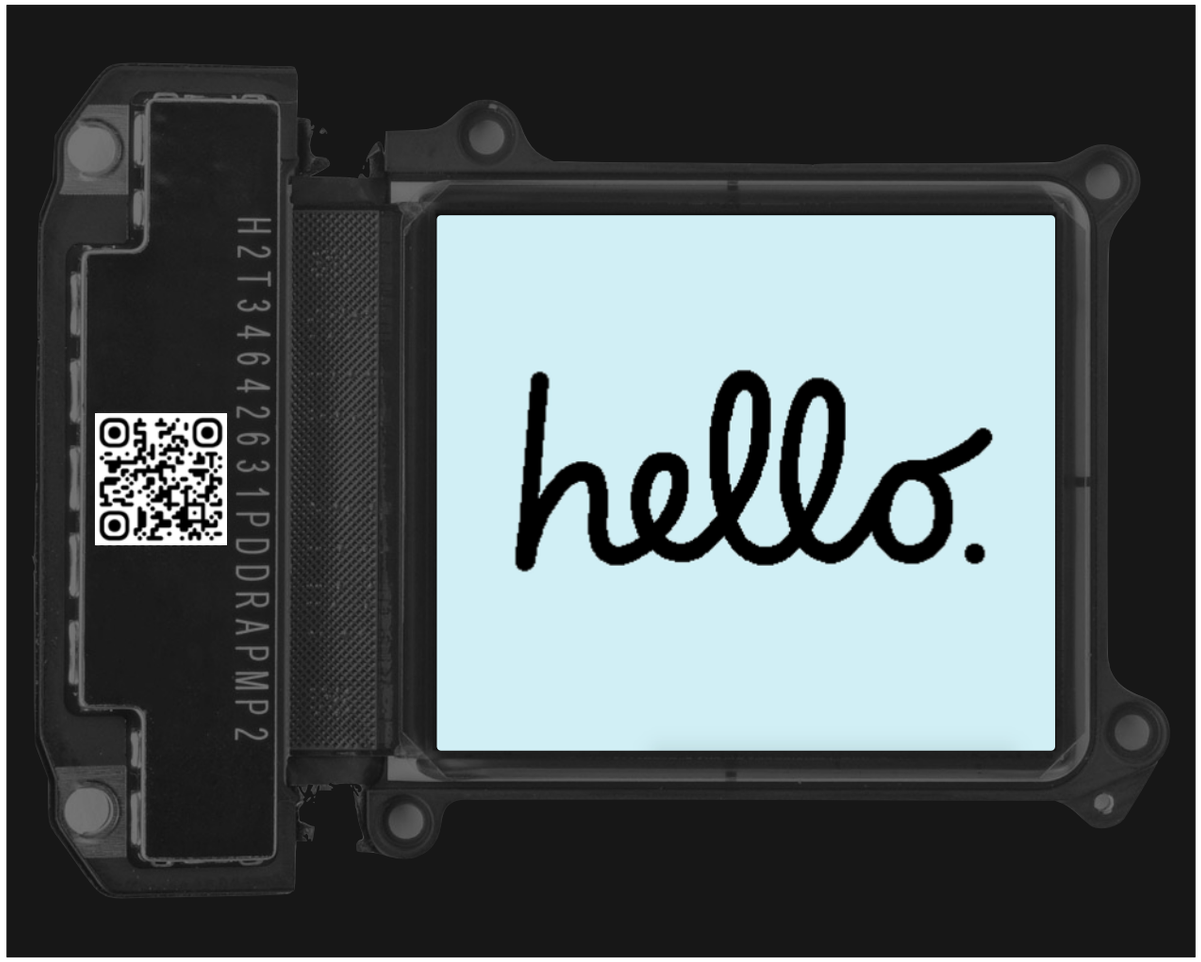
Explore accessible spatial interactions

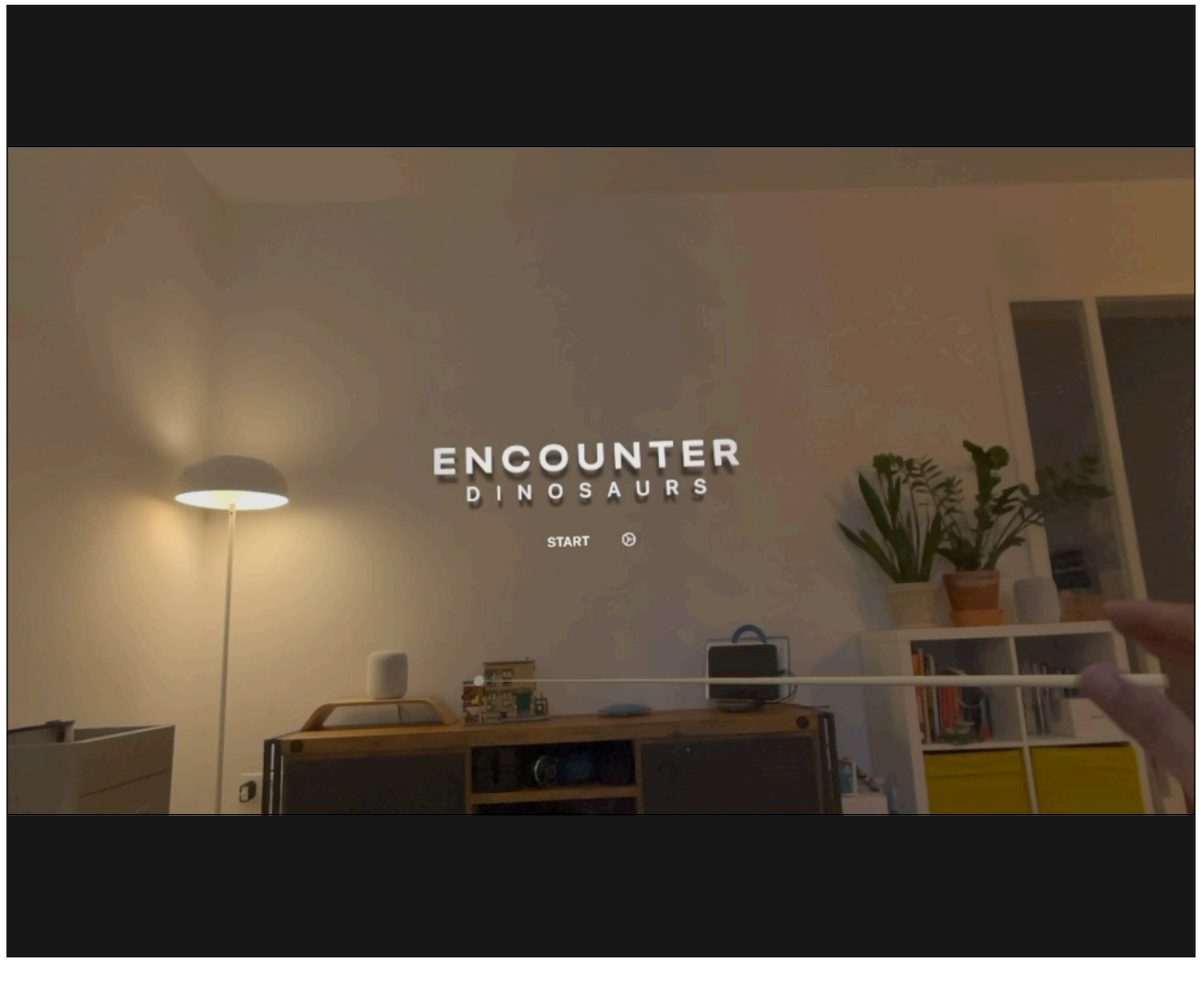
@elkraneo
Cristian Díaz
Lead Developer @ Monstarlab

Global Accessibility Awareness Day
https://accessibility.day

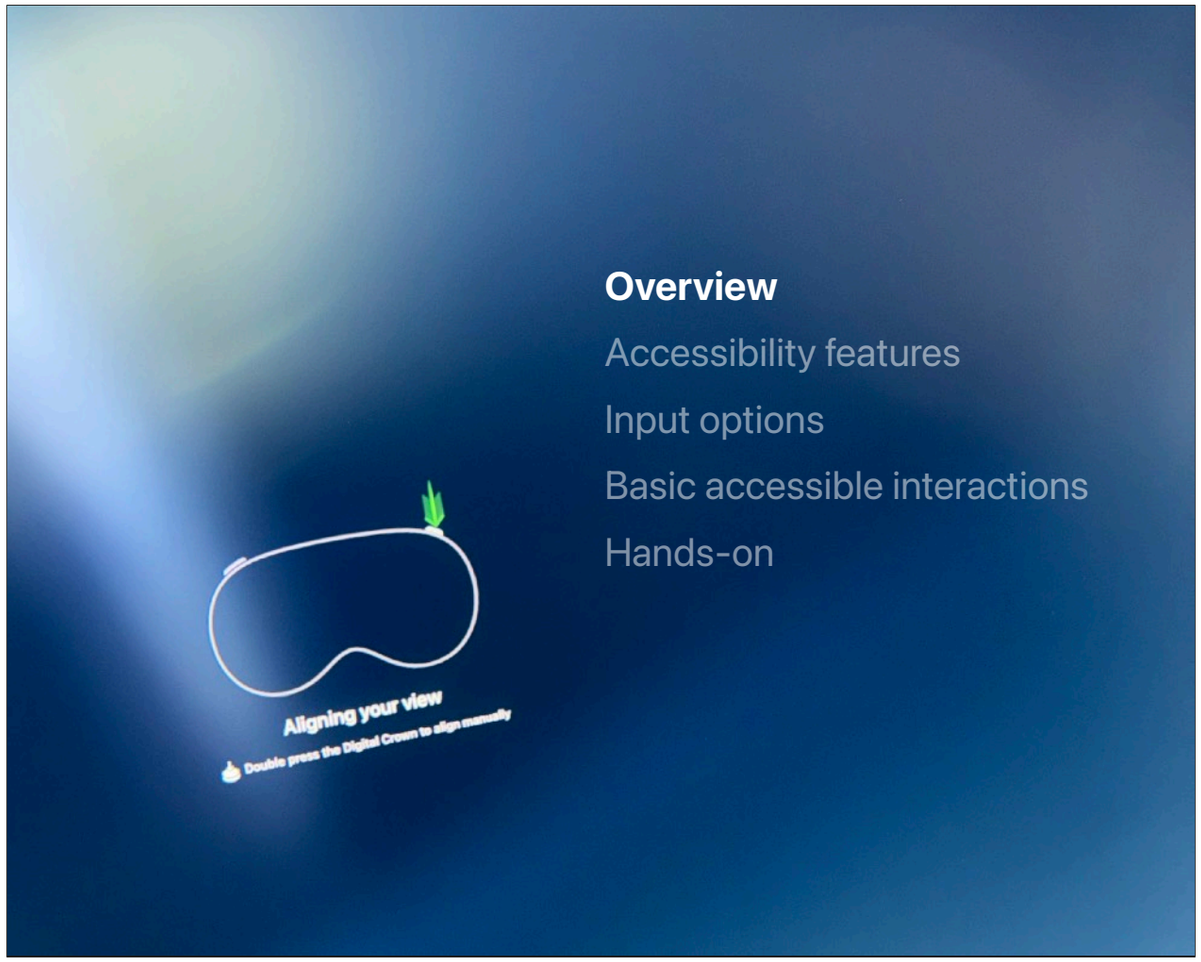
#GAAD



https://www.typeroom.eu/article/susan-kare-icon-icons-receives-cooper-hewitt-s-lifetime-achievement-award
https://www.ifixit.com/News/90409/vision-pro-teardown-part-2-whats-the-display-resolution



Who is familiar with Encounter Dinosaurs? how many are aware of its accessibility features?
https://support.apple.com/en-mk/guide/apple-vision-pro/tane01bb99a2/visionos#tan83806a43e



