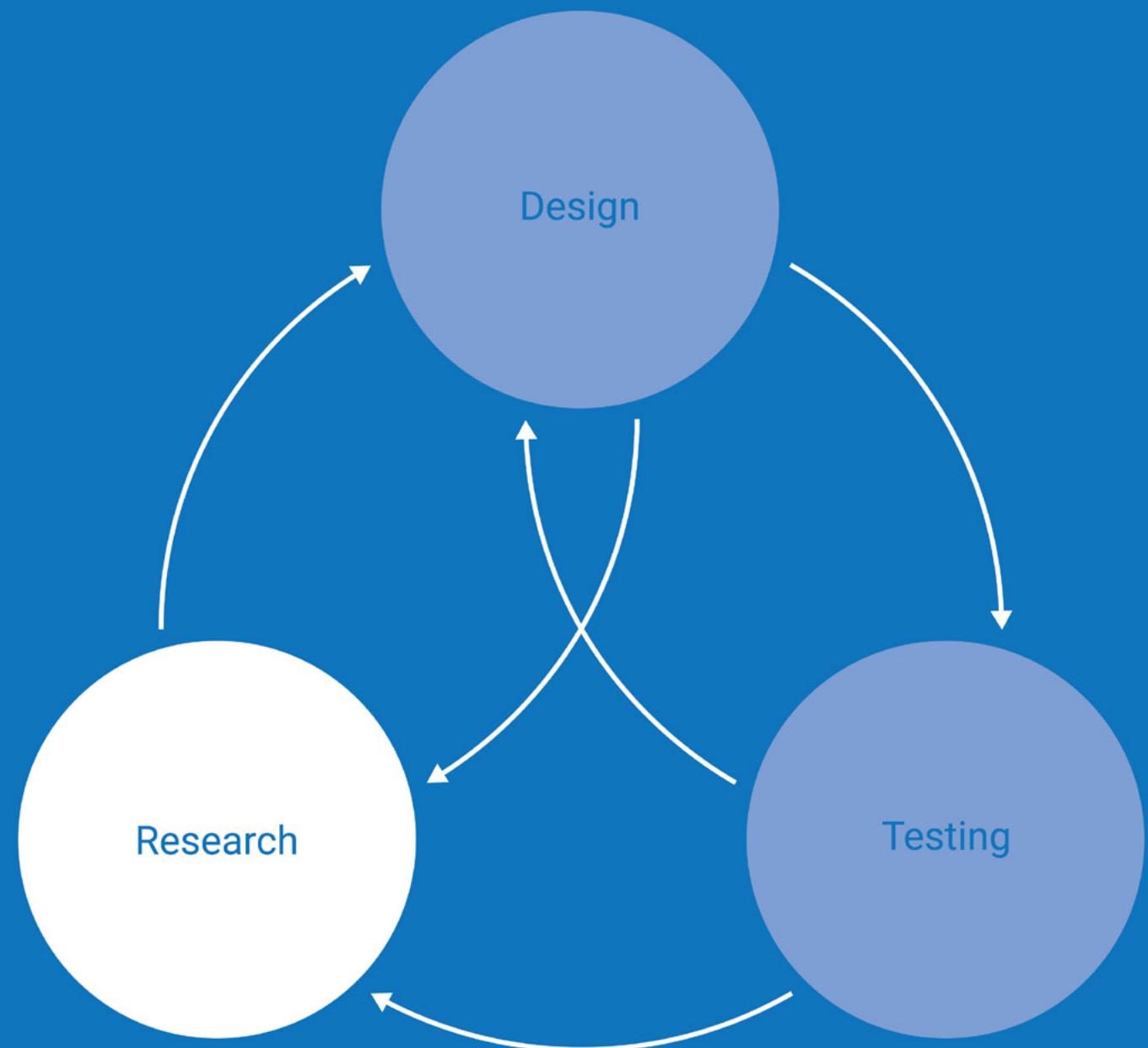
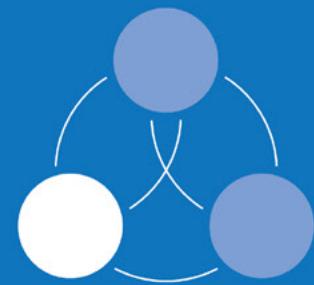
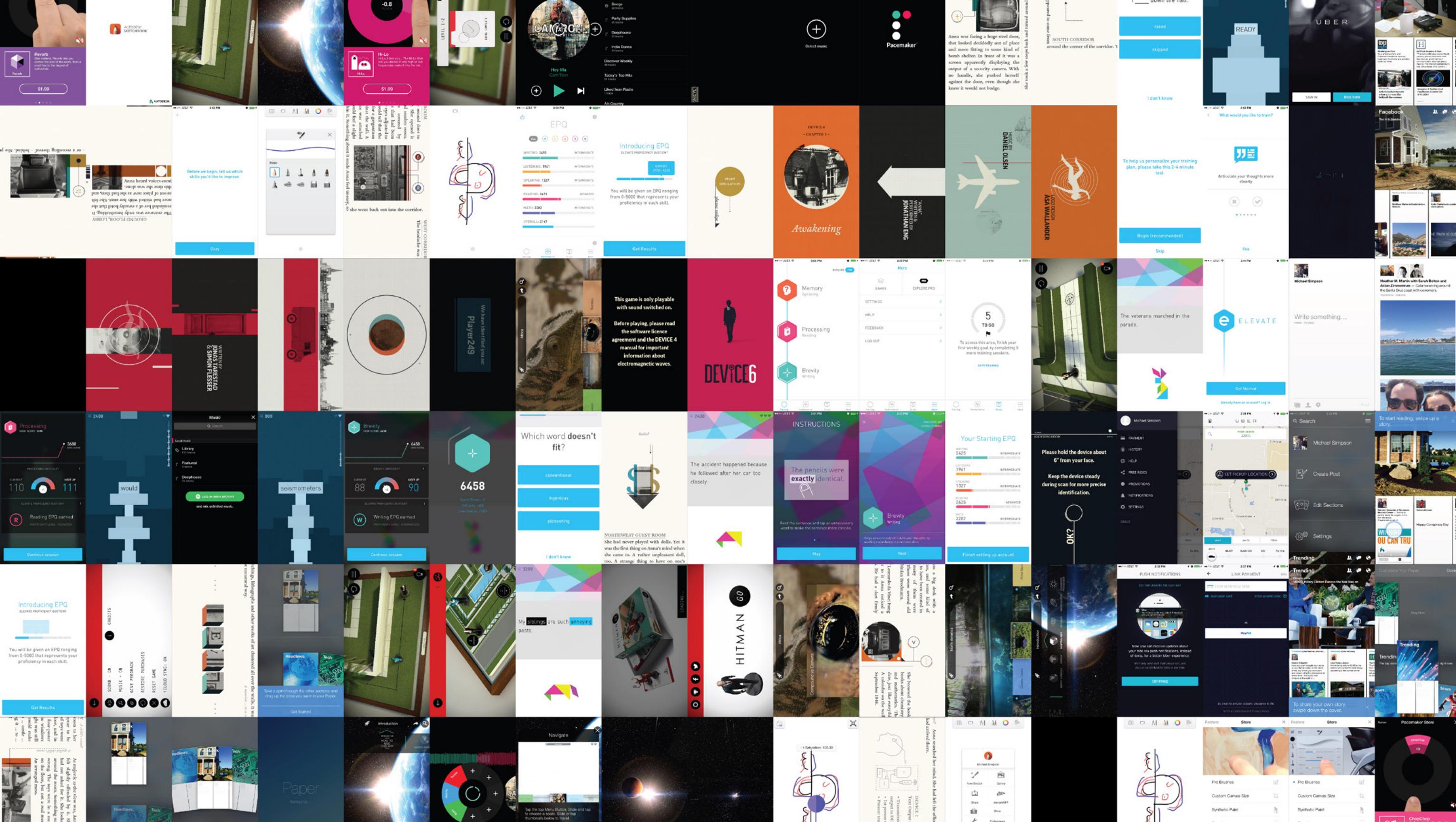


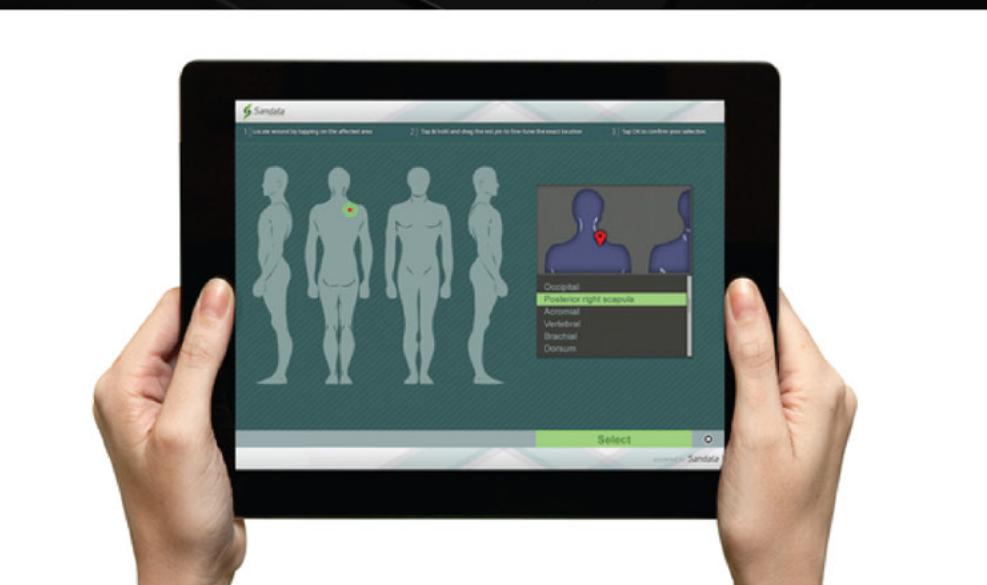
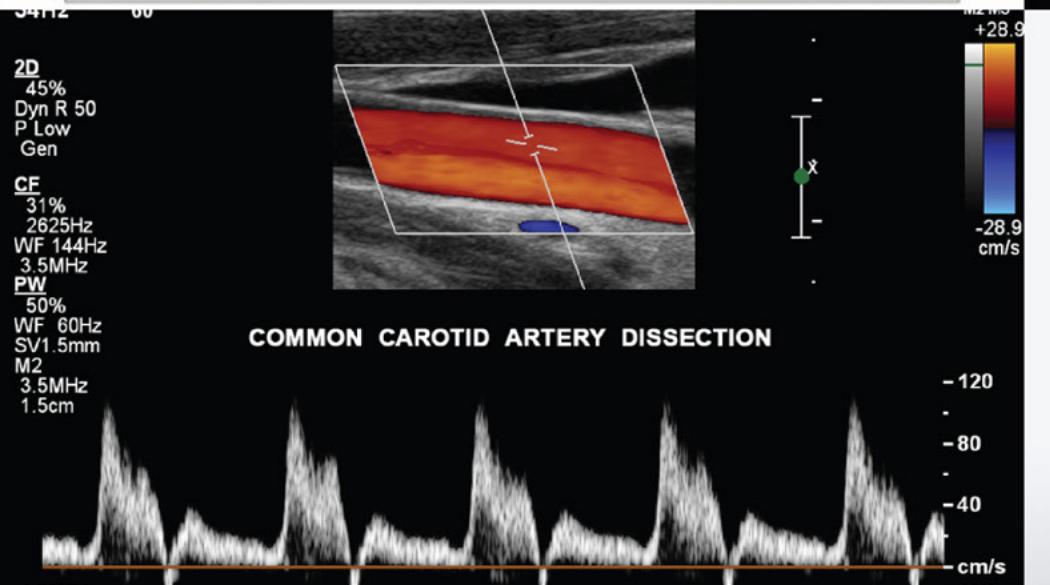
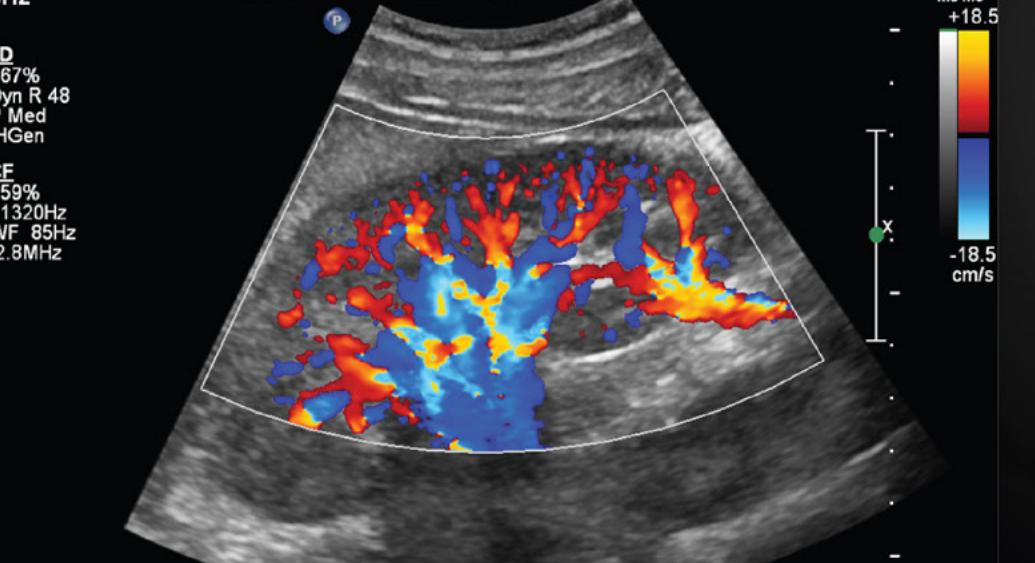
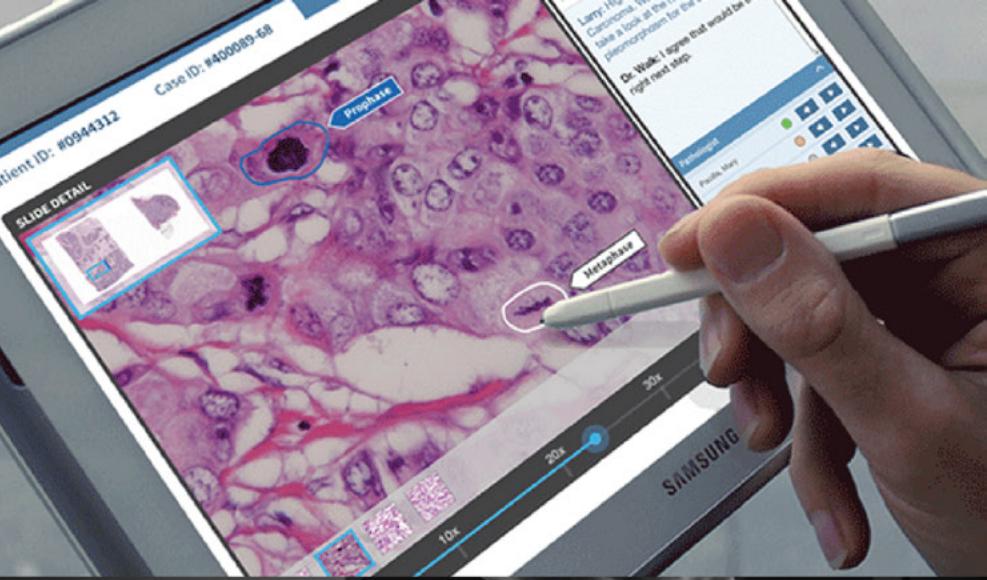
During my time at Sonosite, the team that I was a part of was tasked with designing a user interface (UI) for an ultrasound machine known as “Phoenix” (PHX). We employed an interconnected, three-part design process. We researched the UI problem, ideated possible solutions, and then tested the solutions using a clickable prototype.





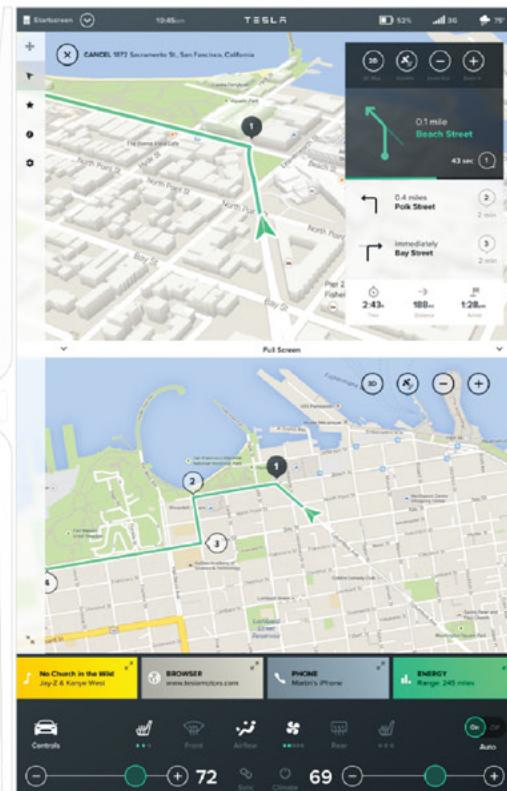
During the research phase, we conducted user interviews with onsite clinical professionals, studied award winning apps from the consumer realm as well as the health care realm, read UI guidelines such as Google's *Material Design* and Apple's *Human Interface Guidelines*, analyzed existing ultrasound machinery, and familiarized ourselves with research conducted by other departments within Sonosite. We strived to distill this information down to a UI that was effective, delightful, and authentically Sonosite.





## Navigation

The XXL Navigation widget supports a split screen mode to show two maps at once.



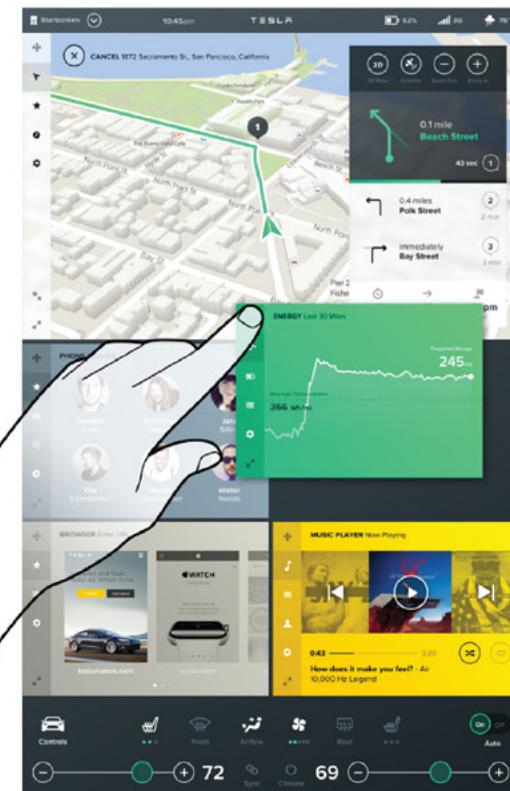
## Car Controls

The main car settings for lights, doors, sunroof, etc. can be reached through the "Controls" button.



