

## INFORMATION SHEET FOR PROSPECTIVE PARTICIPANTS

### BACKGROUND

You are invited to participate in this study on push-notifications which aims to test alternate methods for creating, displaying and delivering push-notifications with a goal of improving the engagement experience for push-notification subscribers.

In particular, this study wishes to examine how notification engagements differ over participants of different demographics, levels of mindfulness and levels of curiosity. Additionally, this study will assess the performance of a notification service which:

- autonomously generates notifications
- uses different templates to display notifications
- uses different methods for personalising delivery of notifications

This will be achieved through studying various aspects of notification features and their effect on notification engagements, such as: topics; keywords; sentiment; enticement; emojis.

To achieve this, we ask participants to subscribe to our push-notification service for a period of 12 days and answer short questionnaires about the notifications which are opened and dismissed.

Over the past decade, technology has become increasingly ubiquitous. Smartphones are an obvious example of this. We are rarely without our mobile devices. This has resulted in a massive influx of apps created for our smartphones, all of which fight for our attention. A key feature used by mobile apps to grab our attention are push-notifications. These are the alerts that cause our device to \*ping\* or vibrate, attempting to draw us back into engaging with the app that created the notification. Marketers use push-notifications as a tool in strategies that aim to: maximizing time spent on their platform; convert purchases; advertise deals; etc. With widespread adoption of mobile browsing, websites now also have the ability to push-notifications, giving every business with an online presence the ability to reach subscribers 24/7.

While push-notifications can be a great and useful tool for staying up to date with important information, they can also be a nuisance. For example too many notifications cause the receivers to become anxious due to an overload of information and notifications delivered at inopportune times reduces productivity. This study aims to explore how well different types of push-notifications are received by subscribers through testing different sources for creation, different formats for displaying and different methods for delivery.

### RESEARCH TEAM

This study is being carried out as part of the requirements for a PhD in Computer Science at Trinity College Dublin. The lead researcher, Kieran Fraser, is a PhD candidate in the School of Computer Science at Trinity College Dublin and is a member of the ADAPT Centre for Digital Content Technology. This research study will further his work on push-notifications as part of his PhD.

### PARTICIPANT CRITERIA

We are seeking participants who meet the following criteria:

- over the age of 18
- fluent in English
- primary mobile device uses Android operating system
- uses (has the ability to install) Google's Chrome web browser on their mobile device

### PARTICIPANT INSTRUCTIONS

You are asked to navigate to the *Pushd* webpage, <https://fraserkieran.com/pushd>, using the Chrome browser on your mobile device. On this webpage, you will find a digital copy of this Participant Information Sheet and the Informed Consent Sheet.

On reading both sheets and giving your informed consent, you should click the button provided which will ensure you can receive push-notifications. In the second part of the study, which you will be invited to on successful completion of the prescreen, will open a dialog window where you are asked to:

- answer a small number of demographic questions
- complete the Curiosity and Exploration Inventory questionnaire
- complete the Mindful Attention Awareness Scale questionnaire
- indicate preferences for notifications e.g. website sources, topics

You can exit the questionnaire and stop participating at any point by selecting the cancel button. On completion of the questionnaire, and over the following three weeks after signing up, you will receive up to 20 notifications spread throughout the day. Your action taken on these notifications (opened/dismissed) will be tracked.

**Important:** do not delete cookies for the study website ([fraserkieran.com/pushd](https://fraserkieran.com/pushd)) during the study period or you will be automatically removed from the study. This is due to the fact that the system depends on cookies for delivering the notifications.

At the end of each of each day you will receive a notification with the title *Pushd Study Alert – Nightly Survey*. You are asked to open this notification and answer the subsequent questions regarding your engagement with notifications over the day. You are asked to complete at least 5 of these per week.

You may choose to leave the study at any point by simply navigating back to the *Pushd* webpage and clicking the *Unsubscribe* button – all data recorded up to this point will be destroyed and you will no longer receive notifications.

