On Recruiting and Retaining Users for Security-Sensitive Longitudinal Measurement Panels

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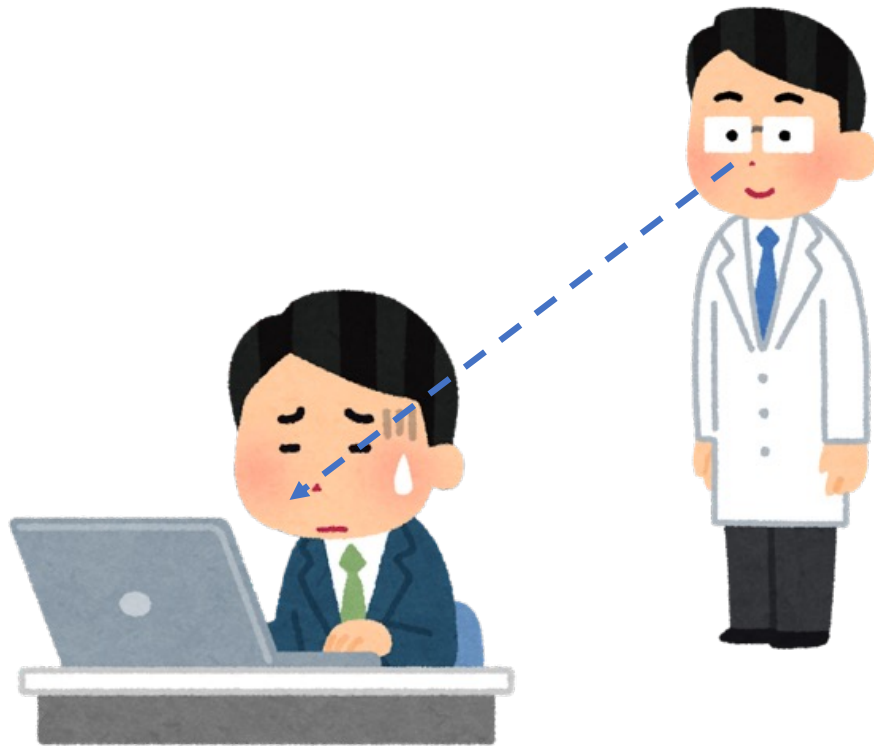
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Measurement panels

Intrusive nature of measurement panels

Since participants' devices are instrumented, such monitoring can be highly intrusive in terms of security and privacy

Research goal

To ==synthesize recommendations==
for recruiting and retaining participants
in future privacy-intrusive panel studies
using ==three case studies==

3 case studies

	SBO: Security Behavior Observertory	mSBO: Mobile Security Behavior Observertory	ST: Security Toolbar
Period	4 years	2 years	5 years
Devices	Windows computer	Android smartphone	Windows Internet Explorer
Users	600	2000	2 millions
Country	US	Japan	Japan
Experiment	Conducted by us	Conducted by us	Provided by a security company

Recruiting

Recruiting and rewards

	SBO	mSBO	ST
Rewards	monetary $30 + $10/month	non-monetary Animation character	non-monetary Security functionality
Recruitment	University recruitment service	Free to download via app store	Free to download via web services

mSBO: Animation character incentive

Animation character on homescreen
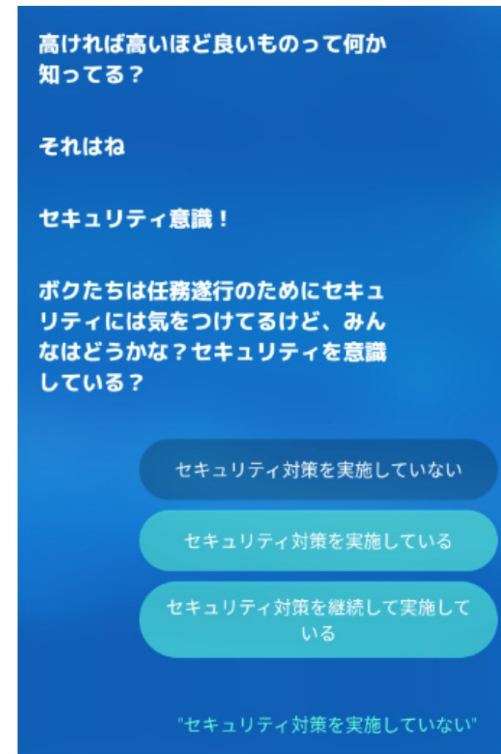
Chat interface for interaction

