What do voters want from an online voting experience?
Results from user testing of a prototype i-voting app

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Executive Summary

The UK does not offer remote online voting now. But, as digital services and digital citizen-government interactions continue to grow, voting could be offered remotely online (i-voting) in future alongside postal and in-person ballots. So what might i-voting look like, and how might voters respond? What makes an i-voting experience positive or negative?

We designed a prototype voting app that mirrors the traditional ballot paper. We asked potential voters to use it, on 3 different digital devices, and compared it with the in-person experience. Our study involved a diverse sample of 32 people from the Brunel community who kindly gave their time to test the alternative voting mode and share their feedback and opinions with us. We are grateful for their participation. Our key findings are:

- The prototype **app was positively evaluated,** both in terms of its design and layout, and the experience of navigating it to complete the voting task.

- **Convenience, ease of use, simplicity and accessibility** were repeatedly mentioned as advantages of i-voting. **Security and privacy concerns** were mentioned frequently, but not always as prohibitively high risks.

- **Two thirds say they would opt for 'i-voting' if it were available.**

- On a 'willingness to vote online' scale of 0 to 10, our respondents gave an average score of 8.4.

- **Gaining first-hand experience of the app was associated with either maintaining or improving willingness to vote online** – the 'maintainers' generally had a high initial willingness to vote online, while the 'improvers' were initially less keen.

- If i-voting were to become an option in future, our **respondents want to see stronger security and authentication features** on an i-voting app, **education to inform voters** about how i-voting works, and **transparency** about data risks, actors involved, and the security measures in place to prevent fraud and malpractice.

Further testing, on a larger scale, could usefully explore which voter groups might benefit most from the option of i-voting, and how design features and voter engagement could address security and data protection concerns.

1. Context

Electronic voting methods are not new, but there are few places in the world that have moved beyond electronic voting (e-voting) booths in a polling station towards i-voting, where votes are cast online and remotely. A number of countries have trialled i-voting but electoral fraud concerns mean it has not been applied on a larger scale, with exceptions such as Canada, Estonia and Switzerland. The UK's last trial of online voting ended in 2007.

The world is a different place now, as are digital behaviours. Governments are increasingly shifting to 'digital by default' public services, and the pandemic offered a new lens to appraise the merits of remote online voting, particularly with the postponement of elections in 2020. This prompts us to ask, can i-voting have a role in future British elections? Can i-voting be seen as being acceptable by a critical mass of voters?

A move to i-voting is asking voters to shift their evaluation of candidates and parties from a familiar ballot paper interface to a digital equivalent, which may feel very different or even radical. Human-computer interaction, design, and experience could all play a part. It's important, therefore, that we understand what factors determine the acceptability of pilot i-voting apps.

In this report we document the findings from a pilot study designed and run at Brunel University London. We designed a prototype i-voting app, and offered it up for testing by staff and students in the Brunel community. We investigate what factors determine the acceptability of a pilot i-voting app. We explored the experience of using the app, compared to the more familiar ballot paper; what people liked or disliked about this novel way of voting; and whether they preferred one platform over another – phones, tablets or laptops.

# 2. Methods and research design

App design

We developed an i-voting web app prototype to investigate the feasibility of people voting digitally in UK elections. Currently, there is no such i-voting app in use in the UK. Our prototype is in a unique position to act as a proof-of-concept.

It consists of a user-friendly interface that mimics the voting experience by presenting a range of candidates from recognisable political parties, and guiding the user through to a voting decision. A web app is one that can be accessed through a web browser. It can work on any device as long as the user has access to a web browser and the Internet. We tested three devices – a smartphone, a tablet and a laptop device – that offer a consistent user experience.