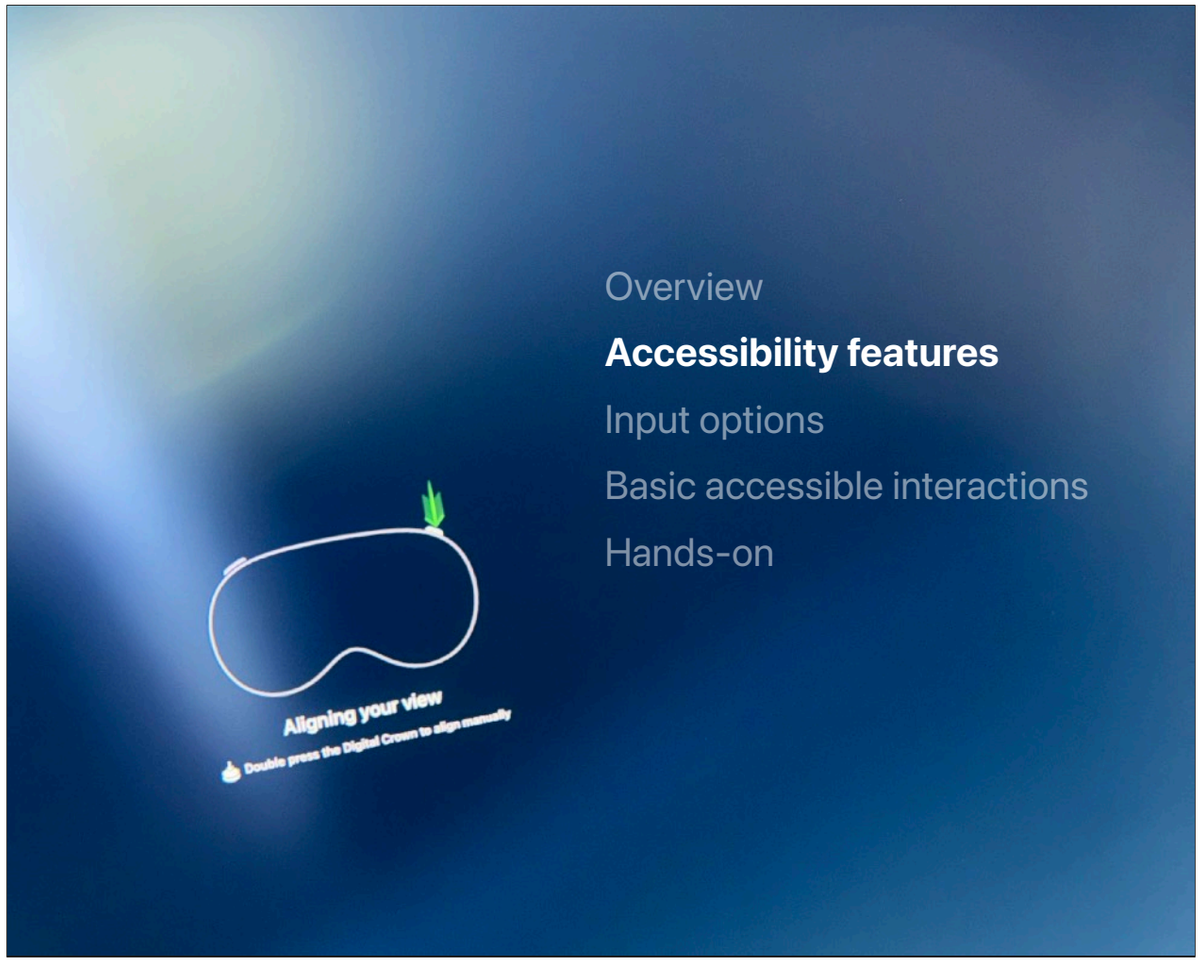
Overview

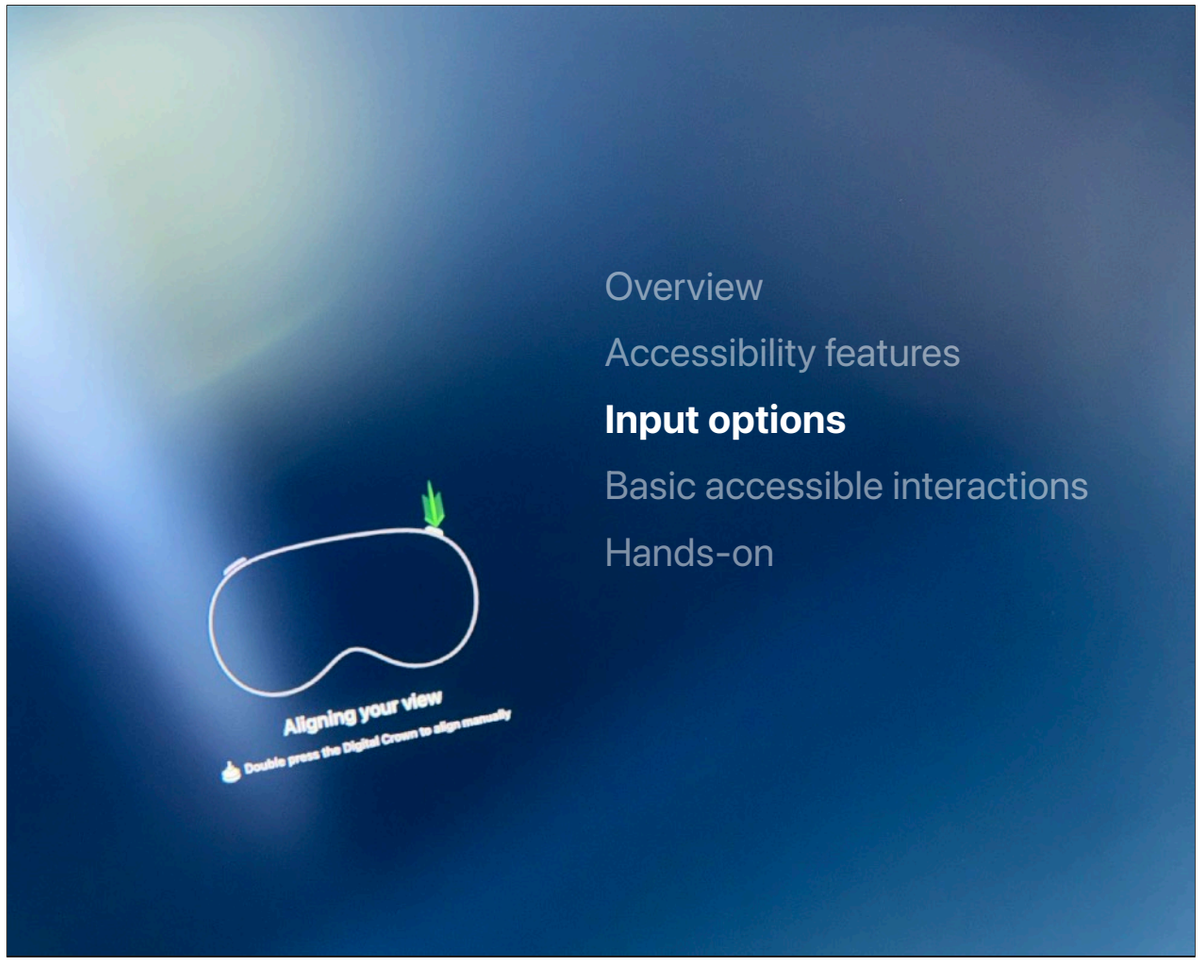
Accessibility features

Input options

Basic accessible interactions

Hands-on


Aligning your view
Double press the Digital Crown to align manually
Overview
Accessibility features
Input options
Basic accessible interactions
Hands-on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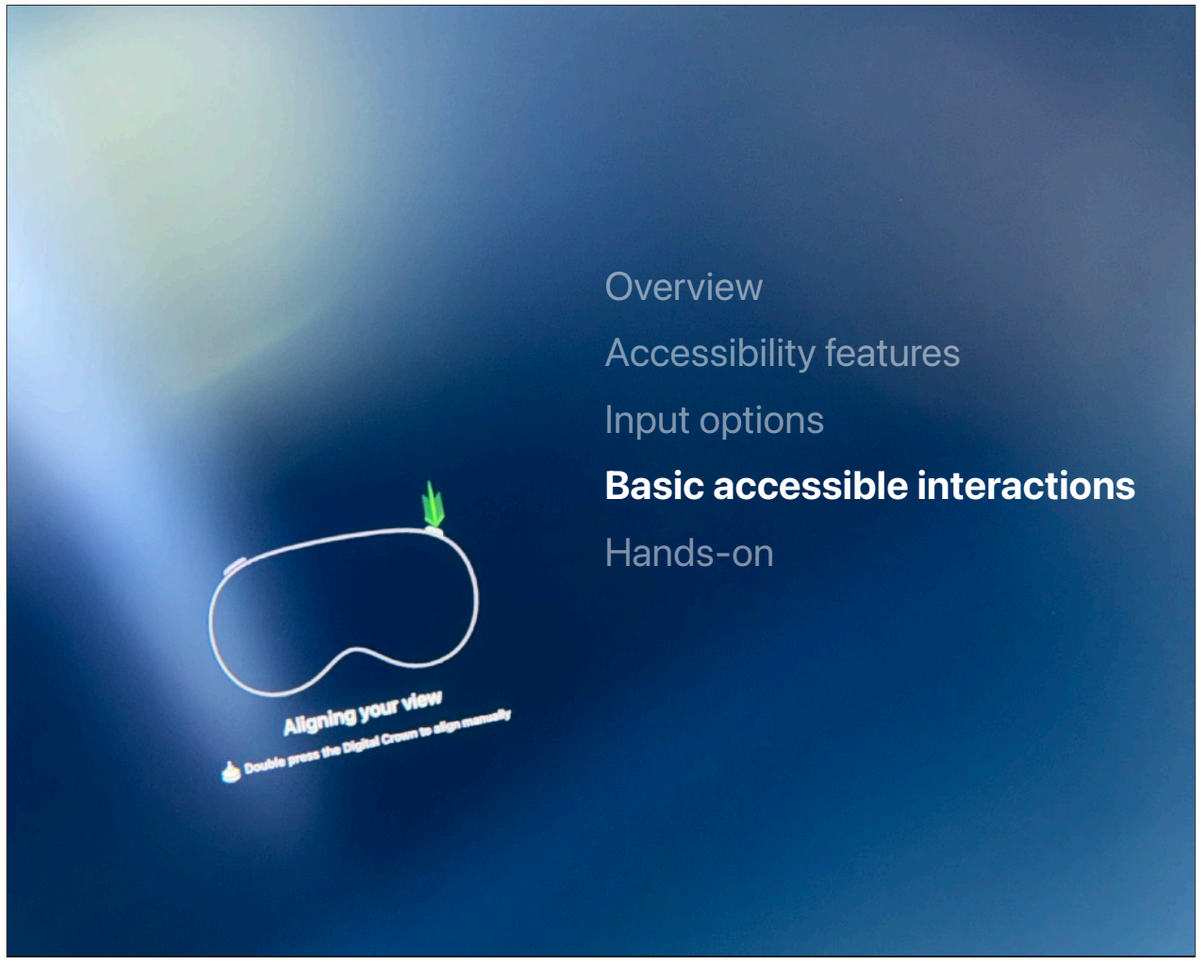
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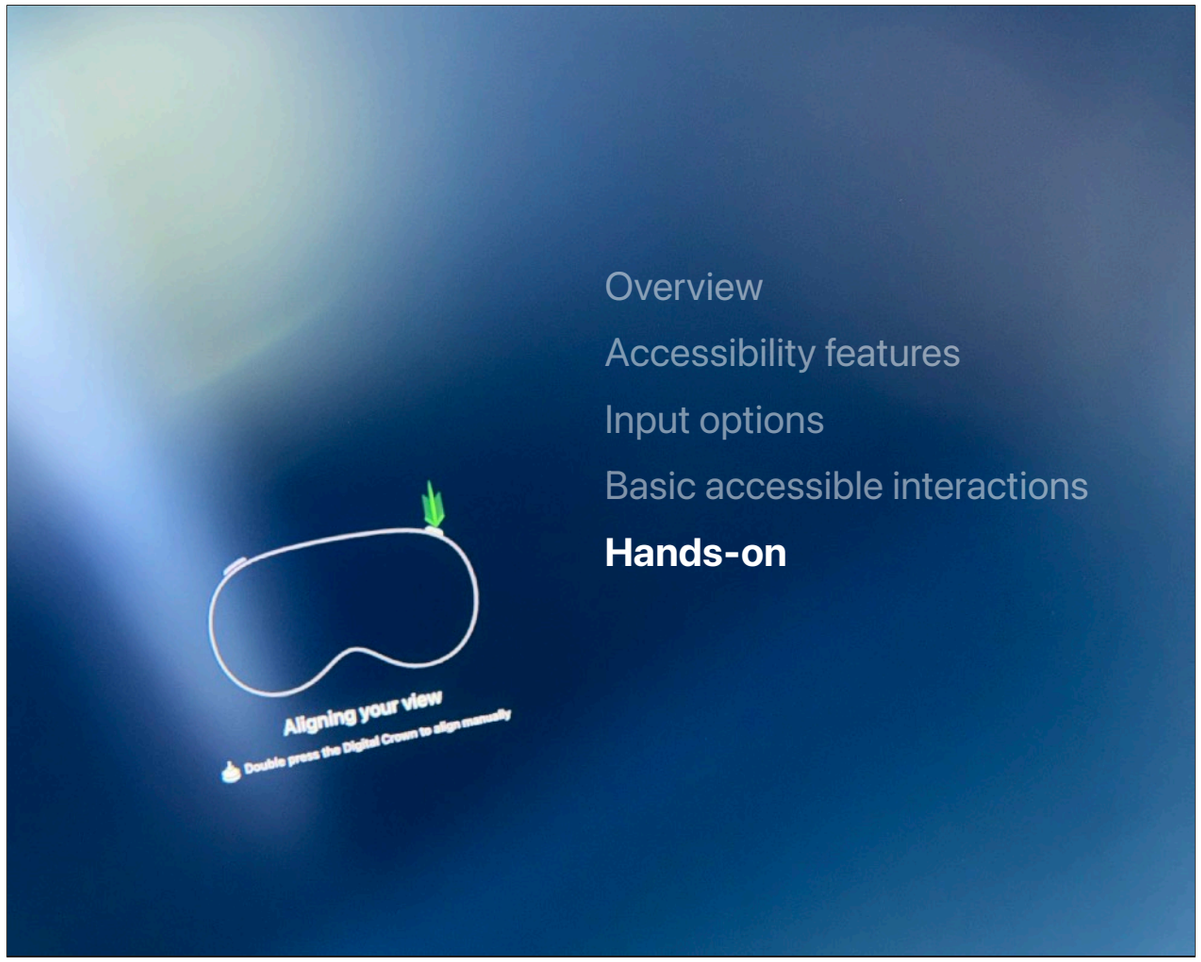
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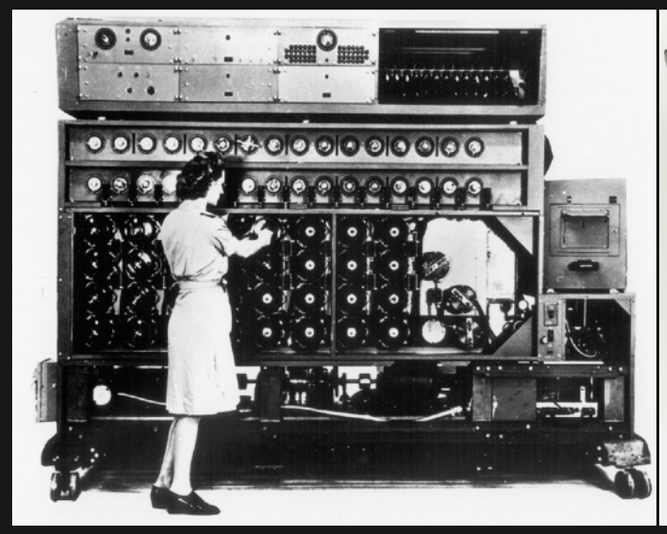
https://kguttag.com/test/

Asking Apple Vision Pro, why? what is this for? What is the killer feature of it?
Is the same as asking what is a computer for? What is the killer feature of a Mac?

