KANTAR PUBLIC

Department for Business, Energy & Industrial Strategy

BEIS Public Attitudes to Science
Digital Dialogues - Wave 2
Perceptions and acceptability of the use of artificial intelligence with a focus in healthcare

Report

July 2019

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Executive summary

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Public dialogue brings together members of the public, policy makers, and expert stakeholders on a subject to deliberate, reflect and come to conclusions about a policy issue; e.g. on new technologies and complex, sensitive, political or difficult issues. This dialogue explored public perceptions and acceptability of artificial intelligence, with a focus on its use in healthcare.

The aims of the dialogue were to:

- To gain a greater understanding of what the public understand of the term 'artificial intelligence';
- To understand participants' relationship with artificial intelligence, engagement with artificial intelligence, and the role of artificial intelligence;
- To understand perceptions of the role of artificial intelligence in healthcare and the aspirations and concerns that the public hold;
- To understand responses to current uses of artificial intelligence in healthcare;
- To understand perceptions of how data is used to enable artificial intelligence to be used in healthcare; and the extent to which different organisations are trusted to hold and use healthcare data;
- To understand the extent to which the public think that their healthcare experience would change if artificial intelligence was used more widely, and the acceptability of this.

One week digital dialogue

- 33 participants reflecting a range of demographics, 4 stakeholders, and 3 policy makers who observed the dialogue process
- 7 day dialogue - 3 waves of materials were released and 2 homework tasks were completed between waves
- 6th – 13th November 2018

Four focus groups

- 4 focus groups with 30 digitally excluded participants in Newcastle-upon-Tyne and Cardiff
- 90 minutes - a reduced version of the dialogue guide and materials were used
- 15th November

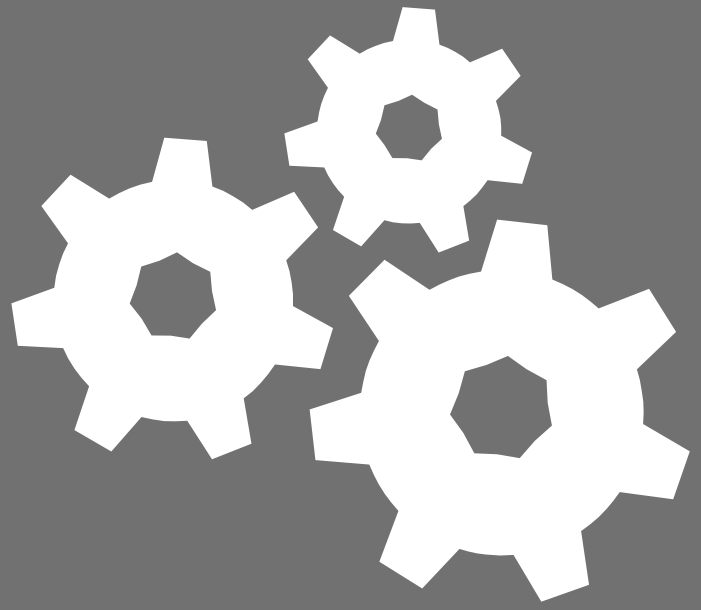
Key Insights: Artificial intelligence in healthcare

Perceptions of artificial intelligence	Views on industries using AI	Benefits of AI in healthcare
While perceptions of artificial intelligence (AI) were mixed, we saw the emergence of some quite considered understandings of it amongst the participants. How an individual perceived AI was largely based on their experiences of it and their sources of information about it. When thinking about AI in general, participants were commonly interested in and curious when they saw that it had potential to improve their quality of life. However, digitally excluded participants felt that the market changed too quickly for them to be able to fully understand AI and therefore they still expressed feeling overwhelmed about using AI.	**Of the industries currently developing AI, participants were most positive about the use of AI in healthcare.** Participants were able to recognise direct and personal impacts that AI in healthcare could have on them including improvements to quality of life, and increased life expectancy. Participants were least positive about the use of AI in retail and advertising where they held concerns about the misuse of their data and intrusive advertising.	**Participants were excited about the efficiencies, convenience and help in making health decisions** that AI in healthcare could facilitate. Participants were positive about AI improving efficiencies in a stretched health service. They also envisioned that AI scheduling could increase convenience for them personally. Participants were positive about AI technology that could provide feedback, and make suggestion for healthy behaviours – this was seen to give them more control over their own health.

Key Insights: Artificial intelligence in healthcare

Concerns about AI in healthcare	Data sharing	Drivers of acceptability
Participants were most concerned about the loss of personal connection and data privacy in healthcare. Participants considered a personal connection to be important in healthcare as information may need to be shared in a sensitive way. Data privacy was also a significant concern. Healthcare data was seen to be highly personal and there were concerns about it being hacked, or used to inform insurance decisions.	**Ideally, participants wanted to give their consent for the use and sharing of their data to develop healthcare AI.** Control over personal data was important to participants, with some wanting the option to opt out of data sharing. Participants were also more positive where they could understand the personal benefits of data sharing, such as better healthcare outcomes. They were less positive where they thought private companies would directly benefit.	**The four key drivers to acceptability of use of AI in healthcare were: level of understanding, familiarity, perceived level of control and recognition of personal value.** Where participants were comfortable with their level of understanding they were more positive about AI. Where participants were familiar with applications of AI they tended to recognise the risks, but were generally more open to the benefits. Participants were more positive where they felt they had some control over the sharing of their personal data. Finally, where a tangible and personal positive benefit could be seen, participants were more positive.

1.
Research design



The purpose of dialogue is to inform government decision making, better facilitate two-way discussions about science, and contribute to open policy making

Digital deliberative dialogue

1

Public dialogue brings together members of the public, policy makers, and expert stakeholders on a subject to deliberate, reflect and come to conclusions about a certain policy issue; e.g. on emerging technologies and complex, sensitive, political or difficult issues.

2

Deliberative dialogue goes beyond exploring people's top of mind views about complex issues, to uncover how they form these views, and to debate issues in more depth using different information sources.
They have more time and space to develop more informed and considered views.

3

Committed stakeholders who can communicate with non-technical participants and invest time in the research are crucial to the success of a dialogue. Their involvement allows participants to ask questions and witness stakeholder interest in the two-way dialogue process.

4

Digital deliberative dialogue brings participants and stakeholders together in an online community for a week rather than in a traditional workshop. The forum brings people together from across the UK and allows us to conduct the dialogue at a faster pace.

This dialogue explored perceptions and acceptability of the use of artificial intelligence in healthcare, including the use of big data and the impact on patient experiences of the healthcare system

This dialogue forms part of the qualitative work to support BEIS's 2018-19 Public Attitudes to Science Survey

In total, we will conduct four waves of qualitative research, each focused on a specific topic of interest and consisting of:

- A 1-week digital dialogue with 33 individuals
- Four focus groups with digitally excluded individuals
- Supporting social media analysis for each wave

The focus of Wave 2 is on the use of artificial intelligence in the healthcare sector

- *Perceptions of artificial intelligence, specifically in healthcare*
- *Aspirations and concerns about the use of artificial intelligence in healthcare*
- *Perceptions of how data is used to develop AI for healthcare*
- *Views on the impact of the use of AI on patient experiences*

The aims of this digital dialogue were:

- To gain a greater understanding of what the public understand of the term 'artificial intelligence';
- To understand participants' relationship with artificial intelligence, engagement with artificial intelligence, and the role of artificial intelligence in their lives;
- To understand perceptions of the role of artificial intelligence in healthcare and the aspirations and concerns that the public hold;
- To understand responses to current uses of artificial intelligence in healthcare;
- To understand perceptions of how data is used to enable artificial intelligence to be used in healthcare; and the extent to which different organisations are trusted to hold and use healthcare data;
- To understand the extent to which the public think that their healthcare experience would change if artificial intelligence was used more widely, and the acceptability of this.

We conducted a one-week digital dialogue with 33 participants and four focus groups with 30 digitally excluded participants

One week digital dialogue

- 33 participants took part reflecting a range of demographics*
- 4 stakeholders participated**
- 3 policy makers observed
- 7 day dialogue (with a minimum of 3 hours participation)
- 3 waves of materials were released and 2 homework tasks were completed between waves
- Use of Recollective platform
- 6th – 13th November 2018
- £75 incentive

Four focus groups

- 4 digitally excluded focus groups were conducted with those who lacked access to or confidence using the internet
- 30 participants took part reflecting a range of demographics*
- 90 minutes
- A reduced version of the dialogue guide and materials were used
- Newcastle-upon-Tyne and Cardiff
- 15th November 2018
- £40 incentive

Conversation flow

- Spontaneous associations with and feelings towards AI
- Responses to current uses of and relationship with AI
- Awareness of AI in healthcare
- Responses to existing uses of AI in healthcare
- Responses to the data collection required for some AI healthcare technologies, using news articles of a recent example
- Responses to examples of current technologies in the healthcare space
- Reflection on whether participants' views have developed, how so and why they have.

*Full details of the achieved sample can be found in the appendix

**Their names are listed in the appendix

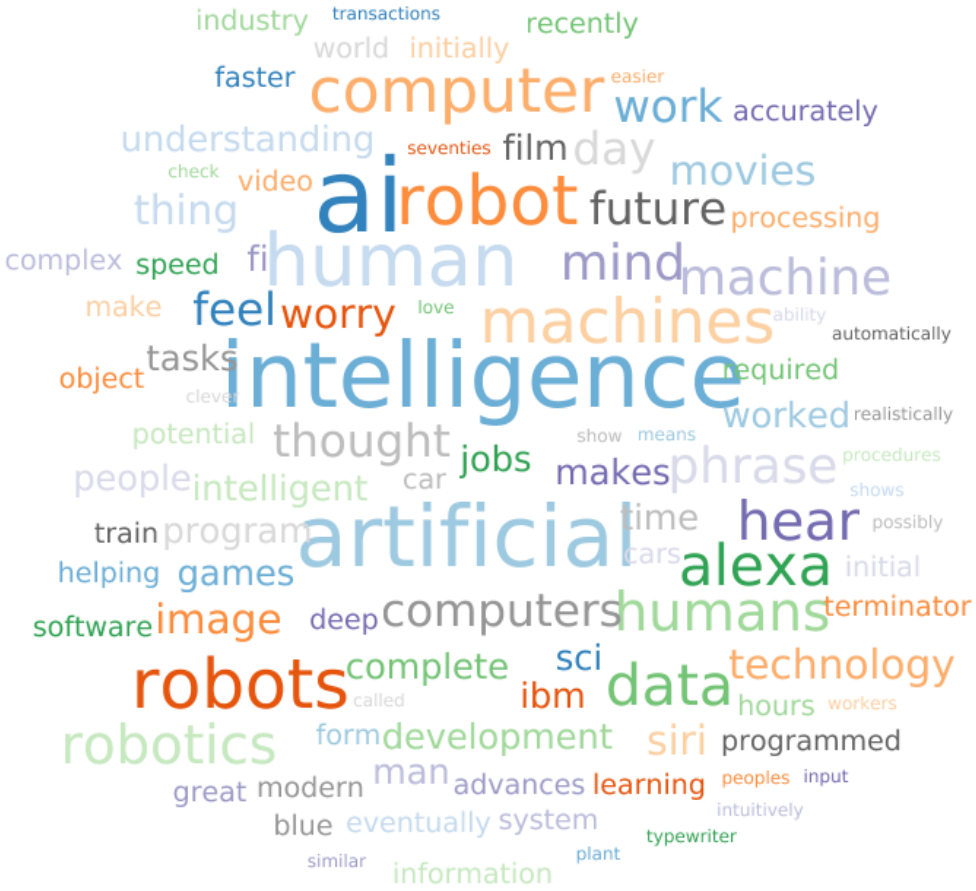
2.
Perceptions of artificial intelligence

Associations with the term ‘artificial intelligence’ varied widely from futuristic visions to more considered terms and ideas

Common associations

Futuristic terms	Human-like	Existing technology	Considered terms
Terminator, robot, sci-fi, future, mind	Mind, man, human, jobs	Voice assistant, computer, car	Complex, processing, learning, information

Level of sophistication in perceptions



The scale of views demonstrates that some segments of the public are moving on from simply viewing artificial intelligence as ‘the terminator’, and developing more sophisticated views and understandings

Level of experience with artificial intelligence was a greater influence on perceptions than other factors such as age or educational level

Considered perceptions

- Often had extensive **first hand experience** of AI technology
- For some, this was through work (e.g. in factories, using booking systems, working for the NHS)
- For others this was current technologies at home (e.g. voice assistants)
- A small number of specific experiences (e.g. AI in a medical operation)

