


Smart Survey Implementation

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Work package 1

Coordination and integration

Deliverable 1.1: Review stage report

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Part 1: Overview of the SSI Review stage, smart survey terminology and the SSI perception survey

1. Introduction

In Part 1 of this first deliverable for WP1 the Review stage is summarized and a draft is presented of a more general framework for smart features, smart tasks and smart services/solutions.

SSI deliberately chose an organizational structure based on smart survey design levels, see Figure 1, over a structure based on applications of smart surveys. The main motivation is that it aims to learn how to develop, test, evaluate and implement smart services with the help of, but not limited to, topical and realistic case studies.

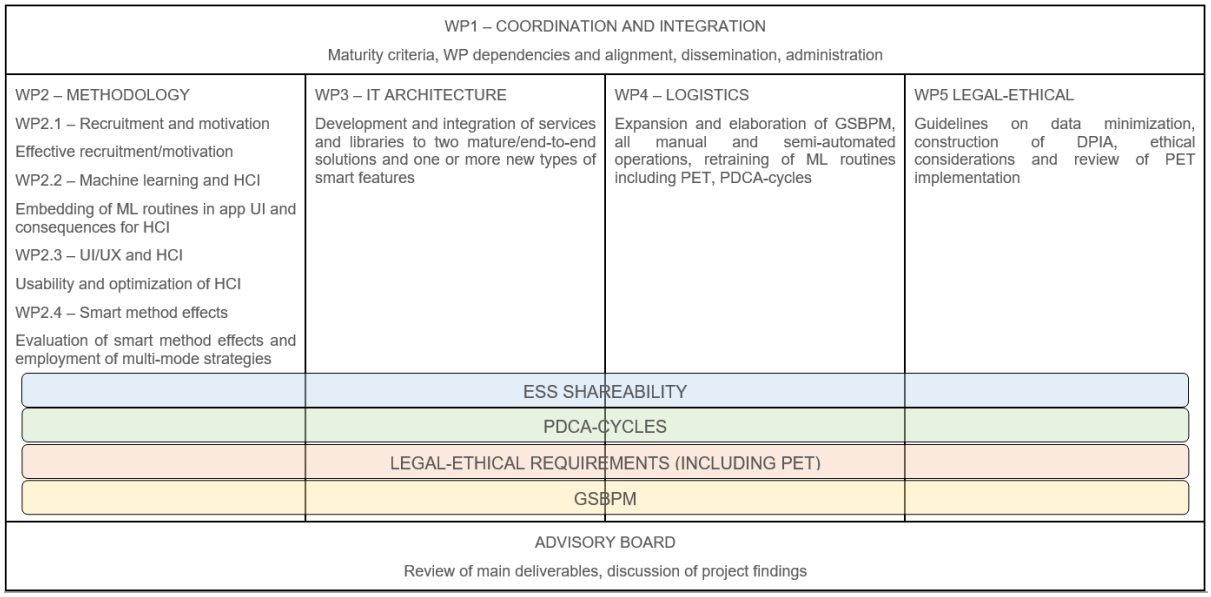

Figure 1: SSI organizational structure and dependencies

The design levels are Methodology (WP2), IT Architecture (i.e. development of microservices and integration) (WP3), Logistics (WP4) and Legal-ethical (WP5) of smart surveys. The obvious challenge of a design-level viewpoint relative to an application-viewpoint is that dependencies and interactions may be underestimated or overlooked. WP1 is, therefore, the linking pin between the various design levels to make sure these get sufficient attention. Important starting points are an overarching terminology and a taxonomy of smart features. This is the topic of Section 2, but is also elaborated in more detail in the Logistics design-level (WP4) which takes on a business process analysis.

The various WP's have delivered Review stage reports (D2.1, D3.1, D4.1 and D5.1). In Section 4, a short summary is given focussing on the relations between the WP's. A crucial product of the Review stage is a proposal for a maturity framework and a set of maturity criteria. These are addressed by WP4 in D4.1 and are summarized here in Section 5.

In Section 6, an overview is presented of the status of the four smart solutions at the start of SSI. These concern the MOTUS platform employed at BE, DE and IT, the @HBS solution applied at FR and NL, the SSB solution applied at NO for HBS and the INSEE solution applied at FR for TUS.

