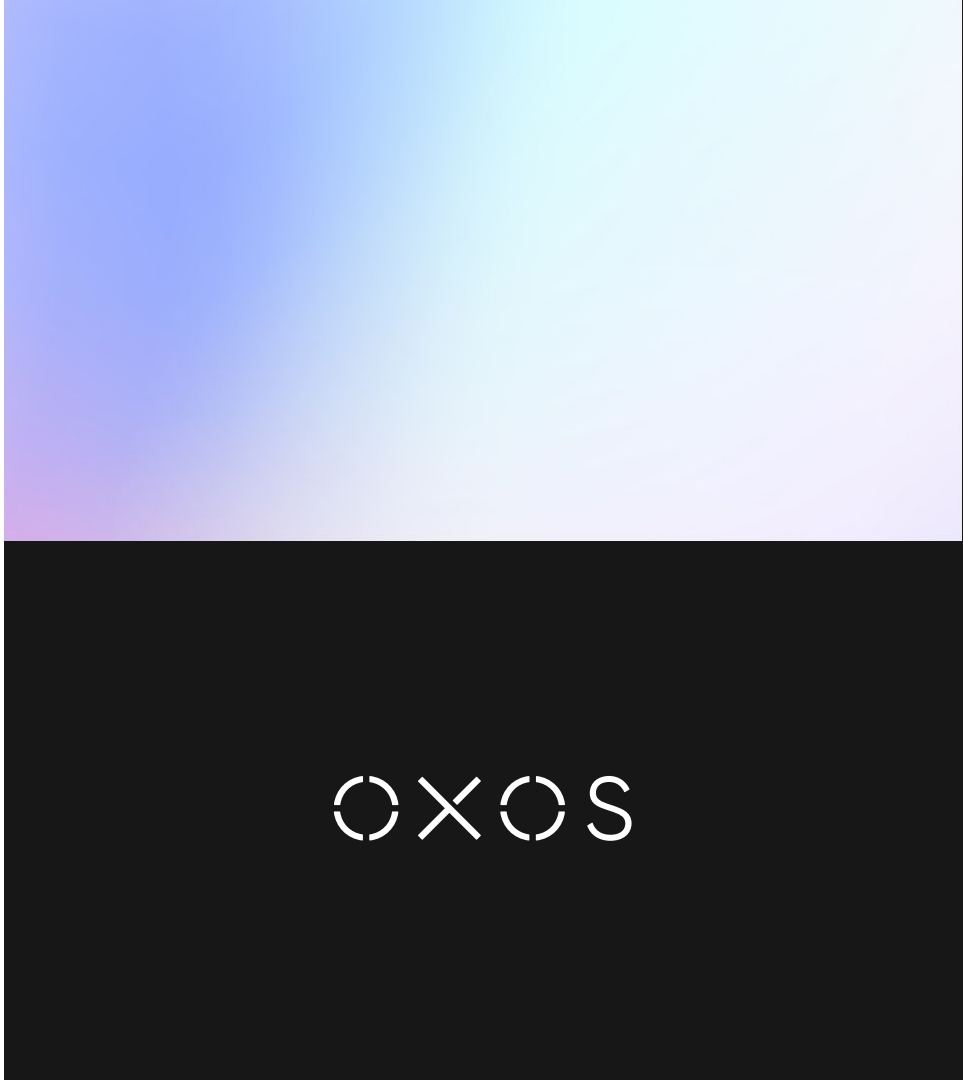
3.2.0 Device App UI
Update Recommendations



App Usability: Foreword

The purpose of this section is as follows:

1. Identify issues with the usability of the app
2. Provide insight on how users perceive these issues
3. Recommend solutions to improve overall usability

The UI issues addressed in this section come primarily from usability studies, but there are some that come from other sources, including HF, Sales and Marketing. They have been grouped by app screen.

While this section attempts to present ideal solutions to these issues, we understand that some may not be feasible. Hopefully we can find a way to execute as many of these items as possible!

To that end, please feel free to bombard this section with comments, and we can set up a meeting to discuss later. Thanks so much!

Link to Figma Prototype: LINK

Exam Setup Screen

On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

Unknown User
OPERATOR

Dana Samuel
PROVIDER

Worklist Server
Mocked MWL server

Search

ACCESSION #	NAME	DOB	ID
5699784492	Ethan Russ	08/08/1978	OXOS2546
5699784493	Martha Adams	07/14/1962	OXOS9875
5699784495	Anna Smith	11/27/1994	OXOS0369
5699784496	Jeremy Michaels	12/08/1989	OXOS9922
5699784497	Kinsey Lee	09/29/2002	OXOS4046
5699784499	Irene Garcia	08/24/1978	OXOS9345
5699784500	Ben Brown	01/05/1999	OXOS7736

Next patient

First Name * Ethan

Last Name * Russ

Identifier * OXOS2546

DOB 08/08/1975

Laterality: Left

Orientation: AP

Body Part: Finger

Description / Notes: X-ray of left finger

CLEAR

START EXAM

START EMERGENCY EXAM

Previous Studies

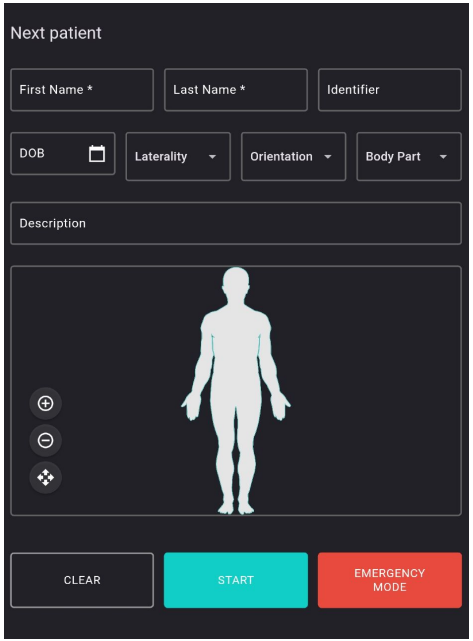
Patient
8157366a-2328-410e-a94b-21178d8aee6e0

Device Mode
PHOTO

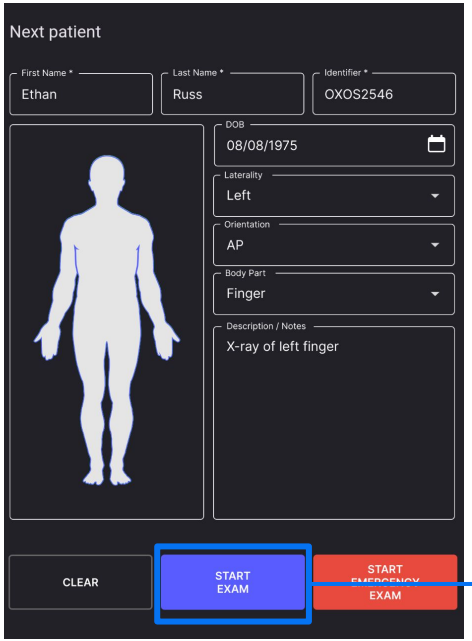
Remaining Storage
3,000

Data Entry Field Layout

Original



Update



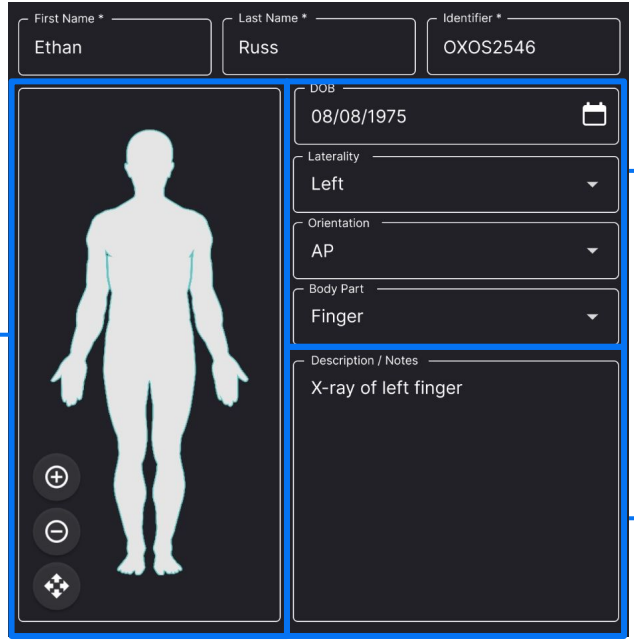
Note that the teal has been replaced with a deeper blue. All teal within the app should be replaced with this blue (Hex #595CFF) to align with new marketing guidelines.

On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

Allocate enough space so that the longest potential entry in each field may be fully viewed and verified by the user.

*Note: This change will need to be propagated to the final Send Screen dialogue as well.