The user experience was designed following a minimalist approach ("less is more") leading to a 3-screen user interface. In the first screen, a user logs in using a pair of authentication codes similar to those used by local authorities when confirming details on the electoral roll in the annual canvass. In the second screen, a user can see the ballot paper (with instructions listed at the top of the screen), and they are able to cast their vote by clicking on their preferred candidate's box. In the third and final screen, users receive a confirmation message with a timestamp.
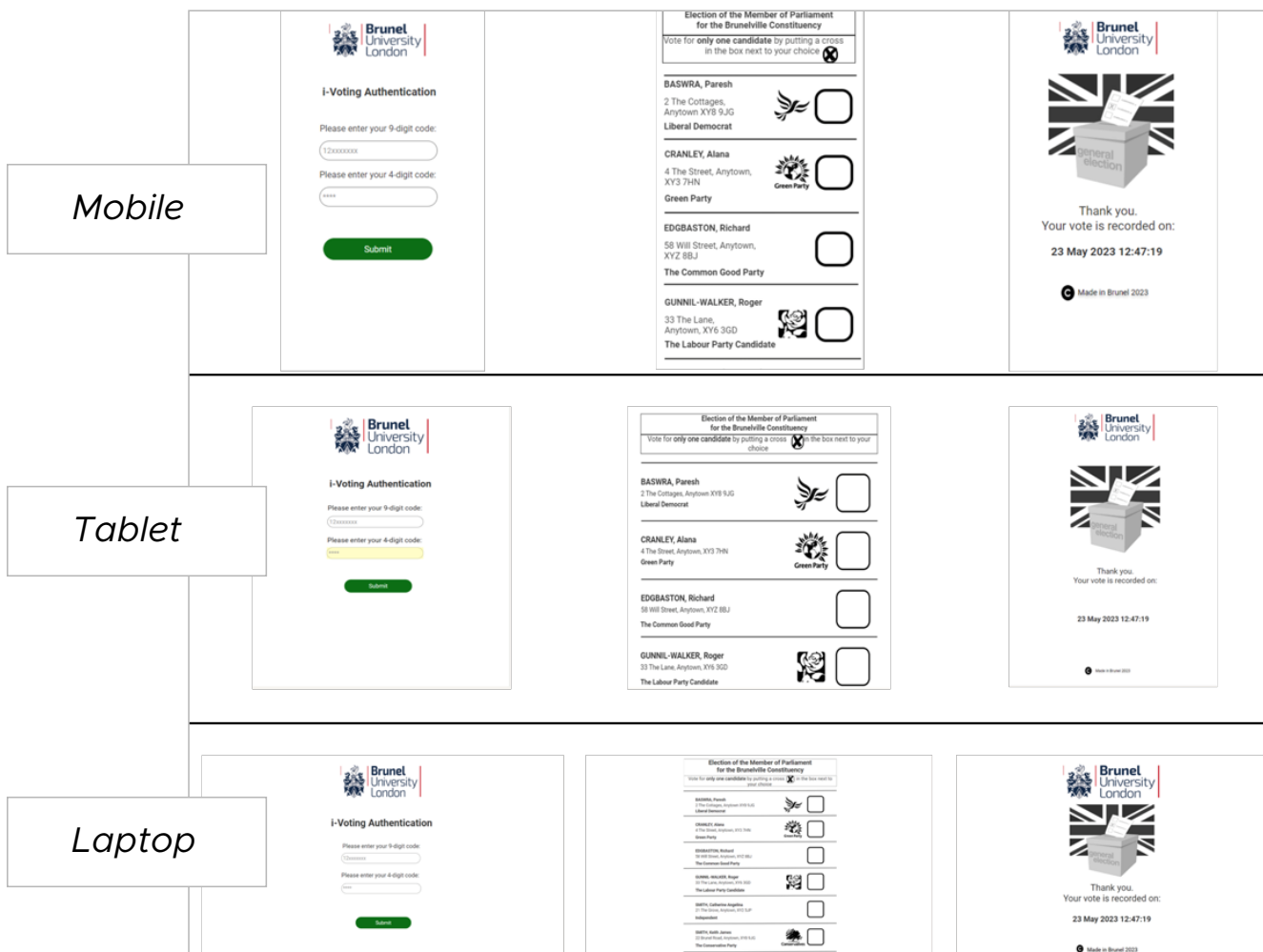

Figure 1 The i-voting app on mobile (top), tablet (middle) and laptop (bottom) devices

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The user journey was kept the same across all three targeted devices, as shown in Figure 1, where the scaling up of the user interface (from a mobile to tablet to laptop) is also evident. The prototype is available through a URL link and works on any device or web browser.

