

Portal software specification

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Review	Date	Author	Description

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1 – Introduction

1.1 This document describes the requirements for the new Portal, which aims to provide image studies (Report and Images) to Patients and Requesting Physicians, via Web access.

1.2 Document Organization

This document is organized as follows:

Section 1: It is an introduction to the document, listing its sections and other related documents.

Section 2: It is an overview of the Portal, and its applications and features.

Section 3: Defines the functional requirements of the Portal

Section 4: Introduces the Portal User interface, for access functions by patients and requesting physicians.

Section 5: Introduces the Portal User interface, for management and administration functions.

1.3 Related documents

The following documents are associated with, or referenced to, this document:

Document	Review	Identification

2 Project Overview

2.1 Description

The Portal project aims to develop a platform that allows radiology clinics to distribute exam results via the Web (Internet). In this way allowing patients to view reports and images directly via the internet, eliminating the need for printing and displacement to obtain the results of exams.

Two models will be developed, a first model will be integrated with the database (via SQL View) of PACS and RIS / HIS to locate images and reports. Access to RIS, will allow access to Patient's Delivery Protocol data.

The second model will be integrated with RIS / HIS, and access to the repository of DICOM images, where the system will scan in a certain configurable time, for the location of the images. Based on the data that we will obtain from RIS / HIS, the system will merge these data and objects.

When the patient is received at the clinic, the data will be collected for the registration of the requested exam (via RIS/HIS), then the patient will receive access instructions on the scheduled day for their online exams (Delivery Protocol). In this protocol, it deliver the access to your exam with unique Patient login and password.

For Portal access the Patient will be asked for a special, additional, access code, which will be delivered to him/her at upon access via SMS. After entering this code the Patient will have access to his result data (report and images), if they are available. To print these documents or download them, the system will again request a code, which the patient will receive via SMS. Only after typing this code will the system release the report for download. In this way, we guarantee the security and confidentiality of data.

2.2 Goals

The objective of the Portal is to develop a new product that allows the clinic, and radiology laboratories, to provide their Patients with access to exam results via the Internet quickly and safely.

This new product will replace the printed versions of Reports and Images, allowing the customer to offer their patients a safe way to deliver exams without the need to travel to the clinic/lab.

The Portal will be developed with web technologies so that the patient can search for his results from any browser or device that has access to the internet.

The SMS ensures radiology service providers, will have delivery and access control to this portal with complete security, since they will only be allowed access through the code sent via SMS to their patients, a unique code for each patient.

The product must be highly customized to meet the specific needs of each client, such as information or guidelines, displayed on the results screens, header and footer specific to each client. In addition to general options for operating the portal, such as sending e-mail to patients, etc.

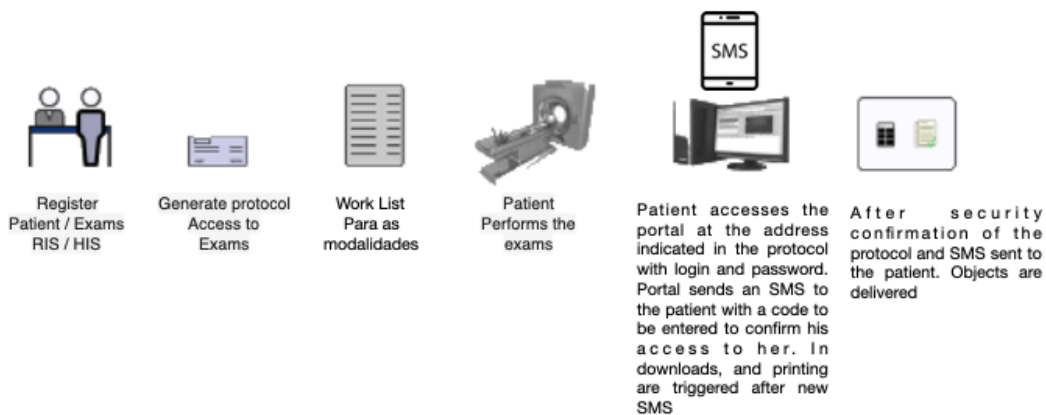
3 – Functional Requirement

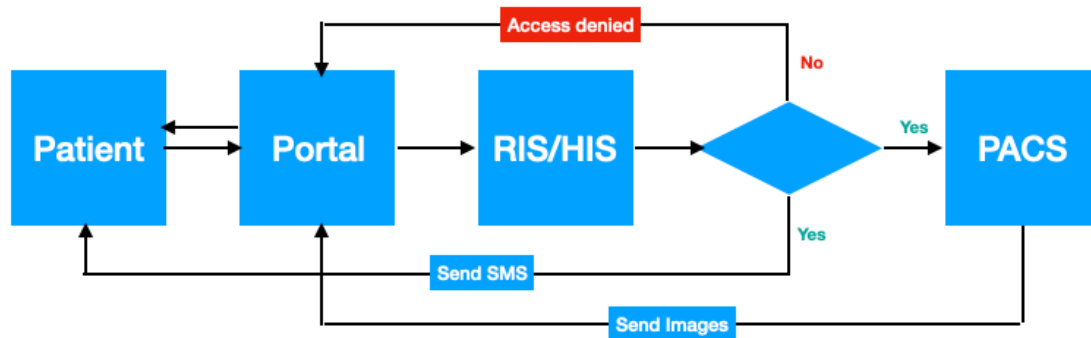
This section defines the functional requirements for the development and implementation of the Best Portal, including the requirements for interconnection with the customers' PACS / RIS / HIS system.

