



dicomPACS[®]vet Module description

Module name: ***dicomPACS[®]vet Web Server***

Version number: 5.2.3.

State : 1.06.2008

Order code: W-5000/ W-6000



dicomPACS[®]vet Web Server for image distribution

General information

Making images available via the internet (or intranet) is becoming a more important daily requirement in the veterinary practice.

One purpose is the distribution of images or other documents in a larger clinic. Equally important is the integration of external referring parties (vets, stud farms and breeders), home workstations or even animal owners.

The intention is always the same: faster, cheaper downloading of archived images and diagnoses via the internet or intranet (also via slow internet connections), in diagnostic quality if possible, from every clinic or internet PC. The use of older PCs, Thin Clients or terminal servers must also be made possible.

To fulfil the requirements of the equine and small animal practice and clinic, we have developed our ***dicomPACS[®]vet*** Web Server in conjunction with respected veterinarians.

As an illustration of the various possibilities and advantages of our ***dicomPACS[®]vet*** Web Server, we

have listed the most important information about its various applications.

The advantages of using ***dicomPACS[®]vet*** Web Servers

Installation:

- The web client does not require any extra investment; Internet Explorer is all that is needed.
- The user is always using the latest version of the programme and updates take place automatically when needed.
- For larger hospital installations there is the option to install several web servers (scaling), e.g. in order to have a separate web server available for each division.

Hardware requirements:

- Workstations need only a modest RAM space and processing speed.
- A narrow band network e.g. GPRS, ISDN, internet, fixed lines etc. are sufficient to ensure an adequate download speed for images.
- The web server installation may be located on the existing archive server, eliminating the need for a further PC (in intranet installations only).

Software features

The web server has a high image download speed despite the general use of DICOM images. This high download speed is achieved by means of streaming technology and a special compression process.

The images in the web client always remain in their original lossless DICOM image quality (16 Bit greyscale possible) without the need for additional programmes to be installed on the PC. This means that with the appropriate hardware (special diagnostic monitors) a diagnosis can be made.

Operation and user interface closely resemble the ***dicomPACS[®]vet*** diagnostic software, so there is no extra training effort necessary.

In order to keep operation as simple as possible for referring doctors, the user interface has been limited to the necessary functions.

There are numerous ways of configuring access and user rights to the database, ensuring that each user group (referring parties, vets, breeders, owners, etc.) only has access to the

information meant for them.

The **dicomPACS[®]vet** Web Client is available in multiple languages.

Applications of **dicomPACS[®] Web Servers**

1. Internal image distribution (e.g. installation in hospitals)

The use of the **dicomPACS[®]vet** Web Server in a hospital or clinic allows the different departments to access all patient images available on the archive server very quickly and easily. The rights management can be used to define which images and documents each user may access.

The images are viewed on a web surface whose viewing component is started automatically by the web server. This ensures that the most current version is always used.

As a matter of principle complete, lossless DICOM image quality (16 Bit possible) is available at all workstations at short download times. Dynamic image building enabled by streaming technology and special compression procedures leads to

materially better image quality and faster image display compared to JPEG images.

The disadvantage in using JPEG images lies in the constant compromise that must be made between fast download time and resulting image quality. The special technology of **dicomPACS[®]vet** Web Server allows extremely fast image construction at full DICOM quality, avoiding the disadvantages of using JPEG images.