(c) Shirow Masamune, Production I.G/KODANSHA/GITS

Search

タチコマ・セキュリティ・エージェント・モバイル

KDDI Research, Inc.   **Personalization**

★ ★ ★ ☆ ☆ 25 👤

16+

ⓘ This app is compatible with your device.

Installed

Demographic bias

Table 1: **Demographics from SBO and mSBO studies**

	Demographic	mSBO	SBO
Gender	Male	69.5%	40.2%
	Female	26.7%	59.3%
	Other/No response	3.5%	0.5%
Age	18-21	2.2%	5.3%
	22–30	10.4%	43.9%
	31–40	23.6%	16.0%
	40–50	36.8%	9.4%
	50–60	22.0%	8.9%
	Over 61	2.5%	16.0%
	No response	2.5%	0.5%
Income	<2.5M JPY / <25K USD	21.1%	32.1%
	2.5–5M JPY / 25–50K USD	32.1%	22.0%
	5–7.5M JPY / 50–75K USD	19.8%	13.6%
	7.5–10M JPY / 75–100K USD	9.4%	8.2%
	10–15M JPY/100–200K USD	2.2%	8.7%
	>15M JPY / >200K USD	0.3%	2.1%
	No response	15.1%	13.2%

- **SBO and mSBO demographics are skewed**
- **SBO:**
  - **Bi-modal age distribution, skewed towards under 30 and over 60**
  - **Participants had lower incomes**
- **mSBO:**
  - **No significant bias in age and income distribution**
  - **Strongly skewed toward men**

Motivation bias

•**SBO ： Financially motivated, <u>most</u> have crowd working service/survey platform experiences**
•**mSBO: Interested in study purpose, <u>few</u> have crowd working service nor survey platform experiences**

SBO

No.	Motivation	Rate
1	How much I will be paid	75.8%
2	Amount of effort or work	66.7%
3	Whether I can participate at home / online (versus going somewhere to participate in person)	64.1%
4	Purpose or topic of the study	52.0%
5	Security or privacy of data collected in the study	36.9%
6	Who is conducting the study	25.8%
7	How quickly I will get paid	20.7%
8	The study's consent form	13.1%
9	Other	4.0%

mSBO

| No.	Motivation	Rate
1	Purpose or topic of the study	77.1%
2	Security or privacy of data collected in the study	64.9%
3	Who is conducting the study	56.7%
4	Amount of effort or work	48.0%
5	Whether I can participate at home / online (versus going somewhere to participate in person)	45.8%
6	The study's consent form	44.8%
7	How much I will will be compensated for participating	16.0%
8	How quickly I will be paid	4.1%
9	Other	3.1%

Security behavior bias

Security behavior:
    mSBO > SBO > PC users

Table 2: **Distribution of SeBIS scores across PC users [41], mSBO, and SBO studies.**

	PC users [41]	mSBO	SBO
Scale	RSeBIS	mRSeBIS	SeBIS
Responses	500	318	399
Mean	2.572	3.739	3.406
Standard Deviation	0.931	0.763	0.523
Minimum	1.067	1.667	2.250
Maximum	5.000	5.000	5.000

