordingly to the active image.

If the **Series** radio button is checked


- all images from the selected series get moved accordingly to the active image.

If the **Selected** radio button is checked

- only the selected image moves.

7.6 Image text tool

Image text tool enables the displaying of the image top text in the **Image viewer**. Image top text is set up in the Settings by the administrator, and is used to display certain relevant information about the image that is being viewed.

Image top text can be enabled or disabled by clicking the data  icon in the view toolbar.

7.7 Viewing multiframe sequences

While viewing multiframe sequences (such as multiframe DICOMs) there are options available for viewing the sequence.



Play button. Starts the playback of a multiframe sequence. When playback is active, it changes to **Stop** button.



Stop button. Stops the playback.



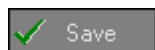
Loop forward button. While active, sequence loops so that when it comes to an end, it starts playing from the beginning.



Loop forward/backward button. While active, sequence loops so that when it comes to an end, it starts playing from the end backward towards the beginning.



Loop backward button. While active, sequence loops backwards from end towards the beginning.




Save button. When you click it, the current frame is taken out of the sequence and saved as a separate image in **Issa**. It is placed immediately after the current sequence.




Slider control. Points the relative position of the current frame in the sequence.


7.8 Changing Window/Level

The contrast (i.e. the width of the spectrum of the image) and brightness (i.e. the position of the center of the spectrum) of the images viewed in the **Image Viewer** are set using the **Center-Width** slider  on the **viewer toolbar**.


To set the width of the spectrum (contrast):

1. Place the mouse pointer over the red or blue edge of the  slider (cursor changes to double arrow: ↔).
2. Click and drag the spectrum to desired width.


The alternative way to set the contrast is:

1. Click the **Contrast** tool  on the viewer toolbar.
2. Place the mouse pointer over the image, press and hold the left mouse button and then move the pointer horizontally (left or right).

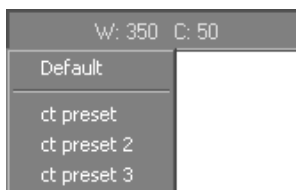
To set the center of the spectrum (brightness):

1. Place the mouse pointer over the central part of the  slider.
2. Click and drag the center of the spectrum to desired position.

The alternative way to set brightness is:

1. Click the **Contrast** tool  on the viewer toolbar.
2. Place the mouse pointer over the image, press and hold the left mouse button and then move the pointer vertically (up or down).

Note that the position of the center of the spectrum cannot be changed if the spectrum is at its maximum width.




- Default center and width of an image can be restored by double clicking on the image, or selecting the **Default** option from the **W-C** menu.
- Preset window levels from the server can be used on the image by selecting them from this menu.

Changing the contrast and brightness affects all the viewed images if the **All** radio button is checked on the **view toolbar**, only the images from the current series if the **Series** radio button is checked, or only the selected image if the **Selected** radio button is checked.

7.8.1 Non-linear window leveling

Non-linear window leveling can be used to compensate for any inherent non-linearity in an image. It allows applying a wider range of gray tones to a particular section of your windowing range. The **sigmoidal** window leveling can be used in **Issa** image viewer. It applies a wider range to the ends of your windowing range, thus giving the image in the middle range greater contrast and resolution.


To use sigmoidal window leveling:

1. Go to the **Image viewer** and select an image to view.
2. Click the **Contrast** tool  on the viewer toolbar.
3. Position the cursor over the image to be adjusted, right click and drag the cursor left

- or right over the image to adjust its coherence (**Alpha**).
4. To restore the default center and width of the image and deactivate sigmoidal leveling, double click on the image with the right mouse button.

7.9 Stacked images tool

Stacked images tool is used to view consecutive images in a sequence in different grid fields. The tool is activated by clicking **Stacked images**  button in the [View toolbar](#).

1. Set the desired [grid configuration](#) (for example: 2x2).
2. Set the desired image in each of the grid fields by selecting a grid field and clicking on an image in the [thumbnail bar](#) (for example: in an exam with 4 series set the first image of each series in each of the grid fields).
3. Activate **Stacked images** tool by clicking  button.
4. Position the mouse pointer to the point where grid fields connect (in our example that is the middle of the screen in the point where 4 fields connect).
5. Press the mouse button and drag. Images in each grid will change to the respective consecutive image in the exam.