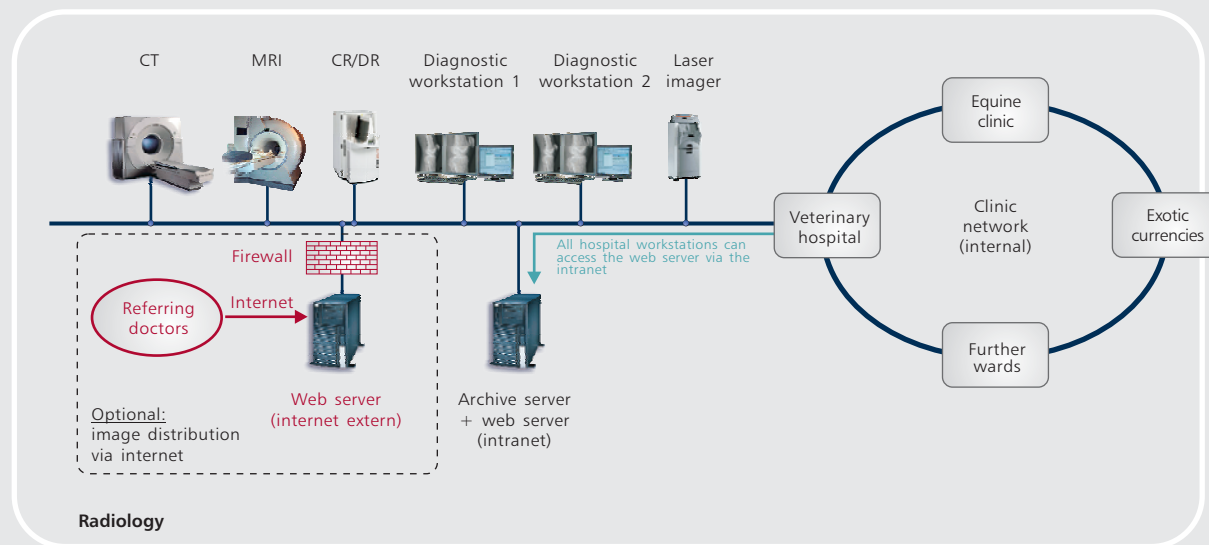
dicomPACS[®]vet Web Server delivers top

performance, even in relatively slow networks.

dicomPACS[®]vet Web Server provides great flexibility regarding suitable hardware, for instance older PCs, Thin Clients, terminal servers, Citrix servers, mobile computing, WLAN etc.

The simple and intuitive user interface eliminates the need for extensive training.

Central administration reduces the need for providing support at workstations.



Internal image distribution in a hospital

2. Image distribution via the internet with **dicomPACS[®]vet** Web Server (e.g. for home workstations or referring vets)

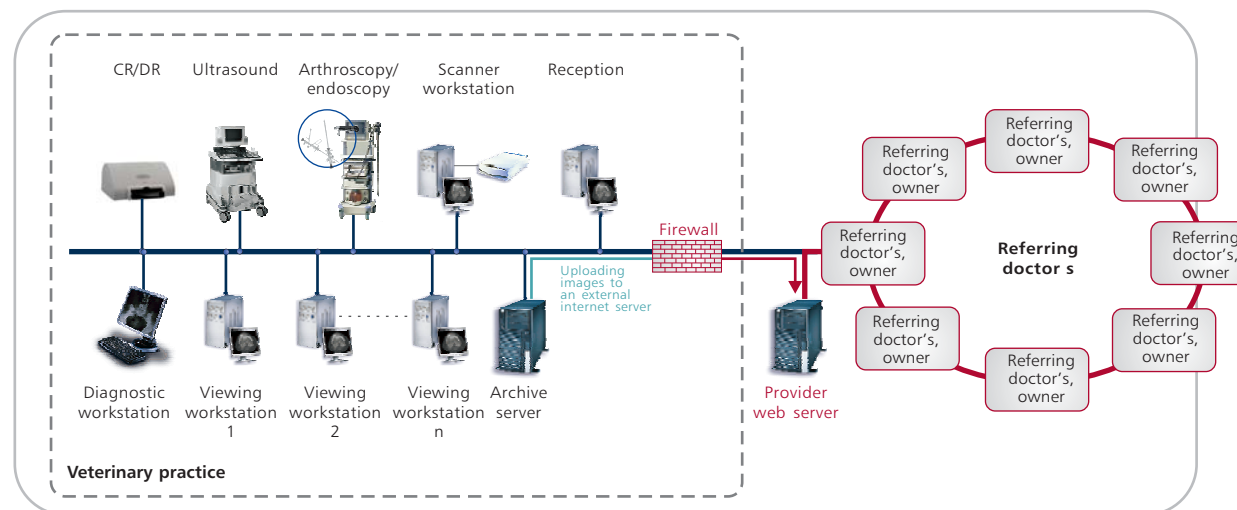
External image distribution is useful when image information has to be provided outside of a specific location (e.g. veterinary practice, clinic). The user, who in many cases has referred patients to a hospital, can simply access the web server via an existing internet connection and look at his patients' images.

