Creating an Accessible & Inclusive Future Flight
In 2021, InnovateUK-KTN and InnovateUK commissioned CCD Design & Ergonomics to deliver a workshop to inform and empower organisations to embed inclusive solutions in their future flight projects.
The global market for drones, AAM and supporting services is projected to be approximately $74 billion by 2035.

76,000 drones projected to be in use by industry in the UK by 2030:

- Public Defence, Health & Education: 27,233
- Agriculture, Mining, Gas & Electricity: 25,732
- Transport & Logistics: 11,008
- Construction & Manufacturing: 4,816
- Technology, Media & Telecoms: 4,541
- Finance, Insurance & Services: 2,514

Predicted impact on UK economy:
There is predicted to be a 1.8% increase in GBP and £16bn in net cost savings to the UK economy by 2030 through drone services.
1 in 5
More than 1 in 5 potential UK consumers have a disability

£2 billion
Businesses lose approximately £2 billion a month by ignoring the needs of disabled people

73%
of potential disabled customers experienced barriers on more than a quarter of websites they visited

£16 billion
Taking averages per head, the online spending power of disabled people is estimated at over £16 billion

Loss of money for business per month

<table>
<thead>
<tr>
<th>Type of business</th>
<th>Loss of income</th>
</tr>
</thead>
<tbody>
<tr>
<td>High street shop</td>
<td>£267 million</td>
</tr>
<tr>
<td>Restaurant / pub / club</td>
<td>£163 million</td>
</tr>
<tr>
<td>Supermarket</td>
<td>£501 million</td>
</tr>
<tr>
<td>Energy company</td>
<td>£44 million</td>
</tr>
<tr>
<td>Phone / internet provider</td>
<td>£49 million</td>
</tr>
<tr>
<td>Transport provider</td>
<td>£42 million</td>
</tr>
<tr>
<td>Bank or building society</td>
<td>£935 million</td>
</tr>
</tbody>
</table>

£17.1 billion
Estimates show that the 4.3 million disabled online shoppers, who click away from inaccessible websites, have a combined spending power of £17.1 billion in the UK

14.1 million
The number of disabled people is increasing: From 11.9 million (2014) to 14.1 million (2019)

75%
75% of disabled people and their families have walked away from a UK business because of poor accessibility or customer service

1 in 5
Nearly 1 in 5 working adults have a disability

£274 billion
The spending power of disabled people and their households continues to increase and is currently estimated to be worth £274 billion per year to UK businesses
This is the spending power of disabled people and their families PER YEAR

To fully realise the economic benefit of Future Flight – all technologies, services and platforms must be accessible.
The 7 Principles of Universal Design

Principle 1: Equitable Use
The design is useful and marketable to people with diverse abilities.

Principle 2: Flexibility in Use
The design accommodates a wide range of individual preferences and abilities.

Principle 3: Simple and Intuitive Use
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Principle 4: Perceptible Information
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Principle 5: Tolerance for Error
The design minimises hazards and the adverse consequences of accidental or unintended actions.

Principle 6: Low Physical Effort
The design can be used efficiently and comfortably and with a minimum of fatigue.

Principle 7: Size and Space for Approach and Use
Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.
Personas and scenarios

**Greg**
Drone delivery service for someone with a visual impairment

**Dan and Becky**
Urban journey for two people with mobility impairments

**Carly**
Sub-regional journey for family with cognitive impairments
Hi, I'm Greg!

Greg is 27, and a PhD student living in Hove. He was born sighted, but has been living with complete blindness for the last decade. Being independent is incredibly important to Greg, and he often plans ahead - allowing extra time in case things don't go as expected.

When in the built environment, he relies on automated audio announcements, tactile markings and staff assistance for navigation, and a long cane and guide dog for mobility. He uses the text-to-speech capabilities of a screen reader for technical tasks, including booking tickets and messaging. Greg is comfortable with using assistive gadgets, but doesn't read Braille.
Drone delivery service considerations

Ordering item & selecting delivery method

What products might drone delivery be available for?

What platform, technology or method of updates might be most appropriate for Greg?

What information will be included?

Tracking & order updates

How will Greg know the item is being/has been delivered?

Delivery

How will Greg know where the item has been left?

Locating item

How easy is it to reorder?
Drone delivery service considerations – outputs from workshop

Ordering item & selecting delivery method
- Voice assistants
- Is it cost comparable to other delivery services?
- Ability to pre-visit delivery site to ensure familiarity
- How to familiarise customers with the required technology

Tracking & order updates
- Ability to select frequency of updates
- How will item be delivered?
- Where will item be delivered?
- Site of delivery needs to be safe for both individual and guide dog

Delivery
- Ability to select frequency of updates
- How will item be delivered?
- Where will item be delivered?
- Site of delivery needs to be safe for both individual and guide dog
- Security reassurance - item will not be stolen
- What happens if the delivery fails?

Locating item
- Guide dog could support locating item
- Audio signals?
- Safety – prefer not to cross roads
- Doorstep drop-off preferred
- Beacons/messaging service to locate item

FLEXIBILITY OF THE SOLUTION KEY AT EVERY STAGE
Urban journey for two people with mobility impairments

We're Dan & Becky!