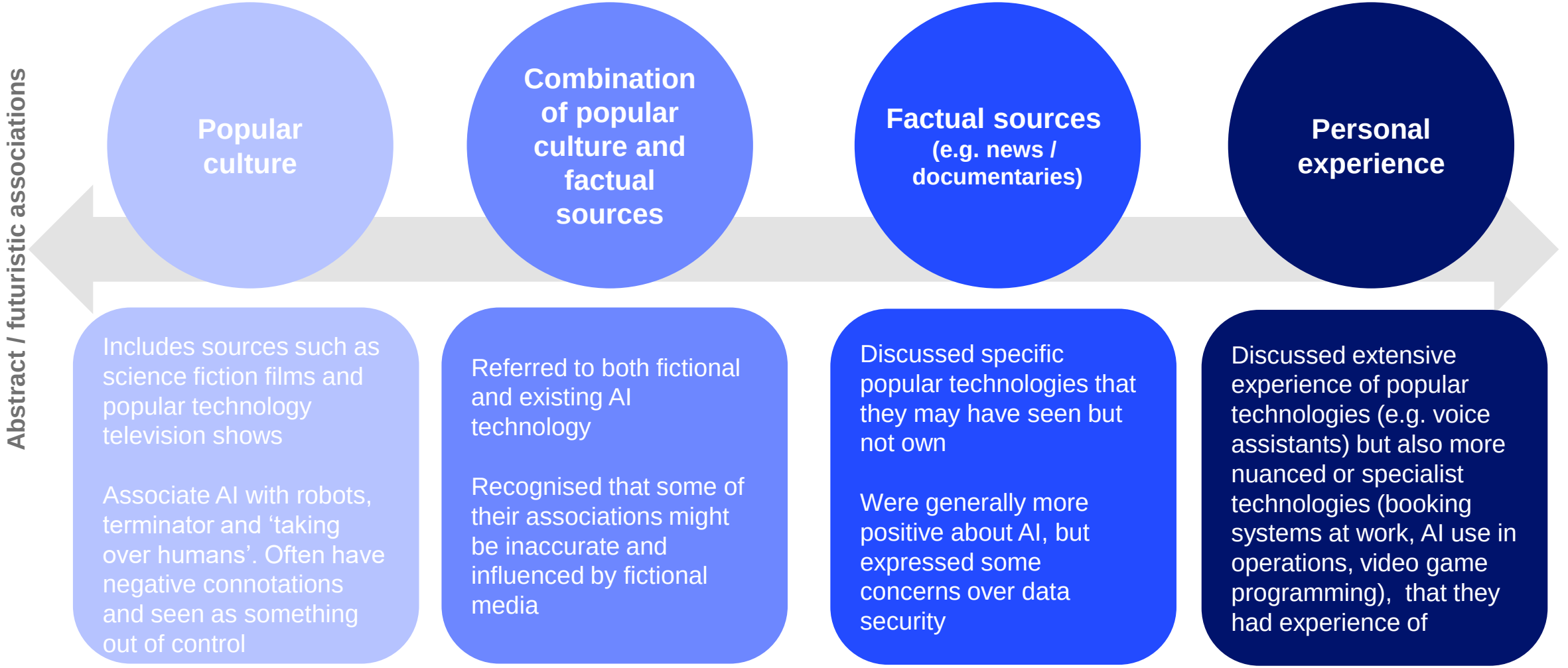
Mixed perceptions

- Commonly had experience with **current, popular** artificial intelligence technologies
- Were **not always aware** of whether certain technologies were artificial intelligence or simply advanced technology

Futuristic perceptions

- **Low levels of experience** with artificial intelligence technology, and often nervous about the thought of interacting with these technologies
- Commonly **digitally excluded** participants

Sources of information also shaped perceptions of artificial intelligence



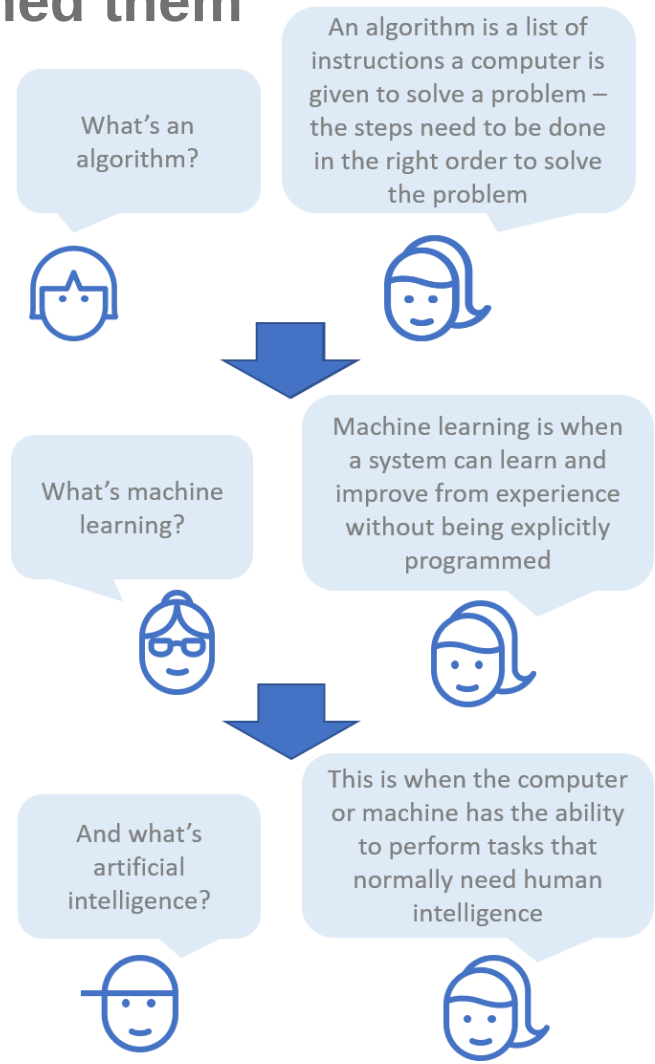
More exposure to and experience of AI tended to increase comfort and positivity

Participants were introduced to definitions and the basic elements of artificial intelligence to see what initially excited or concerned them

Participants used a ‘thumbs up’ and ‘thumbs down’ tool to mark which elements excited them and which concerned them

They added comments to each marker to explain the reasons why they were excited or concerned

Analysis was conduced to identify the areas that participants were more excited or concerned about and why



In response, participants discussed levels of control - the extent to which they felt 'in control' of AI tended to determine how excited or concerned they were

Participants were more excited where they felt more in control…

= They welcomed AI development where humans retained control over the instructions being fed into machines

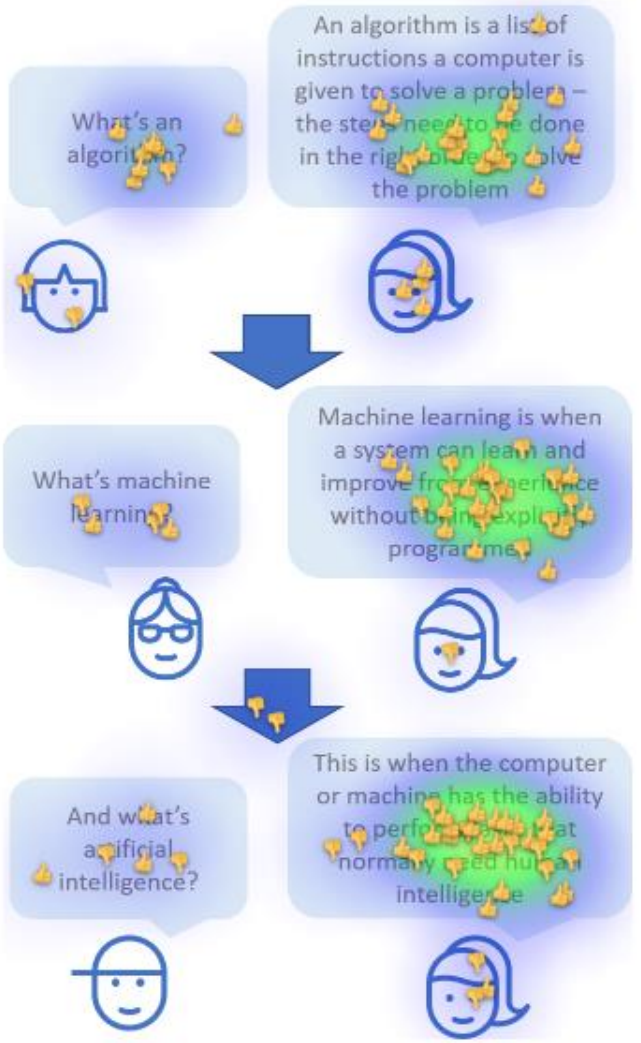
= They were excited where processes gave them more control the over time, quality, and convenience of services

Participants were more concerned where they felt less in control…

= They were concerned where they felt machines could become self-sustaining and not rely on human input

= They were concerned about losing control of their data to a group or company that they did not trust

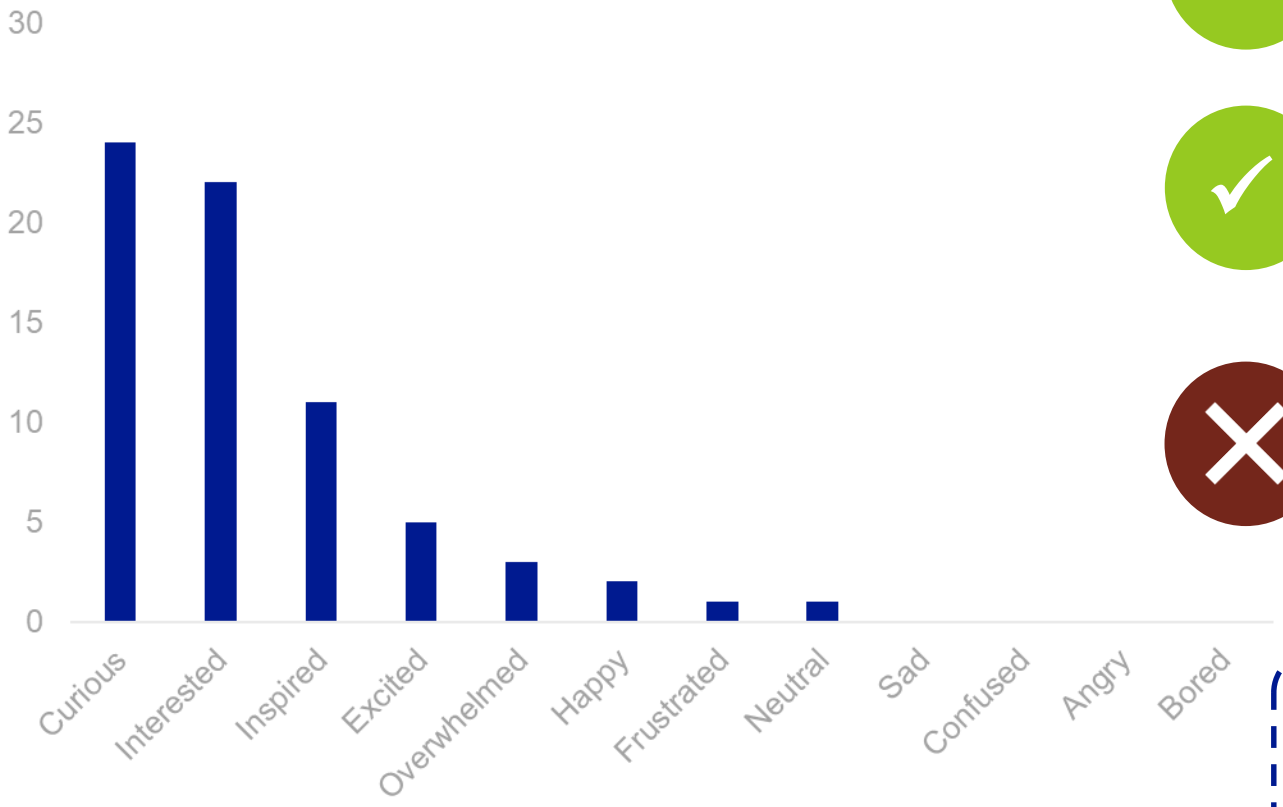
= They were concerned about the loss of control over livelihoods due to job losses to AI



3.
Aspirations and concerns about AI

There was wide interest in and curiosity about artificial intelligence - although participants who were less digitally literate felt overwhelmed

Participants used emojis to describe their feelings about artificial intelligence