All the advantages of the intranet web server also apply to external access to the image archive via the

internet, e.g. sufficiently fast image access even over slow internet connections like GPRS.

When new images become available on the web server, all authorised recipients are automatically advised by e-mail. Depending on the user access rights, comprehensive research can be conducted in the archive.

Where data is to be made available to third party users via the internet, it is advisable to store this data on a separate server for security reasons. There are two different ways of doing this:



External image distribution via internet

a) Web server in the hospital/clinic

A separate PC with internet access is installed as web server in the hospital/clinic. The required images are selected from the archive and directly copied onto this PC. Authorised persons can now log onto the PC from outside and view the images over the internet in accordance with their user access rights.

Advantages:

- No costs for the rental of comparable archive capacity from an external provider

Disadvantages:

- Low internet speed, as internet access available in the hospital / clinic will be relatively slow.
- High administration and maintenance costs for the server.
- Own responsibility for operating security, data availability and security etc.
- Good security skills required

b) Renting a server from a professional internet provider

Here, a separate server with sufficient hard drive capacity and the web server software is rented from a professional internet provider. The veterinary practise/ clinic copies patient images and data from its own server via the available internet connection to the rented server.

Advantages:

- No acquisition cost for an own server, rental only
- High internet speed
- No administration and maintance costs
- No responsibilty for operation security, data availability and security etc.
- Only limited security skills required

Disadvantages:

- Costs for renting the server and service



Description of functions

1. Availability of images on a web server for image distribution via the internet

This tool allows images and diagnostic findings to be placed on the internet and provides easy access to selected users.

A Different search words or terms to find a user are entered into this search box. When searching for a name you may also use parts of the surname or first name. For instance, if you wish to search for a user called Prof. H. Meier from Berlin, you may either enter the complete name or only the surname or, for example, Pr., Mei, Berl. If you enter Mei, Berl, all those users whose surname starts with Mei and who live in a place starting with Berl will be displayed.

B By clicking the button "add user" you may create new users and add them to the selection box.

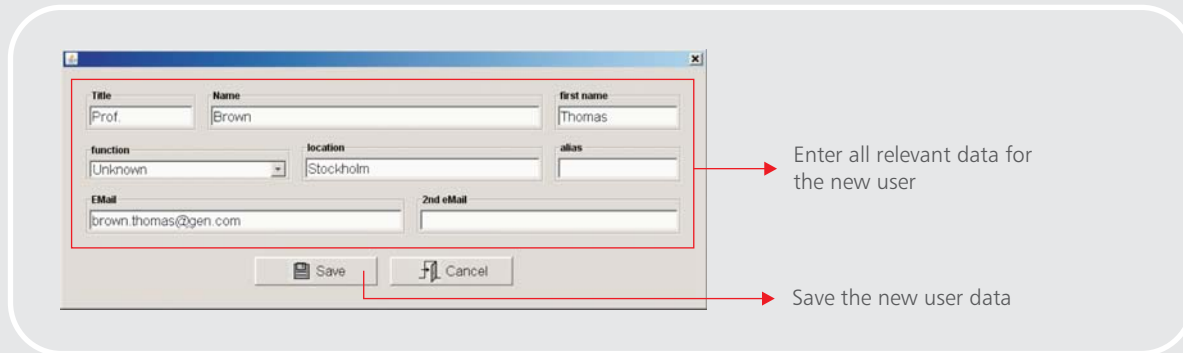
The box "other search word" allows you to enter, for instance, the doctor's area of specialization. The word entered in this box, in addition to email, form of address, name and place, may also be searched for in the user table, see **A**.

