Designing technology that gives disabled people a voice

James Reichelt

UX/UI Design Lead

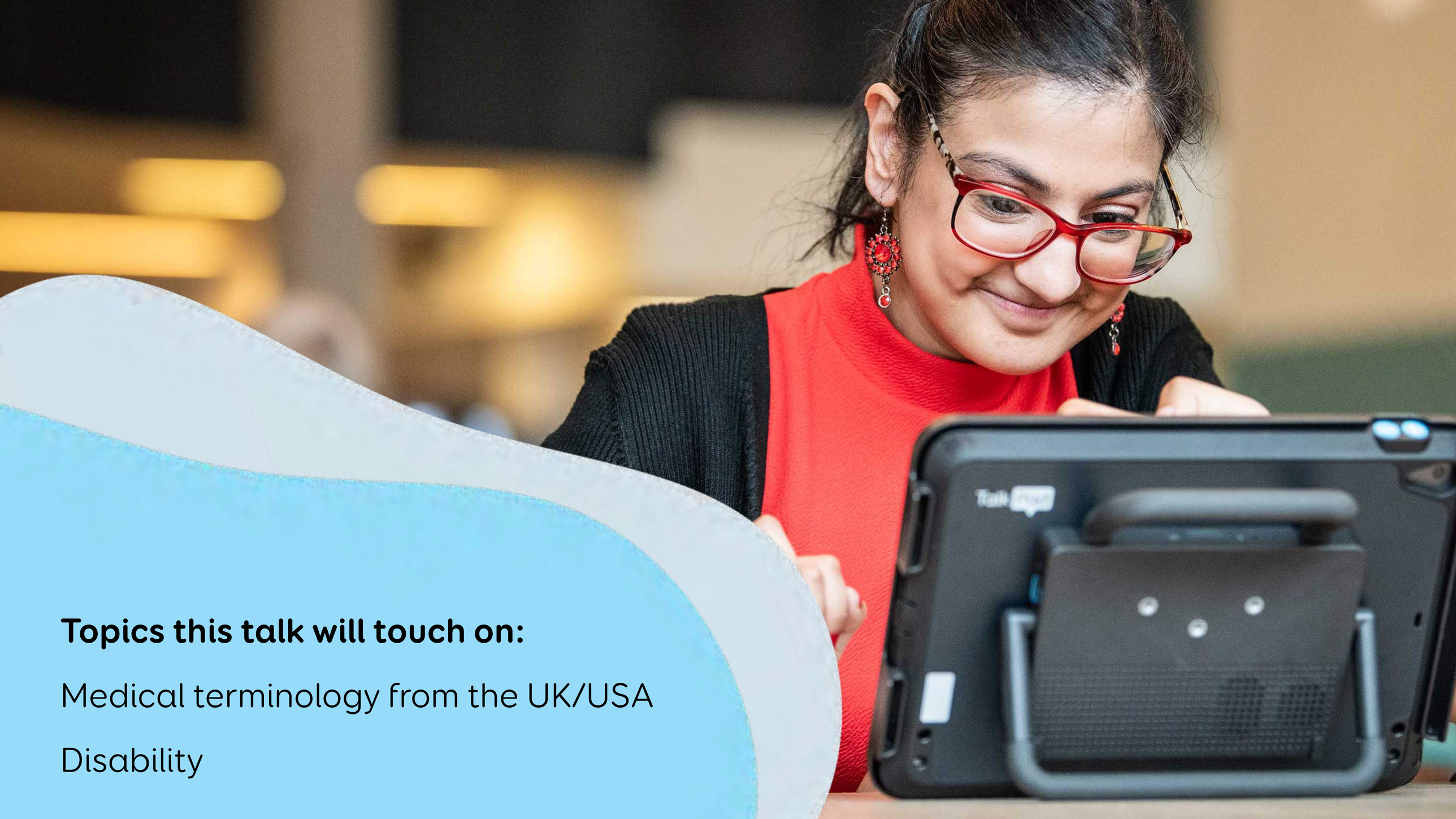
Smartbox

If you couldn’t use your **natural voice**, what would you be able to participate in?

What would you miss out on?

How **we** can ensure that if someone cannot communicate with their natural voice, they are **heard**, **understood** and **included** in society?

This is a talk about **inclusive design**



Topics this talk will touch on:

Medical terminology from the UK/USA

Disability

James Reichelt

UI / UX Design lead

Small team of UX designers linked to content development, software and hardware

@ Smartbox since 2015

Previously worked on EU digital inclusion projects in Wales linking businesses to accessibility testing and inclusive design.

Smartbox

Communication is Life

We create **software** and **devices** to give disabled people a voice.

This is called **Augmentative Assistive Communication** (AAC)

AAC is a **medical intervention** for when a person, for whatever reason, needs to use a tool to re-enforce their natural speech, or be used instead of speech.

“5 million Americans and **97 million** people in the world may benefit from AAC”

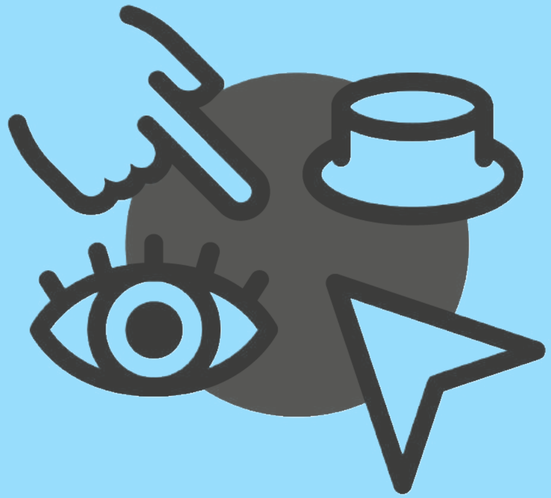
Beukelman and Light (2020)

GridPad
I've just realised

Smartbox
Smartbox
Smartbox

Our software platform is **Grid**

This a platform that links synthesised voices, ‘alternative’ access methods like eye control and switches, to accessible tools like keyboards, vocabularies and apps



jump home
jump back
speak
delete word
clear
who
what
why
where
when
now
then
English
art
I
to
want
come
see
this
that
stories
colours
my
is
stop
go
put
in
on
numbers
123
shapes
it
can
like
get
tell the time
calculator
you
do
need
help
people
have
questions