At the end of the study period, a notification will be sent with the title *Pushd Study Alert - You have finished the study. Click to confirm submission*. You are asked to open this notification, answer the short concluding questionnaire and confirm your submission. **After this point you will no longer be able to withdraw your data from the study as the unique identifier linking you and your data will be destroyed.**

### STUDY DURATION

Over the course of the 12 days, we expect your involvement to take approximately 22 minutes.

- 2 minutes are allocated for the pre-screen process.
- 5 minutes are allocated for part 2 which includes answering the regarding notification preferences.
- 10 minutes are allocated for 12 days of nightly surveys (30 seconds each).
- The final 5 minutes are allocated for the concluding questionnaire and submission confirmation.

### RISKS & BENEFITS

As the study involves sensitive information, there is a potential risk to the privacy of the participant, and so we will take the following measures to ensure your privacy:

- all data recorded is encrypted and, where possible, pseudonymization is applied
- participants are assigned a unique identifier on sign-up which is destroyed after submission, effectively anonymizing the data (**Note:** truly anonymised data is difficult to achieve – here we mean that no obvious/explicit link will exist between the original participant and the data stored)
- on completion of the study, the data will be stored in encrypted form on the lead researcher's laptop for a maximum of three years from the date the study begins (approximately May 2023).

There is a risk a participant could delete cookies necessary for the system to operate. **Participants are asked to take extra care not to delete information (web history & cookies) for the study website (<https://fraserkieran.com/pushd>) for the duration of the three weeks. Doing so results in withdrawing from the study as a participant cannot be identified if this occurs.**

- If participants are recruited through Prolific Academic, on conclusion of the study they will receive £3 – as per the guidelines for paying workers on Prolific Academic.
- If participants are recruited generically (e.g. through social media or email advertising of the study) they will be entered into a draw for a €100 *One4All* gift voucher as a token of appreciation.

### WITHDRAWAL

Your participation is entirely voluntary, and you can withdraw at any time without penalty.

#### To withdraw:

Simply navigate back to the *Pushd* study homepage (<https://fraserkieran.com/pushd>) and select the *Unsubscribe* button. You will be asked for confirmation. Once given, all data recorded up to that point will be destroyed and you will no longer receive notifications.

### DATA COLLECTED

A full list of data points collected during this study can be found in the Appendix. You are encouraged to examine in detail. All personal data collected is encrypted and pseudonymized to ensure privacy and prevention of discoverable identities.

Under Article 15 of the General Data Protection Regulation (GDPR), you have the right to request a copy of your personal data. To make a data access request, simply fill in the contact form on the study webpage (<https://fraserkieran.com/pushd>) and include 'data request' in the message field with your preferred format of data.

If you are a participant entering the study without a Prolific Academic account, you will have an option to enter a draw for a €100 *One4All* gift voucher – to do this, you must enter your email in the box provided when submitting your *post-study* questionnaire. This email will be encrypted and stored only for the purpose of contacting the winner. All emails collected will be deleted once the winner is chosen (approx. July 2020).

### QUESTIONNAIRES

As the purpose of this study is to assess the effect of creation, presentation and delivery of push-notifications on different user types, the following questions (which appear in questionnaires presented to participants throughout the study) are required to be answered (non-optional) in order to participate:

#### 1. Pre-Study Questionnaire

- a. **Gender and Age groups** – these are essential fields as this study wishes to identify how notification engagements differ between different demographics.
- b. **Topic & website preferences** – these are essential fields used by the notification service for creation and delivery.
- c. **Mindful Attention Awareness Scale** – this is an essential part of the study as we wish to assess how notification engagements differ over dispositional mindfulness.
- d. **Curiosity and Exploration Inventory** – this is an essential part of the study as we wish to assess how notification engagements differ over participant's recognition, pursuit, and integration of novel and challenging experiences and information.
- e. **Example notifications** – this field requires participants to select an open or dismiss action on sample notifications - this is an essential part of the study as it is required by the notification service for creating personalised notifications.

