

# THE SIMPLE LAYOUT OF A COMPLEX INTERFACE

---

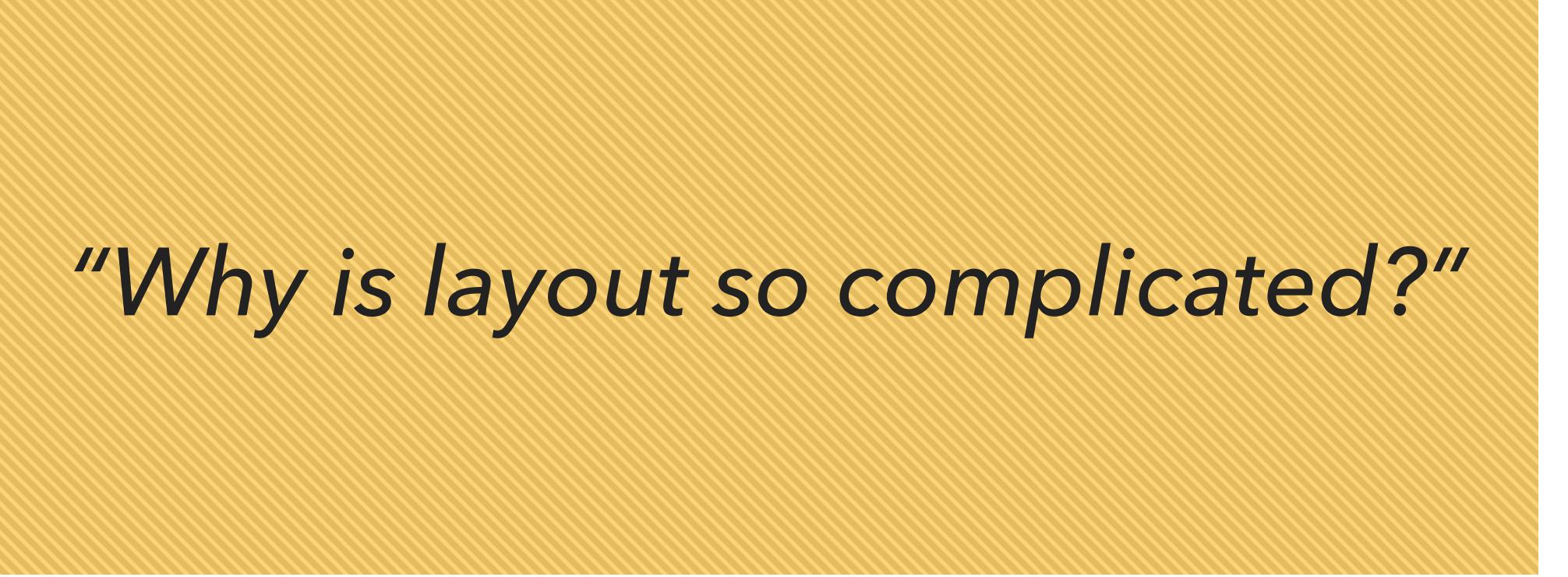
Agnes Vasarhelyi



@vasarhelyia



Topology Eyewear



*“Why is layout so complicated?”*

- The developer

“WHY IS LAYOUT SO COMPLICATED?”

---

Because it needs to react to changes.

## WHAT KIND OF CHANGES?

---

Status bar height changed

Device orientation changed

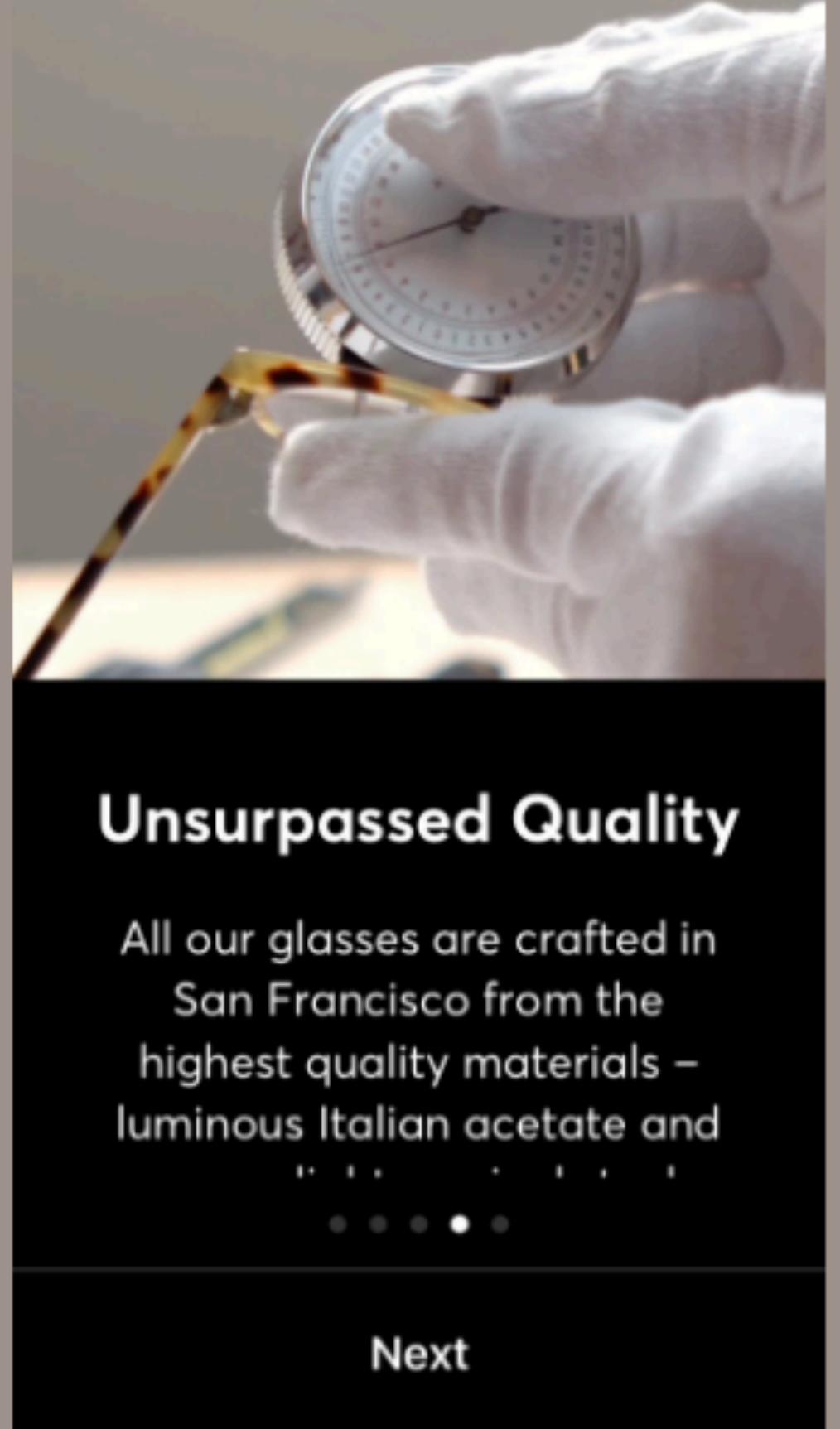
Your app is now presenting in split view

User added more than three items to list

Something finished downloading

External (superview's bounds change)

Internal (view's size changes)