AVP's killer feature is to crack the Enigma.

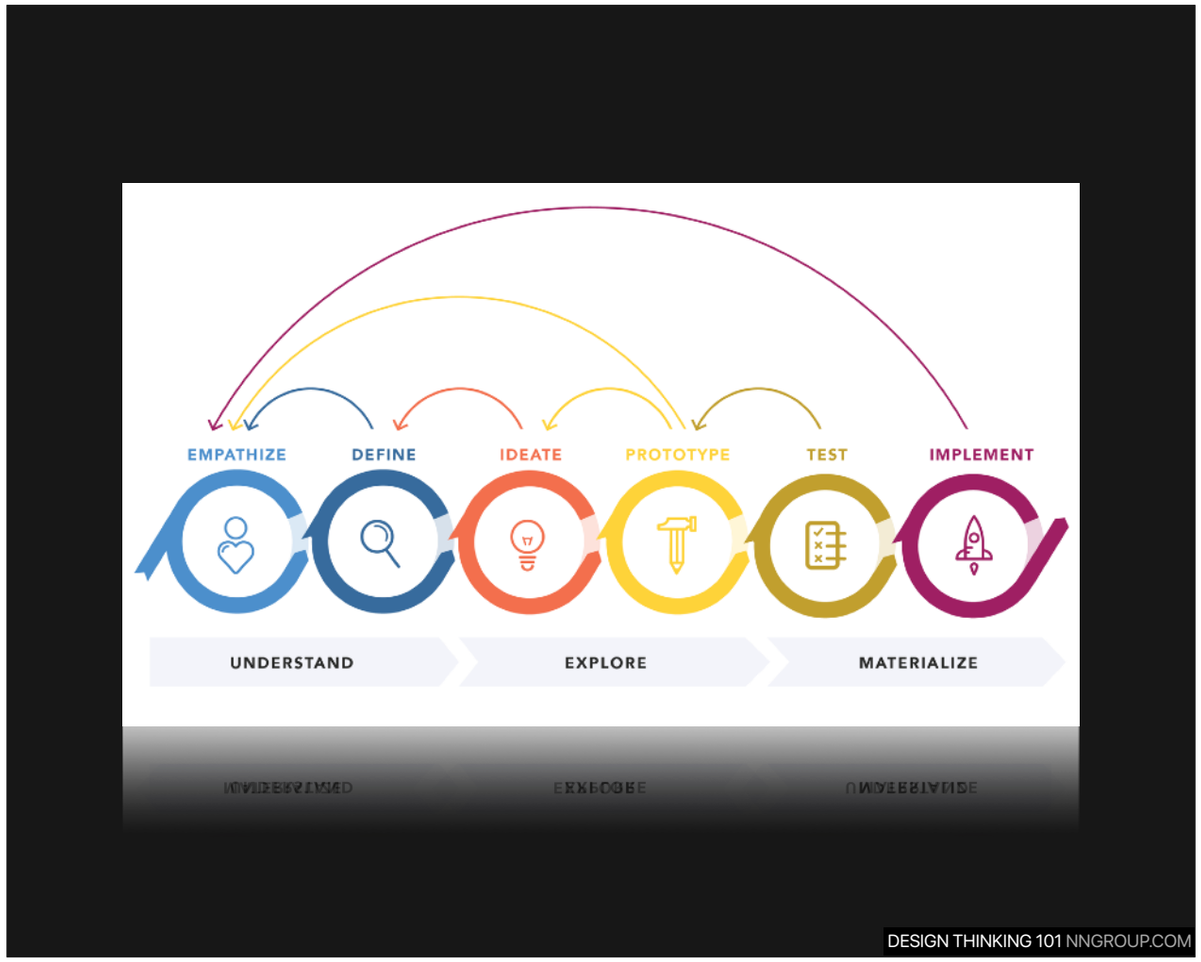


Version of the “Bombe” electro-mechanical device

Military Model Enigma I, in use from 1930

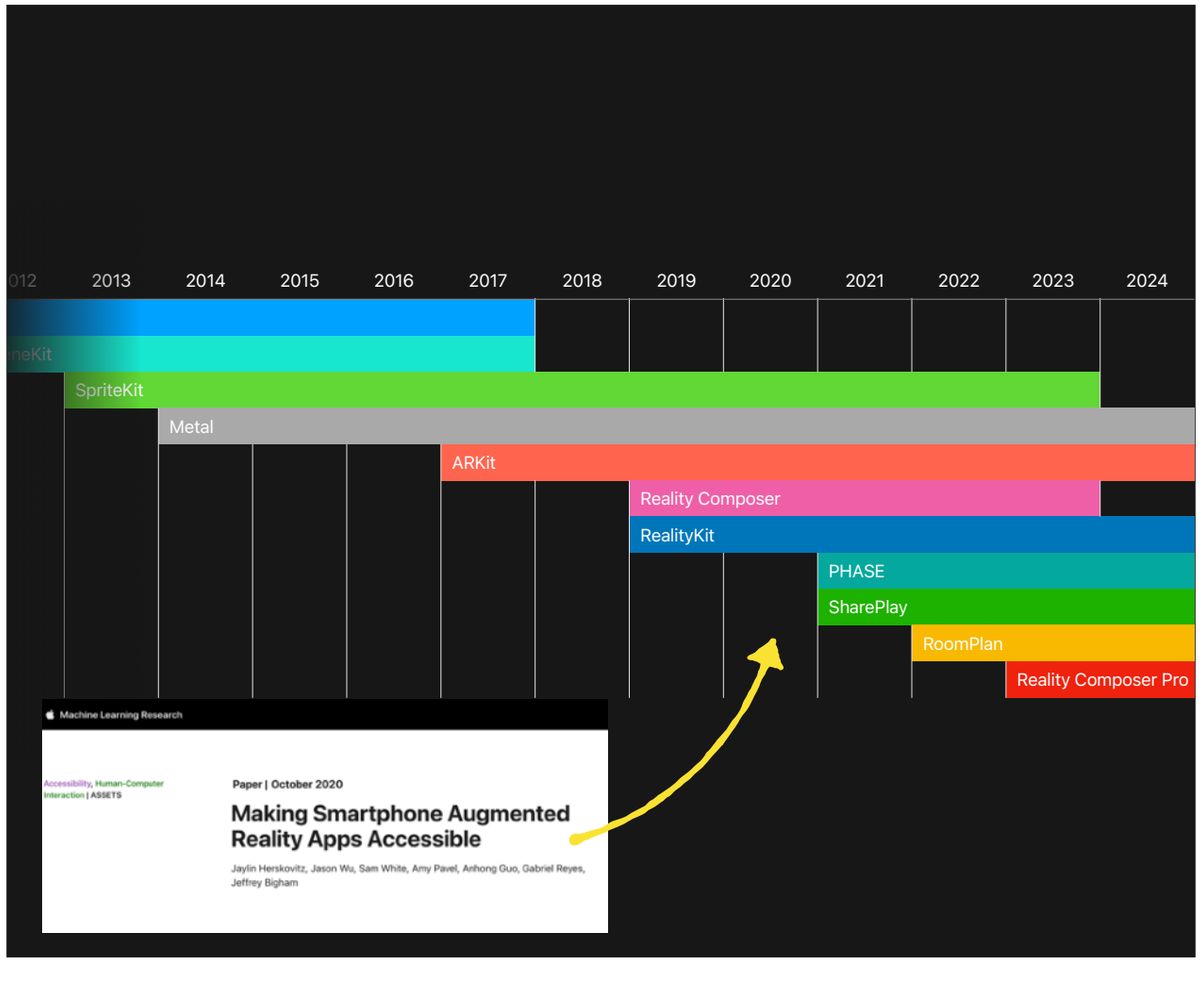
https://en.wikipedia.org/wiki/Bombe
https://en.wikipedia.org/wiki/Enigma_machine

[Auburn University Spring 2010 Commencement Speaker Tim Cook](https://apps.npr.org/commencement/speech/tim-cook-auburn-university-2010/)

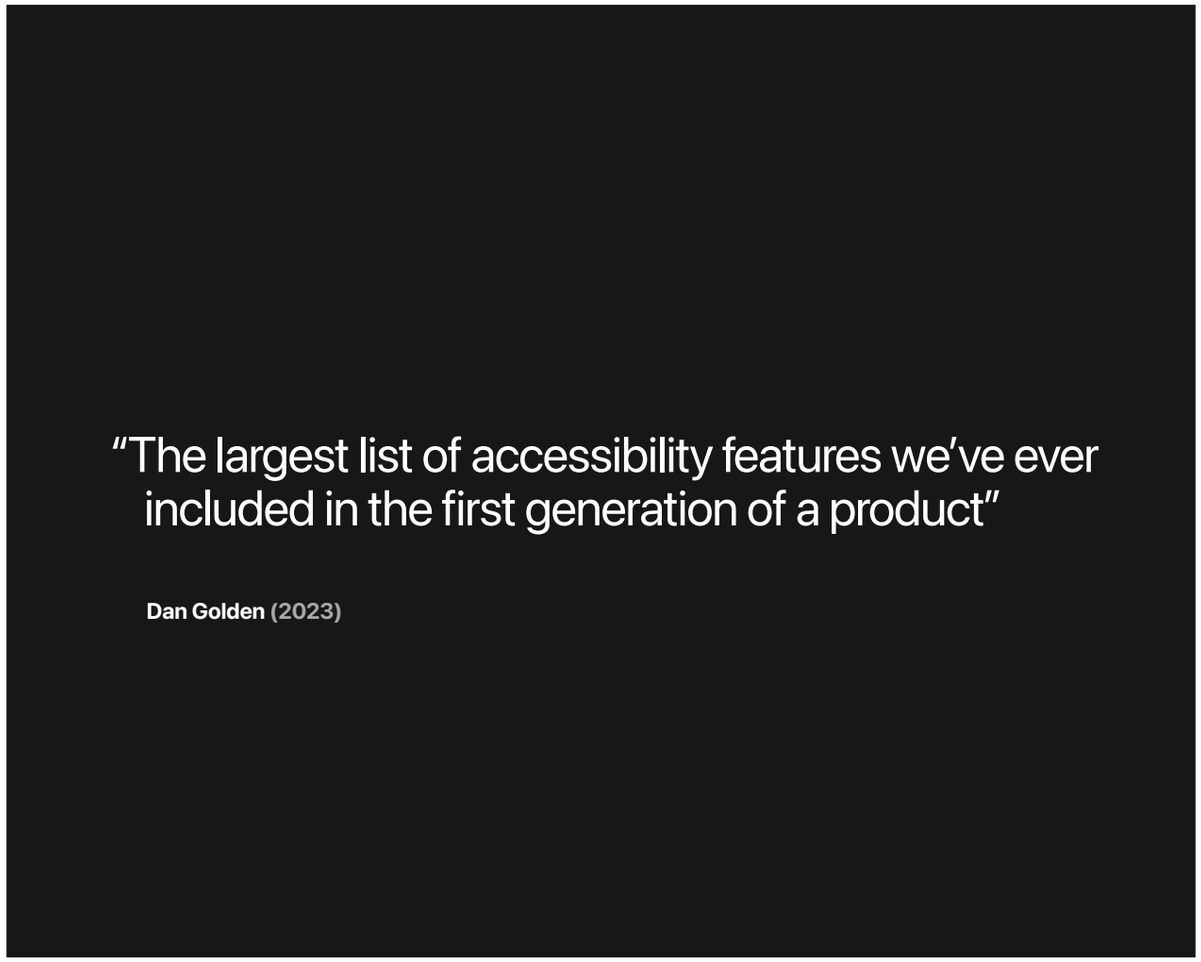


https://www.nngroup.com/articles/design-thinking/

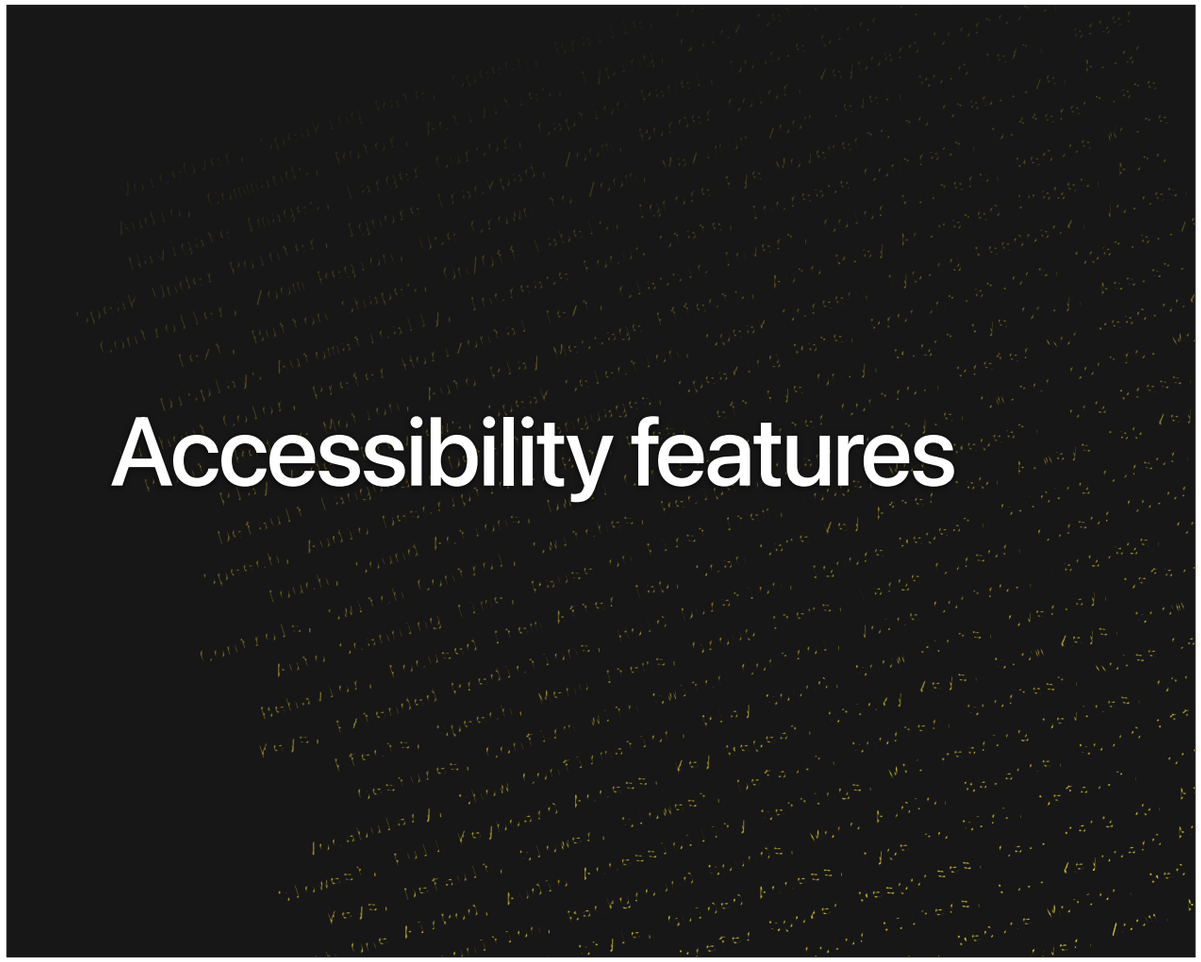
Regarding the empathy required for creating this device, one has to always keep thinking that we want to solve this for people, we have to have created ideas for them, we have to have looked for the ideas and implemented the sensors, and a lot of things that are these 10 years or more that we have been developing to make this possible