Participants were commonly interested and curious about AI

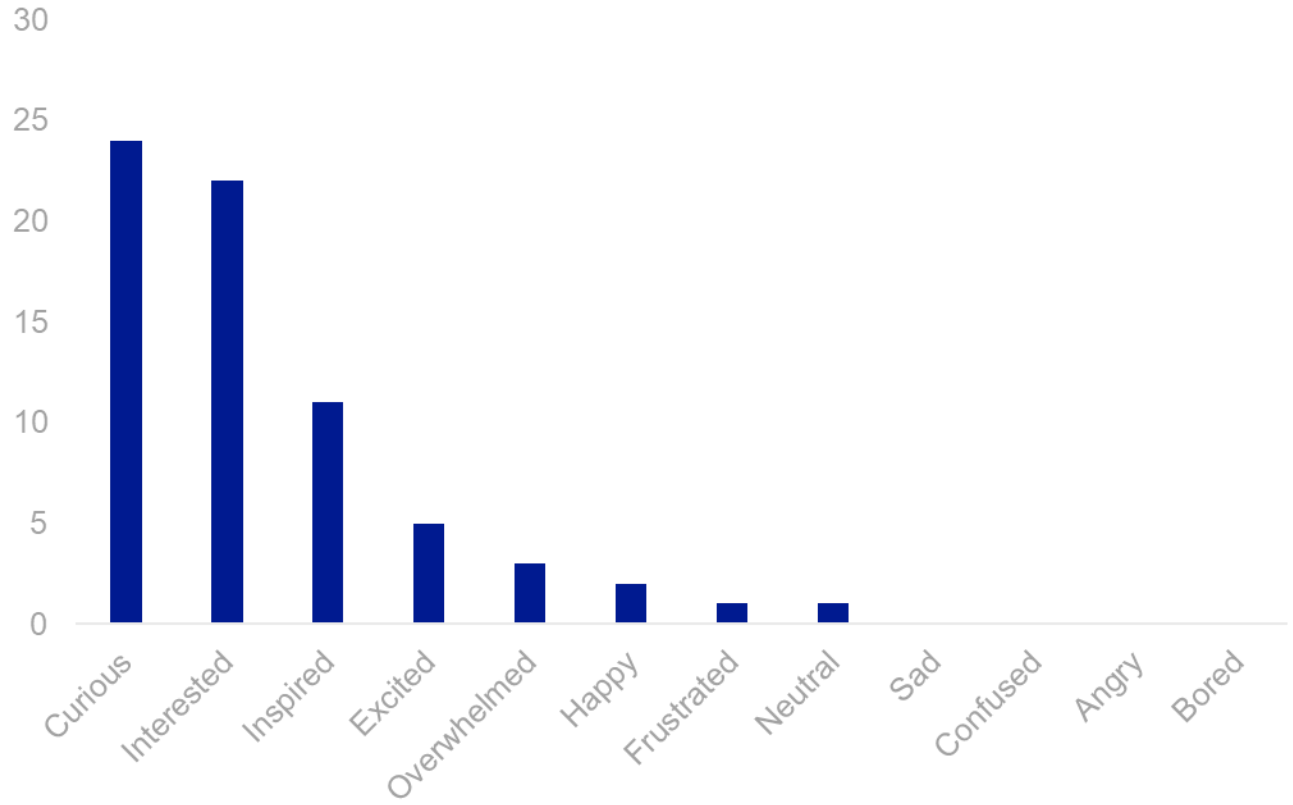
They were often interested in how AI could have large impacts on their lives, especially through improved healthcare

Some older participants had more sceptical responses, with mentions of uses in weaponry and safeguards that need to be in place. They were less aware of AI in current technologies and more likely to see the rolling-out of AI as something beyond their control

Digitally excluded participants more commonly reported feeling overwhelmed. They felt unable to comprehend the technologies' full potential, especially with new technology being released so frequently.

There was wide interest in and curiosity about artificial intelligence - although participants who were less digitally literate felt overwhelmed

Participants used emojis to describe their feelings about artificial intelligence



Interested

"I realise I need to find out more about AI, I know I have only just scratched the surface" (Digital Dialogue, Female)

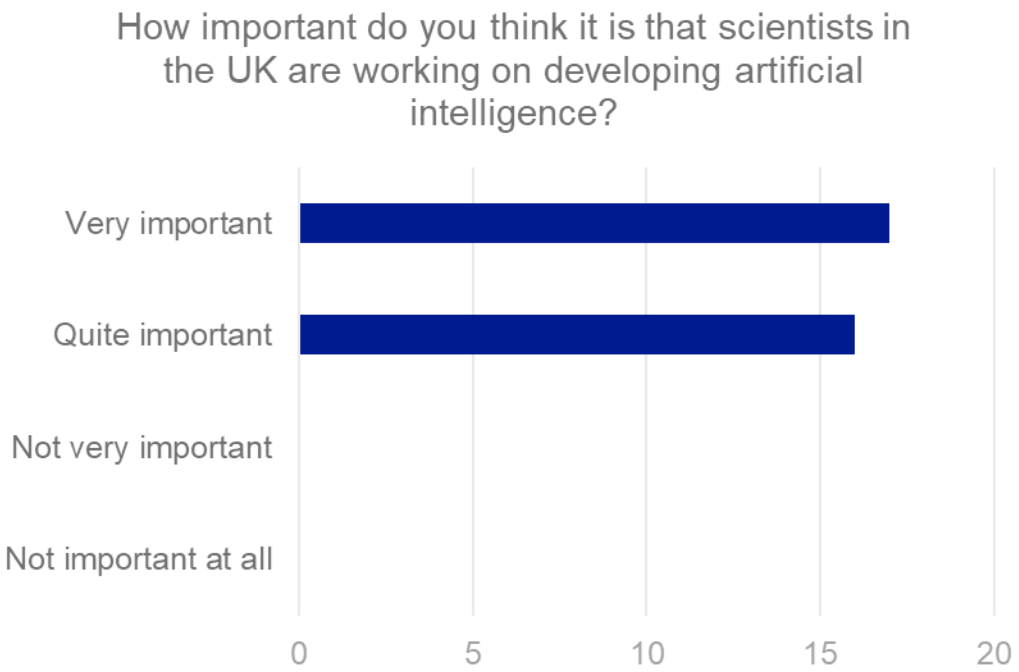
Curious

"I realise that I don't know very much about AI at all, and certainly didn't realise how much it's in use in our world already. I would be very interested to understand more about how it might make huge improvements in the world of medicine" (Digital Dialogue, Female)

Overwhelmed
Digitally excluded

"It's everywhere and everything you have to do is electronically and you can't get your head around it." (Focus groups, Male)

Despite some scepticism, all participants thought AI was important



Three positive impacts were identified:

Improving quality of life
- Saving time on menial tasks freed up more time for leisure
- Progressing healthcare was seen to improve quality of life
- Consistently raised across participants

"It's going to benefit people from all walks of life […], especially if it is integrated into the health service" (Digital Dialogue, Male)

Making efficiencies
- Through completing tasks more accurately, and faster than humans both in healthcare and more widely
- Cheaper to run systems using AI, so finances can be spent elsewhere

"A program uses logic and works at tasks efficiently and to a degree of accuracy that can potentially far outweigh the skills of any human being." (Digital Dialogue, Male)

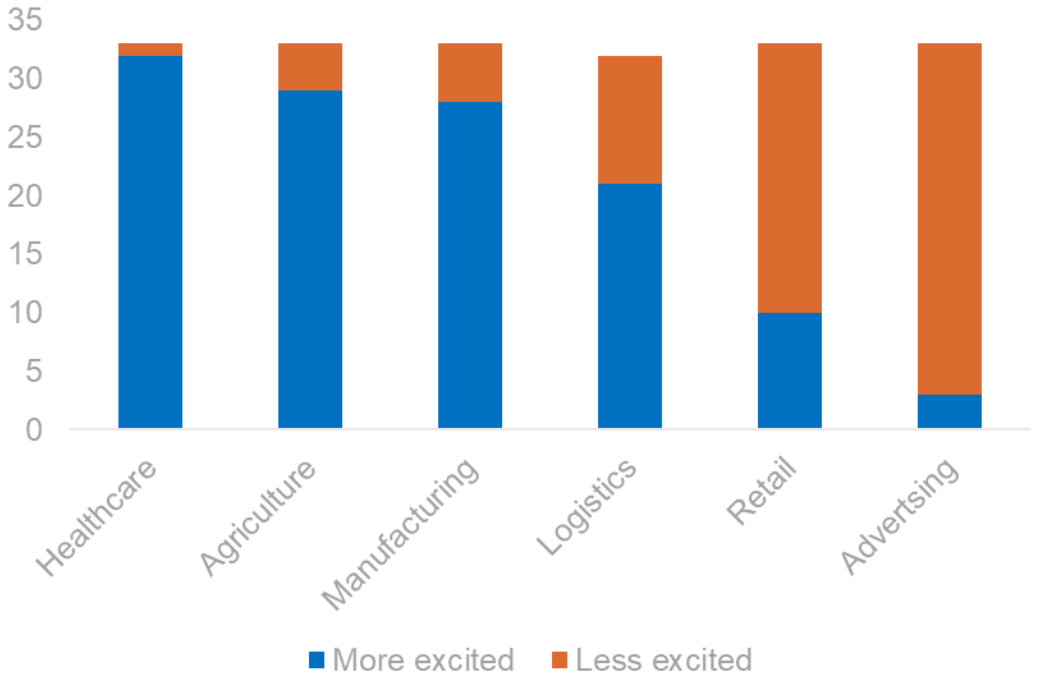
UK staying ahead
- Belief that the UK belongs at the forefront of scientific development
- Perceived to be important for defence and security of the country

"We need to be aware on this and how other countries may/may not be developing their own intelligence" Digital Dialogue, Female)

Participants' initial thoughts generally related to how artificial intelligence could benefit them, or their society and its development was therefore considered important.

Participants' feelings around different industries developing AI were largely shaped by what they thought the direct impact on them would be

Rank these industries in the order of which you are most excited about using AI to those who you are least excited about using AI



Direct positive impact ⟷ Direct negative impact

Healthcare	Agriculture Manufacturing Logistics	Retail Advertising

While participants saw a direct positive impact from the use of AI in healthcare, they thought that it could be intrusive and irritating when used in retail and advertising

Direct positive impact ⟷ **Direct negative impact**

Healthcare	Agriculture Manufacturing Logistics	Retail Advertising
Participants recognised that healthcare AI could have direct personal impacts including: - Improving quality of life - Extending life	Participants recognised the benefits but considered these secondary to healthcare benefits: - Improving efficiency and convenience - Reducing costs	Participants thought that these industries would use AI to negatively impact them through: - Invasive advertising - Misusing their data
"Health care should always be a priority. advances into medicine and treatment should always be being thought about." (Digital dialogue, Female)	*"Logistics and Agriculture as we can transport and provide for our country more efficiently in a post Brexit economic landscape." (Digital Dialogue. Female)*	*"I get really irritated with adverts that pop up on my Facebook of things to buy based upon guesses from my google searches. It's a bit too Big Brother for my liking" (Digital Dialogue, Female)*

Positive experiences of current AI technology increased how comfortable participants were

Positive experiences	No experience	Negative experiences
Some participants owned some of the technologies mentioned and had found them convenient, useful and fun	Where participants had not previously interacted with home-voice-assistants, they were more concerned about their data privacy	Participants reported some concerns about previous data breaches e.g. conversations being recorded
Previous interaction with these technologies increased understanding of how they were used and why they might be useful	Participants with no experience were more commonly concerned about the usability of the technologies	A small number of participants reported technology not working as expected e.g. not recognising accents, inaccuracies
Those who had experienced bank fraud or knew of this happening to someone they know were positive about detection AI – it made their finances feel more secure		

"I have relied upon google maps for so many journeys. The real time traffic update is so helpful - particularly as my car satnav doesn't detect traffic/accidents etc." (Digital Dialogue, Female)

…and participants were more positive where they felt in control of their data

More control

Participants felt more in control where they were able to dictate what data could be collected (e.g. when they could turn off GPS on Google Maps)

Participants felt more in control where they felt the technology was being used to benefit them as a customer (e.g. detecting bank fraud)

"It could be concerning that so much of our personal preferences and tastes are sent to corporations who might misuse that data, and it also raises the question of whose intellectual property our recorded voices are" (Digital Dialogue, Male)

Less control

Participants raised concerns over who controlled their data and what they could do with it. They raised concerns about the misuse of data by corporations

There were some concerns that some of the technologies could be misused by others (e.g. children using Amazon Alexa to buy items on their account)

Less technologically literate participants felt less in control of their data and expressed concerns about it. However, they were not always deterred from using the technology as a result