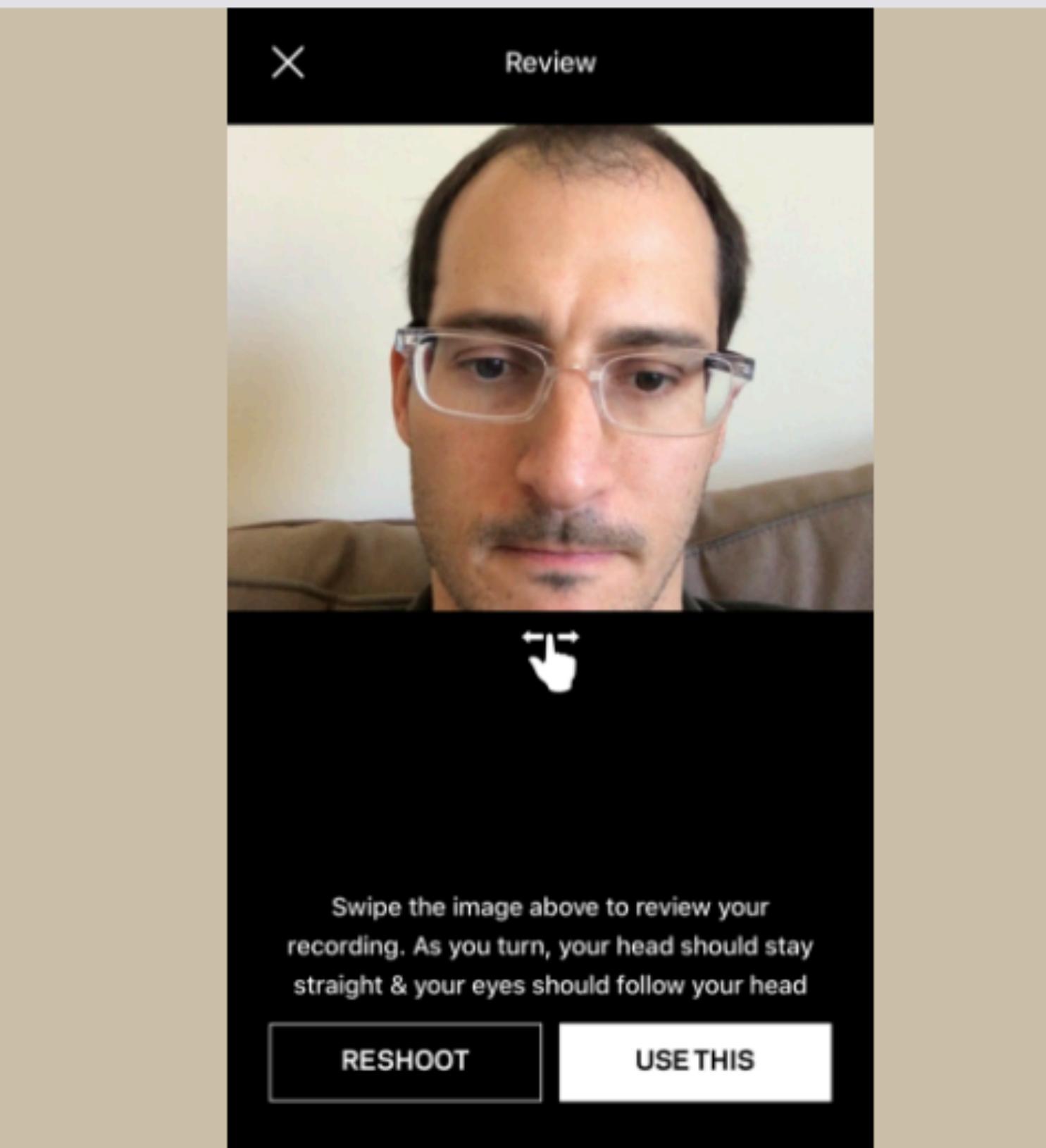
## FTUE layout issues on iPhone 5s

1 3



Fix Rx screen to work on accursed iPad

1



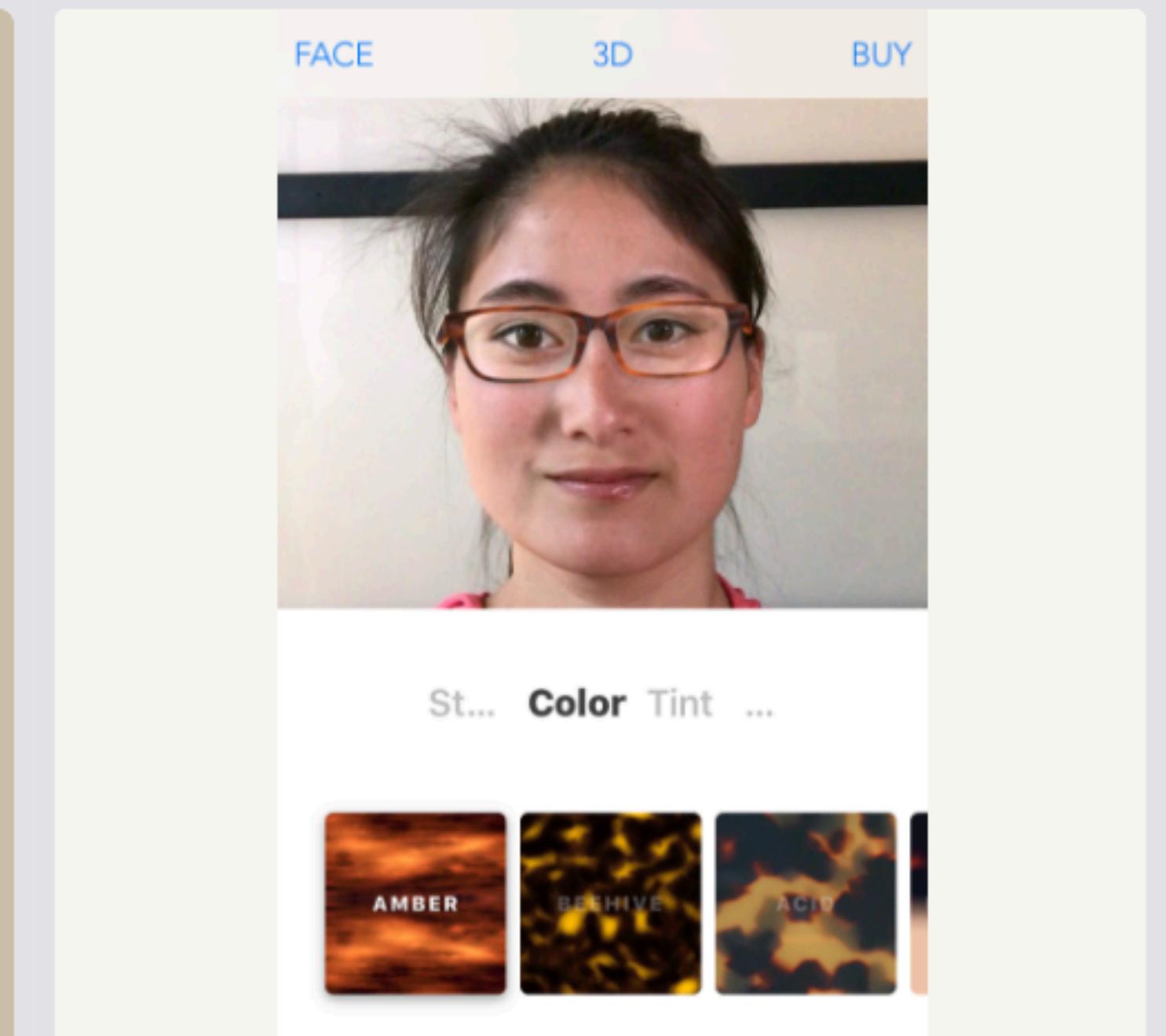
improve text layout on 5.5" screen during selfie capture review

1 1

iPhone 8 Plus - iOS 11.1

## Home screen layout width issues: 4", 5.5" devices

1 3 0/2



TRY-ON NEW FACE SCAN

Accessibility Settings: Dynamic Type, Bold Text, Display Zoom can mess up our design picker layout (esp. segmented control)

3 6



## WHAT TOOLS DO WE HAVE?

---

Frame layout

Autoresizing masks

Auto Layout

## WHAT TOOLS DO WE HAVE?

---

	Frame layout	Autoresizing masks	Auto Layout
Position	manual	manual	automatic (external, internal)
Size	manual	automatic (external)	automatic (external, internal)

## WHAT IS AUTO LAYOUT?

---

Linear equations for determining the size and position  
of items in a layout.

## WHAT I LIKE ABOUT AUTO LAYOUT

---

-  **Maintainable code**
-  **Reduced state**
-  **Simple set of rules**

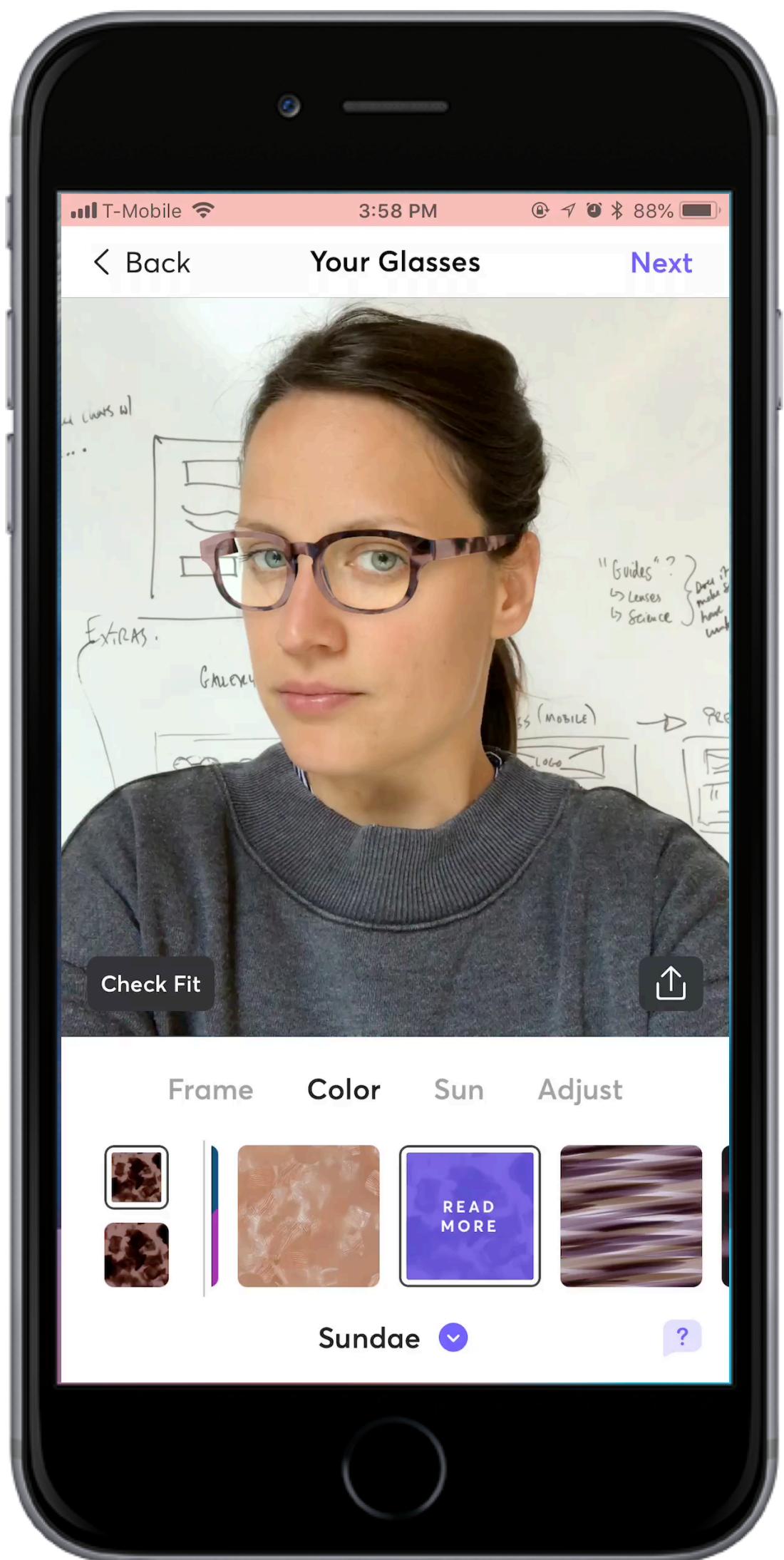
## SEVEN THINGS TO KNOW ABOUT AUTO LAYOUT

---

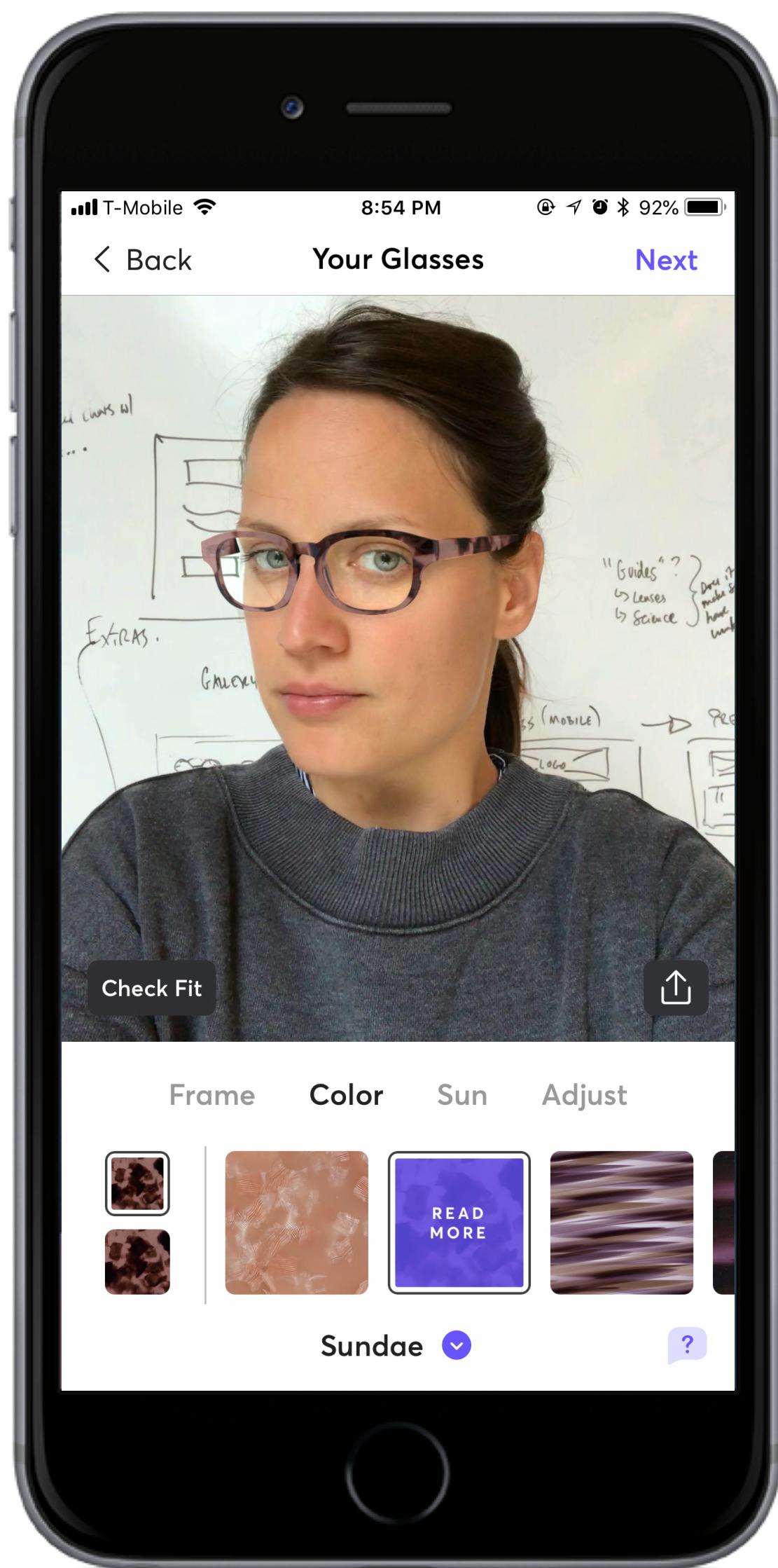
1. Constraints
2. Layout correctness
3. UIStackView
4. Safe area
5. UILayoutGuide
6. Debugging
7. Auto Layout performance