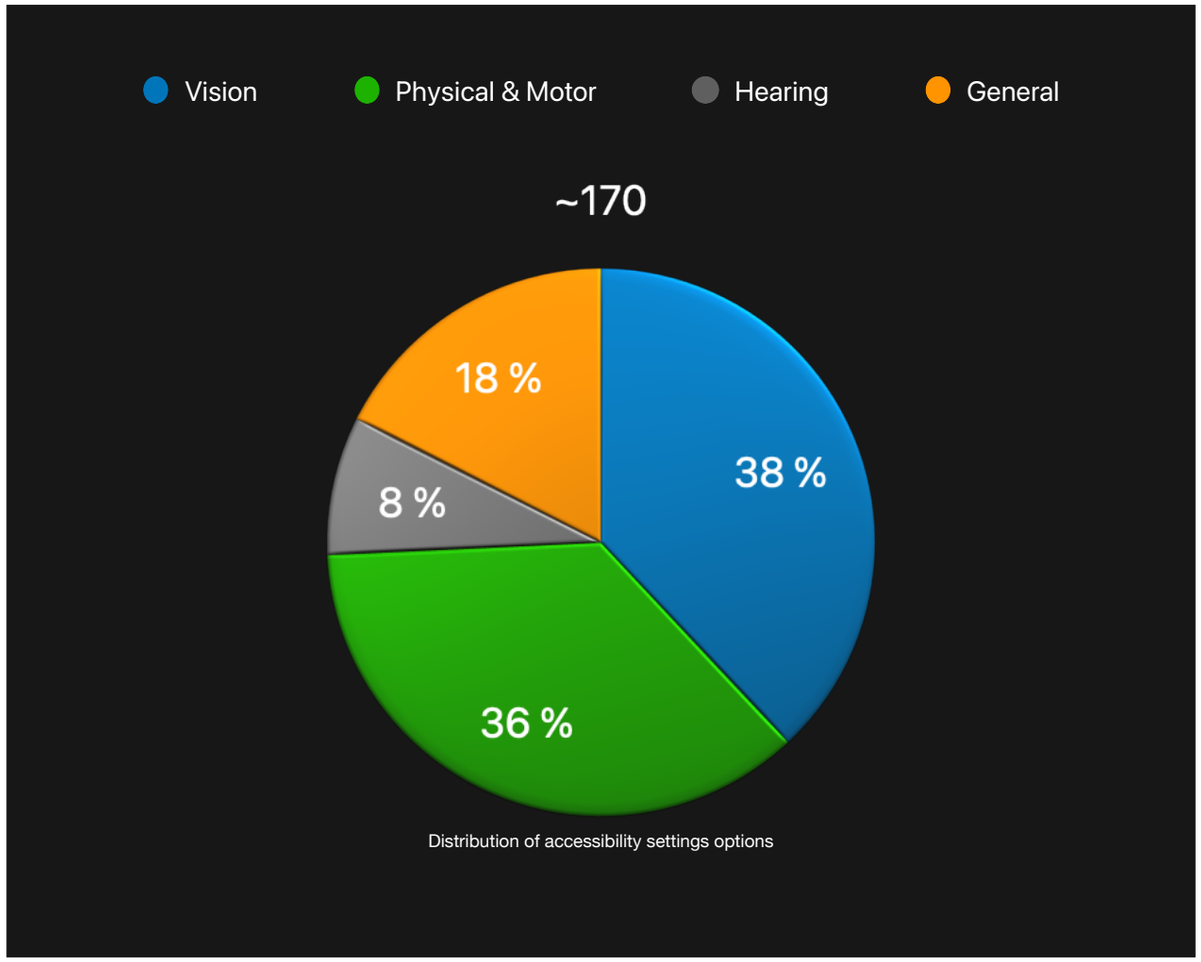


https://web.archive.org/web/20201016103043/https://www.apple.com/iphone-12-pro/
https://machinelearning.apple.com/research/making-smartphone-augmented-reality-apps-accessible

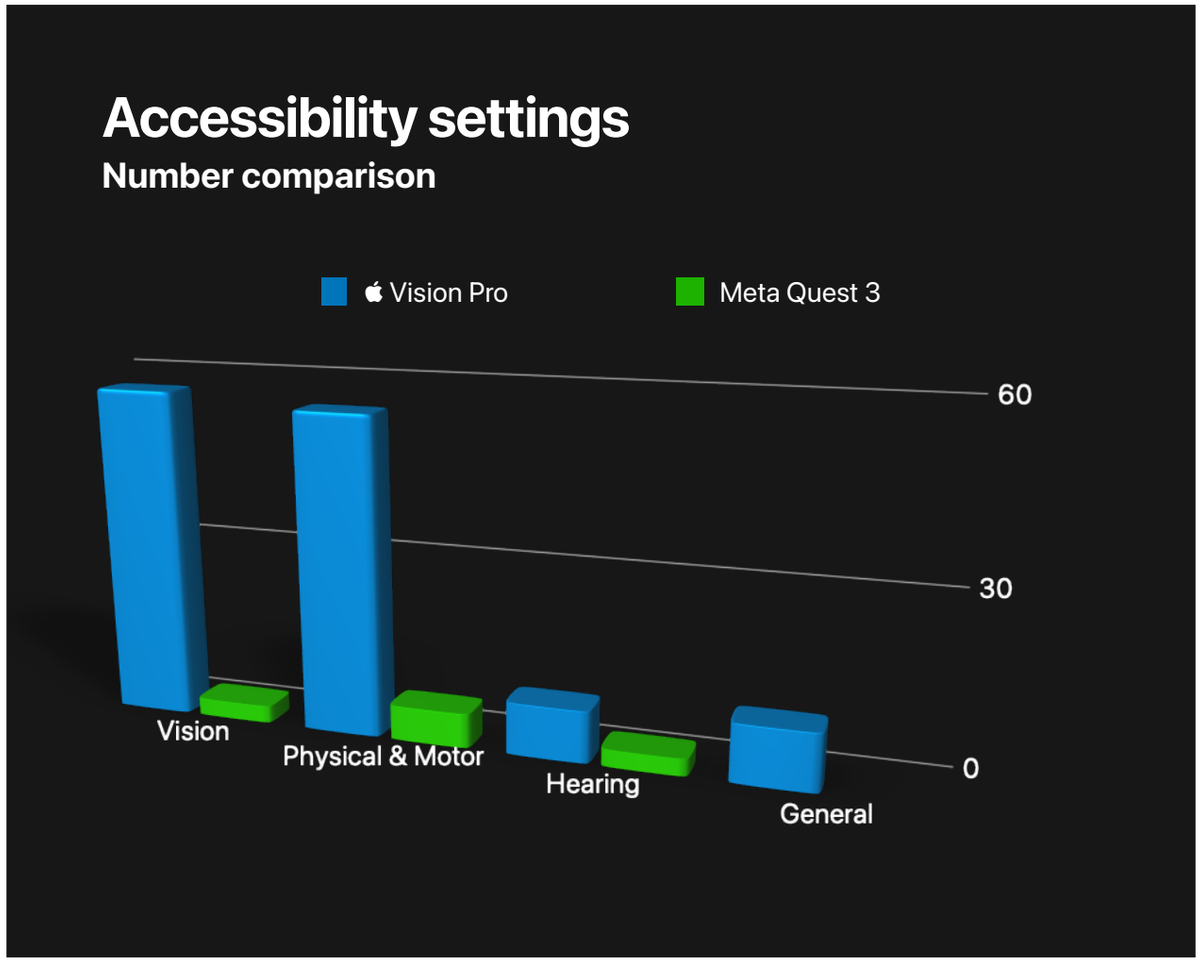


Dan Golden, Accessibility Engineer @ Apple
https://developer.apple.com/videos/play/wwdc2023-10034

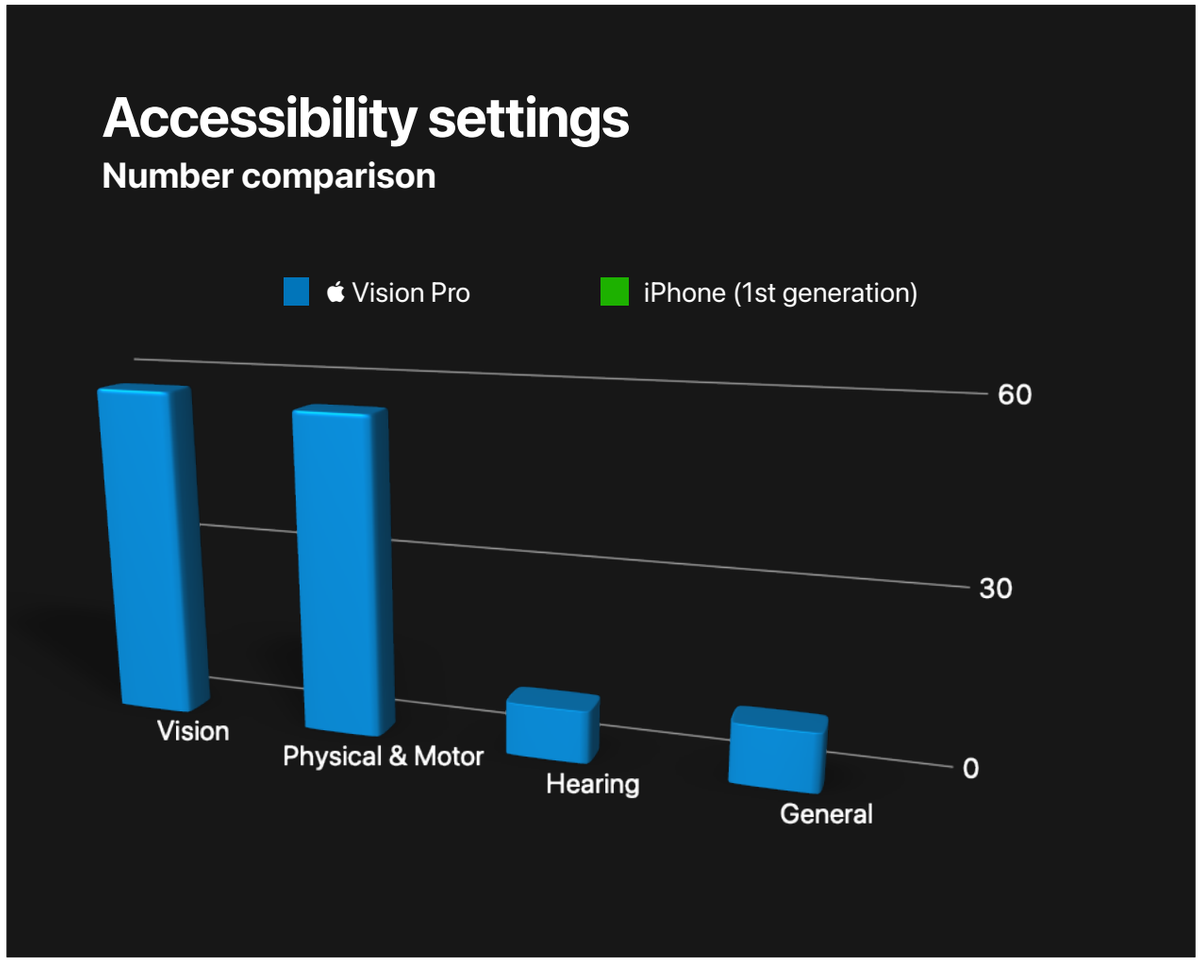

Accessibility features



Distribution of accessibility settings options



https://medium.com/@elkraneo/the-largest-list-of-accessibility-features-43e861d07e40