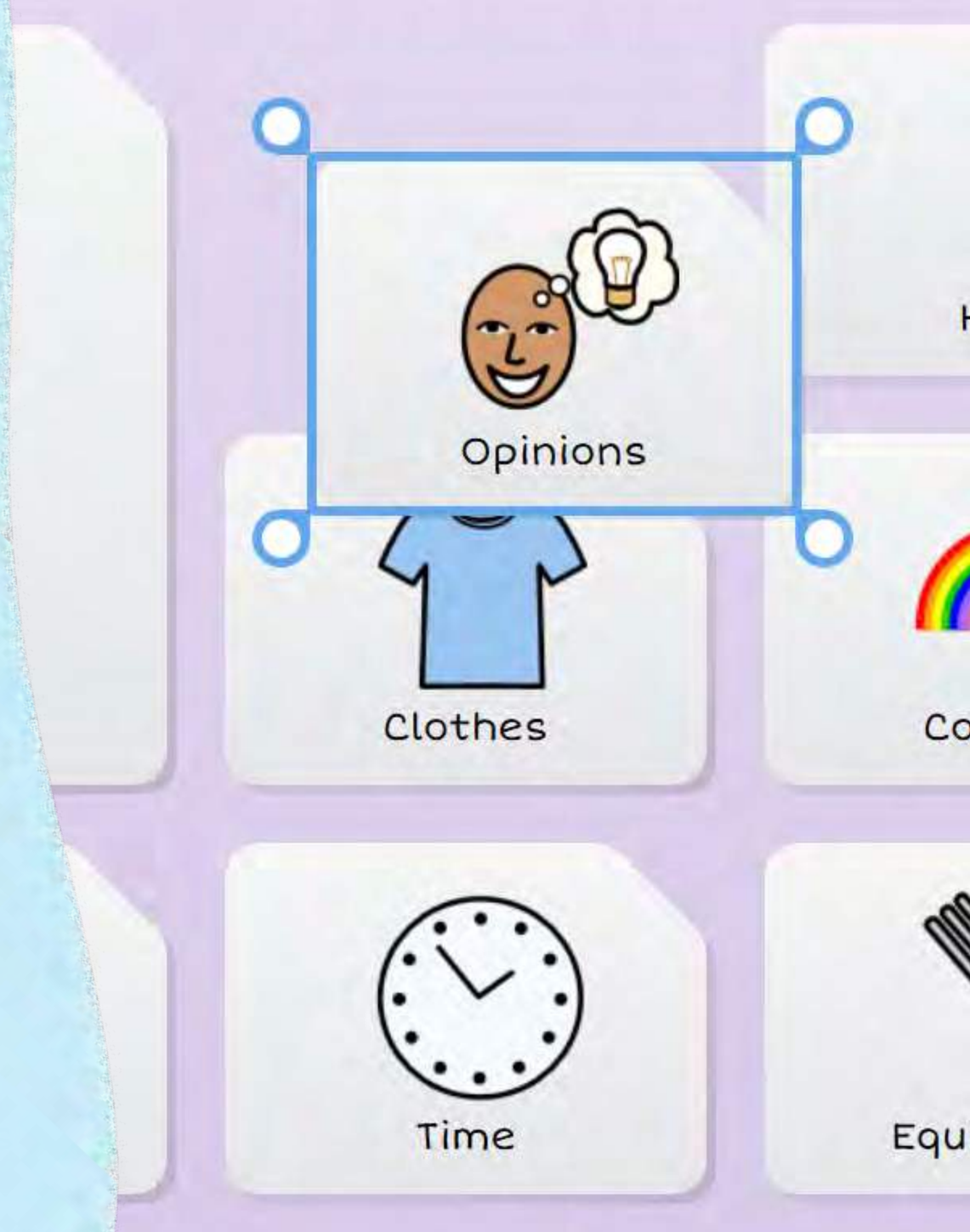
Start
Werkzeuge
Als Beispiel
Pause
für
habe
der
ist
Löschen
Zeichen löschen
Rückgängig
Leertaste
Smartbox

Home
I want someone
me
My family
Family words
I'll describe them
Back
my
My friends
People words
Relationships
Delete
you
More
Clear

Grid builds accessible interfaces

Grid is a flexible design tool.

We build our accessible interfaces within it, from our keyboards and vocabularies to tools that control other applications.

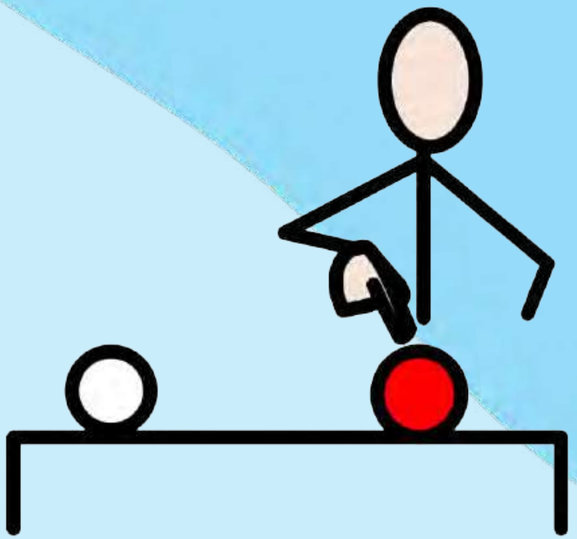


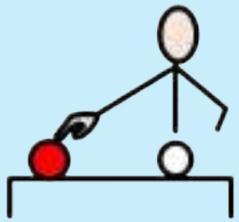
Congenital conditions:

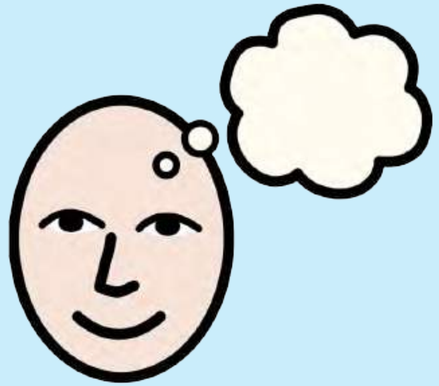
Cerebral Palsy, Autism, RETT,
genetic conditions.

Acquired and progressive conditions:

Stroke, MND/ALS, Aphasia, Brain Injury







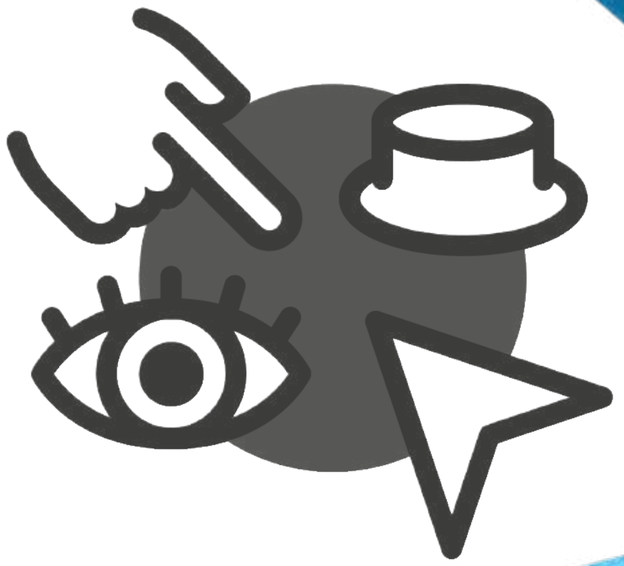
Accessing AAC

Motor functions

When someone is unable to use their natural voice, this is often compounded by other issues.

An access need comes from loss or lack of control of motor functions.

It is also common for the user to have other accessibility needs, such as a visual or hearing impairment.