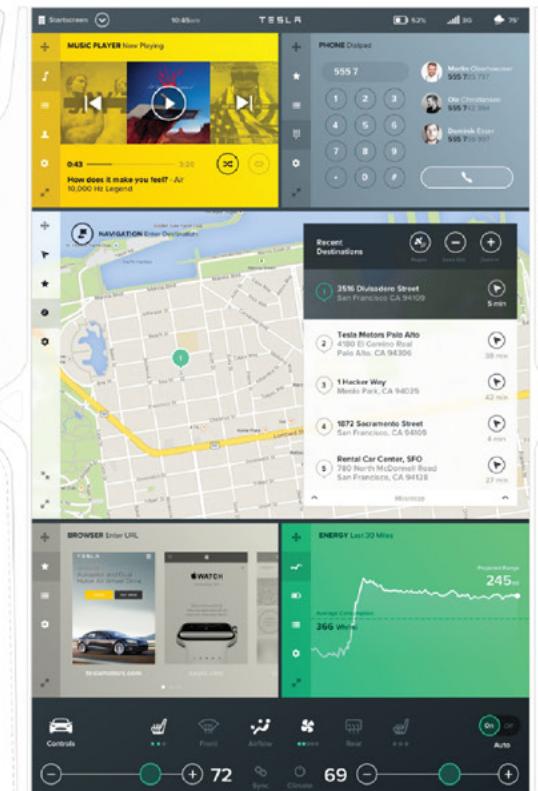
## Drag'n'Drop

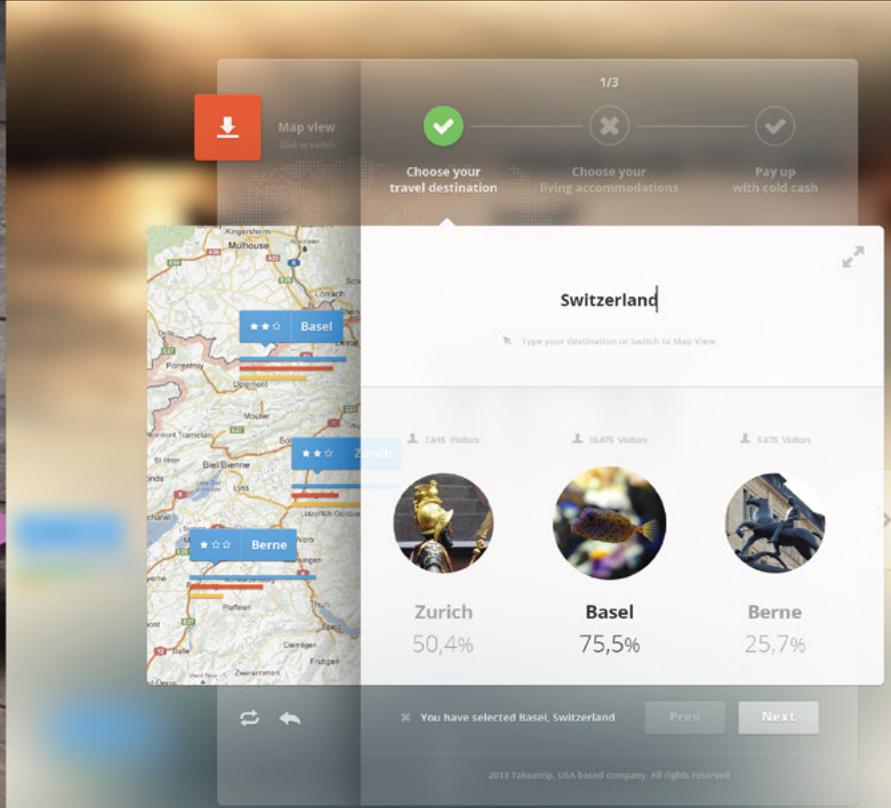
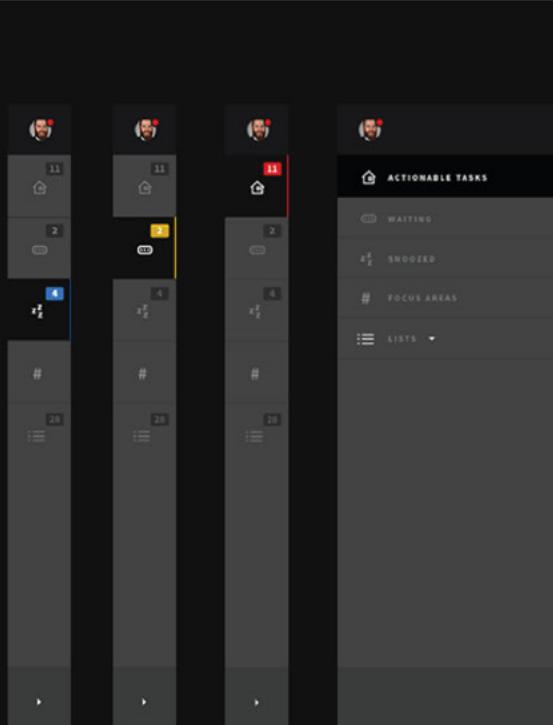
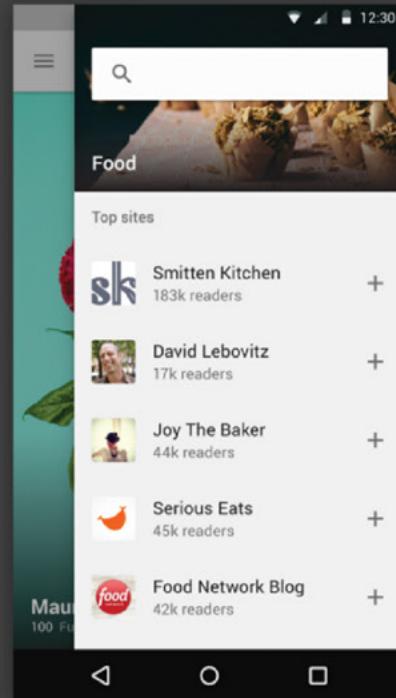
The widgets can easily be rearrange on the screen by dragging and dropping them.



## Screen Layouts

The flexible grid allows for countless screen layouts and automatically anchors the widgets in place.

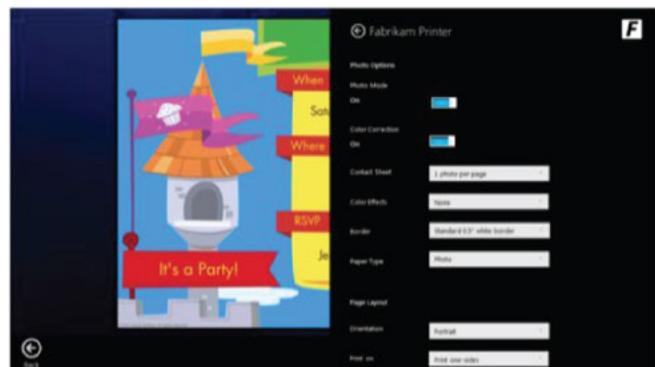




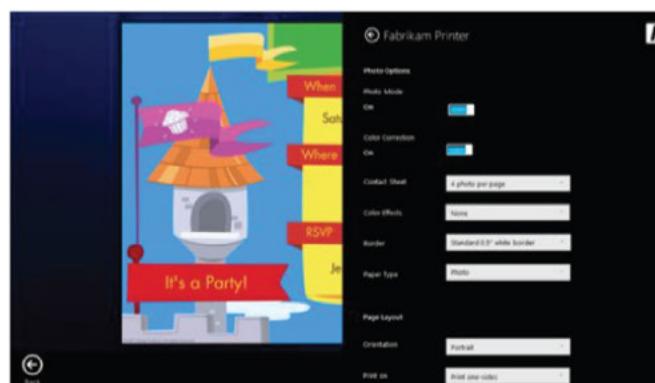


## Contracts and charms

Guidelines for print UI design



In this customized and branded Windows Store device app for print preferences, Amelia can modify the number of photos per page.



Next, Amelia presses the **Back** button. This automatically saves the new settings or printing preferences, and returns her to the original print flyout.

## Contracts and charms

Guidelines for print UI design

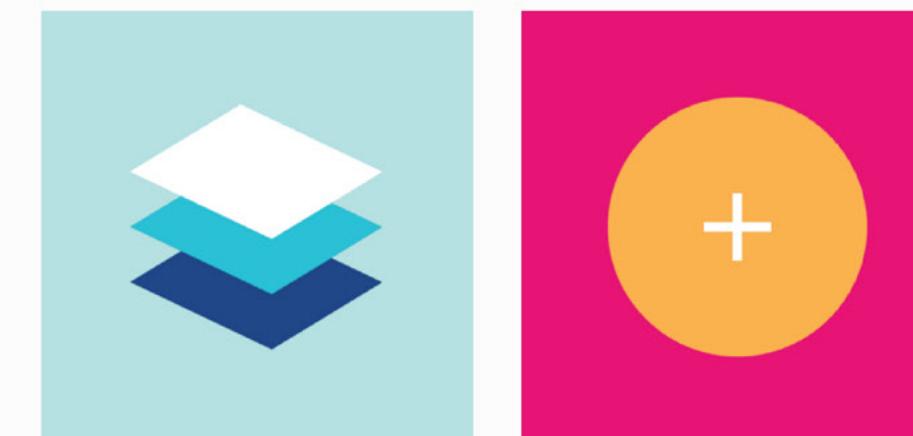


G Introduction - Material design

https://www.google.com/design/spec/material-design/introduction.html#introduction-principles

Material design – Introduction

## Principles

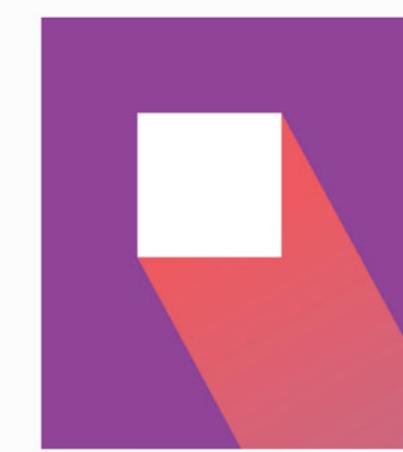


### Material is the metaphor

A material metaphor is the unifying theory of a rationalized space and a system of motion. The material is grounded in tactile reality, inspired by the study of paper and ink, yet technologically advanced and open to imagination and magic.

Surfaces and edges of the material provide visual cues that are grounded in reality. The use of familiar tactile attributes helps users quickly understand affordances. Yet the flexibility of the material creates new affordances that supersede those in the physical world, without breaking the rules of physics.

The fundamentals of light, surface, and movement are key to conveying how objects move, interact, and exist in space and in relation to each other. Realistic lighting shows seams, divides space, and indicates moving parts.



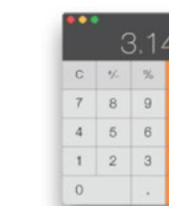
### Bold, graphic, intentional

The foundational elements of print-based design – typography, grids, space, scale, color, and use of imagery – guide visual treatments. These elements do far more than please the eye. They create hierarchy, meaning, and focus. Deliberate color choices, edge-to-edge imagery, large-scale typography, and intentional white space create a bold and graphic interface that immerse the user in the experience.

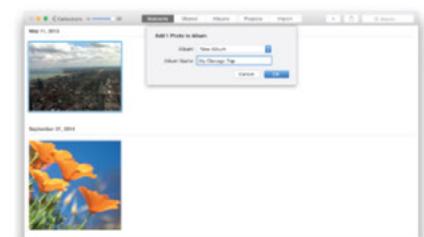
An emphasis on user actions makes core functionality immediately apparent and provides waypoints for the user.

## App Styles and Anatomy

Broadly speaking, there are three main styles of OS X apps:



**Single-window utility.** A single-window utility app, such as Calculator or Dictionary, helps users perform the primary task within one window. Although a single-window utility app might also open an additional window—such as a preferences window—the user remains focused on the main window.



**Single-window "shoebox."** A single-window shoebox app tends to give users an app-specific way to view and manage their content. For example, Photos users don't find or organize their photos in the Finder; instead, they manage their photo collections entirely within the app.



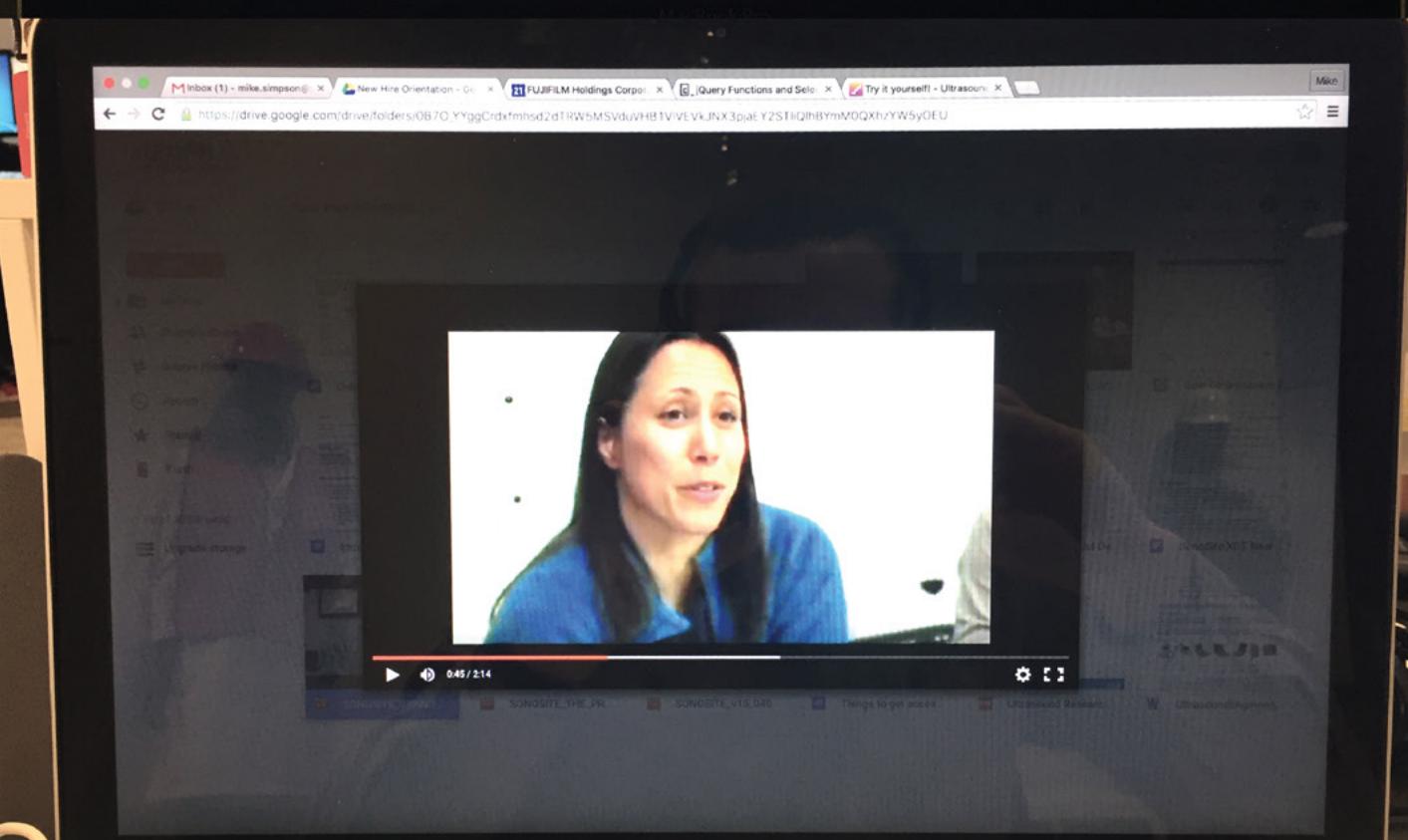
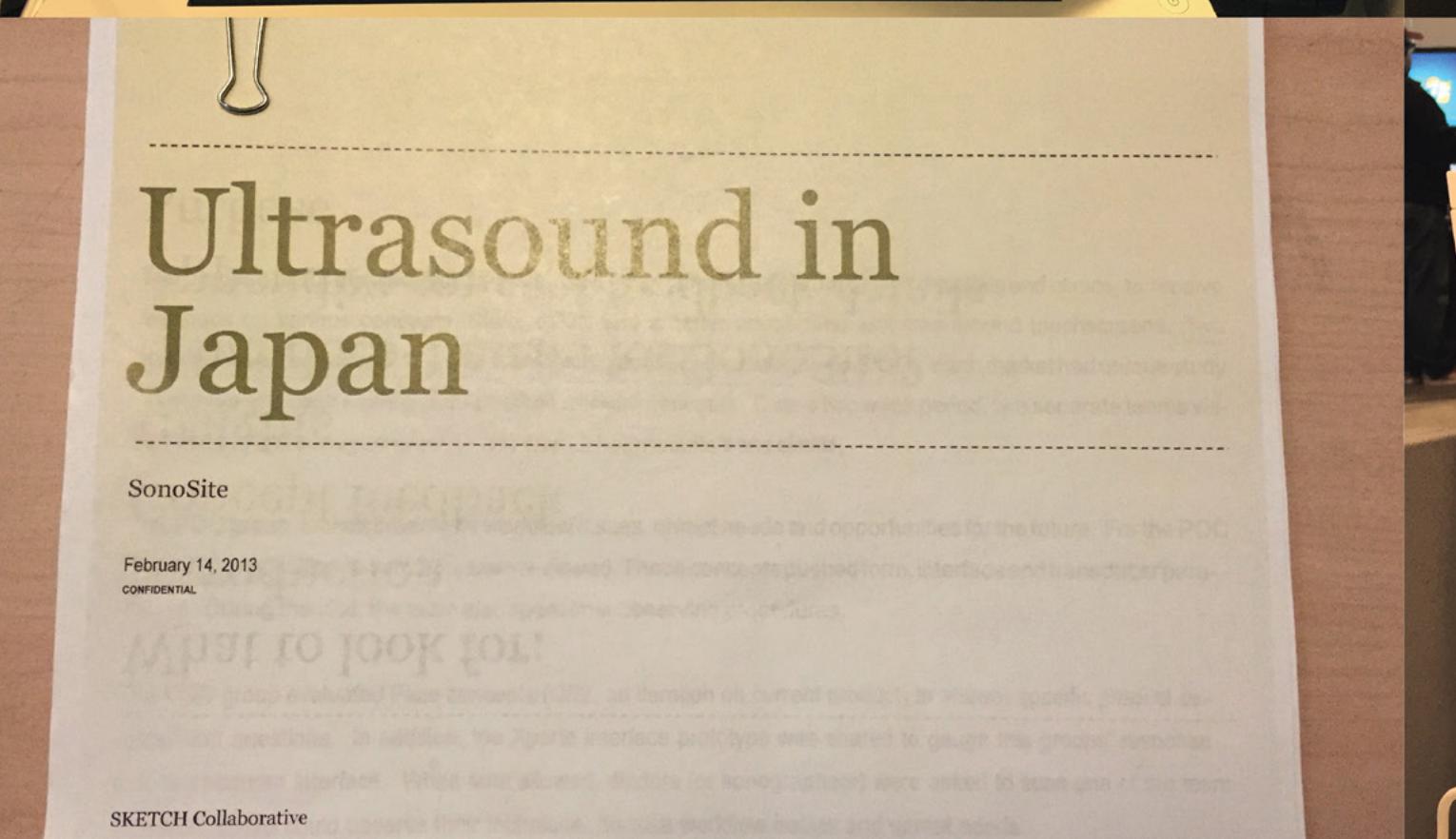
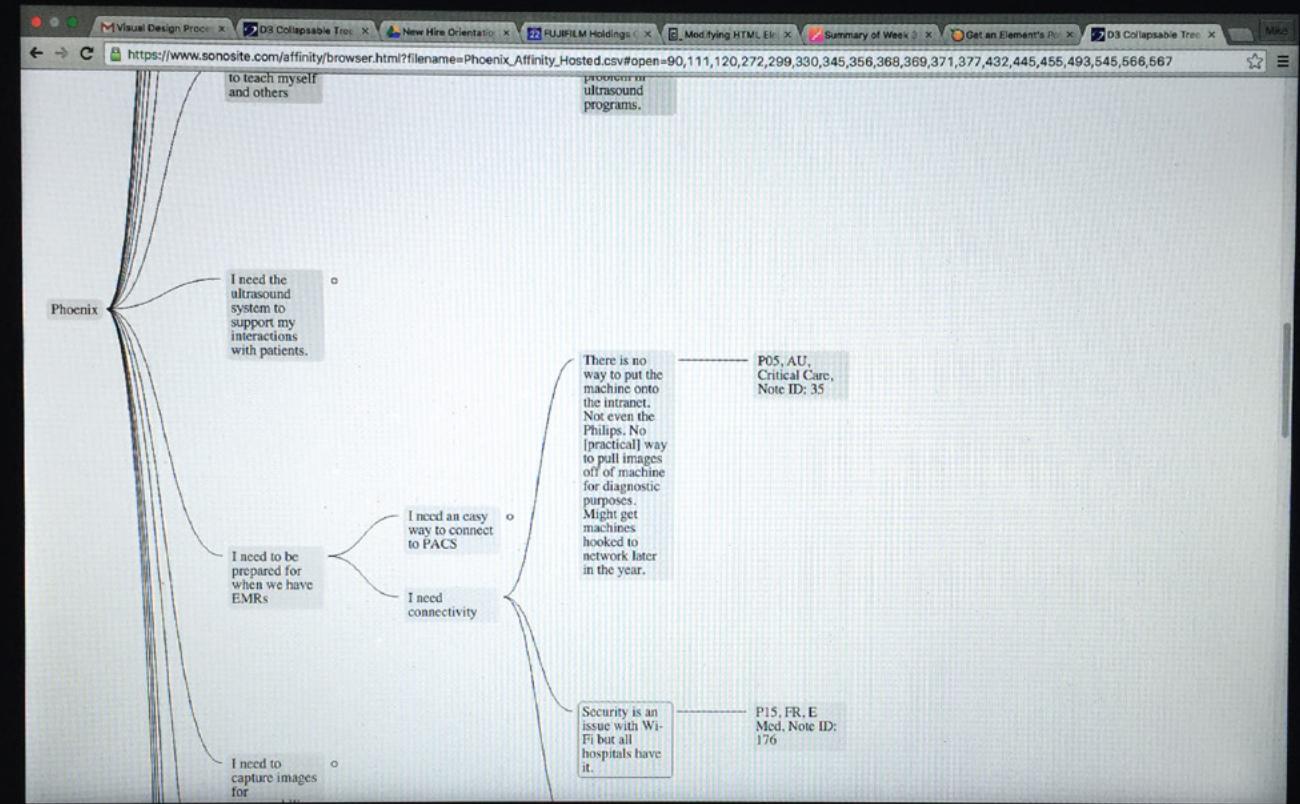
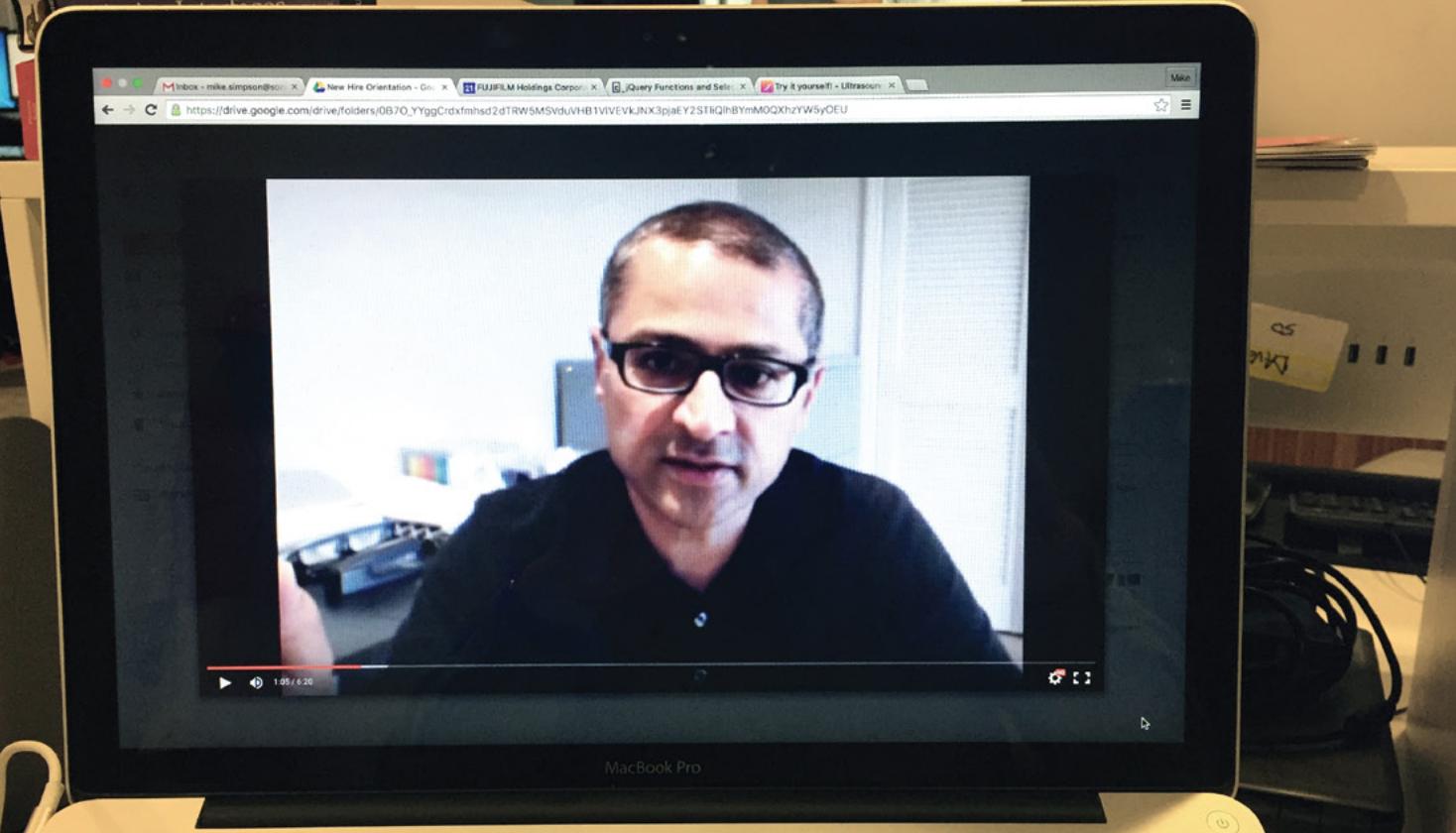
**Multiwindow document-based.** A multiwindow document-based app, such as Pages, opens a new window for each document the user creates or views. This style of app does not need a main window (although it might open a preferences or other auxiliary window).