The screenshot shows a web application window titled "You may send images and findings to the internet and share these documents to user, you have to select." The interface is divided into several sections:

- Image Selection:** A section at the top with radio buttons for "the current image", "current series (1)", "all selected images", and "all loaded images (3)". There are also checkboxes for "With reports" and "Reports only".
- Search Field:** A text input field labeled "Search for:" containing the text "<e.g. with entering Pr,Sm,lon you will find Prof. H. Smith' from London>".
- Add User Button:** A button labeled "Add a user" next to the search field.
- User Table:** A table with columns: EMail, Title, Name, location. It lists several users, with checkboxes in the first column. Two users are selected: Joseph.Viewer@Hellbraun-359.de and Karl.Waldmann@Isabell-361.de.
- Email Template Editor:** A section titled "The recipients will get the following eMail as an information:". It includes a dropdown menu for "test template", a text area for "Agency FB", and a "12" dropdown. Below is a preview of the email content, including a subject line, a salutation "Dear {{Title}} {{first name}} {{surname}}", and a link to view or download images.
- Confirmation Email:** A section titled "Send confirmation to:" with a dropdown menu showing "Hoppel.Timm@Goldfuchs-353.de".
- Sender Email:** A section titled "use the following sender address" with a text input field containing "Hans.Stealberg@Fuchs-349.de".
- Buttons:** "Execute" and "Continue" buttons at the bottom right.
- Status Bar:** A box at the bottom left showing "Web-Status: available".


Red arrows point from the following labels to the corresponding features in the screenshot:


- A** Search field
- B** Adds a new user
- C** Selection of user for web sharing
- D** Selection or creation of email message for the recipients
- E** Confirmation email
- F** Sender email
- G** Status bar



All the doctors specializing in the particular field entered will then be displayed.

If you wish to enter two email addresses for one user you can enter the second email address into the "2nd e-mail" box provided. However, only the first email address will be used for the release of the images and diagnostic findings.

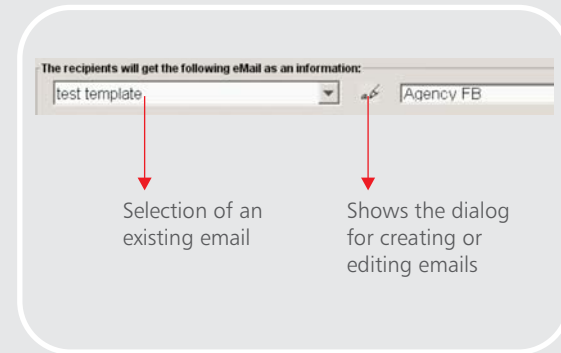
C This is to select the users to whom the images or diagnostic findings are to be released. By ticking the box in the first column of the table you select the user. If you wish to de-select the user, you can either re-click the box or click the  icon behind the email address below the table. A nearly unlimited number of users may be selected.

User data may be edited after clicking the  icon in the table. This will open the dialog box which is also used for creating new users, see **B**.

To delete the user, click on the bin icon in the table.

D The email text that will be sent to the user as soon as the images or diagnostic findings are available on the web server may be selected, created or altered here (text template).


A dialog box is used to edit email messages (see following page). All functions are similar to other text processing programmes such as MS Word, for example.



You may also process edit email messages, create new messages and alter fonts.

Alterations to a highlighted text can be made by using the following buttons:



Font, font size and font style (bold, italic, underline) can be changed. By clicking the appropriate box  you may either center or align the text to the right or the left.

E A confirmation email may be entered as an option. If the box in front of the selected email is not ticked, no confirmation mail will be sent.