#### 2. Nightly Questionnaire

- a. **Satisfaction, Trust, Relevance & Enticement** – these are essential fields as this study is assessing participant notification engagements with respect to each metric. These metrics were chosen for the purposes of evaluating the creation, presentation and delivery systems implemented in the notification service sending notifications to participants.
- b. **Engagement perception** – these are essential fields as this study also aims to assess how participants perceive previous engagement with notifications.
- c. **On a scale of 1 to 10, how likely are you to recommend the service?** – This is an essential question for this study as it quantifies how satisfied the participant is with the notification service and contributes toward evaluating the user experience. Note: the free text field is optional, only the score is mandatory.

### 3. Post-study Questionnaire

- a. **Identify which datasets describe the notifications you received and acted upon** – this is an essential field as it provides a quantitative measure of how realistic the notification service generates data, which this study strives to uncover.
- b. **Notification presentation** – these are essential fields as they assess the effect notification presentation formats have on privacy, distraction and usefulness, all relevant to the study.
- c. **Emojis** – these are essential fields as they assess the effect emojis, present in notifications, have on sentiment and perceived enticement of the participant, again relevant to the goals of the study.

#### POST-PARTICIPATION

We will publish free-to-access copies of all publications on the project website. If you have any questions which you wish answered discreetly, please use the contact form on the study homepage (<https://fraserkieran.com/pushd>).

#### DATA USAGE & PUBLICATION

This data will be analysed in order to identify improved methods of creating, displaying and delivering push-notifications to subscribers. We plan to publish the results of our research in academic journals and conference proceedings. We will do this in a way which does not identify you, or any other individual participant.

As part of this study, notifications and subsequent actions (taken by participants) will be used to train algorithms (e.g. Generative Adversarial Networks) to simulate participant actions so that a synthetic dataset can be generated and shared amongst the research community. No identifying data shall be present in the synthesized dataset.

For example, one such targeted conference for publication of result of findings is *UbiComp 2020*.

#### WARNINGS

While it is unlikely that illicit activities would be disclosed, if you do so, we would be obliged to report them to the appropriate authorities.

#### CONFLICTS OF INTEREST

The following are relevant conflicts of interest:

- This research will contribute to the lead researcher's PhD degree.
- The lead researcher has been awarded a grant from Enterprise Ireland to commercialise previously undertaken research on push-notifications.
- As the study will be advertised through the lead researcher's centre and university community, it is likely that research colleagues may participate – however as anonymous unique identifiers are used, identities will not be known to the researchers.

#### CONTACT DETAILS

If you have any queries, feel free to contact the lead researcher, Kieran Fraser ([kieran.fraser@adaptcentre.ie](mailto:kieran.fraser@adaptcentre.ie)), and we will be happy to answer questions about the study. You may also contact us via a contact form on the study website.

## APPENDIX

Table 1 - Pre-study Questionnaire Data

Pre-Study Questionnaire		
Feature Name	Explanation	Privacy Action
age	categorical age group of the participant e.g. 18-29, 30-40	pseudonymization & encryption
curiosity_scores	answers to curiosity questionnaire	encryption
gender	gender of participant	pseudonymization & encryption
id	anonymous unique identifier generated for the user	pseudonymization & encryption
init_dismissed	ids of notifications which participant indicated they would be inclined to dismiss	encryption
init_open	ids of notifications which participant indicated they would be inclined to open	encryption
mindful_scores	answers to mindful questionnaires	encryption
neg_web	list of websites which participant would like to receive notifications from	encryption
pos_web	list of websites which participant would not like to receive notifications from	encryption
prolific_id	participants prolific id if applicable	encryption
signed_up	datetime participant signed up (calculated automatically)	encryption
timezone	of the participant (calculated automatically)	encryption
topics	list of topics participant is interested in receiving push notifications on	encryption