Another starting point for all WP's is the public perception on surveys that employ smart features, in particular in the ESS cross-country perspective. Within WP1 a smart perceptions survey (New Ways of Measuring Survey, NWMS) is conducted between September and December 2023 in IT, NL and SI. The results of the survey are input to WP2 and WP5. The state of affairs and the analysis plan of NWMS are presented in Section 7.

2. Smart features, tasks, services and solutions

Within project Smart Survey Implementation (SSI) three smart services are developed, implemented, tested and evaluated. But what are smart services, how do they relate to smart features and what constitutes a smart survey? To date, the term 'smart surveys' still is relatively new and vaguely defined. To aid mutual understanding, to facilitate exchange between different disciplines and design levels, and to expand to smart applications not yet researched within SSI, it is necessary to introduce clear terminology. This section proposes terminology, introduces a taxonomy of smart features and derives properties of smart tasks.

Definitions

First a few definitions are made:

Smart feature: A smart feature is a data collection action through a smart device from one of the following options:

- In-device storage and/or computing
- Employment of in device-sensors
- Linkage to external sensor systems
- Linkage to public online data
- Data donation through the respondent
- Data donation through the statistical institute, i.e. requiring identification keys to link data already in possession

Smart data: Smart data are data collected through one or more smart features

Smart task: A smart task is a processing[1] action applied to smart data, potentially mixed with other forms of data.

Smart service (solution): A smart service (solution) is a combined and implemented series of smart tasks (i.e. with a single input and a single output).

Smart survey: A smart survey employs one or more smart features

Smart features

Smart features are very diverse in nature and, consequently, may have very different impact on all design levels. Perhaps the most prominent impact is on the legal design level where risk assessments and data protection impact assessments (DPIA) could be made for each instance and country-replication of a smart survey. Without a taxonomy, there is an imminent risk of a plethora of documentation, assessments and guidelines. SSI attempts to provide structure so that these can be made generic, shareable and easy-expandable. A taxonomy is an imperative stepping stone to this pursuit.

[1] Here, 'processing' does not refer to the GSBPM 'Process' phase, but it does correspond to actions that in 'non-smart' surveys would take place in the 'Process' phase.

The goal of the taxonomy is to identify classes of smart features that are homogeneous in all design-levels, i.e. methodology (push-to-app strategies, AI-ML, UI-UX), logistics (monitoring and analysis, active/online learning, interviewer training), IT (frontend and backend requirements) and legal (risks, counter measures).

A draft has been prepared for review and further elaboration that includes classification based on the following six questions:

1. Do the data exist independent of a survey? YES, NO
2. What type of measurement is performed? REGULAR Q&A, MOBILE DEVICE SENSOR, EXTERNAL SENSOR SYSTEM
3. Where does the feature store the data? PUBLIC DOMAIN, IN-DEVICE, PRIVATE CLOUD/ONLINE
4. Is any handling/processing performed in-device? YES, NO
5. IF Q2 ≠ REGULAR Q&A: What type of sensor is employed? LIST OF SENSOR TYPES
6. IF Q4 = YES: Is external data sent to the device to perform the handling/processing? YES, NO

The first four questions lead to 36 categories and a further 18 are added by question 6. Question 5 has not yet been elaborated. Some of the categories are not smart and some are only hypothetical in daily life. The feasible, smart categories are discussed in D4.1 of WP4.

Smart tasks

The core of smart services consists of smart tasks. A smart task performs a processing action on smart data through a specified input and a specified output. Input and output specifications comprise of:

1. the description and definitions of the smart data content
2. the metadata of the smart data accuracy, split into representation (full and/or partial missing) and measurement (systematic error and random error)

Being processing steps (and, thus, can be and will be mapped to GSBPM during SSI), smart tasks are one of the following:

- Cleaning: Smart data noise and outliers are removed
- Enriching: External data are added
- Editing: Smart data are confronted with edit/plausibility rules and edited if needed
- Imputation: Missing smart data are imputed
- Prediction: Smart data are classified into a specified categorization
- Transformation[2]: Smart data are aggregated, combined and/or fused

The following features can be given to a smart task:

- TYPE: Cleaning, enriching, editing, imputation, prediction, transformation

[2] Includes also derivations of new variables based on smart data, possibly mixed with other forms of data, and interpretation through text mining and/or computer vision.