# TOPOLOGY APP

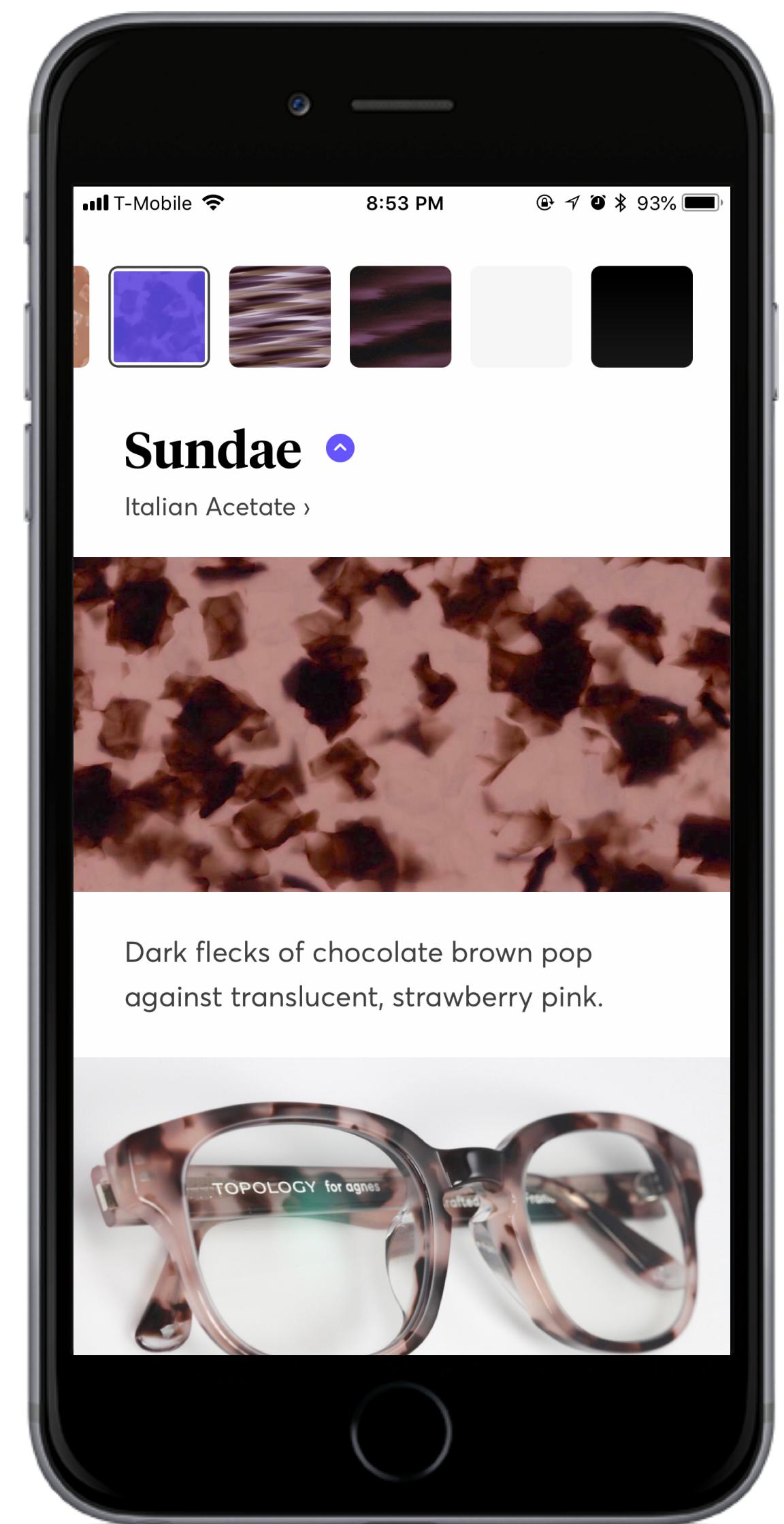
---



# TOPOLOGY APP



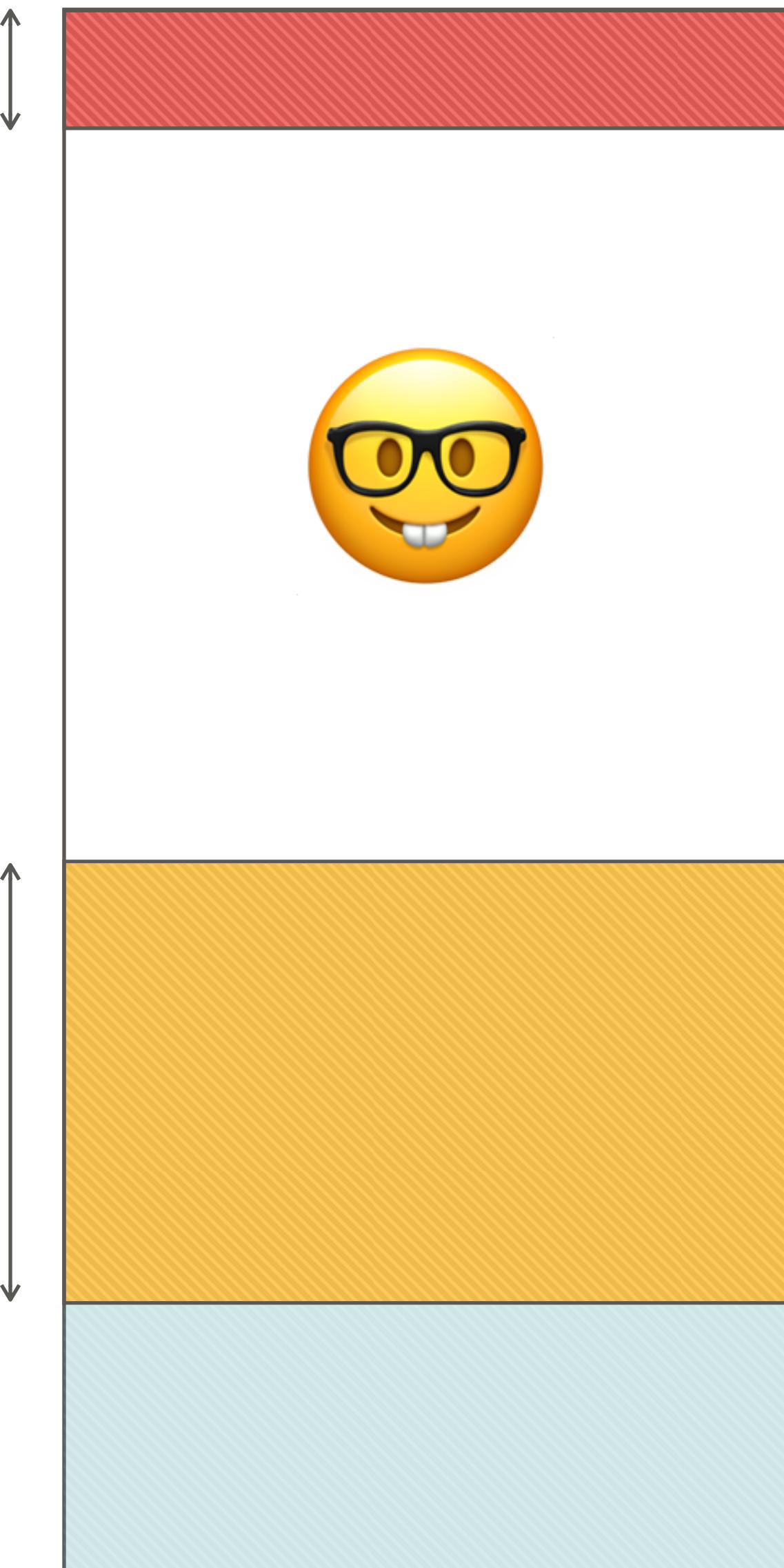
"TryOn"



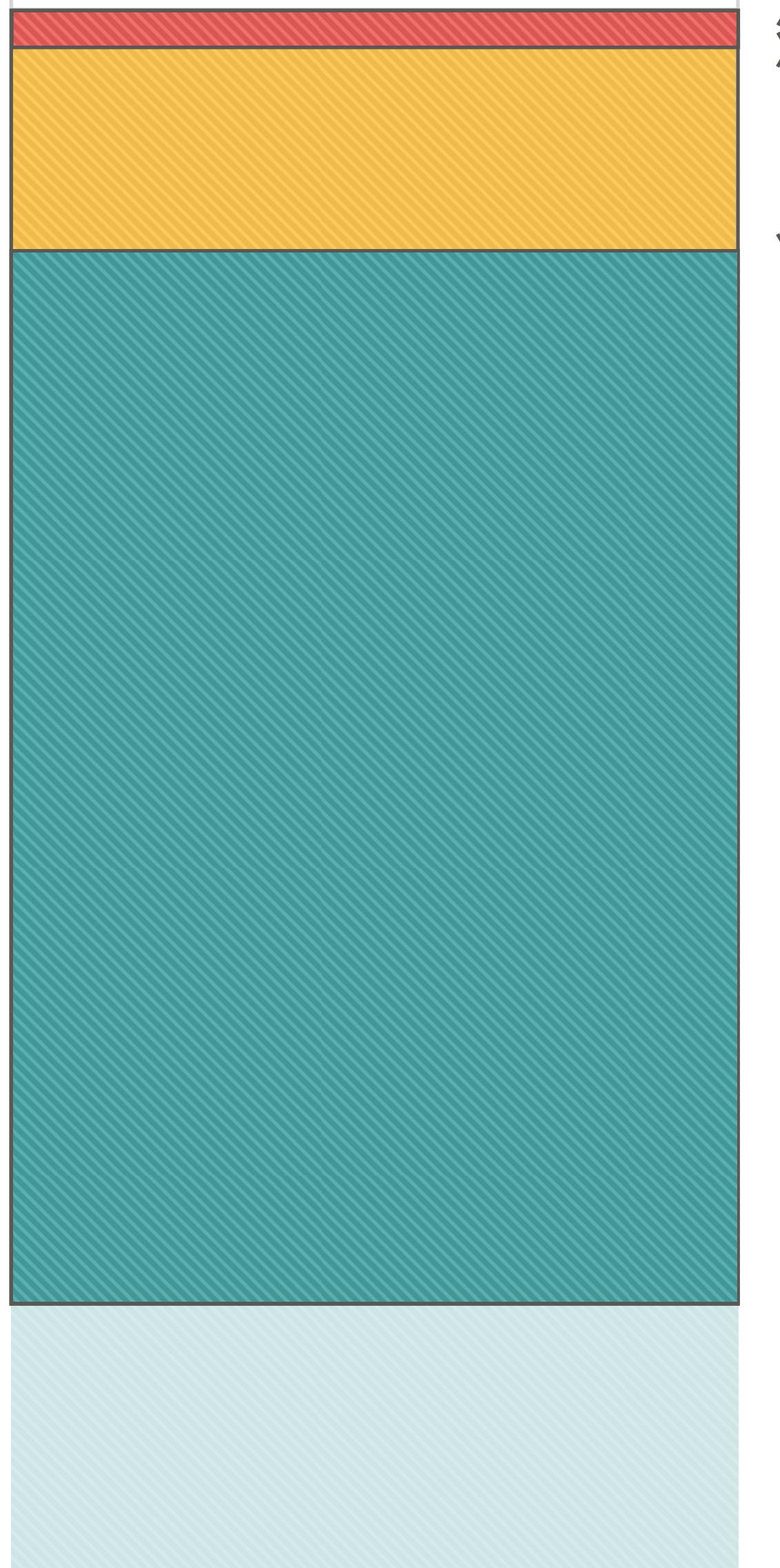
"Product Info"



“TryOn”



“Product Info”