Data Entry Field Layout



Reclaim some space from the pictorial patient widget

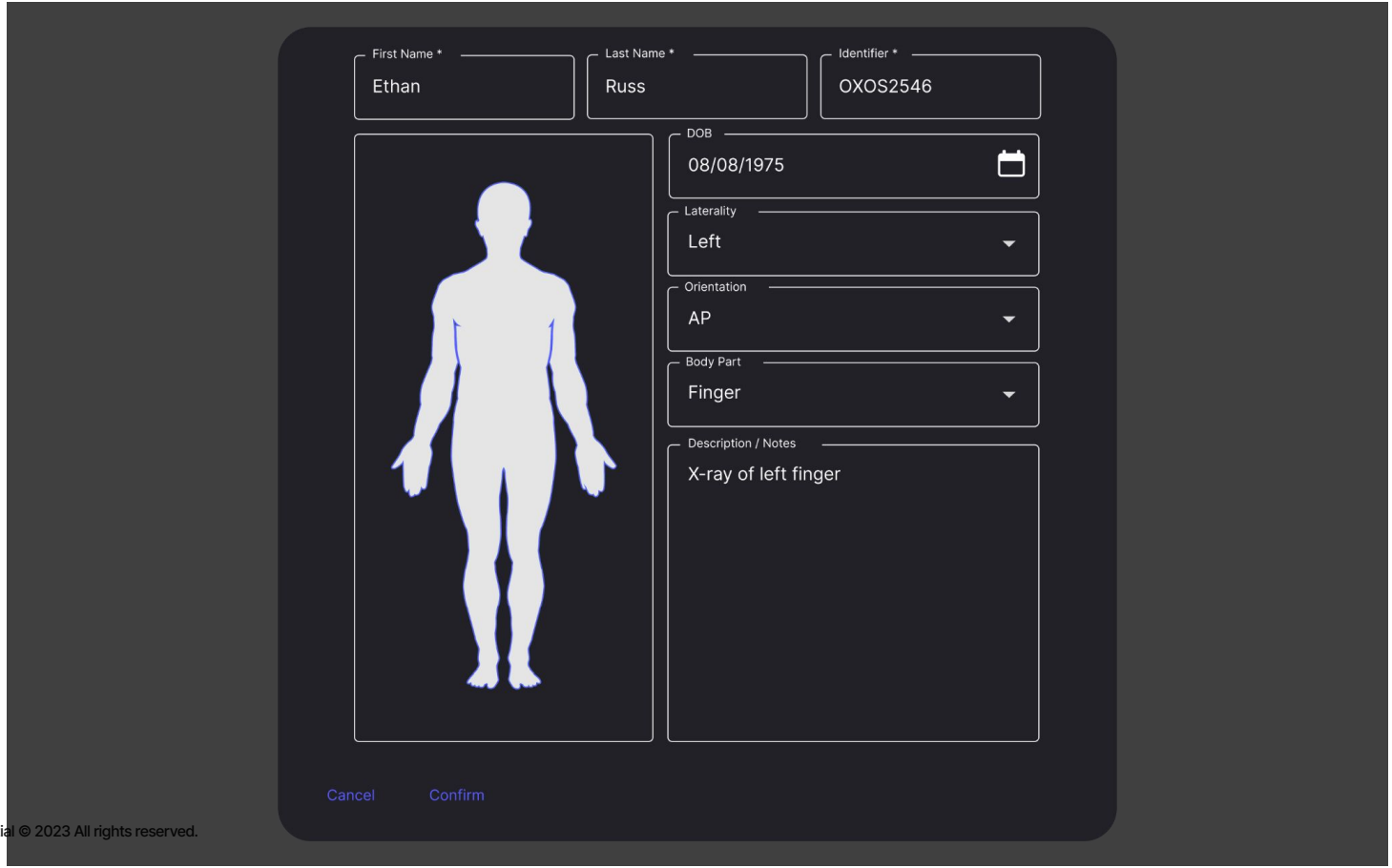
Lengthen dropdown fields to accommodate possible selections and group like functionality

Make the Description/Notes field larger to better accommodate post-exam note-taking

On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

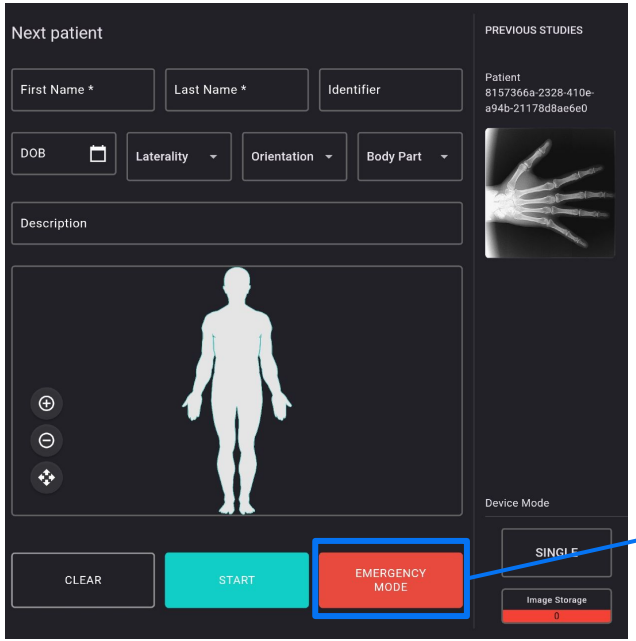
Allocate enough space so that the longest potential entry in each field may be fully viewed and verified by the user.

Corresponding Update to Send Screen



Presentation of Information

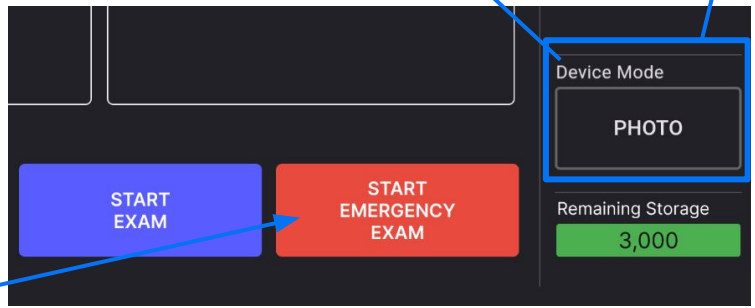
Original



Update

Rename "Emergency Mode" to "Start Emergency Exam" and rename "Start" to "Start Exam", making them less likely to be confused with "Device Mode"

Ideally the "Device Mode" toggle should go away all together, there doesn't seem to be any linked IED reqs and users cannot take x-rays in this screen anyway.

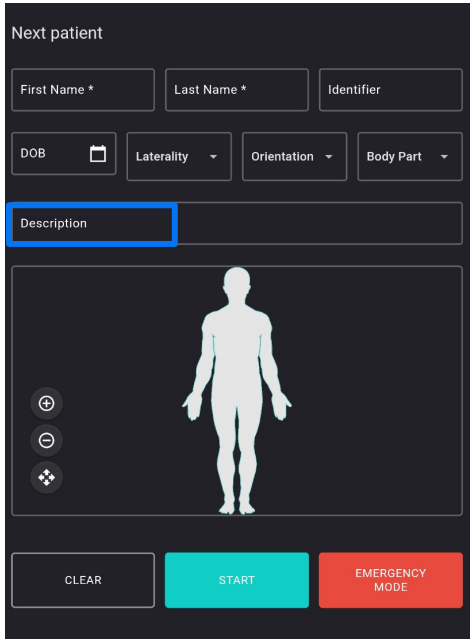


On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

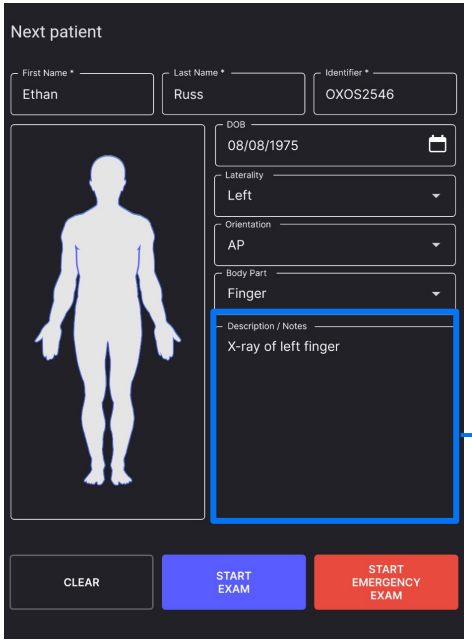
Utilize similar language for similar functions in order to better distinguish from non-similar functions.

Presentation of Information

Original



Update



Change “Description” to “Description / Notes” to allow for two potential use cases:

1. Manually recording any events of note that happened over the course of the exam
2. (**STRETCH GOAL**) Importing and auto-filling the this field information using MWL

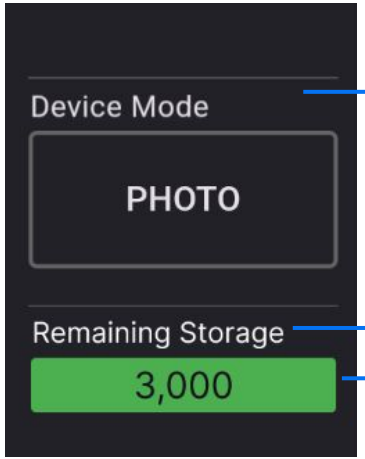
On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

Reword the language used to describe elements to better align with user expectations.

Presentation of Information

Original

Update



Change the order so that the divider comes first and the title comes second for both elements so that they are more easily identifiable as separate items

Rename “Image Storage” to “Remaining Storage” so users don’t think “0”= 0 images currently stored

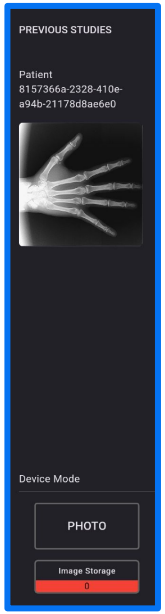
Move the indication outside of the bounding box because it looks too much like an interactable button; take advantage of the organizational structure established above

On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

Reword the language used to describe elements to provide additional clarification.

Presentation of Information

Original



Make the highlighted elements marginally narrower in order to help accommodate another column within the Modality Worklist widget on the left side of the screen

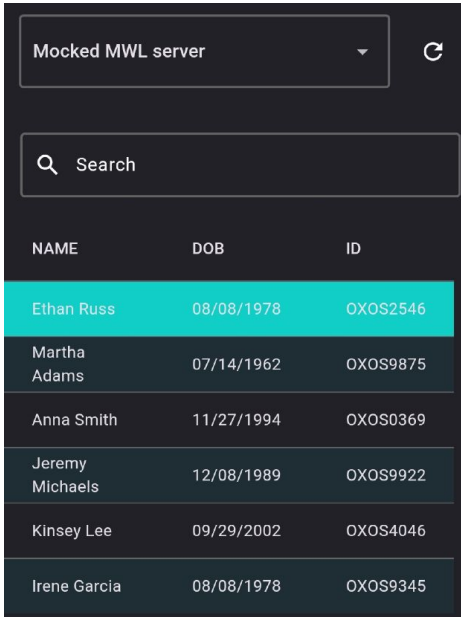
Update

On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

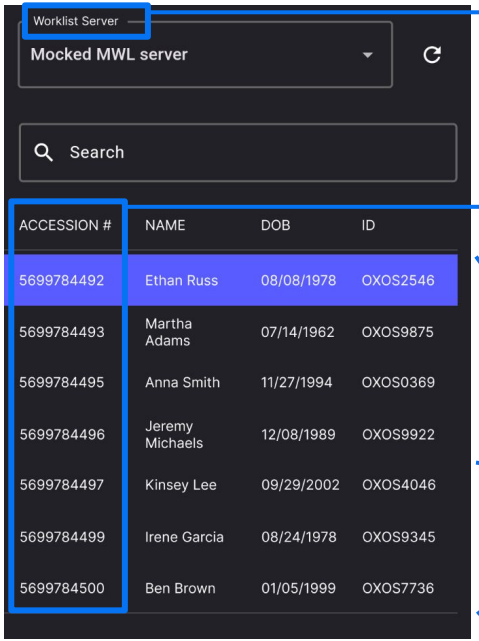
Reorganize elements to better align with user expectations.