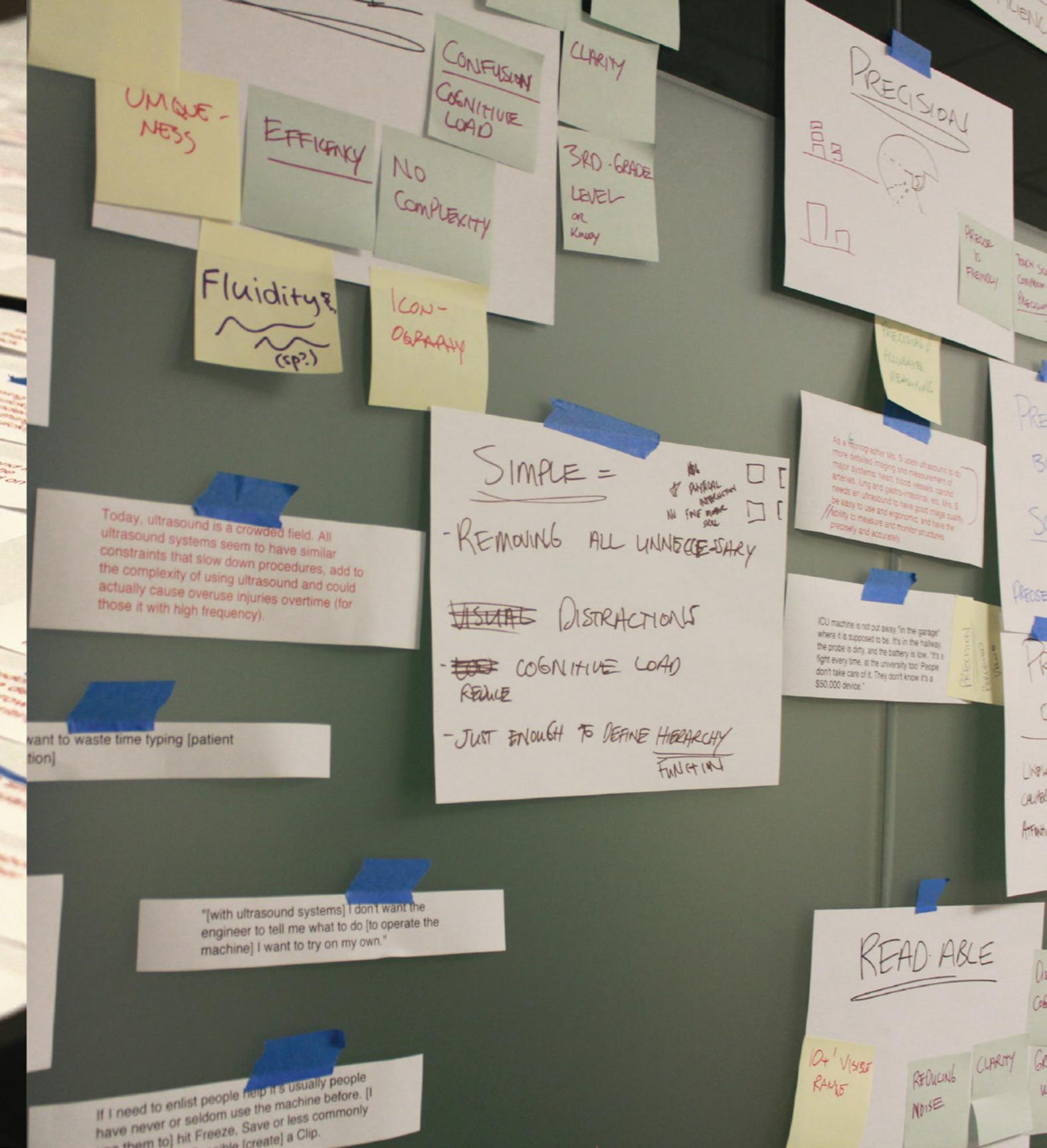
Regardless of style, an OS X app presents content in one or more windows and app-specific commands in the systemwide menu bar.

The AppKit framework defines the windows, menus, controls, and other objects that you use to present your app's UI, and it supports many app-level features, such as gesture recognition, font management, image handling, accessibility, and speech synthesis and recognition. AppKit also defines the light and dark vibrant appearances in Yosemite, in addition to a visual effect view you can use to create custom vibrant views (to learn more about this view, see [NSVisualEffectView](#)).

Setting aside programmatic inheritance, you can think of the UI objects that AppKit provides as belonging in the following broad conceptual categories:

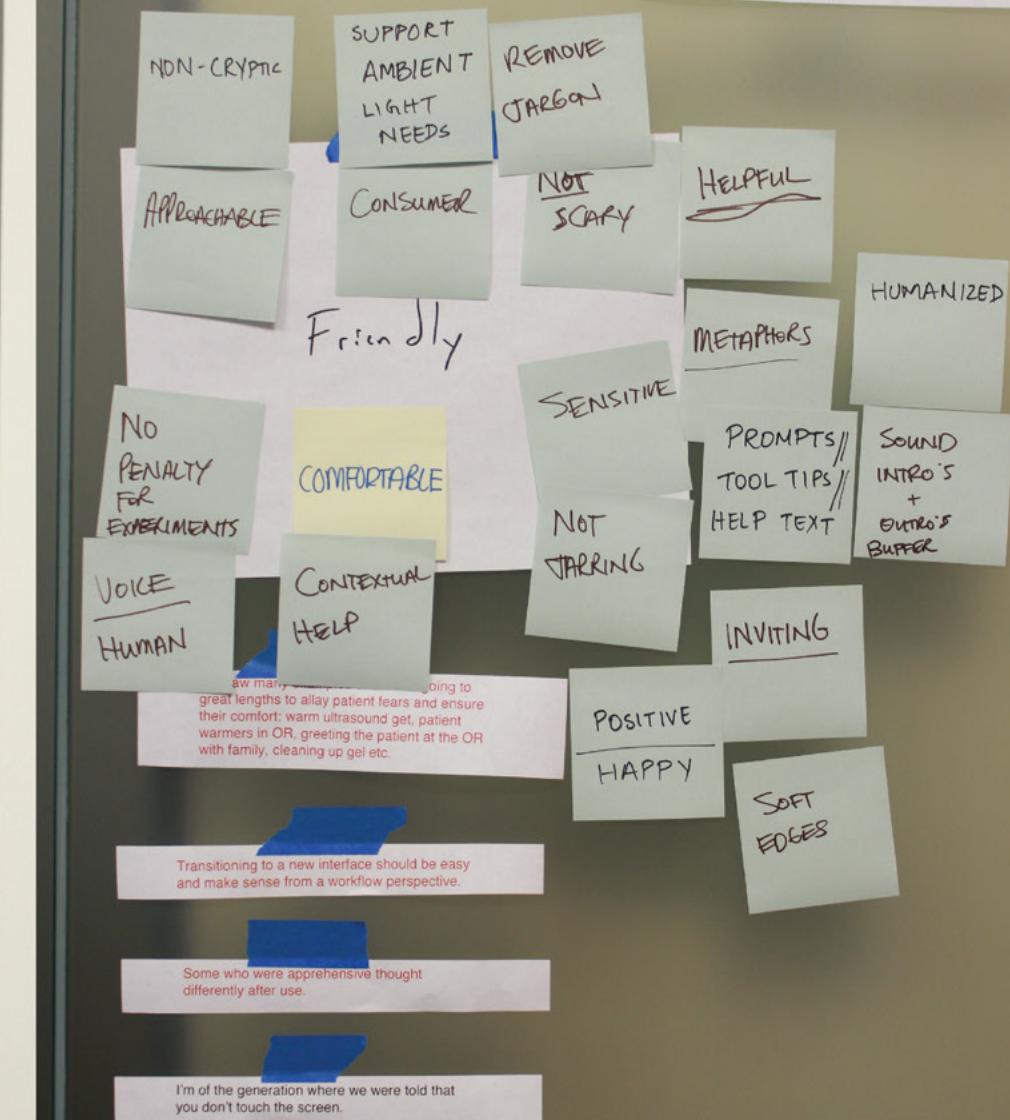
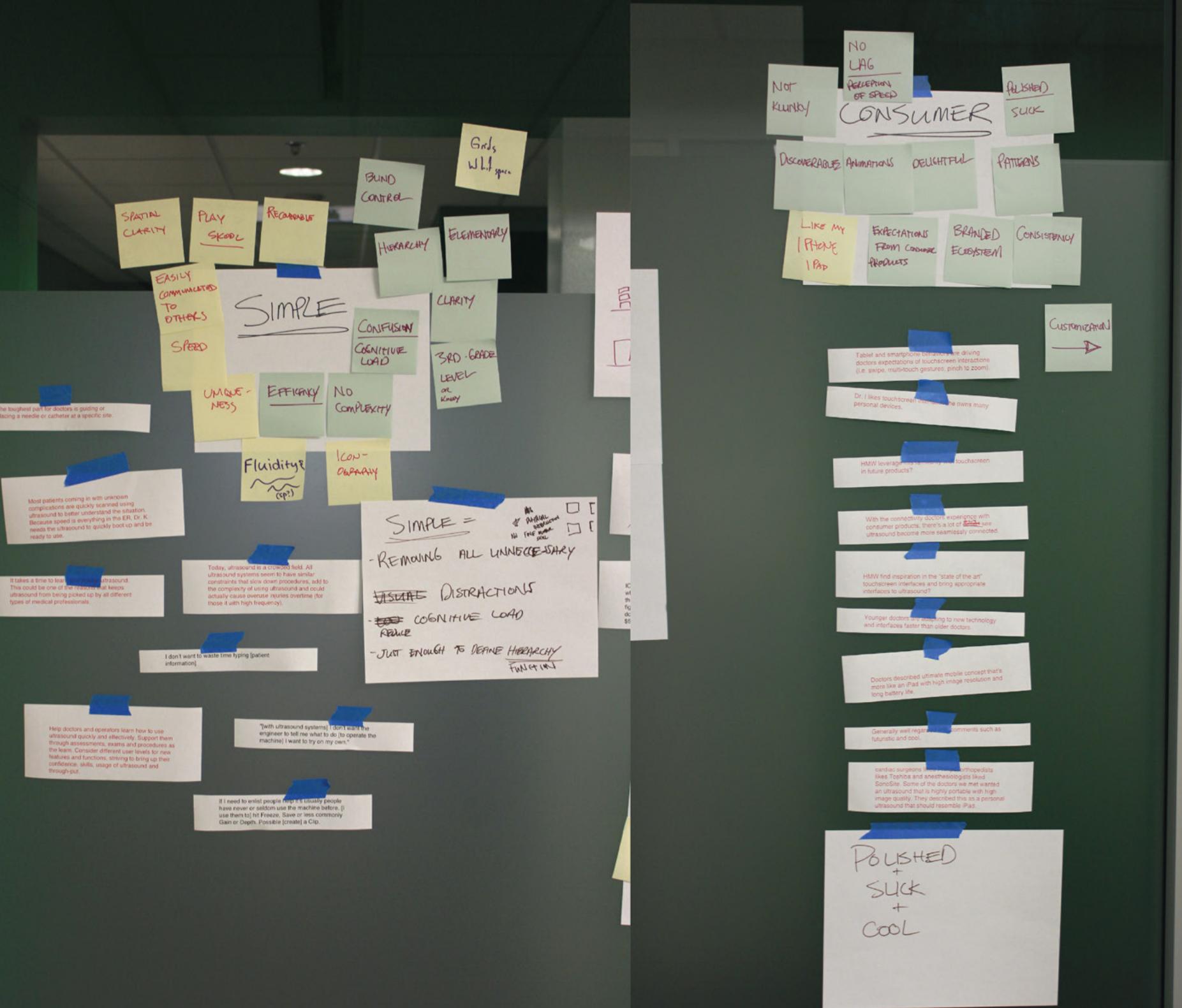
- **Windows.** A window provides the frame in which the app's content is displayed.





Once I'm sterile the only interaction I can have with the machine is with my elbows. The most common thing that happens is that the machine auto freezes and you have to have a control big enough that you can tap it with your elbow.

The machine battery goes dead. No one remembers to plug it in.



## HF Process

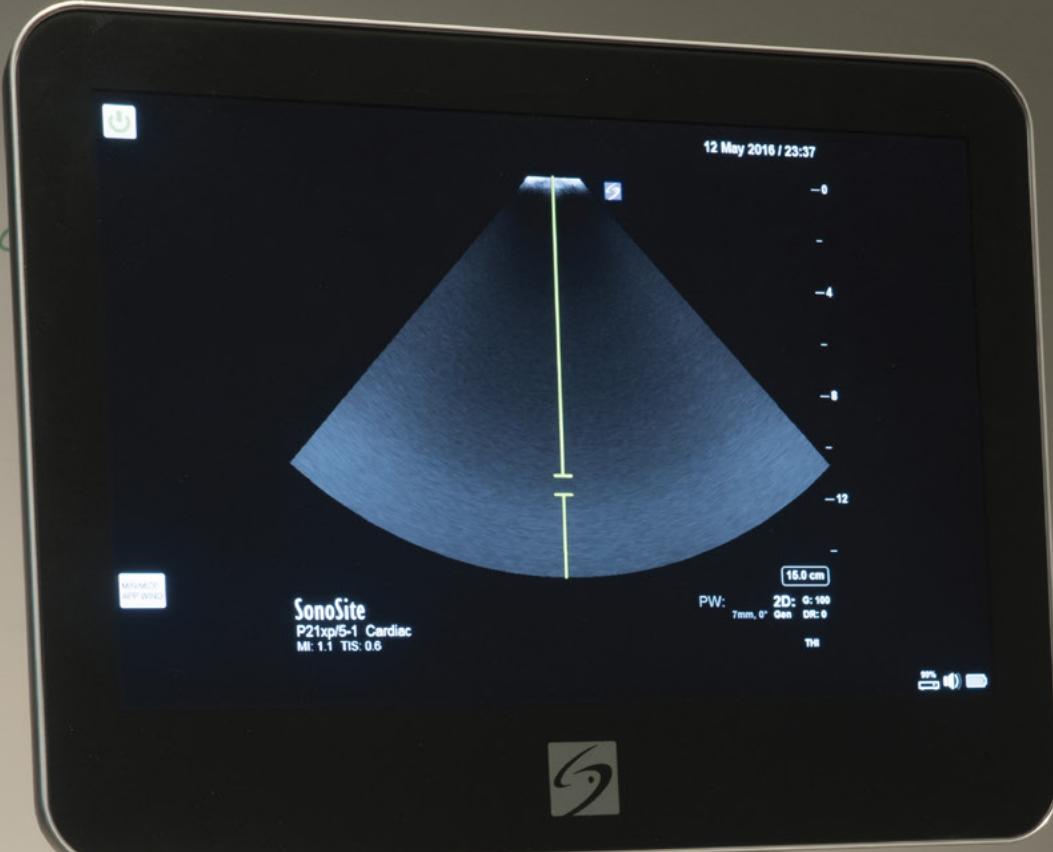
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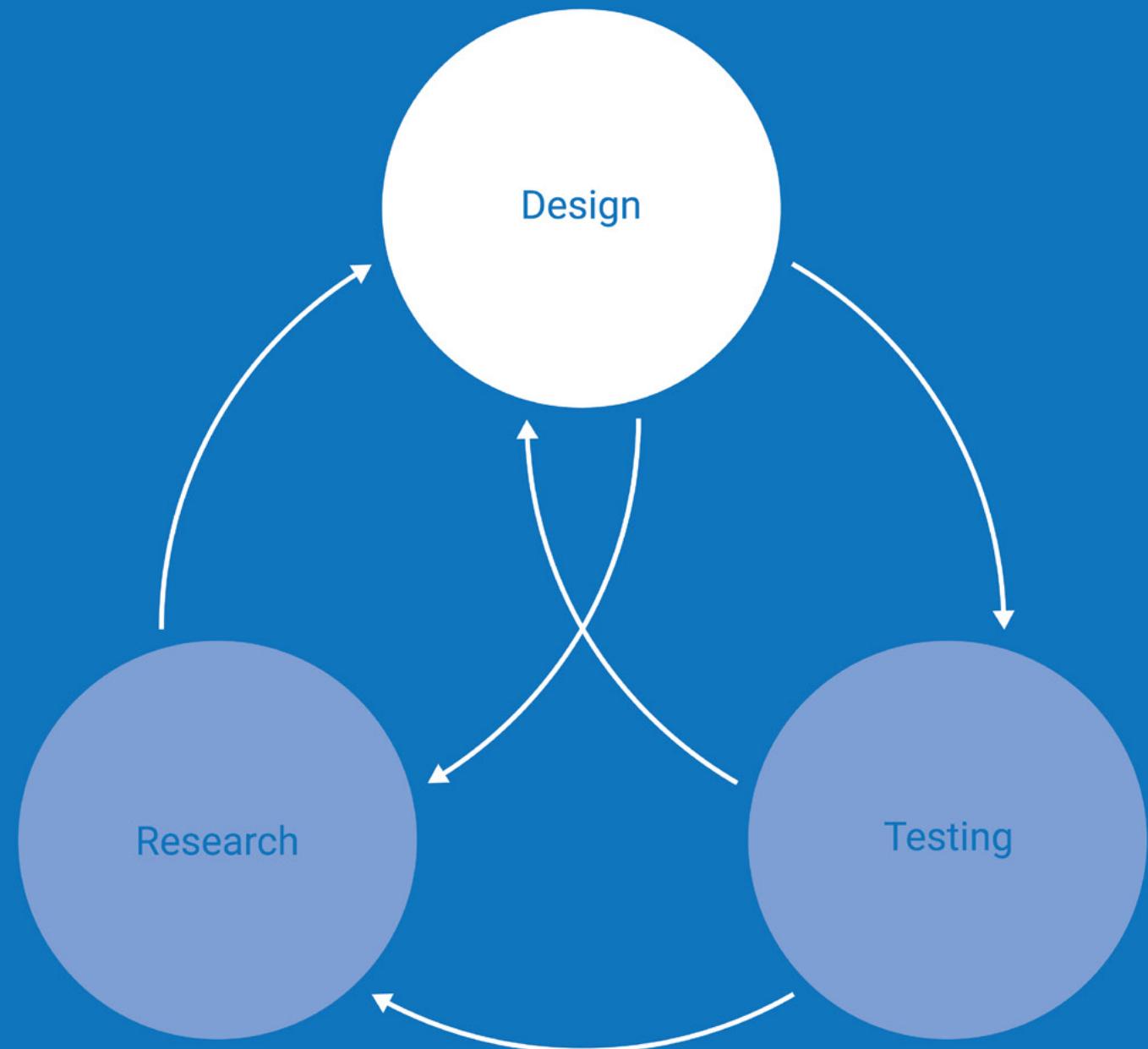
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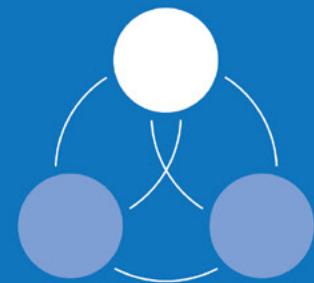
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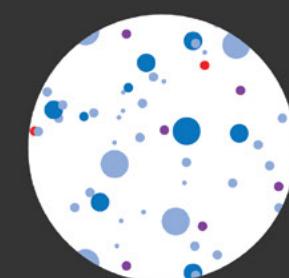
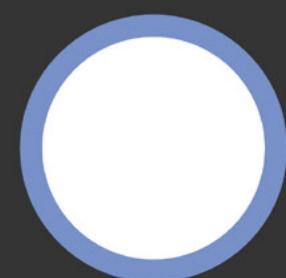
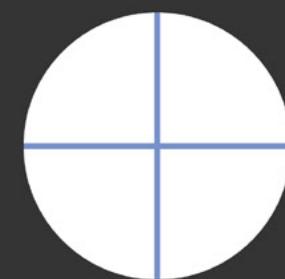
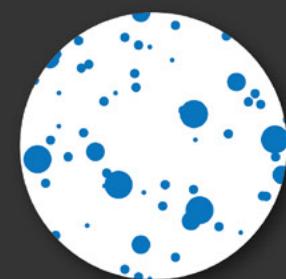
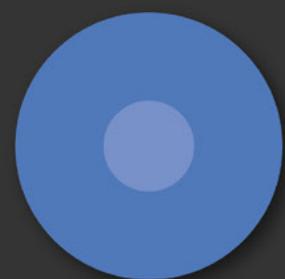
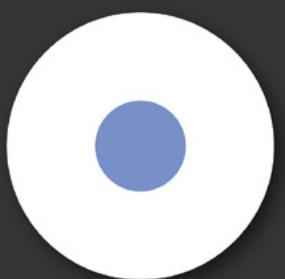
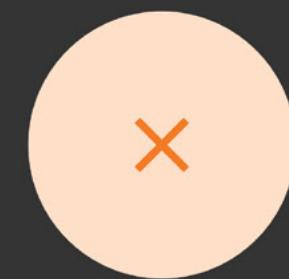
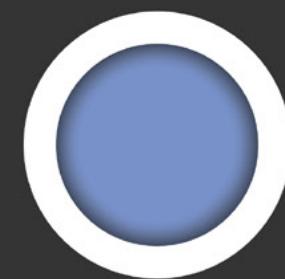
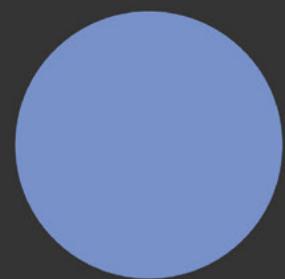