There are several ways to set a particular image from a series or an exam to the selected grid field while using **Stacked images** tool:

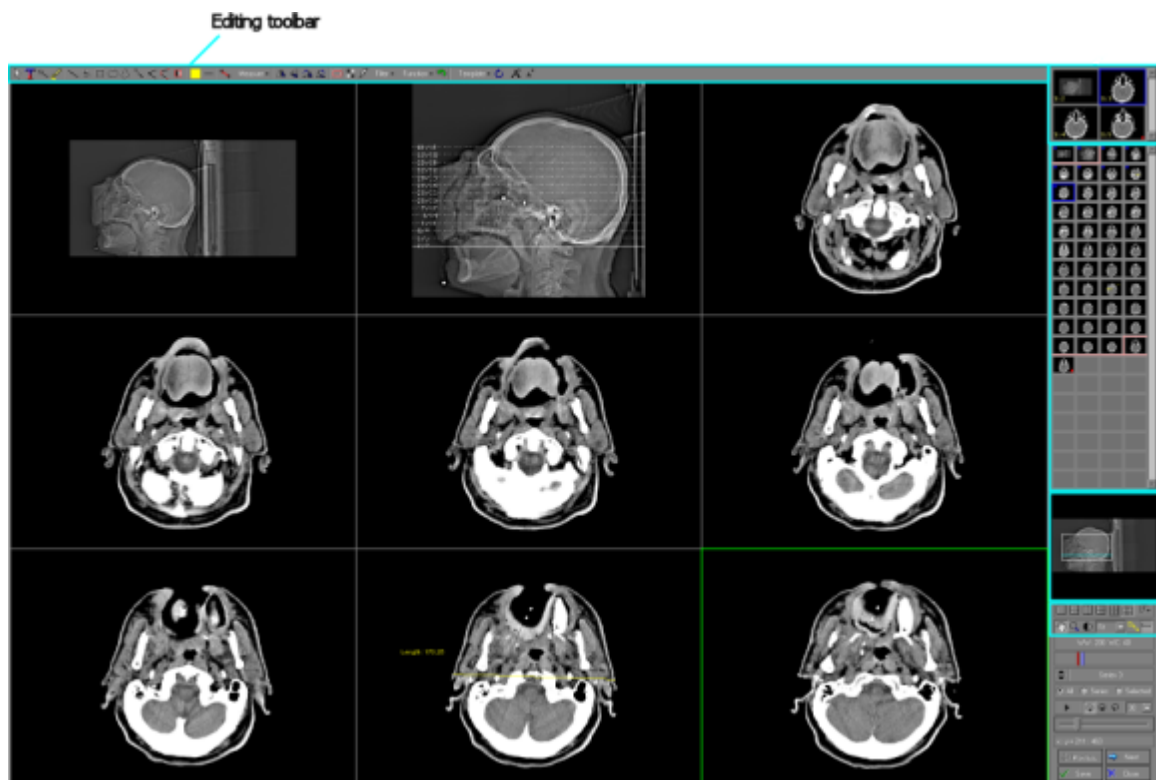
To put first image of each series to grid fields:

- Right-click the first series in the series bar. First image of the series you clicked will be set to the first grid field, and first image of the consecutive series will be set to respective grid fields.

To select which series or exam to view in a selected grid field:

- Select a grid field and right-click anywhere inside of it. A list of all series/exams will be displayed. Select the desired series or exam.

7.10 Editing and measurement




Tools for measuring, marking and editing images are available from the [editing toolbar](#).

Before any measurements are made, the image has to be calibrated (see [Calibration](#)). For some DICOM images that might not be necessary, as they come already calibrated.

































Measured quantity is displayed near the measured object on the image

7.10.1 Editing toolbar

By right clicking the empty space in the editing toolbar (where there are no buttons), several customizing options can be selected.

Option	Description
Top	Positions the editing toolbar on top of the screen.
Bottom	Positions the toolbar in the bottom of the screen.
Auto-hide toolbar	Turns the auto-hide function on or off. If this option is on, the editing toolbar will become visible when the mouse pointer is positioned over it.
Close	Removes the editing toolbar from view. To return it to view, click the  button in the view toolbar .