When people reflected on how AI could improve their lives, they thought about immediate impacts to them in their everyday lives

Direct benefits to them

= For some, these were everyday benefits such as convenience around the home

= For others these were longer term, such as benefits to the health service or transport systems

= Considered the benefits to outweigh the risks – the risks were seen to have less of a personal impact on their everyday lives

Direct negative impact on them

= These largely involved companies invading privacy and using data to advertise to them or to sell on to other companies

= Where people had been personally impacted by data breaches, these were considered to outweigh the benefits

Digital Dialogue, Female, 55+, Low interest in science

= Considered immediate benefits such as facilitating food shopping through recognising what she has available in her fridge and the speed at which she uses different products

= Saw this as a convenience to her everyday life

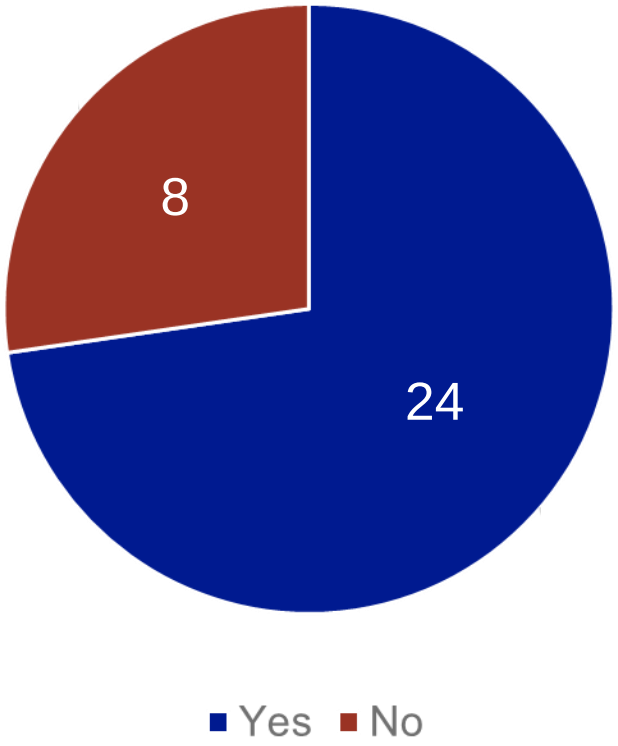
= Raised some concerns over manipulation of her data by organisations to meet their agenda (e.g. profiteering by supermarkets)

"I hate food shopping. It can take as long on some grocery websites as it does to do the actual shop. I have found that in the future AI could check what was in my fridge, freezer and cupboards and order the foods I need when they are running low. Not only will they do the ordering, then they will then arrange to get my food delivered."
(Digital Dialogue, Female)

4.
Perceptions, aspirations and concerns about the use of artificial intelligence in healthcare

There was wide awareness of artificial intelligence being used in healthcare – although this was less the case amongst the digitally excluded

Have you heard of artificial intelligence being used in healthcare before?*



More technologically literate participants had generally heard of artificial intelligence being used in healthcare.

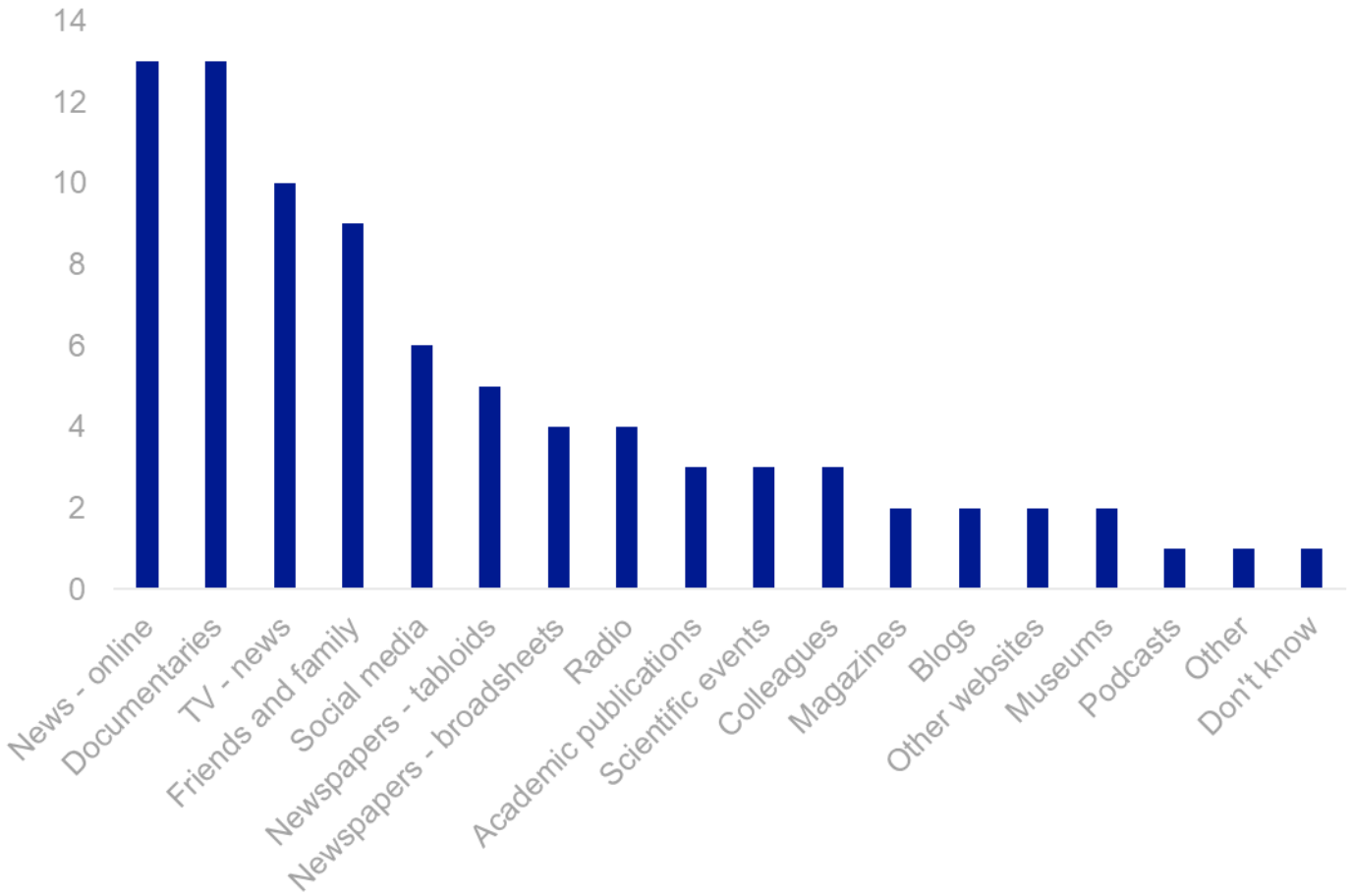
Some digitally excluded participants discussed having heard about artificial intelligence in healthcare for a number of reasons:

- Some had, or were about to, experience AI in healthcare in action through different operations
- Some participants had heard of a recent high-profile local news story based in Newcastle reporting about the unsuccessful use of artificial intelligence.

*33 Digital Dialogue participants

Online news and documentaries were the most common sources of information about artificial intelligence in healthcare

Where did you hear about artificial intelligence being used in healthcare?



The most popular sources of information were news sources such as:

- Online news
- Documentaries
- TV news

Friends and family were influential, particularly for females

Less common sources of information were:

- Magazines
- Blogs
- Other websites
- Museums
- Podcasts

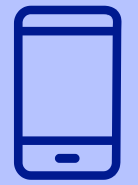
Participants were shown four types of AI that could be used in healthcare and asked what excited and concerned them about each

Medical scheduling

Drug discovery

Wearable AI

Diagnostic AI



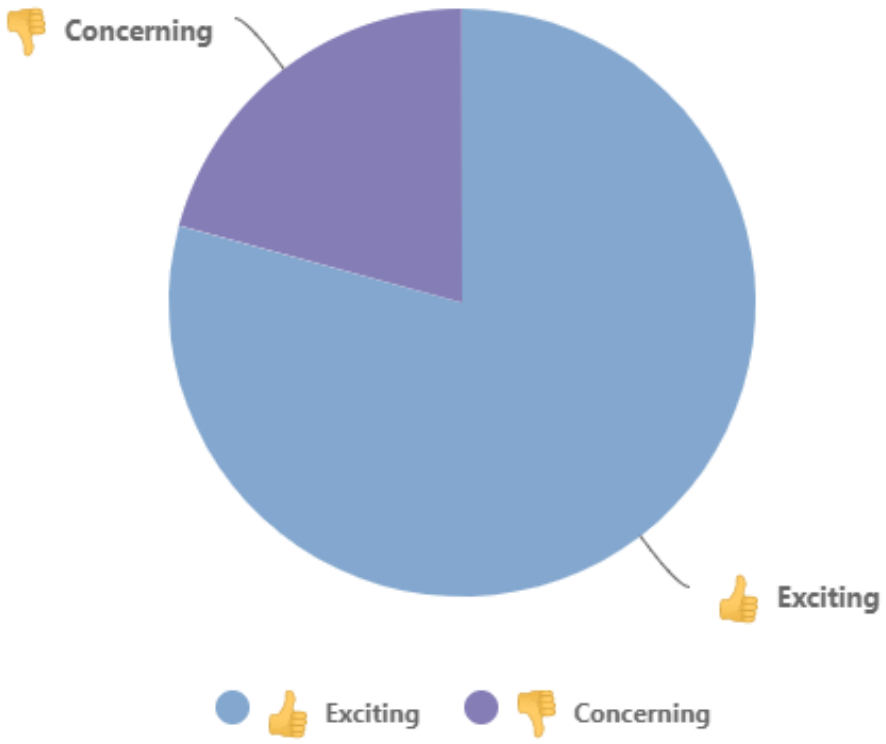
Participants were most positive about medical scheduling. They understood its purpose and felt it added value by allowing appointments to fit with their schedules

- To most participants, this was not considered a significant change to how they would currently book appointments
- Participants generally thought this would give them more control over their own appointment scheduling and allow them to fit timings of appointments to their own needs
- Generally, participants thought it would decrease waiting times
- More digitally literate participants did not feel the need for a personal, human service when scheduling appointments

- Some digitally excluded participants concerned about interacting with unfamiliar technology which made them feel nervous
- Some concerns were raised over hacking of personal data

Of the four technologies, there was greatest enthusiasm for the use of scheduling AI, and participants were largely ready to welcome it to the healthcare system

Mark up anything that excites or interests you with the thumbs up tool, and anything that concerns you with the thumbs down tool



"This is excellent. What a time saver! Perfectly slotting possible appointments." (Focus groups, Male)

"I think this could be a great idea in helping the patient actually get an appointment that suits." (Digital Dialogue, Male)

"A well considered treatment schedule, planned out in the best possible timetable could cut down on anxiety for patients about their treatment" (Digital Dialogue, Male)

Participants generally understood the purpose behind this application and did not think that a personal connection was needed

- Participants largely understood the purpose of this technology and welcomed a more efficient process
- Although they were not familiar with the current process of drug discovery, they were comfortable with the idea of it being carried out using AI
- Developing drugs faster was seen as hugely beneficial. Participants discussed the opportunities for new cures for diseases to be discovered
- Participants did not think that a human, emotional connection was needed in this process. Efficiency was the most important factor.

