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# Challenges and best practices when designing a mobile application for the ELIPSS panel

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Institute of Philosophy and Sociology, Polish Academy of Sciences

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# Presentation outline

1. ELIPSS Study
  - a probability-based internet panel
2. ELIPSS Infrastructure
3. Challenges
  - a. [challenge #0 getting the timing right](#)
  - b. [challenge #1 providing a connected device](#)
  - c. [challenge #2 choosing a device model](#)
  - d. [challenge #3 managing a mobile fleet](#)
  - e. [challenge #4 designing a mobile app](#)
  - f. [challenge #5 developing for interactive surveys](#)

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## Longitudinal Internet Studies for Social Sciences

- 9-year grant from the French National Research Agency (ANR-10-EQPX-19-01) [DIME-SHS](#)
- probability-based sample (from 18 to 83 years old)
- sample size:
  - pilot study: 2012 - 2016 +1000 panellists
  - main study: 2016-2019 +3200 panellists
- 2 full-time staff members dedicated to support and follow-up respondents
- panellists unconditionally equipped with a 4G-enabled touchscreen tablet



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# a software infrastructure backing a mobile fleet

A mobile fleet:

- one single device model at a time
- managed in-house from stock management to troubleshooting

Incrementally built software suite, including :

- sample management interfacing with
- survey platform
- fleet management
- monitoring dashboard
- native mobile application



Self-hosted infrastructure

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# a survey platform and a mobile application

early choice of a survey platform: [Blaise©](#)

**assets:** complete set of social sciences survey methods

**shortcomings:** basic web rendering, not mobile-friendly



**Best of two worlds:** a mobile app to enhance survey rendering while leveraging the proficient survey backend for development



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## challenge #0 getting the timing right

- **Synchronise** project planning and manufacturer's schedule.
- Ensure hardware **quality** guarantees a study-long **lifespan**.
- Anticipate losses and maintain model homogeneity by ordering **spare stock**.

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## challenge #1 offering a durable incentive

attractive device + mobile subscription = **timeproof incentive**

- at **recruitment** time: appealing device
- to control **attrition**: data subscription is a stable incentive, whereas device attractiveness may quickly drop in a fast evolving market

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## challenge #2 choosing a device model

<b>pilot study</b> (Samsung GTP3100)	<b>main study</b> (Archos 80b Helium)
good hardware quality	limited hardware quality
<b>no technical support</b> from constructor	support from constructor's R&D enabled customisations simplifying management

The choice of a model affects **device management capabilities**.



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# challenge #3 managing a mobile fleet

## hardware inventory

real-time fleet **inventory**

## software update control

ELIPSS application and software dependencies must always be installed and match a specific version

## remote control

remote **support** demands a tool to take remote control of devices

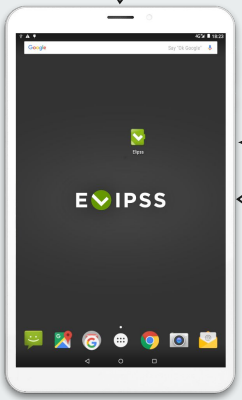
```
W/ARUM ( 4040): Got ARUM ALARM I
W/ARUM ( 4040): Start the download of apks
W/ARUM ( 4040): Already updated recently
W/ARUM ( 4040): Creating com.archos.arum.ImplicitApkRefresh
W/ARUM ( 4040): Start Implicit APK Refresh
W/ARUM ( 4040): Creating com.archos.arum.CheckForApkUpdate
W/ARUM ( 4040): Done APK check
W/ARUM ( 4040): checking if there is a new apk version
W/ARUM ( 4040): <xml>
W/ARUM ( 4040): <app url="https://elipss.fr/apk-updater/apks/Elipss-5.1.1.apk" version="21" name="fr.sciencepo.odsp.elipss.prod"/>
W/ARUM ( 4040): <app url="https://elipss.fr/apk-updater/apks/webview67.apk" version="339608700" name="com.google.android.webview"/>
W/ARUM ( 4040): </xml>
W/ARUM ( 4040): installed app has version code: 21
W/ARUM ( 4040): to-be-downloaded app has version code: 21
W/ARUM ( 4040): apk fr.sciencepo.odsp.elipss.prod exists (no need to DL)
W/ARUM ( 4040): installed app has version code: 339608700
W/ARUM ( 4040): to-be-downloaded app has version code: 339608700
W/ARUM ( 4040): apk com.google.android.webview exists (no need to DL)
W/ARUM ( 4040): Custom Apks updates available
W/ARUM ( 4040): No APK to update
W/ARUM ( 4040): Done checking if there is a new version of custom apks
```