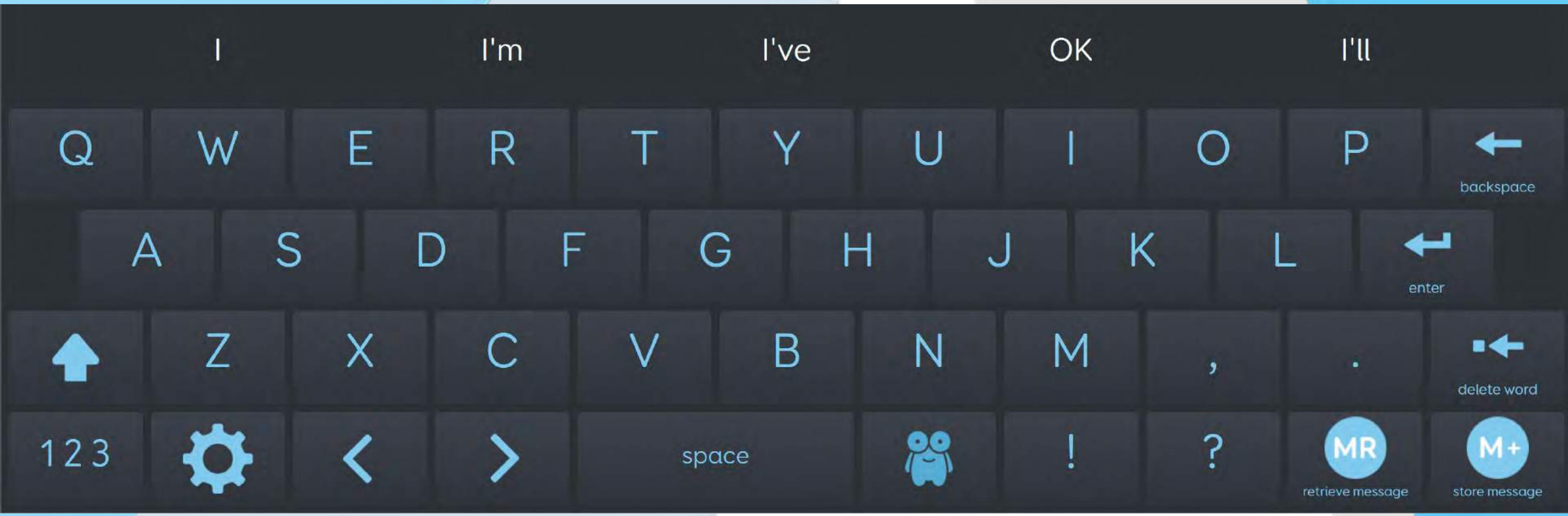


Multiple Solutions to Complex Access Needs

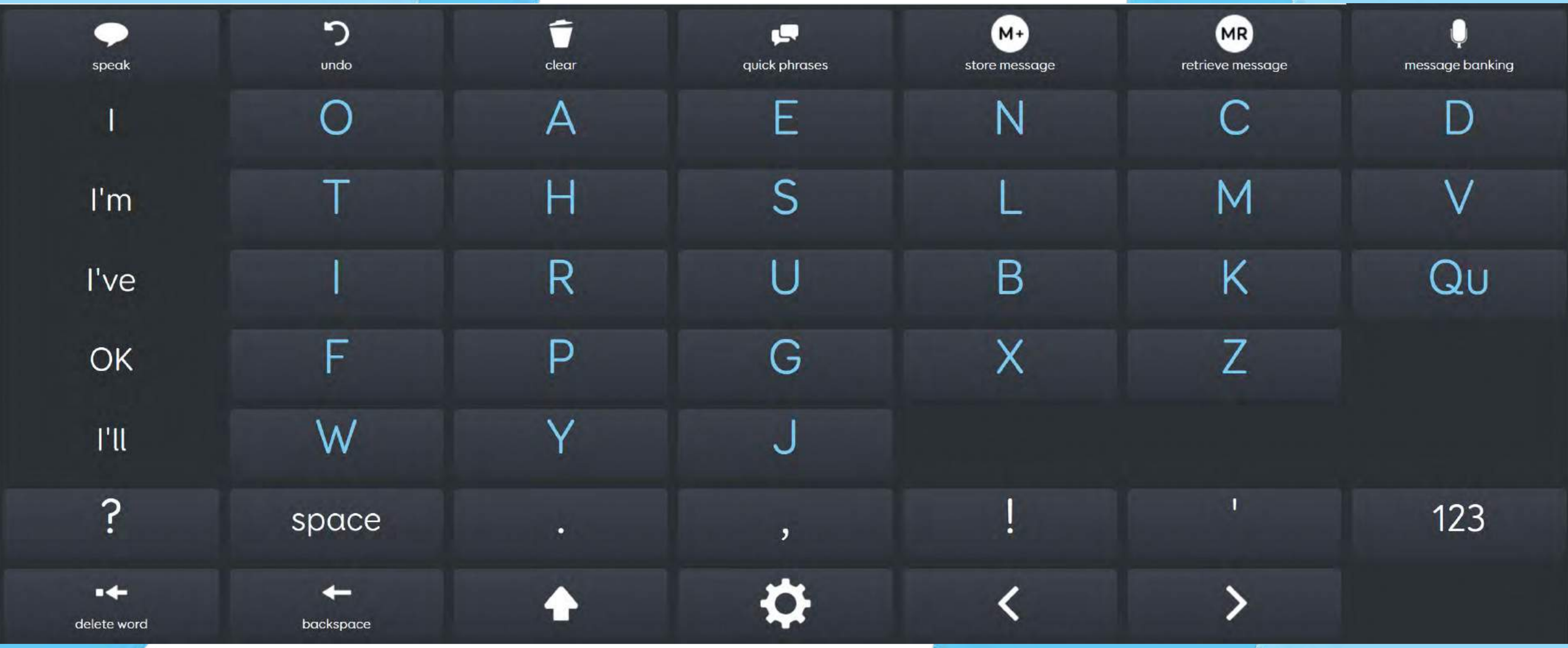
There is never one clear answer to what the ‘right’ accessibility solution is for an individual.

Combinations of input methods like eye control and switch are common.

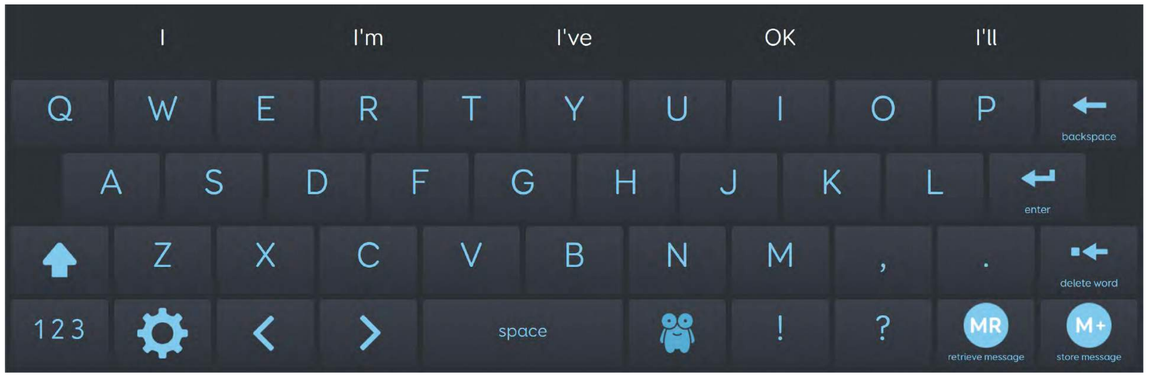
Touch screens must be configured correctly or have a keyguard helping with selections.

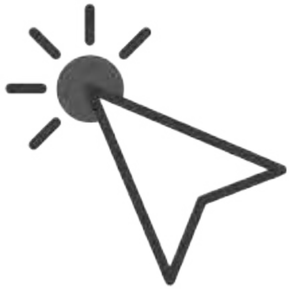


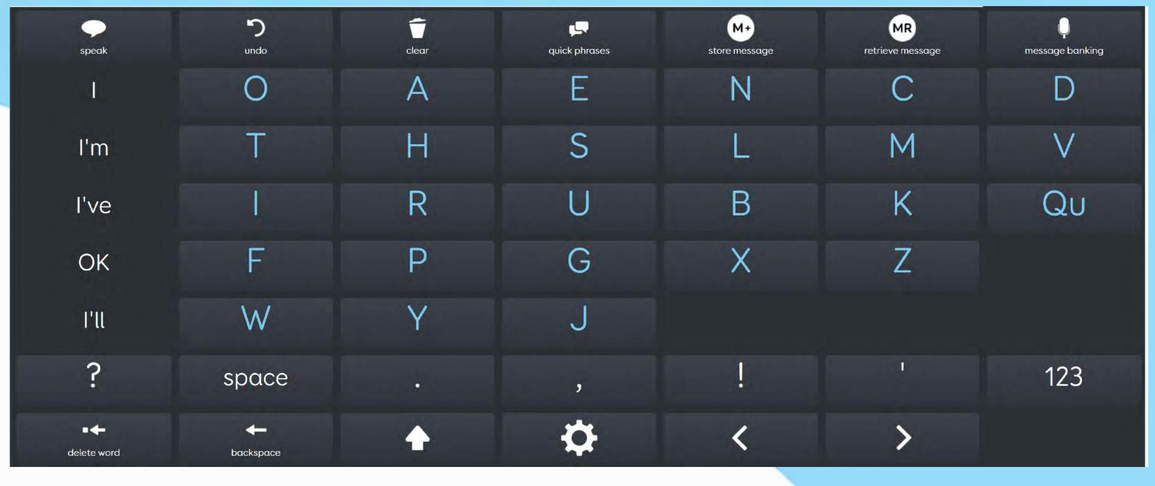
This is a ‘standard’ keyboard



This is a ‘switch frequency’ keyboard


I
I'm
I've
OK
I'll
Q W E R T Y U I O P
backspace
A S D F G H J K L
enter
Z X C V B N M , .
delete word
123
space
!
?
MR
retrieve message
M+
store message