Presentation of Information

Original



Update



Add a field title when a server is selected like the other data entry fields

Make the left section of the screen wider to add another column, “Accession #”, to the Modality Worklist widget so that it may be used as an additional search term.

Since the “Accession #” serves as the unique identifier for the exam as a whole, it may be more commonly used as a search term, especially for users who aren’t familiar with a patient.

Per Marketing, remove the alternating color blocks and dividers. Add dividers below the column titles, and at the bottom to indicate the bottom.

On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

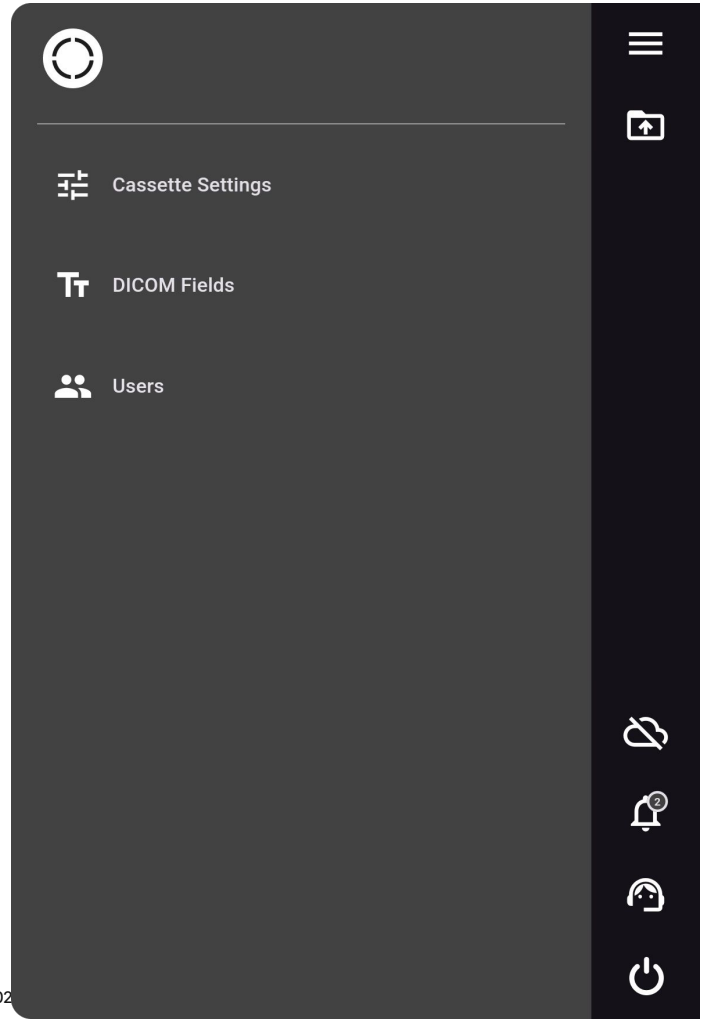
Reorganize elements to <u>better align with user expectations</u>.

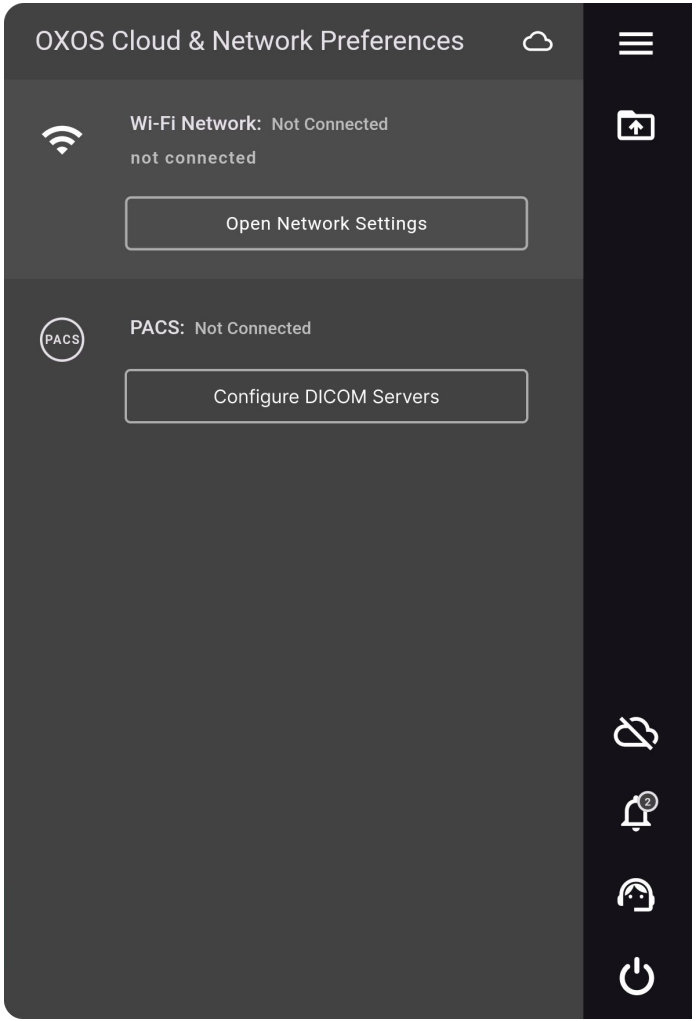
Summary of Changes - Exam Setup Screen

- Clerical Changes:
  - Clarify “Image Storage” by changing it to “Remaining Storage”
  - Change “Description” to “Description/Notes”
  - Clarify “Emergency Mode” by changing to “Start Emergency Exam” and “Start” by changing it to “Start Exam”
- Reorganization:
  - Adjust sizing and organization of data entry fields to better accommodate selections
- Asset Updates:
  - Change all teal in the app to Hex #595CFF (Blue) to match marketing guidelines
  - Make the “Remaining Storage” indication look less like a button
  - Make the right section (containing the previous studies widget, etc.) smaller to allow the MWL widget in left section to fit another column
  - Remove the alternating color blocks and dividers from the MWL widget in favor of dividers below the column titles and at the bottom of the list

Sidebar & Menus

In the **Sidebar** and its corresponding menus, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.





Device Settings

Acquisition Settings

Load Time Limit

0 — 300 — 250 sec

Dose Rate Limit

0 — 176 — 100 mGy

Irradiation Pulse Signals

Dose Area Product (DAP) Units

Gy·cm² | cGy·cm² | mGy·cm² | µGy·m²

Delete Stored:

Photos | Series | Singles

Footpedal ID

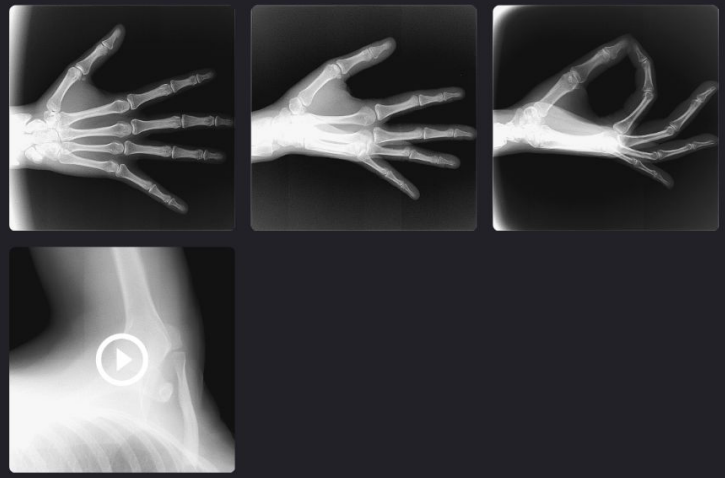
ID

0

Select an Image to Send

Patient #8157366a-2328-410e-a94b-21178d8ae6e0

Just now

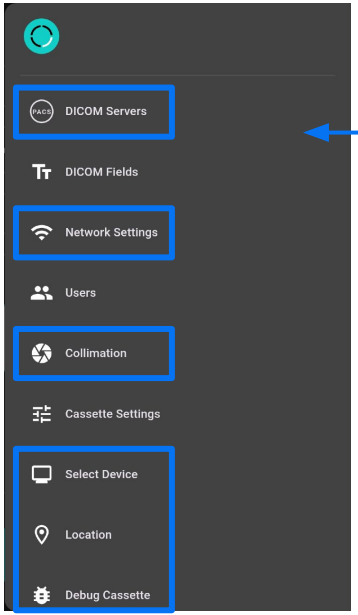


USB DRIVE

PACS

Sidebar Reorganization

Original

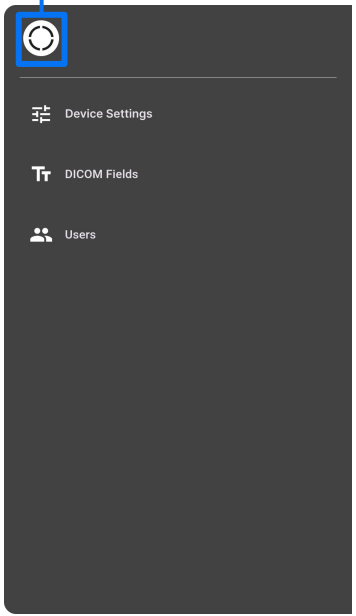


Remove the highlighted elements for the following reasons:

1. "DICOM Servers" and "Network Settings" can already be accessed from the ☰ menu
2. "Collimation" is very unlikely to be used outside of an exam
3. The purpose of "Select Device" is now done automatically
4. "Location," is not intended to be available at launch
5. "Debug Cassette" is not intended to be user-facing (it is only available when in Debug Mode)

Update to match current brand guidelines

Update

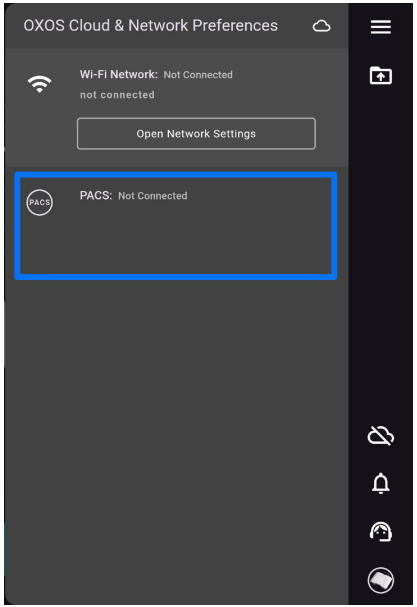


In the **Sidebar**, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.