2. on boot and recurring requirements checking

ELIPSS mandatory applications requirements list (online <XML>)

3. application download (if missing or out of date)

ELIPSS application repository



1. production (or pre-production) firmware installation

4. hardware and software inventory data pushed by application

GENERAL GROUPS TICKETS FLEET MANAGER RELANCES EDITION MESSAGES BOARD

Geneviève Michaud

Pas de message non-lu.

Rechercher un panéliste

Name  
Chercher par nom...

Prénom  
Chercher par prénom...

Identifiant  
Chercher par identifiant...

Email  
Chercher par email...

IMEI : 354438070000000 - IMEI2 : 354438070000000

Status Utilisable

Line number 077777777

last network WIFI (11/03/2019 15:07)

Android version 5.1

ELIPSS APP

version : 5.1.1-prod

real-time inventory information available for support staff

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## challenge #4 designing a mobile app

a minimal app to serve the needs of research

- staff-editable welcome message
- native pop-up messages
- offline features
  - FAQ and staff contact
- online features
  - change password and edit profile information
  - available survey(s)
  - closed surveys with global statistics



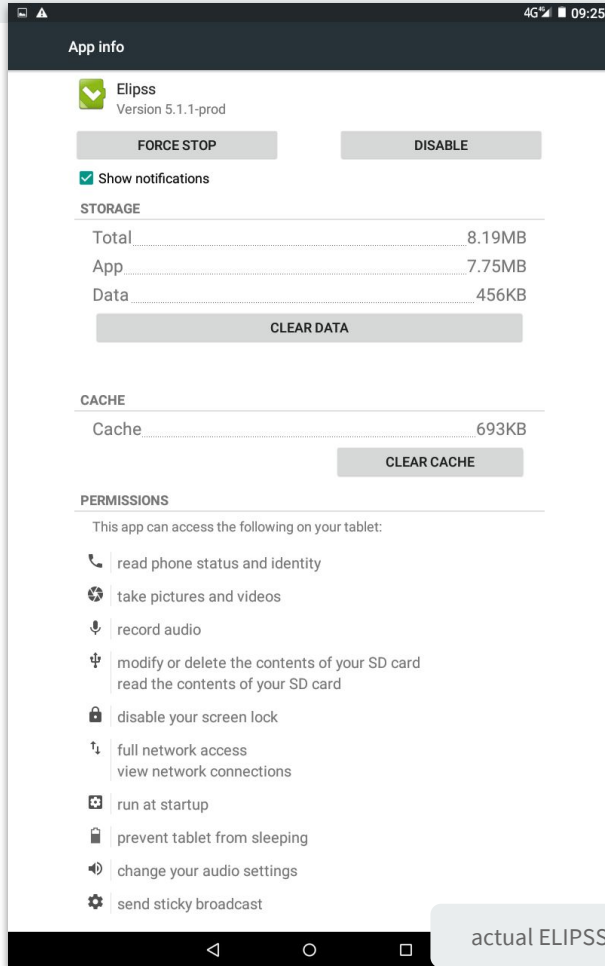
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# collecting paradata frugally

Developing a custom Android application allows **passive and comprehensive** paradata collection.