Use a right click in the document to select a wildcard whose content will later be read from the database and filled with the correct values.

test template --> Selection of an existing email message

--> Creates a new email message; a standard text will be displayed

--> Saves email messages:

- all changes to a selected email message are saved,
- for a new email message a small window appears in which a name for the new message must entered

--> Deletes the selected email message

When the box is ticked, a confirmation email will be sent to the selected email address.

F The web release can only be processed when the sender's email has been entered. The "Execute" button cannot be activated until an email address has been entered.

G The status bar indicates whether or not the particular recipient is ready to receive images. If the status display indicates "ready", the images or diagnostic findings can be released. The status bar then displays "sending". Should the transmission fail, the status bar will read "failed". Failed attempts are counted and the number of jobs in line is displayed. The display may, for instance, read: "1...n failures / 2 jobs in line / pause". Attempts to release the images or diagnostic findings will continue until transmission has been successful. Once the images have been transmitted successfully, the status bar will display "ready" again.

2. Functions of the web viewer

[The patient overview:](#)

An overview **(B)** indicates all the patients/owners who are allocated to the registered user. The details of every patient include patient ID, date of birth and gender.

Patients **(A)** can be searched with several criteria:

- modalities/ filter
- study date
- patient/owner
- patient ID
- date of birth
- full text (patient/owner, patient ID, modality)

The search result in the overview is automatically updated after each character entered or after each altered selection.

The number of results displayed at a time can be changed. The results can be sorted by patient/owner, patient ID and date of birth.

At a click on the patient, all studies, series and images

of the patient are displayed in the study overview **(F)**.
By double clicking on the patient, all the studies of

this patient are selected, downloaded immediately and displayed on the viewer.

The screenshot displays the dicomPACS-Web interface in a Windows Internet Explorer browser window. The page title is "Welcome Mr. Mustermann" and "Your patients and studies". The interface is divided into several sections:

- Search and Filter Section (A):** Includes a "Modalities" filter (CR, CT, MR, US, ES, BC, KA, all others) and a "selected filter: none" indicator. Below it are buttons for "All", "Today", "Yesterday", "Time period", "Date", and "Time frame".
- Search Criteria Section (B):** Labeled "Owner, Patient", it contains input fields for "Patient-ID", "Full text", and "DOB", and a search button.
- Results Table:** A table with columns "Owner", "Patient", "Patient-ID", "DOB", and "F/M". It lists 26 patients, with the first few rows visible. The table is sorted by "Patient-ID".
- Actions Section (C):** Buttons for "EMR", "Attachment", "Share", "Admin", and "Logout".
- Window Management Section (D):** Buttons for "Current window", "Display images in the current window", and "New window".
- Image Preview Section (E):** A "Table preview" and "Image preview" section. The "Image preview" section shows a grid of image thumbnails. The first row shows a study from "2005-01-05" with modality "CR" and description "SKY,ZEHE seitl.,OXSPRING". The second row shows a study from "2005-01-06" with modality "MR" and description "L_Front_FootL_Front_Foot / Pilot Scan,L_Front_Foot / T2*W 3D G".
- Image Selection (F):** Red boxes highlight specific image thumbnails in the grid.

The study overview:

All the studies of a patient are displayed in an overview **F**.

Each study also displays the study date, the modality, the study description and the total number of images.

The buttons **E** "table preview" and "image preview" above the study list allow you to display or hide small preview images. If the images are displayed, the size of the images may be altered by the slide control in the button "image preview". To display the preview images in an enlarged or reduced size, click on the "+" or "-" buttons.

Choose one of the following options to select studies, series or images to be shown in the viewer:

click on study line: all series and images of the study are selected

click on series/ image: series or image is selected

click on the box at the top of the table: all studies of the particular patient are selected

Display of the selected images in the viewer:

By activating the buttons **D** "current window" or "new window" you select in advance whether the images in the viewer are always to be displayed in the current or in a new window. A click on the button "load images in the current / new window" **D** will display all selected studies/series/images in the viewer.