During the design phase, we translated business goals, user needs, and technical constraints into effective and delightful UIs. We held weekly design challenges. Each Friday, we would present the wire frames that we had created during that week. We welcomed constructive criticism and strived for pixel-perfect improvement.

WIFI  
NETWORK: FFSS-Guest  
PASSWORD: J\$01e7744

Tissue Harmonics







off

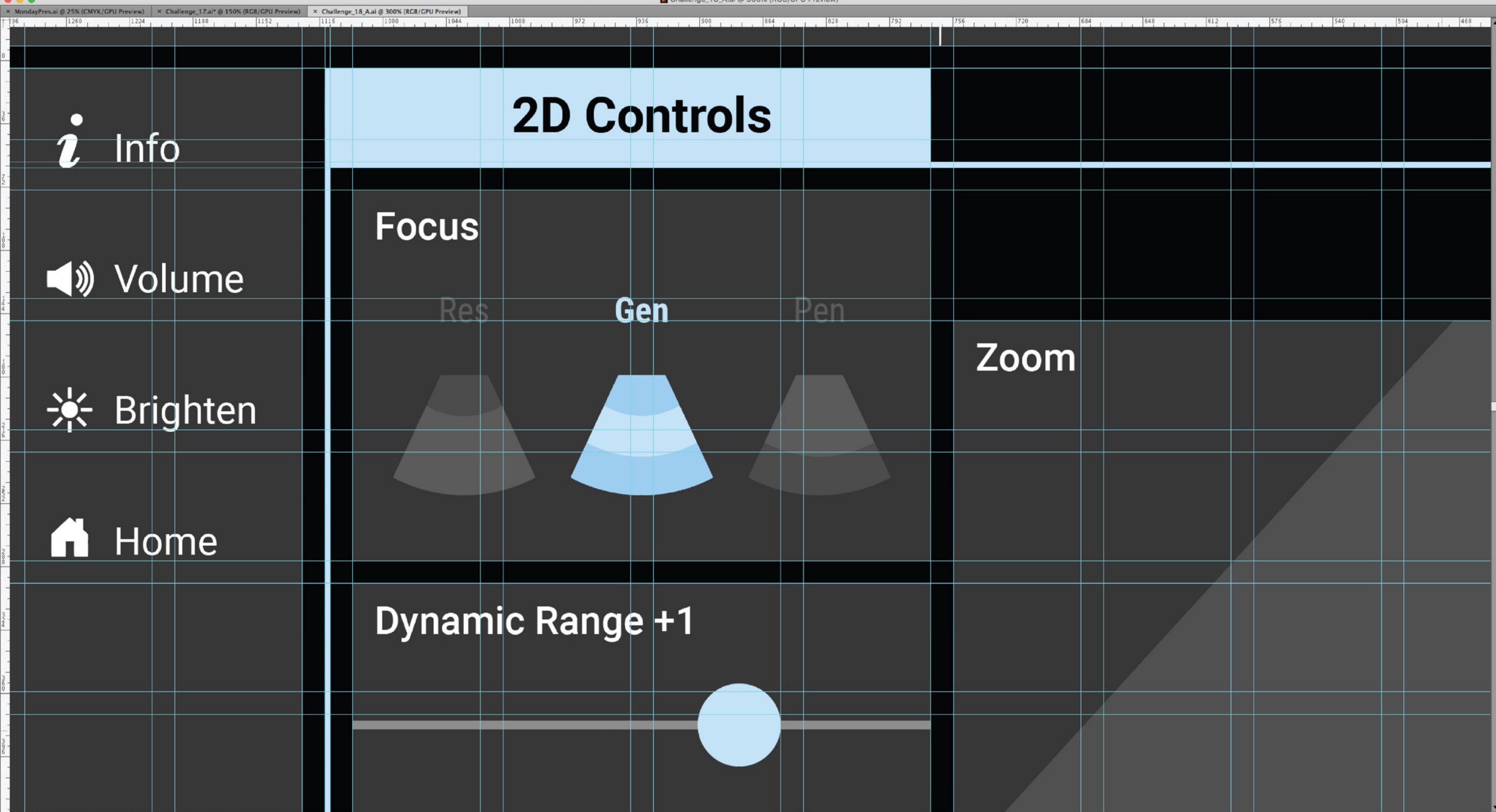
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# Settings

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Abdomen  
Arterial

Bladder

Abdomen  
Arterial

Bladder

Phased - P29 PHX  
19-4 mhz

Phased - P29 PHX  
19-4 mhz

Phased - P29 PHX  
19-4 mhz

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Font Style: Light  
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Leading: 60px  
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Opacity: 1.00

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Font Style: Medium  
Leading: 60px  
Alignment: Left  
Opacity: 0.65

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Point Size: 32px  
Font Family: Roboto  
Font Style: Medium  
Leading: 40px  
Alignment: Left  
Opacity: 0.65

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Point Size: 32px  
Font Family: Roboto  
Font Style: Medium  
Leading: 40px  
Alignment: Left  
Opacity: 1.00

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Beeps & Clicks

2D Controls

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Point Size: 27px  
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Leading: 36px  
Alignment: Left  
Opacity: 1.00

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Leading: 36px  
Alignment: Center  
Opacity: 1.00

Color: #FFFFFF  
Point Size: 27px  
Font Family: Roboto  
Font Style: Medium  
Leading: 27.6px  
Alignment: Left  
Opacity: 0.65

Color: #232323  
Point Size: 27px  
Font Family: Roboto  
Font Style: Medium  
Leading: 27.6px  
Alignment: Center  
Opacity: 1.00

Color: #FFFFFF  
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Font Family: Roboto  
Font Style: Medium  
Leading: 21.6px  
Alignment: Right  
Opacity: 1.00

**1**

B9D9ED

**2**

607D96

**3**

46637D

**4**

FF8666

**5**

E35B26

**6**

FFFFFF

**7**

838383

**8**

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**11**

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**12**

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Opacity: 0.22

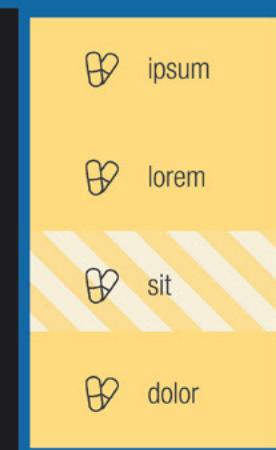
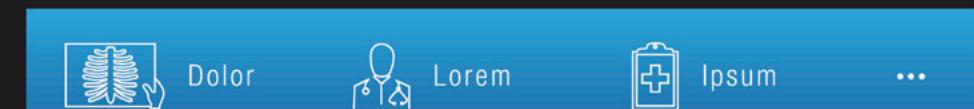
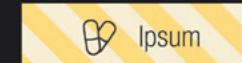
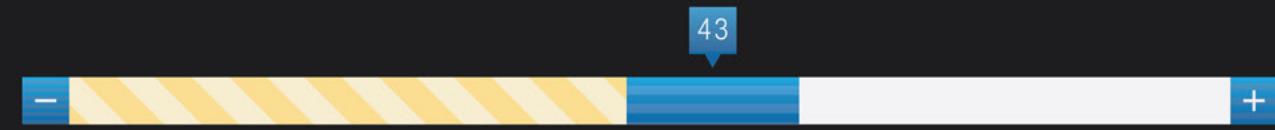
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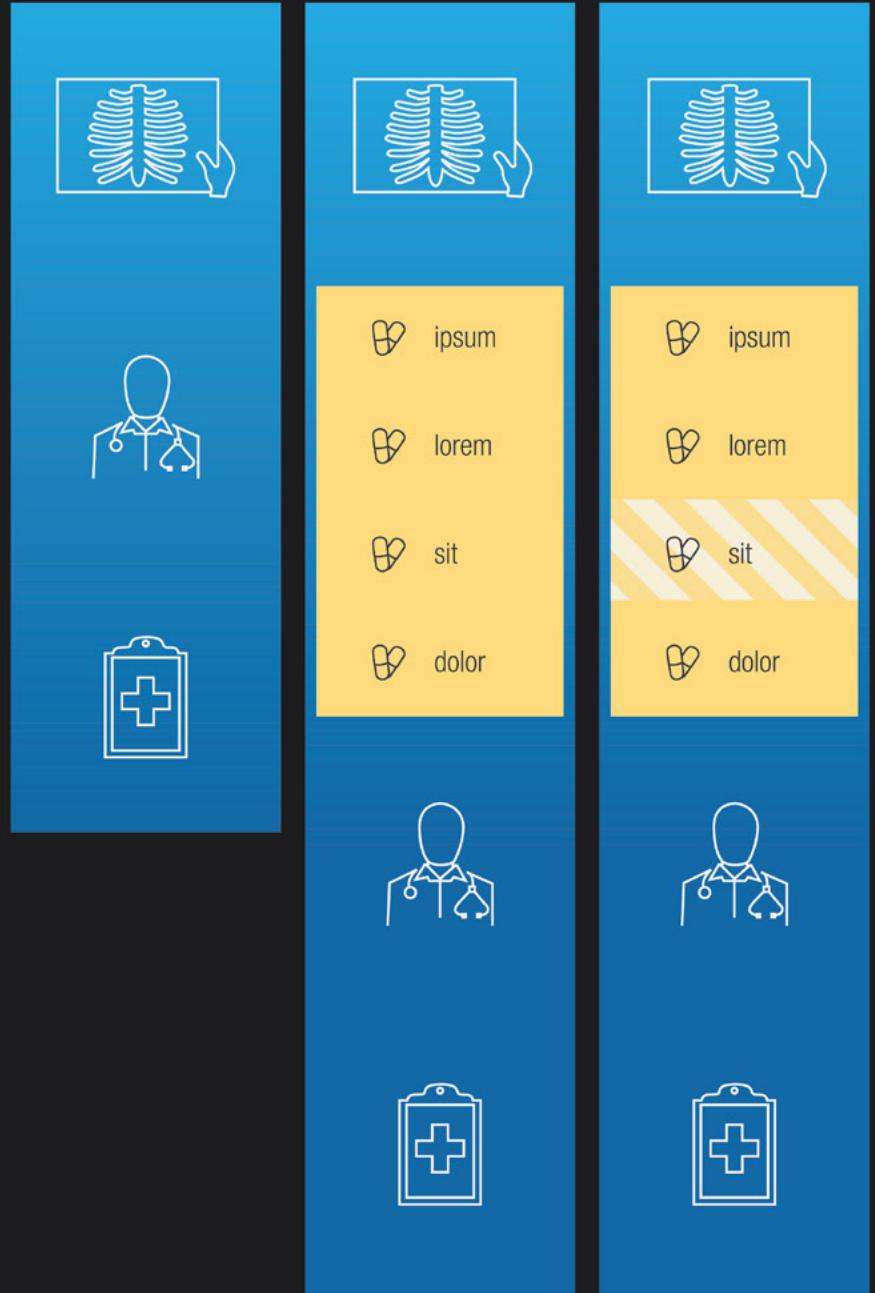
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abcdefghijklmnopqrstuvwxyz



ipsum  
lorem  
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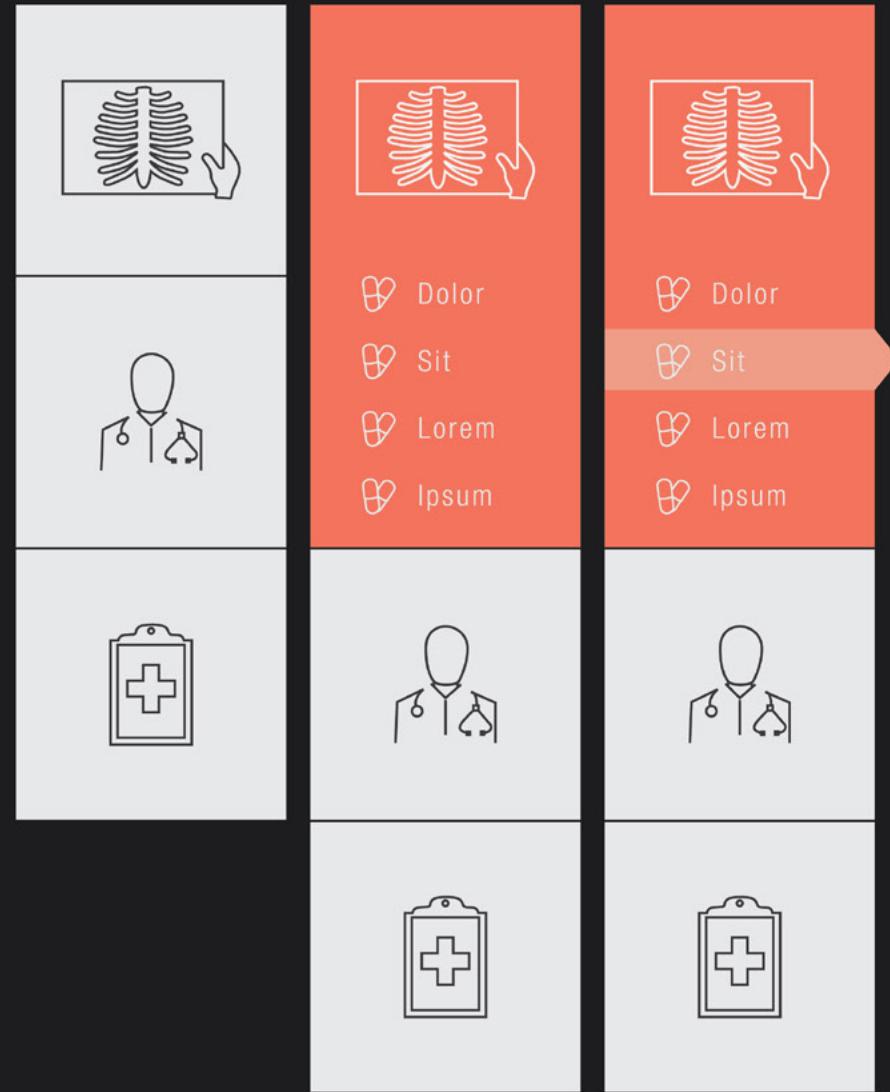
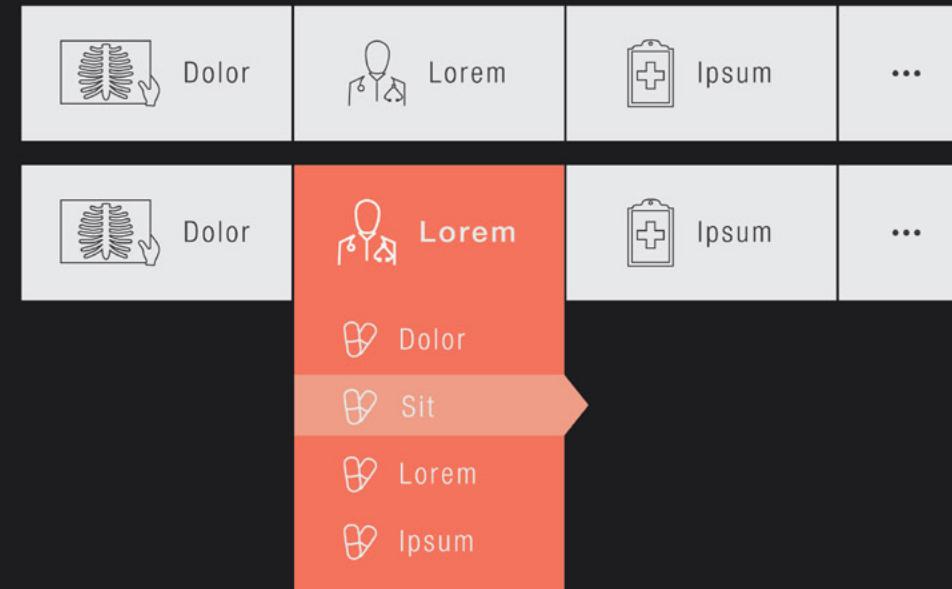
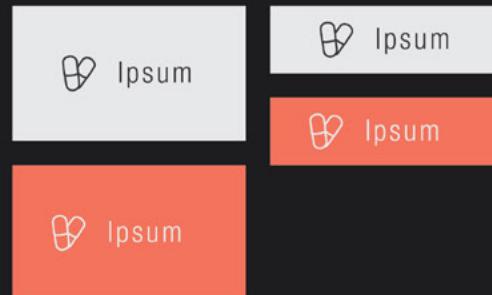




ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz

- 52 +

- 43 +



# Settings

User Dr. Jones

Patient  
No Patient Name

Transducer  
& Exam

Scan  
2D Color  
Doppler M-Mode

Freeze

Review  
4 images

Report

End Exam  
01:23:15

Caption

abc!