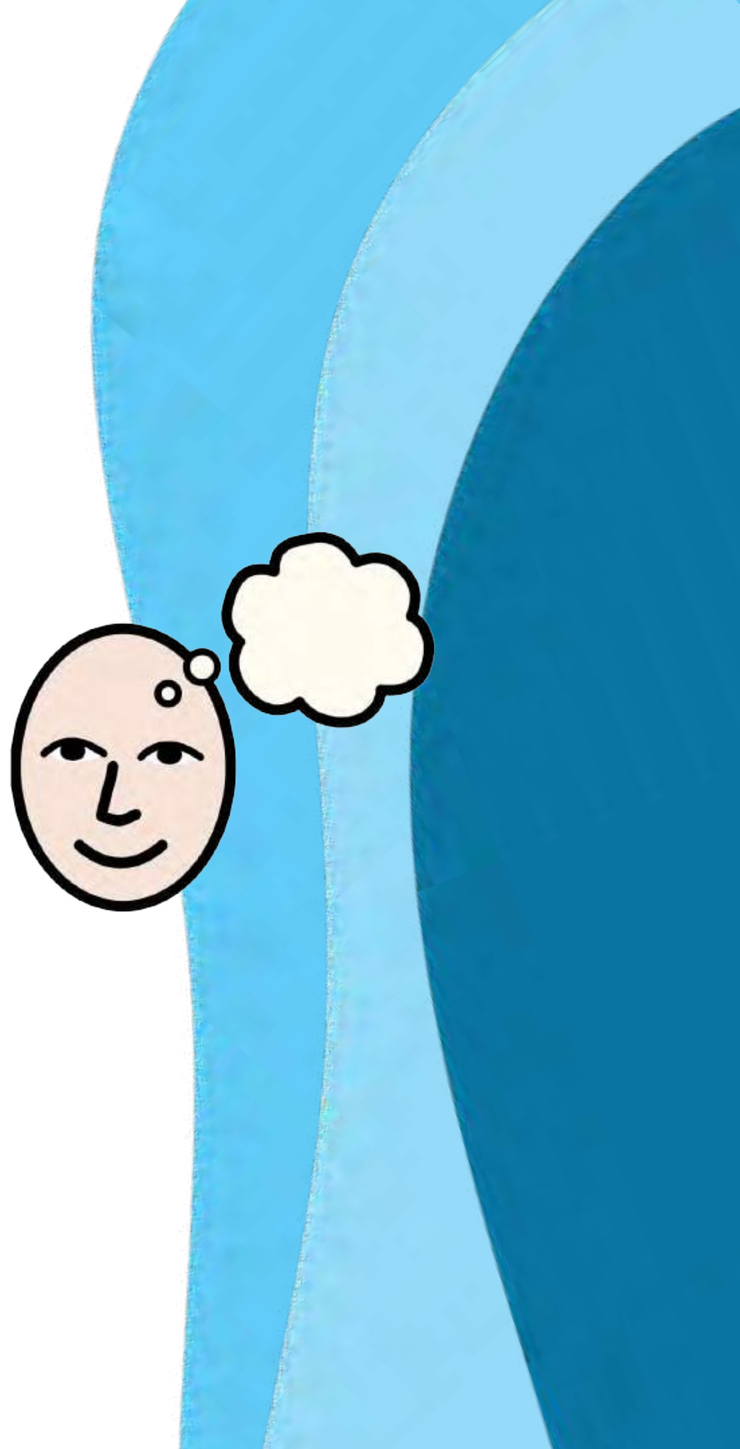

speak
undo
clear
quick phrases
M+
store message
MR
retrieve message
message banking
I
O A E N C D
I'm
T H S L M V
I've
I R U B K Qu
OK
F P G X Z
I'll
W Y J
?
space
.
,
!
'
123
delete word
backspace

Cognitive impairment

It is important to say that a cognitive impairment does not mean that someone may not understand something.

It is often the time it takes to comprehend a task or interface, and be able to respond, that has been impaired.

It may also reflect memory issues and recall. Images and symbols can help here, particularly with complex language.



Access needs change over time

The needs of an AAC user will change.

Progressive conditions will change how the user accesses the device through deterioration of function.

Other users may find they improve with different approaches.

Access needs

Cognitive impairment

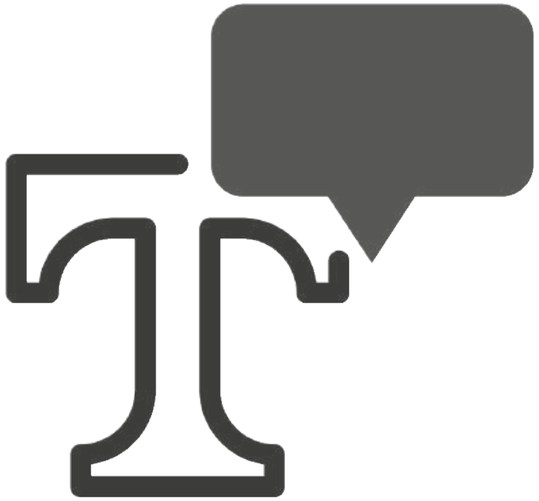
Change over time

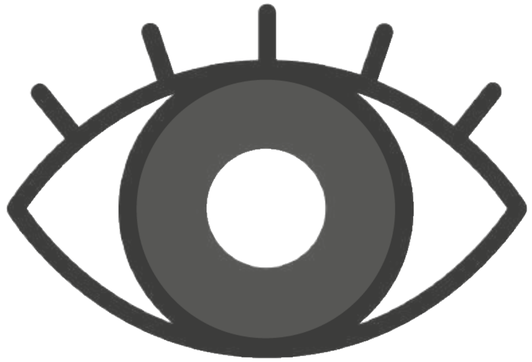
“Communication compression”

Communication compression

Even with great access devices, AAC is **slow**.

This is frustrating for the user, and results in the possible utterances becoming shorter, less diverse and with less personality.