A double click offers you more options to select images and to display them immediately in the viewer:

Double click on patient: all the studies of this patient are selected; the selection is then displayed in the viewer.

Double click on study line: all the series and images of the study are selected; the selection is then displayed on the viewer.

Double click on series/image: a series or image is selected; the selection is then displayed in the viewer.

Navigation: **C**

Logout: disconnect the registered user

Administration: edit access and personal data

The Viewer

Mouse buttons – functions

Functions of the left mouse button

In the navigation bar:

- move the scroll bar (while holding the mouse button down)
- click on a preview image to display that image in the work area

In the work area:

- move the image within its grid area (pan function)
- perform the function selected in the task bar (e.g. zoom etc.)

In the task bar:

- select functions or tools

Functions of the mouse wheel

In the navigation bar:

- scroll preview images up or down

In the work area:

- scroll through a series

Function of the right mouse button:

In the work area
- window level

[The user interface – an initial overview](#)

Task bar

The most important functions on the task bar can be called up directly by clicking on the icons. If the cursor rests on a tool icon, the function of the icon is indicated in a tool tip. (Online help).

Work area

The work area displays all opened images which can also be edited there.

Navigation bar

The navigation bar shows all downloaded objects (images, series etc.) irrespective of whether or not they are displayed in the work area.



Navigation bar

Working area

Tool bar

Task bar

The most important functions on the task bar can be called up directly by clicking on the icons.

If the cursor rests on a tool icon, the function of the icon is indicated in a tool tip. (Online help).

General information



Info



Help (brief instructions)



Maximises the **dicomPACS[®]vet** window

Rotation Section



Rotate 90° to the left



Rotate 90° to the right

Grid Section



Grid 1x1



Grid 2x1



Grid 3x2



Grid 2x2



Grid 1x2



Grid 2x3

Filter Section



Inverts the whole image

Window Level Section



Window position



Window width

Image Selection Section



Standard cursor (deactivates the function last selected)



Undoes all image alterations and shows the original image

Zoom Section



Magnify function to enlarge image details



Fits the image size to the selected grid



Increases the size of the selected image



Decreases the size of the selected image

Cineloop Section



Playback of images in a series (backwards)



Playback of images in a series (forwards)

The navigation bar

The navigation bar displays all downloaded images, series or documents in the form of preview images.

A click on an image displays that image in the grid area 1x1 of the work area.

If the work area is divided into several grid areas, e.g. 2x2, 2x3 or others, a click on an image or a series automatically provides a selection for you to choose the grid area in which the particular image or series is to be displayed.

Moreover, all images/series – starting with the image or the series you clicked on – may be successively displayed in the available grid areas automatically. If a large number of images have been downloaded, the display area of the task bar can be moved by means of the scroll bar. This function can also be performed with the mouse wheel. The images currently displayed in the work area – or in several grid areas – are framed red.

A Study information: All subsequent images/series up to the information on the next study are part of

one and the same study. The owner, the patient and the study date are indicated.