3.1 Router

In case the images are integrated via a repository, a router is installed so that this router can read the DICOM tags of these images and create a database organizing the location of each exam.

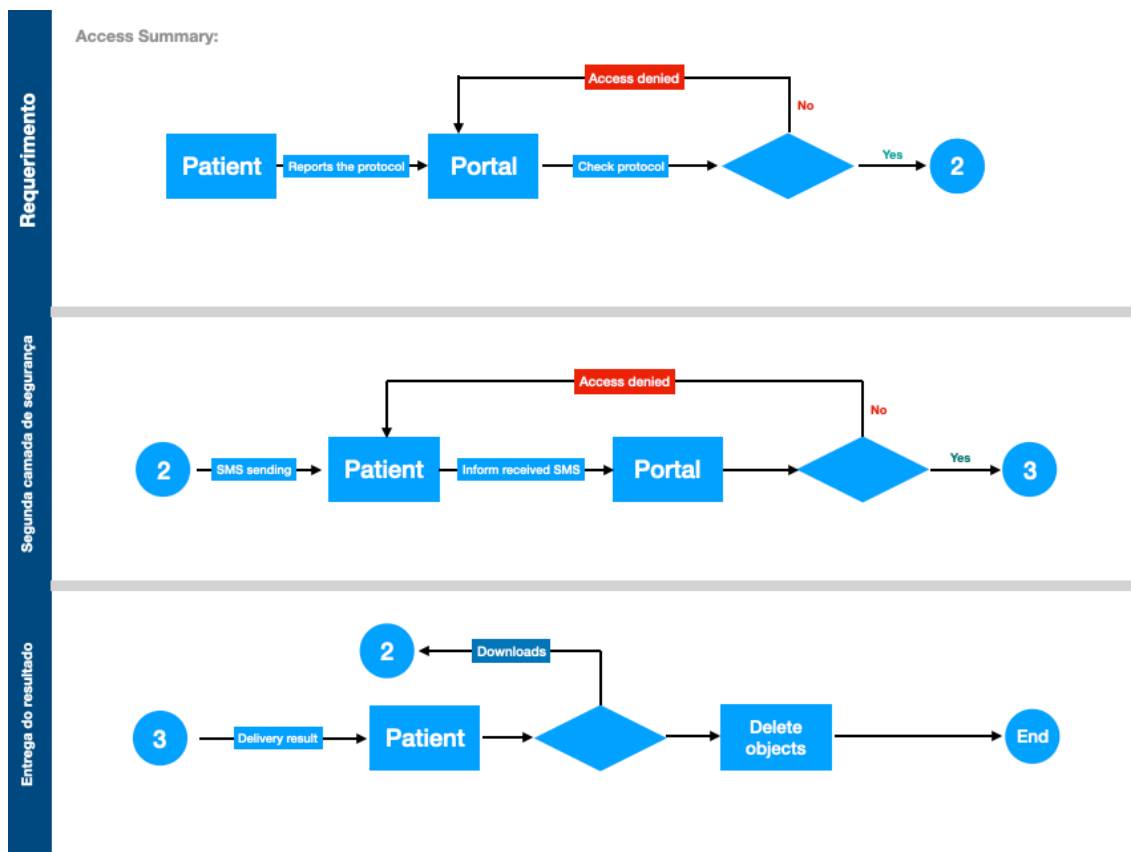
Summary flow of the system engine:





- 1) Patient accesses the URL provided by the clinic where exams were performed
- 2) Portal will request the access code (protocol) and password
- 3) Portal verifies in the RIS / HIS integration the data provided by the patient, if the access data is invalidated, Portal returns an access denied message to the patient.
- 4) Access data being valid, Portal sends an SMS containing a special code to access the studies, then presents a screen informing that the user needs to enter that “key”
- 5) If patient enters an invalid “key”, Portal sends an access denied message, otherwise Portal will present the studies available for the patient to select what they want to view. By clicking on the selected study, Portal will collect the exam’s images from PACS.
- 6) In case Patient wants to print or download results, Portal will again send a new SMS informing the code for Downloads, and will present a screen for the patient to inform the “key” code sent to his cell phone. Once the entered “key” is validated, the printing or downloading process will be carried out.
- 7) When the patient leaves the portal, all studies will be deleted from the server where the portal is hosted.

Access flow:



3.1.1 Patient Data

Patient data will be extracted directly from the customer database, or obtained through an HL7 interface, when available.

In the case of straight extraction from the customer's RIS / HIS database, the portal will use a SQL View provided by the customer. That View should allow queries to patient data, based on information received from PACS, either by DICOM tags in case of searching images in the repository or directly in the database through a PACS View.