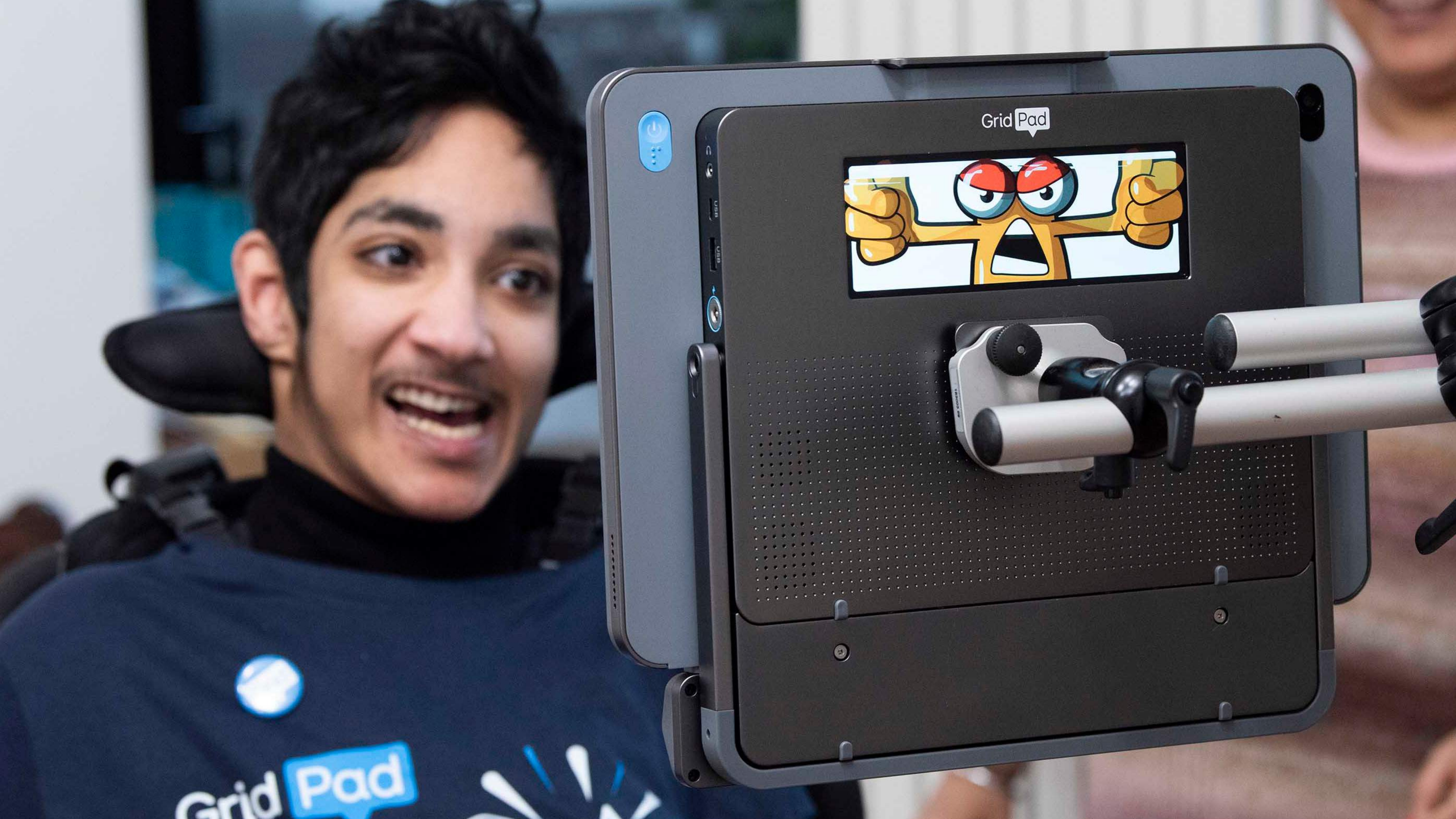




“Coffee please”

3 seconds

30 seconds


Grid Pad
Grid Pad

How are you doing?

Disability is **isolating**

Communication is **everywhere**.

Access to other methods of communication

Email

Messaging

Online shopping

Government services

Social media

inbox

speak

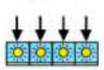
stop speaking

delete

Zazen, Pour-Over Coffee and Purple Socks

The gentle piyo piyo of pedestrian crossing signals and the cawing of crows no longer

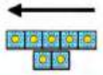
fill the urban soundscape. The faint scent of incoming humidity from the tsuyu plum


3

rains is no more. Daily at 3 PM, an irresistible urge to sleep overtakes you, betraying

your body's anchorage in the JST time zone. Vending machines and konbini are

conspicuously absent. Your time in Tokyo is behind you.