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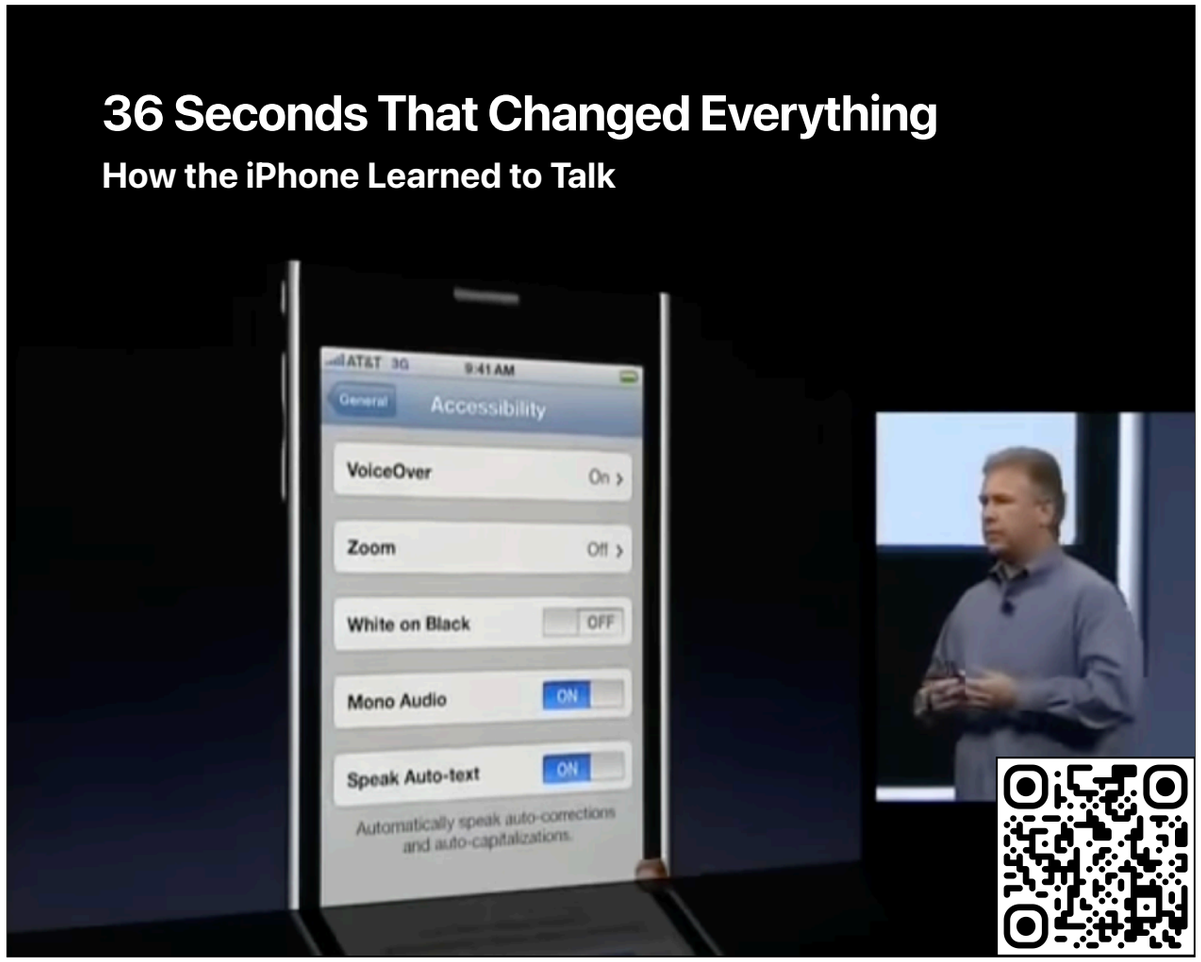
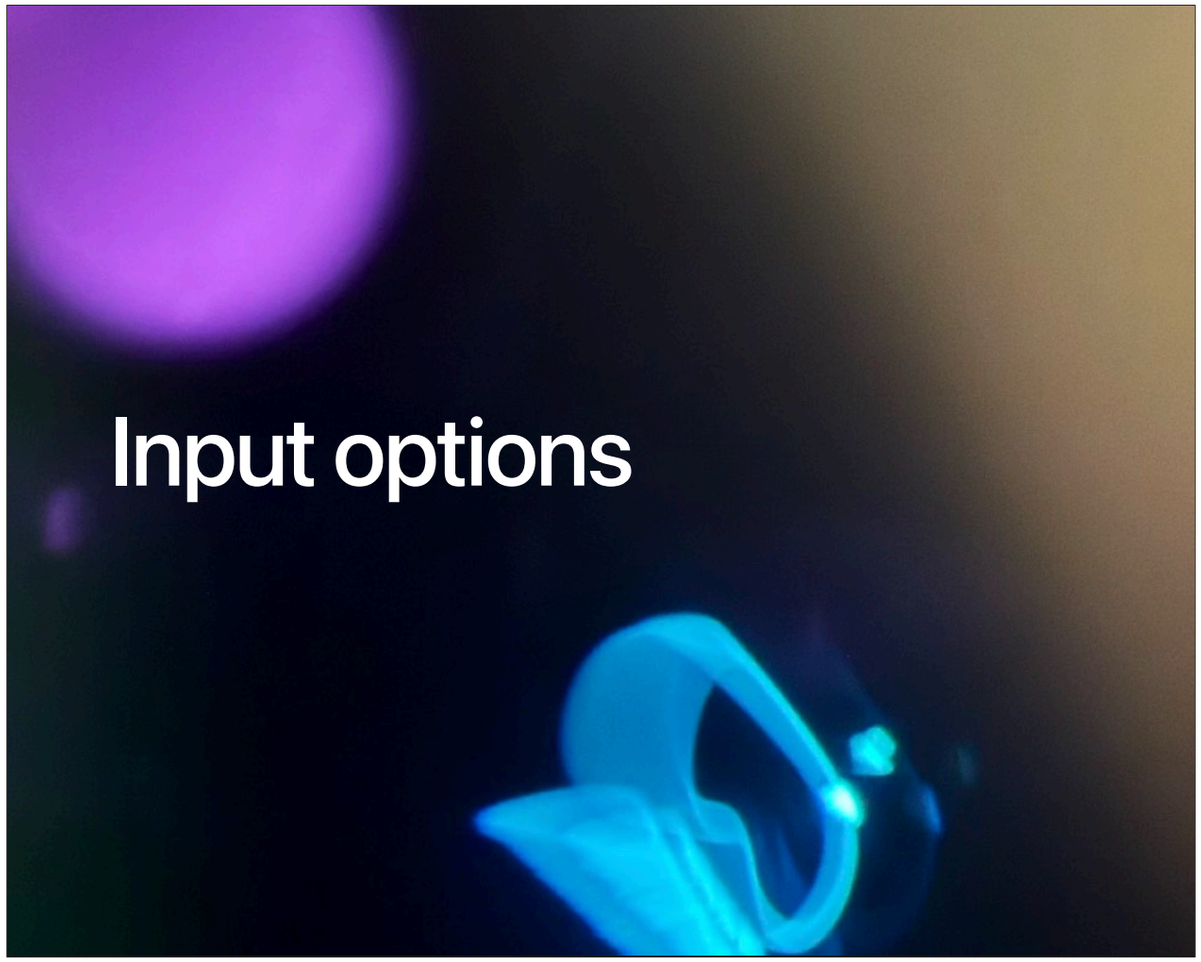


In fact, it wasn't until the iPhone 3GS that we had a dedicated section for accessibility in settings
https://www.36seconds.org

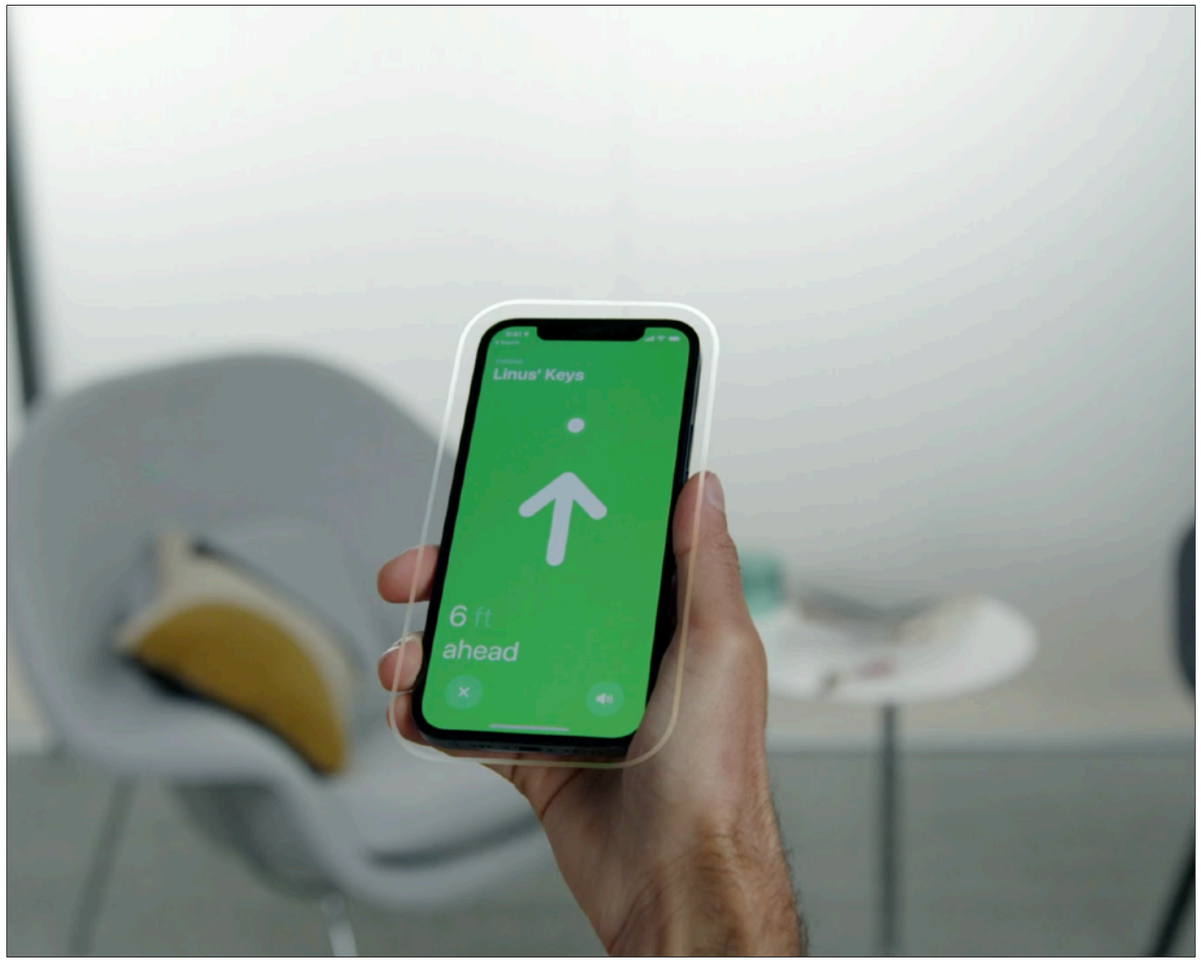


Every major Apple platform was driven by an innovative new input model. Mac with the mouse. iPod with the Click Wheel. And iPhone with Multi-Touch. With Vision Pro, we set the ambitious goal to design an incredibly intuitive input model for spatial computing– one that can be used without controllers or additional hardware.

https://en.wikipedia.org/wiki/Apple_IIe

https://en.wikipedia.org/wiki/Macintosh_Classic

https://en.wikipedia.org/wiki/IPhone_(1st_generation)



https://developer.apple.com/videos/play/wwdc2021/10245/

https://www.ifixit.com/News/90137/vision-pro-teardown-why-those-fake-eyes-look-so-weird

https://www.apple.com/apple-vision-pro/specs/

Input
- Hands
- Eyes
- Voice

Supported Input Accessories
- Keyboards
- Trackpads
- Game controllers

Human scale interaction

(direct + indirect + context) interaction mode

```
init(allowedInputTypes: InputTargetComponent.InputType = .all)
```

Direct interaction does not appear to be the quickest or most accessible method of working on spatial computing (you have to be within the reach of the objects to be able to interact with them). Apple's decision to make indirect interaction the primary and default method on the Vision Pro supports this.
So, even though we want natural interaction and the ultimate goal of eliminating affordances, we are currently in a phase where indirect interaction is still more precise, efficient, and accessible.
Also, in general, **it removes the limitation of the scale of the experience to whatever is within physical reach (spatial apps frequently involve content outside of these bounds).**
A valid parallel would be to think of direct interaction as working directly with the hands and indirect interaction as using tools (or adaptors) to accomplish the same task. The use of tools (indirect) is prevalent in visionOS, and there are multiple adaptors available, such as VoiceOver.