7.10.2 Editing tools


	Select tool. See Drawing and measurement tools .
	Text tool. See Drawing and measurement tools .
	Label tool .
	Arrow tool. See Drawing and measurement tools .
	Highlight tool. See Drawing and measurement tools .
	Line tool. See Drawing and measurement tools .
	Polyline tool. See Drawing and measurement tools .
	Rectangle tool. See Drawing and measurement tools .
	Ellipse tool. See Drawing and measurement tools .
	Polygon tool. See Drawing and measurement tools .
	Wand tool. See Drawing and measurement tools .
	Angle tool. See Drawing and measurement tools .
	Angle 4-point tool. See Drawing and measurement tools .
	Probe tool .
	Line color. See Modifying line color and thickness .
	Line weight. See Modifying line color and thickness .
	Calibration .
	Measure options for setup, calibration, and measurement table.
	Flip horizontal. See Image transformations .
	Flip vertical. See Image transformations .
	Rotate -90°. See Image transformations .
	Rotate +90°. See Image transformations .
	Region Of Interest (ROI) .
	Negative. See Image transformations .
	Sharpen. See Image transformations .
	Filter list .
	Function list .
	Reload.
	Template list.
	Rotate.
	Grow font. See Drawing and measurement tools .
	Shrink font. See Drawing and measurement tools .

7.10.3 Calibration

Before any measurements are made, image has to be calibrated. This means that dimensions of pixels on image have to be related to real-world units.

DICOM images are usually calibrated by default. Non-DICOM images have to be calibrated, and such images usually have some scale displayed on them. Typically, it is a straight line with a specified length.

To calibrate an image:

1. Click the  button on the editing toolbar.
2. Click and hold left mouse button and drag the line across the calibration line displayed on source image.
3. When you release the mouse button, **Calibration dialog** appears.
Here you have to specify the following:
 - In the field **Length**, you must specify the length of the calibration line in real-world units.
 - In the field **Aspect** you must specify the aspect ratio of the image.
 - In the **Unit** combo, you must specify the units in which Length was specified.
 - Click **OK** to accept.

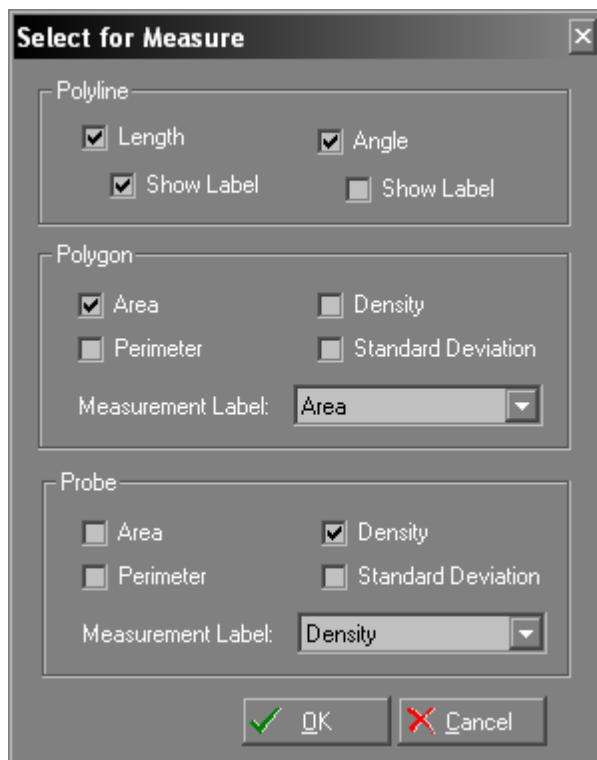
Units which can be used in calibrations have to be specified in the table of units in **Settings**. If you need to use a unit which is not provided in the list, ask your system administrator to add it at the server.

Note that calibrations cannot be saved for other images in **Issa Anywhere**.

You can change the current calibration or set a predefined calibration to an uncalibrated image. To do this:

1. Click the **Measure** button on the editing toolbar. A menu appears.
2. Select the **Current Calibration** option from the menu.
3. Select the calibration you desire for the active image.
4. Click **OK** to accept.

7.10.4 Measurement setup



Several measurement options can be configured from the **Measurement setup** dialog. To open the **Measurement setup** dialog select the **Measurement setup** option from the **Measure** menu in the **Image viewer**.

Options for Line/Polyline objects:

- If **Length** option is checked, length of the line is saved in **Measurement table**.

Options for Angle objects:

- If **Show label** option is checked, length is also displayed near the line on screen.
- If **Angle** option is checked, the angle is saved in **Measurement table**.
- If **Show label** option is checked, angle is also displayed near the **Angle** object on screen.






Options for Polygon objects:

- If **Area** option is checked, area of the polygon is saved in **Measurement table**.
- If **Perimeter** option is checked, circumference (perimeter) of the polygon is saved in **Measurement table**.
- If **Density** option is checked, the mean density of area within the polygon is saved in **Measurement table**.
- If **Standard Deviation** option is checked, the standard deviation of density within the polygon is saved in **Measurement table**.