User testing

We invited members of the Brunel University student and staff community to test the app in a "lab-in-the-field" setup on campus. Our respondents took part in a series of voting exercises. They used our app prototype on three different devices: first, a smartphone (the participant's own), second, a tablet (provided), and third, a laptop (provided). They were given access to the app through an online URL link which they used to access it on all three devices.

They were then asked to navigate through the app on each device in turn and make their voting decision after considering hypothetical candidates standing for election in a hypothetical ballot. Finally, they were asked to also cast their vote using a physical ballot paper (identical to the digital version) and mocked-up ballot box provided in the room.
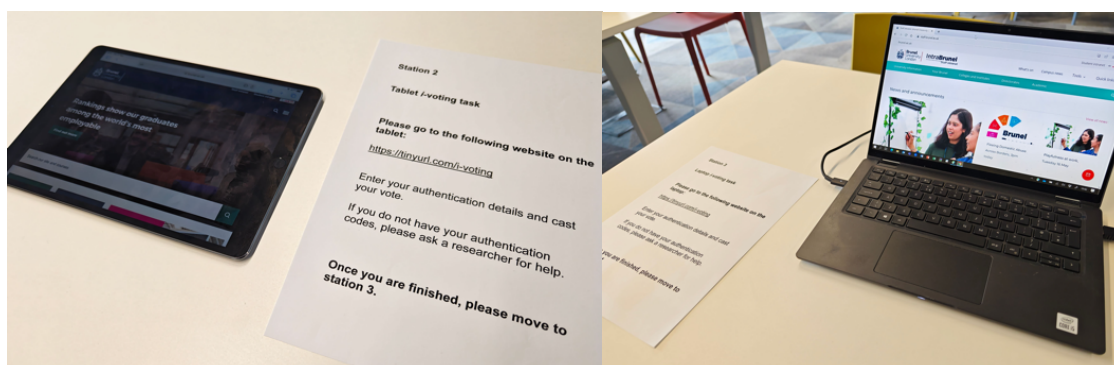
Image 1 Voting exercises in the user testing lab

Participant sample

We recruited 32 participants via an open invitation for the pilot study from Brunel University London. For our purposes, a convenience sample was sought rather than a representative sample. Our 32 respondents were a combination of professional and administrative staff (9%), academic and research staff (25%), and students (66%). The sample was not gender balanced. Based on self-declaration (which permitted non-declaration), 66% were male and 34% female.

Reflecting the preponderance of students in our sample, the age profile was skewed towards a younger cohort, although ages ranged from 19 to 69. Thus, while the mean age was 31.25, the modal response was 23 and the median 24.5. Given the size of the sample for this pilot study, care should be taken in interpreting quantitative results. Overall, however, our triangulation and corroboration of findings across statistical and qualitative data allows us to be more confident about the robustness of our results.

Data collection

Image 2 Understanding the i-voting experience compared to the traditional ballot box

Our participants completed a short registration survey before the user testing. We asked for some background information about the participants, including online experiences and behaviours, previous voting experiences, and demographic and social characteristics. After the user testing exercises, we asked people to tell us what they thought of the app in two ways: (1) they completed a brief survey to rate different aspects of the app; and (2) they shared their views and feedback with researchers in a debrief interview.

Data analysis

Our survey was based on the short version of the established User Experience Questionnaire. This involved rating eight aspects of the app on each platform separately (smartphone, tablet and laptop), to measure whether the app was:

- obstructive or supportive
- complicated or easy
- inefficient or efficient
- confusing or clear

- boring or exciting
- not interesting or interesting
- conventional or inventive
- usual or leading edge

The interview notes were written up and analysed for recurring themes and ideas. They offer a direct insight into people's immediate impressions of the app, and what they think about future voting.

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We invited members of the Brunel University student and staff community to test the app in a "lab-in-the-field" setup on campus. Our respondents took part in a series of voting exercises. We asked them to tell us about their experience and opinions.

3. Findings

What do people make of the i-voting app?