Monitoring influence
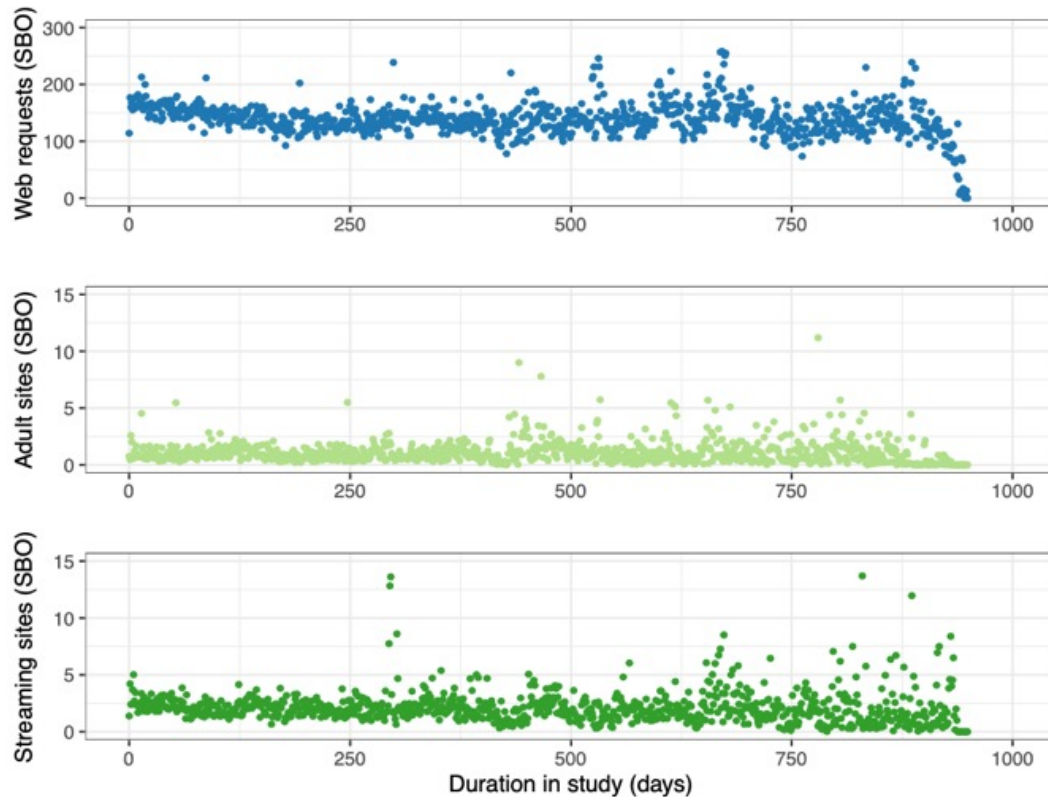
- **We did not find any differences in behavior during the period**
- **Device use remained relatively constant regardless of the length of time**
- **We observed SBO users visit adult and streaming websites from day zero**
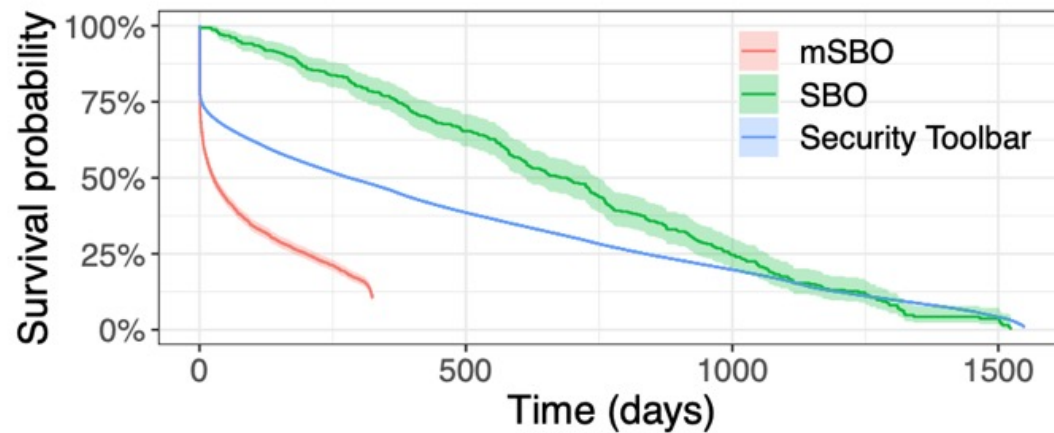
Retaining