Options for Probe objects:

- To select which of the quantities will be displayed on the screen, select it from the **Measurement label** combo box.
- If **Area** option is checked, area of the probe is saved in **Measurement table**.
- If **Perimeter** option is checked, circumference (perimeter) of the probe is saved in **Measurement table**.
- If **Density** option is checked, the mean density of area within the probe is saved in **Measurement table**.
- If **Standard Deviation** option is checked, the standard deviation of density within the probe is saved in **Measurement table**.
- To select which of the quantities will be displayed on the screen, select it from the **Measurement label** combo box.

7.10.5 Drawing and measurement tools

Icon	Name	Description
	Select tool	<p>Selects a particular object.</p> <ul style="list-style-type: none"> • Click on the object's edge to select it. When selected, the object outline becomes brighter.
	Text tool	<p>Adds text on the image.</p> <p>To enter text on the image:</p> <ul style="list-style-type: none"> • Click on the place where you want to enter text. • Type in the text. • Press <Enter> to finish, or click somewhere else to type text on that other place.
	Arrow tool	<p>Draws a straight arrow.</p> <p>To draw an arrow:</p> <ul style="list-style-type: none"> • Press and hold the mouse on the place from which the arrow points. • Drag the arrow to the place to which it points to. • Release the mouse button.
	Highlight tool.	<p>Highlights a particular place on the image.</p> <p>To highlight:</p> <ul style="list-style-type: none"> • Press the left mouse button and use the pointer as a highlighter pen.
	Line tool	<p>Draws a straight line between two points.</p>

To draw a line:

- Press and hold the mouse on the place where the line begins.
- Drag the line to desired length and orientation.
- Release the mouse button.



Polyline tool

Draws a freehand or broken line.

To draw a broken line:

- Click on the point where the line starts.
- Drag the line to desired length and orientation. Each new click fixes the end of the line to the current cursor position and enables dragging the line further.
- Double-click to finish the line.

To draw a freehand line:

- Press and hold the mouse button
- Move the mouse to draw the line of any shape.
- Double-click to finish the line.

Icon Name

Rectangle tool

Description

Draws a rectangle.

To draw a rectangle:

- Click on the upper left vertex and hold the mouse button.
- Drag to desired shape and size.
- Release the mouse button.



Ellipse tool

Draws an ellipse.

- The procedure is the same as the one for the rectangle, only the ellipse is inscribed to the dragged rectangle.



Polygon tool

Draws a polygon.

To draw a polygon:

- Click and drag the first line of the polygon.
- Click again and drag the second line of the polygon. Repeat the process until you form the polygon.
- Double-click to close the polygon. A line is automatically drawn from the last to the first line in case polygon is not closed.



Wand tool

Draws a border around the area of the same or similar color. When colors of two neighboring pixels differ by more than a certain precision value, border is placed there.

- Click inside the area that is to be bordered.
- The wand precision (i.e. minimal difference in color levels needed to draw a border) is specified by right-clicking the tool and specifying the difference in the opened dialog. Smaller number gives higher precision in drawing the border.



Angle tool

Draws an angle.

To draw an angle:

- Click once on the angle top.
- Drag the line from the top to form one ray and click again.
- Drag the other ray of the angle and click.



Grow font tool.

Enlarges the font objects (measures, text, labels).

To enlarge a font object:

- Select the font object with the selection tool.
- Repeatedly click the grow font button until the desired font size is accomplished.



Shrink font tool.

Shrinks the font objects (measures, text, labels).

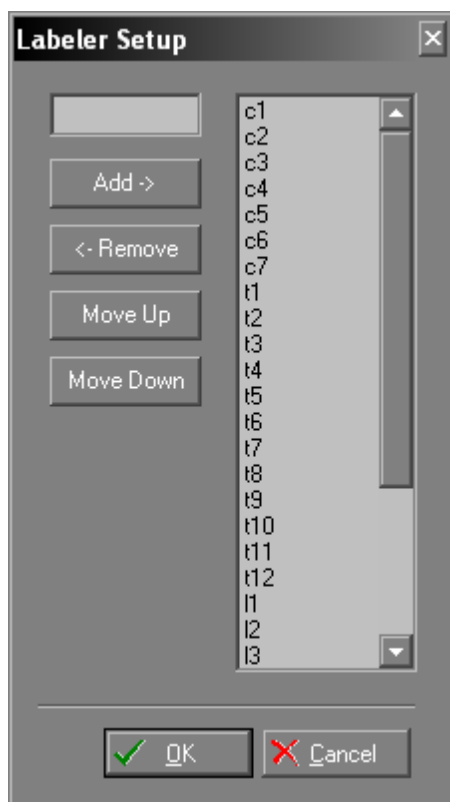
To shrink a font object:

- Select the font object with the selection tool.
- Repeatedly click the shrink font button until the desired font size is accomplished.