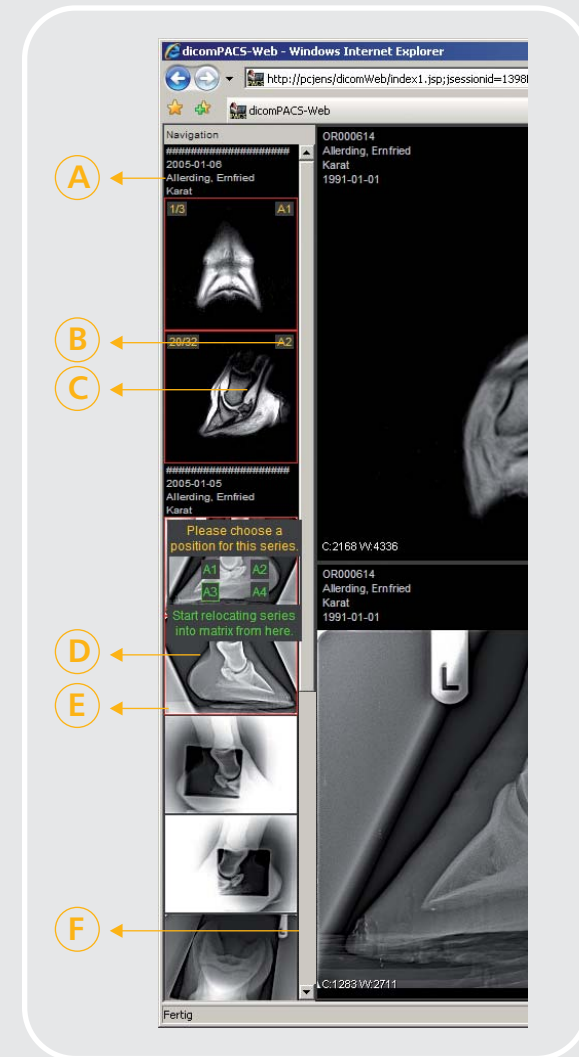
B Position of the series in a grid area of the particular screen window (here: A2)

C Image that was clicked on

D The screen "A" was previously divided into 2x2 grids (A1-A4). The image that was clicked on is currently in grid area A3 (framed green and marked in the bottom left corner of the preview image)

E Starting with the image/series that was clicked on, screen windows A1 – A4 are automatically filled with the following images/series.

F Scroll bar to move the viewing window of the navigation bar.



The work area

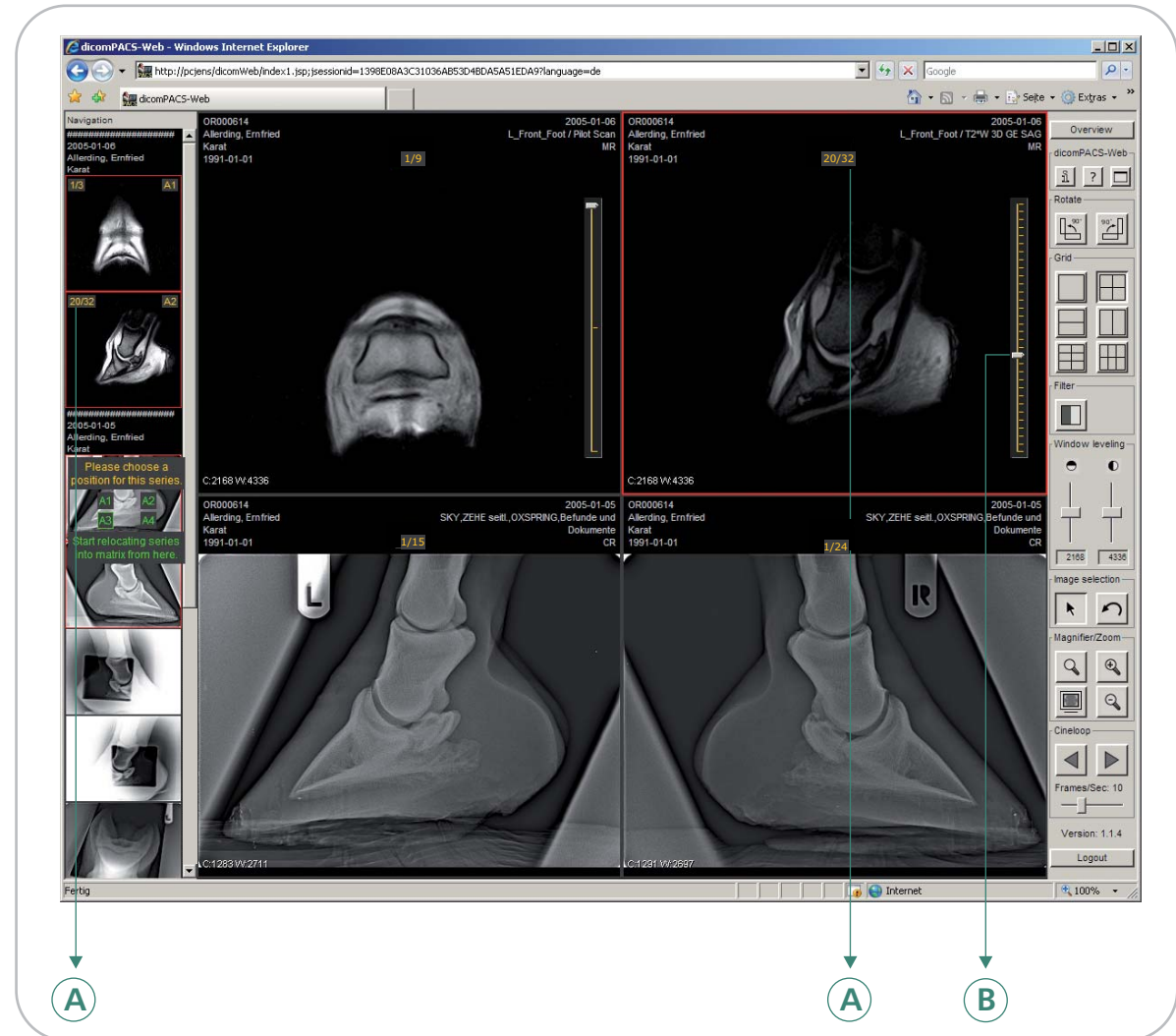
The work area displays the downloaded images. Information on the particular image, such as patient name, date of birth or examination details is displayed.