- TIMING: In-survey, post-survey
- SOURCES: No additional sources, in-house admin data, public online data, in-house admin data and public data
- ACTORS: Fully automated, semi-automated with respondents, semi-automated with staff, semi-automated with respondents and staff
- UI (User Interface): No respondent interaction needed, in-platform respondent interaction, in-service respondent interaction
- RULES: Set of parameters that are input to the processing task
- QUALITY STANDARDS: Lower thresholds to quality of smart data
- TOOLS: Stand-alone, dependencies on existing software/tools
- LEARNING: Output contains no data for learning, output contains data to learn per respondent, output contains data to learn across individuals, output contains data to learn per respondent and across respondents

In SSI, the focus is on smart tasks that have an in-survey timing. There are two motives for doing a task during data collection: respondent interaction to improve quality and feedback of personalized statistics to improve engagement. However, an NSI may decide to implement an in-survey task as post-survey, e.g. abstain from feedback or interaction. This can only be done when the type of timing is made configurable.

Sources are additional data about the respondent or groups of respondents and are used as features in methods to clean, edit, impute, predict or transform. They come in two forms. The first is through data already in possession of the institute (NB: This is not the same as smart feature Data donation through the statistical institute as this feature requires identification keys/info). In SSI context, this will often be administrative data. The other option is linkage of public online data (NB: This resembles smart feature Linkage of public online data, but these data may also need pre-processing and editing).

Actors conform to human-in-the-loop which can be respondents themselves and/or data collection staff. When a human-in-the-loop component is included, then the UI must be set at either in-platform (i.e. outside the service itself) or in-service (i.e. the service has a UI itself).

Rules depend on the type of task. They are input parameters to methods employed within the task.

Standards are lower thresholds to smart data quality. Below these thresholds the task is/cannot be performed. They imply that a preceding smart task is re-initiated or that respondent context or supplements are imperative.

Tools are also dependent on the type of task and are parts of the methods that are external. External means that external libraries/packages are included described and validated in the literature.

Learning refers to the decision to use output data of the smart task to adapt to individuals and/or to groups of respondents. The form depends again on the type of task. If true, then

the smart task output (and thus also of the services including the smart task) need to specify what part of data needs to be separated for learning purposes.

Case studies

The smart tasks are elaborated for the receipt processing and location tracking case studies.

Location tracking may consist of the following task:

1. Cleaning location data: Outliers are detected and removed and sensor noise is smoothed (e.g. through a median filter)
2. Imputation of small gaps: Short gaps in location data are imputed (e.g. through segmentation)
3. Enriching with POI (points-of-interest) data: Open Streetmaps and/or other forms of point-of-interest data are added
4. Imputation of long gaps: Long gaps in location data are imputed, possibly with help of respondents and/or diary days of the same and other respondents
5. Stop-track derivation: Location data are transformed into stops and tracks
6. Travel mode prediction/classification: Travel modes in tracks are predicted, possibly with help of respondents
7. Stop purpose prediction/classification: Stop purposes are mapped on classifications, possibly with help of respondents

Receipt processing may follow these tasks:

1. A photo or uploaded file is evaluated and pre-processed
2. Relevant text is extracted from the file, possibly with help of the respondent
3. Text is interpreted and transformed to products and prices, possibly with help of the respondent
4. Pairs of products and prices may be compared to edit rules and adapted if needed
5. Interpreted text is classified to formal categories, possibly with help of the respondent

To fix thoughts, let us try two of the tasks: cleaning of location data and classification of product texts.

Location data cleaning:

- Input
  - Content: a series of latitude-longitude-bearing-time stamps including possible ranges
  - Accuracy: a series of sensor accuracy-battery level
- Output
  - Content: a series of latitude-longitude-bearing-time stamps including flags for points adjusted
  - Accuracy: a series of sensor accuracy-battery levels
- Type: Cleaning
- Timing: During the survey

- Sources: No other sources
- Actors: Fully automated
- UI: No interaction needed
- Rules: Outlier detection based on a speed parameter and median filters with a specified window length
- Standards: Lower threshold to location data density, i.e. number of location points per time unit
- Tools: No specific tools
- Learning: No learning

Product classification:

- Input
    - Content: a matrix of texts with rows representing single products and columns representing product text and product prices
    - Accuracy: per entry of the matrix an OCR (Optical Character Recognition) score with value zero representing missing text or price
- Output
    - Content: a vector of COICOP (Classification of Individual Consumption by Purpose) categories
    - Accuracy: a matrix with rows representing receipt lines and columns representing classification propensities
- Type: Prediction
- Timing: During the survey
- Sources: Assumes pre-trained model, so no additional data
- Actors: Semi-automated with both respondent and staff
- UI: In-service or in-platform interaction
- Rules: Pre-trained ML model
- Standards: Lower threshold to proportion/number of entries in input with OCR score below a specified value
- Tools: ML model compressed
- Learning: Output data to learn per individual and across individuals