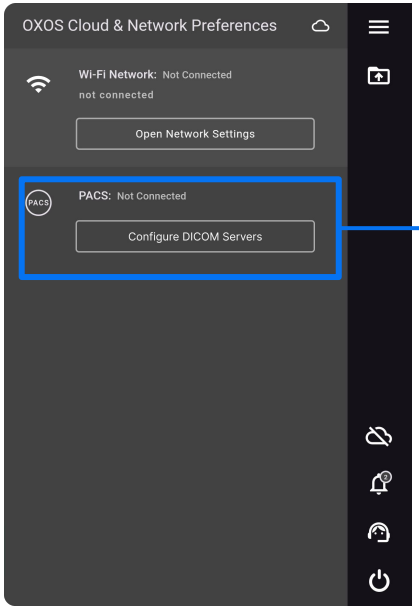
Remove redundant shortcuts to reduce clutter and potential confusion.

Sidebar Reorganization

Original



Update

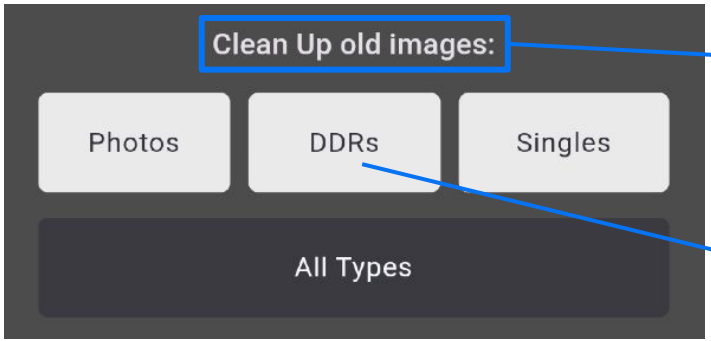


Add a “DICOM Servers” shortcut to the menu, similar to the “Network Settings” shortcut

In the **Sidebar**, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.

Remove redundant shortcuts to reduce clutter and potential confusion.

Image Deletion Function

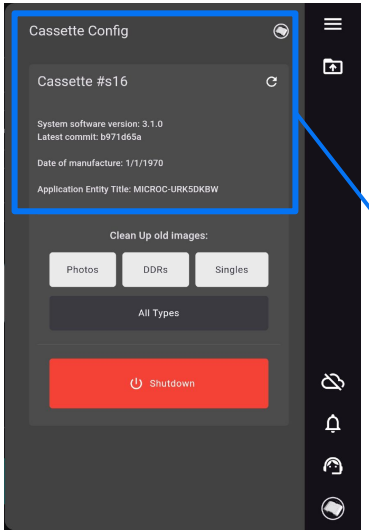


In the **Sidebar**, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.

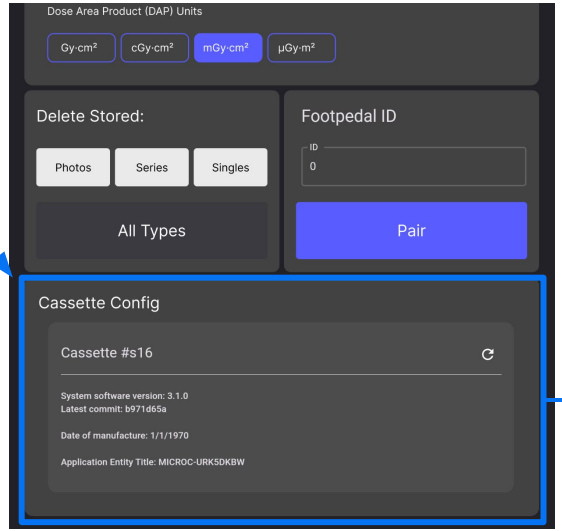
Reword the language used to describe elements to provide additional clarification.

Consolidation of Cassette Config

Original



Update



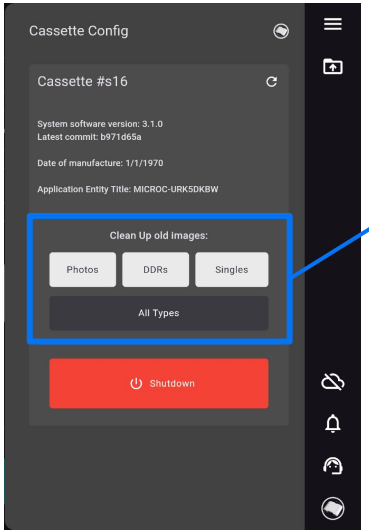
Integrate into Device Settings
(Previously Cassette Settings)

In the **Sidebar**, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.

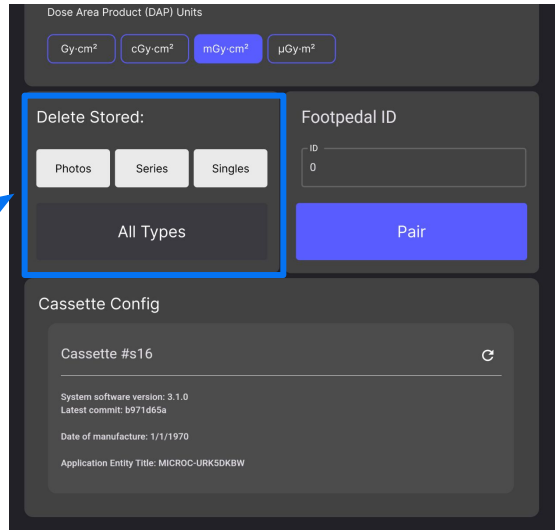
Combine like menus to reduce clutter and potential confusion.

Consolidation of Cassette Config

Original



Update

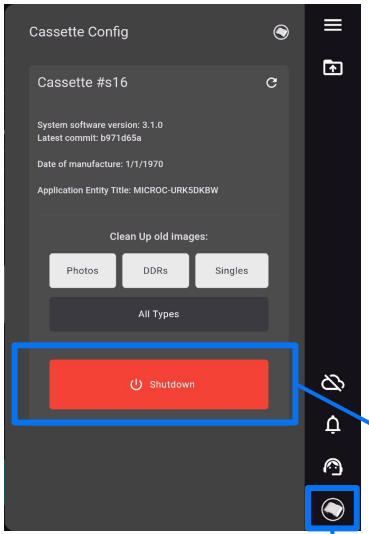


In the **Sidebar**, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.

Relocate elements to better match their function, reducing clutter and making them more intuitive to access.

Consolidation of Cassette Config

Original



Removing the Shutdown Button will fully empty the Cassette Config menu, allowing it to be removed completely

Update

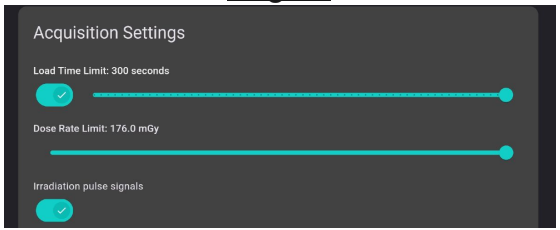
The Shutdown Button can then replace the Cassette Config menu, making it much more accessible for users that don't want to wait 3-10 secs to power off both devices independently

In the **Sidebar**, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.

Relocate elements to better match their function, reducing clutter and making them more intuitive to access.

Cassette Settings - Load Time Limit and Dose Rate Limit Interface

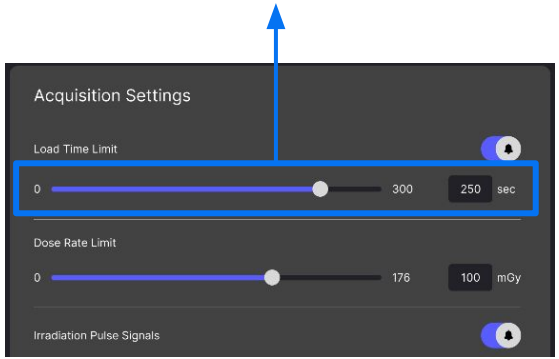
Original



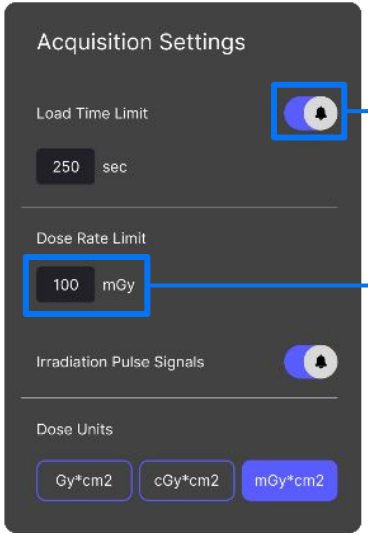
Update

Improve the slider interface by:

1. Pairing each slider with an input field allows the user to easily enter discrete values when needed
2. Adding an indication of the min and max values for each slider



Option 1:
Add input fields



Changing the icon from a check to a bell better communicates the fact that this toggle is a mute

Removing the slider in favor of the input field has additional space-saving benefits

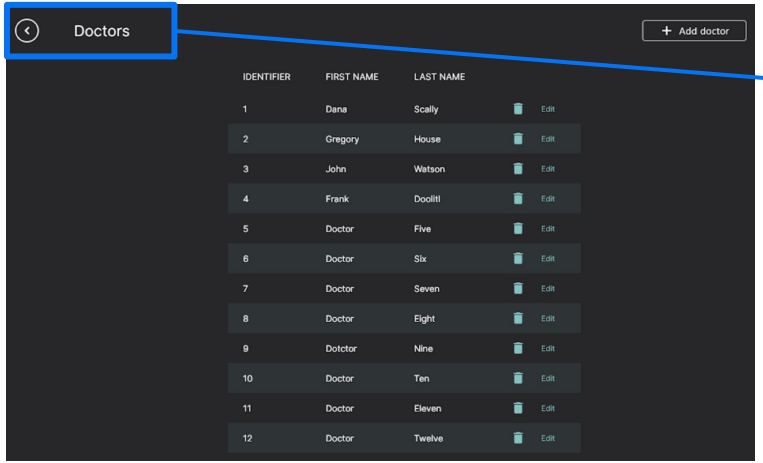
Option 2:
Add input fields & remove slider

In the **Sidebar**, the user is focused on configuring the device. The UI should help the user find what they need **quickly** and **easily**.