Flag



Delete



Send



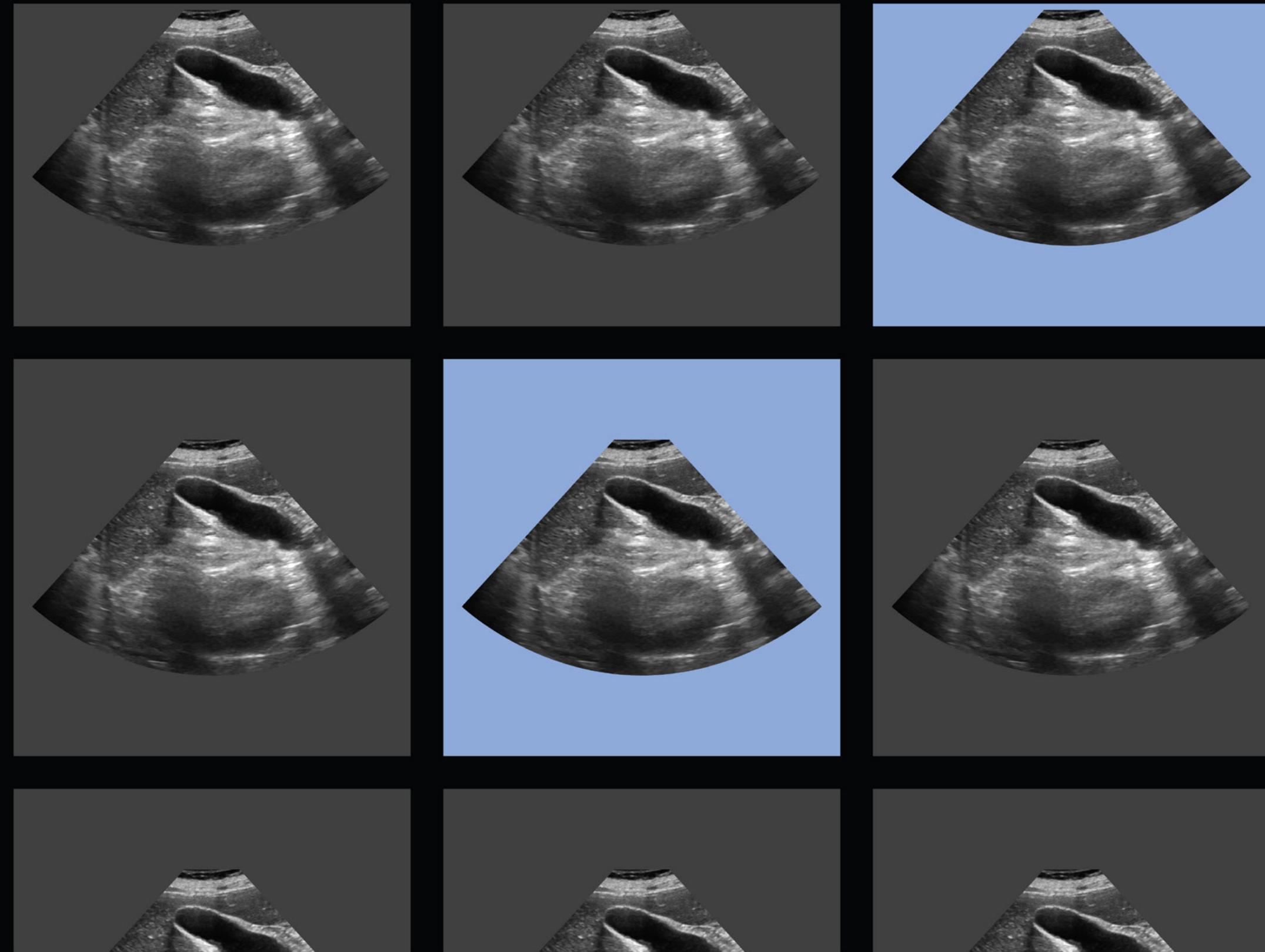
Multi select



Preview



Label



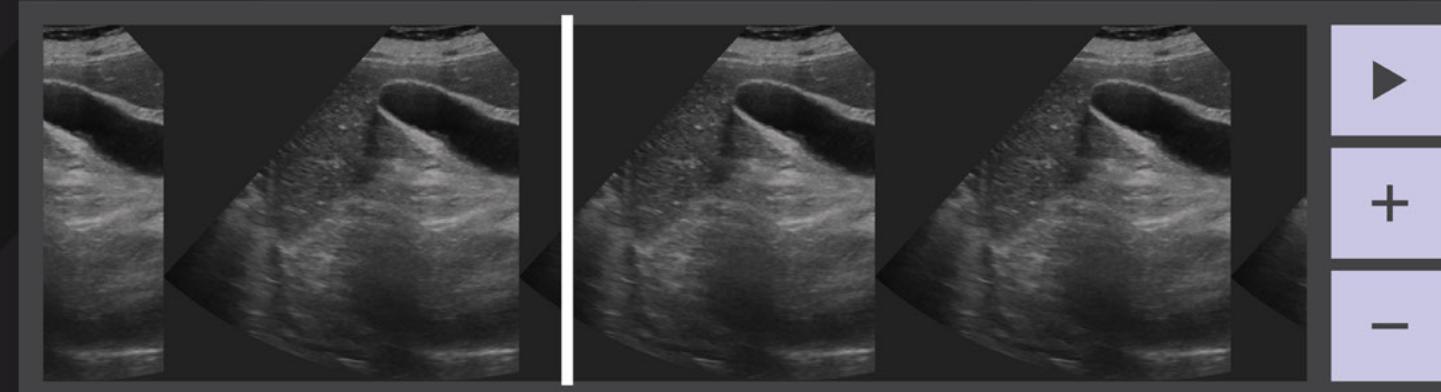
Volume

Brightness

2D

C

Frozen



Orientation

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LL

RL



Needle Profiling

steep



mid



shallow



Sono MB On



Focus

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Volume

Brightness

2D

C

**Orientation**

LU



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RL

**Sono MB On**

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O

**Focus**

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**gen**

pen

**Needle Profiling**

steep



mid



shallow



 Settings

 Dr. Mingo 

Patient Info

Joe

Thompson

Transducer & Exam

2D Scan

Freeze

Review 4

End Exam

Timeline

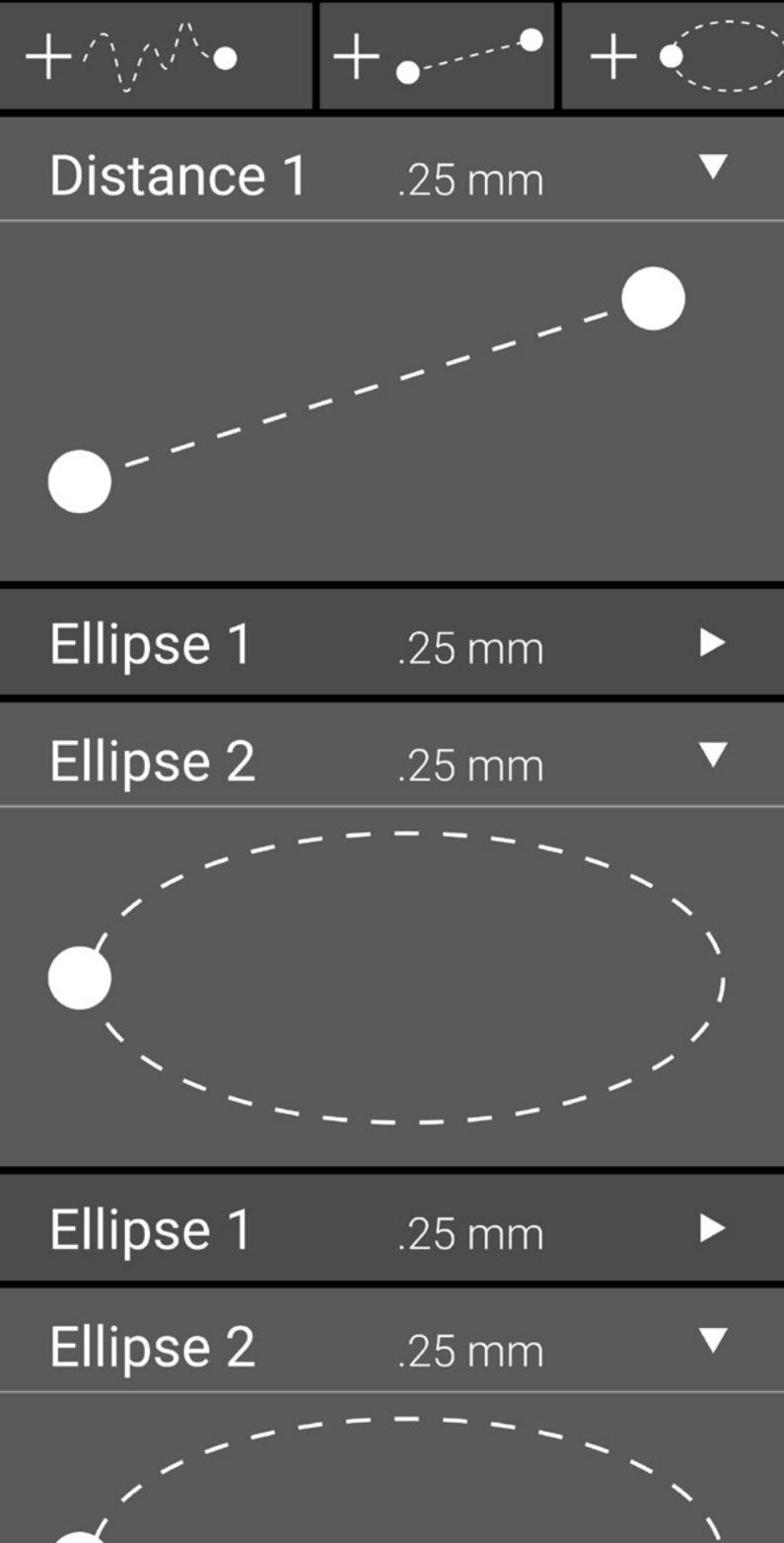
Dynamic Range +3

Calculations

Measurements

Zoom +1.1

Label



Arterial

3/3

LVM

.25 mm

BGG

.89 mm

ATP

.33 mm

Cranial

.38 mm

Simpsons

.44 mm

Cranial

.38 mm



User  
Dr. Jones

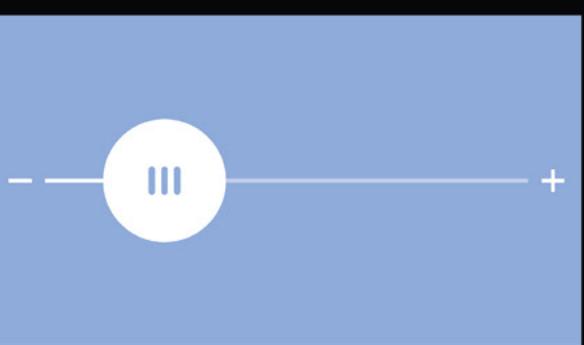
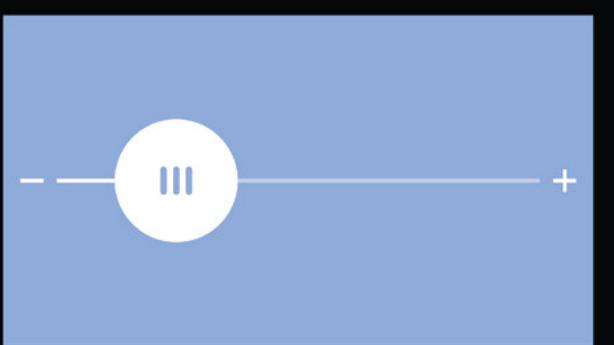
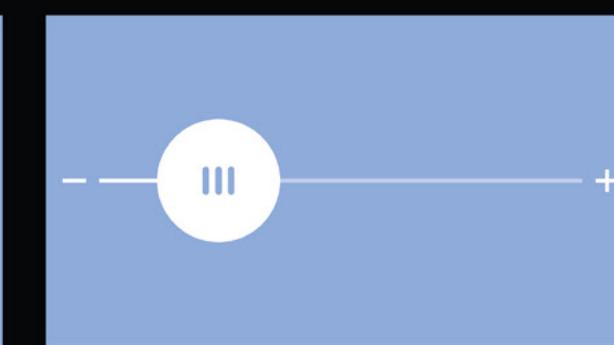
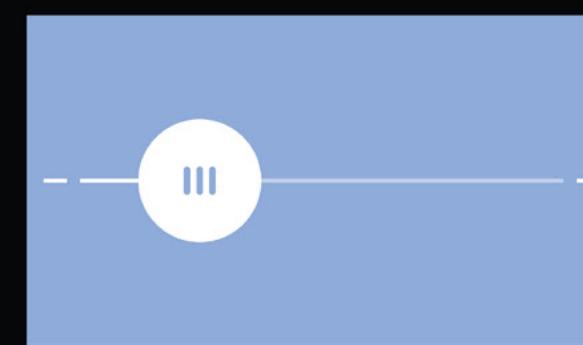
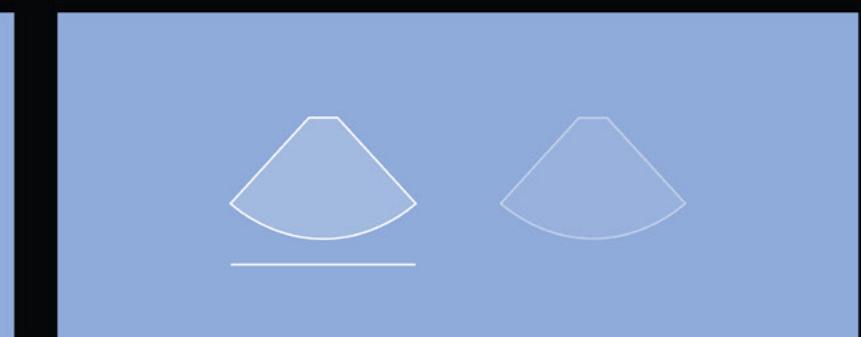
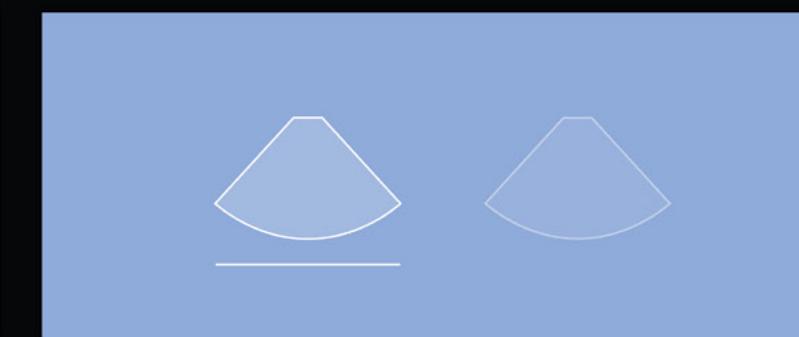
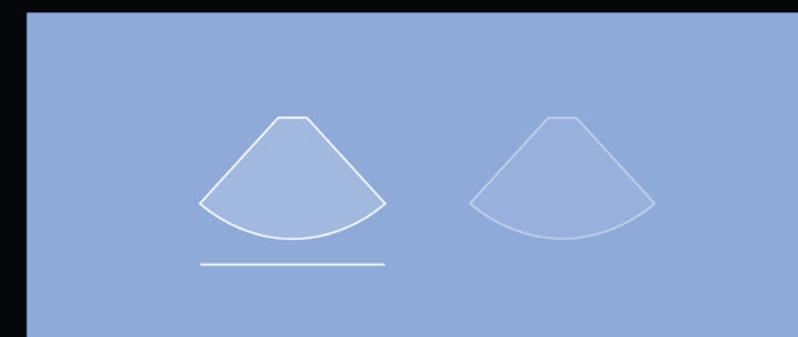
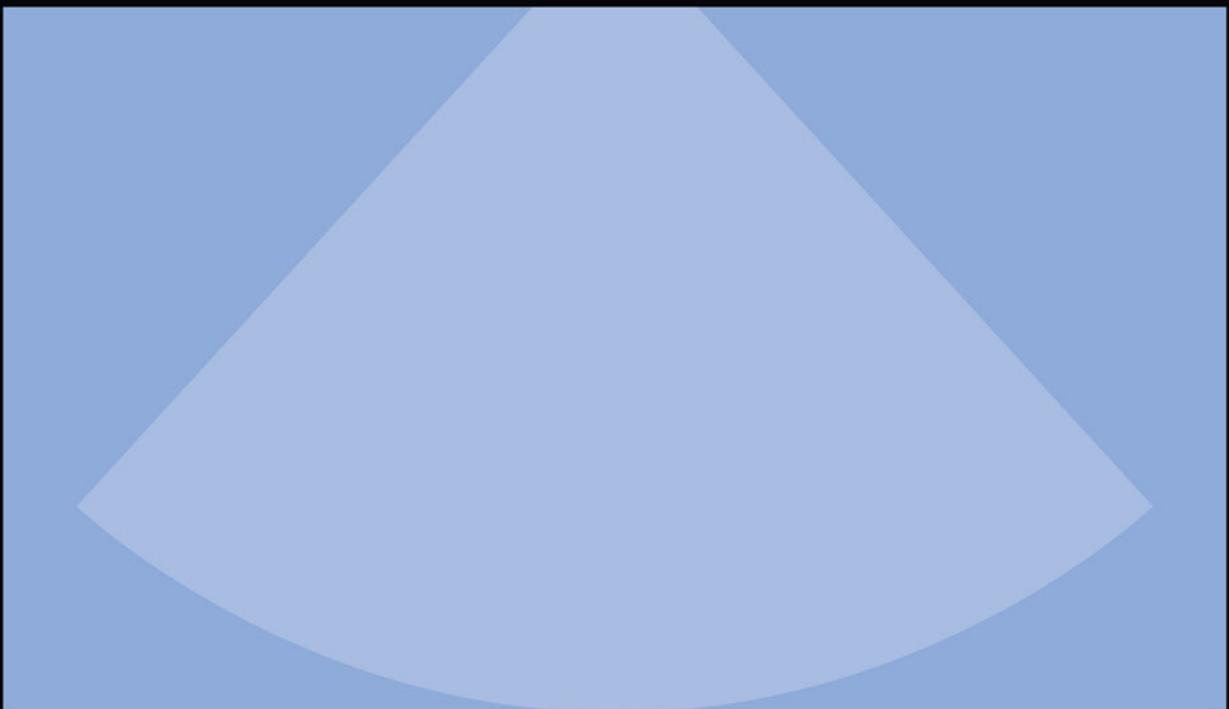
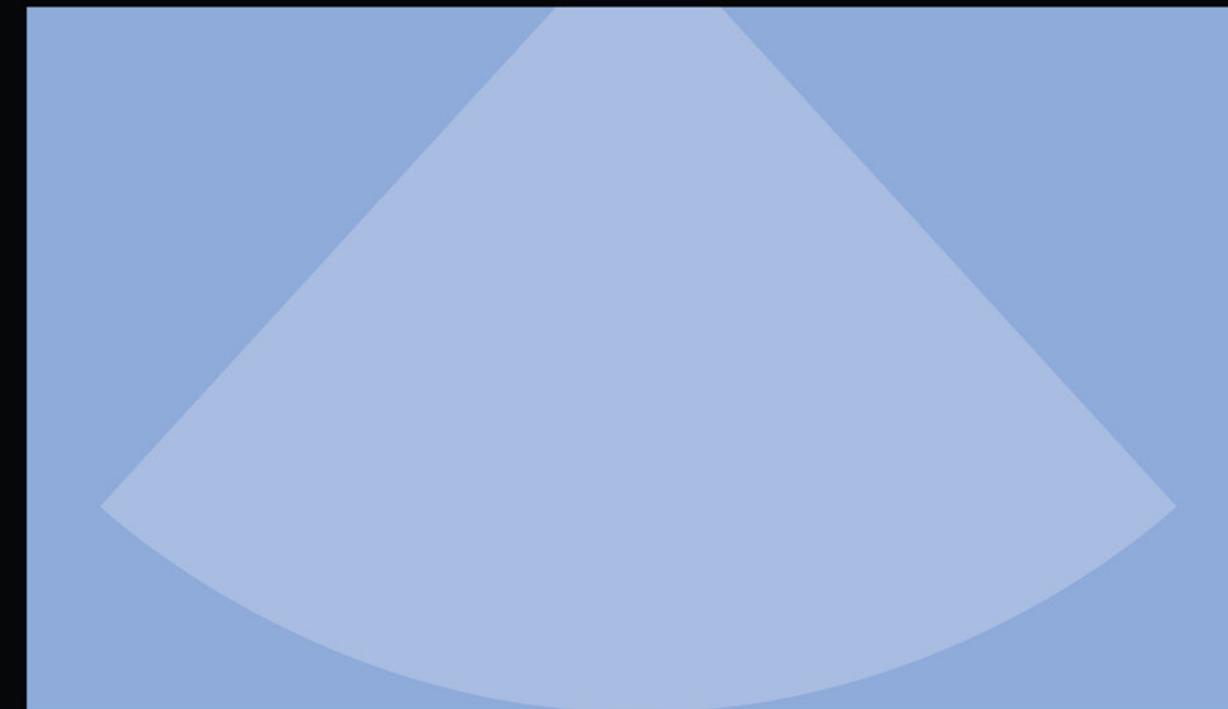
Patient  
No Patient Name