In the case of searching for images in PACS Image Repository, Portal will extract information from DICOM tags, such as Accession Number, that will be used to obtain patient data and the link between images and report.

In cases where images do not come directly from the repository, Portal will use the RIS / HIS database view, and the PACS database view, to find the reports and images.

In the prerequisite document for data access, we provide the information necessary to perform data/image retrieval process.

Basically it is a product that has access to the worklist (exam schedules) and locates its data (report and images) through information retrieved from the customer's database, provided by SQL Views, or in the cases of the images by the DICOM tags in images.

The access to these data by the patient is in a very simplified format and with total security. We will explore this theme below.

Security:

Portal was developed thinking about usability and security of all processes. The product has various layers of security.

Portal is hosted on a server running Windows operating system, with its lock settings properly configured, such as antivirus, firewall, and other IT security best practices.

The storage of both the report and the images are temporary, these objects will be retrieved when patient accesses the Portal. After patient leaves Portal, all data is deleted from the server where Portal is hosted. This is another layer of security, which in case of viruses, or even an invasion, we guarantee that no study data will be obtained by the attacker, since there is no permanent storage.

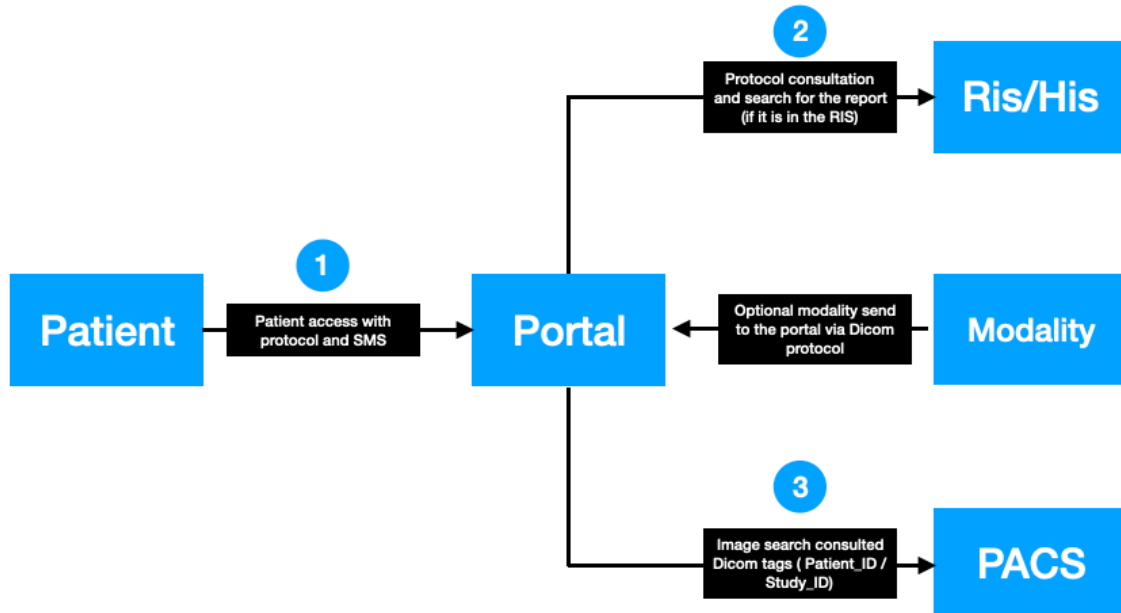
To have access to his study, Patients must have the access protocol provided by the clinic. This protocol will contain the electronic address for web access, login and password.

As soon as the protocol is typed on the portal, an SMS will be sent to the patient to his cell phone. If the patient wants to print via Portal, or download results, Portal will send another SMS to validate the requested.

Thus, Portal delivers two additional layers of security, ensuring that the results of these exams are being delivered to their intended holders.



Flow summarizing computational operation of the portal.



Portal software is hosted on a minimum 8GB i5 configuration server (depending on the clinic's access volume) equipped with the Windows operating system with IT security practices applied. This server will host a relational database and web server for external patient access. For the operation of this service, some logical and physical prerequisites are required.

Logical prerequisites:

- **Construction of a View in RIS / HIS relational database.**

Customer receives technical documentation for preparing this View (mirroring) of just the necessary data. The View must provide the schedule of exams performed at the clinic, and delivery protocols to validate Patients.

When Exam Reports are stored at customer's RIS / HIS, that can also be delivered to Portal through this View.

- **Construction of a View in PACS relational database.**

Customer receives technical documentation for preparing this View (mirroring) of just the necessary data. The View must provide access to the customer's images and reports.

In case Reports are not stored in PACS, the system can have access to the image repository where it develops an image database and its location through DICOM tags.

Physical prerequisites:

- Hardware CPU i5 8GB or equivalent (Minimum requirement)
- Network (TCP / IP)

Description of Portal's operational flow

- Patient types the access protocol delivered in his exam registration (Login / Password)
- Portal accesses RIS / HIS, validating the Patient entered data
- Portal seeks the Exam's Report, if it is store at RIS / HIS
- Portal searches for images on PACS using the View, or the DICOM repository. If Reports are stored in PACS, Portal will retrieved it there.
- When the Patient leaves the Portal, all objects are discarded from the Portal.