### Pre-Study Questionnaire (max 3 mins)

1. Select applicable gender:

Nothing selected ▼

2. Select applicable age group:

Nothing selected ▼

3. Select multiple (min 2) topics which you would like to receive notifications on:

Nothing selected ~

4. Select multiple websites which you **would** like to receive notifications from:

Nothing selected ▲

5. Select multiple websites which you would **would NOT** like to receive notifications from:

time.com ▲

6. Mindful Scale

7. Curiosity Inventory

The following 15 notifications have been autonomously generated from your selected websites. Please select the actions (open or dismiss) which you might take on these notifications:



**Will COVID-19 Ever Really Go Away?.**

Open Dismiss

time.com



**What to Know and What to Do About COVID-19.**

Open Dismiss

time.com



**As the First Coronavirus Vaccine Human Trials Begin, Manufacturer is Already Preparing To Scale Production to Millions.**

Open Dismiss

time.com


Kieran Fraser @ ADAPT Centre  
Trinity College Dublin

Cancel Participation

Proceed

Figure 1 - Pre-study Questionnaire





### Mindful Attention Awareness Scale

**Instructions:** Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1. Never/Almost

2. Not frequently

3. Sometimes frequently

4. Sometimes infrequently

5. Very infrequently

6. Almost never

I could be experiencing some emotion and not be conscious of it until some time later.

I break or spill things because of carelessness, not paying attention, or thinking of something else.

I find it difficult to stay focused on what's happening in the present.

I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.

I tend not to notice feelings of physical tension or discomfort until they really grab my attention.

I forget a person's name almost as soon as I've been told it for the first time.

It seems I am "running on automatic", without much awareness of what I'm doing.

I rush through activities without being really attentive to them.

I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.

I do jobs or tasks automatically, without being aware of what I'm doing.

I find myself listening to someone with one ear, doing something else at the same time.

I drive places on 'automatic pilot' and then wonder why I went there.

I find myself preoccupied with the future or the past.