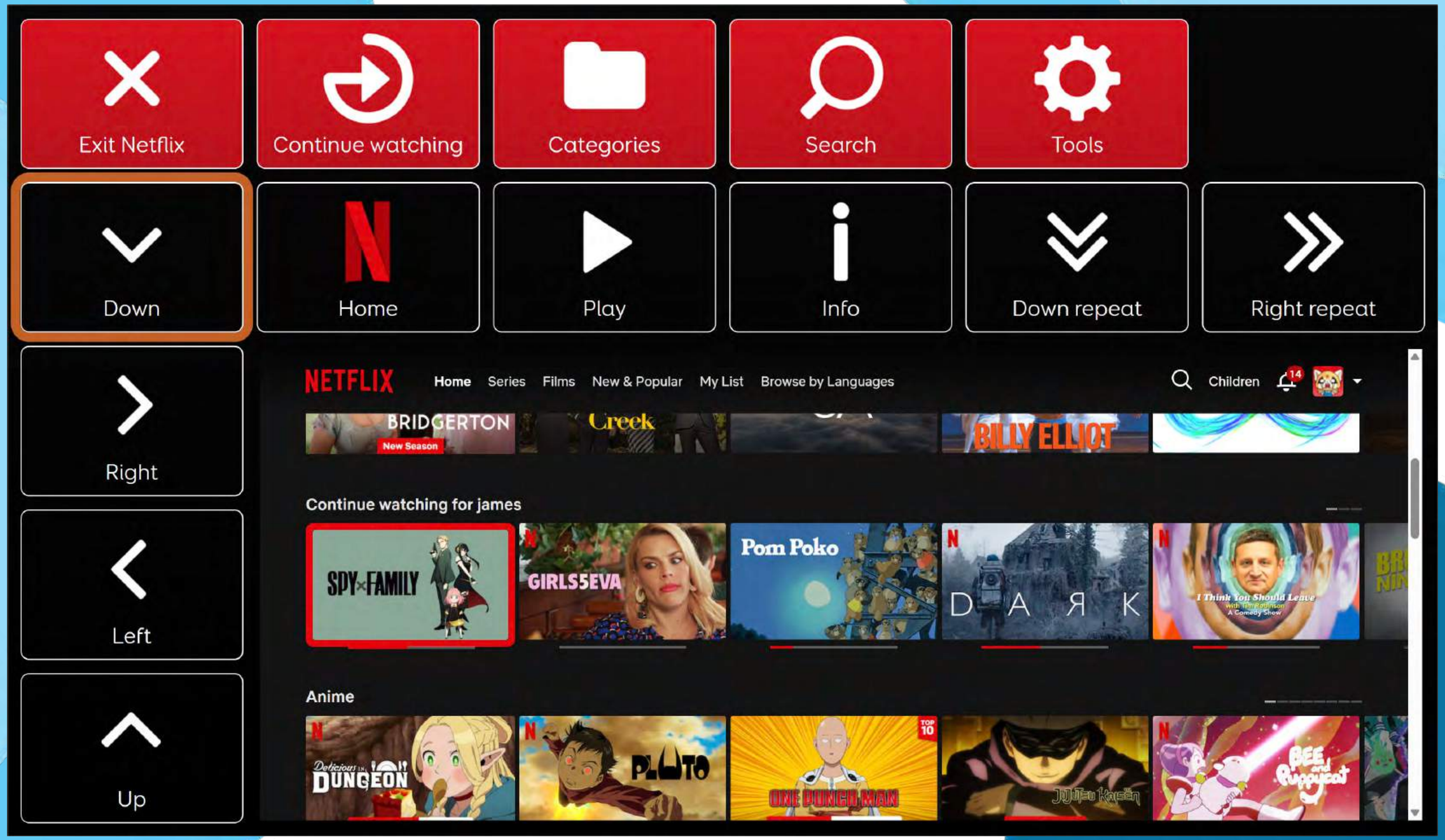
up

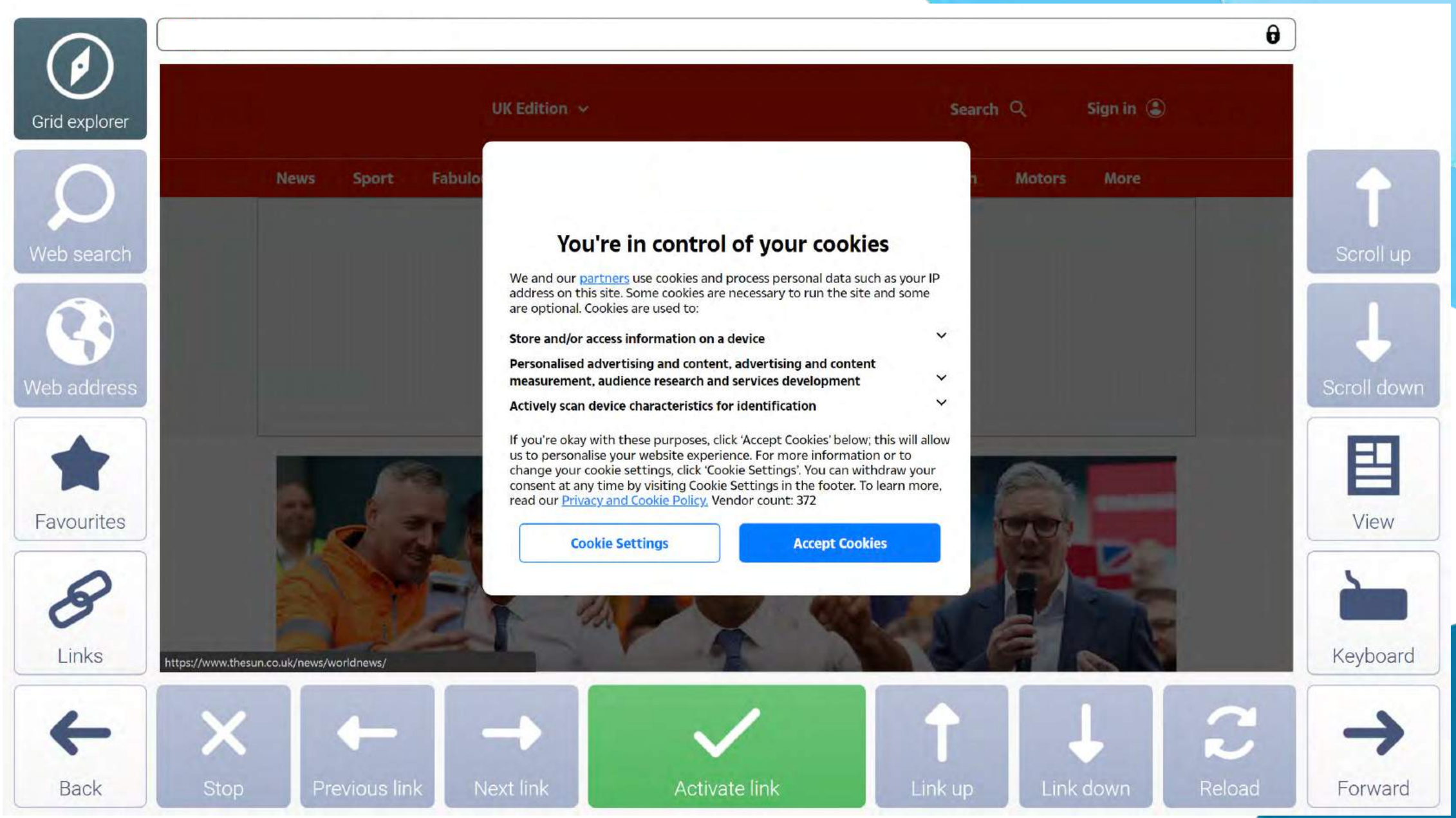
down

open

reply

Home - BBC News
https://www.bbc.co.uk/news
BBC
Home
News
Sport
Weather
iPlayer
Sounds
Bitesize
NEWS
Home | InDepth | Israel-Gaza war | Cost of Living | War in Ukraine | Climate | UK | World | Business | Politics
More
England | N. Ireland | Scotland | Alba | Wales | Cymru | Local News
Discover your BBC
Sign in or create an account to watch, listen and join in
Sign in
or
Register
Let us know you agree to cookies
We use cookies to give you the best online experience. Please let us know if you agree to all of these cookies.
Yes, I agree
No, take me to settings
Left click
Clicks
Type
Move
Zoom in
Zoom out
Close tab
New tab
Refresh
More
Scroll
Close
Rest


Exit Netflix
Continue watching
Categories
Search
Tools
Down
Home
Play
Info
Down repeat
Right repeat
Right
Left
Up
NETFLIX
Home
Series
Films
New & Popular
My List
Browse by Languages
Children
14
BRIDGERTON
New Season
Creek
BILLY ELLIOT
Continue watching for james
SPY×FAMILY
GIRLS5EVA
Pom Poko
DARK
I Think You Should Leave
with Tim Robinson
A Comedy Show
Anime
Delicious in Dungeon
PLUTO
ONE PUNCH MAN
TOP 10
Jujutsu Kaisen
Bee and Puppycat


Grid explorer
Web search
Web address
Favourites
Links
UK Edition
Search
Sign in
News
Sport
Motors
More
You're in control of your cookies
We and our partners use cookies and process personal data such as your IP address on this site. Some cookies are necessary to run the site and some are optional. Cookies are used to:
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Personalised advertising and content, advertising and content measurement, audience research and services development
Actively scan device characteristics for identification
If you're okay with these purposes, click 'Accept Cookies' below; this will allow us to personalise your website experience. For more information or to change your cookie settings, click 'Cookie Settings'. You can withdraw your consent at any time by visiting Cookie Settings in the footer. To learn more, read our Privacy and Cookie Policy. Vendor count: 372
Cookie Settings
Accept Cookies
https://www.thesun.co.uk/news/worldnews/
Scroll up
Scroll down
View
Keyboard
Back
Stop
Previous link
Next link
Activate link
Link up
Link down
Reload
Forward

WCAG and Access needs

Easy to follow guidelines for online accessibility.

Ensures compatibility with operating system level accessibility options.

Adopted as part of the European Accessibility Act requiring web and applications to meet standards from 2025.