- Some digitally excluded participants found understanding the technology difficult and this made them feel uncomfortable
- Some participants expressed concerns over the reduction of 'human involvement' in the process. Humans reviewing the process offset some concerns

There was wide acceptance of the use of AI in drug discovery

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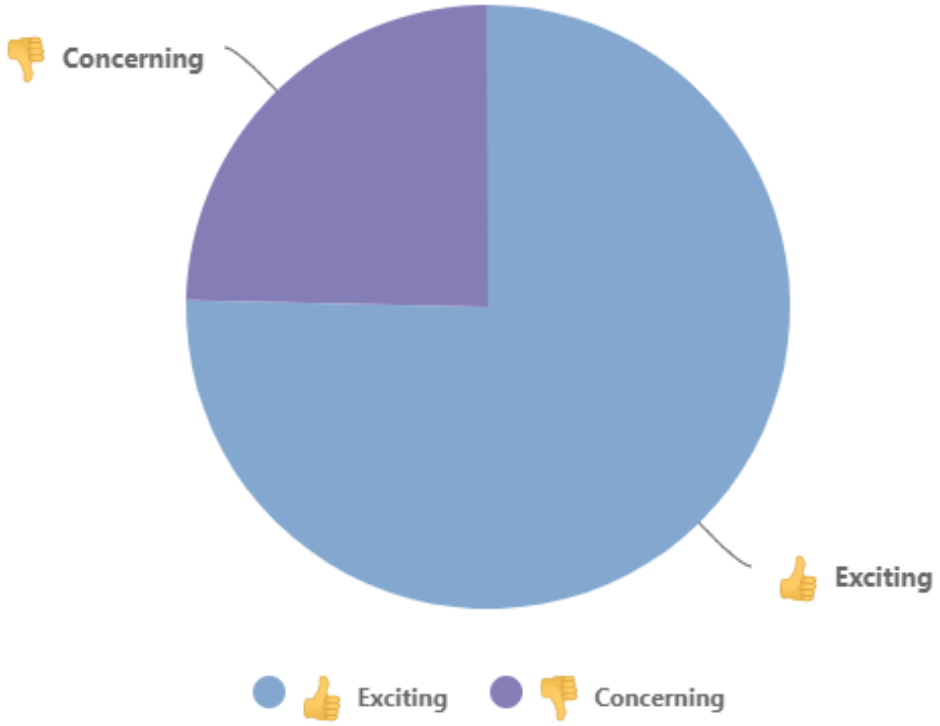

"Many treatments have been discovered by accident. Using AI permits greater experimentation and faster results." (Digital Dialogue, Male)

"Could some of these patterns come from articles that are not peer reviewed? The standard of data collection would have to be carefully controlled" (Digital Dialogue, Female)

"The better we are at finding newer, better drugs to treat people, the higher the quality of life they'll have." (Digital Dialogue, Male)

While some felt that it empowered them to make healthier choices, others were concerned that it could become intrusive

Participants generally had a good level of understanding of what this technology was and involved. They often owned a device that collected their data in a similar way

Some concerns were raised over losing control of the collected data and found it intrusive that organisations might know about their daily activity

Some participants considered this to be empowering. They were positive about retaining a choice over whether to follow advice

Digitally excluded participants were more concerned about the level of dependency on technology that this would bring

Participants largely welcomed the tailored health advice that this would provide

Some expressed concerns that the monitoring of their data could lead to prescriptions or insurance being based on their activity

There were more mixed views about wearable AI - those who were not already using it were more suspicious…

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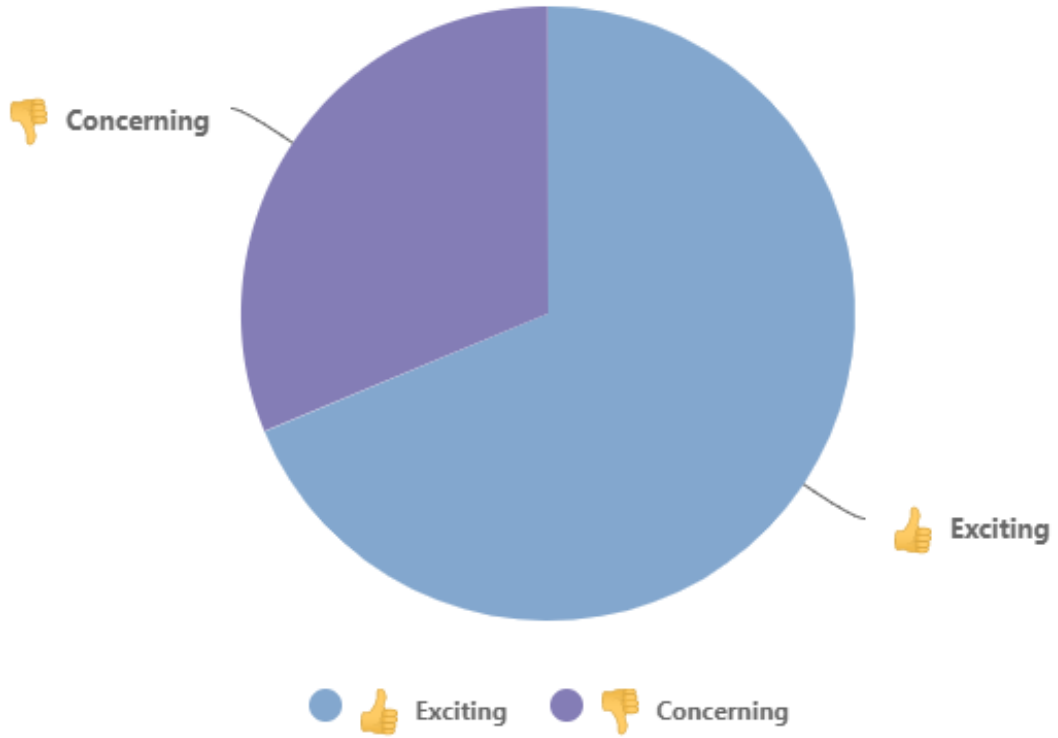
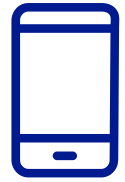


"Exciting - I use a Fitbit and would love it to be more tailored to suit me." (Digital Dialogue, Female)

"Improves overall health and wellbeing of people and allows them to see a visual of where they are up to providing greater motivation" (Digital Dialogue, Female)

"How would it keep track of that without being tied to technology – I like time away. Needing to have tech for this just frustrates us" (Focus group, Female)

Participants feared the loss of a valued personal, emotional connection during diagnosis



A small number of participants welcomed being able to facilitate their own diagnosis. They thought this gave them a greater level of control and saw it as empowering

Participants welcomed the opportunity for faster diagnosis, and access to this service outside of GP hours

Less technologically literate groups found it difficult to differentiate this technology with entering symptoms into Google. This raised concerns over accuracy and 'scaremongering' or risk averse diagnoses

Those who better understood it remained concerned as they were worried about the consequences of reducing the role for human judgement

A broad range of participants lacked trust in the accuracy of the data entered by the public and were concerned about accountability in misdiagnosis

The main drawback was the loss of a personalised emotional connection. Receiving a diagnosis was considered scary process where they would want human connection

While some thought this could provide greater consistency of practice, some raised concerns over lack of access for digitally excluded groups

These findings were consistent with the Social Media Analysis: participants were concerned about the data entered by others and the level of sophistication of the technology

Participants were less enthusiastic about the use of diagnostic AI than the other applications…

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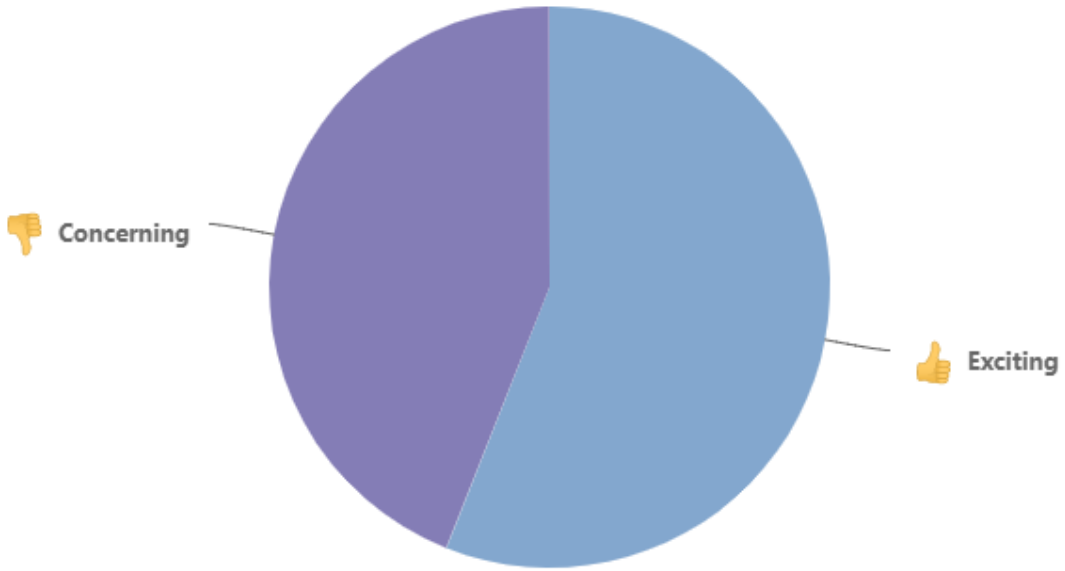


"I've been told by my doctor not to go on the internet…It's a hypochondriacs paradise" (Focus groups, Female)

"Not all, but some patients may either over or under play their symptoms. . It's not wise to rely on patients to diagnose themselves via an app" (Digital Dialogue, Female)

"I would prefer it as something that doctor uses as a tool rather than I use as a tool because it could be scary what it comes back with" (Focus groups, Female)

The public were least ready for this technology due to low levels of understanding, control and a perceived negative impact on the quality of care received. They would need more educating around how this technology would work and the benefits it could have to feel comfortable.

5.
Views on the impact of artificial intelligence on healthcare

Wearable AI was the most commonly suggested application for Eric – while it was considered to be empowering, there were some concerns over support in an emergency

Eric

- Age 62, retired, lives in a small village in Yorkshire
- Lives alone and is a widow
- Has a computer, sends emails to his family, and is part of the family Whatsapp group

- Has diabetes, used insulin for 10 years
- Has regular check ups with his GP - a 45 minute bus ride away
- GP is monitoring his weight and giving weight loss advice as he has a high Body Mass Index

Wearables

Benefits

Participants were positive about Eric getting targeted advice and support that could supplement ongoing engagement with his doctor. They thought that this technology could help him to make healthy choices, and alert his doctor when he wasn't doing so

Concerns

There were concerns that, in an emergency there would be less support for Eric. His technological literacy was also a concern with some suggesting that he might be unable to use or understand the app

Chatbot technology

Benefits

Some participants suggested that this could provide him with a form of interaction that could help with loneliness in his isolated setting

Concerns

More commonly, participants were concerned that relying on the app could make him more isolated and lonely

While diagnostic AI was seen to relieve pressure on the health service, participants were very concerned about the loss of personal interaction at the point of diagnosis

Sheena

- Age 38, works as a busy solicitor in central London
- Lives with her husband and two young children
- Uses her computer, laptop and smart phone daily – including numerous apps for travel, finance and social media

- Is registered with a GP but finds it difficult to get appointments around work and childcare
- Currently has an ear infection which is causing her pain

Diagnostic AI technology

Benefits

Participants were positive about Sheena using diagnostic AI in the interim, before accessing a doctor. It was felt that she could self-medicate where possible, therefore easing pressure on the health service. Participants liked that Sheena was empowered to fit her healthcare around her busy schedule

Concerns

Participants felt that diagnosis was something that should involve a personal interaction to ensure that symptoms were reported accurately and that no underlying conditions were missed. Moreover, as diagnosis was considered a sensitive issue, participants thought that an emotional connection might be needed

While a chatbot was considered to be a positive gateway to human support, participants raised concerns that this could further isolate lonely people and those with mental health conditions

Riley

- Age 22, works part time in sales after graduating from university
- Moved back in with his parents
- Uses his games console regularly and smart phone daily for games and social media apps

- Registered with his family GP but has not visited for years
- Has been experiencing anxiety and depression since finishing studying

Chatbot AI technology

Benefits

Participants were positive about the chatbot being a gateway to in person support. They suggested that initially he might feel more able to open up through technology, building trust before he felt able to open up to a doctor

Concerns

Some participants were concerned that the chatbot would make Riley more isolated and more reliant on technology. They felt that the chatbot was an insufficient replacement for human contact. There were a small number of concerns raised that the chatbot would not be able to react sufficiently in an emergency

When thinking about the impact on institutions, participants were positive about artificial intelligence easing pressure on healthcare professionals and the NHS

AI was seen to be a method of easing increasing pressures on doctors…

= Healthcare professionals were widely considered to be under excessive pressure, leading to long waiting times for patients

= AI was seen as a way to reduce the burden on them by doing certain tasks more efficiently (such as assessing scans) and by reducing administrative tasks

= Participants were positive about having greater amounts of time to dedicate to tasks they considered to need more emotional capacity

"This could mean the patient may not need to use a doctors appointment or attend A and E if she could resource the information here." (Digital Dialogue, Female)

But there were concerns that technology would have adverse impacts on professional's practice

= Some participants raised concerns that AI could restrict the flexibility and autonomy of healthcare professionals by enforcing them to stick to stricter schedules and providing antisocial working hours

= Some were concerned that professionals may become reliant and lose skills due to not needing their knowledge as often

= Some concern over the loss of emotional service patients currently receive from their GP

"Too much control…telling the doctor what he should be doing when he should decide. If he can't tell you what he needs in 10 minutes you'd be shoved out the door" (Focus groups, Male)