Our respondents shared many positive sentiments about the app. They particularly liked that it was **easy and straightforward to use** (78% of users mentioned this). It was seen as being highly **convenient,** avoiding the need for planning ahead and travelling to the polling station on the day (31%). Recurring descriptions include that the app: *"gets around hurdles of going out to vote, e.g. travel, taking time from work"*; it was *"easy to follow"*,*"simple, straightforward"*, *"quick"*, and *"time-saving"*.

Image 3 Voting on a smartphone

The design and layout of the app was also praised for its **clarity, accessibility and simplicity** (69% of users referred to this). The security codes and login process worked well, although not all users had kept their authentication codes and had to be prompted. We believe this gives an accurate insight into real world experiences, but despite the extra step there were no complaints about the authentication process itself.

These generally positive findings about the app are corroborated by our survey ratings. Scores were given on a scale from -3 to +3, with 0 as the middle point. A higher score indicates a better rating, and anything over 0 indicates it was positively received. **The app received a positive evaluation across all 3 platforms** (see Table 1).

The highest scores emerged for the pragmatic features of the app (it being supportive, easy, clear and efficient), over the hedonic features (such as how interesting or exciting it was). This is perhaps a reflection of our deliberate design decision for the app to feel like a ballot paper, eschewing more interactive online features.

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Our respondents shared many positive sentiments about the app. They particularly liked that it was easy and straightforward to use, as well as quick, time-saving, and gets around the hurdles of going out to vote.

Table 1 User Experience Scores: A higher score indicates a more positive appraisal

Mean Scores	Smartphone	Tablet	Laptop
Pragmatic			
Supportive	1.32	1.66	2.06
Easy	1.78	1.84	2.25
Efficient	1.50	1.59	2.13
Clear	1.90	2.13	2.25
Hedonic			
Exciting	0.68	0.65	0.42
Interesting	0.50	0.90	0.45
Inventive	0.74	0.74	0.39
Leading Edge	0.74	0.57	0.77

Notes: Questions are coded from -3 to +3, with 0 as the middle point. Not all respondents scored each of the traits, means provided here are for all available data. For standard deviations see appendix.

There were aspects that were seen as less convenient or appealing. Arriving at the website by typing in the URL was *"fiddly"* for some, particularly on a smartphone. The fact that the design replicated a ballot paper was both appreciated and critiqued. For example, the design was *"not colourful, just black and white"* and *"too much like gov.uk"* for some users, although this same characteristic was seen as a strength by others who described the *"black and white good for [the] colour blind"*, and it being *"identical to the [ballot] paper, felt comfortable"*.

While positive on the whole, user experiences varied across the 3 platforms. Some users found *"the scrolling and display wasn't great [on the] phone"*, and preferred the larger screen size of the laptop and tablet for reading and navigating. In fact, we found that across 4 of the 8 elements (*supportive, easy, efficient, clear*) laptops delivered the best user experience. On the remaining 4 elements, tablets delivered better scores for being *interesting*; smartphones and tablets jointly for being *exciting* and *inventive*, and smartphones and laptops jointly for leading edge. While the more portable devices were favoured in the *hedonic* aspects (exciting, interesting, inventive), laptops are clearly the more *pragmatic* choice.

What are the bigger issues that voters are concerned about in relation to i-voting?

Two broader themes emerged, relating to security, and the socio-cultural experience of voting.

Security was raised by 31% of users when asked what they disliked about the i-voting app, and by 34% of users when asked to explain whether they would prefer to vote in-person or online. The majority of users who mentioned security saw it as a potential risk and concern, mentioning it would be *"too*

easy to manipulate", with *"hacking"* risks relating not just to the login system and voter identification, but also where the data would go and how it would be stored; as well as worries around people *"being forced to vote, coercion, privacy"*.

A number of users mentioned the authentication codes. It was seen to be *"a good option so long as [it] can identify one person"*, but perhaps needed further *"layers of security, maybe integrate [a] passport check"* or something akin to identification checks needed for online banking. Being able to i-vote remotely still required a secure *"physical environment... needs to be a private place"*.