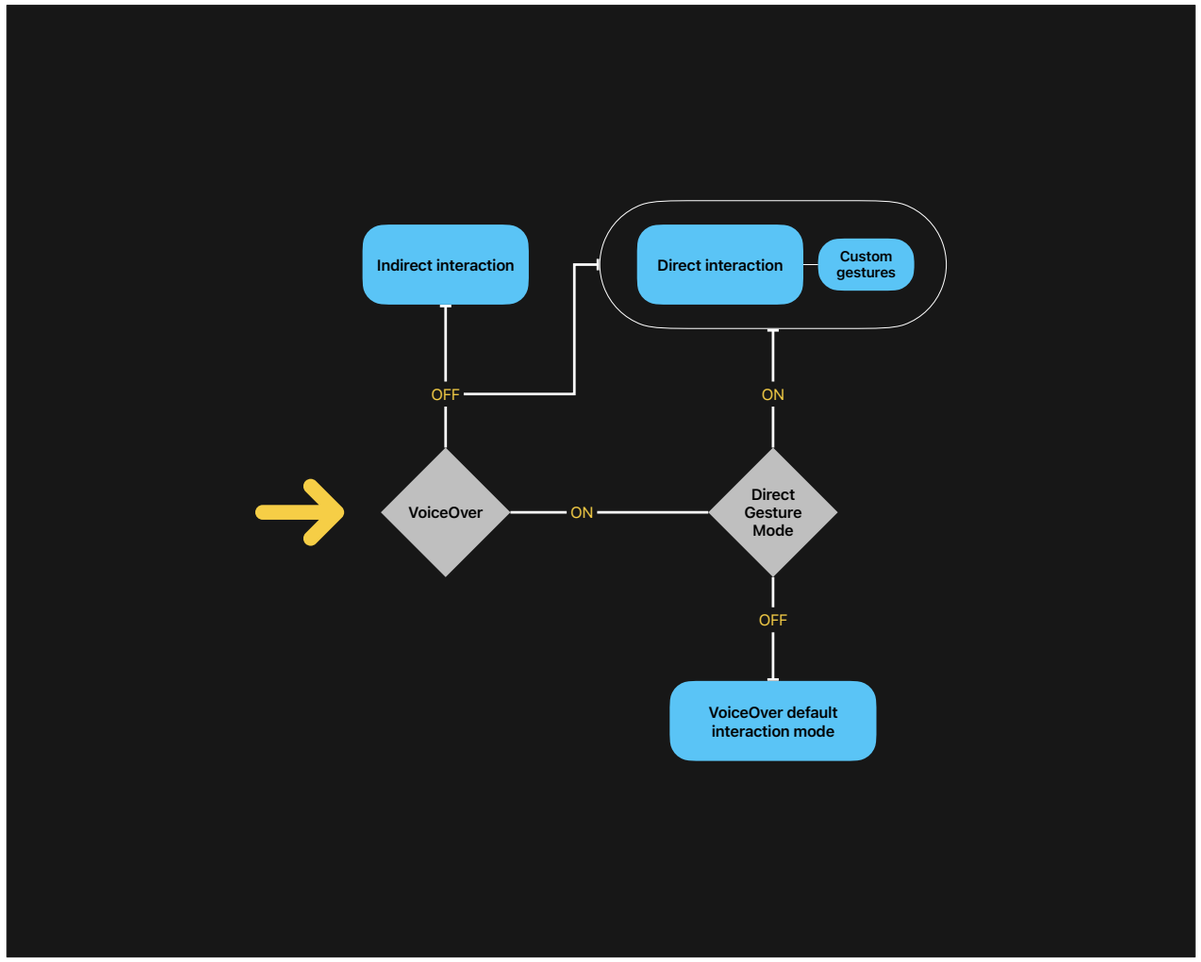
(Herskovitz et al.)

This user-centered mentality, as well as acknowledging how users creatively reimagine the use of technology, is critical for everyone involved in development, but especially for the AVP, because the big array of options provides exponentially more ways of use.

This is a known phenomena

[Desire path](https://en.wikipedia.org/wiki/Desire_path)
…**unplanned small trail created as a consequence of mechanical erosion** caused by human or animal traffic. The path usually represents the shortest or the most easily navigated route between an origin and destination, and the width and severity of its surface erosion are often indicators of the traffic level it receives.

https://www.reddit.com/r/DesirePath/
http://www.waxine.nl/waxine/thoughts/20150105_desire_paths.php


Indirect interaction
Direct interaction
Custom gestures
OFF
ON
VoiceOver
ON
Direct Gesture Mode
OFF
VoiceOver default interaction mode

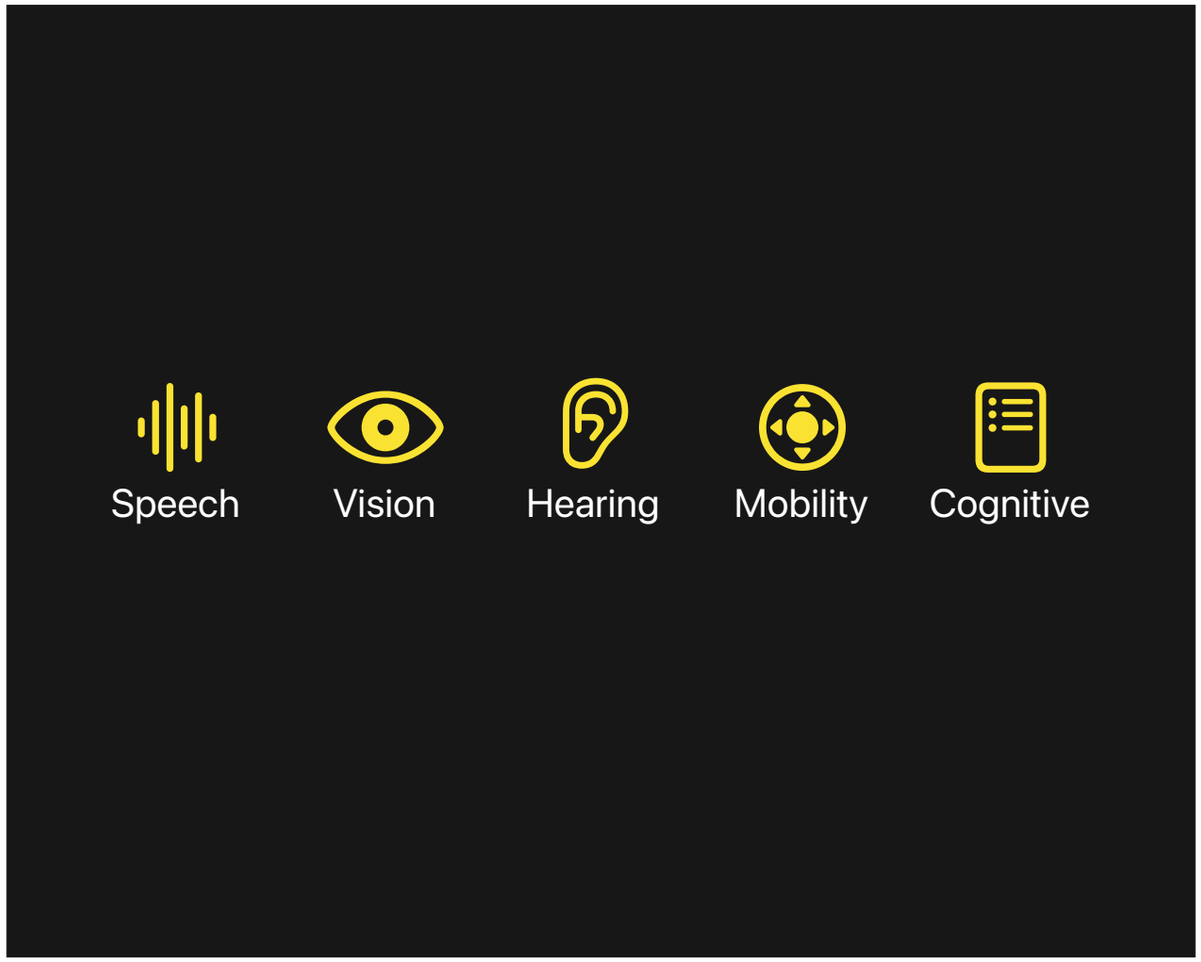
take a deep breath

It's important to be aware, like a teacher who sees that a student can reach the goal in a unique way.

The seahorse (Seepferd) patch certifies that she can avoid drowning. The problem requires swimming unaided for 25 metres (among other things). Mañana was unable to complete the task as expected, but the teacher recognized her ability to do it in their own way, earning her the patch.

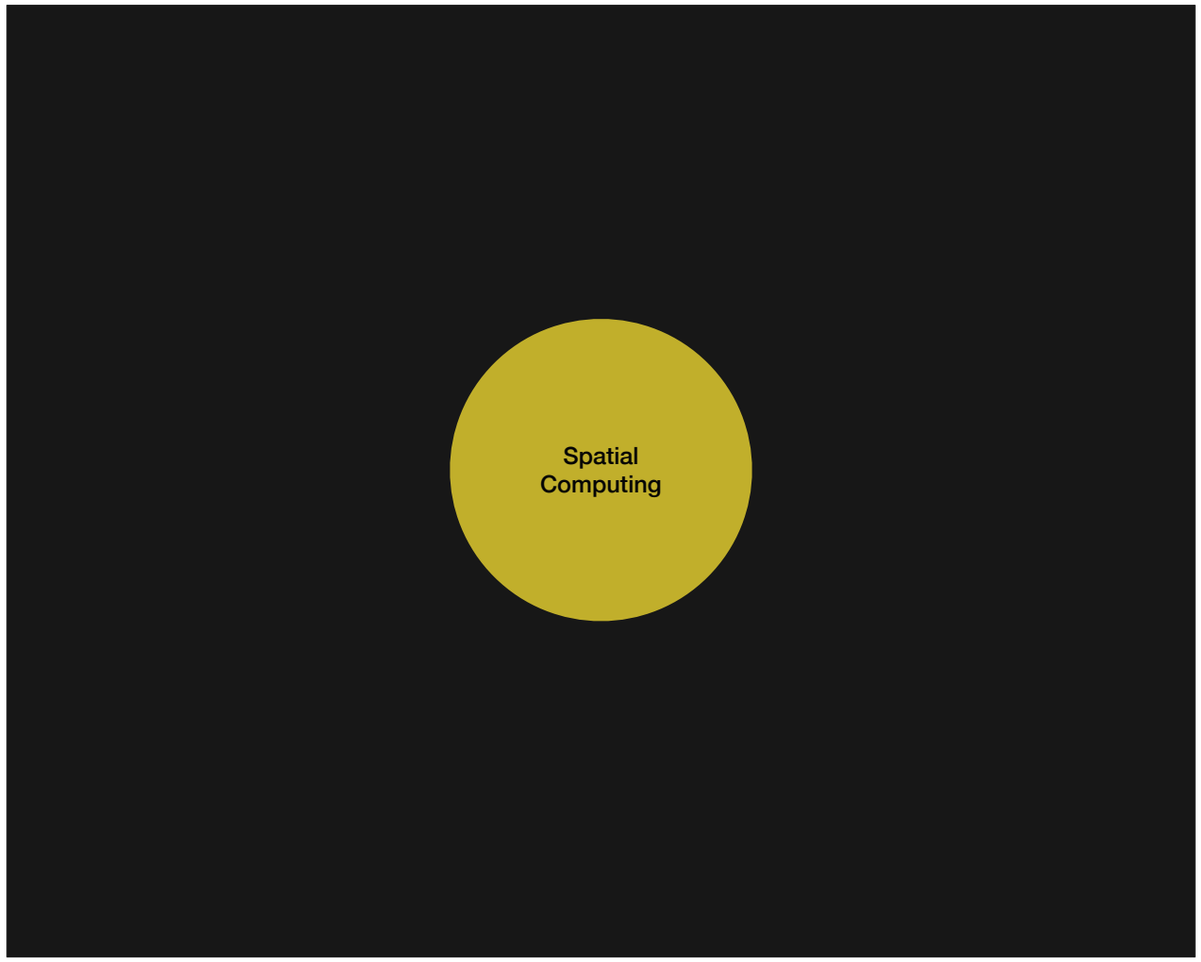
https://en.wikipedia.org/wiki/German_swimming_badge
https://www.german-way.com/becoming-seahorses-otherwise-known-as-swimming-lessons/

In order to fix this, it is important to include a conceptual framework when making products. For instance, if you think about all the important parts of AVP and why they were made that way, **one can use that mental model generate a big jump in usability** and create various of the things we expect from a better future.