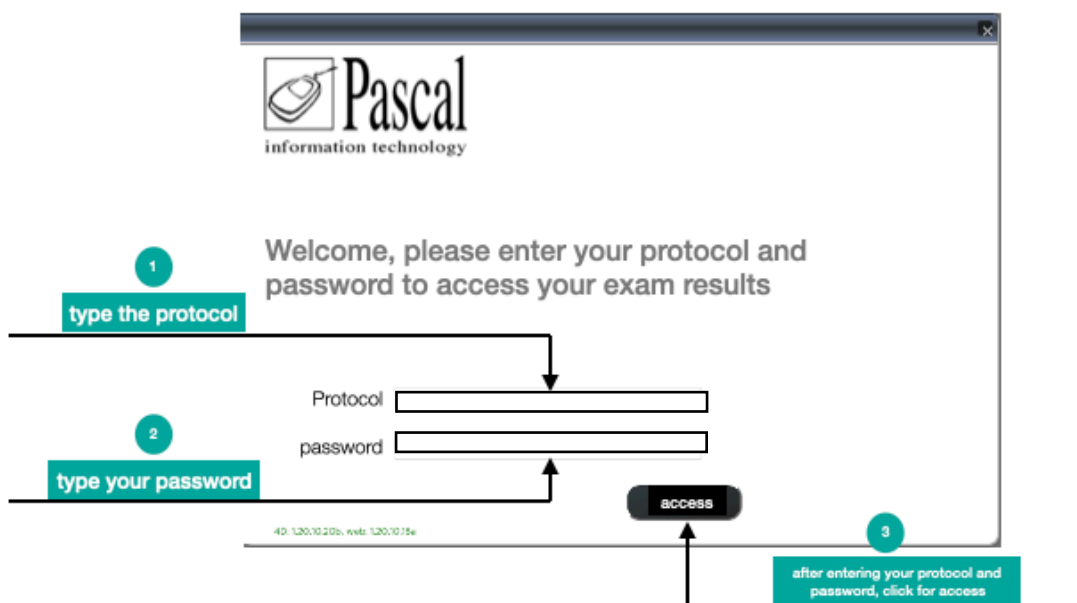
Implantation:

As that is Client's confidential information, Pascal does not provide Portal's installation and configuration manuals. Portal must be installed by highly trained personnel (IT Professionals), appointed by and certified by Pascal. Professionals will do all the deployment, configuration and monitoring of the performance and security of the entire system.

Below are instructions that describe in detail the screens for Patient access and usability.



The screenshot shows a web browser window with the Pascal logo and the text "information technology". Below the logo, it says "Welcome, please enter your protocol and password to access your exam results". There are two input fields: "Protocol" and "password". Below the "password" field is a black button with the word "access" in white. At the bottom left, there is a small green text string "40: 120/10.10.10.15e, web: 120/10.15e".



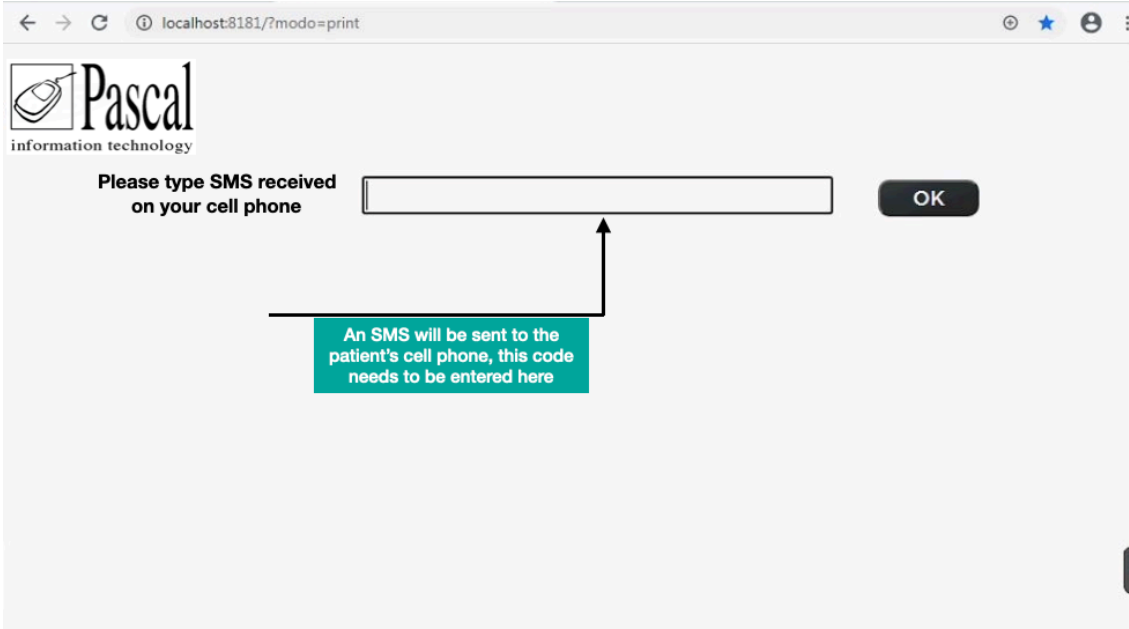
This screenshot is annotated with three numbered steps to guide the user through the login process:

- 1** type the protocol: An arrow points from this instruction to the "Protocol" input field.
- 2** type your password: An arrow points from this instruction to the "password" input field.
- 3** after entering your protocol and password, click for access: An arrow points from this instruction to the "access" button.

