Smart Survey Implementation Informational Meeting Q1 2024

Friday, 22 March 2024, 10:30 – 12:00

Agenda

- Welcome and agenda
- Methodology results review stage and outlook (Peter)
- Demo of the receipt scanning service pipeline (Joeri)
- Process building blocks (Marc)
- Next informational meeting and closure

Q&A after each presentation; please put your questions in the chat

WP 2: Methodology – questions for SSI

1. How can we successfully recruit people for Smart Surveys
2. What should be the role of machine learning?

- When is the respondent needed, when can model used without help?
- How and when should training datasets be updated or improved?

3. How should Smart sureys work for respondents?

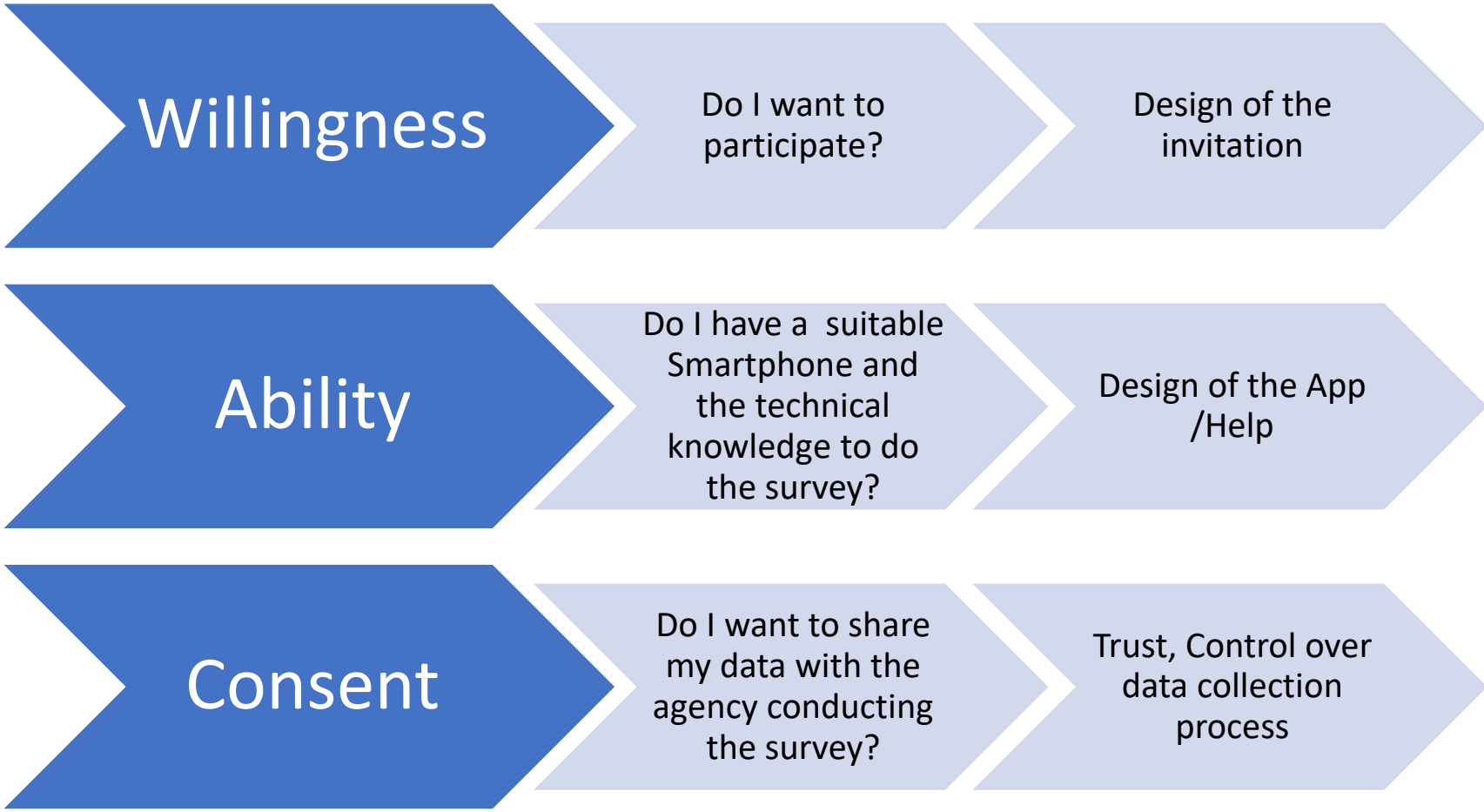
- User interaction/ User experience

4. How should we combine smart surveys with traditional surveys?

- Timeseries
- Mixed-mode setting

M6– what do we know? 1.Recruitment

Participation rates in Smart Surveys are generally lower than in other survey modes.



M6– what do we know? 1.Recruitment

- Collaboration with universities as a (co-) **sponsor** of the study -> higher trust
- An unconditional small monetary **incentive**
  - Conditional as alternative
  - How high?
- The **length of data collection** -> max 2 weeks.
- Respondents should have **control over the data collection process** -> e.g. pause GPS
- **Transparent information about the data collection process** in invitation letter
- An **app-based approach** is best for SSI (e.g. use reminders).
  - **progressive web app** could help reach members of the general population who are not willing to or able to download apps.
- Simplify the process of installing and downloading the app
  - To attract people with lower literacy skills
- **Privacy concerns** are a major issue
  - Part of SSI perceptions survey (completed in March 2024)

M6– what do we know? 2. Machine learning

Examples – Lessons learned from studies on geotracking and transport modes prediction

To understand time use better

From travel surveys - measurement errors (outlier, noise, missing)

(McCool et al., 2021)	Pre-processing of the raw data for treating measurement errors (outlier, noise) is an important step for the accuracy of ML models. Methods to filter likely measurement errors in GPS data include discarding single points with a too wide or omitting data points that would lead to an unrealistic high speed. Further pre-processing in the form of smoothing the data to remove random noise