Improve user entry controls so that they are easier to interface with and allow the user to more efficiently enter their preferred values.

Presentation of Information

Original



Update

The current way that you are able to add/edit users is by going into the *Top Menu*, selecting Users, and adding/editing there. When adding a user, you are able to designate whether the user is Physician or a more generic Operator.

The current screen can only be accessed by attempting to start an exam with the "Provider" field empty, and then selecting the "Configure" text.

If it is intended that there is a separate list for Providers, then the title of this page should be changed to "Providers" to match the language used on the Exam Setup Screen.

If this is an outdated version of the "Users" screen, the title should be changed to "Users" since not all of our users are doctors.

On the **Exam Setup Screen**, the user is focused on data entry and verification. The UI should facilitate **efficient**, **error-free use**.

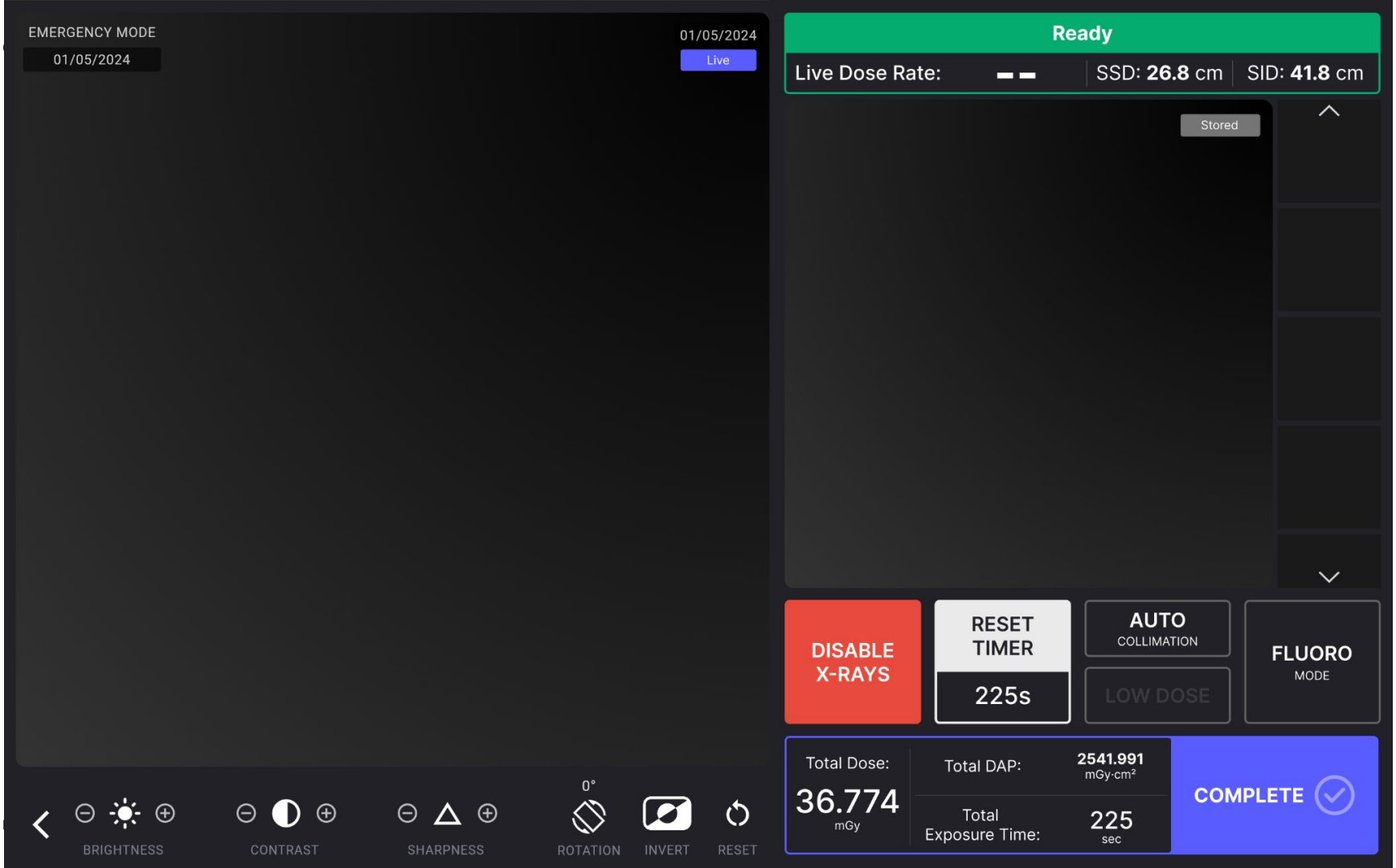
Reword the language used to describe these elements to better align with user expectations.

Summary of Changes - Sidebar and Internal Menus

- Clerical Changes:
  - Clarify “Clean Up old images” by changing it to “Delete Old Images”
  - Standardize the language used to refer to the Operator as “Users” (as opposed to “Doctors”)
  - Update old OXOS logo within the Top Menu
- Reorganization:
  - Remove DICOM Servers and Networks from the Top Menu
  - Remove Collimation Settings from the Top Menu
  - Consolidate the Cassette Config menu into the Cassette Settings menu
  - Move the Device Shutdown button to a more accessible location
  - Move Image Deletion Feature to the Library Page
- Asset Updates:
  - Add a button to access DICOM Servers in OXOS Cloud & Network Preferences
  - Change the Load Time Limit and Dose Rate Limit Sliders to a more user-friendly interface

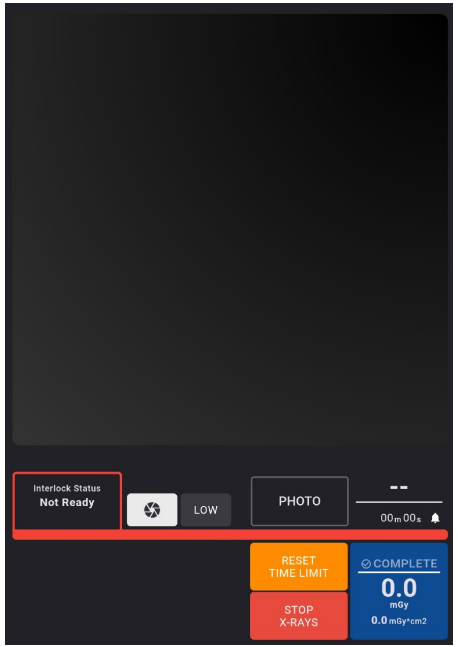
Acquisition Screen

On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should present every tool **without visual fatigue**.

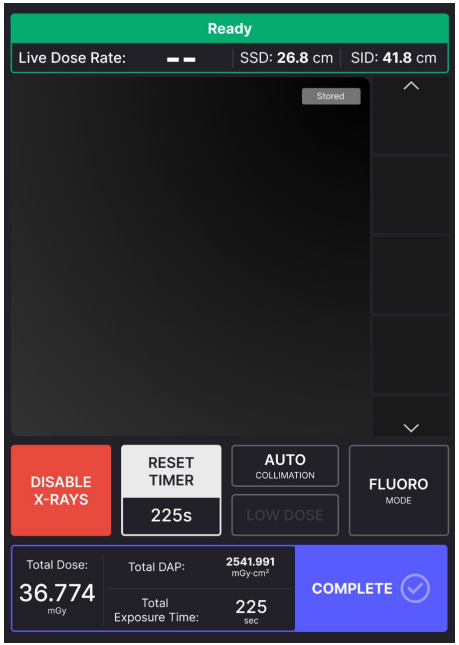

EMERGENCY MODE
01/05/2024
01/05/2024
Live
Ready
Live Dose Rate: -- --
SSD: 26.8 cm
SID: 41.8 cm
Stored
DISABLE X-RAYS
RESET TIMER
225s
AUTO COLLIMATION
LOW DOSE
FLUORO MODE
Total Dose:
36.774
mGy
Total DAP:
2541.991
mGy·cm²
Total Exposure Time:
225
sec
COMPLETE
0°
BRIGHTNESS
CONTRAST
SHARPNESS
ROTATION
INVERT
RESET

Primary Function Layout

Original



Update

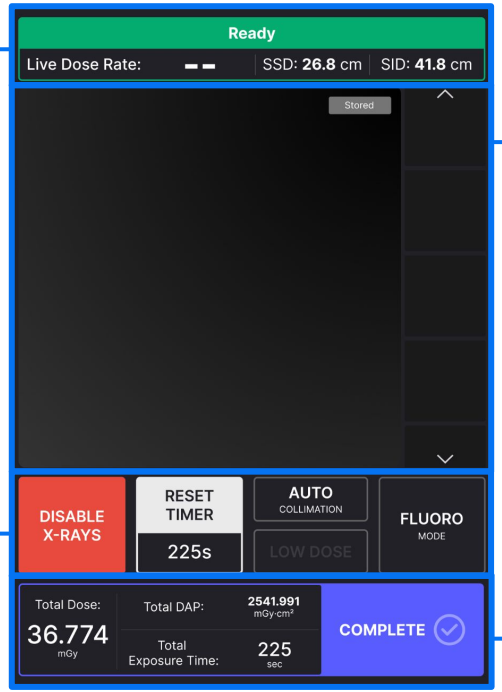


On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should provide every tool **without visual fatigue**.

Reorganize the layout of these elements to effectively utilize space, create size-based functional hierarchies, and group like functions.

Primary Function Layout

We now have room for a "During-Exam" widget that incorporates all of the indications that provide the user with live updates for the device's status, including live SSD and SID, which there wasn't room for before.



Making the Secondary Image Presenter slightly smaller and pairing it with a vertical camera roll opens up a large chunk of space that can be reclaimed by key functions.

This was done under the assumption that as user may not need to compare images side-by-side as often as was first expected, especially considering they'll use our device outside of surgery only.

All functions provided for use during the exam have been grouped together, with all mode toggles placed on the right hand side.

The additional space has allowed us to to better allocate space for each button to be both clearly defined and easily interacted with.

Previously, the Exam Complete button was largely crowded with multiple required numerical indications because they are related to the cumulative exam. It was also difficult to discern the meaning of these indications because there was no room to define them.