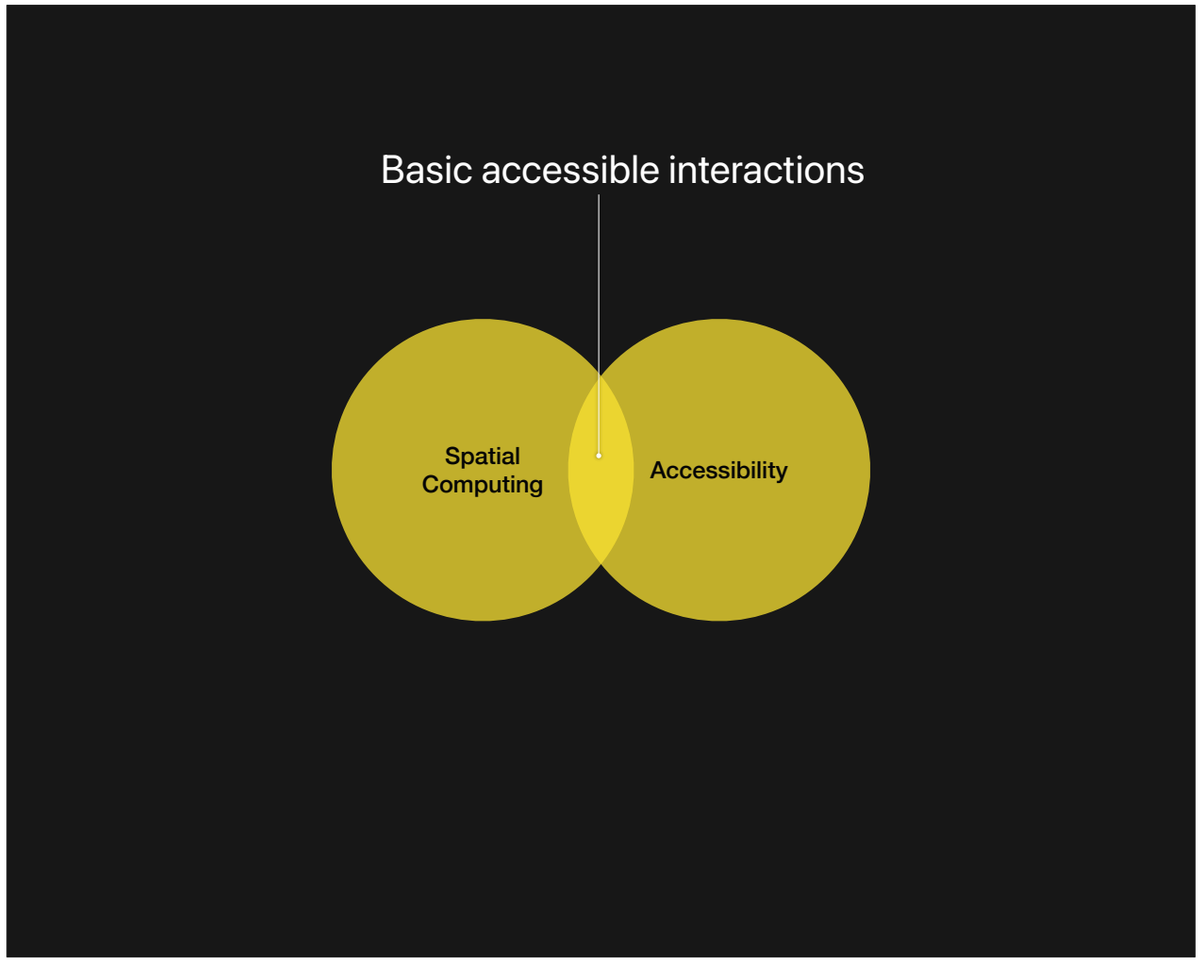


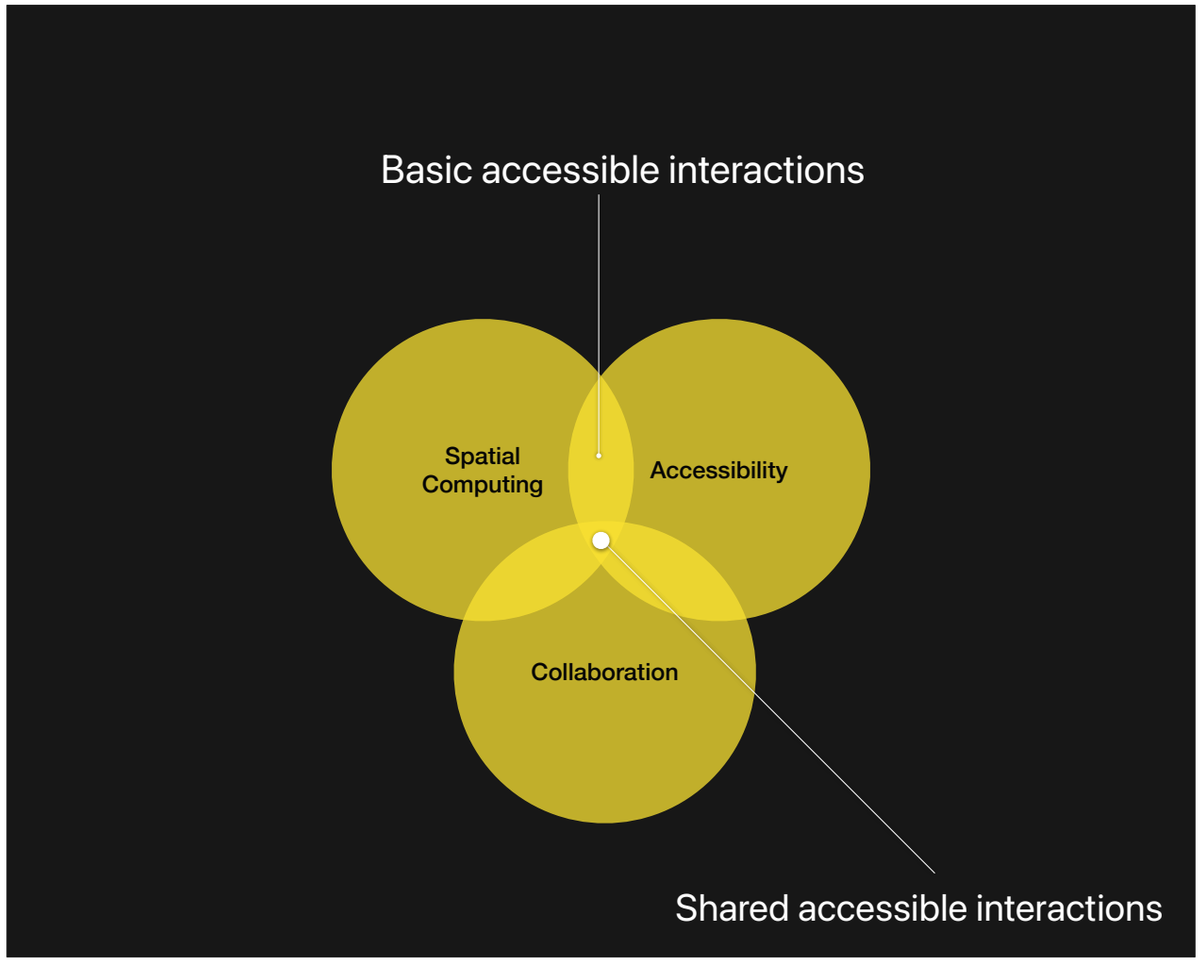
Pay attention to more than just making a list of accessibility domains and tools. We need to find out how these areas are defined to include all kinds of people and how the tools are just that—tools that need to be put together to acomplish tasks.

At the intersection of accessibility and spatial computing, fundamental patterns of use must be identified in order to offer accessible alternatives. For example, Basic Accessible Spatial Interactions may include actions like scanning the environment, marking locations in space, attaching virtual objects to real surfaces, and more.

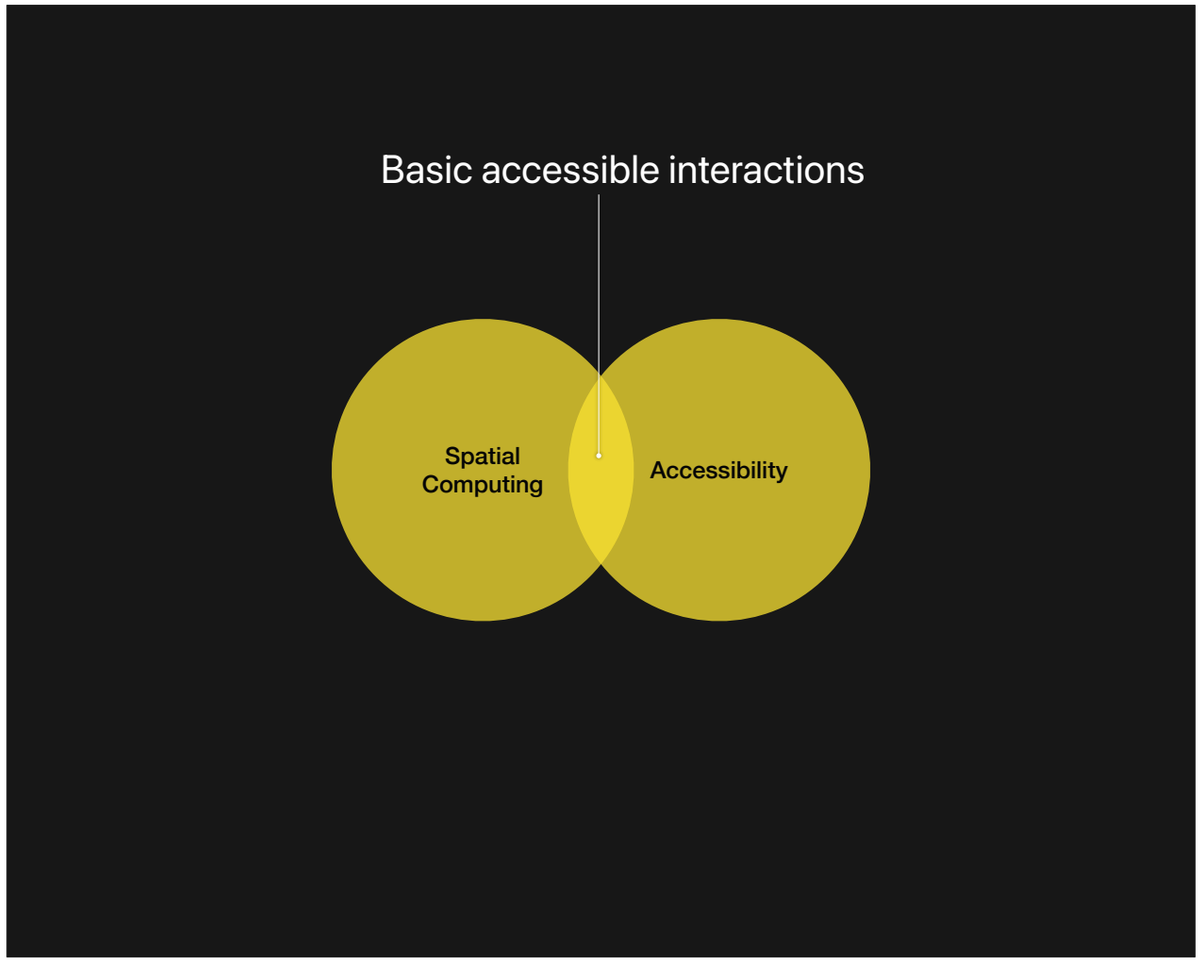


How do we turn specific tasks into accessible functionalities? The first step to improve compatibility with assistive technologies is to make spatial tasks more manageable and incorporate support for features like voice control and screen reader support. Additionally, consider integrating intent donation.


Basic accessible interactions
Spatial Computing
Accessibility



When shared experiences are introduced, a new dimension of interaction surfaces; we name those “Shared Accessible Spatial Interactions". For instance, Collaborative Accessible Spatial Interactions could involve joint tasks like creating virtual content together, sharing spatially aware information, or engaging in collaborative problem-solving activities. These types of interactions are the next desired step to solve after the basic ones are resolved.


Basic accessible interactions
Spatial Computing
Accessibility

Basic Accessible Interactions

Essential tasks that require alternatives

- Establish relation
- Create
- Observe
- Transform
- Activate

Demo time

- Im going to open mr beam and show an extended arm (comment about reach)
- Then go to settings and activate multiple options to increase legibility size and contrast
- Open “Accessibility Tasks” app and mention how it works
- Activate voice over and try to place some models