3. State of affairs current SSI smart solutions

In SSI three case studies are considered:

1. Adding and processing purchases reported through scans of paper tickets or uploads of e-tickets;
2. Providing a tentative timeline of stops and tracks in time use diaries through location tracking;
3. Adding details on energy usage by data donation of smart energy meter data;

The third case study is new and not (yet) embedded in any of the smart solutions. The other two case studies have been explored and are in part implemented in smart solutions by CBS, Hbits, INSEE and SSB. CBS has worked on receipt processing within the Household Budget survey app and geo-tracking in the Dutch Mobility Survey, Hbits on receipt processing and geo-tracking in the MOTUS app and SSB on receipt processing in the Norwegian HBS app. INSEE is developing both an HBS app and a HETUS app. The HBS app will include receipt processing. The HETUS app will not include geo-tracking.

The following questions were asked to contact persons:

General

- What kind of devices are expected/supported?
- Does the tool include both questionnaires and diaries?
- What is the respondent interaction philosophy (active-passive)?
- How are multiple languages handled?
- Who is developing the tool (internal/external/mix)?
- Who is maintaining the tool (internal/external/mix)?
- Does the tool have dependencies on external components?
- How is the tool embedded?
- What is the app strategy?

Services:

- To what extent have services already been implemented in the solution in terms of
    - UI
    - Backend
    - Machine learning processing
- What interaction is assumed with the respondent?
- Is processing of data (supposed to be) near real-time?
- What specifications would you set to output of services?
- Are there other smart features that (likely) interact with the services?

Answers to the questions are given per solution.

General

State of affairs CBS

- What kind of devices are expected/supported? The focus is on smartphones. Depending on the topic and tasks also tablets and laptops/desktop options are added. For HBS currently smartphones and tablets are supported. Multi-device options will be developed during SSI. For the mobility survey, only smartphone is supported. An online questionnaire is also available but does not allow for geo-tracking and assumes a single day of travel to be reported. When geo-tracking is embedded in time use surveys, then most likely the same strategy will be followed as for HBS with the distinction that tablet and desk/laptop options will not support geo-tracking;
- Does the tool include both questionnaires and diaries? The design strategy for now is to have an in-app introduction questionnaire and an in-app diary. Other specific questionnaires such as recurrent cost questionnaires in HBS are not included. These will be part of an online dashboard. It has yet to be decided whether they can also be accessed through the HBS app. For the mobility/time use survey there is just one general questionnaire that will be included.
- What is the respondent interaction philosophy (active-passive)? For reasons of respondent data control, respondent engagement, data quality improvement and updating of ML models, the paradigm is to actively involve respondents. Through experiments the breaking point is evaluated where respondent burden starts to outweigh data quality gains. For HBS respondents are involved in checking scan quality, cropping images and OCR and NLP results. While it is stimulated through the UI design, respondents can submit data without explicitly validating. Respondents are not asked to check classification into COICOP. Field tests have demonstrated all mentioned active features are profitable in terms of data quality and do not lead to extra drop-out. For geo-tracking, respondents can change almost all aspects of stop-track detection: change time stamps, add/delete stops, add/delete tracks. Currently it is investigated based on a recent field test what actions are profitable. Respondents are for now asked to provide transport modes and stop purposes. However, ML models have been and are being trained to predict. These may be provided in-app to further reduce burden;
- How are multiple languages handled? All country-specific texts are separated through CSV language files. This concerns a file for UI texts, a file for the intro questionnaire, a file with keywords for use of NLP of extracted receipt texts, a country-specific product list for manual data entry and for editing extracted texts from receipts, and a country-specific shop/store list. The app by default chooses English when the mobile device language is different from the main country language(s), but product and store lists are kept in the country language.
- Who is developing the tool (internal/external/mix)? Internal CBS.
- Who is maintaining the tool (internal/external/mix)? Internal CBS, but it has been discussed with ESTAT and other NSI's whether a consortium can be formed.
- Does the tool have dependencies on external components? The paradigm is to avoid dependencies as much as possible. For receipt processing standard functionality is used for photographing and for OCR. For geo-tracking, maps and points-of-interest

data are used to display stops and tracks, to search for addresses and to aid stop-track detection.