Participants were most positive about AI when they could see that it would help to increase patient access to doctors when it is most needed

Overall, greater convenience and efficiency were seen to be the most important benefits of the use of AI in healthcare for patients

Convenience

= Participants were positive about being able to receive a response in **real time** to a health issue occurring from the **comfort of their own home**

= Some participants saw an opportunity for this to act as a **gateway to human support**. This could be through offering support to someone with mental health issues that feels unable to speak to a person yet, or through alerting individuals to speak to their GP when reporting certain symptoms, when they otherwise may not have done so

"For some people, the hardest hurdle to overcome is actively making an appointment to see a medical professional due to their condition. This could potentially eliminate this, should it be an issue" (Digital Dialogue, Male)

Efficiency

= AI was perceived to be able to **free up resources** that could be directed to areas of greater need

= AI was considered to positively benefit those who need **simple follow up support**, such as simple exercises. These could be done from the comfort of their own home with healthcare professionals being alerted to progress or relapses

"Being able to ask an "expert" (albeit a machine) at any time of day or night is excellent." (Digital dialogue, Female)

Overall, the main concern about the use of AI in healthcare was the risk of the loss of human interaction which was highly valued in the healthcare sector

Lack of human empathy

= AI did not account for emotional responses to illness. It was important to patients that doctors could respond to their **emotional** as well as physical needs and wellbeing

= Participants wanted an **emotional connection** when sensitive diagnoses were provided

Trust

= Participants saw AI applications as self-diagnosis and wanted **confirmation and reassurance** from a doctor

= Some were doubtful over **data quality**, saying that much of the health-related information they see on the internet (which they align with AI) is incorrect

= A minority were concerned that companies would **push towards** specific treatments or drugs for profit

Accessibility

= Raised concerns over **access** for the digitally excluded

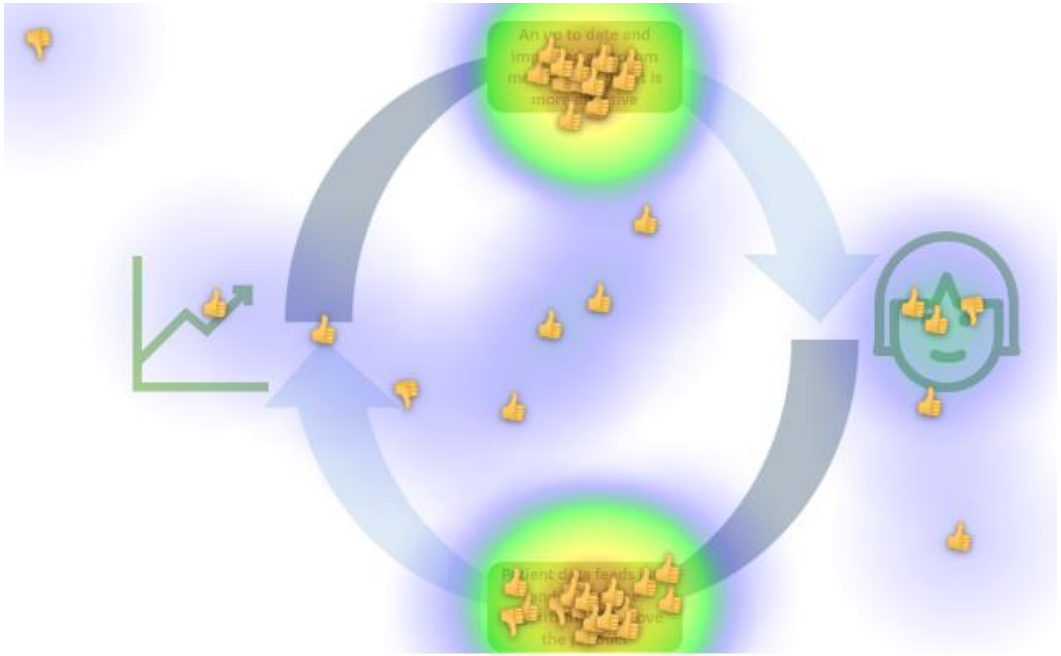
= Concerns that other factors, such as socio economic circumstances, wouldn't be taken into consideration and patients may be recommended actions that are beyond their capability or options

Misuse

= Some concerns that individuals may manipulate their responses to get access to drugs

6.
Views about the use of personal data in the development of AI

Generally, participants were positive about data being used iteratively to improve health outcomes – but this was dependent on their perceived level of control and who they felt would benefit



Do they feel in control of their data?

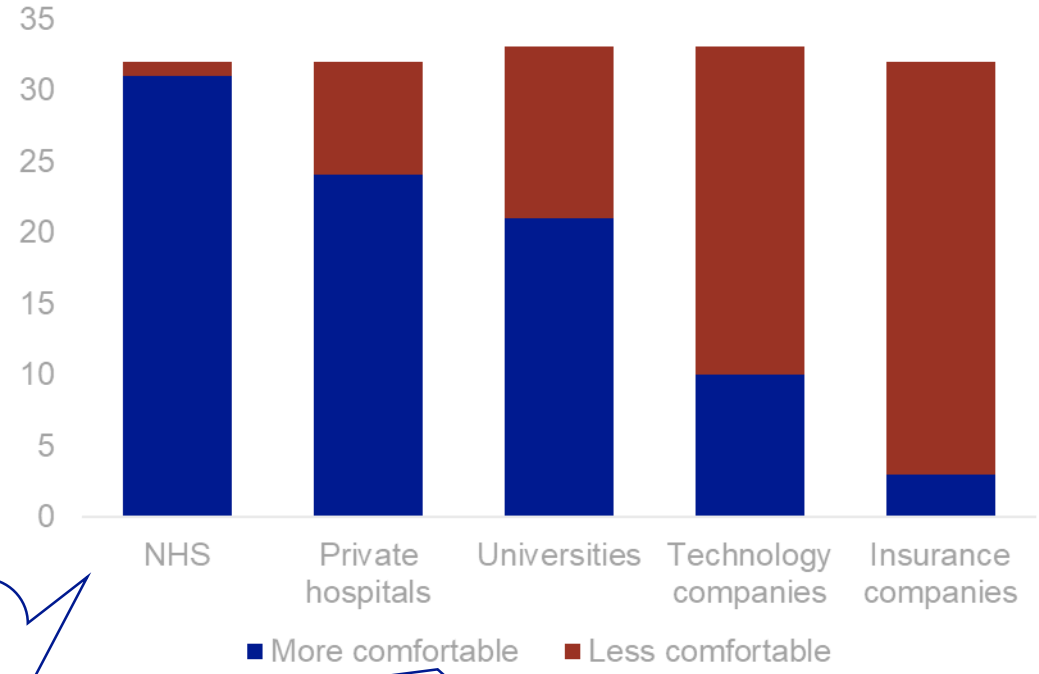
- Participants questioned who would own their data. They were less comfortable with private companies holding the data than the NHS. This was largely driven by how they perceived their motivations
- Participants felt more comfortable if they were given the opportunity to opt out. Participants on the digital dialogue were generally comfortable with their data being used. However, some digitally excluded participants were less comfortable – they did not understand why their data was needed and how its use could benefit them.

Who do they see as benefiting from iterative use of data?

- Participants were positive about the process where they could see direct benefits to them or people like them, such as more accurate healthcare outcomes
- Participants were less positive where they thought private companies were benefiting from use of their data, more so than them.

The NHS was the organisation most trusted to hold data, driven by the perception it is there to extend and improve life rather than make profit

NHS
Participants were positive about the NHS holding data. They considered the NHS's motivation to be patient-centred. It was considered to be well regulated, so participants felt that their data would be secure



Insurance companies
Participants considered their motivations to driven by profit rather than societal benefit, so their trust was lower. Some discussed receiving nuisance calls that they associated with insurance companies

Private hospitals
Participants could see some personal benefits, however expressed some concerns around links with insurance companies

Universities
Participants discussed the positive motivations of universities including research and training and thought there may be long term benefits

Technology companies
Profit driven motivations made these organisations less trustworthy. Some participants discussed examples of inadequate data security

Perceptions were largely driven by how participants conceptualised the motivations of each organisation – there was less trust in organisations who were seen to be profit driven

However, some participants with higher levels of experience of AI, and higher education levels recognised some benefits of allowing private companies to have access to healthcare data

Some participants thought private companies had greater capacity than the NHS

= Some discussion of the broader resources available to private companies

= This included having access to greater levels of finances to invest in research and implementation, but also the number of available bodies to develop artificial intelligence

"The technology companies have the cleverest people in the world working for them and all the money…so they're probably best placed" (Focus groups, Male)

Those with first hand experience into the realities of data security

= While most considered the NHS to be trustworthy with their data, some who had worked in the NHS identified less positive practices in reality

= Some went further to suggest that private companies may have stricter policies than the NHS

= Tended to come from those with first hand experience of data security in organisations

"I have worked in the private and the public sector…in the private sector there is much more diligence and money put into keeping data secure and training on updating staff on data protection rules. The NHS is too big." (Digital Dialogue, Female)

There was greater acceptance of the risks associated with data sharing where participants could see direct, personal benefits

Participants were asked to respond to one of three news articles on the news story of DeepMind's use of NHS data

"AI could spot disease more accurately than doctors, study suggests"

Participants more commonly could identify the potential positive outcomes from this article, including:

- Reducing **NHS workload**
- Greater **accuracy** leading to lives being saved
- The **greater capacity of private companies** to carry this out, as a result of more funding and resource. This was drawn out by those more technologically literate

Some concerns remained, including whether the NHS would have to pay for this in the future and whether private companies would profit from their data

"[Tech giant] given access to London patient records for research"

Participants were able to identify some positive outcomes. Some participants were happy with data being shared as **treatments would improve** as a result. One participant identified the **lack of resource** to keep this within the NHS

Participants held concerns around Google specifically holding the data, due to **past data breaches**. There were also concerns raised over the **lack of permission** gained before data was shared.

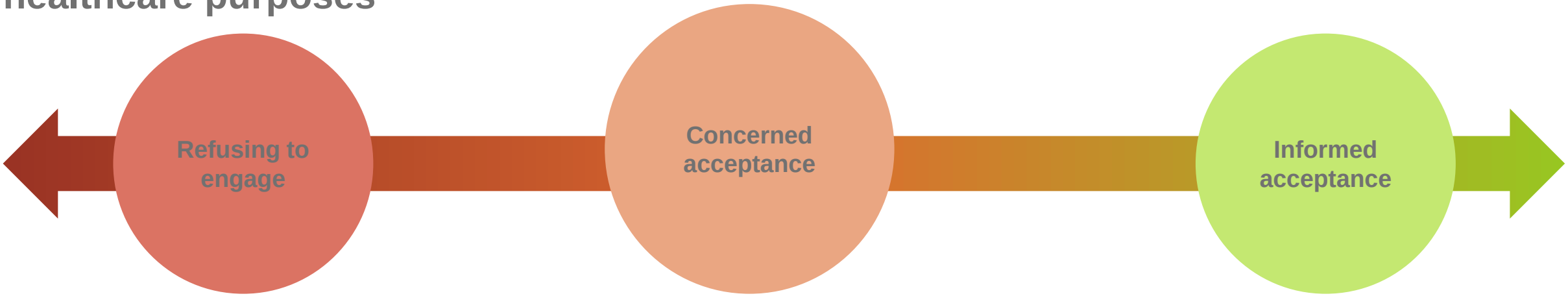
"[AI company] given 'legally inappropriate' access to NHS data"

Some participants discussed sharing their data for the 'greater good', but were unable to discuss benefits beyond this

Participants who thought sharing data was for the greater good were emotional in their negative responses discussing issues with:

- Sharing data **without permission**
- Sharing data with an organisation previously suffering from **data breaches**
- The potential for data breaches with **personal healthcare data**

Participants fell at different points on a scale of acceptability for using data for healthcare purposes



Often demonstrated an emotional response to lack of consent needed

Considered the sharing of data without consent to be morally wrong

Concerned that private companies may make the NHS pay to access the technology in the future which was considered morally wrong

"I don't think that it is acceptable for data to be shared without your permission - what happens when there are glitches and identifiable data is shared? "(Digital Dialogue, Female)

Concerned over data security, lack of permission and the potential of the NHS paying in the future, but were less emotional

Were reassured that identifiable information would be removed and that data would not be used by advertising or insurance companies

Thought data sharing was inevitable

It concerns me that they don't ask for your permission. But at the same time, if it can help diagnose certain diseases then I find it useful. (Digital Dialogue, Female)

Held some concerns about data security, and cost of the technology being passed back to the NHS