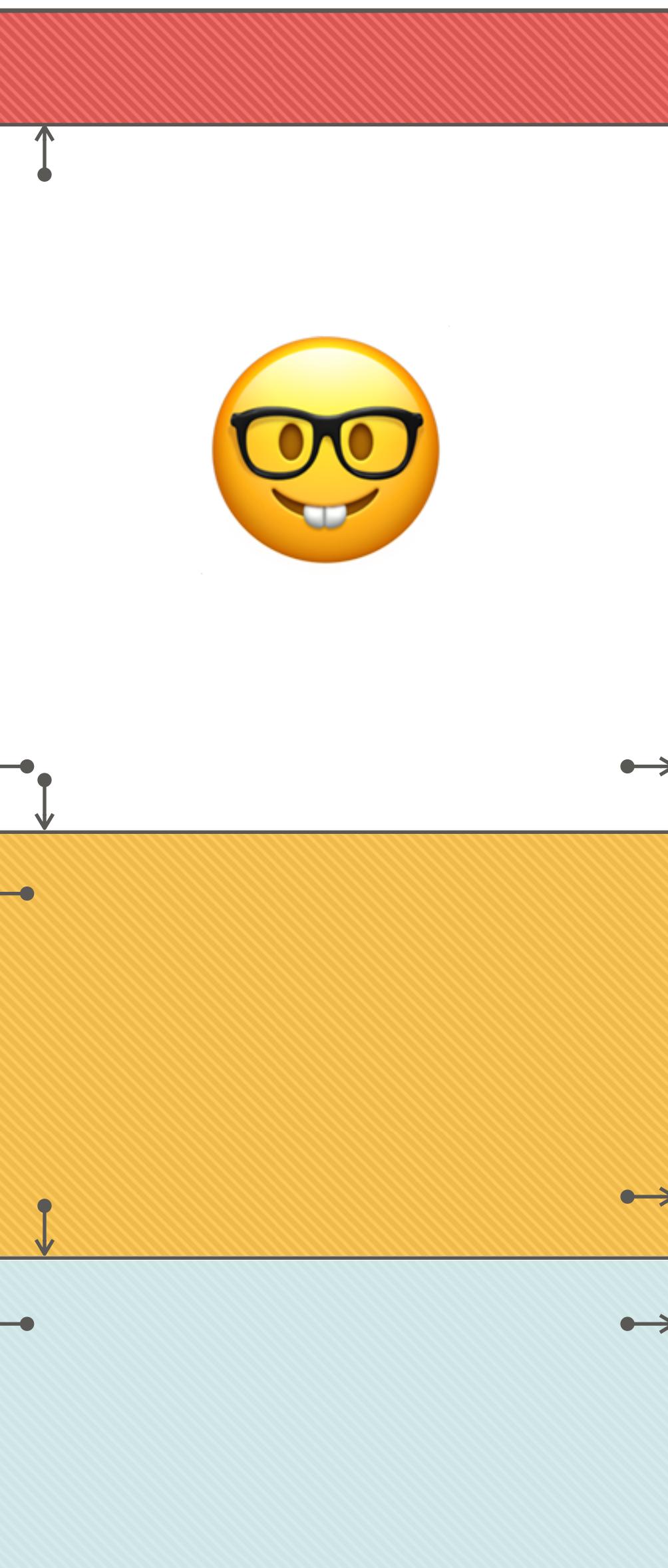
1.

---

# CONSTRAINTS

1. Size

2. Position

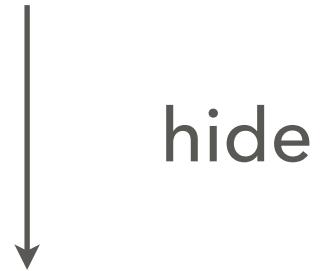


## 1. CONSTRAINTS

---

### Constraint constants

```
let shareHeightConstraint: NSLayoutConstraint =  
shareView.heightAnchor.constraint(equalToConstant: 34).isActive = true
```



```
shareHeightConstraint.constant = 0
```



```
shareHeightConstraint.constant = 34
```

## 1. CONSTRAINTS

---

`setNeedsLayout()`

`layoutIfNeeded()`

# LAYOUT CORRECTNESS

ambiguous



not enough constraints

unsatisfiable

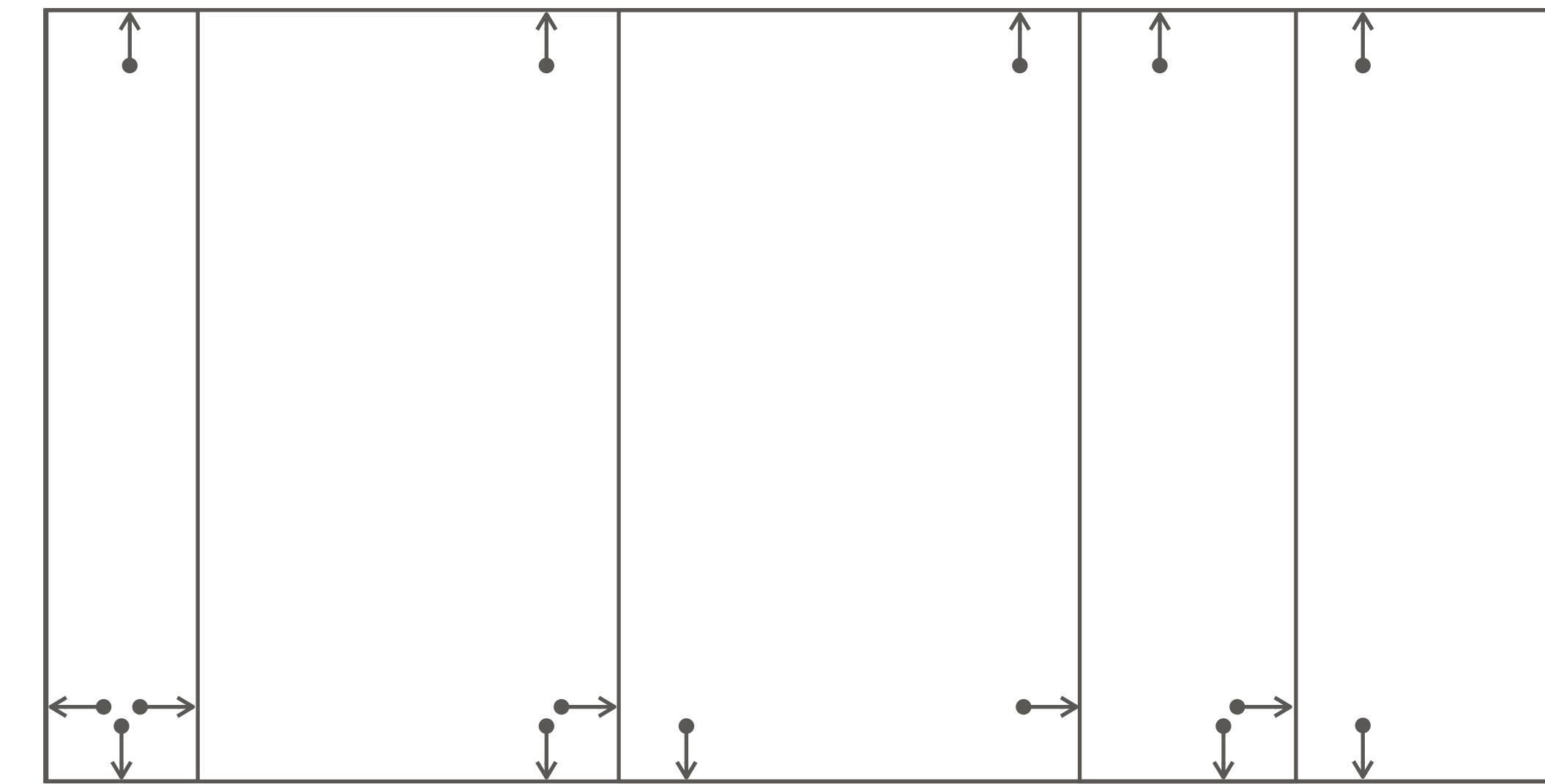
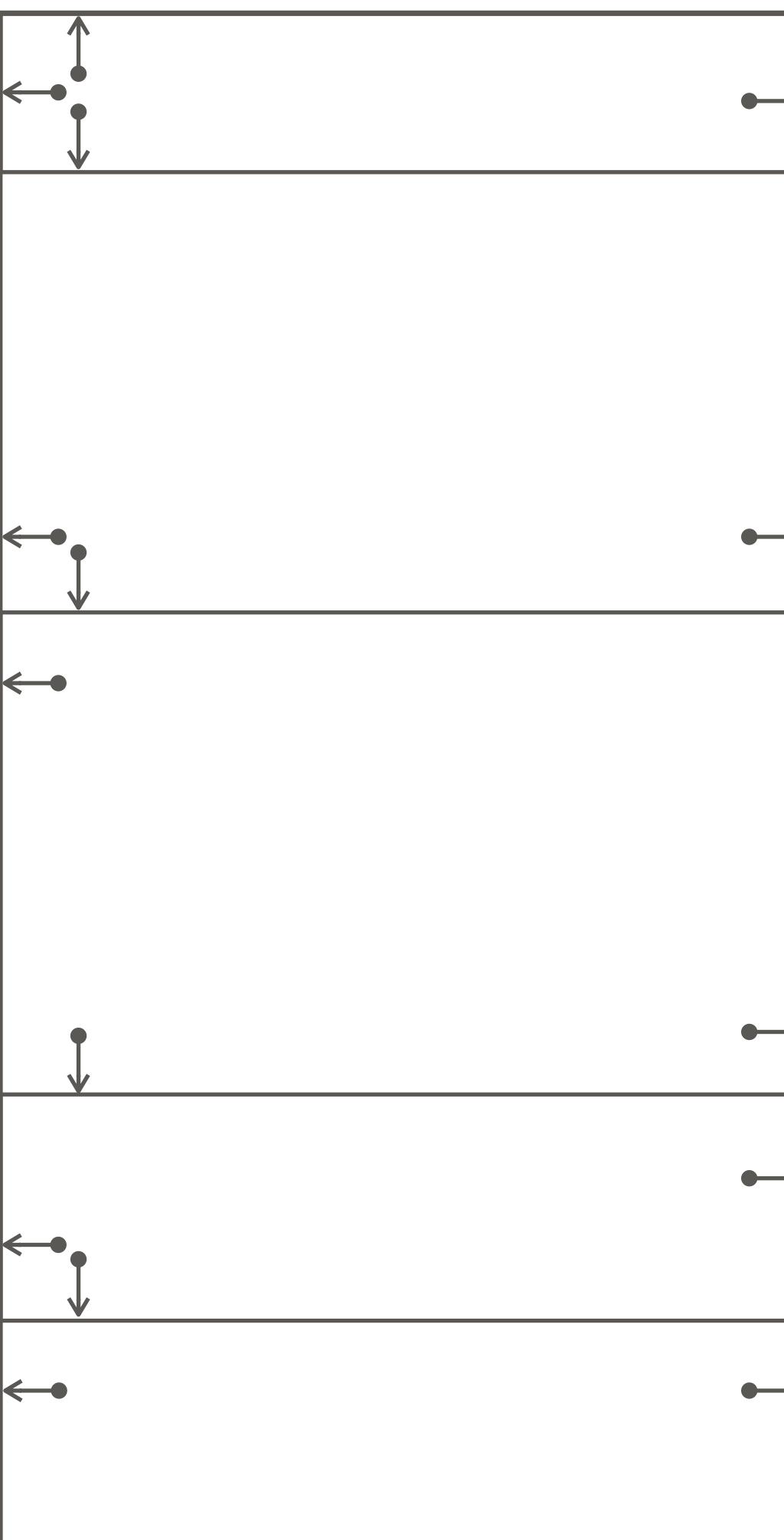