- How is the tool embedded? As it is now, the HBS app is a single app with a set of possible configurations such as reporting period length, intro questionnaire, editing options, personalized feedback. The backend is specific to the app as well. To date, the app backend is not linked directly to the data collection case management system. In 2024-2025 this link will be established.
- What is the app strategy? While some UI-UX design principles are shared across applications such as the intro questionnaires, the calendar screen and the settings screen, overall the strategy is to have one app per survey application. The main reason is the variety of smart features and the subsequent processing of smart data and respondent interactions. To aid simplicity of design, to allow for dedicated help options and tutorials and to have real-time interaction, apps are tailored.

State of affairs Hbits

- What kind of devices are expected/supported? MOTUS platform consists of several components of which the front-office with the mobile app and the web app is one component. The mobile app can be installed on a smart device, the web app runs in a browser. The mobile and web app have the same UI/UX. In principle only one mobile/web app is needed to run any different study as defined in the back-office of MOTUS. Through the CORE component of MOTUS every app running on every device has available the latest study design and is in sync with all research information given by the respondent. Via the MOTUS CORE also microservices can be connected, and so in principle every other device can be connected to MOTUS.
- Does the tool include both questionnaires and diaries? MOTUS takes into account all study components of a TUS or HBS, and so includes also questionnaires, communication, household grid, etc. Every component belongs to a so-called 'builder'. The entire flow of a study is designed in the research builder. In this research builder the study components, communications and the conditions are specified to go from one stage to another stage. MOTUS also includes e.g. events for e.g. Experience Sampling, or to interact with thresholds on sensor data.
- What is the respondent interaction philosophy (active-passive)? Hbits entails the tentative vs. committed strategy. Respondents can actively commit data, but the apps can also show tentative data coming from connected microservices. Respondents can edit/improve/add/delete this data in order to commit this tentative information. Only when the tentative data is committed the data is part of the research database (= GDPR).
- How are multiple languages handled? Via the back-office study content can be translated which the apps can show. Configurations are done in the back-office. System translations are done via xliff files. Respondents can change between languages without loss of data, and all content is shown in the selected language. The app always shows the last selected language on all applications and devices of the respondent.
- Who is developing the tool (internal/external/mix)? Hbits CV and Vrije Universiteit Brussel.

- Who is maintaining the tool (internal/external/mix)? Hbits CV and Vrije Universiteit Brussel.
- Does the tool have dependencies on external components? The CORE of MOTUS has no dependencies to other tools. External data are provided via microservices, like receipt scanning and geolocation.
- How is the tool embedded? The MOTUS app is part of the MOTUS platform. This platform has 6 components of which the front-office applications are one of them. MOTUS makes use of the container technology to make the platform available as an ESS platform. Every Docker container is a separate component of the MOTUS platform, with its software dependencies. How and where the containers are deployed is a responsibility of the accepting institution. It is advised to use Kubernetes to deploy the containers on ISO/IEC 27001 certified infrastructure. This setup brings natural security barriers and provides tools for scalability and high-availability as well.
- What is the app strategy? MOTUS handles the one app multifold study strategy. In principle one app can be used for several studies, both for TUS and HBS (or other statistical domains). It is possible to build different apps for the app stores from the same code base, and to change the branding and look and feel. This strategy has it merits in maintaining, updating and upgrading the tool. Besides a production app, MOTUS has the MOTUS ACPT app for internal use and a test MOTUS Discovery app for external testing. The MOTUS app is used for production.

State of affairs INSEE

HETUS app

- What kind of devices are expected/supported? Available on laptops/desktop, tablet, smartphone (responsive design). Focus is on smartphone but the initial feedback from the test shows that respondents find the smartphone screen too small to be comfortable with the diary and weekly schedule.
- Does the tool include both questionnaires and diaries? No questionnaire inside, only a diary and a working time schedule.
- What is the respondent interaction philosophy (active-passive)? No passive data collection to improve quality and help the respondent, the application detects missing or overlapping time slots: warning of the respondent feedback of the respondent when it has finished the diary. The interaction philosophy is different for the interviewer: the interviewer's role is more directed by the app: a quality score is calculated, which decides, when the diary is of poor quality, whether the interviewer has to return to the respondent's home or simply phone him.
- Who is developing the tool (internal/external/mix)? External development.
- Who is maintaining the tool (internal/external/mix)? But internal INSEE maintenance. The maintenance resources are very limited, and there are no specific means for SSI project, so it is not possible to connect a new smart microservice.
- Does the tool have dependencies on external components? Yes (SSO connection, and Lunatic, the library behind the tool of most of INSEE' surveys).