On the other hand, some users seemed relaxed about the security aspects and mentioned their *"trust in the process"*. One user explained they *"use [the internet] for online banking and pretty much everything else"* so did not have any issues with trust themselves but could see that others might. Others suggested it could be more secure to vote online than in person, either because *"it's easy to tamper with ballot papers";* or to avoid potential coercion at the ballot box (with reference to a context outside the UK) since voting online *"can be remote and in the privacy of our own home"*. Some of our users felt that security issues could be addressed, but the information and education of voters was a priority. The app itself could have provided more information about the security of the vote to raise trust in the act of i-voting.

A second theme related to the in-person *"election experience"*, *"ceremony"* and *"social ritual"* of voting. While raised only by a minority of respondents (9% of users when asked about i-voting, 18% when asked to explain their preference for online or in-person voting), it was a passionately-held view: the *"physical act of voting [is] more of an occasion"*, and it would *"lose its sense of significance online"*. Voting in-person was *"democracy in action"*, important to be part of the *"community...being part of a bigger exercise"*. It is worth noting that this perception of voting as an important social and community exercise was held by people of varying ages and backgrounds.

Are people willing to vote online?

We wanted to understand if our respondents prefer to vote online or in person if the choice were available. **66% said they would prefer online voting if it were available**, and 34% would prefer in-person voting.

We also asked respondents to indicate their willingness to vote online on a scale of 0-10, before and after they had taken part in the trial, to understand whether the experience of testing the app makes any difference. The level of willingness began reasonably high even before the user lab, with a mean score of 7.8.[1] Afterwards, willingness increased to an overall mean score of 8.4.

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1 This compares with a mean of 6.6 recorded in a recent study by Fisher and Savani, which had a much larger and more representative sample. See: *Who's in charge? The impact of delivery and perception of risk on the willingness to voting online - Justin Fisher, Manu M. Savani, 2022 (sagepub.com)*

Do attitudes change after testing the prototype app?

Looking a little deeper we identify three groups of users, who we can describe as maintainers, improvers and decliners:

- 61% of respondents offered identical scores before and after the trial (maintain)
- 32% indicated an increased likelihood of voting online (improved)
- 7% said they were less likely to do so (declining)

Those whose ratings stayed the same were, on the whole, quite willing to vote online already (mean score of 8.3 out of 10). In contrast, those respondents whose likelihood of voting online increased, saw their mean score increase considerably from 6.7 before the trial to 8.7 after. Amongst the small number of respondents whose score decreased, the means fell from 9.0 to 8.0. **Overall, experience of testing the i-voting app either maintained or increased willingness to vote online amongst those who were initially more sceptical.**

Who was more inclined to i-vote?

Women were more likely to be positive about i-voting both pre and post the pilot. Following the trial, the mean score for women was 9.3, compared with 8.0 for men. We also observe the impact of wider internet behaviour on the willingness to vote online. As we would expect, those who used the internet most regularly for banking, shopping and hobbies were more likely to favour online voting, with the impact of banking being particularly strong, even within the small sample. Age is also a predictor. Splitting the sample into two equal groups, we observe that those aged 19-24 were more likely to favour i-voting, both before and after the trial. Following the trial, those age 19 to 24 scored a mean of 8.6 compared with 8.1 for those aged 25 and above. We observe a similar age effect when comparing preferred mode of voting. The mean age of those preferring online voting was 29, compared with 36 for those favouring voting in-person

Overall, despite the positive levels of willingness to vote online overall, a substantial minority still favoured the in-person form of voting. The evidence suggests this could be related to three broad factors discussed above: (1) security concerns, (2) preferences for and current usage of digital devices, particularly smartphones, and (3) the importance of voting in-person on social and cultural grounds.

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Those aged 19-24 were more likely to favour i-voting, and women were more likely to be positive about i-voting both before and after the trial.

Which device would people prefer to use, if i-voting were available?

Having tried all 3 digital devices, we asked users which one they would be most likely to use should i-voting be available. There was a clear preference for smartphones (44%) and laptops (41%) over tablets (13%). The relative unpopularity of tablets may be down to availability. While all respondents (100%) had daily access to a smartphone and 94% to a laptop, only 34% had daily access to a tablet.