Probe  
Exam

Review  
4 images

Report

End Exam  
01:23:15



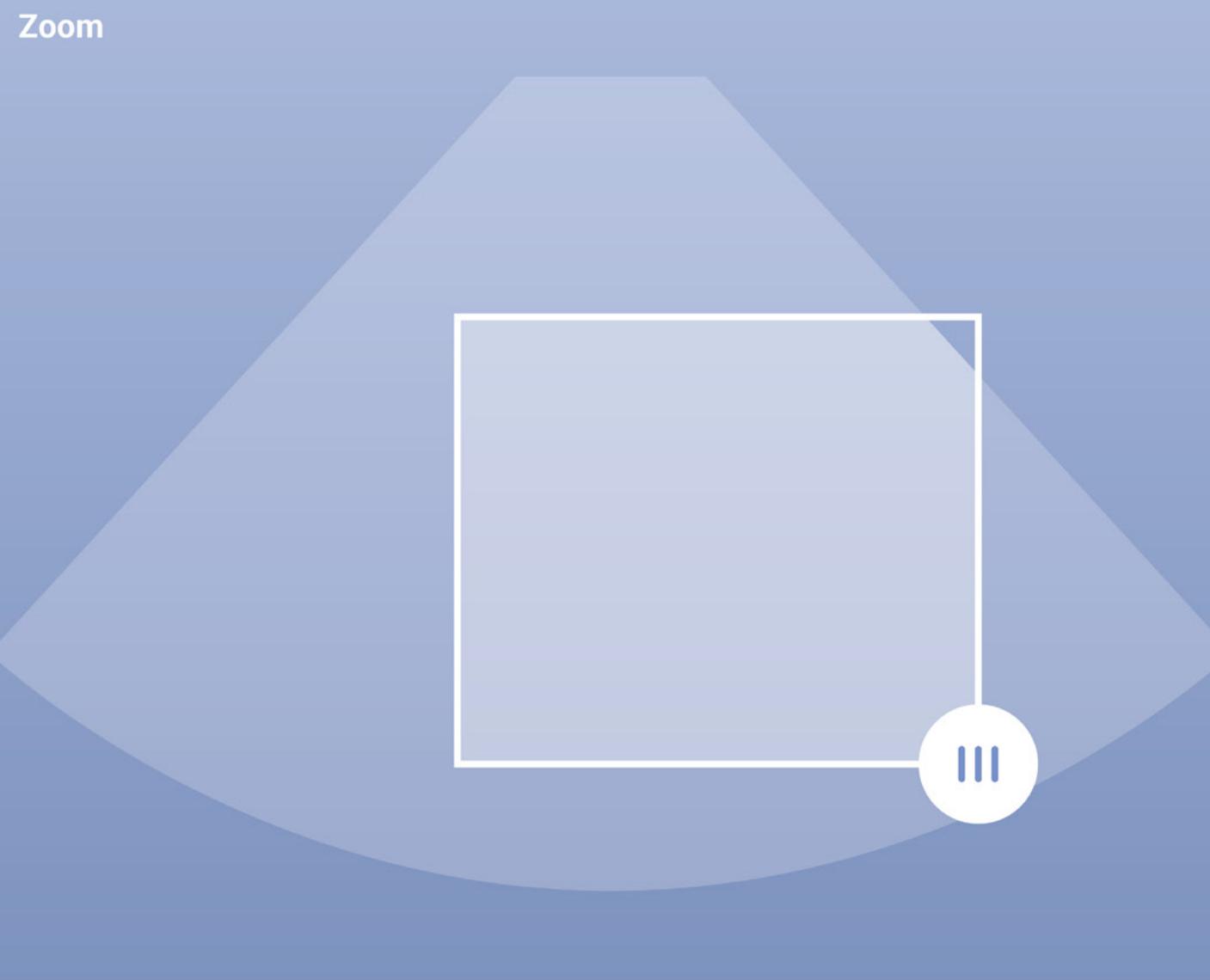
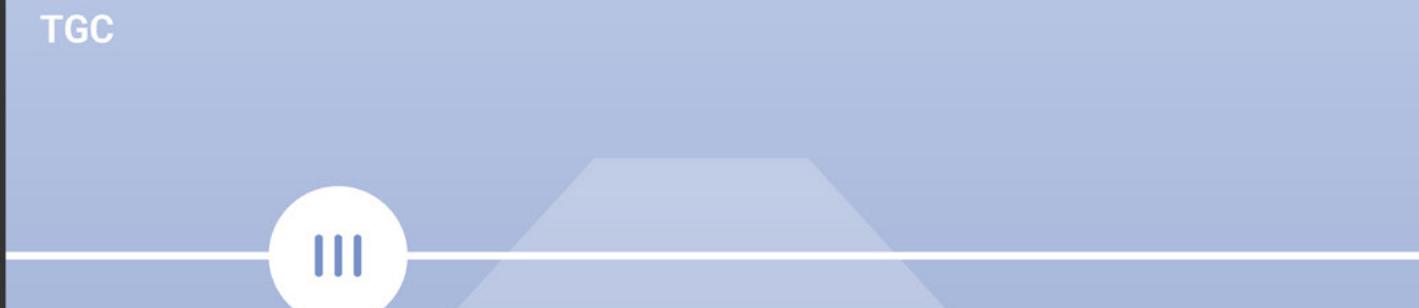
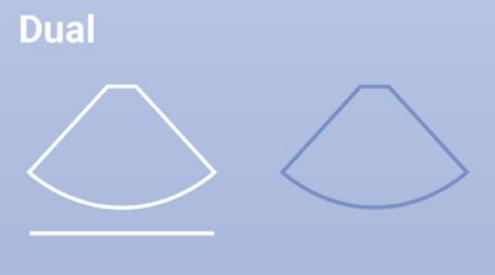
End Exam 01:23:15

Patient Patricia Cobalt

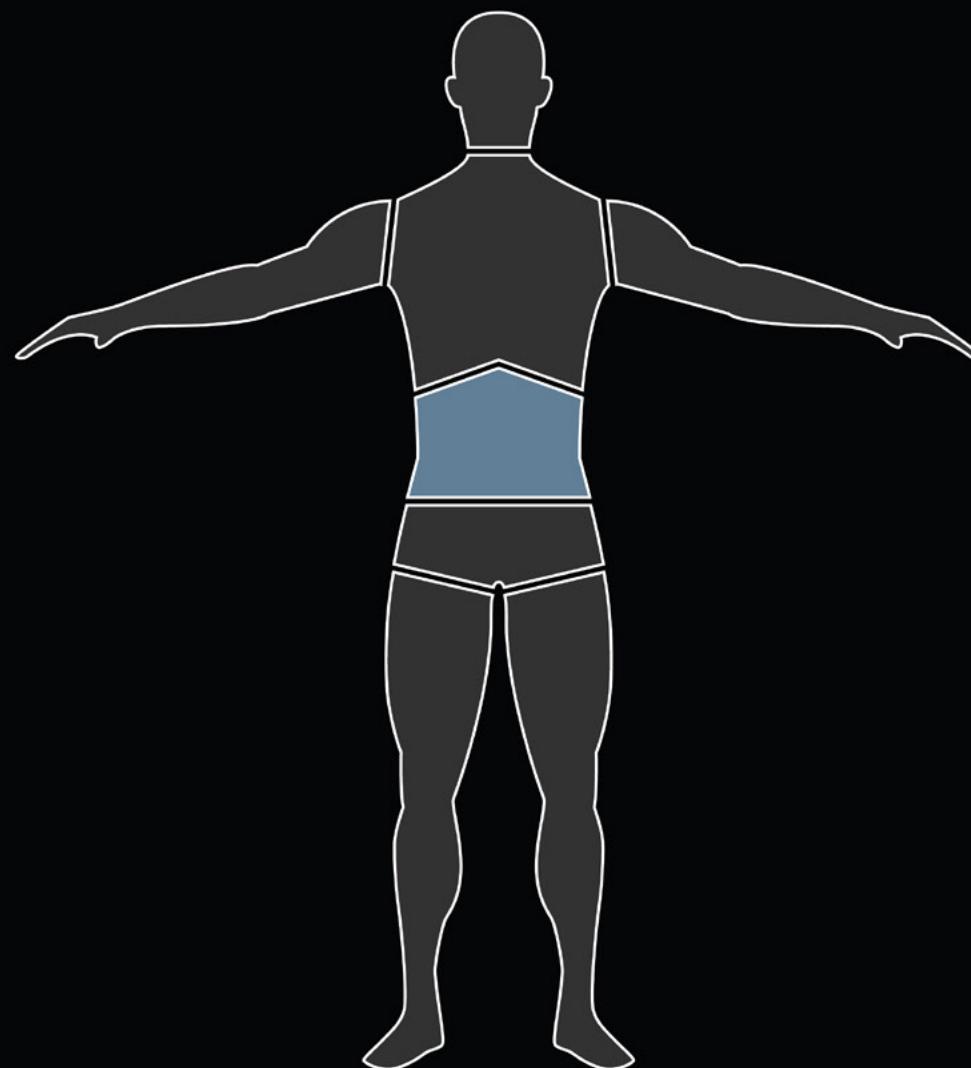
User Dr. Jones

Probe CL24 Abdomen

?



Please select desired exam type



Mid-Torso

Exams

- Abdomen
- Arterial
- Bladder
- Venous

Protocols

- Rush
- eFast





Patient

Report

Review

Calculate

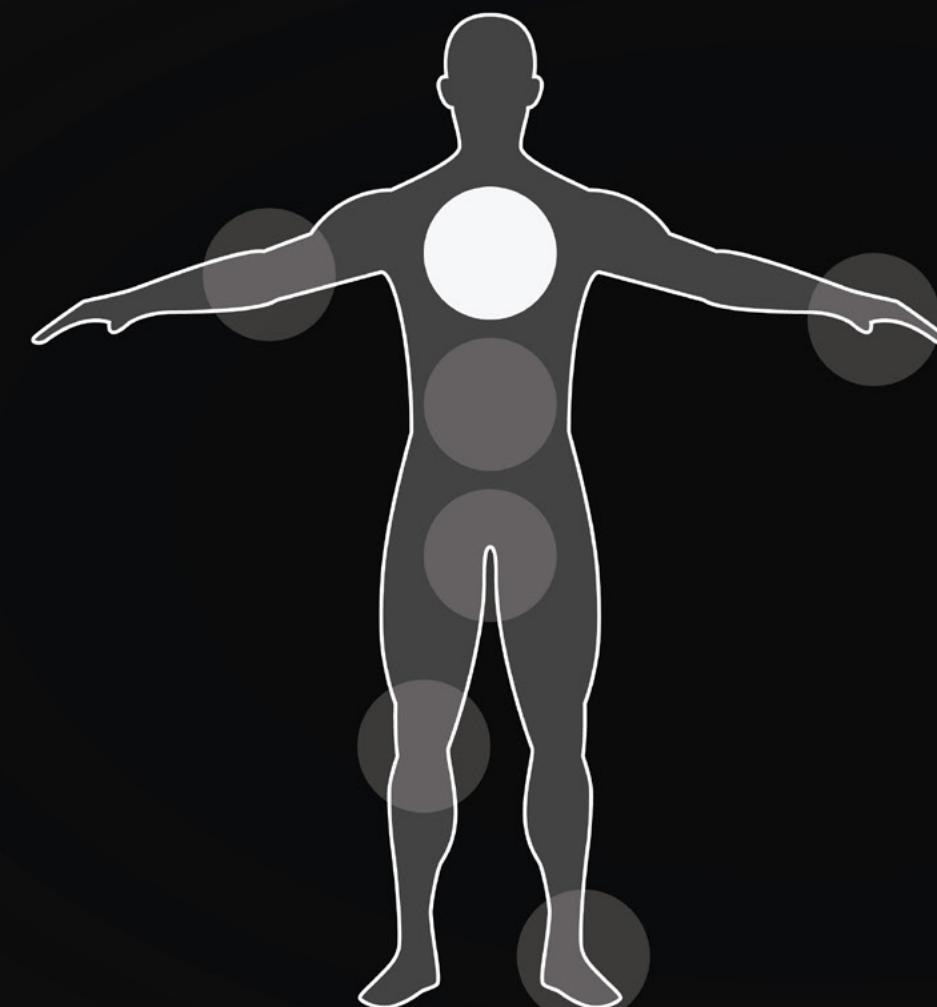
Label

Measure

Learn

Abdomen

Select an exam type or filter by anatomy region



Abdomen

Arterial

Bladder

OB

Cardiac

Small Parts

Thyroid

Venous

David Cardiac

eFast

Dynamic Btn 1

Dynamic Btn 2

Dynamic Btn 2

Dynamic Btn 4

Widget 8

Widget 9

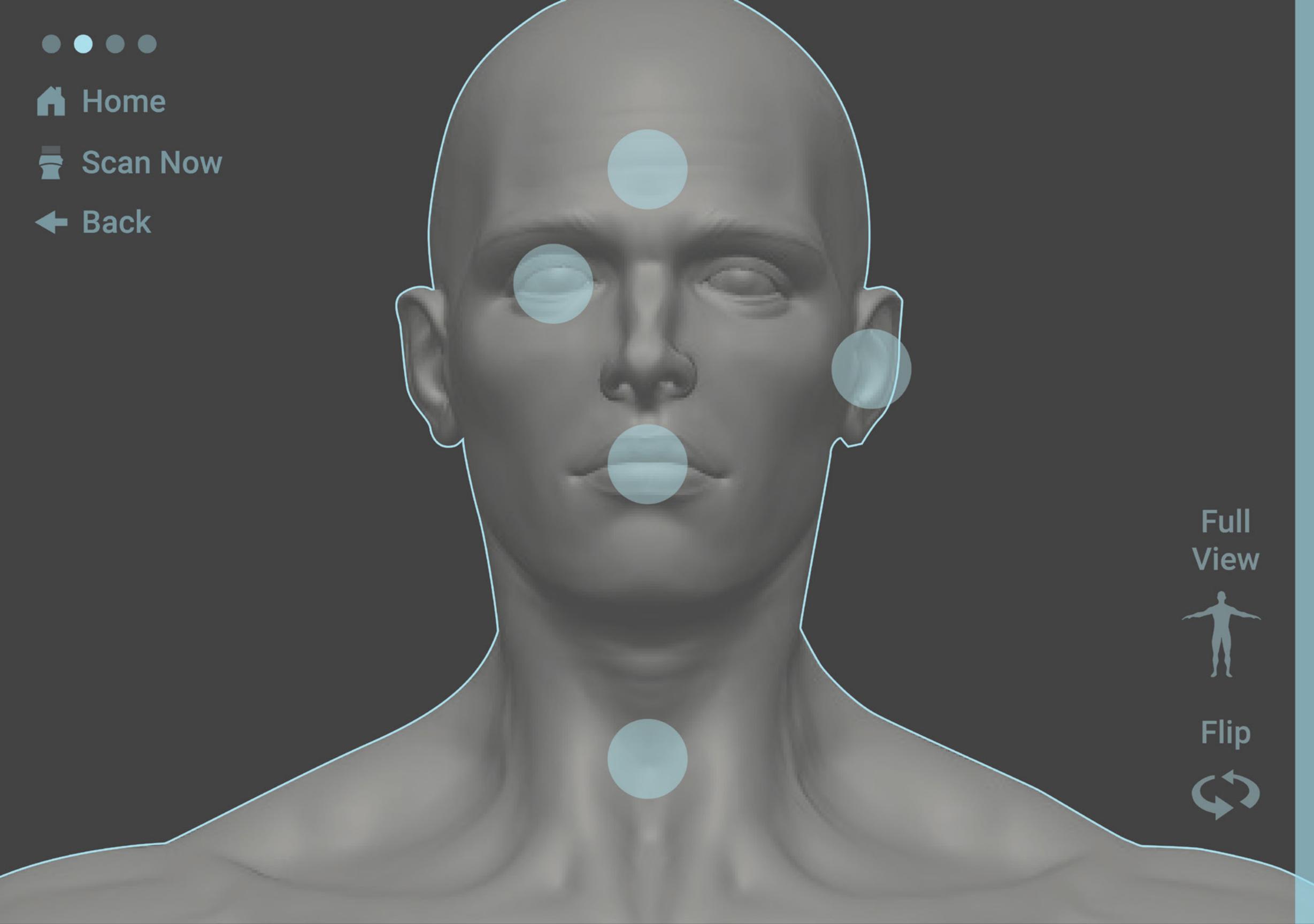




Home

Scan Now

Back



General Body

Vascular

MSK

Foot

Ocular

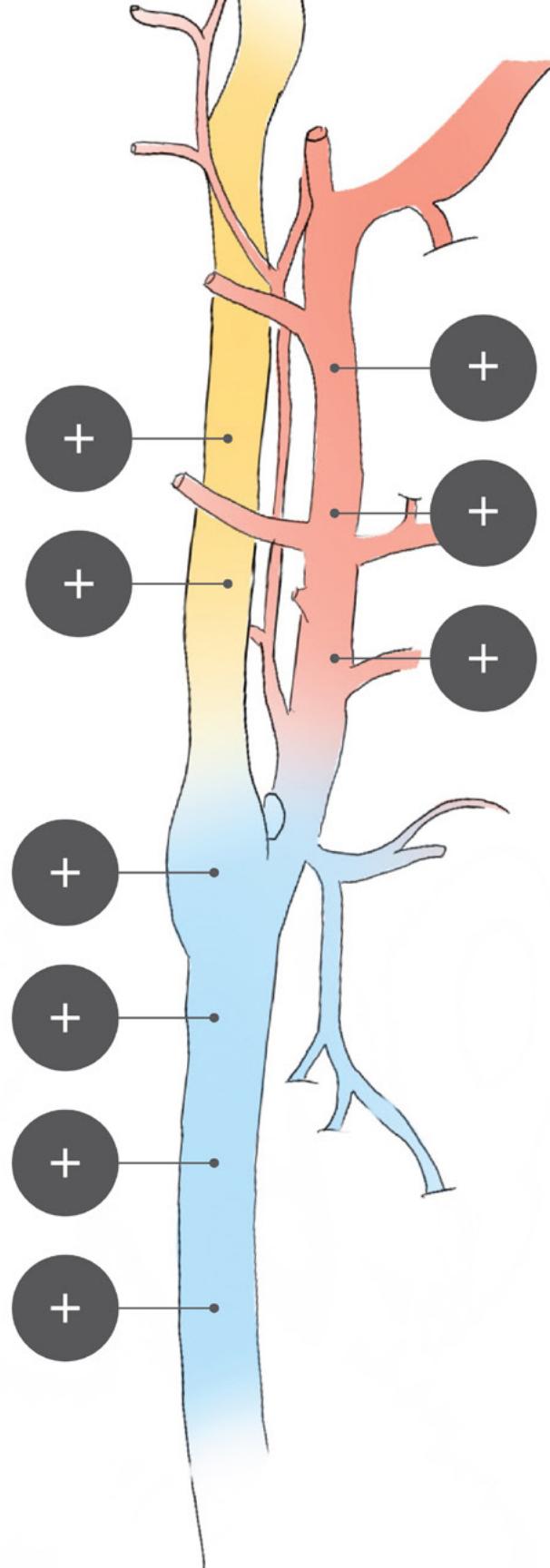
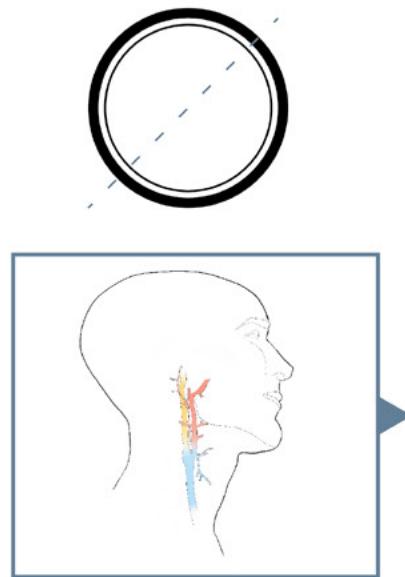
Head/Neck

Cranial

Small Parts

Respiratory

Ocular



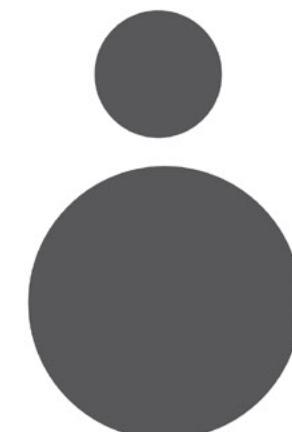
Prox ICA / Mid CCA = 123 cm/s

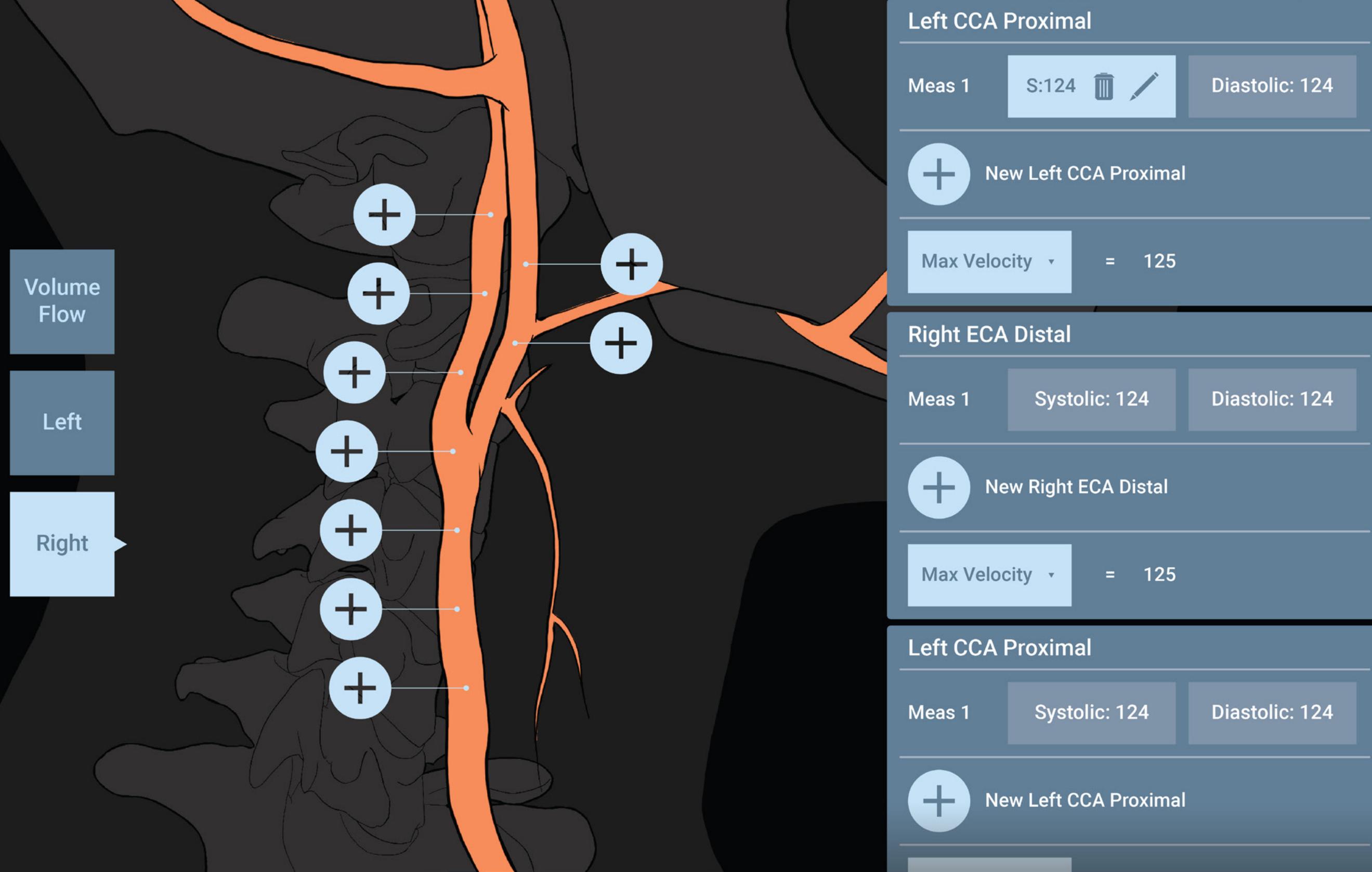
### Left CCA Proximal

	Systolic	Diastolic
Meas 1	18 cm/s	123 cm/s
+ New Left CCA Proximal	<hr/>	
Max Velocity ▾	18 cm/s	123 cm/s