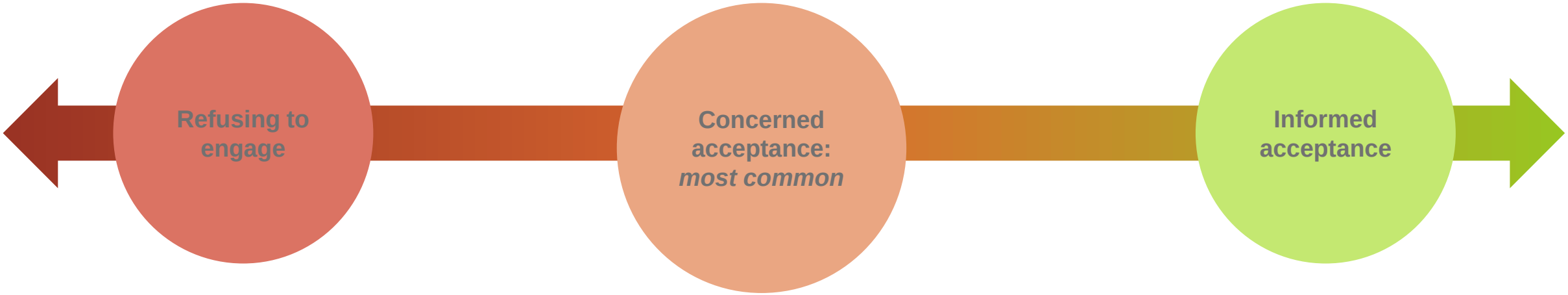
Despite concerns, these participants considered the overarching outcome of data sharing for this purpose to be positive

The potential benefits were seen to substantially outweigh the risks

"Because personal data is protected the benefit of this outweighs any negatives due to the data being used to help identify conditions in the future" (Digital Dialogue, Female)

Size of bubble related to number of participants

Where a participant fell on the scale was largely driven by demographics, understanding and personal experiences of data security



Tended to be digitally excluded participants

Had lower levels of comprehension over how their data would be used and the purpose of using it

Had often suffered data breaches or incidents in the past, meaning levels of trust in corporations were low (e.g. bank fraud, tech companies being hacked)

Most participants fell at this point on the scale - individuals came from a mix of demographics

Had a higher level of understanding of the potential benefits of data sharing for this purpose

A few had suffered negative experiences with data breaches

Tended to be participants with higher levels of education

Had a high level of understanding of the potential benefits of data sharing for this purpose

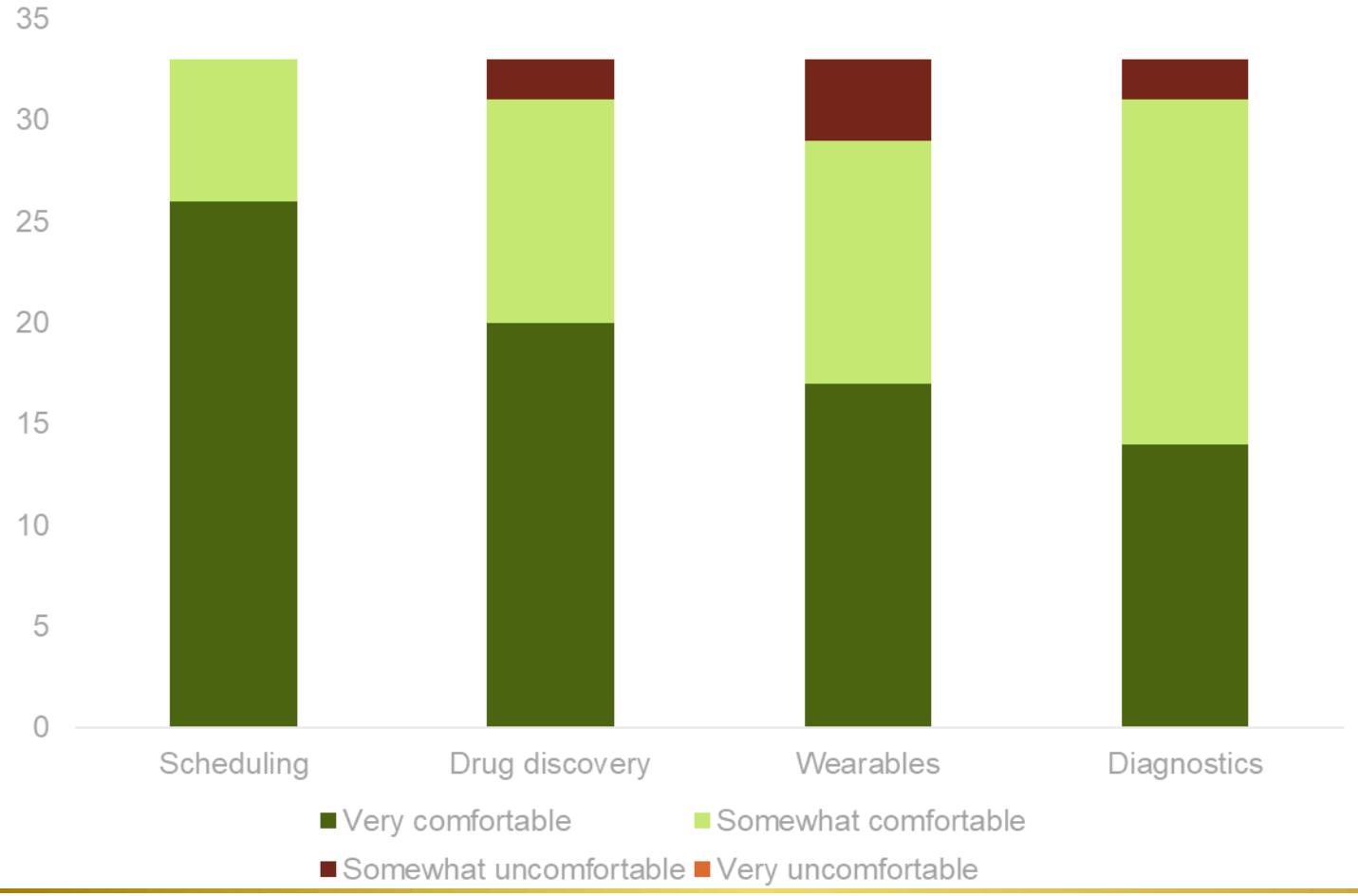
Considered the potential benefits to outweigh the risks of personal data breaches

Size of bubble related to number of participants

7.
Acceptability of the use of AI in healthcare

Participants were most ready for scheduling AI to become part of healthcare systems

Thinking back across the forum, how comfortable do you now feel about the development and use of each of the below technologies



Although views about AI only shifted in a positive way as participants learned more about AI, providing information did not change some participant's views

A small number of digitally excluded participants remained negative about the use of artificial intelligence, largely driven by a lack of familiarity and understanding

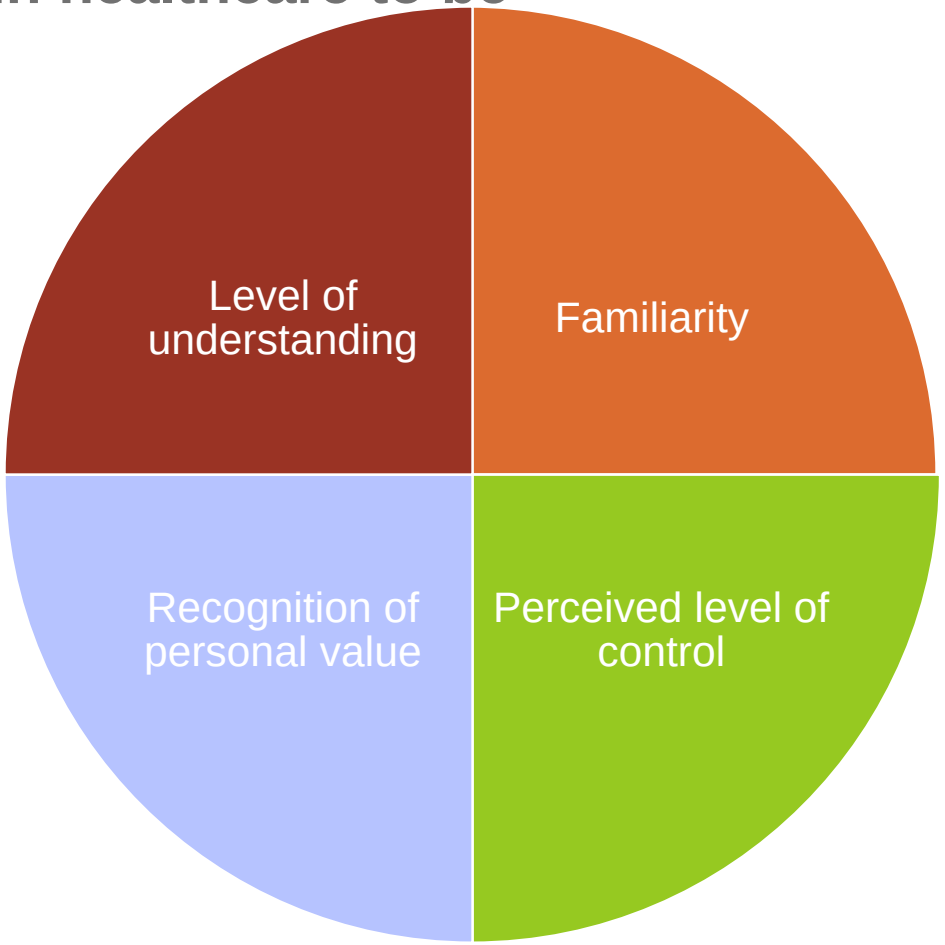
Some participants had become more optimistic, but retained some concerns around aspects such as: data ownership, lack of control and diagnostic technology

Some participants had become reassured by the information they had seen, and were now excited about the prospects of AI in healthcare

A small number of informed participants felt that their already optimistic views about AI had not shifted due to the information provided matching their expectations

These shifts in views about the acceptability of AI in healthcare were not meaningfully driven by demographic factors

Overall, four factors contributed to how acceptable participants found the use of AI in healthcare to be

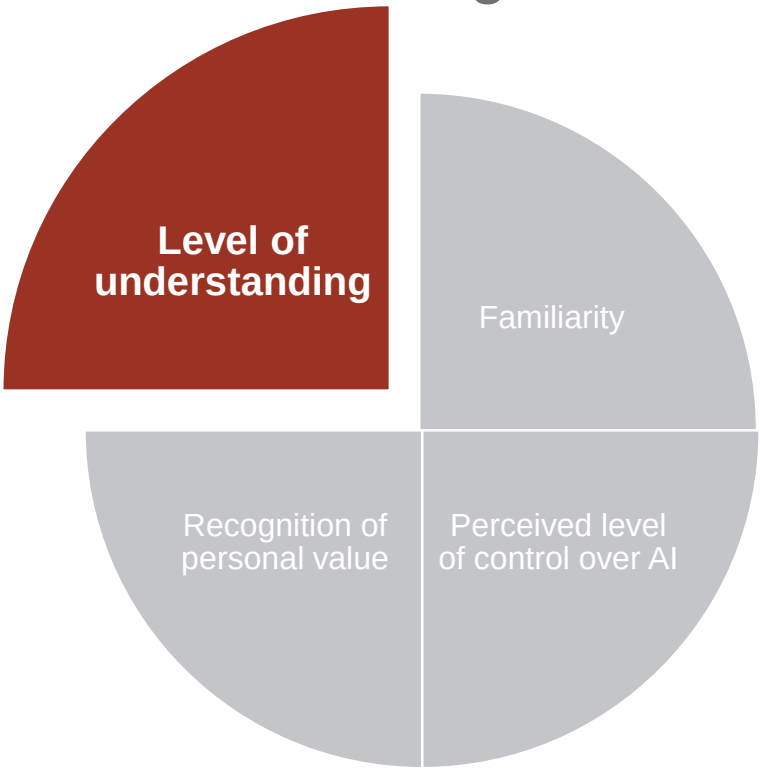


Artificial intelligence is considered most acceptable when:

- Participants were comfortable with their **level of understanding** of artificial intelligence
- Participants recognised the risks, but were generally more open to the benefits when they were **familiar** with the AI
- Participants could **see a clear, positive impact** on them, or someone they knew
- Participants **felt they had a choice** over using the artificial intelligence and felt in control of how their data was being used

These four themes have been drawn from across the digital dialogue and focus groups

Greater levels of understanding made participants more open to the benefits of artificial intelligence



"Use it everyday when driving live traffic updates and re routing. Really is one of the best things and makes travel so much easier and stress free" (Digital Dialogue, Male)

What increases level of understanding?