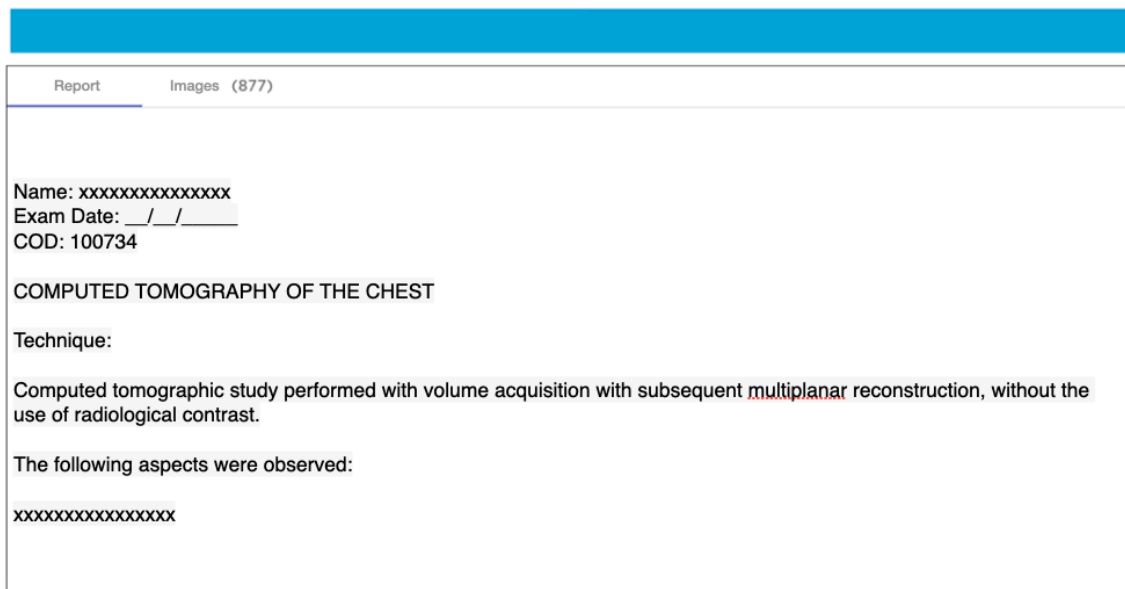
The rest of the screen content is identical to the previous screenshot, including the Pascal logo, the welcome message, and the status text at the bottom left.

1. Enter your protocol

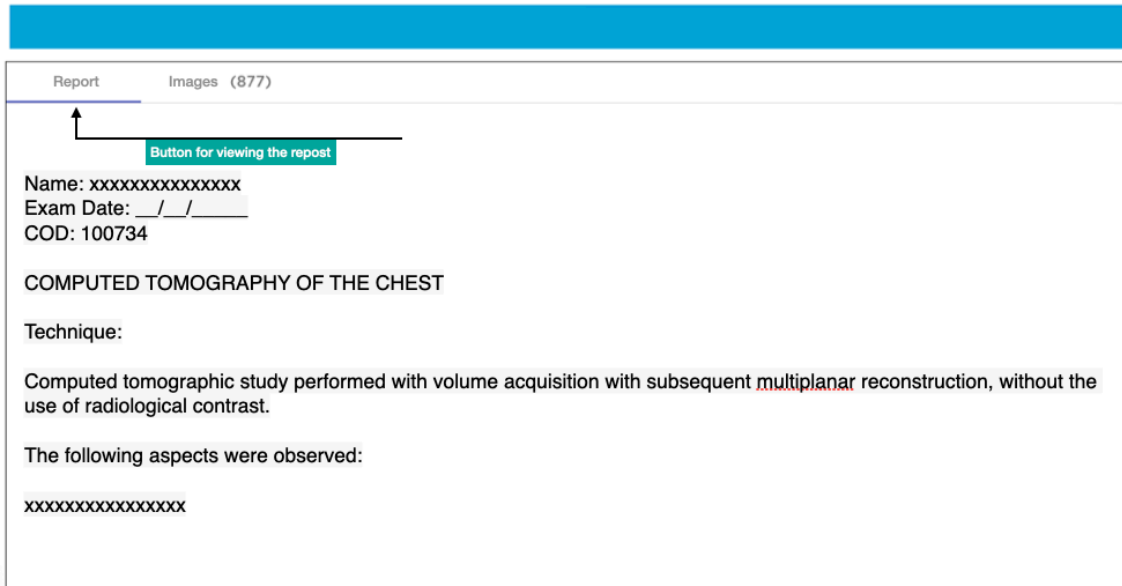
2. Type your password
3. Click on access



Then the system will provide this screen requesting a code sent to the Patient via SMS. That is a unique random code, and another layer of security. Ensuring actual delivery to right holder.