To change line color and weight when using the drawing tools, see [Modifying line color and thickness](#).

7.10.6 Label tool

The **Label tool** enables you to place labels on certain places on images in **Image viewer** (eg. vertebrae). The vertebrae labels are predefined, but any type of label can be added in the labeler setup.



To add a label:

1. Open the **Labeler Setup** by right clicking the **Label** icon  in the [editing toolbar](#).
2. Write the name of the label into the empty field.
3. Click the **Add** button. The label will be added to the list.
4. Click **OK** to accept changes or **Cancel** to discard them.

To place a label:


1. Click the **Label** icon  in the [editing toolbar](#).
2. Click on the exact position in the image where you want to add the label.

You can select with which label to label, or whether to move up or down when labeling repeatedly, by right clicking anywhere in the viewer while using the Label tool and selecting the desired option from the pop-up menu.

7.10.7 Probe tool

The **Probe tool** enables you to place a rectangular or circular shaped frame within which an average gray level is measured. The result is copied into the **Measurement table**.

To place the probe:

1. Click the **Probe** icon  on the [editing toolbar](#).
2. Click on the place where the center of the probe should be located. The probe frame gets placed on the specified place on the image.

Measurement table gets updated with the probe data, as given in the following table:

Name	Description	Value	Unit
N	Per	Perimeter of the probe object.	
N	Area	Area of the probe object.	
N	Dens	Average density of the gray level within the probe frame.	HU
N	StnD	Standard deviation of the gray level.	Std

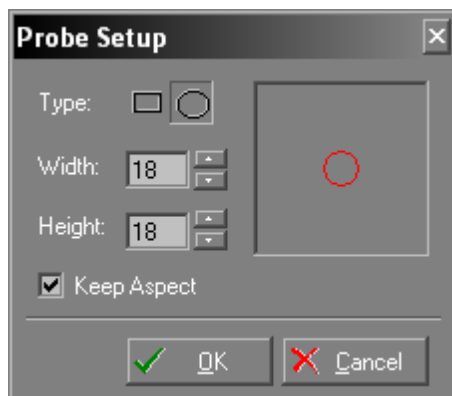
The number N in the **Name** column stands for the ordinal number of the probe used. This number is unique among all measurement objects on the current image.

The measurement unit for the area of the probe depends on the image calibration. By default, it is pixel².

By default, the probe is quadratic in shape, with the side length of 50 pixels. These settings can be changed.

To change **Probe** settings:

1. Right-click the **Probe** icon  on the toolbar. **Define Probe** dialog appears.



2. Specify the probe type by clicking the appropriate shape button.
3. Specify the probe size by defining **Width** and **Height**.
4. Click the **OK** button to accept the changes or **Cancel** to keep the previous configuration of the probe.

7.11 Handling objects on images

7.11.1 Deleting objects

To remove any object from the image:

1. Select the object using the **Select** tool.
2. Press the <Delete> key.

Note that if an object is deleted, its entries in the **Measurement table** are removed as well.

7.11.2 Moving objects

To move a graphical object to a new position:



1. Activate the **Select** tool.
2. Press and hold the mouse button on the object. The object is marked with white holders.
3. Drag the object to the new position.

If an object is moved, adequate changes might happen in the corresponding **Measurement table** entries.

Note that the label of an object is moved as well when the object is moved. But the label can be selected and moved separately.

7.11.3 Modifying line color and thickness

To change the color and/or line weight of lines on drawn objects:

1. Select the object using the **Select tool**.
2. Select the line color or line weight by clicking the  or  icons on the [editing toolbar](#).
3. Select the desired color or line thickness.
4. Click anywhere on the image to deselect the object.


7.12 Image processing filters

The image being edited in the **Image Editor** can be processed with certain graphical filters and algorithms that can alter the image quality to make certain parts of the image more visible and recognizable.