www.w3.org/WAI

Involving AAC users and people with disabilities in your design research

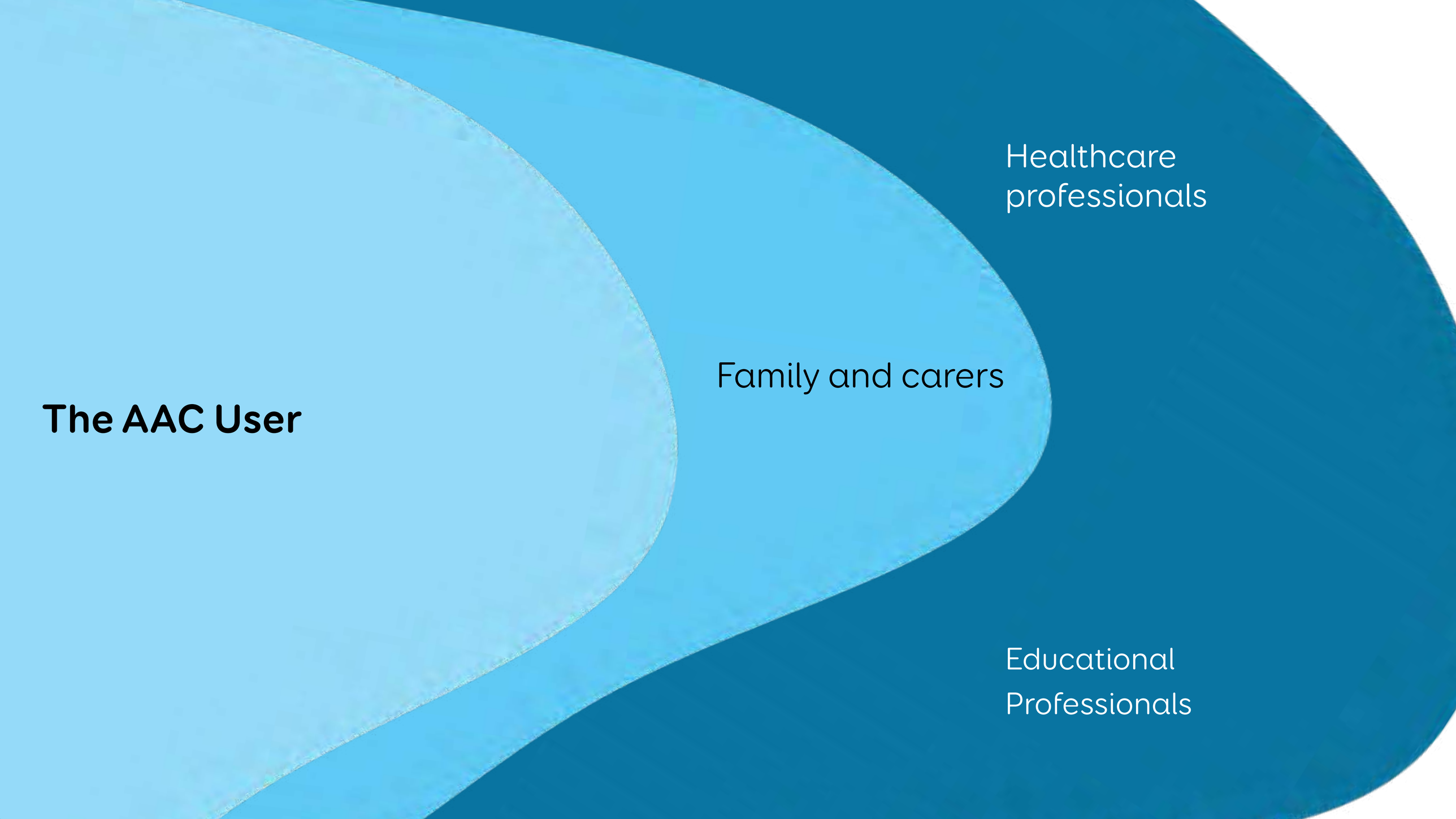
Our inclusive design practice

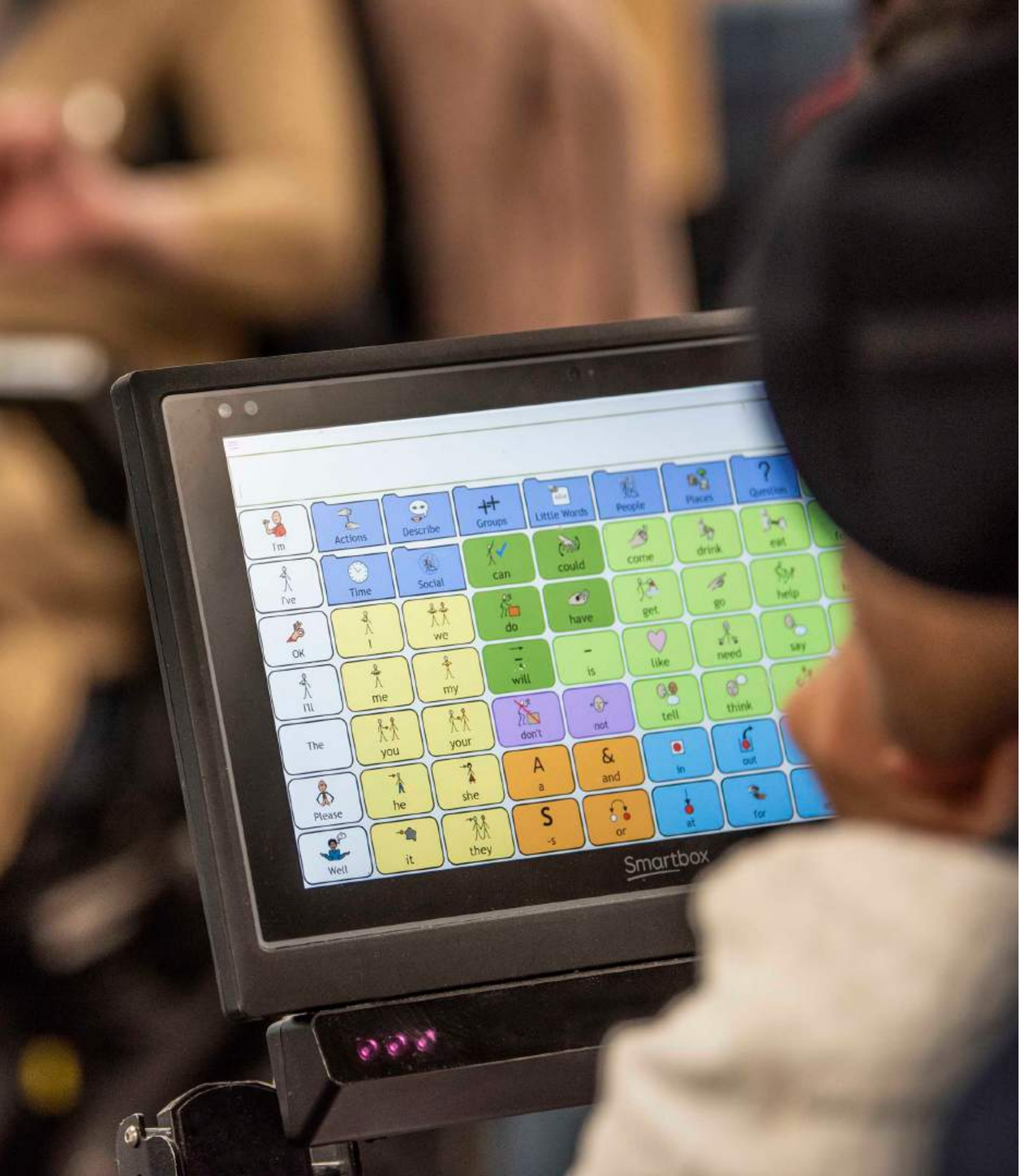
The Abandonment Project

You can’t design **for** disabled people without **including** disabled people from the **beginning**.