But without prior panellist consent, paradata collection must be kept:

- frugal
- device-management oriented



actual ELIPSS app permissions

# permissions

Permissions requested by ELIPSS application are a combination that must allow for:

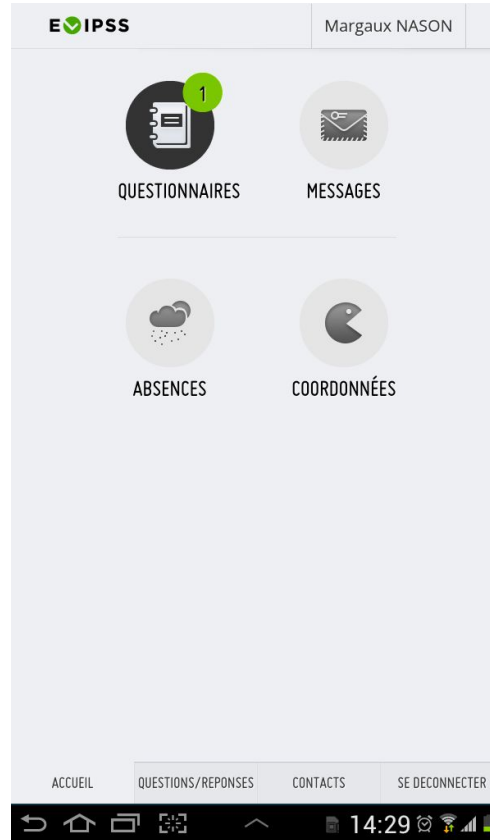
- limited paradata collection
- survey data collection

Permission Group	Permissions
CALENDAR	<ul style="list-style-type: none"><li>• READ_CALENDAR</li><li>• WRITE_CALENDAR</li></ul>
CALL_LOG	<ul style="list-style-type: none"><li>• READ_CALL_LOG</li><li>• WRITE_CALL_LOG</li><li>• PROCESS_OUTGOING_CALLS</li></ul>
CAMERA	<ul style="list-style-type: none"><li>• CAMERA</li></ul>
CONTACTS	<ul style="list-style-type: none"><li>• READ_CONTACTS</li><li>• WRITE_CONTACTS</li><li>• GET_ACCOUNTS</li></ul>
LOCATION	<ul style="list-style-type: none"><li>• ACCESS_FINE_LOCATION</li><li>• ACCESS_COARSE_LOCATION</li></ul>
MICROPHONE	<ul style="list-style-type: none"><li>• RECORD_AUDIO</li></ul>
PHONE	<ul style="list-style-type: none"><li>• READ_PHONE_STATE</li><li>• READ_PHONE_NUMBERS</li><li>• CALL_PHONE</li><li>• ANSWER_PHONE_CALLS</li><li>• ADD_VOICEMAIL</li><li>• USE_SIP</li></ul>
SENSORS	<ul style="list-style-type: none"><li>• BODY_SENSORS</li></ul>
SMS	<ul style="list-style-type: none"><li>• SEND_SMS</li><li>• RECEIVE_SMS</li><li>• READ_SMS</li><li>• RECEIVE_WAP_PUSH</li><li>• RECEIVE_MMS</li></ul>
STORAGE	<ul style="list-style-type: none"><li>• READ_EXTERNAL_STORAGE</li><li>• WRITE_EXTERNAL_STORAGE</li></ul>

"dangerous android permissions"