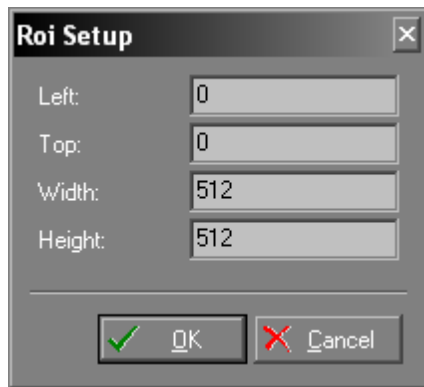
7.12.1 Region of interest


The image filters apply to a specific rectangular area of the image that is referred to as **Region Of Interest (ROI)**. By default, the **Region Of Interest** is the whole image.

To define the **Region Of Interest**:

1. Click the **Region Of Interest** icon  on the [editing toolbar](#).
2. Press and hold the left mouse button on the location of one vertex of the rectangle.
3. Drag the rectangle to desired shape and release the mouse button.


The alternative way to define **ROI**:



1. Right-click the  icon on the [editing toolbar](#). A **ROI Setup** dialog appears.
2. In the **Left** and **Top** fields, enter the x and y coordinates (measured in pixels) of the upper left vertex of the **Region of Interest** rectangle.
3. In the **Width** and **Height** fields, enter the width and height of the rectangle in pixels.
4. Click the **OK** button to accept the **ROI** setup.

The **Region Of Interest** set to some part of the image can be stretched over the whole image by right-clicking on any edge of the **ROI** rectangle.

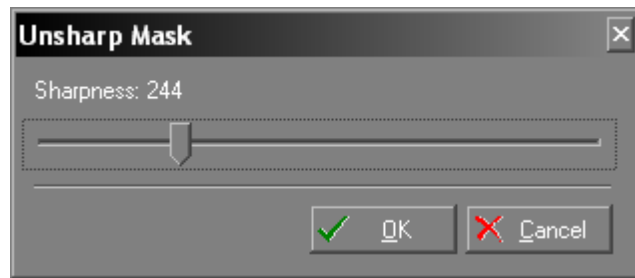
The **Region Of Interest** can also be moved around the image in the same way as an ordinary rectangle graphical object. To move **ROI**:

1. Click  icon on the toolbar to activate the select tool.
2. Press and hold the left mouse on one edge of the **Region of Interest** rectangle.
3. Drag the **Region of Interest** to a new position and then release the mouse button.

7.12.2 Working with filters

Here are the descriptions of each of the image processing filters that can be applied to the **Region Of Interest**. A particular filter is applied by selecting it from the **Filter** menu on the [editing toolbar](#).

Average	Calculates the arithmetic mean of the central pixel and its eight neighbors. The calculated value is then assigned to the central pixel.
Blur	Blurs the image.
Blur More	Blurs the image more than Blur function.
Sharpen Less	Sharpens the image less than Sharpen function.
Sharpen	Sharpens the image.
Sharpen More	Sharpens the image more than Sharpen function.
Unsharp Mask...	Sharpness can be defined with the slider on this mask.









Median	Removes the tiny noise from the image.
Minimum	Calculates the minimum value of the central pixel and its eight neighbors. The calculated value is then assigned to the central pixel.
Maximum	Calculates the maximum value of the central pixel and its eight neighbors. The calculated value is then assigned to the central pixel.
Edge Detection	Finds the edges of mono colored areas on the image.

To cancel any filtering operations, click the **Reload**  icon on the [editing toolbar](#).

7.13 Image transformations

Image transformations available in **Issa** are:

Icon	Name	Description
	Horizontal Flip	Flips the image horizontally.
	Vertical Flip	Flips the image vertically.
	Rotate clockwise by 90 degrees	Rotates the image by 90 degrees in clockwise direction.
	Rotate counterclockwise by 90 degrees	Rotates the image by 90 degrees in counterclockwise direction.
	Negative	Applies the negative operation on the selected region of interest.
	Sharpen	Sharpens the image.

Further operations are available from the [Function](#) menu.

7.14 Function menu options

Function menu options offer further image transformation tools:

Reload	Cancels all the changes on the image and loads it again from disk.
Copy	Copies the image to Windows clipboard , as it is currently seen on the screen.
Convert to greyscale/truecolor	If the current image is in grayscale, it is converted to true color and vice-versa.
Resample...	Enables you to resize the image. When you select this option, you have to specify the new size of the image.

Crop	Crops the current region of interest, and deletes everything outside.
Crop Image Using Grid	Crops the image with a user defined grid, saving each segment of the image.

7.15 Exiting Image viewer

To exit the **Image viewer**

- Click the **Close** button .