We are also able to dedicate a larger portion of the screen to this dedicated "End-of-Exam" widget that accomplishes the following:

1. Defines and integrates all cumulative indications in one location
2. Better distinguishes the interactable "Complete" button from all the related but non-interactable elements that are meant only to provide information to the user

On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should provide every tool **without visual fatigue**.

Reorganize the layout of these elements to effectively utilize space, create size-based functional hierarchies, and group like functions.

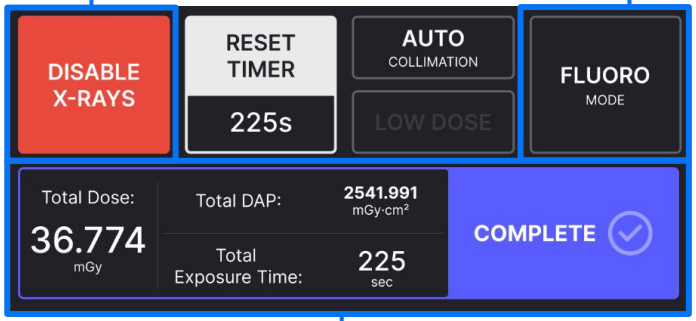
Presentation of Information

Rename “STOP X-RAYS” to “DISABLE X-RAYS” (and “ENABLE X-RAYS upon toggling) so that users don’t confuse its function with the “COMPLETE” button

Clarify the Device Mode Button by adding the text “MODE” below the currently active mode.

Original

Update



Clarify the radiation dose indications by more obviously separating them from the “Complete” button and adding descriptive titles to each indication

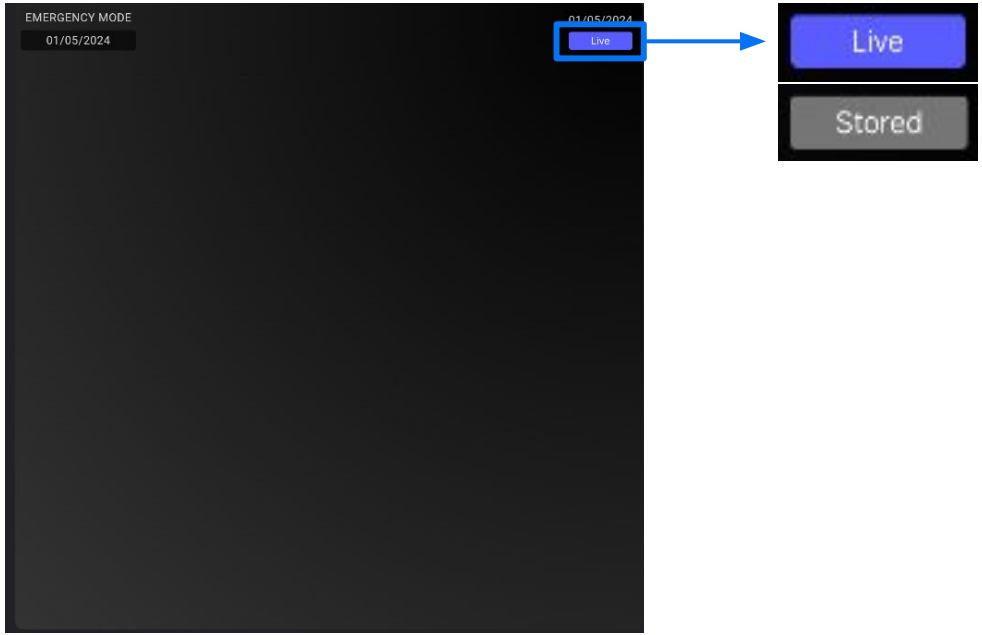
On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should present every tool **without visual fatigue**.

Provide additional clarification to these elements to better distinguish their function from the other elements.

Presentation of Information - Indication of Live vs. Stored

Original

Update

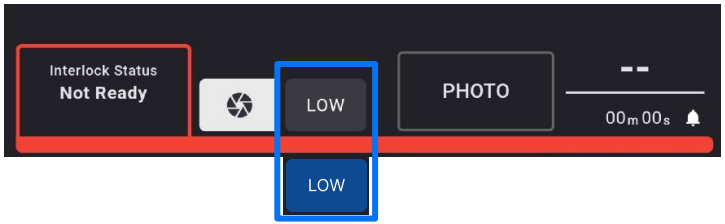


On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should present every tool **without visual fatigue**.

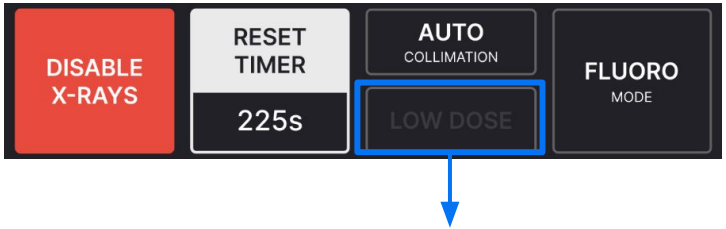
Provide additional clarification to these elements to effectively indicate their status in a way that does not blend into the background.

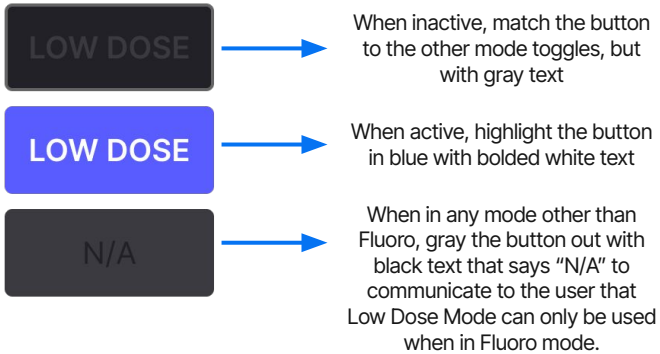
Presentation of Information - Low Dose Mode

Original



Update





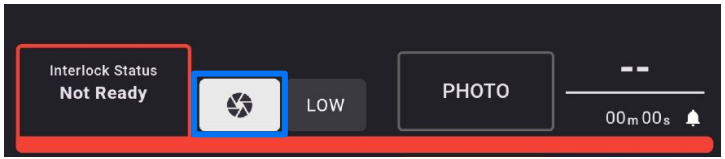
On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should present every tool **without visual fatigue**.

Provide additional clarification to these elements to effectively indicate their status and better distinguish their function.

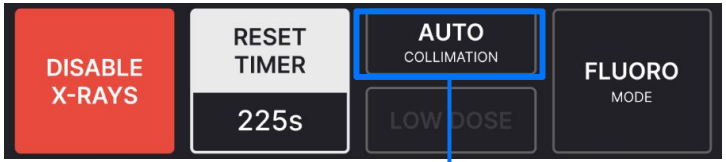
*Note: This change is dependent on the change proposed in the previous slide. One or the other may be chosen.

Presentation of Information - Collimation Mode Indication

Original



Update



When a collimation mode is chosen, indicate the current selection on the button

On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should present every tool **without visual fatigue**.

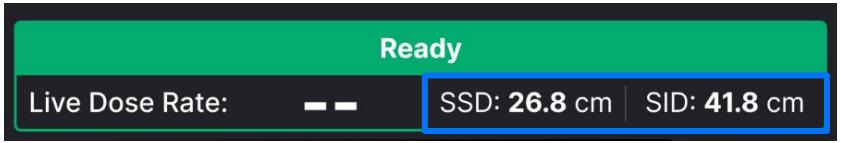
Provide additional clarification to these elements to effectively indicate their status and better distinguish their function.

*Note: This change is dependent on the change proposed in the previous slide. One or the other may be chosen.

Presentation of Information - SSD/SID Indication

Original

Update



Move live SSD and SID indications out of the Capture Presenter to address user confusion regarding live SSD and SID on Stored images

On the **Acquisition Screen**, the user is focused on capturing and viewing images. The UI should present every tool **without visual fatigue**.

Relocate these elements to better match their function and minimize presentation of conflicting information.

*Note: This change is dependent on the change proposed in the previous slide. One or the other may be chosen.

Summary of Changes - Acquisition Screen

- Clerical Changes:
  - Change button “Stop X-rays” and “Allow X-rays” to “Disable X-rays” and “Enable X-rays”
  - Clarify the radiation dose indications (DAP, Total Dose, Total Exposure Time, Live Dose Rate, SID, and SSD) by adding descriptive titles
  - Make the “Live” and “Stored” indicators on images more obvious
  - Clarify the Low Dose Mode toggle by relabeling it “LOW DOSE”
  - Remove the bell (“mute”) button
- Reorganization:
  - Make the Secondary Image Presenter smaller to accommodate a vertical image reel to its right
  - Move all the “live” indications (air kerma rate, interlock status) to its own widget at top of the screen
  - Reorganize the lower right functions to have two widgets: one with all the “end-of-exam” indicators and the “Complete” button in a row at the bottom of the screen, and one will all of the “during exam” functions in a row above that
  - Make better use of space by making all buttons and elements larger and more usable
  - Remove live SSD/SID from the Capture Presenter and place them with the other “live” indications at the top of the screen
- Asset Updates:
  - Make Low Dose Mode button unavailable for interaction when outside of Fluoro mode by labeling it “N/A”
  - Better differentiate when the Low Dose Mode is active vs. inactive
  - Indicate when Automatic, Manual, or Puck has been selected from the Collimation menu by changing the label to “AUTO Collimation”, “MANUAL Collimation”, and “PUCK Collimation” respectively when on the Acquisition Screen
  - Indicate when there are no images taken yet in the image reel by representing them with gray boxes

User Logins: Foreword

As an X-ray machine with Protected Health Information (PHI), our device needs to prevent unauthorized access.

After conducting research, we have identified problems that our users need solved, and split them into software versions 3.2.0 and 3.3.0. Version 3.2.0 aims to address the following problems:

1. Anyone can walk up to our device and access PHI
2. Anyone can walk up to our device and start taking X-rays
3. While the above is true, some facilities want the option to use their device without restriction

Concerning user login, there are cybersecurity requirements:

- Minimum password length / complexity
- Inactivity and other automated sign-offs
- Failed login attempt lockouts
- Password Aging

Currently, the first **2 of these 4** requirements are in scope for 3.2.0, as these are considered minimum viable product requirements!

User Login Workflow

Facilities need a user login workflow in order to control who can access PHI and take X-rays using the MC2.