Survival Curve

Figure 2: **Kaplan-Meier survival curves for all user panels.**

- **SBO is relatively linear, with half of the participants dropping out after about 700 days**
- **mSBO suffers the highest initial dropout rate, losing about 60% of participants over the first month**
- **After stabilizing, mSBO participants drop out at a rate as in the SBO study**

Application stability

In mSBO, unanticipated compatibility issues and software bugs led to application instability and unexpected crashes during the first four months of the app's release.
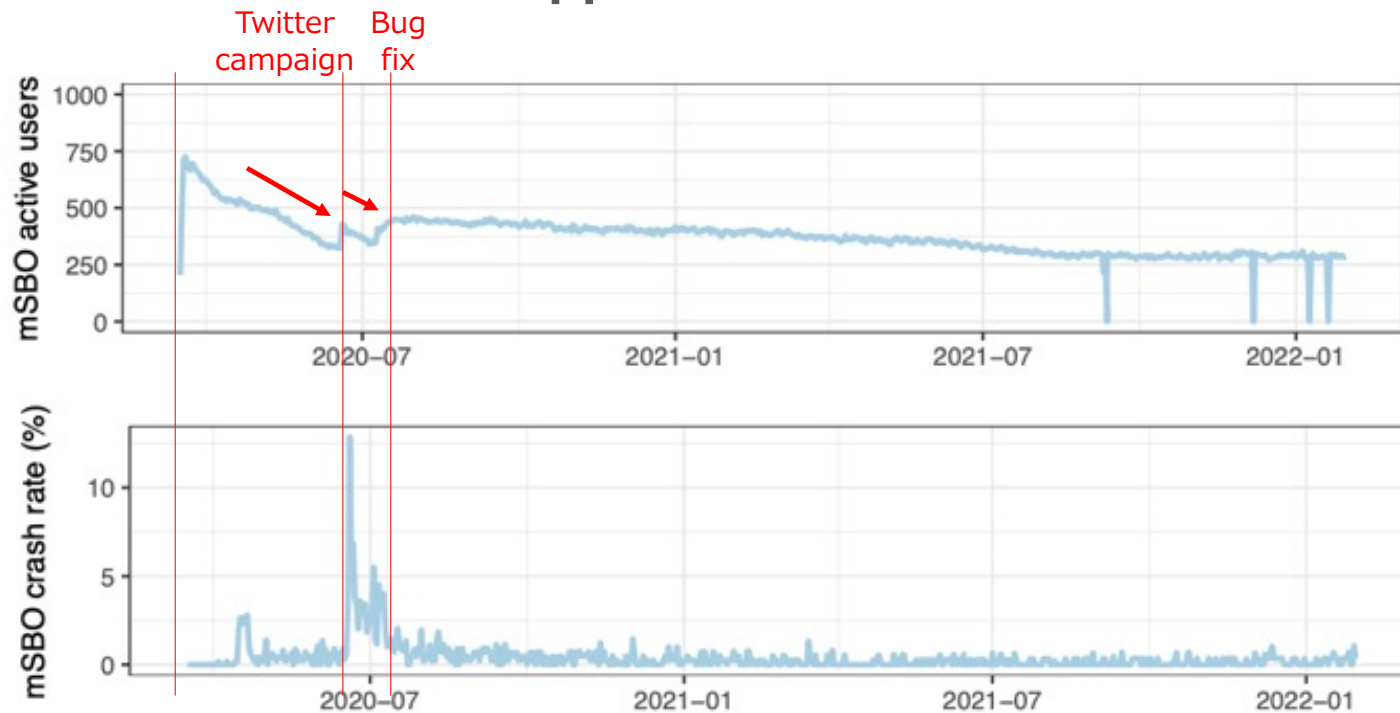
Minimizing interference