too many constraints

### 3. UISTACKVIEW

---

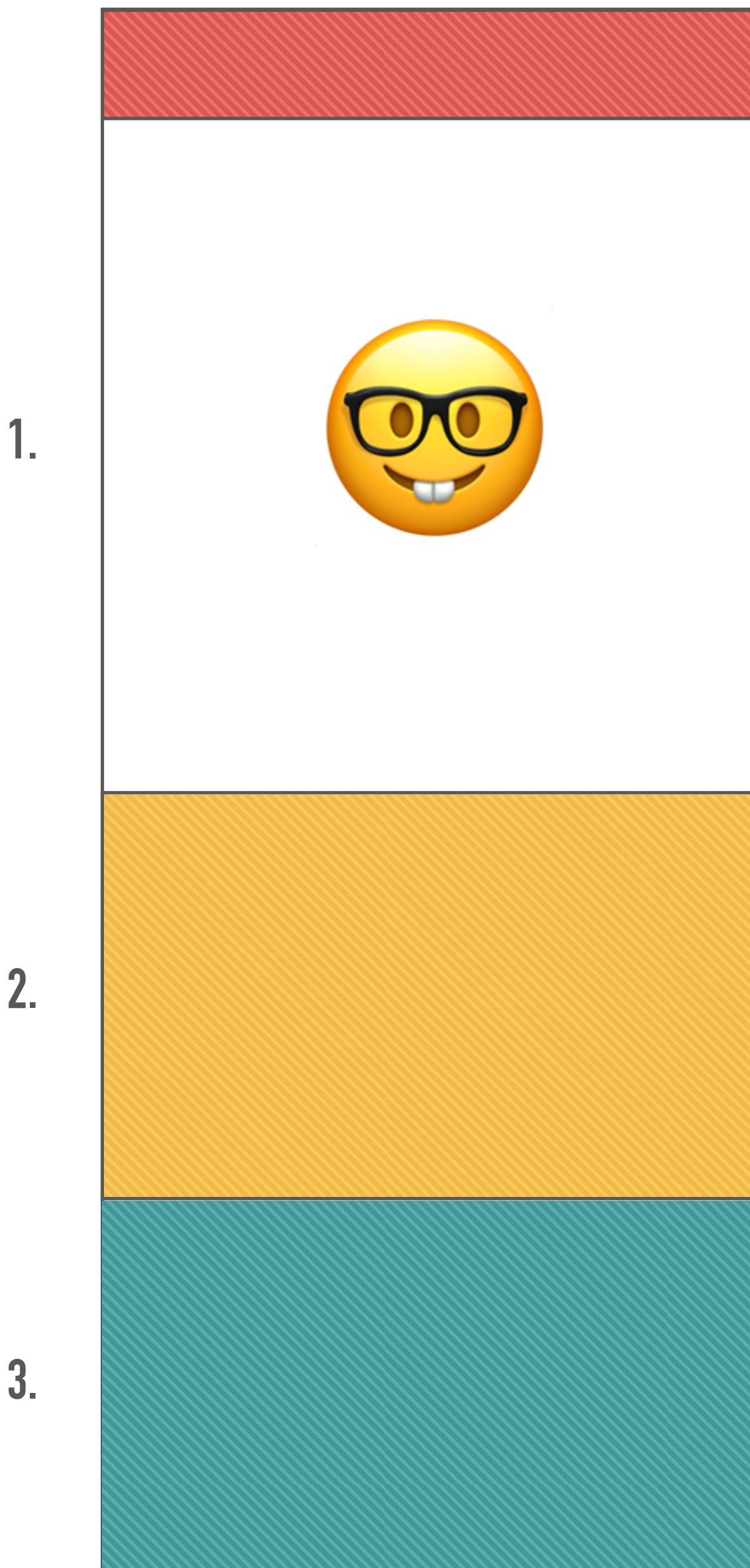
## UISTACKVIEW



### 3. UISTACKVIEW

---

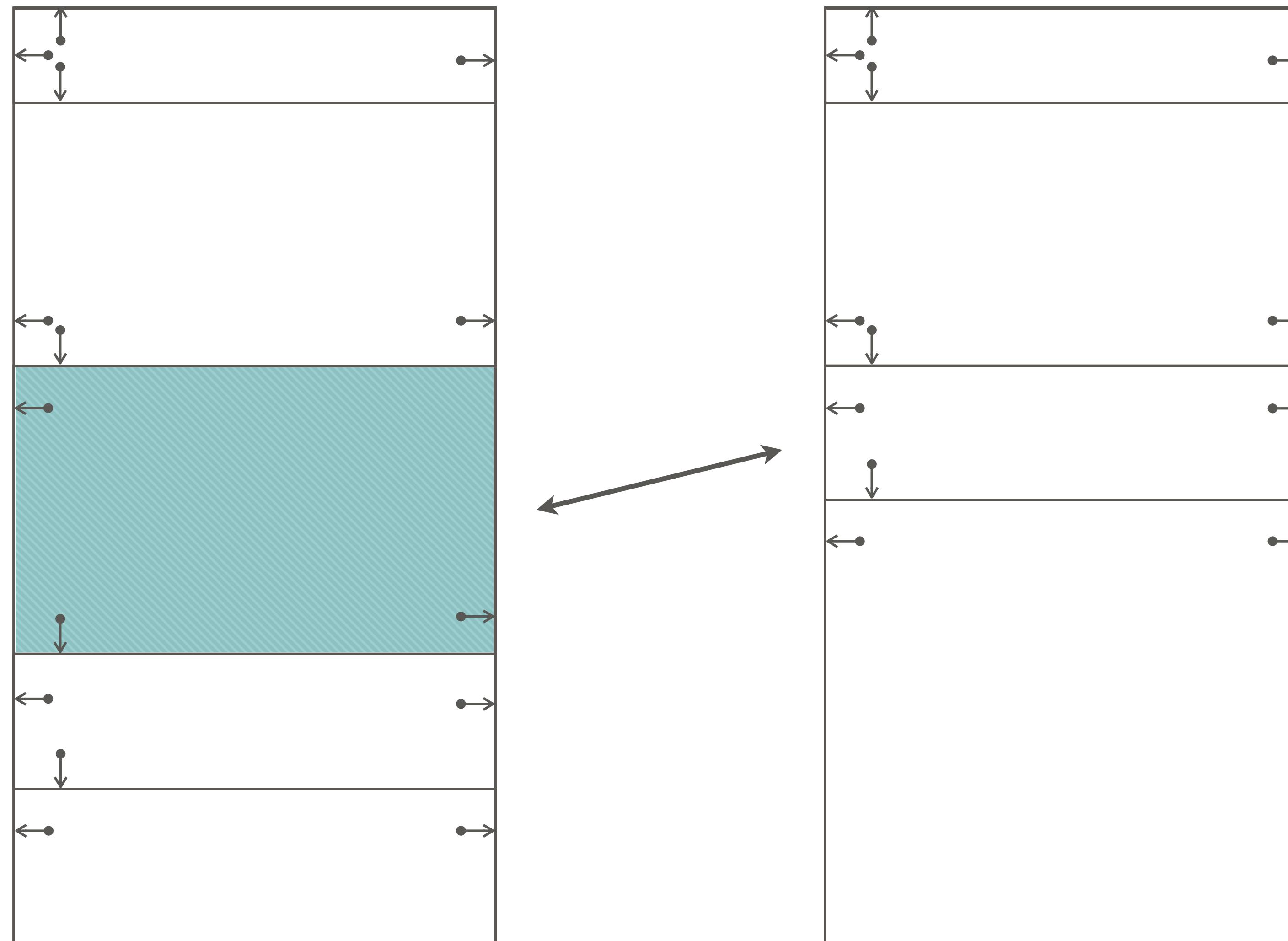
```
stackView.axis = .vertical  
stackView.alignment = .fill  
stackView.spacing = 0
```