# user interface

Designing a straightforward,  
accessible interface



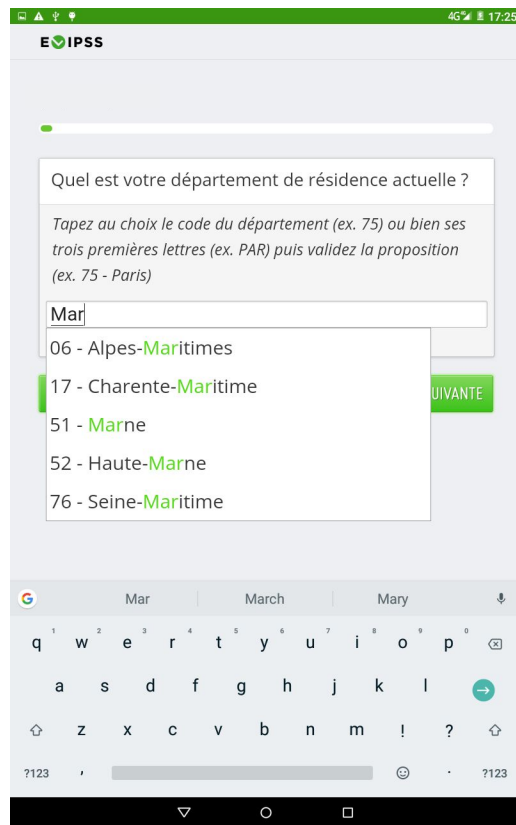
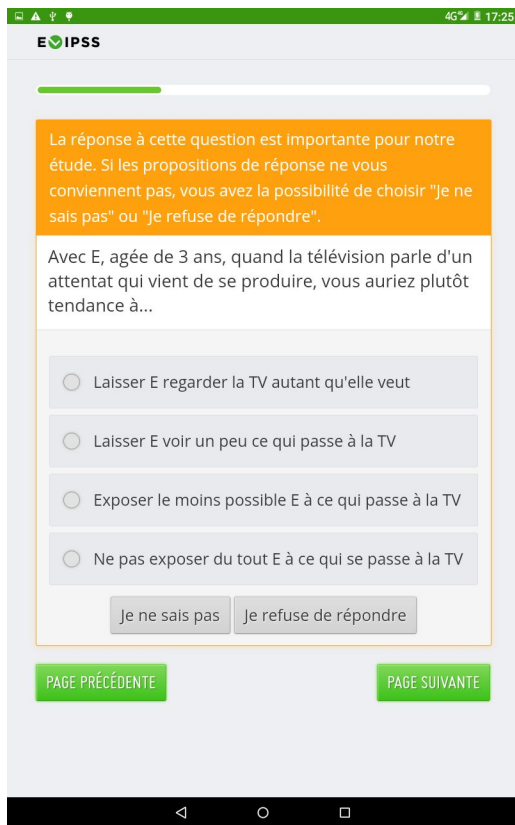
same but different: pilot study (7") and main study (8") application homepage

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## **challenge #5 developing for interactive surveys**

Over time, growing library of survey questions interactions.

- fine-tuning non response options
- auto-complete, ordered items list
- experimenting with rich interactions and multimedia content (video, maps)
- use of device sensors (voice recording, camera)





4G 17:25

**EIPSS**

Il s'agit d'un court extrait du journal télévisé du lendemain de l'attentat du 14 juillet 2016 à Nice.

Merci d'appuyer sur le bouton central pour démarrer la vidéo ci-dessous.  
Une fois la lecture de la vidéo terminée, merci de passer à la page suivante.



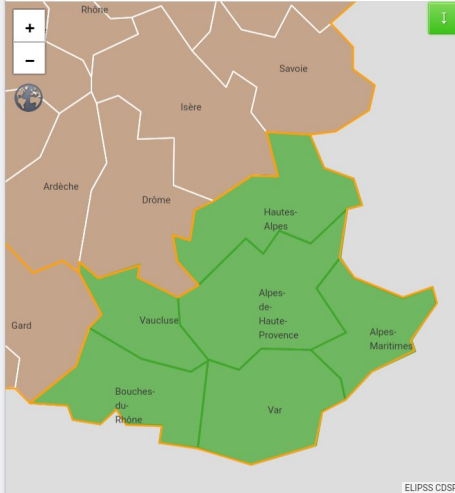
0:00 / 0:52

Navigation icons: back, home, recent apps

4G 17:25

**EIPSS**

sortir / entrer dans votre région ?  
Sélectionnez ou désélectionnez-le(s) en appuyant dessus.