Dan and Becky live in Chester. They have been married for 20 years, and travel regularly as a couple – although that’s not always plain sailing due to their multiple, differing requirements and the prejudice they often receive from members of the public.

Dan has cerebral palsy, which affects his walking gait, co-ordination, speech and causes fatigue. He requires frequent dwell space and struggles to book assistance over the phone as staff can have trouble understanding him. Dan uses a lightweight mobility scooter for some journeys, and often comments that "stair (and stare) free access makes things much easier".

Becky is of shorter stature, and has difficulty boarding any kind of transport that involves wide stepping gaps, automatic doors with high sensors, high platforms and a lack of handrails or supportive equipment. For Becky, the physical barriers of travelling are much easier to overcome that the attitudinal barriers of other people; she is regularly filmed and mocked on public transport, especially when other passengers have had a drink!
Air taxi service considerations

Arriving at vertiport

How might Dan & Becky book their journey at the Vertiport?

Is there staff available? Who are they, how will they help and what training do they need to provide this?

Pre-boarding

Beyond physical assistance, what might make this journey special for Dan & Becky?

What physical assistance might support Dan & Becky boarding?

Boarding

Disembarking

What else might need to be considered at the other end of the journey?

Have you considered storage?
Air taxi service considerations – workshop outputs

Arriving at vertiport
- Step-free access
- Flexible design to allow for changes in impairment
- Met by a member of staff
- Adequate rest points
- Clear signage
- Pre-booking
- Mobility aids kept with pax
- Covered walkways
- Good transport connections &/or parking

Pre-boarding
- Accessible check-in/touch screens
- Wide aisles & clutter free
- Charging points for mobility aides
- Consideration on height of assets (e.g. desks, vending machines)
- Plenty of time to board
- Pax requirements are understood at time of booking, enabling better customer assistance at vertiport

Boarding
- Seat height adjustable
- Ability to charge mobility aids
- Can wheelchairs be the vehicle chair?
- Respect
- Well trained staff

Disembarking
- Well trained staff
- Help with bags/luggage
- Priority disembarkation
- Wide spaced arrival lounges
- Mobility scooter/wheelchair available immediately
- Information on linked services

CUSTOMER ENGAGEMENT TEAM
- Seat height adjustable
- Ability to charge mobility aids
- Can wheelchairs be the vehicle chair?
- Respect
- Well trained staff

CUSTOMER ENGAGEMENT TEAM
- Seat height adjustable
- Ability to charge mobility aids
- Can wheelchairs be the vehicle chair?
- Respect
- Well trained staff
Sub-regional journey for family with cognitive impairments

Hey, I'm Carly!

Carly is Autistic and the mother of two daughters who are also neurodivergent. As a well-renowned businesswoman, Carly has to travel regularly for work and is often accompanied by her daughters - and their assistance dog - as she is their primary carer.

Carly excels at planning, but has great anxiety around unpredictability, and the aspects of travel she cannot control, such as delays, diversions and schedule changes. She has yet to find a sensory friendly travel setting that everyone is comfortable in and, when travelling, she admits that she has "little time for any form of self-care", as she must support her daughters' needs first. This usually involves packing numerous 'sensory kits', managing overstimulation, and ensuring the group's proximity to charging capabilities.

A previously manageable journey can become impossible from a sensory point of view if plans change at the last minute and lateness becomes an issue, and Carly has often reverted to spending hundreds of pounds on a taxi to simply avoid meltdown.
Sub-regional journey for family with cognitive impairments

Booking journey

Arriving at airport

Pre-boarding

Boarding & onboard experience

What might help ease Carly's anxiety at this stage?

Is there anything Carly should know, or the service know about Carly, at this stage?

Who or what will be there to greet Carly and her family at the Airport?

How will Carly and her family fill their time while waiting for their trip?

Are there any specific facilities that Carly might be interested to know about? How will she know about or find them?

What might be included in the onboard experience to ease Carly's anxiety or help her children settle?

How might this experience differ from a traditional flight?
Sub-regional journey for family with cognitive impairments

**Booking journey**
- Advanced booking
- Contextual information before & during booking
- Pre-travel simulation to enable familiarisation
- Discretely informing operator of disability
- Provision for assistance dog
- Pre-travel sensory familiarisation
- Clear instructions on where to find help during travel

**Arriving at vertiport**
- Avoiding queues
- Predictable drop off areas
- Smooth transition
- Real time information
- Clear wayfinding
- Technology to enable smooth transition (e.g. facial recognition)
- Catering for possible chaperones

**Pre-boarding**
- Avoiding queues
- Predictable drop off areas
- Smooth transition (e.g. facial recognition)
- Real time information
- Clear wayfinding
- Waiting & transfer areas with low sensory attributes
- Charge points
- Toilets & facilities
- Trained staff & awareness of customers with additional needs

**Boarding & onboard experience**
- Accommodating assistance dogs
- Visual flight tracker & real time flight data
- Safety briefing
- Contact point on flight
- How will sound be minimised?
For more information on the Future Flight Challenge

E: futureflight@ktn-uk.org

Twitter: #FutureFlight

LinkedIn: https://www.linkedin.com/groups/13866337/