### 3. UISTACKVIEW

---

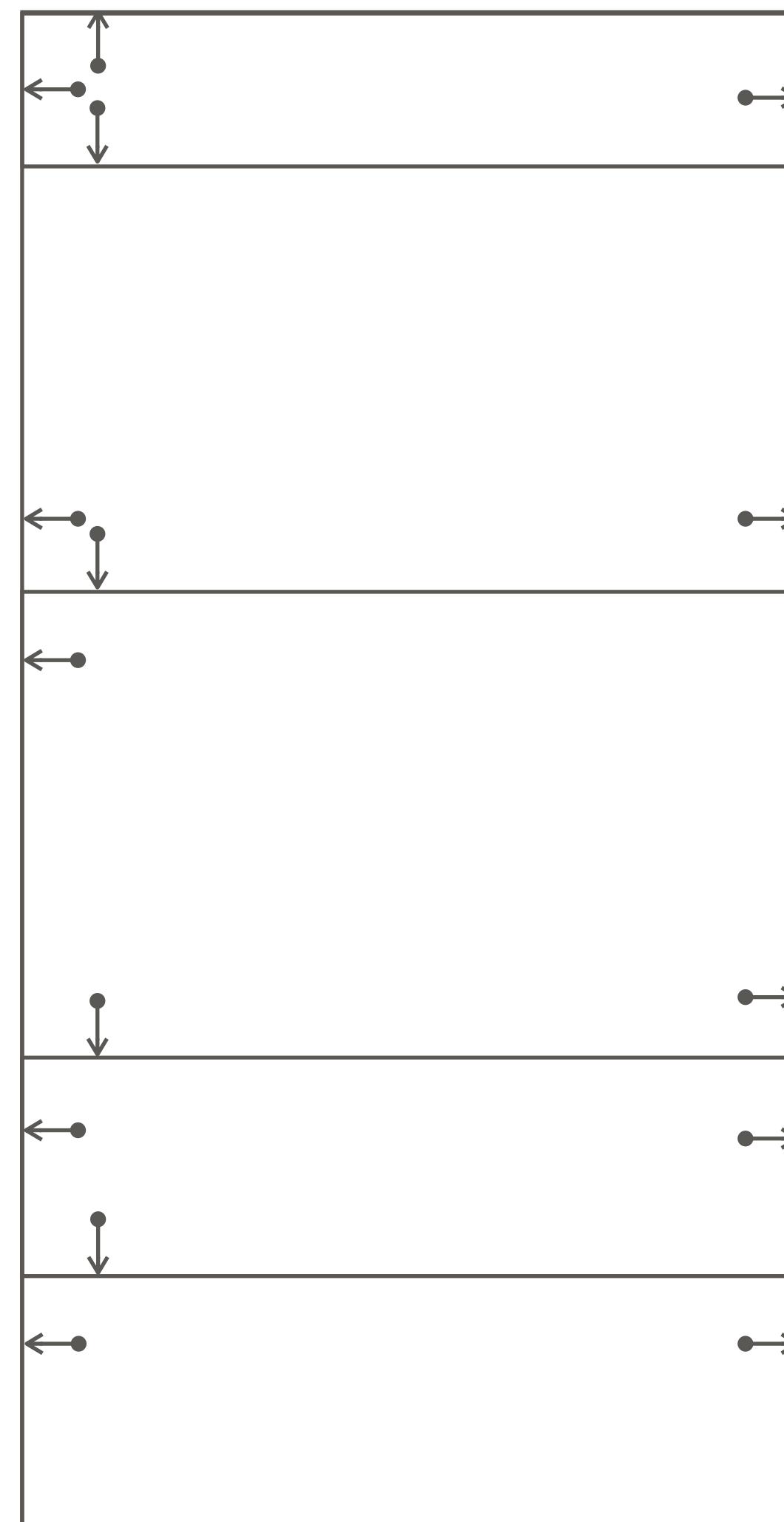
**isHidden** changes the layout



### 3. UISTACKVIEW

---

can't set backgroundColor



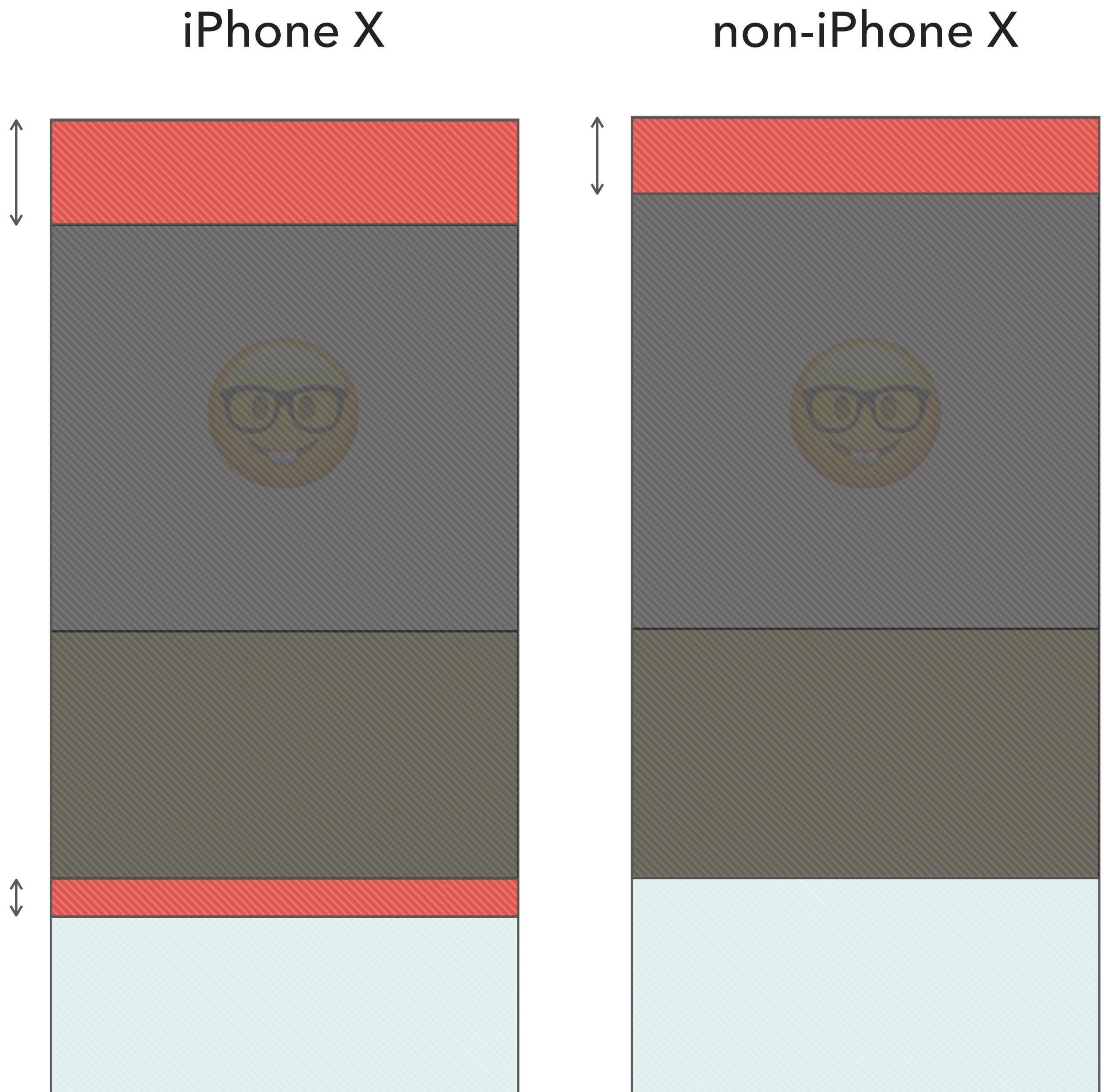
## 4. SAFE AREA

---

# SAFE AREA

safeAreaLayoutGuide (iOS 11)

- “Unsafe” area
- Safe area



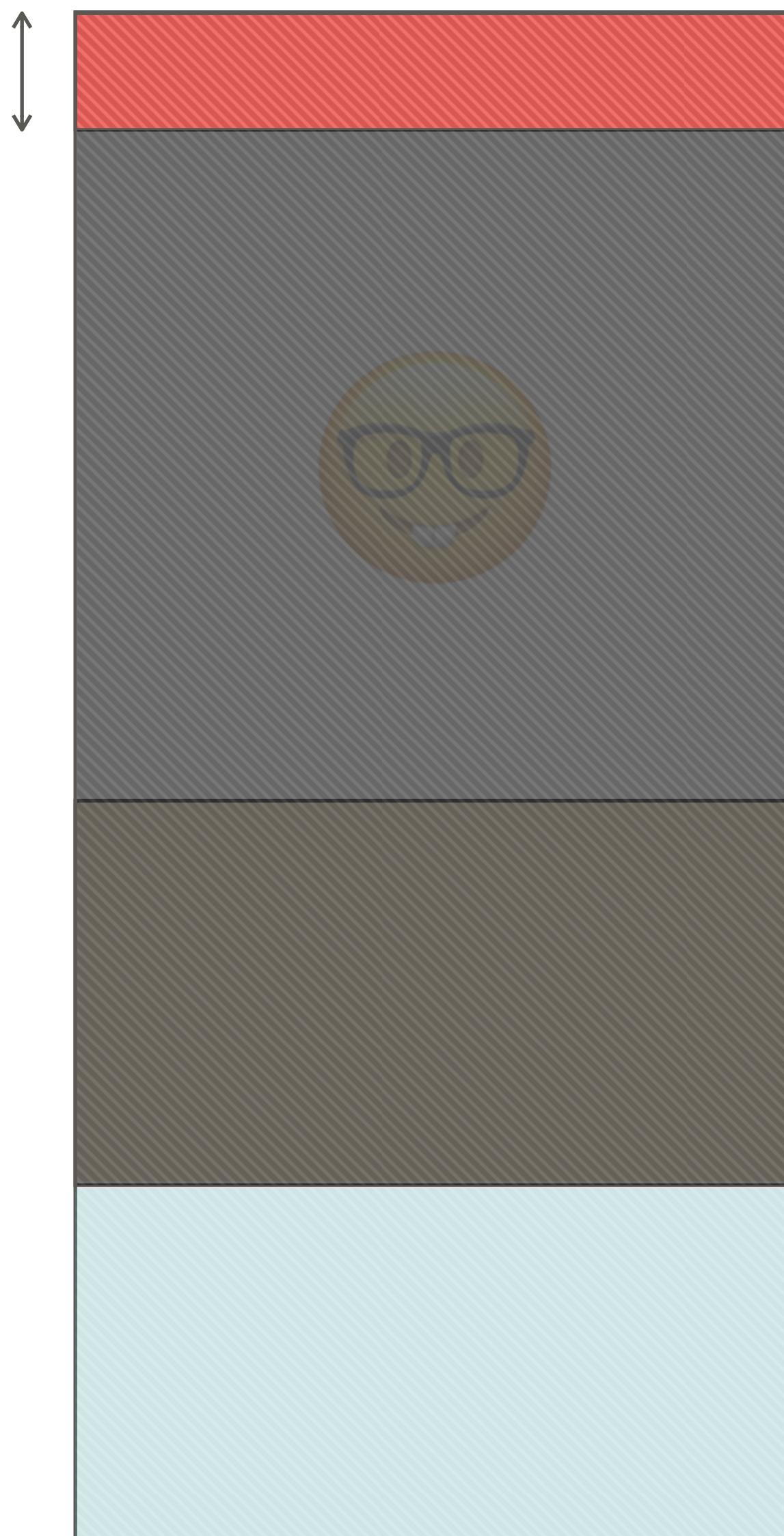
## 4. SAFE AREA

---

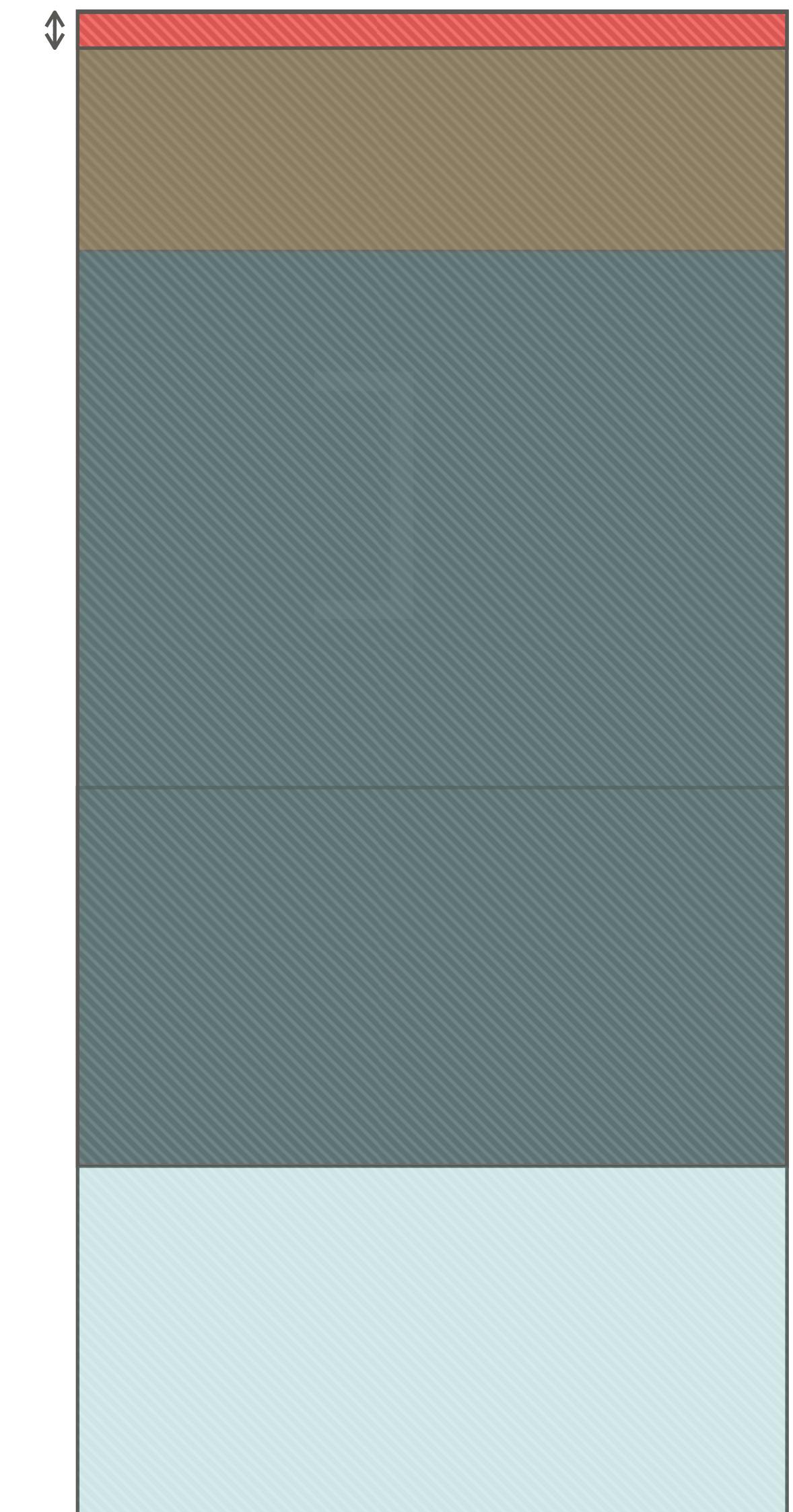
layoutMarginsGuide (iOS 10)

- “Unsafe” area
- “Safe area”