The smartphone option was largely favoured because of its convenience, with users pointing out that it is *"handy"* and *"easier to carry"*, and one explaining *"[I] have access to it all the time, [I'm] quickest with it"*. On the other hand, those who favoured a laptop referred to its advantages for typing and reading due to the bigger screen. The ability to use a keyboard and mouse for navigating to the website and through the voting process was also important, with one user explaining they were *"more used to [a] keyboard; touch screens can lead to mistakes"*. Some users also linked their preference for a laptop to the formality and significance of the experience. In contrast, one user mused that *"voting by phone might be more trivial"*, while another explained that *"voting is [a] trust-based exercise, [I] trust [the] laptop"*. Again, we observe variation by age. The mean age of those favouring smartphones was 27, compared with 33 for those favouring laptops.

An association between voting preferences and device preferences

We also examined whether overall preference for in-person or i-voting was related to what users thought about different devices focussing on smartphones and laptops as the two most popular online platforms. We observed that while a better user experience was associated with a greater likelihood of preferring online voting, there was a greater polarising effect for smartphones compared with laptops. In general, those who would prefer to vote in person scored much lower when evaluating the user experience of smartphones compared with laptops (see Appendix for further details). This serves as further evidence that respondents had more confidence in the laptop platform.

What could i-voting look like in the future?

Our respondents shared a number of insights on how i-voting might operate in the future, and what they would like to see. Most of these suggestions centred on security, and the features of an app that would encourage more trust in the elections. Some specific suggestions that emerged included:

- *"Authenticity and identification… [having] two codes was good but would like a physical verification, e.g. biometric scan, to feel more secure"*.
- Would like to see a further confirmation email or unique reference number after the online vote is cast to generate more confidence that the vote was being counted.
- More information and education about the privacy and security measures taken, how to avoid *"scams"*, and who is managing data protection.

4. Conclusions and recommendations

We designed a prototype i-voting app, and tested this with a diverse range of 32 potential voters at an in-depth user experience lab. **We learned that:**

- 66% of users would be willing to i-vote if there was the option; 34% would prefer voting in-person.
- Our prototype app offers simplicity, ease, convenience and accessibility, and was positively evaluated across phones, tablets and laptops for the practical aspects of user experience.
- There remain valid concerns about security and authentication, data storage and electoral integrity.
- Trying out a voting app and becoming more familiar with the process tends to improve willingness to i-vote in the future amongst those who are initially less keen; and maintains willingness among those who are initially more keen.
- Phones and laptops are the most popular devices for i-voting if it becomes available. Laptops offer advantages in terms of size of screen, formality of voting experience, and trust. Laptops also score best for user experience as being supportive, easy, efficient, clear and leading edge.

We recommend:

- Further field research into the feasibility and acceptability of i-voting across different platforms, amongst different groups of voters, and with different interface designs.
- Any i-voting considered in the future should be offered on a range of digital devices to take account of varying personal preferences and access to different platforms.
- Education campaigns will be key to inform voters about the process and the security of ballots cast through i-voting. A mock voting experience could be incorporated into such campaigns to improve familiarity with i-voting and ensure accessibility to as many voters as possible, as well as allowing for informed choice over what a switch to i-voting would feel like as a social experience.