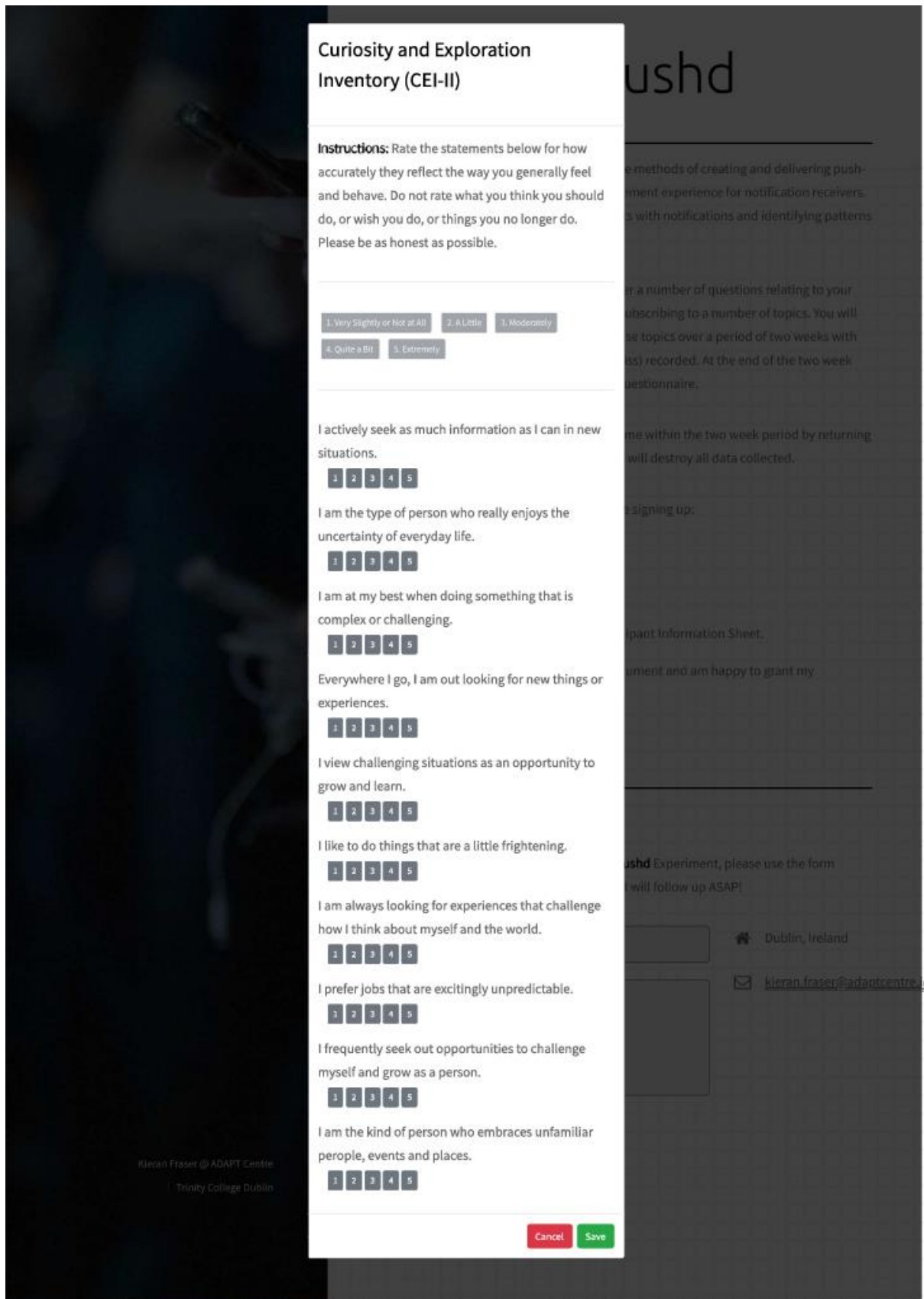
I find myself doing things without paying attention.

I snack without being aware that I'm eating.

Cancel

Save

Figure 2 - Mindful Attention Awareness Scale



**Curiosity and Exploration Inventory (CEI-II)**

**Instructions:** Rate the statements below for how accurately they reflect the way you generally feel and behave. Do not rate what you think you should do, or wish you do, or things you no longer do. Please be as honest as possible.

1: Very Slightly or Not at All    2: A Little    3: Moderately  
4: Quite a Bit    5: Extremely

I actively seek as much information as I can in new situations.  
1 2 3 4 5

I am the type of person who really enjoys the uncertainty of everyday life.  
1 2 3 4 5

I am at my best when doing something that is complex or challenging.  
1 2 3 4 5

Everywhere I go, I am out looking for new things or experiences.  
1 2 3 4 5

I view challenging situations as an opportunity to grow and learn.  
1 2 3 4 5

I like to do things that are a little frightening.  
1 2 3 4 5

I am always looking for experiences that challenge how I think about myself and the world.  
1 2 3 4 5

I prefer jobs that are excitingly unpredictable.  
1 2 3 4 5

I frequently seek out opportunities to challenge myself and grow as a person.  
1 2 3 4 5

I am the kind of person who embraces unfamiliar people, events and places.  
1 2 3 4 5

Cancel Save

Kieran Fraser @ ADAPT Centre  
Trinity College Dublin

pushd

methods of creating and delivering push-  
ment experience for notification receivers.  
s with notifications and identifying patterns

a number of questions relating to your  
subscribing to a number of topics. You will  
se topics over a period of two weeks with  
ss) recorded. At the end of the two week  
questionnaire.

me within the two week period by returning  
will destroy all data collected.

signing up:

Participant Information Sheet.

ment and am happy to grant my

pushd Experiment, please use the form  
will follow up ASAP!