- Initial version mSBO app continuously displayed the character icon on the home screen
- This was designed to remind participants of the app's monitoring
- However, we received feedback that this feature severely interfered with user activities

Communication balance

- We hypothesized that regular notifications would increase users' engagement
- However, we found that 3 times per week is too high
- In July 2020, we turned off the notifications and made them optional

Following up with participants
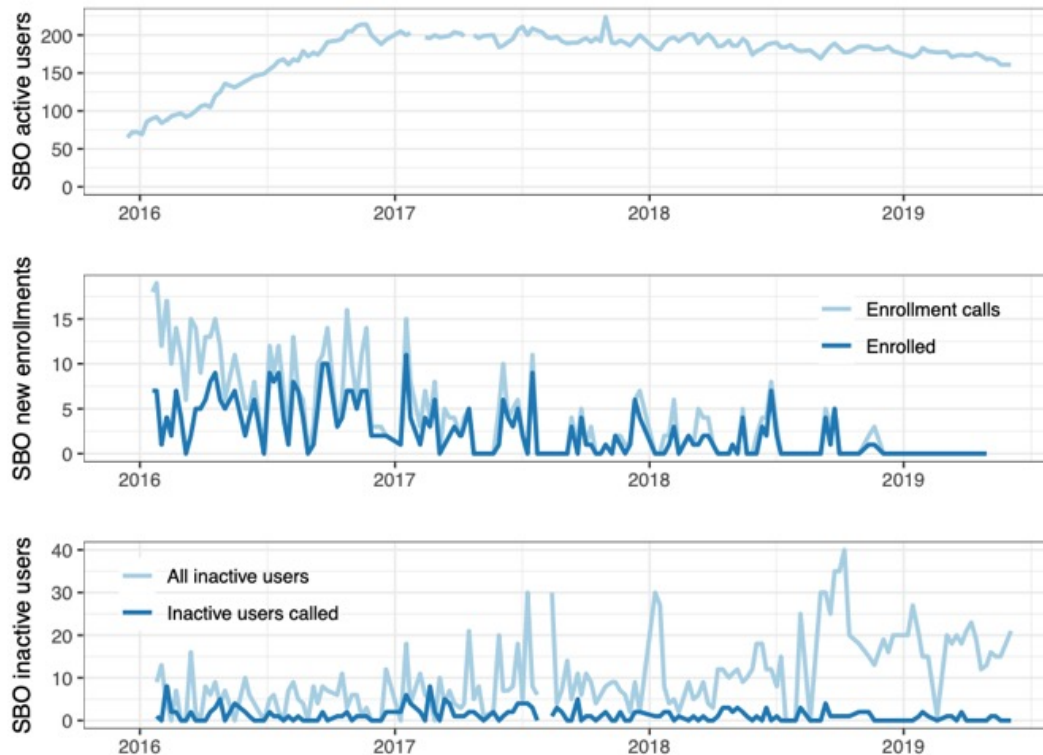
- **New participants received an initial enrollment call from the research team when they signed up**
- **Research team would also call participants to follow up whenever the participant had stopped sending data**

Recommendations / Findings

- **Both monetary and non-monetary incentives are effective in recruiting, although each may introduce its own potential bias**

- **Newly recruited users do not behave differently in their first few weeks than they do later on**

- **As for participant retention, personalized enrollment and follow-ups can lower initial dropout rates but are challenging and costly to scale**

- **Communication, including following up with inactive users, is vital to retention, but finding the right balance of communication is equally important**

- **Interfering with a participant's everyday device use is a sure way to lose users**

- **We highlight the importance of monitoring for sensor outages and user dropouts, maintaining the order of observed events, establishing good measures for active user engagement, and handling multi-user devices and multi-device users**

Thank you!

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