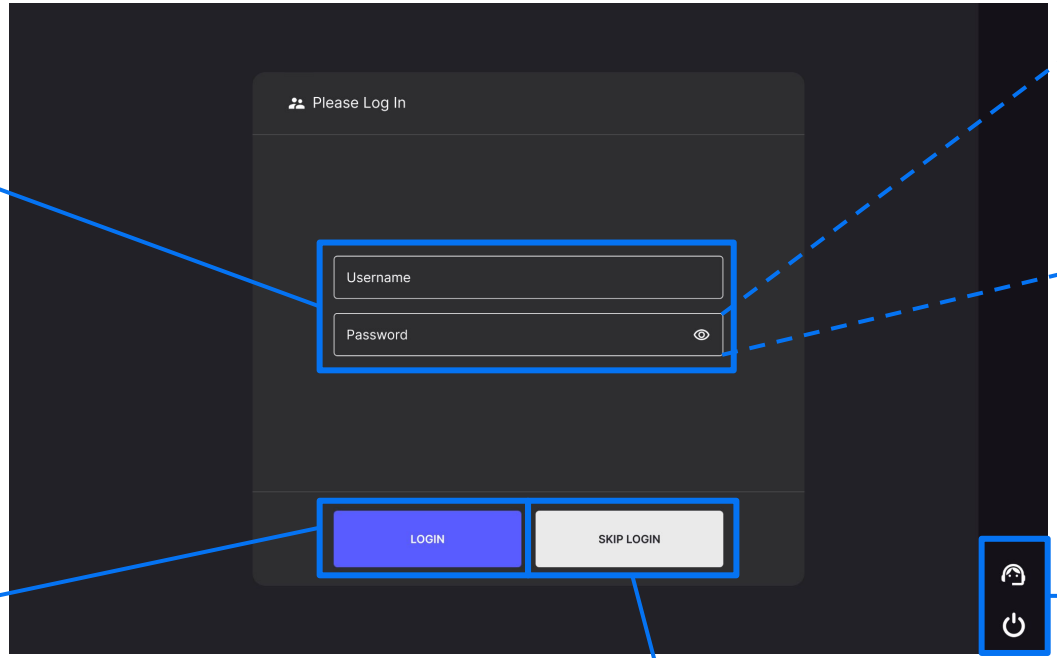
*Note - User logins should be app-side, not device-side. If one user logs into the app on one tablet, this should not allow another user to view that active session via a separate connected tablet without logging in.

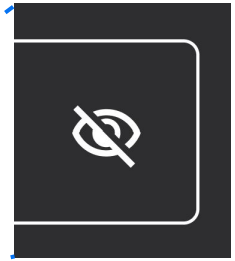
Login Option 1 - Dedicated Screen

Login credentials are entered here.

By default, passwords are Not Visible (indicated by the crossed out eye symbol) and are instead replaced with a generic character such as “.” or “*”.

Selecting the eye symbol will make the password Visible (indicated by the normal eye symbol).





Not Visible

Selecting this button with a correct login entered will bring the user to the exam setup screen.

If “Login” is selected without filling in both fields, the app will prompt the user to enter their credentials.

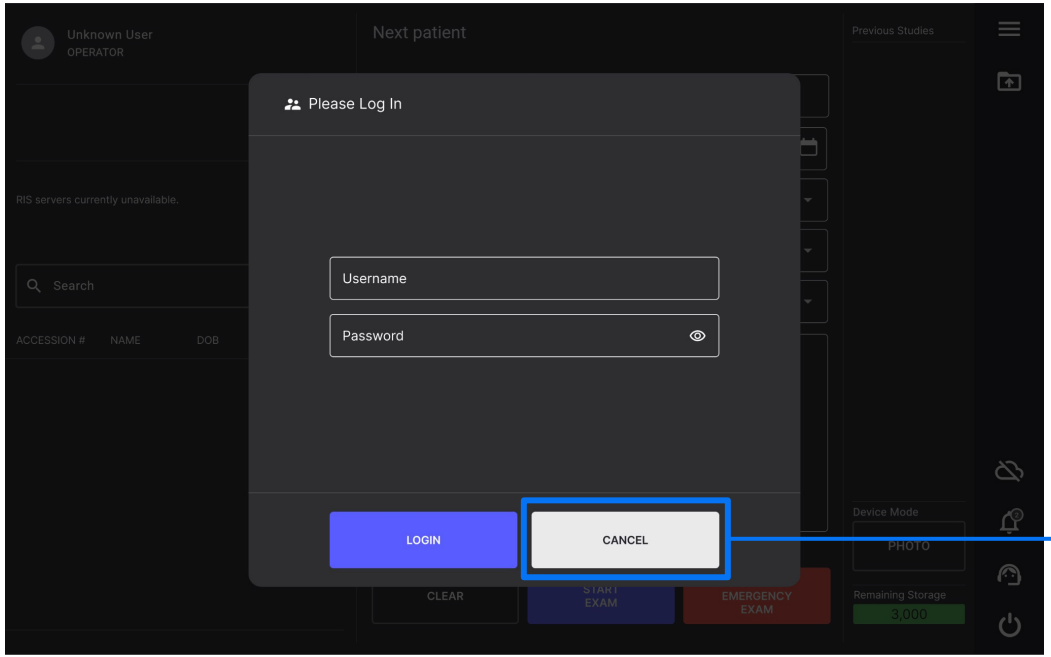
If “Login” is selected and either field is incorrect, the app will inform the user that the login is incorrect and prompt them to re-enter their credentials.

In this dedicated login screen, limited sidebar functionality is available. Users may only power down the device, or access the support drawer.

This button is to be used in emergencies. Selecting it will take the user to the exam setup screen, albeit a limited one in which no PHI is visible.

The availability of this button is toggleable by an admin user. When toggled off, the “Login” button is centered here.

Login Option 2 - Dialogue Overlay



Rather than having a dedicated login screen, this option presents it as a pop-up window accessed from the exam setup screen.

When the user opens the app, the first thing they see is the PHI-restricted version of the exam setup screen. They must log in to enable PHI.

This cancel button returns the user to the exam setup screen without logging in. Otherwise, the login fields and buttons here behave the same as the other option.

Exam Setup Screen w/out Login

In option 2, selecting “Login” will open the login dialogue. In both options, once a user is logged in, this changes to a “Logout” button. In option 2, selecting “Logout” will hide all PHI. In option 1, selecting “Logout” will return the user to the dedicated login screen.

This button has the potential to be integrated into the sidebar (depending on ID choices).

A user that has not logged in may not view stored PHI. To accommodate emergency exams, they may create and view new PHI.

MWL contains PHI and is therefore hidden when a user has not logged in. Providers and worklist orders are hidden, search functionality is disabled, and connected DICOM servers cannot be accessed.

After completing an emergency exam (assuming that the emergency has ended), a user must log in before assigning a provider and exporting.

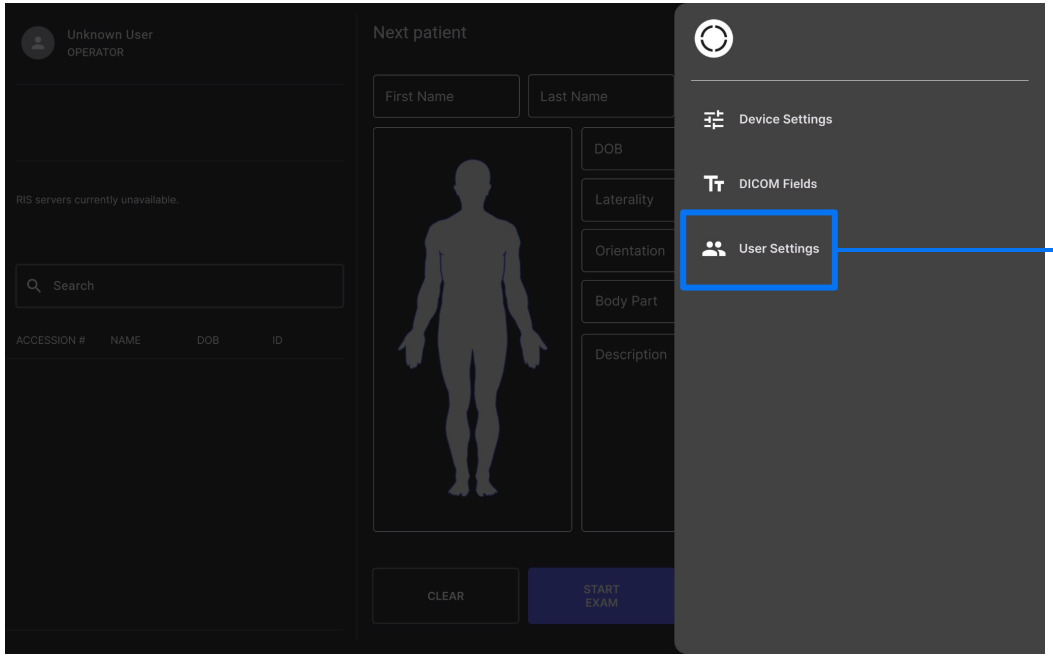
Previous studies are also hidden when a user has not logged in.

There are two options for the library screen.

Option 1:
The library screen is not available to a user that has not logged in and the shortcut is removed from the sidebar. Images taken during an emergency exam must be reviewed on the acquisition page. If the emergency exam is completed, the user is returned to the exam setup screen. The user must log in before the exam can be exported in the library screen.

Option 2:
The library screen is available to a user that has not logged in, but all stored PHI is hidden and exports are not allowed. If images are taken in an emergency exam and it is completed, that new PHI is displayed in the library screen. The user must log in before the exam can be exported.