Dublin, Ireland

kieran.fraser@adaptcentre

Figure 3 - Curiosity and Exploration Inventory (CEI-II)

Table 2 - Nightly Questionnaire Data

Nightly Questionnaire		
Feature Name	Explanation	Privacy Action
satisfaction_likert	likert score for how satisfied participant was with delivery of notifications	pseudonymization & encryption
trust_likert	likert score for participants trustfulness of notifications	pseudonymization & encryption
relevance_likert	likert score for how relevant the notifications were to participants context and interests	pseudonymization & encryption
enticement_likert	likert score for how enticing the notifications (e.g. language and how it was displayed) were for participant	pseudonymization & encryption
num_push	the number of notifications received according to the participant	encryption
opened_push	the number of notifications opened according to the participant	encryption
receptive_topics	the topics of notifications which were most frequently opened according to the participant	encryption
nps_score	the net promoter score given by the participant	encryption
nps_reason	free text reason for the net promoter score assigned by the participant (optional)	encryption
time_submitted	the datetime for when the questionnaire is submitted (calculated automatically)	encryption



Please answer the following questions relating to your push-notification engagements over the past day.  
*Please do not name third parties in any open text field of the questionnaire. Any such replies will be anonymized. In the extremely unlikely event that illicit activity is reported I will be obliged to report it to appropriate authorities.*

### Satisfaction

How satisfied were you with the delivery time of notifications received?

☐ Very unsatisfied ☐ Unsatisfied ☐ Neutral ☐ Satisfied ☐ Very satisfied

### Trust

How trustful were you of the notifications which you received?

☐ Very untrustful ☐ Untrustful ☐ Neutral ☐ Trustful ☐ Very trustful

### Relevance

How relevant (with regard your interests and context) were the notifications which you received?

☐ Very irrelevant ☐ Irrelevant ☐ Neutral ☐ Relevant ☐ Very relevant

### Enticement

How enticing were the contents (text & format) of the notifications which you received?

☐ Very unenticing ☐ Unenticing ☐ Neutral ☐ Enticing ☐ Very enticing

### Engagement Perception

How many push-notifications did you receive from this study today?

Of these notifications, how many do you believe you opened today?

Which notification topics (can select multiple) do you believe you were most receptive to today?

### Final Thoughts

On a scale of zero to ten, how likely are you to recommend the notification service to a friend or colleague?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

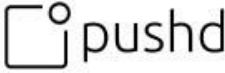
What is the primary reason for your score? (optional)

Figure 4 - Nightly Questionnaire

Table 3 - Post-study Questionnaire Data

Post-study Questionnaire		
Feature Name	Explanation	Privacy Action
<b>topics</b>	Participants answer indicating whether synthetic or real data better describes their engagements with notifications	pseudonymization & encryption
<b>websites</b>	Participants answer indicating whether synthetic or real data better describes their engagements with notifications	pseudonymization & encryption
<b>days</b>	Participants answer indicating whether synthetic or real data better describes their engagements with notifications	pseudonymization & encryption
<b>times</b>	Participants answer indicating whether synthetic or real data better describes their engagements with notifications	pseudonymization & encryption
<b>format_informative</b>	Participants answer indicating which notification format is more informative	pseudonymization & encryption
<b>format_decision</b>	Participants answer indicating which notification format aids decision making	pseudonymization & encryption
<b>format_privacy</b>	Participants answer indicating which notification format contributes more to privacy	pseudonymization & encryption
<b>format_consent</b>	Participants answer indicating which notification format they would be willing to consent to be used for automated decisions	pseudonymization & encryption
<b>emoji_enticing</b>	Participants answer indicating which notification emojis are most enticing	pseudonymization & encryption
<b>emoji_use</b>	Participants answer indicating which notification makes best use of emojis	pseudonymization & encryption
<b>emoji_relevance</b>	Participants answer indicating which notification has the most relevant emojis for the content	pseudonymization & encryption





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186

# notifications  
delivered

4

# questionnaires  
answered

Please answer the concluding questionnaire regarding your notification engagements. Thank you for your participation!