UINavigationBar



UINavigationBar





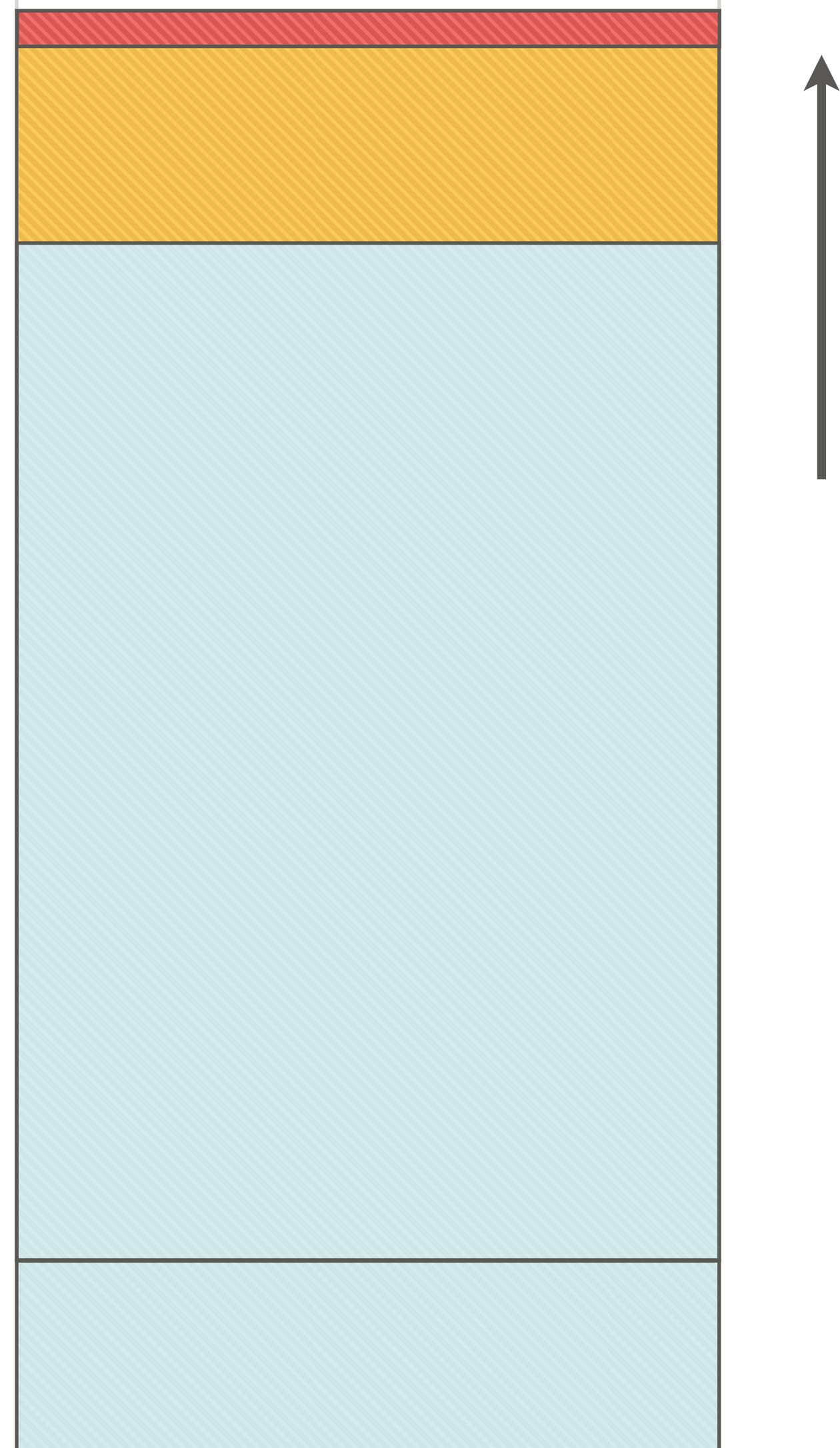
## 4. SAFE AREA

### Constraint Inequalities

■ Design Control (floating above stack view)

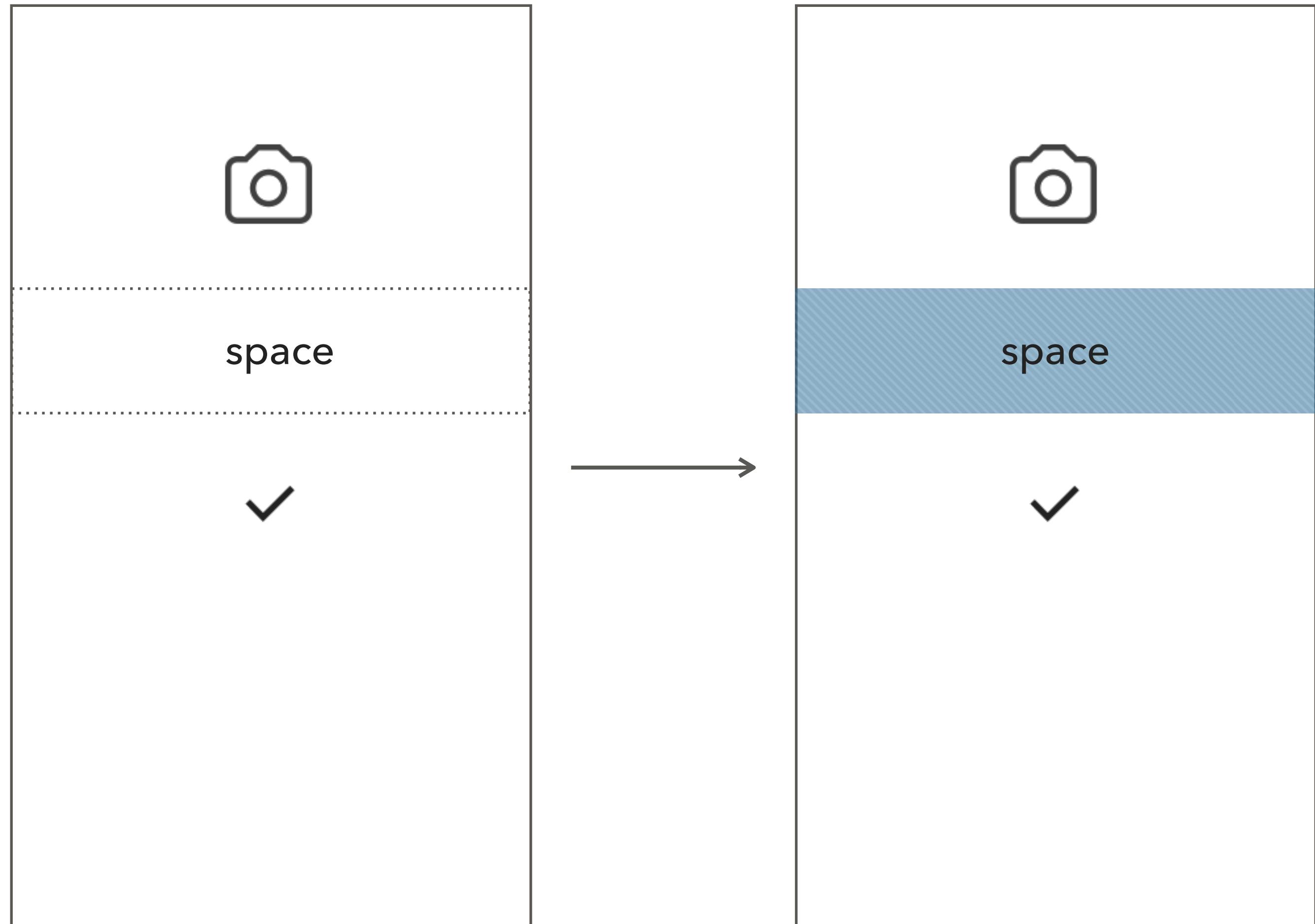
```
designControl.topAnchor  
.constraint(greaterThanOrEqualTo:view.safeAreaLayoutGuide.topAnchor)
```

“Product Info”



# UILAYOUTGUIDE

Replace “dummy views”