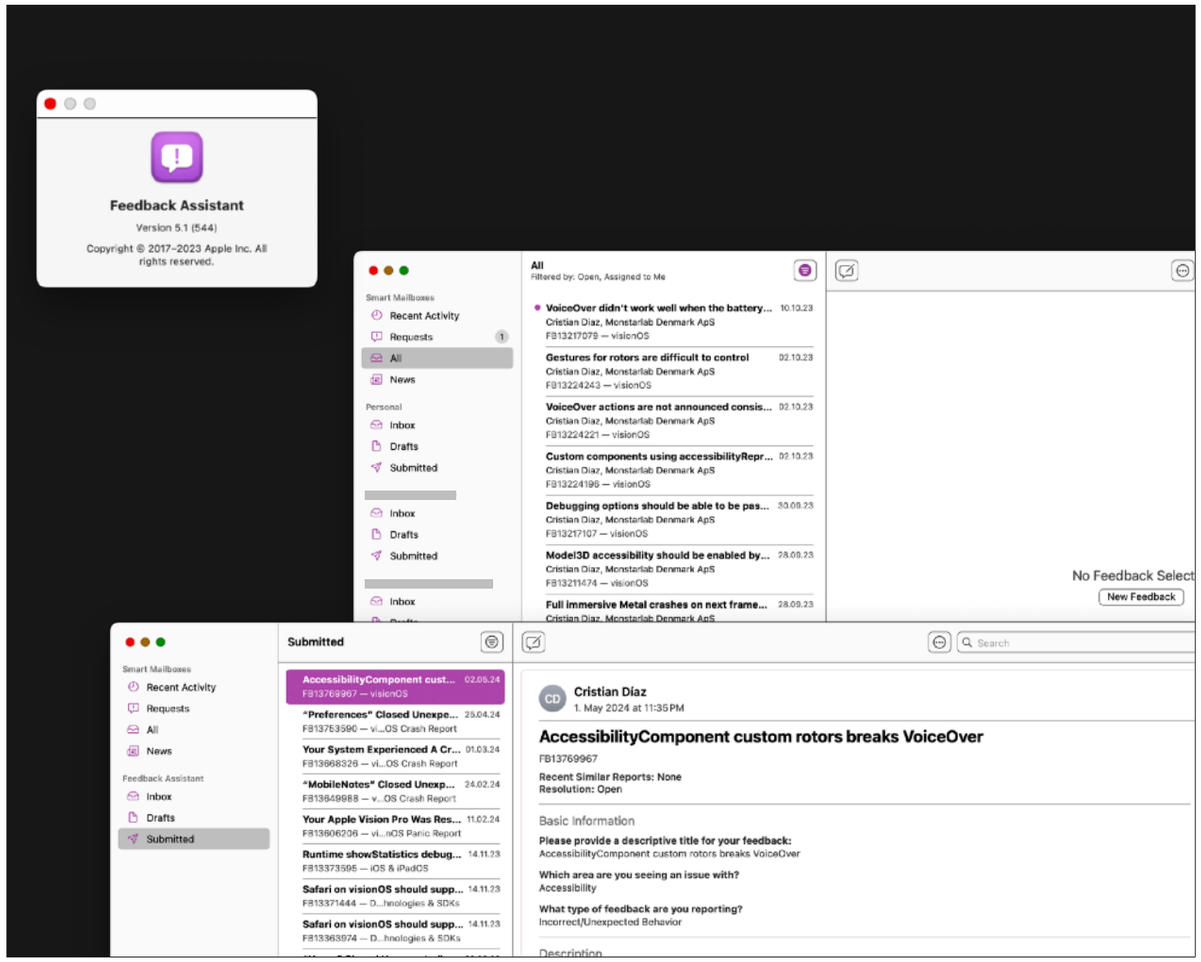
Going further

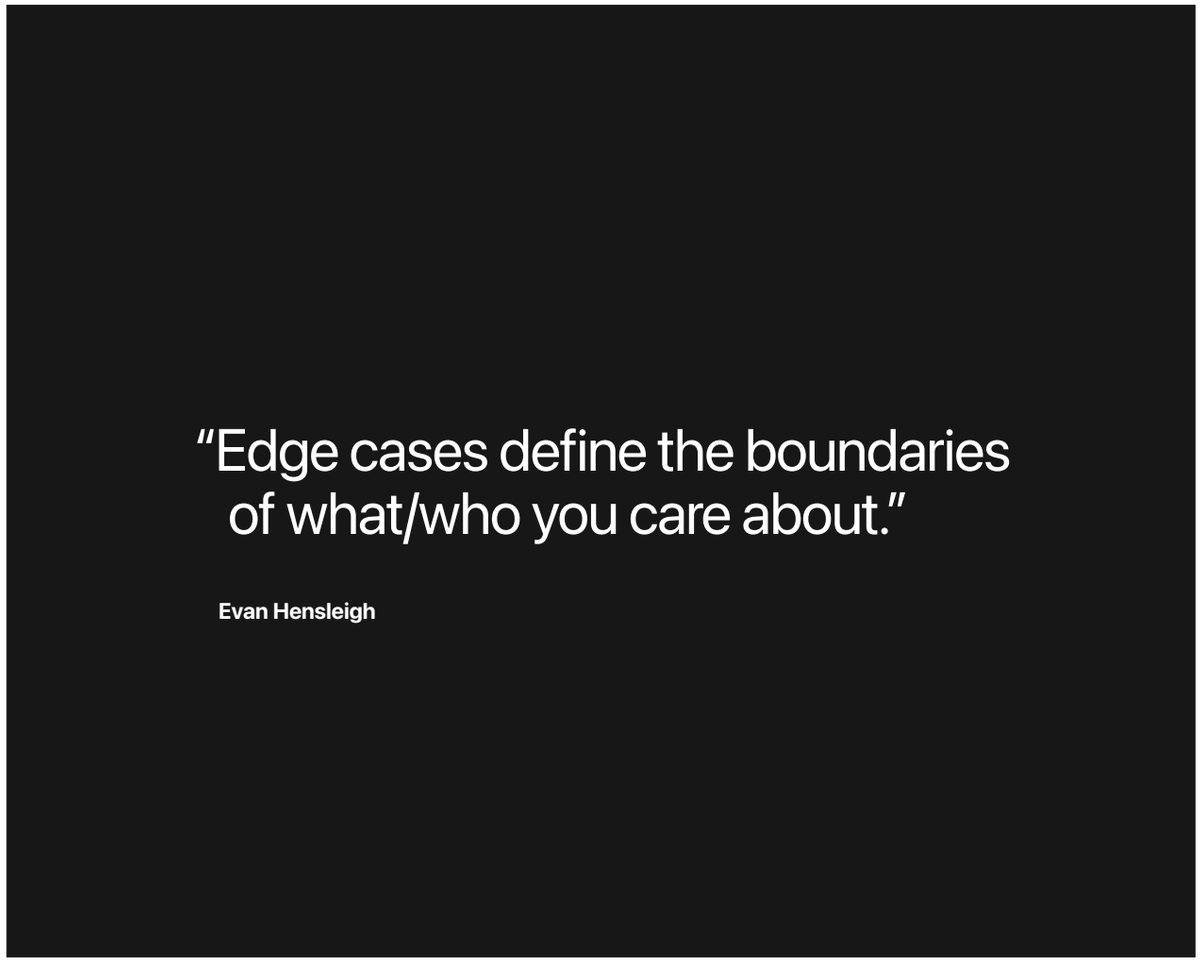
Trouble in paradise

The system is not so forgiving (error-tolerant)

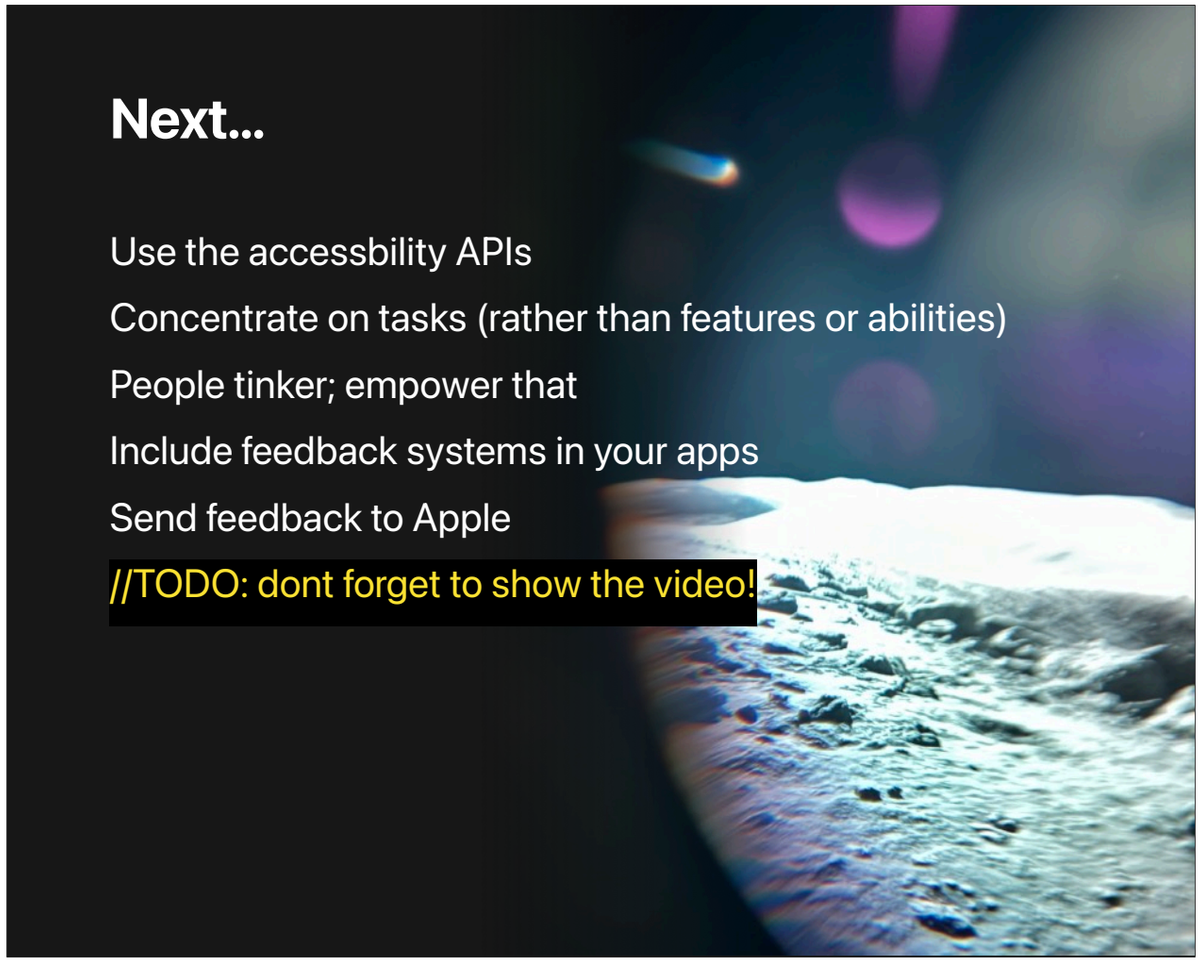
API is occasionally broken and/or undocumented

Certain people struggle with the concept of space


Feedback Assistant
Version 5.1 (544)
Copyright © 2017–2023 Apple Inc. All rights reserved.
All
Filtered by: Open, Assigned to Me
Smart Mailboxes
Recent Activity
Requests
All
News
Personal
Inbox
Drafts
Submitted
VoiceOver didn't work well when the battery...
Cristian Diaz, Monstarlab Denmark ApS
FB13217079 — visionOS
Gestures for rotors are difficult to control
Cristian Diaz, Monstarlab Denmark ApS
FB13224243 — visionOS
VoiceOver actions are not announced consis...
Cristian Diaz, Monstarlab Denmark ApS
FB13224221 — visionOS
Custom components using accessibilityRepr...
Cristian Diaz, Monstarlab Denmark ApS
FB13224196 — visionOS
Debugging options should be able to be pas...
Cristian Diaz, Monstarlab Denmark ApS
FB13217107 — visionOS
Model3D accessibility should be enabled by...
Cristian Diaz, Monstarlab Denmark ApS
FB13211474 — visionOS
Full immersive Metal crashes on next frame...
No Feedback Select
New Feedback
Submitted
Search
Feedback Assistant
Inbox
Drafts
AccessibilityComponent cust... 02.05.24
FB13769967 — visionOS
"Preferences" Closed Unexpe... 25.04.24
FB13763590 — vi...OS Crash Report
Your System Experienced A Cr... 01.03.24
FB13668326 — vi...OS Crash Report
"MobileNotes" Closed Unexp... 24.02.24
FB13649988 — v...OS Crash Report
Your Apple Vision Pro Was Res... 11.02.24
FB13606206 — vi...nOS Panic Report
Runtime showStatistics debug... 14.11.23
FB13373595 — iOS & iPadOS
Safari on visionOS should supp... 14.11.23
FB13371444 — D...hnologies & SDKs
Safari on visionOS should supp... 14.11.23
FB13363974 — D...hnologies & SDKs
CD
Cristian Díaz
1. May 2024 at 11:35 PM
AccessibilityComponent custom rotors breaks VoiceOver
FB13769967
Recent Similar Reports: None
Resolution: Open
Basic Information
Please provide a descriptive title for your feedback:
AccessibilityComponent custom rotors breaks VoiceOver
Which area are you seeing an issue with?
Accessibility
What type of feedback are you reporting?
Incorrect/Unexpected Behavior
Description



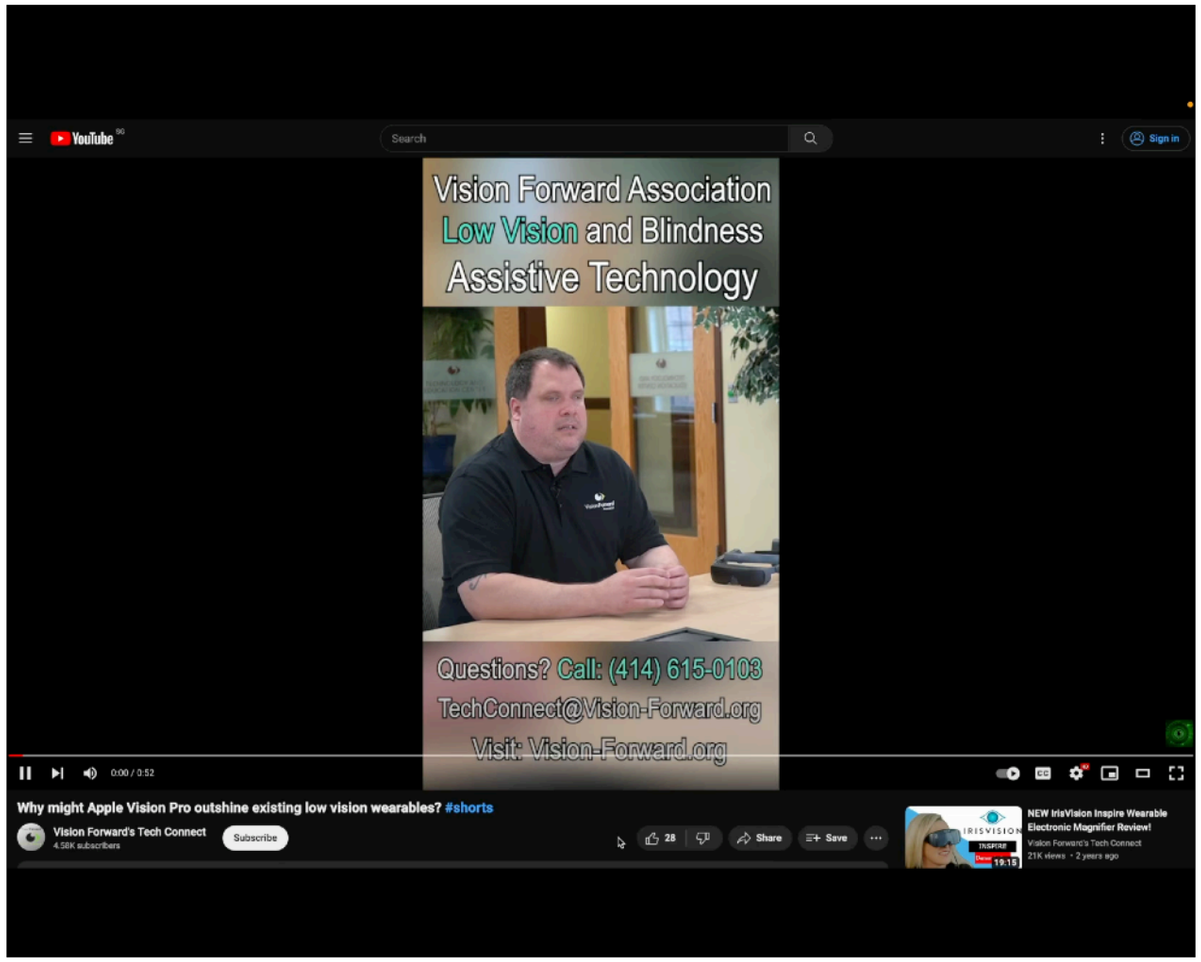
https://abookapart.com/products/design-for-real-life
https://x.com/futuraprime/status/580810337391345664



“We believe we are now at a critical time in the development of AR, where we can think ahead about how to make sure that AR applications are accessible to everyone as they are emerging“ — (Herskovitz et al.)

— — —

The mindset that created this device (AVP), the questions that are answered by the existence of this device, I think are the right mindset and questions to have, and it will create, if we use them as a mantra, the best products we can create.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Low Vision and Blindness
Assistive Technology
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TechConnect@Vision-Forward.org
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Why might Apple Vision Pro outshine existing low vision wearables? #shorts
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