All functions and image manipulation options of the task bar are only effective in the "active" image. An image is activated by clicking on it. It is then framed red.

If an enlarged image is displayed in the selected grid area, it can be moved within that area by holding the left mouse button down.

If one or more series (CT, MRT etc.) from the navigation bar are displayed in the work area, you can scroll through the series with the mouse wheel if you place the mouse cursor above the series **A**.

- A** Number indicating the position of the image in this series
1st number: number of the active image
2nd number: number of slices
- B** Position of the image in this series



Security concept

In order to prevent unauthorised access to patient data on an internet web server, there are other options apart from login and password to increase security.

1. Delimitation of the web server by means of VPN

Access is only possible via secured protocols. This can be achieved by means of software or hardware. This method does not allow access to the web server from a random computer with internet connection. Establishing a connection always requires an administrative process. The PC which establishes the secured connection must be placed in a safe environment and be protected from unauthorised access.

2. The patient data stored on the web server is anonymous.

Anonymisation takes place in the practice or the hospital that transmits the images onto the web server. An unique ID (anonymous ID) is generated as a patient name. You have the option to include a surgery abbreviation in the ID. The date of birth may remain the visible or, if required, it may also be anonymised (either completely or always changed to the first day of the month).

Allocating the anonymous ID to a patient is only possible within the image archiving system in the practice / hospital. The anonymous ID is the link between diagnostic findings and the image data. Even if the web server or access is compromised, confidentiality of patient data is guaranteed. The notification email addressed to the referring doctor provides both the link to the image data as well as the complete name of the patient. Thus the doctor will always be able to match the anonymised images on the web server with the patient.

We have summed up the main advantages for you here:

- Images are always available in their original quality (DICOM)
- High speed availability of images even in slow networks/ with slow internet thanks to special streaming technology and compression procedures no compromises between image quality and loading speed.
- Automatic e-mail notification
- Extensive research options
- Simple, intuitive operation
- No installations costs
- Extensive configuration of user and access rights
- Automatic updates
- The use of several web servers is possible
- Only modest hardware requirements
- Thin Clients, terminal servers, mobile computing and WLAN can be used
- Central administration reduces support to clients
- Multilingual