(McCool et al., 2021)	Identification of the issues underlying missingness and measurement is an important step in assessing data quality
(McCool, Schouten & Lugtig, 2023)	Understanding the composition of the missing data is integral to making the correct decisions about its content. The composition can involve the length of the component gaps, the overall sparsity of the data, or the time at which the gaps begin or end
(McCool, Schouten & Lugtig, 2023)	Aggregation of Individual mobility trajectories data (difficult to measure and often with missing data for long periods) without accounting for the missingness leads to erroneous results, underestimating travel behavior

On stops and functional locations

(McCool, Lugtig & Schouten, 2018)	Stop detection based on time-location sensor data is relatively robust. An improvement of stop detection will only be possible through linkage of geo-locations and/or employment of motion sensors.

M6– what do we know? 3. UI/UX

- Smart features alleviate complexity of study and potentially further increase reliability and accuracy of the data.
- Smart features change the human computer interaction in smart surveys
- Yet the true test of smart features lies in the ability to use them for the intended purposes (i.e. usability)

- **Usability** is “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (Weichbroth, 2020)

M6– what do we know? 3. UI/UX

- Usability relates to the three pillars of end-to-end solution for Trusted Smart Surveys

Pillars	1. Involvement and engagement from citizens	2. Acquisition, processing and combining data collected from smart devices	3. Contribution to trustworthiness and guarantee of strong privacy safeguards
Key usability attributes	- Engagement - Accessibility - Clear instructions - Time efficient - Error handling	- Intuitive UI - Clear task flow and guidance - Error prevention - (In app) training - (In app) feedback	- Trust and credibility - Security and privacy - Transparent communication - Data collection efficiency - User control of data

- Think Aloud: usability testing method in which "allows 'observing' what a user is thinking because a user verbally articulates the struggles or experienced difficulties when doing a task (Olmsted-Hawala, Murphy, Hawala, & Ashenfelter, 2010).