**Top notification topics which you opened:**

<p>Data</p> <ol style="list-style-type: none"> <li>1. business</li> <li>2. tech</li> <li>3. science</li> <li>4. entertainment</li> <li>5. wellness</li> </ol> <p>A:</p>	<p>Data</p> <ol style="list-style-type: none"> <li>1. wellness</li> <li>2. business</li> <li>3. travel</li> <li>4. entertainment</li> <li>5. politics</li> </ol> <p>B:</p>
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Which set of data, A or B, most accurately describes your notification engagements?

Nothing selected ▼

**Top websites from notifications that you opened:**

<p>Data</p> <ol style="list-style-type: none"> <li>1. news.marketsizeforecasters.com</li> <li>2. Irishmirror.ie</li> <li>3. neoxam.com</li> <li>4. businessinsider.com</li> <li>5. cnet.com</li> </ol> <p>A:</p>	<p>Data</p> <ol style="list-style-type: none"> <li>1. whyalla.ymca.org.au</li> <li>2. nytimes.com</li> <li>3. femcat.cat</li> <li>4. ft.com</li> <li>5. thesun.co.uk</li> </ol> <p>B:</p>
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Which set of data, A or B, most accurately describes your notification engagements?

Nothing selected ▼

**Top days you opened notifications:**

<p>Data</p> <ol style="list-style-type: none"> <li>1. Sun</li> <li>2. Tue</li> <li>3. Mon</li> </ol> <p>A:</p>	<p>Data</p> <ol style="list-style-type: none"> <li>1. Sat</li> <li>2. Tues</li> <li>3. Sun</li> <li>4. Mon</li> <li>5. Fri</li> </ol> <p>B:</p>
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Which set of data, A or B, most accurately describes your notification engagements?

Nothing selected ▼

**Top time (hour) of the day you opened notifications:**

<p>Data</p> <ol style="list-style-type: none"> <li>1. 10</li> <li>2. 20</li> <li>3. 8</li> </ol> <p>A:</p>	<p>Data</p> <ol style="list-style-type: none"> <li>1. 10</li> <li>2. 13</li> <li>3. 20</li> </ol> <p>B:</p>
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Figure 5 - Post-study questionnaire



4. 18  
5. 22

4. 15  
5. 11

Which set of data, A or B, most accurately describes your notification engagements?

Nothing selected

### Notification Presentation Format Unexpanded

Notification

From: pushd@pushd.co.uk  
Subject: Important information

B

A:

Notification

From: pushd@pushd.co.uk  
Subject: Important information

B

B:

Which notification, A or B:

1. is more informative **at a glance**

Nothing selected

2. would enable you to make a **quicker** decision (of opening or dismissing the notification)

Nothing selected

### Notification Presentation Format Expanded

Notification

From: pushd@pushd.co.uk  
Subject: Important information

B

A:

Notification

From: pushd@pushd.co.uk  
Subject: Important information

B

B:

Which notification format, A or B:

1. would better protect sensitive/private information, if present, in a notification?

Nothing selected

2. would you prefer to be used by a machine making automated decisions on your behalf?

Nothing selected

### Emojis 😊

A:

From: pushd@pushd.co.uk  
Subject: Important information

B

B:

From: pushd@pushd.co.uk  
Subject: Important information

B

C:

From: pushd@pushd.co.uk  
Subject: Important information

B

Which notification, A or B or C:

1. is more visually enticing?

Nothing selected

2. makes best use of emojis?

Nothing selected

3. has the most relevant emojis for the content?

Nothing selected

Confirm Completion

Figure 6 - Post-study questionnaire (continued)