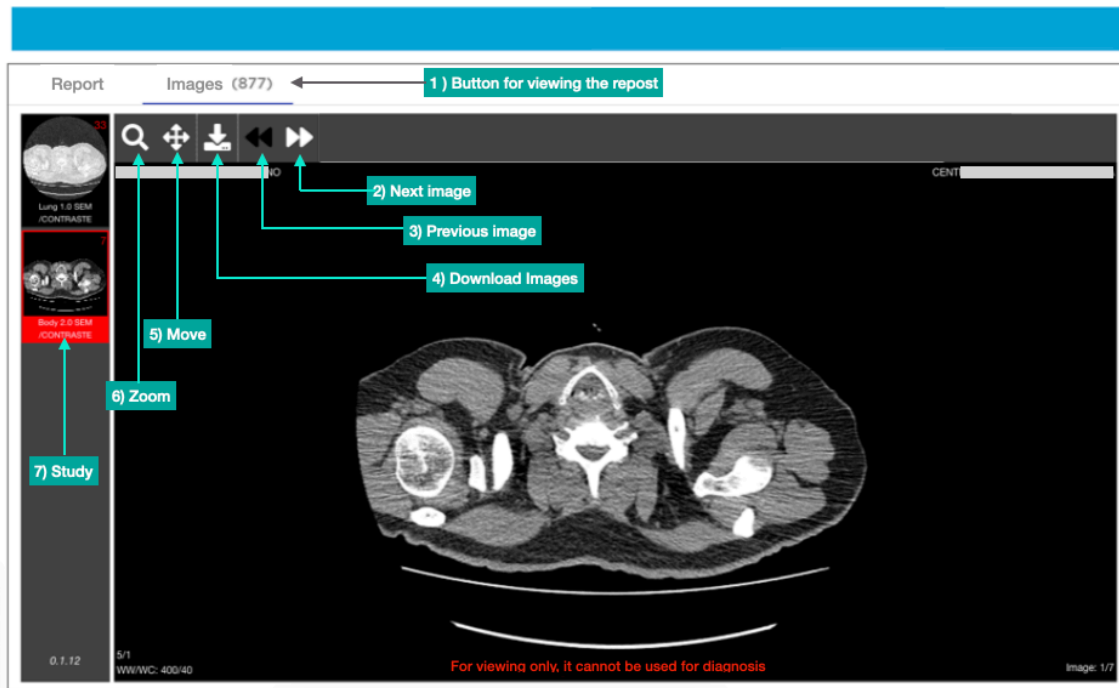
After validating the access security protocols, the system presents the screen with the radiology report data.



On the left side at the top of the page, there is the button for viewing the report



The system searches for the images in PACS, so that the patient can view them remotely.



When opening images, the portal provides the patient with some basic tools for better visualization.

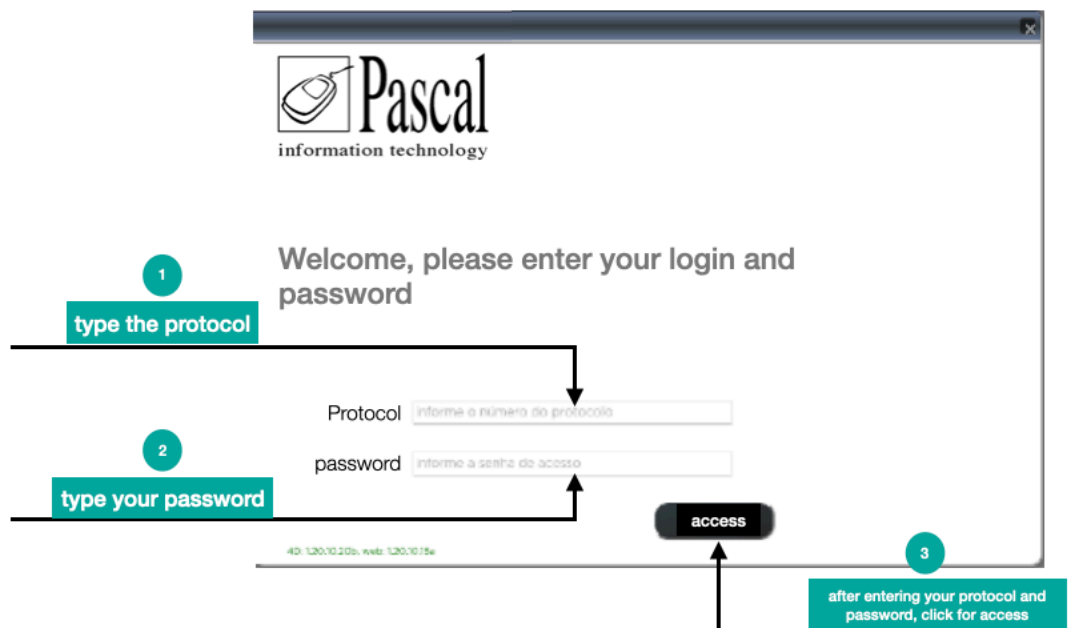
We warn that tools delivered in this viewer can never be used for diagnostics, they are for visualization ONLY.