Top Menu Screen

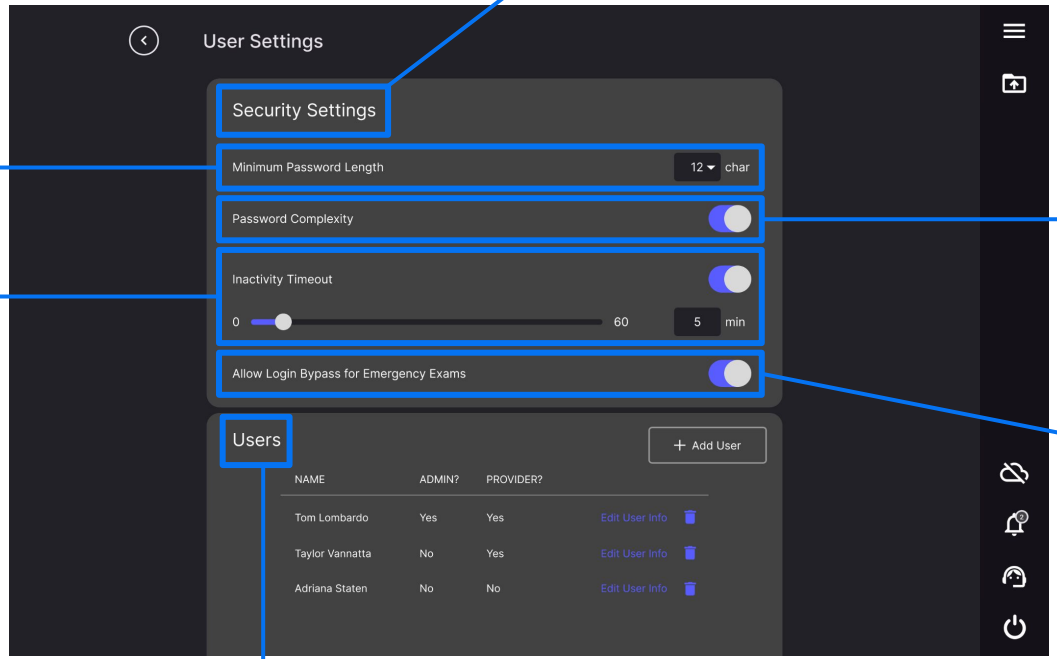


"Users" is now called "User Settings" due to the addition of security settings.

This shortcut is visible to a user that is logged in and is an "admin" (i.e. "Can Edit User Settings" toggle is active). Otherwise, this shortcut is unavailable.

User Settings Screen

This is a new “card” containing security settings. This currently implements 2 out of 4 security setting recommendations: Minimum Password Length/Complexity and Inactivity Timeouts. Implicit requirements include: usernames must be unique per user account, and credentials are case-sensitive. The particular UI elements used to select each of these are subject to change (depending on ID choices).



Sets the minimum required length when creating passwords for all users. Dropdown options are ~~1,~~ 8, 12, and 16.

Toggle to enable an “inactivity timeout” and set the duration that must pass without activity before a user is logged out and must log back in. “Activity” is considered:

- Any action taken on the app
- Actions taken on the device that would also prevent the device from going idle

Logging back in after an inactivity timeout returns the user to where they last left off. The inactivity timeout is in effect on ALL screens.

A user is also automatically logged out if the device is shut down, if the app is exited and swiped away, or if the tablet is slept.

The users list is now in a “card” as well. With this, this screen now matches the style of the Device Settings Screen.

Toggle to require “complexity” when creating passwords for all users. “Complexity” refers to the standard rules:

- At least 1 lowercase letter
- At least 1 uppercase letter
- At least 1 number
- At least 1 symbol (e.g. ! @ # $, etc.)

Instead of an overall “complexity” toggle, each of the requirements above could be its own toggle.

Some facilities want to be able be able to bypass logins in emergencies. Other facilities want to prioritize locking out untrained users from taking X-rays. Toggle to allow logins to be bypassed when necessary.

In option 1 (dedicated login screen), “Skip Login” would be hidden when this toggle is off.

In option 2 (login dialogue), when this toggle is off, a user that is not logged in cannot start an exam (“Start Exam” and “Start Emergency Exam” buttons are disabled/hidden). When this toggle is on, a user that is not logged in can start an exam.

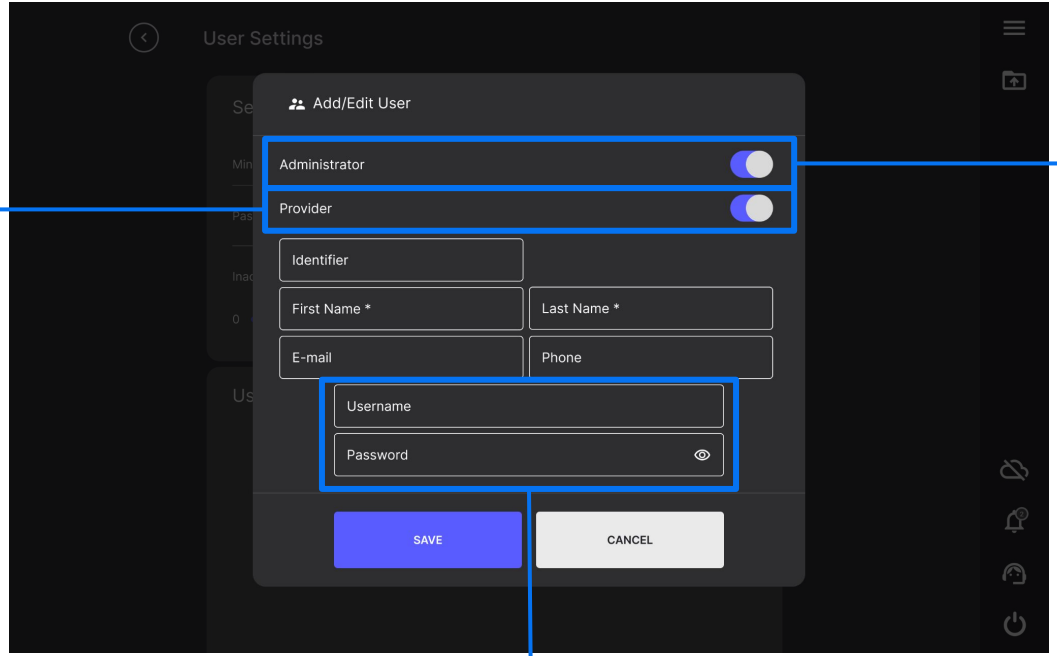
Add/Edit User Screen

*Note - There should always be at least one “admin” user. An “admin” should not be able to delete the account they are logged into. This prevents a scenario where there are no longer any users who can access the User Settings screen.

Toggle to make this user a Provider.

When a user is trying to assign a Provider to a patient exam without MWL on the exam setup screen, tapping the “Configure” button should provide the user with a dropdown containing the First Name + Last Name of all users that are labeled as Providers. This same dropdown should be provided when trying to assign a Provider without MWL on the Send Screen.

This mimics the original implementation of “Doctors” options to indicate the provider who is billing for the imaging procedure.



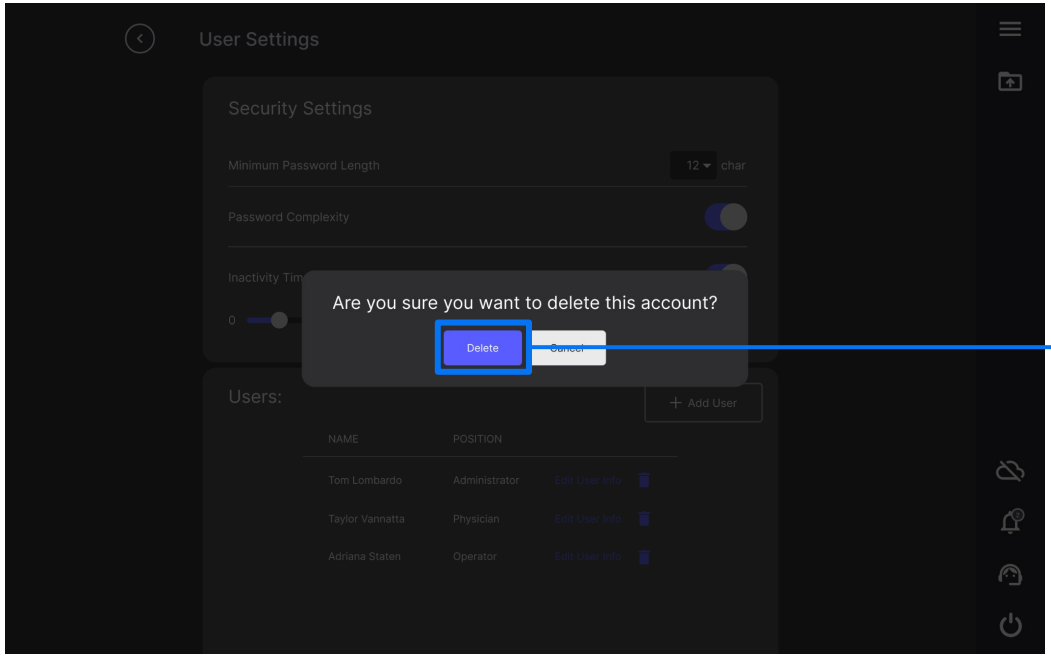
Toggle to give this user “admin” privileges, meaning they can make changes on the Users Settings screen. If this is off, the “User Settings” shortcut on the sidebar is hidden from this user.

A user can be an “admin” and a Provider at the same time.

An “admin” may change a user’s Username or Password here. The minimum length and complexity requirements set in the Security Settings are in effect here. When changing or making a credential, if a new username matches one already assigned to an account and “Save” is selected, the app should prompt the user to create a different one. If the a credential is empty and “Save” is selected, the app should also prompt the user.

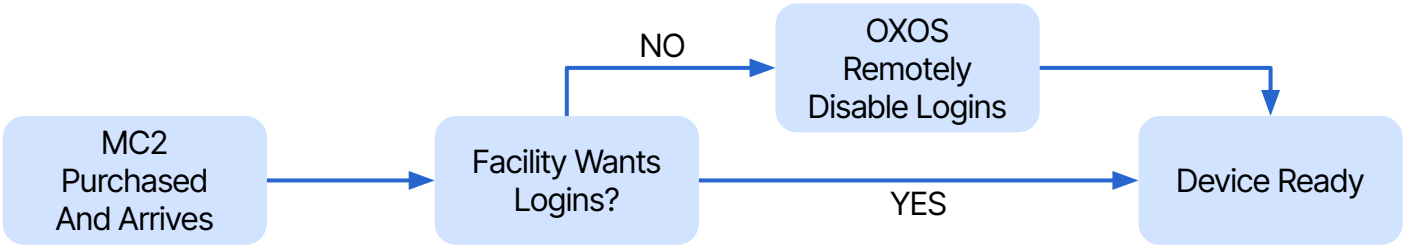
The visibility eyes work the same here as they do on the login screen. By default, they should be “Not Visible.”

Delete User Account Screen



The Delete User Account Screen was updated to reflect the blue from the current marketing guidelines.

Options for App Accessibility



Some customers may **not want or need user logins** as they do not have the same security concerns as traditional healthcare facilities.

Accommodate a facility's preference for device workflow by providing the option to enable or disable user logins.