	Systolic	Diastolic
Meas 1	29 cm/s	55 cm/s
<hr/>		
Add Measurement	<hr/>	
Max Velocity ▾	29 cm/s	55 cm/s

### Left CCA Proximal





No Patient Open

XXXX.XXXX.XXXX

Calculate ▼

Exam Labels

Experiento

Solando

Avici

2D

Gain: 47

TTI: 47

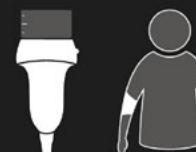
Dr: +2

VOT: +2

Res

CL24

5cm - 12cm



MI: 33

TIS: 25

Measurements

a : 28cm

Dff: 28cm

b : 81cm

Swe: 81cm

c : 76cm

Bcd: 76cm

Der: 15cm

Wop: 23cm

Dwt: 22cm

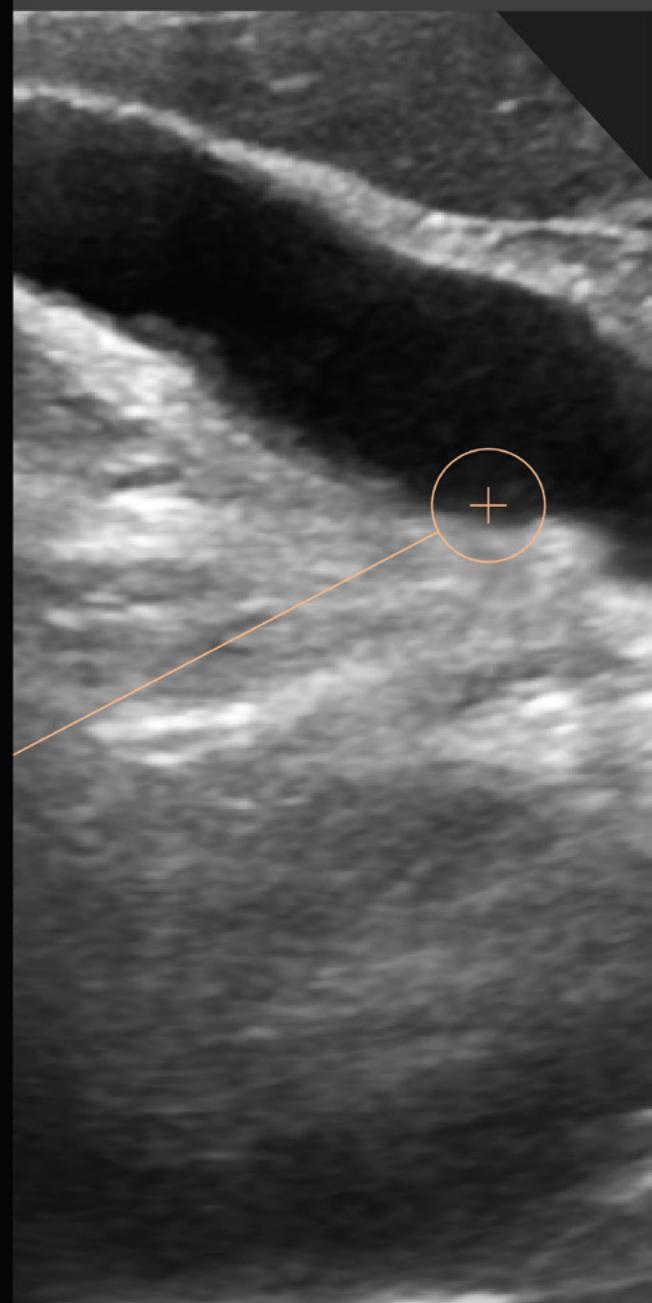
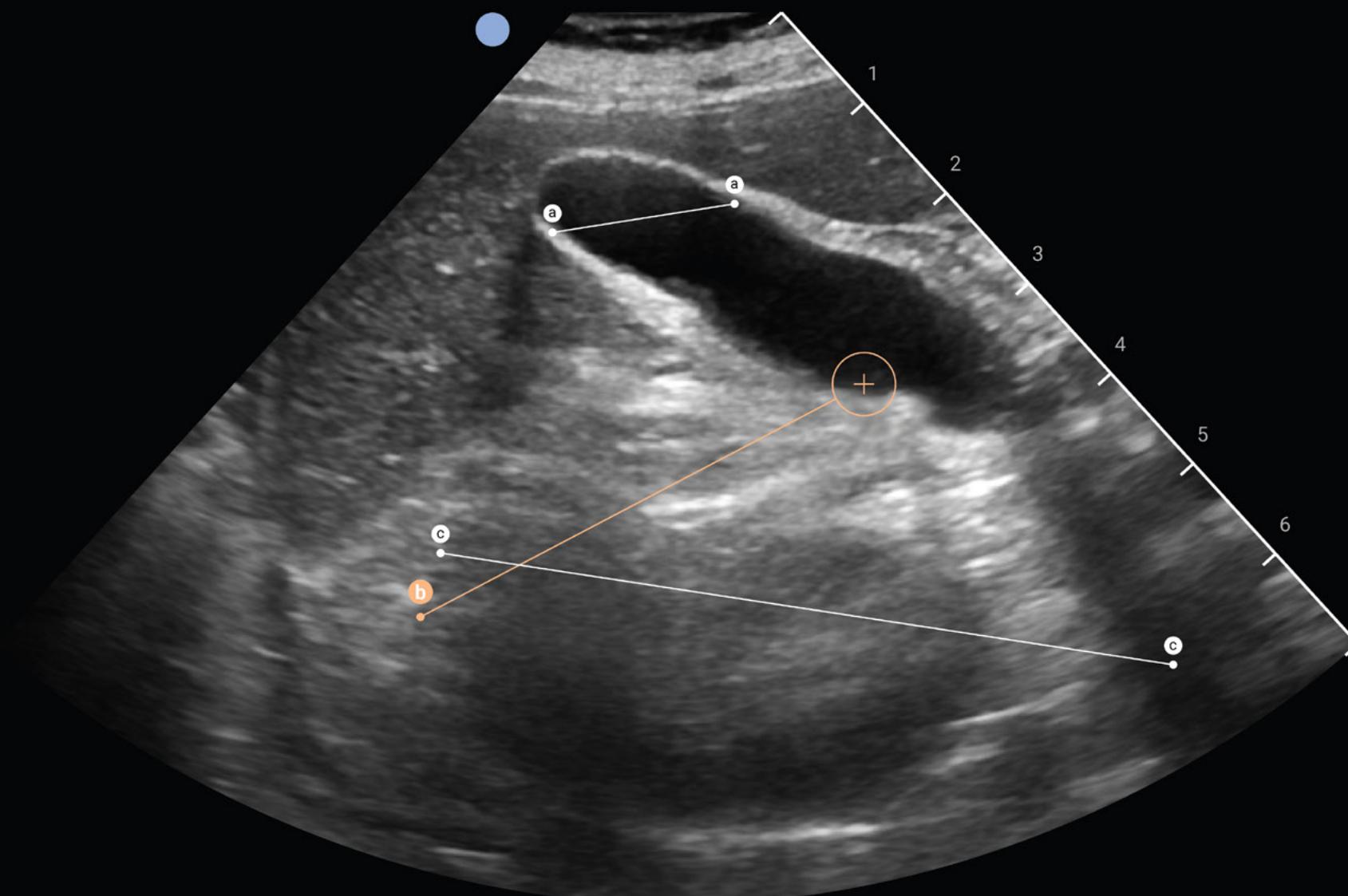
Ffe: 65cm

It is important to hold the transducer firmly



Sun Mar 28 9:45

Measure ▼



Label

No Patient Open

XXXX.XXXX.XXXX

Exam Labels

Experiento

Solando

Avici

2D

Gain: 47

Gain: 47

Dr: +2

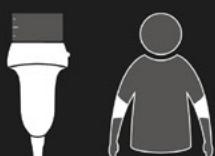
Dr: +2

Res

Res

CL24

5cm - 12cm



MI: 33

TIS: 25

Measurements

Lvv: 28cm

Dff: 28cm

Tpp: 81cm

Swe: 81cm

Agg: 76cm

Bcd: 76cm

Der: 15cm

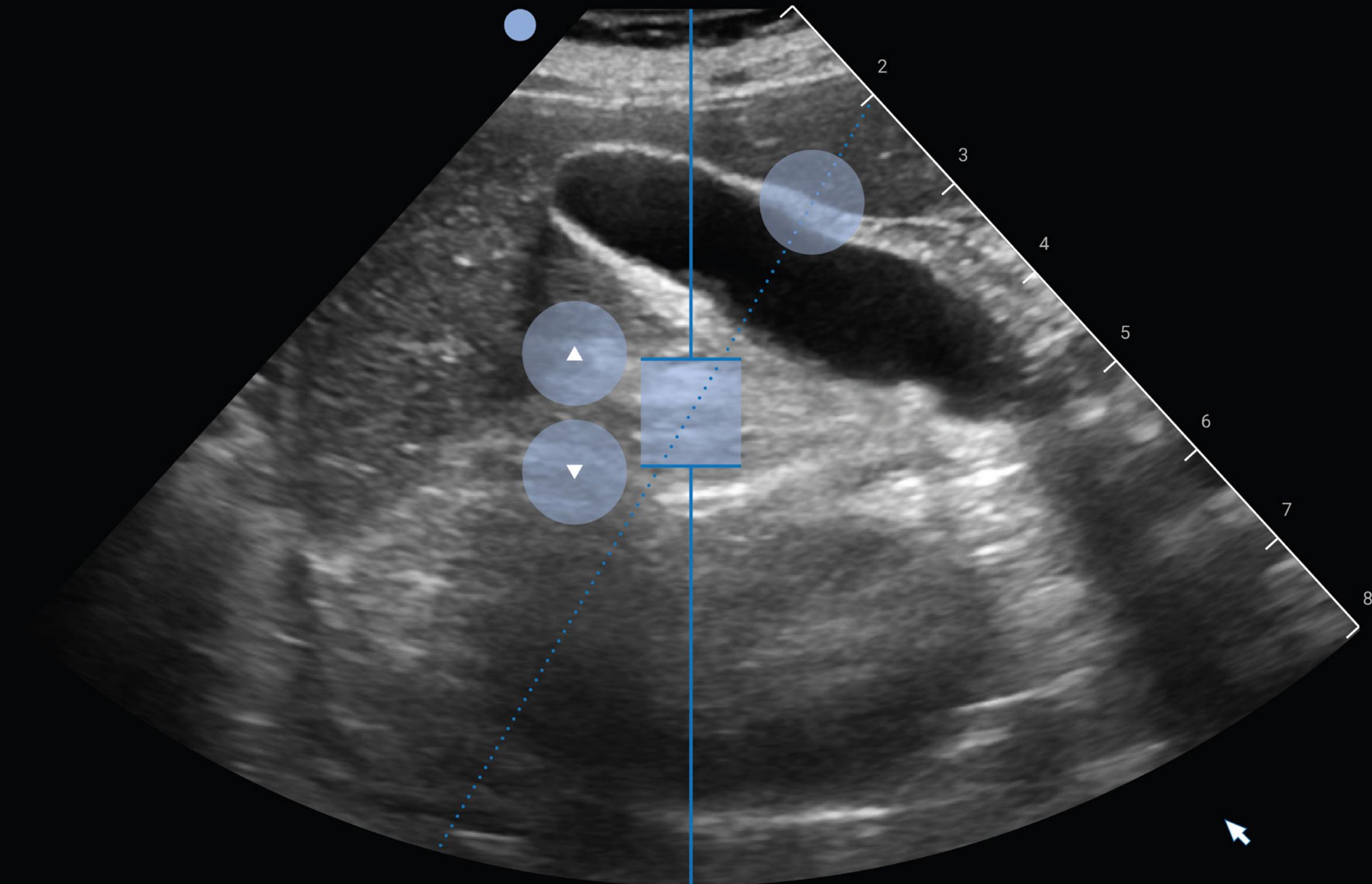
Dwt: 22cm

Ffe: 65cm

Wop: 23cm



Sun Mar 28 9:45



Joanne Spiro

1430.5629.7509

## Measurements

Transtemporal

MCA Dist

TAP -0.97cm/s

TAM -0.95cm/s

PSV 12.5cm/s

EDV 7.20cm/s

MDV -11.0cm/s

RRT -34.1cm/s

ET 210.0ms

RI 210.0ms

ACC 210.0ms

S/D 1.74

BBV 210.0ms

TTU 6.50cm

RET 7.3cm/s

Time 1060ms

HR 56bpm

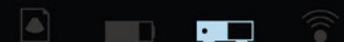
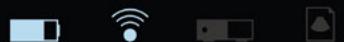
Ratio -0.51

Fujifilm Sonosite

Cedar Sinai - Emed

Riley Huntsman

Sunday March 28 9:45



CL24 Abdomen, MI: 0.5, 5cm - 12cm, TIS: 1.0

PW G:60, 3906hz, 5mm 0°, 6.50cm | Color DR:-2, G:50, 1263hz, Low | 2D G:50, DR: 0, Gen, 3906hz

Info

Volume

Brighten

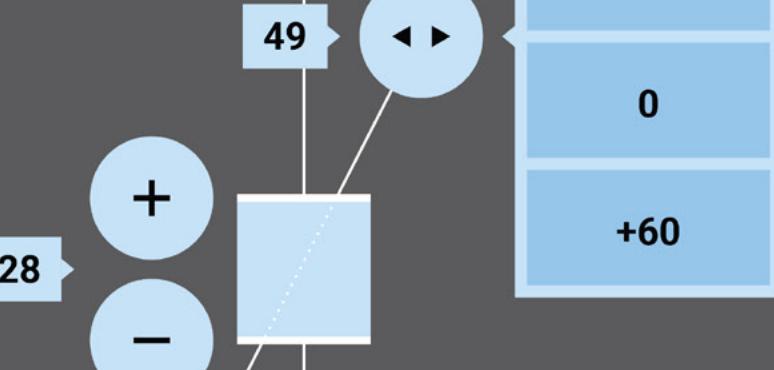
Home

2D Controls

Color Controls

Doppler Controls

## Doppler



START

Sono MB



Procedure

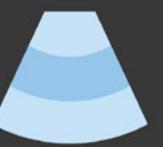


## Focus

Res

Gen

Pen



## Orientation

LU

RU

LL

RL



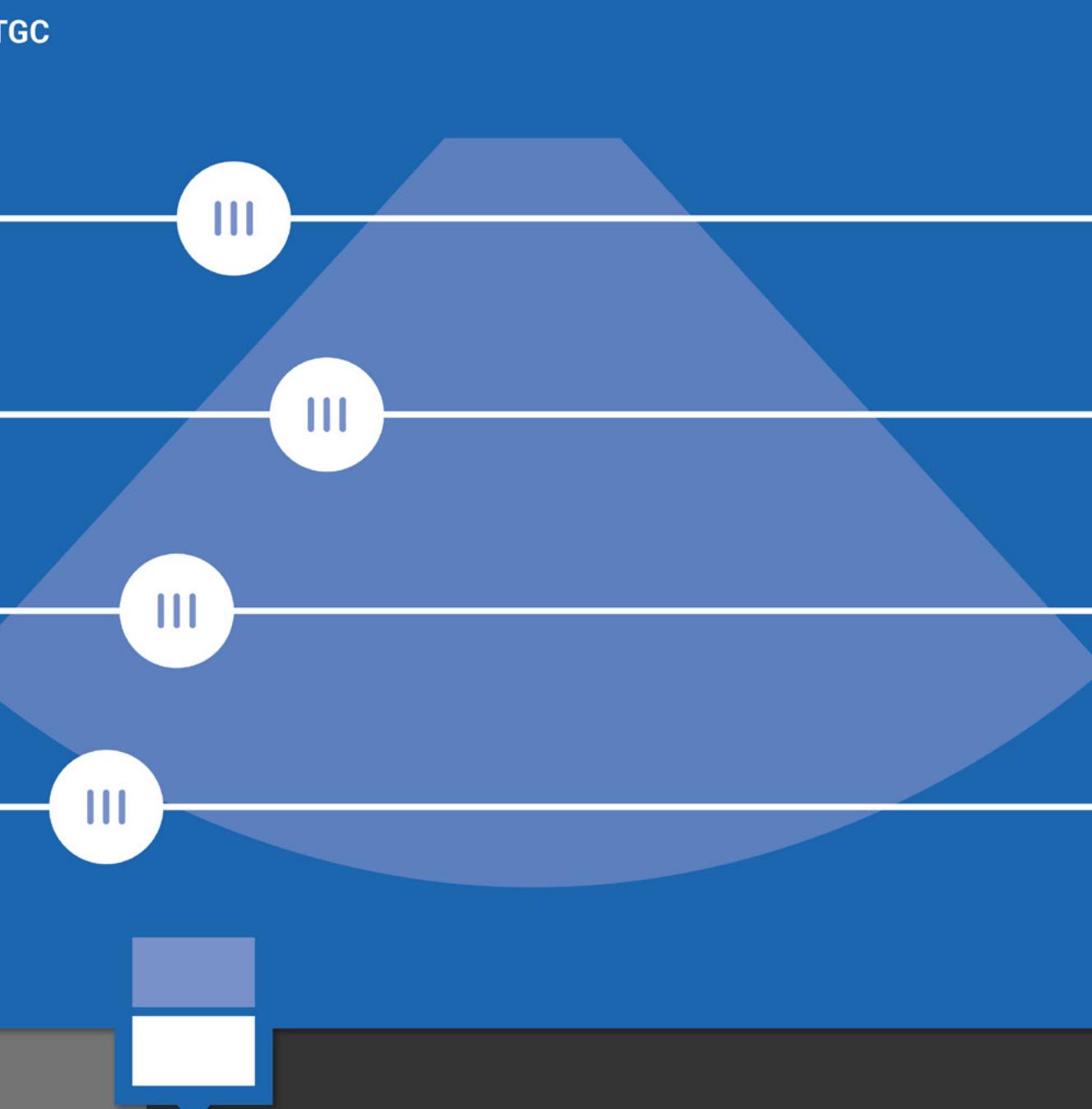
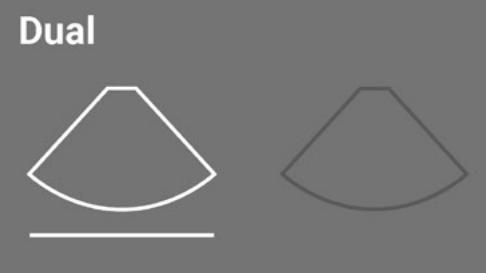
End Exam 01:23:15

Patient Patricia Cobalt

User Dr. Jones

Probe CL24 Abdomen

?



## Patient Info

Name

Last...

First...

Middle...

ID Number

ATP10089767 |

DOB

Tap to input...

Gender

Tap to input...

Accession Number

Tap to input...

## Facility

Reading Doctor

Tap to input...

Department ID

Tap to input...