1. Activate the visualization of images
2. Activate the display of the next image
3. Triggers previous images
4. Download images
5. Movement of images
6. Zoom the images
7. Other Series (when there are multiple Series on the same Study)

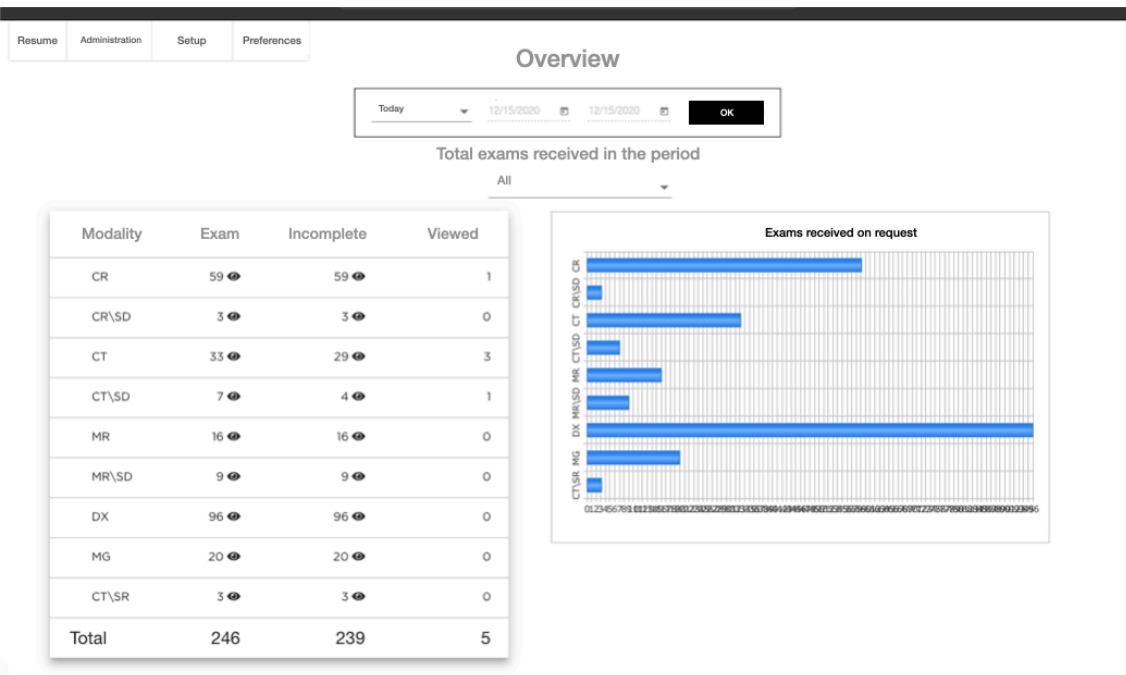
Admin module

Portal hosts also provides a module where client can monitor the entire delivery flow, and perform some basic configurations.

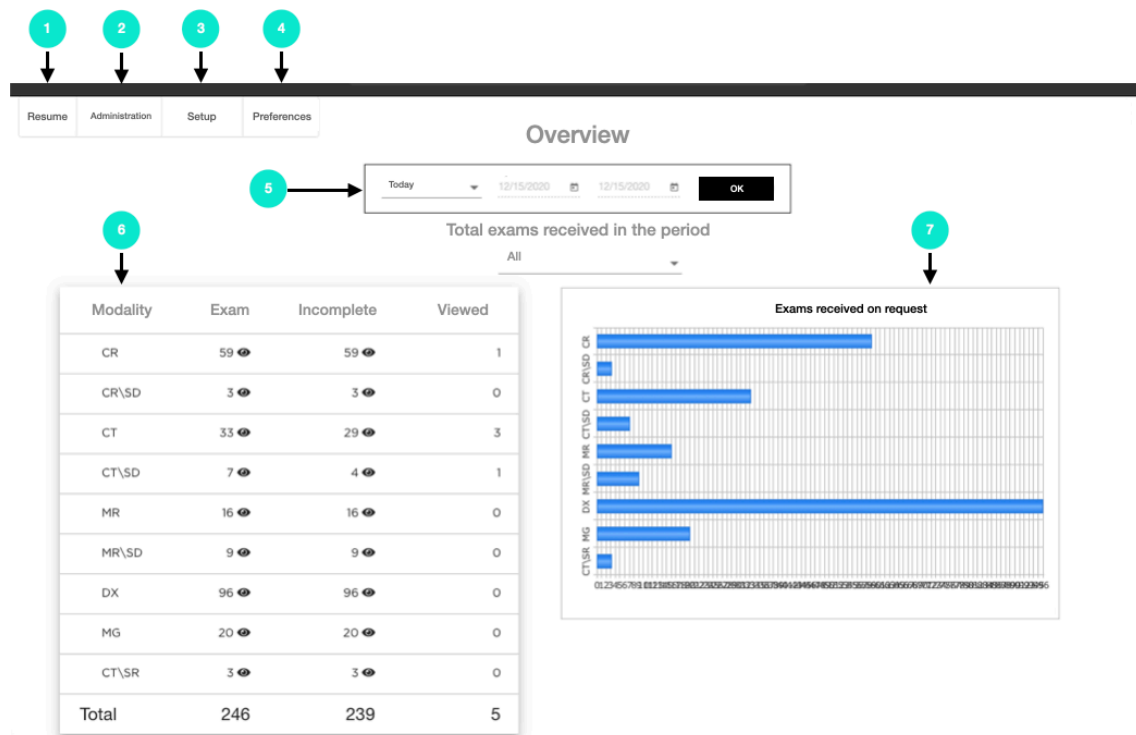
In the following instructions we will demonstrate the operation of each screen:



For access to the administrator module, an http address is previously configured by one of our qualified analysts, and a special login/password will be provided for this access. Users can change that later.

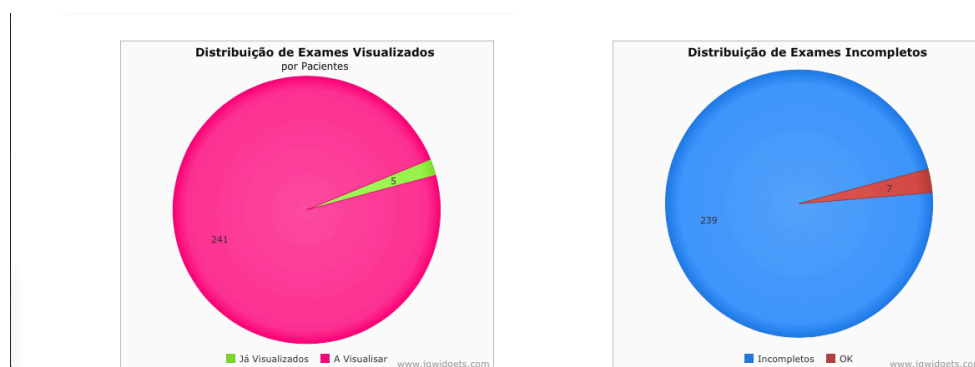


Right after the login and administrative password, this screen is presented so that the user can filter his data and monitor Study deliveries.



1. **Summary**, shows the screen above, bringing summary indicators depending on the requested filter.
2. **Administrator**, shows a screen that provides access to all Studies via a filter.
3. **Setup**, shows a system configurations screen
4. **Preferences**, shows a screen for setting users preferences.
5. **Filter by period**, users can choose to filter Study results by period.
6. Grid of available exam results by modalities
7. Graphs of available results by modality

In item 6, the system will show in the first column the modality, in the second column the total number of exams for the requested period, in the third column the total number of incomplete exams (incomplete exams are exams missing an item, report or image).



On the right side the system provides a graph with the green indicating the number of exams that were already viewed by Patients. In pink, the number of exams that have not yet been viewed (Remembering that this result is presented according to the period informed by the user).

Resume
Administration
Setup
Preferences

Portal Administration

Patient?
Modality
Device?
Unity?

☐ Without report?
☐ No images
☐ Late
☐ Released
☐ Not viewed?

Period?
12/15/2020
12/15/2020
OK

59 - Exams found

Patient	Date	Mod	Device	Unity	Region	Date	Description	Problem	Viewed
...	12/15/20...	CR	FCR-MAMO	...	BREAST	4				...	
...	12/15/20...	CR	FCR-RX	...	PELVIS	4				...	
...	12/15/20...	CR	FCR-MAMO	...	BREAST	4				...	12/15/20...
...	12/15/20...	CR	FCR-MAMO	...	BREAST	4				...	
...	12/15/20...	CR	FCR-RX	...	LOW...	3				...	
...	12/15/20...	CR	FCR-RX	...	HEAD	4				...	
...	12/15/20...	CR	FCR-RX	...	CHEST...	3				...	
...	12/15/20...	CR	FCR-TIE	...	BREAST	4				...	
...	12/15/20...	CR	FCR-RX	...	BREAST	4				...	

1 2 50
1 - 50 de 59

The Administrative screen can be activated by clicking on the summary screen on any result shown in the grid on the left or by clicking on the Administrator tab at the top of the site.

By double clicking on the desired patient, the portal opens the same patient viewing page (images and reports) for quality control of deliveries.

Patient?
Modality
Device?
Unity?

☐ Without report?
☐ No images
☐ Late
☐ Released
☐ Not viewed?

Period?
12/15/2020
12/15/2020
OK

This page is equipped with additional filters, in addition period. One can filter by modality, patient name, devices and other filters.

Implementation and maintenance of the Portal System is strongly recommended to be assigned to credited and Pascal's certified personnel.

As these are medical images and security protocol, we do not recommend maintenance or implantation to be done by professionals that are not qualified in DICOM protocols and Pascal's technologies.

Our best regards
Pascal