Appendix

Thematic analysis of interviews

Table 2		
1. What did you like about the app?		
Easy, simple, straightforward to use	"ease of use" (ID 1)	25 users
	"simple, straightforward" (ID 5)	
	"easy to follow" (ID 66)	(78%)
Design and layout of the app	"simplicity, direct match to the paper...no weird colours or shapes" (ID 6)	22 users
	"clear interface - just like paper" (ID 47)	(69%)
	"not too many questions" (ID 64)	
2. What did you like about the app?		
Design and layout	"QR code easier" (ID 4)	16
	"too simple, could have hover effects" (ID 11)	
	"scrolling and display wasn't great on phone" (ID 26)	(50%)
	"phone - typing the url, easy to mistype, but ok on laptop and tablet" (ID 39)	
Security, authentication, and trust	"Voting should not be online - too easy to manipulate" (ID 3)	10
	"needs extra layer of security – maybe integrate passport check" (ID 59)	(31%)
	"where is [data] being stored?" (ID 60)	
3. If you did vote online, which one platform would you be most likely to use? What are the main reasons for your preference?		
Convenience and ease	"smartphone easy, use laptop regularly" (ID 57)	19
	"use phone all the time, quick" (ID 64)	(59%)
Size of screen and/or keyboard on device	"bigger screen – easier to use" (ID 7)	11
	"helps reading – screen size, easy to browse" (ID 66)	(34%)
4. If you had the choice, would you prefer to vote online or in-person? What are the main reasons for your preference?		
Convenience, speed, efficiency	"lower barrier to entry, not having to travel" (ID 8)	19
	"avoid hurdles and hassles" (ID 55)	(59%)
Security and privacy	"people could cheat and miscalculate...manipulate people in change of software" (ID 3)	11
	"Would wait to see government IT for more formality" (ID 19)	(34%)
	"Security reasons; Trump and Russia; easier to allege cheating online" (ID 59)	

User experience scores – detailed analysis

Table 3 User experience ratings across devices

Mean Scores (Std Dev)	Smartphone	Tablet	Laptop
Pragmatic			
Supportive	1.32 (1.92)	1.66 (1.88)	2.06 (1.65)
Easy	1.78 (1.74)	1.84 (1.61)	2.25 (1.37)
Efficient	1.50 (2.00)	1.59 (1.72)	2.13 (1.73)
Clear	1.90 (1.76)	2.13 (1.38)	2.25 (1.34)
Hedonic			
Exciting	0.68 (1.80)	0.65 (1.45)	0.42 (1.61)
Interesting	0.50 (1.70)	0.90 (1.47)	0.45 (1.50)
Inventive	0.74 (1.73)	0.74 (1.48)	0.39 (1.82)
Leading Edge	0.74 (1.69)	0.57 (1.78)	0.77 (1.78)

Notes: Questions are coded from -3 to +3, with 0 as the middle point. Standard deviations in parentheses. Not all respondents scored each of the traits, averages provided here are for all available data.

An association between voting preferences and device preferences

We looked into whether overall preference for in-person or i-voting was related to what users thought about different devices. We constructed scales of the eight user-experience questions for smartphones and laptops, being the two most popular online platforms. The scales are reliable, both producing Alpha scores of almost 0.9 (the convention is that 0.7 is the baseline). We also created scales of the pragmatic (supportive, easy, efficient, clear) and hedonic (exciting, interesting, inventive, leading edge) aspects for both smartphones and laptops. Again, the Alpha scores exceed 0.8 in all four cases.

We can use these scales to evaluate whether the user experience differed for those who would wish to vote online compared to those who wished to vote in-person, were such a choice to be available. The scales can be added up (they were coded from –3 to +3) to produce a maximum total score of 24. Taking the pragmatic and hedonic scales separately, the maximum scores are 12 each. The results are shown in Table 4.

In both modes of voting, a higher score (indicating a better user experience) is associated with a greater likelihood of preferring online voting. However, the differences are more pronounced in respect of smartphones; indeed attitudes towards the smartphone app appear to be more polarised when we compare the preferred voting mode. For example, while the difference between the scores for laptops amongst those who would prefer to vote in person to those who would prefer to vote online is 5.9, it is 13.3 for smartphones. In general, those who would prefer to vote in person score much lower on all three smartphone scales. This serves as further evidence that respondents had more confidence in the laptop platform.

Table 4 Impact of User Experience on Preferred Mode of Voting
(Standard Deviation in Parentheses)

Mean scores (Std Dev)	All Respondents	Prefer In-Person	Prefer Online
Laptop All	10.7 (9.878)	7.0 (10.705)	12.9 (8.950)
Pragmatic	8.7 (5.607)	6.0 (6.017)	10.3 (4.831)
Hedonic	2.0 (5.357)	1.0 (5.329)	2.6 (5.423)
Smartphone All	8.9 (10.463)	0.5 (8.915)	13.8 (7.962)
Pragmatic	6.41 (6.587)	1.1 (6.564)	9.4 (4.510)
Hedonic	2.6 (5.482)	-0.6 (5.104)	4.4 (4.945)