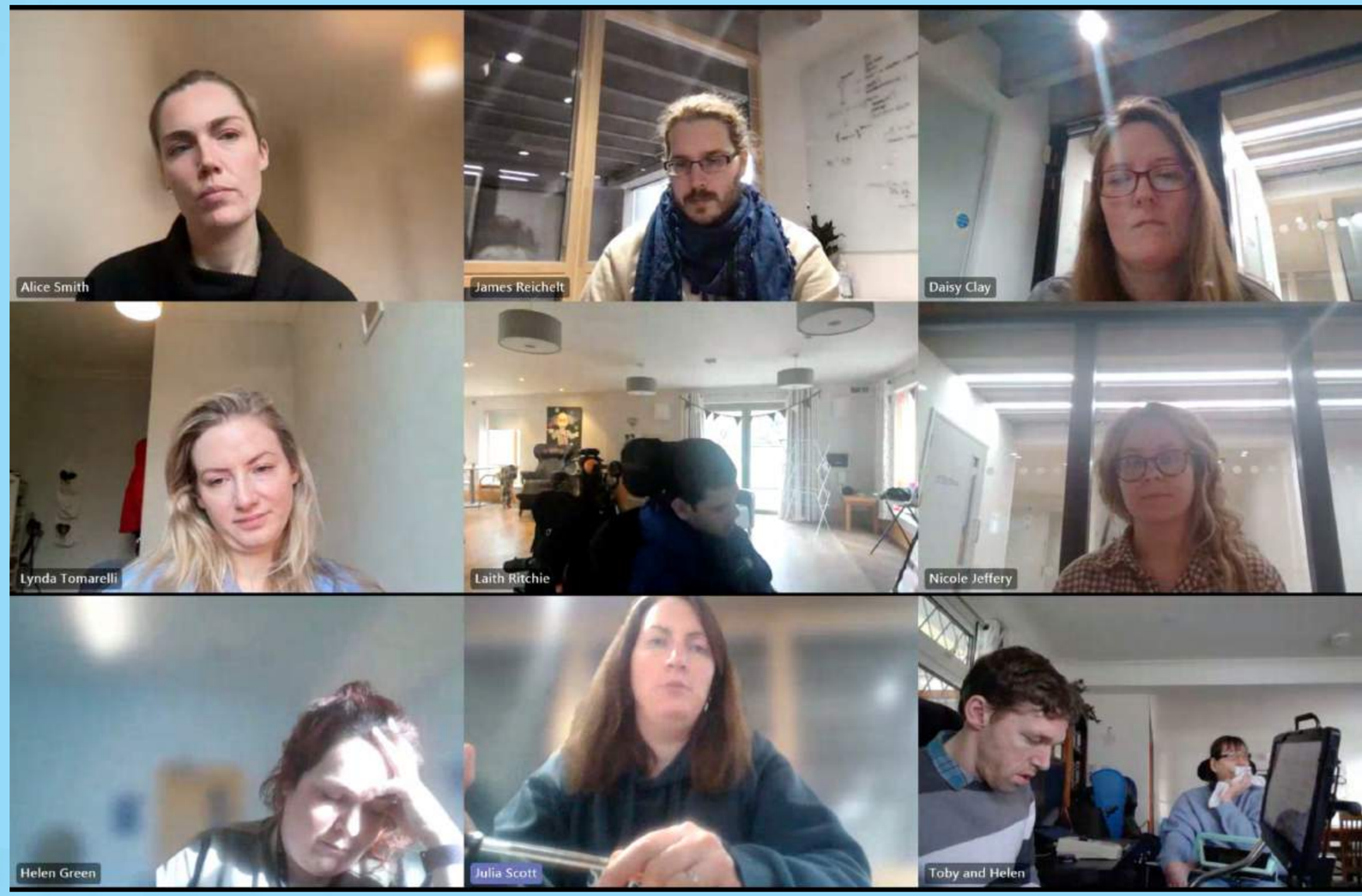
You can’t design for disabled people without including disabled people from the beginning.

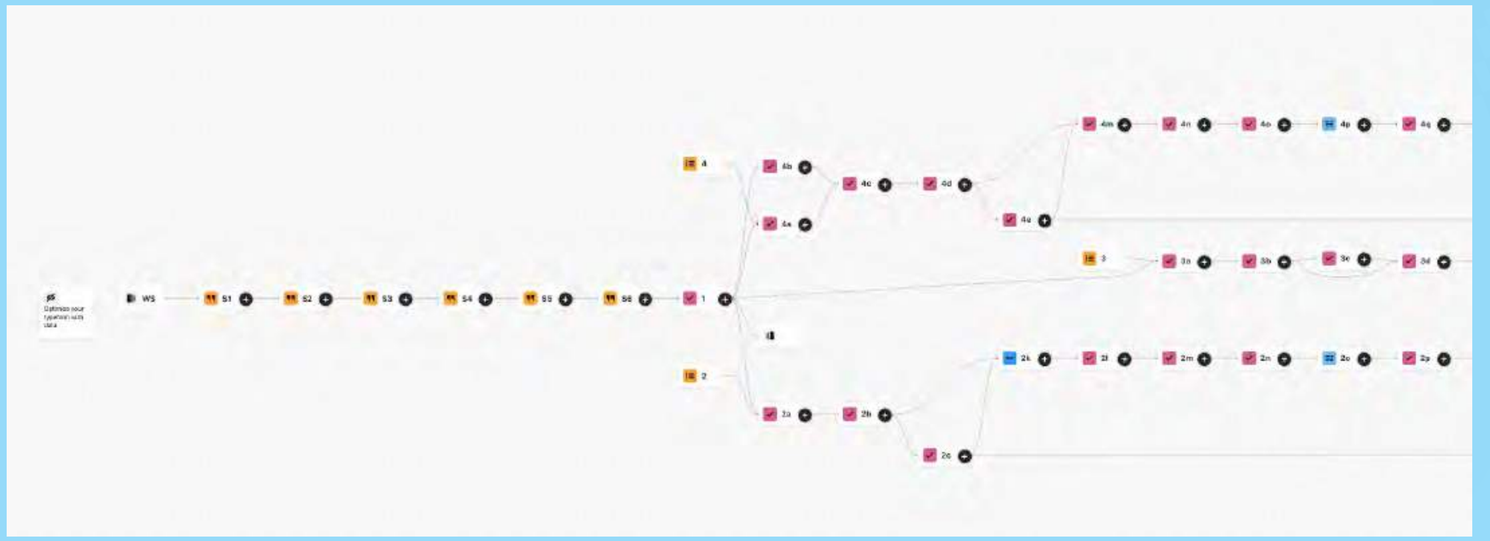
You must also include the people who **surround** them and **support** them.


The AAC User
Family and carers
Healthcare professionals
Educational Professionals


I'm
Actions
Describe
Groups
Little Words
People
Places
Questions
I've
Time
Social
can
could
come
drink
eat
OK
I
we
do
have
get
go
help
I'll
me
my
will
is
like
need
say
The
you
your
don't
not
tell
think
Please
he
she
A
a
&
and
in
out
Well
it
they
S
-s
or
at
for
Smartbox

Out of 32 users
11 have thought
using their device.
my son felt it made him
peers in school, so didn
and the teaching staff
little knowledge of it.
User
Family
Smartbox


Alice Smith
James Reichelt
Daisy Clay
Lynda Tomarelli
Laith Ritchie
Nicole Jeffery
Helen Green
Julia Scott
Toby and Helen



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Have you ever been offered or thought about getting one of the following
Description (optional)
A A mainstream electronic device - Phone, Tablet/iPad, Laptop
B A text to speech app
C A specialised communication device
D None of the above
Add choice

Let disabled people **in** to guide you

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Smartbox
Smartbox

Take the time to **ask**.

Understand how disabled people can be and want to be engaged.

Including disabled people as **co-researchers**

I know my daughter wants the device in her life. It gives her a voice.

We just don't know what place it should have and where that should be

Survey results
289 replies
34 users
75 families
180 professionals
Of the 34 users who responded....
AAC User
Out of 34 users who responded, 2 no longer use a device for communication.
Smartbox
Laith

When you design alongside people with disabilities, you will always end up with a **diversity** of ideas that will impact your whole organisation.

Inclusive design allows you to see the big picture,
show you new paths and **build for everyone**.

Finally.. This process was **hard**.

We made mistakes, one user thought our prototype was the final product and was devastated to learn they couldn’t use it.

But we learn, we respond, and we will do, and have done better since.

By including disabled people in your design process, your product, service or solution can and will fit into their lives.

To be inclusive of those using AAC, take the time to **listen**.

Take the time to see the world at their pace and build mindfully of their needs. Think of the people around them, and how they see the tools you make.

Technology is always pressing forwards. However, the core needs of access, communication and independence will always remain.

Japan ALS Association:

als-mnd.org/directory/japan-als-association

Upit Ltd:

upit.co.jp

American Speech and Hearing Association:

asha.org

When we design our future inclusively of disabilities,
we are not just designing for others.

We are designing for our friends, our families and
ourselves.

Smartbox

Communication is Life

thinksmartbox.com

James Reichelt

UX/UI Design Lead

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