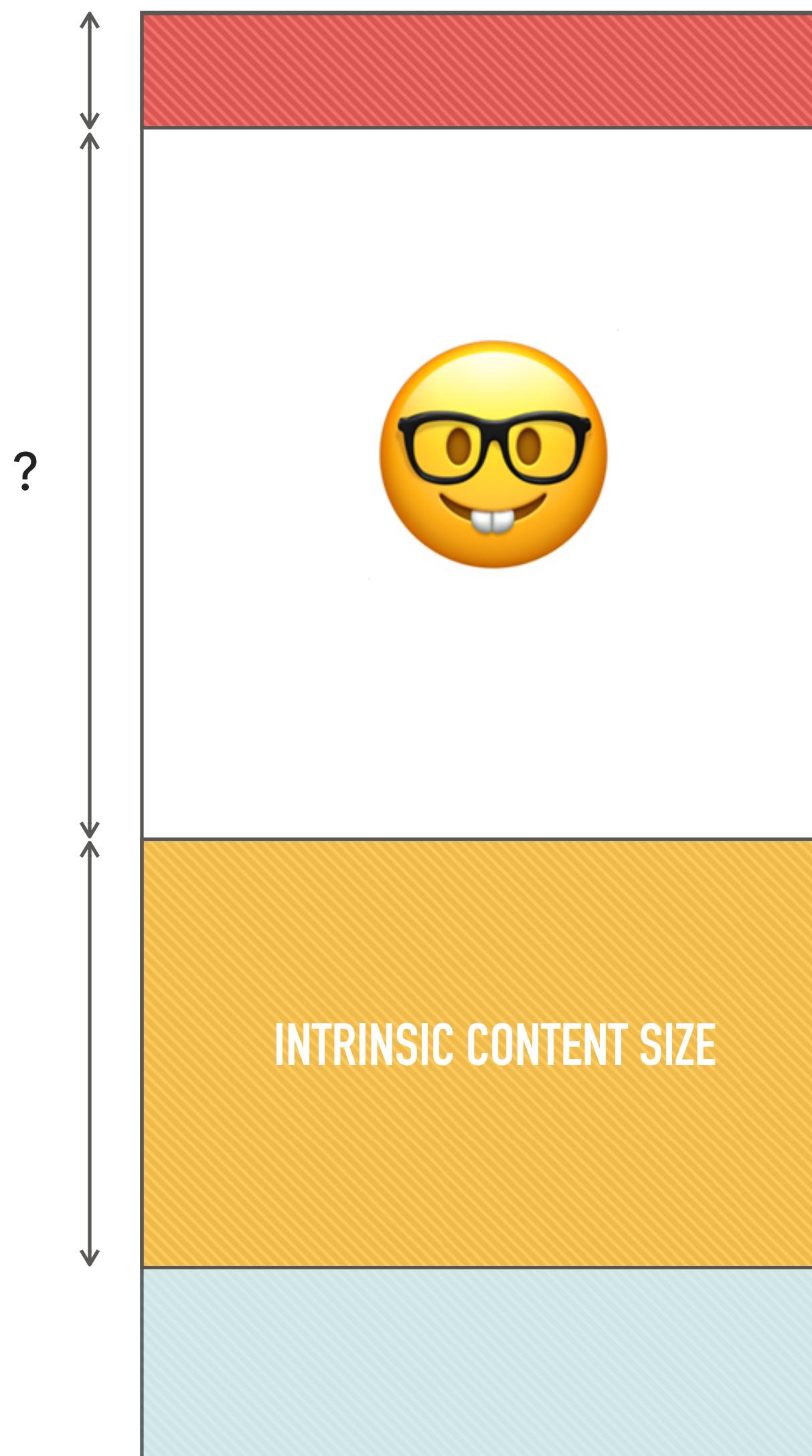


dummy view

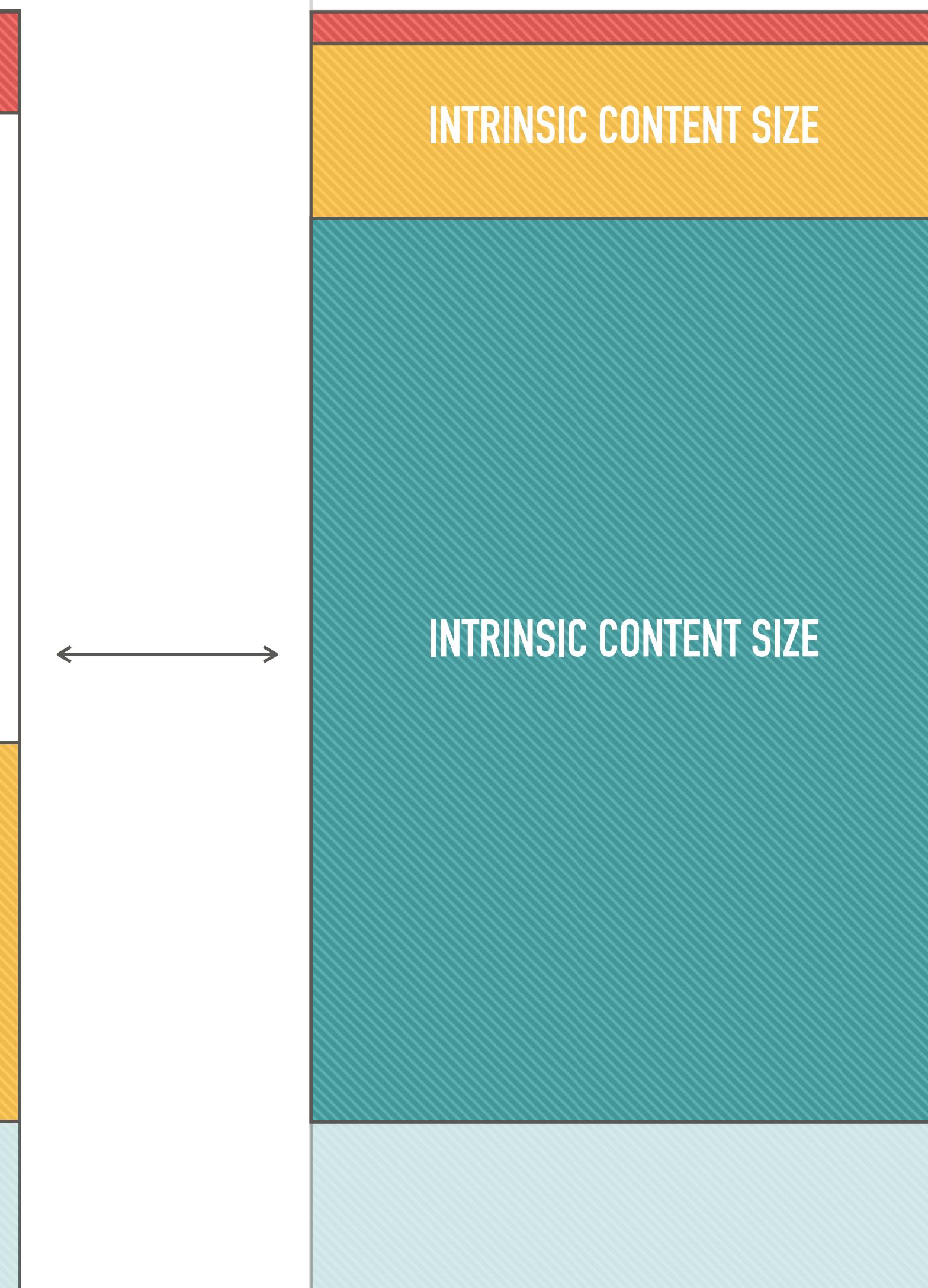
UILayoutGuide



“TryOn”



“Product Info”



## 5. UILAYOUTGUIDE

---

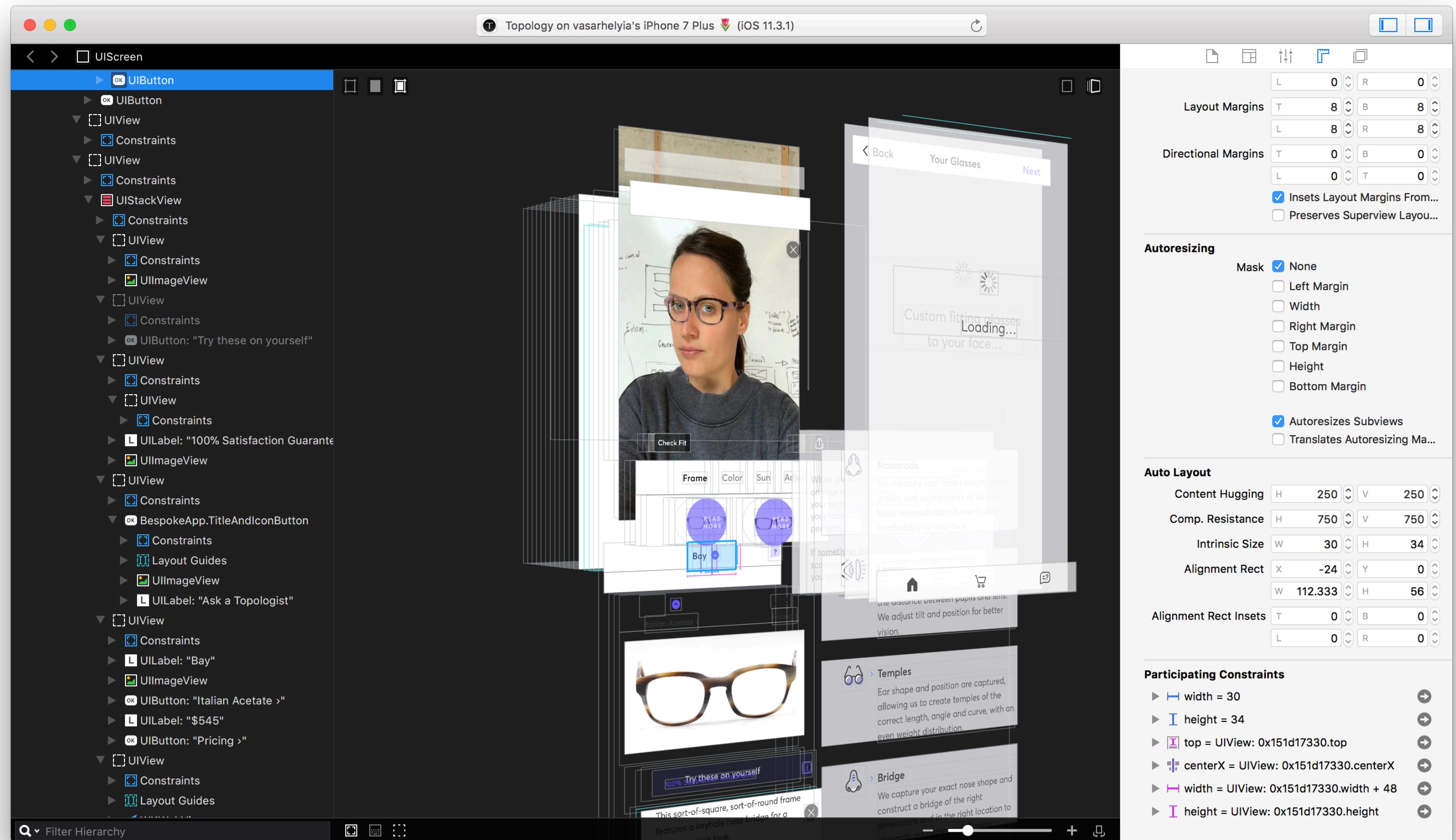
“TryOn”



## 6. DEBUGGING

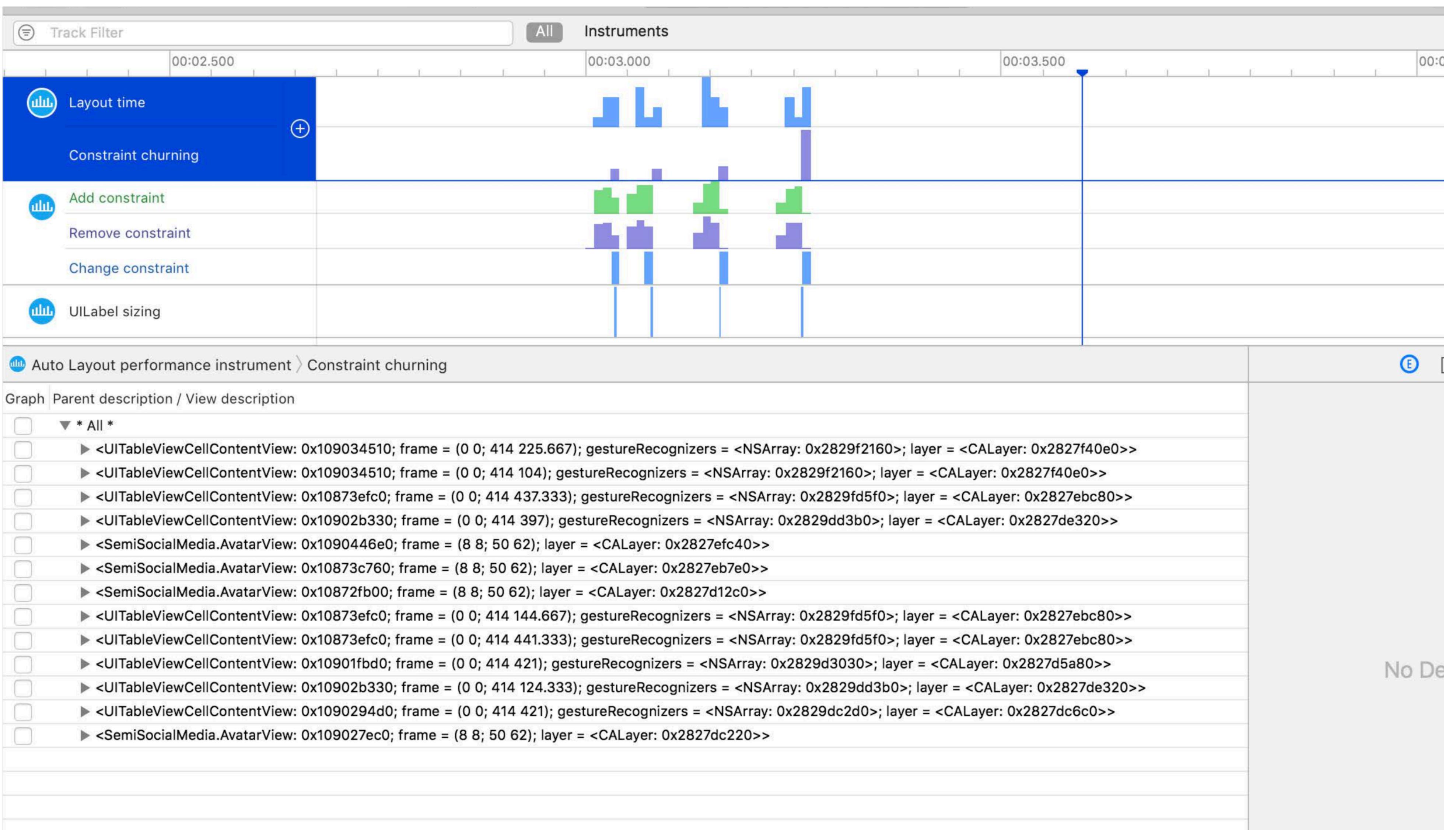
# DEBUGGING AUTO LAYOUT

Reveal



## 6. DEBUGGING

### Instruments (beta preview)



## 7. AUTO LAYOUT PERFORMANCE

---

*"You only pay for what you use with Auto Layout."*

- Ken Ferry (Apple)

## 7. AUTO LAYOUT PERFORMANCE

---

 Don't churn constraints

 Model the problem naturally

 Think of AL engine as a layout cache and tracker

## REFERENCES

---

### High Performance Auto Layout session at WWDC '18

<https://developer.apple.com/videos/play/wwdc2018/220/>

### Auto Layout documentation

[https://developer.apple.com/library/content/documentation/UserExperience/Conceptual/AutolayoutPG/AnatomyofaConstraint.html#/apple\\_ref/doc/uid/TP40010853-CH9-SW1](https://developer.apple.com/library/content/documentation/UserExperience/Conceptual/AutolayoutPG/AnatomyofaConstraint.html#/apple_ref/doc/uid/TP40010853-CH9-SW1)

[https://developer.apple.com/library/content/documentation/UserExperience/Conceptual/AutolayoutPG/ProgrammaticallyCreatingConstraints.html#/apple\\_ref/doc/uid/TP40010853-CH16-SW1](https://developer.apple.com/library/content/documentation/UserExperience/Conceptual/AutolayoutPG/ProgrammaticallyCreatingConstraints.html#/apple_ref/doc/uid/TP40010853-CH16-SW1)

### Topology Engineering Blog

<https://topologyeyewear.github.io/engineering-blog/>

@vasarhelyia on Twitter

**THANKS!**