7

8

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0



!@#



10:01:25 - End Patient

Transducer

Learn



Connor  
Herald

Report

Review

Calculate

Label

Measure

Abdomen

2D

Color

Doppler

Orientation



Dynamic Range +1



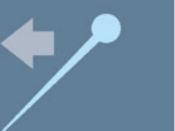
Needle Profiling



Right



Left



Steep



Mid



Shallow



Off



Image Optimization



Res



Gen



Pen



Dynamic Btn 1

Dynamic Btn 2

Dynamic Btn 2

Dynamic Btn 4

More Controls



Patient

Abdomen

Report

Review

Calculate

Label

Measure

Learn

2D

Color

Doppler

Orientation

Res

Gen

Pen

Needle

Right

Left

Steep

Mid

Shallow

Off

Orientation



Dynamic Btn 1

Dynamic Btn 2

Dynamic Btn 2

Dynamic Btn 4

More Controls

# Welcome, what would you like to do?

---



## Scan

Start scanning with  
your PHX system



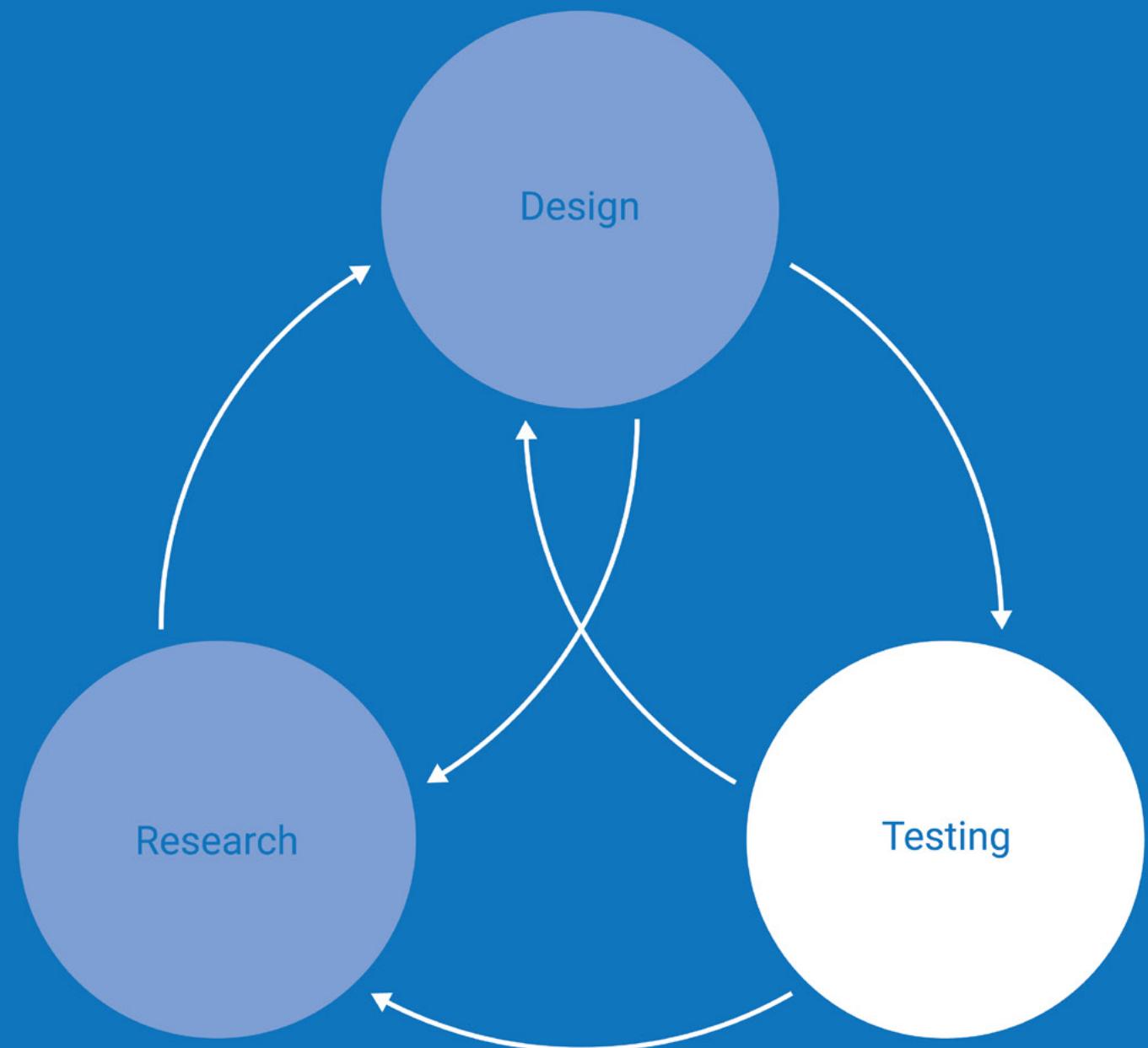
## Guide

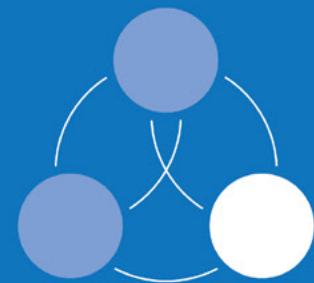
Enter Patient Info  
Select Exam  
Optimize Image



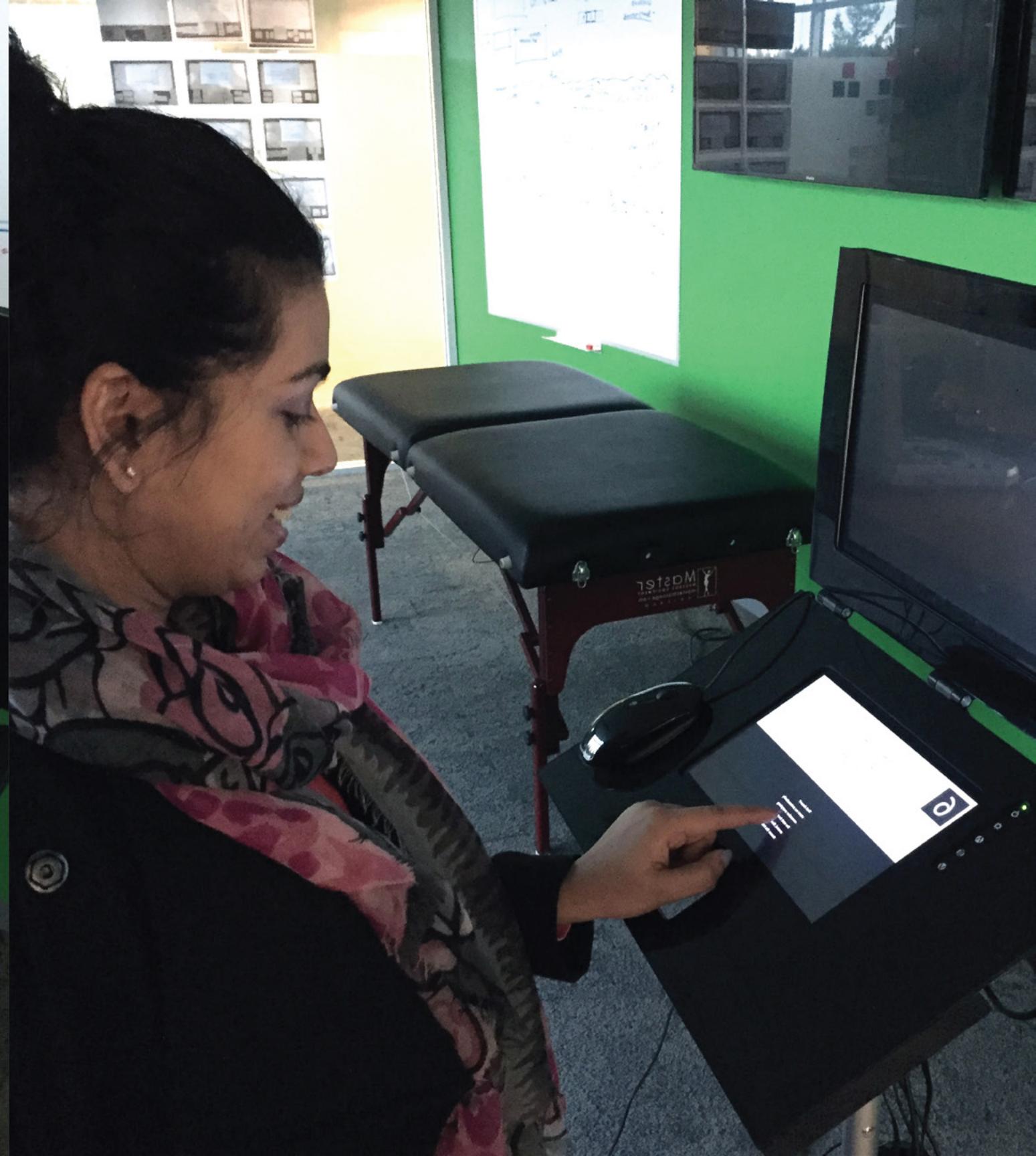
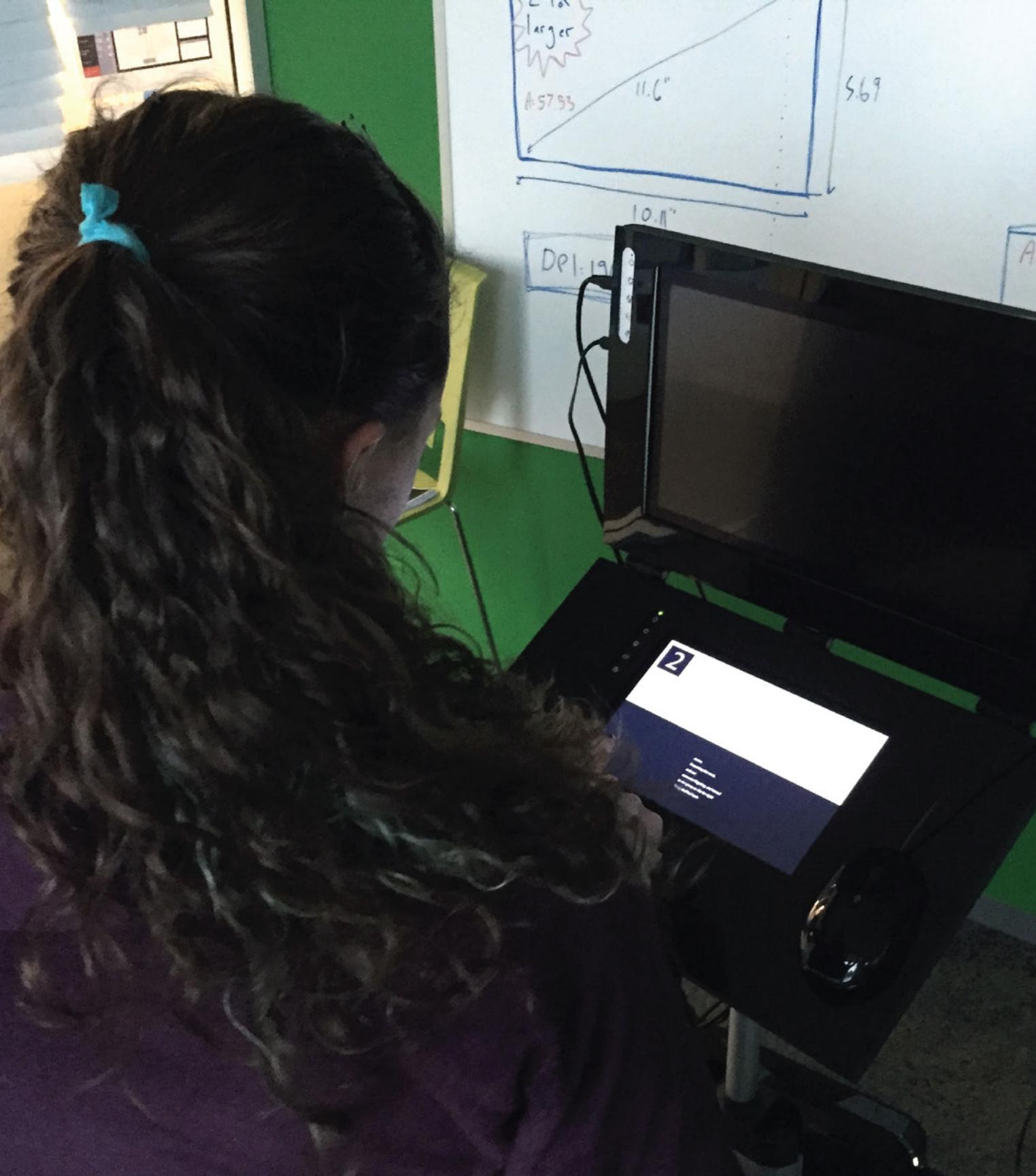
## Learn

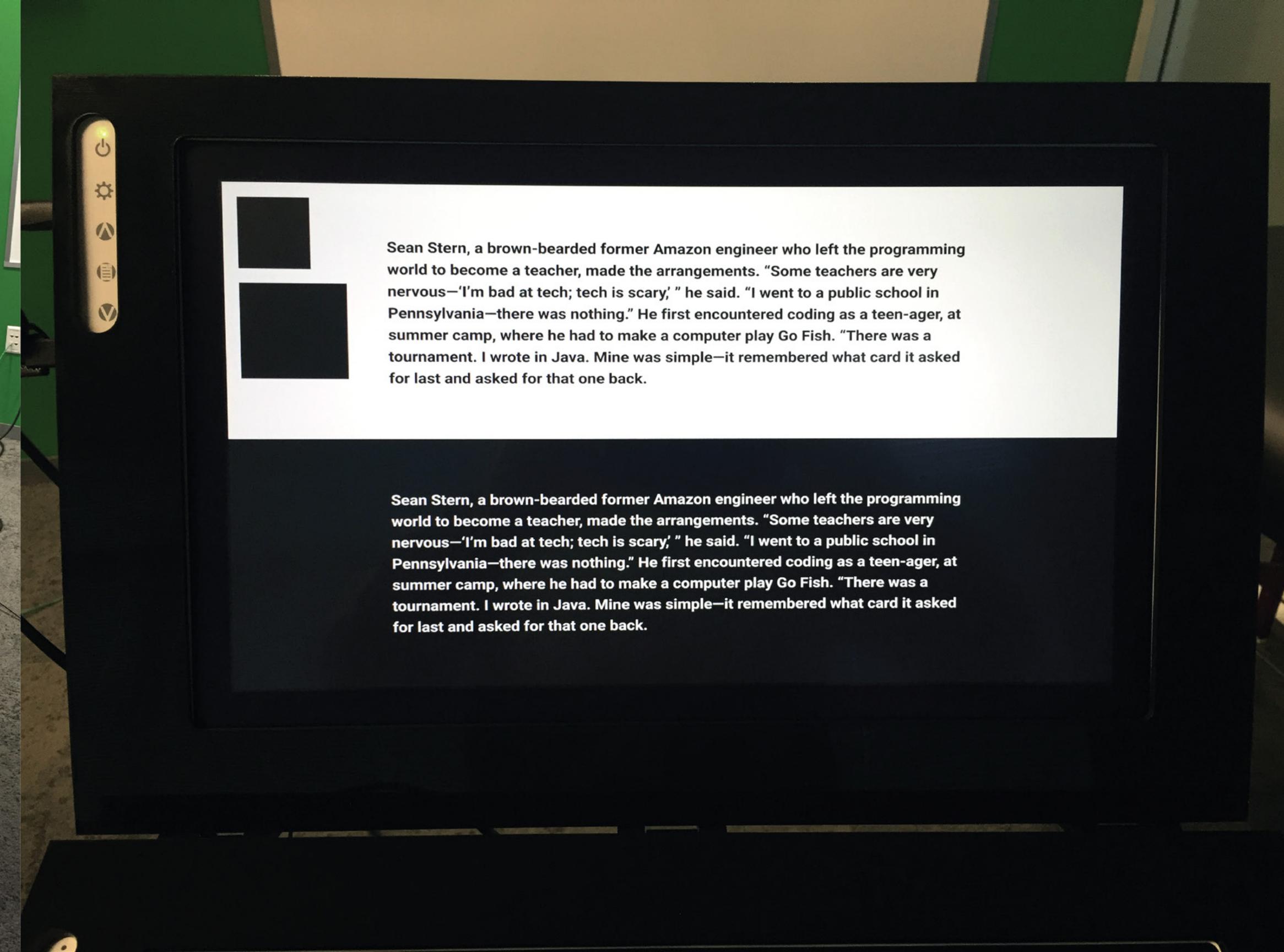
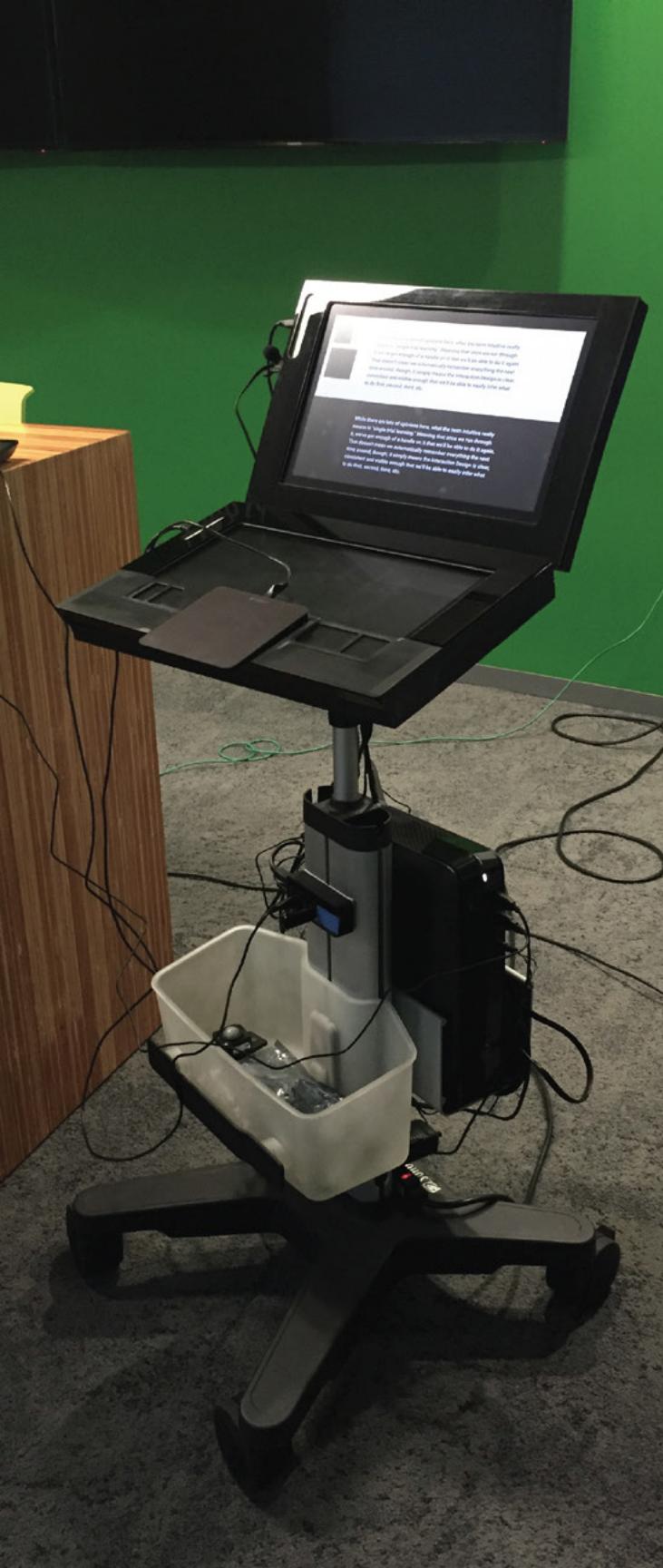
Watch videos & learn  
ultrasound techniques





During the testing phase, we partnered with human factors engineers. The engineers recruited representative users to come into the office to use the interfaces that were created during the design phase. The participants were asked to complete several task flows that mimicked real world scenarios. Their successes and failures were recorded and fed into the next round of design ideation.





**Sean Stern**, a brown-bearded former Amazon engineer who left the programming world to become a teacher, made the arrangements. "Some teachers are very nervous—'I'm bad at tech; tech is scary,' " he said. "I went to a public school in Pennsylvania—there was nothing." He first encountered coding as a teen-ager, at summer camp, where he had to make a computer play Go Fish. "There was a tournament. I wrote in Java. Mine was simple—it remembered what card it asked for last and asked for that one back.

**Sean Stern**, a brown-bearded former Amazon engineer who left the programming world to become a teacher, made the arrangements. "Some teachers are very nervous—'I'm bad at tech; tech is scary,' " he said. "I went to a public school in Pennsylvania—there was nothing." He first encountered coding as a teen-ager, at summer camp, where he had to make a computer play Go Fish. "There was a tournament. I wrote in Java. Mine was simple—it remembered what card it asked for last and asked for that one back.



Why did you leave?



I left because I felt held back. The minimum viable product (MVP) was often deemed 'good enough'. I want to elevate the interfaces I work on to excellence. I believe excellence is effective visual communication and efficient interaction design.

I left because my skill set was under utilized. I wanted to be challenged to translate the design concepts into functional code rather than just images. I wanted to be challenged to create infographics and illustrations rather than just buttons.

What could you have  
done better?

I am always striving to become a greater design professional.



Moving forward, I will do a better job of communicating to my colleagues that I value their inputs and backgrounds. I will be confident in assuming that they reciprocate this appreciation (even if they don't directly communicate so).

At Sonosite, I was so eager to influence the UI that I may have alienated senior designers. Moving forward, I will trust that my senior designers have the best intentions for me, the product, and the department. I will be more proactive in backing their visions.

What are your primary  
takeaways?



Overall, Sonosite was an incredible experience. I am so happy that I had the opportunity to learn and grow there. Prior to my time with Sonosite, I did not fully value all of the skill sets that go into creating, marketing, and distributing a successful product. The greatest takeaways that I have are a more full appreciation of the product life cycle and the people who are involved in the process.

# Thank You!