M6– what do we know? 4. mode effects

1. Few studies where smart- and non-smart surveys have been combined
2. A lot we can learn from mixed-mode surveys
   - We ideally like to get small/no measurement differences
   - And get different respondents in different modes

3. We do smart surveys because we want to improve measurement
   - Measurement differences may be larger

Two methods that can be used to integrate data

- Mixed mode methods (One dataset, some calibration

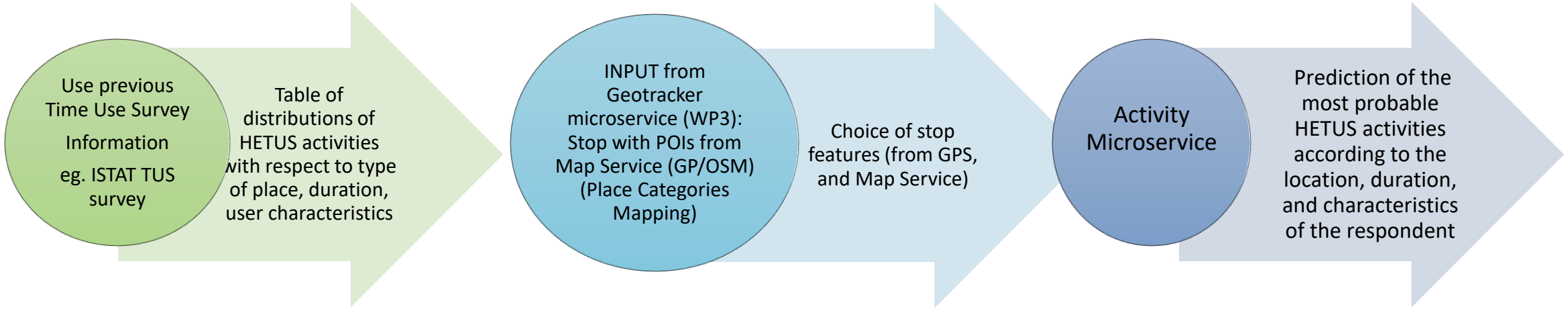
- multi-source statistics

What is next: fill in knowledge gaps

- 2.1 Recruitment – Field experiments using recruitment protocols
- 2.2 Machine learning– Training data using receipt pictures, and travel data collected via GPS
- 2.3 UI/Ux – different rounds of small scale tests
  - Focus on household budget first
  - split into different tasks: installing app, changing settings, making picture, retaking, editing, etc.
- 2.4 Mode effects – Field experiments using different levels of smart surveys

What is next: 2.2
machine learning– travel data collected via GPS

Scheme of the algorithm to infer TUS activities using external information and previous Time Use survey data
(Activities Prediction TUS based)



ISSUES under study

1. GPS data quality depending on the smartphone, mapping it in European countries.

2. Quality of maps in different countries

3. Is it possible to use Google Places? Are GDPR issues stringent and prevent its use? Could the microservice use both OSM and Google?

Large experiments - setup

Country-specific design element	BE	DE	FR	IT	NL	NO
2.1: incentives	No incentive vs. 15 euro conditional					
2.1: Access app						Download from SSB home vs. playstore
2.1 Interviewers as help				Yes, no experiment	Experiment: more or less involvement	CATI help vs. no help
2.1: Paper as a follow-up mode to boost responses	Paper not mentioned Vs. respondent can ask for paper Vs. paper included					
2.1: Communicating smartness of survey		HBS Basic App Full (microservice) app vs. basic smart				
2.1: Adaptive design					Use of interviewers to convert 'difficult' respondent.	
2.4: Mode selection	Paper offered as a secondary mode		Paper vs. smart app:	basic TUS vs. smart TUS, with microservice		
2.4: Mode measurement effects			Test re-test effects doing paper and app	Matching respondents to estimate mode measurement		