ELIPSS CDSP

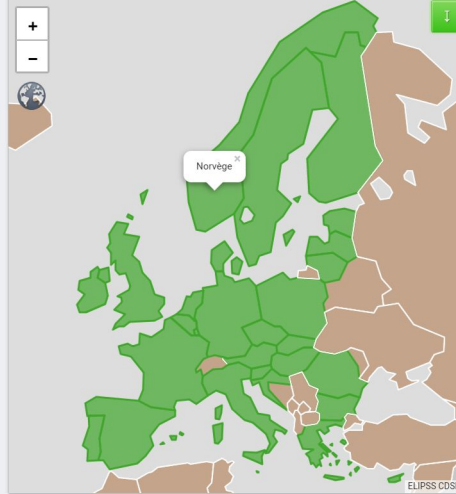
PAGE PRÉCÉDENTE PAGE SUIVANTE

Navigation icons: back, home, recent apps

4G 17:25

**EIPSS**

Quel(s) pays souhaiteriez-vous voir sortir de l'UE / entrer dans l'UE ?  
Sélectionnez ou désélectionnez-le(s) en appuyant dessus.



ELIPSS CDSP

PAGE PRÉCÉDENTE PAGE SUIVANTE

Navigation icons: back, home, recent apps



**feedback**

# thank you!

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SciencesPo-CDSP IT team throughout the ages:

Adam Schaal, Daniele Guido, Adrien Ferreira, Alexandre Chevallier, Raphaël Paoloni, Anthony Jacques,

[Jérémy Richard](#), [Romain Mougin](#), [Baptiste Rouxel](#), [Quentin Agren](#), [Simon Dellac](#)



## Sample & Survey Management system Factsheet



**SciencesPo**  
CENTRE DE DONNÉES SOCIO-POLITIQUES

### Differentiated samples and groups

- Distinction between pilot sample and final sample
- Response status groups allowing targeted outreach
- Faceted search engine (by sub-sample, group, panelist name, email or phone number)

### Panelist accounts

- Allows questionnaire access, communication with help-desk, profile updates and password recovery
- Accessed through responsive web application or native mobile application

### Privacy compliance

- Distinct sets of identifiers for survey data and panel management
- Secure network protocols



### Fine-grained user privileges

- Granted through user management back office
- **Panelists** can access and update their personal data
- **Survey managers** can handle survey enrollment and retrieve response data for post-production.
- **Panel managers** (help desk and follow-up) can view panelist profiles and device information, response statuses and aggregate statistics.
- **Scientific project managers** have access to response rates, attrition trends and other global indicators
- **Recruitment team** can perform batch imports of panelist data through file upload

### Rich para-data recording

- Question-level time tracking
- Interruptions and context switching (ELIPSS Android app)
- Recording of *ad hoc* events for rich multimedia questions (video controls, engagement with interactive maps...)

### Multi-channel communication

- Email
- SMS
- In-app messages
- Native mobile notifications (ELIPSS Android app)
- Direct follow-up phone calls, made in a collaborative workflow
- Traditional mail (integrated through national postal service API)

### Web technologies

- Languages : Python, JavaScript
- Web framework : Django
- Libraries: Tornado, Bokeh, Pandas

### Mobile technologies

- ELIPSS Android application (available on ELIPSS Android repository).
- Mobile fleet management service integration (MDM API)

### Development team contact :

[itcdsp-scpolist@sciencespo.fr](mailto:itcdsp-scpolist@sciencespo.fr)



### Survey platform integration

- Blaise™ software handles survey engineering, basic web rendering of questionnaires and answer recording.
- Survey management platform handles user authentication, survey publication and questionnaire access.
- Seamless integration through standard web protocols.

### Tailor-made question enhancement

- Leverage web technologies to enhance answering experience
- Allow questions with rich interactions, going beyond ink and paper transposition

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# pilot study and main study equipment: comparison

	Samsung GTP3100	Archos 80b Helium
Size	7.0 inches, (~58.2% screen-to-body ratio)	8.0 inches, (~72.46 % screen-to-body ratio)
Resolution	600 x 1024 pixels, (~170 ppi density)	768 x 1024 pixels, (~160 ppi density)



**Samsung GALAXY Tab 2 (7.0)**  
193.7 x 122.4 x 10.5 mm | 344 g



**ARCHOS 80b Helium 4G**  
210 x 122 x 9.3 mm | 320 g