= Working in industries where artificial intelligence is currently used

= Higher levels of technological literacy, as a result having exposure to existing technologies

= Interaction with factual sources of information such as the news or documentaries

What this means for acceptability?

High levels of understanding

= A more nuanced understanding of uses of artificial intelligence

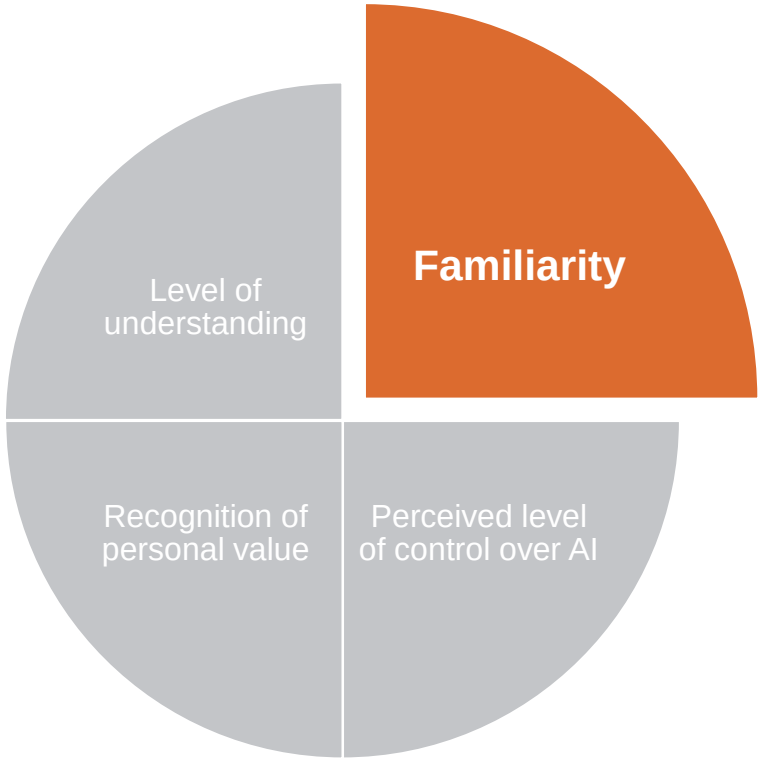
= Where participants were comfortable with their level of understanding they were more positive. Some participants felt they wanted a higher level of understanding despite being well-informed

Low levels of understanding

= Futuristic perceptions of artificial intelligence that are often considered scary

= Often focus on the risks of artificial intelligence

Participants were more open to the benefits of AI where it was familiar to them



"This would relieve the stress of trying to book an appointment…like online booking but less stress" (Focus groups, Male)

What drives familiarity?

= Participants were able to better understand the benefits where the technology was a smaller step from current technology that they had experienced

= Technological literacy increased the extent to which participants had interacted with technology

= Interaction with factual sources such as the news and documentaries

What this means for acceptability?

High levels of familiarity

= Participants recognised the risks, but were generally more open to the benefits.

= If the experience was positive, participants were more likely to discuss the benefits. If the experience was negative, participants became more sceptical of artificial intelligence.

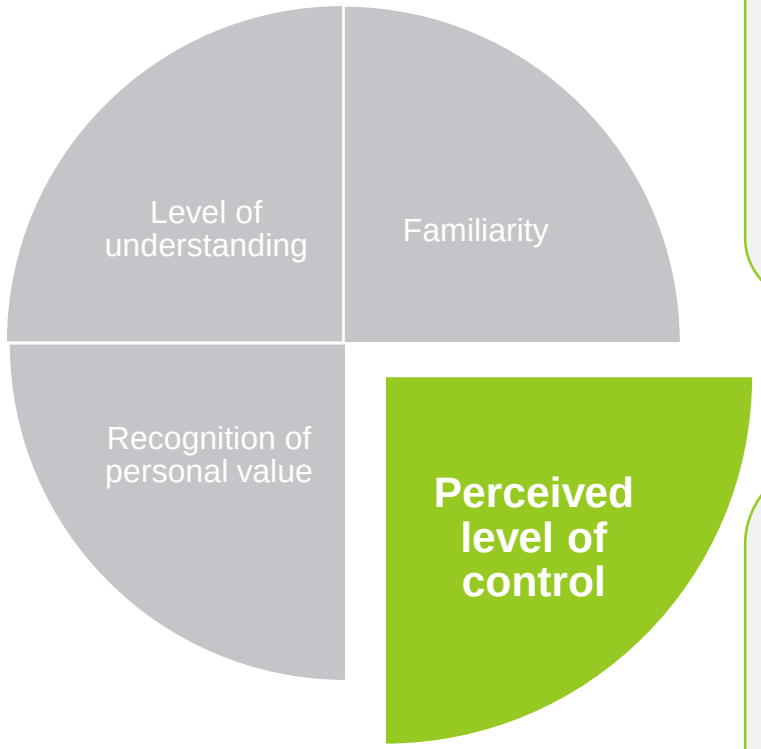
= Participants generally felt interested in further development

Low levels of familiarity

= Participants generally felt more overwhelmed, and were less open to further information

= Participants did not view the development of AI as a priority

Participants felt that AI was more acceptable when they felt in control and empowered to make choices



"Surely this is a very sensitive area, and needs to be thoroughly thought through with some sort of law? I think every patient should give consent and be informed" (Digital Dialogue, Female)

What drives how in control participants feel?

= Participants felt more in control where they had the option to give consent for data sharing and whether they knew who would be able to access their data

= Participants felt more in control where they felt that they had a choice of whether to use the artificial intelligence technology

= Participants felt less in control if they had suffered a data breach in the past

What this means for acceptability?

High levels of control

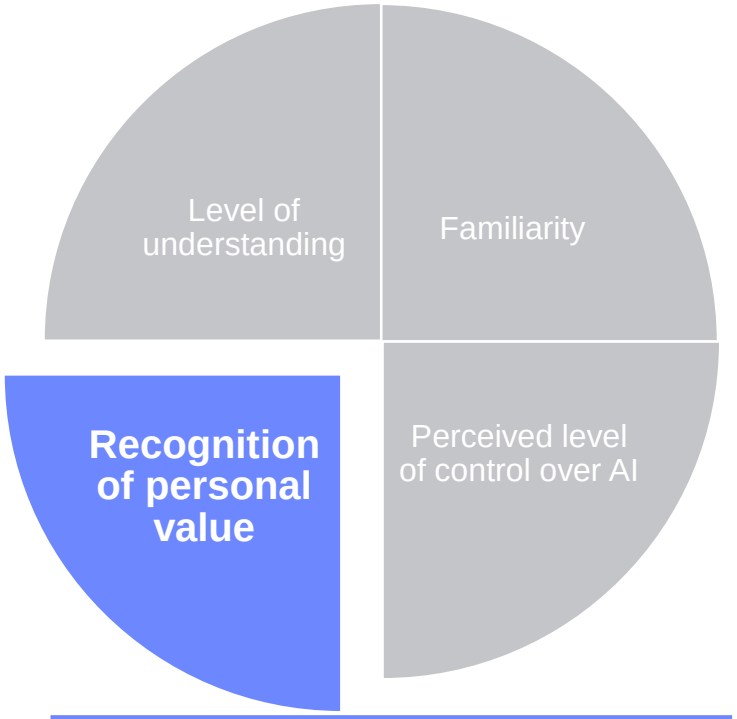
= Participants felt empowered to make choices about which artificial intelligence would work for them and improve their quality of life and what they felt comfortable consenting for their data to be used for

Low levels of control

= Participants did not trust the technology, meaning levels of acceptability dropped

= Some participants became irritated about the potential intrusiveness of the technology

Participants welcomed AI when they thought that it would have a positive impact for them, or people like them



"It has the potential to do more good for me than harm" (Focus groups, Male)

What drives how participants perceived impact?

= Whether the participant felt they had gained personally through: greater convenience in gaining appointments, quicker access to healthcare, improved quality of life or tailored advice

= Whether the participant felt the healthcare system would become more efficient

= Whether the participant felt that they would lose a personal connection

What this means for acceptability?

Positive impact

= Envisioned that there would be a personal, positive impact for them or others like them

= Benefits of artificial intelligence seen to outweigh any risks, increasing acceptability

Negative impact

= Thought that companies would benefit and profit from the advances, rather than being impacted personally

= Risks seen to outweigh benefits, decreasing acceptability

= Participants felt that there would be a loss of personal connection in sensitive interactions

8.
Implications

Implications

Area	Implications
Perceptions of AI	Identify areas in which the public can gain greater exposure to, and experience of artificial intelligence beyond popular culture references to increase levels of familiarity with artificial intelligence technology through targeted communications. This could facilitate a greater understanding of AI and allow people to see the benefits.
Aspirations about AI	The development of AI is seen as important when the public perceive it to improve quality of life, make efficiencies and keep the UK at the forefront of scientific development. Messaging around these three factors could increase engagement with, and enthusiasm for, artificial intelligence.
Concerns about AI	The public have significant concerns about the use of AI in retail and advertising, particularly around it being intrusive and annoying in their everyday lives. Action needs to be taken to ensure that people feel in control of how their data is used in this context.
The use of AI in healthcare	Participants were open to the idea that AI can help relieve pressure on the NHS. They were more welcoming of AI applications when they are used in areas where there is a clear need to improve customer experience, and where it is not at the expense of a human connection – these are areas where they are more comfortable with early adoption. Therefore, communications should highlight how the technology will improve current customer experiences.

Implications

Area	Implications
Views about the use of personal data in the development of AI	Ideally, people want to give consent for their data to be used. However, they are more accepting of data use when they can see direct befits to themselves, or others like them. Therefore, the benefits of sharing data should be highlighted in any communications.
Acceptability of the use of AI in healthcare	Overall, four factors should be considered to increase acceptability of AI in healthcare. • Firstly, the public feel more comfortable where they are educated in an accessible way on technologies that will be used. Therefore any communication should be targeted based on existing knowledge. • Secondly, the personal value rather than the value to corporations should be highlighted. • Thirdly, acceptability is higher where people have control and choice over which AI they use and how their data is subsequently used, therefore individuals should be given some control over how their data is used and by who. • Finally, acceptability is increased where participants can see a positive overarching impact – these positive impacts should be highlighted in communications.

9.
Appendices

Stakeholder list

The Kantar Public team would like to extend our thanks to the stakeholders who participated in this wave of the dialogues. They helped with the development and review of the materials for the digital dialogue and focus groups and took part in the online forum to provide accurate, and up-to-date information and ensure that the dialogue was a two-way process.

- Natalie Banner (Wellcome)
- Nika Strukelj (Future Advocacy)
- Ben Glocker (Imperial College London)
- Dan Leightley (Kings Centre for Military Health Research)

Achieved sample – digital dialogue

	Target	Achieved	Scotland	NI	Wales	North West	East Midland	South East
TOTAL	33	33	5	5	5	6	6	6
GENDER								
Male	MIN 12	17	2	3	2	3	4	3
Female	MIN 12	16	3	2	3	3	2	3
AGE								
18-34	MIN 8	11	2	0	3	3	2	1
35-54	MIN 8	12	2	2	1	2	2	3
55+	MIN 8	9	1	2	1	1	2	2
SEG								
ABC1	MIN 12	19	3	2	3	3	4	4
C2DE	MIN 12	14	2	3	2	3	2	2
INTEREST IN SCIENCE								
Low interest (2-5 on scale)	MIN 12	15	3	3	2	2	2	3
High interest (6-9 on scale)	MIN 12	18	2	2	3	4	4	3
ACTIVITIES								
Visited a science and/or technology museum	MAX 5	1	0	0	0	0	1	0
Visited a science and/ or technology exhibition								
Attended a science or technology conference								

Achieved sample – digitally excluded focus groups

	TARGET	Newcastle 1	Newcastle 2	Cardiff 1	Cardiff 2
TOTAL	8	8	8	7	7
GENDER					
Male	MIN 3	5	5	3	2
Female	MIN 3	2	3	5	5
AGE					
18-34	MIN 2	3	3	1	1
35-54	MIN 2	2	1	2	3
55+	MIN 2	2	4	5	3
SEG					
ABC1	MIN 3	2	3	5	4
C2DE	MIN 3	5	5	3	3
INTEREST IN SCIENCE					
Low interest (2-5 on scale)	MIN 3	3	3	5	4
High interest (6-9 on scale)	MIN 3	4	5	3	3
ACTIVITIES (PER GROUP)					
Visited a science and/or technology museum	MAX 2	0	0	0	0
Visited a science and/ or technology exhibition					
Attended a science or technology conference					