@HBS app

- What kind of devices are expected/supported? Available on iOS and Android smartphones.
- Does the tool include both questionnaires and diaries? We chose to use the app only for the diary (questionnaire in CAPI, and some CAWI).
- What is the respondent interaction philosophy (active-passive)? The respondent is active by giving input into the app: taking a photo or selecting a product in a list.
- Who is developing the tool (internal/external/mix)? Use of the open-source code of @HBS provided by CBS to rebuild the app with internal means.
- Who is maintaining the tool (internal/external/mix)? Internal CBS maintenance
- Does the tool have dependencies on external components? There might be some dependencies: we will add an OIDC-compatible authentication module

State of affairs SSB

- What kind of devices are expected/supported? The progressive web app (PWA) for the Household Budget Service 2022 that uses an in-app receipt scanning/OCR is the only smart survey SSB has. We have no concrete plans for others smart surveys. But note that we also have developed a similar PWA for TUS, but this app does not use sensor technology, hence we do not include it here. This HBS PWA supports laptops/tablets/smart phones. The respondents can use all devices, switch between them, or choose their preferred device, as they please. As such, it is a multi-device solution. For SSB, the smart phone is the respondents' preferred device. Presently there is no alternative data collection method to the PWA. Geo-tracking as support is not available or planned. Neither do we have any plans to use geo-tracking for the mobility survey or other surveys at SSB at this point.
- Does the tool include both questionnaires and diaries? Yes, questionnaires and diary are included. The data collection strategy is CATI recruitment with household mapping and in-app registrations by respondents of 1) running expenses in a diary module and 2) recurrent expenses and other large costs in a questionnaire module in-app. The TUS has CATI-recruitment as well, but all questionnaires (including confirming household uploaded from register) and the diary for time use in-app.
- What is the respondent interaction philosophy (active-passive)? The HBS app requires respondents' engagements. It is not passive. The respondents can choose between OCR and manual registration. Our strategy is to make participation as user-friendly as possible for the respondent to secure response rates and good data quality. To simplify the respondent task, we have reduced diary registration from two to one week; cut the number of questions asked in the survey; and we impute demographic data from register where possible. We do not require the respondents to crop or hide person identification on OCR, but we suggest they do for privacy reasons. Neither do we ask respondents to quality check or validate the OCR. They can edit/improve/add/delete data if they desire. When the respondent save a registration, SSB receives the data in our database. Processing of data is real-time. Specifications for output of OCR data is: Shop name, date & time, product item, quantity, value (NOK). For manual registration

respondents choose shop name and product item from automated product search lists which are two libraries built from names for shops and products names used by respondents during data collection. They can also enter product names that are not in the search list. We do not ask respondents to choose category or product classification. SSB does coding and classification in-house with help from machine learning. Respondents have to consent in-app to use of their data (this is a GDPR requirement) and confirm in-app completion of survey.

- How are multiple languages handled? Respondent can choose between “modern” and “old” Norwegian and English. Content is shown in the selected language. Respondents can change between languages without loss of data. The app shows the last selected language on all devices of the respondent.
- Who is developing the tool (internal/external/mix)? Internal SSB.
- Who is maintaining the tool (internal/external/mix)? Internal SSB maintenance.
- Does the tool have dependencies on external components? SSB tries to avoid dependencies as much as possible. SSB complies with Norwegian safety requirement for data storage, and the app has a Data Protection Impact Assessment (DPIA). The OCR reading is done by the US company Veryfi. The remote service runs in AWS in the DPIA zone (Ireland). Images are not stored in Veryfi's servers, but are deleted after loading. Image content is used only to train/improve AI/machine learning algorithms at Veryfi, and only for our needs. It is cost and resource efficient for SSB. Data storage at SSB in general is in Finland provided by Google Cloud.
- How is the tool embedded? The app is part of a back-office system with different microservices for sample selections, case administration, respondent log on, data processing, and COICOP coding.
- What is the app strategy? The strategy is to lend from the development done for HBS to other surveys. As mentioned, has the PWA already been adapted for TUS. Microservices like logon can be adapted for other surveys. The login solution is now being modified and adapted for secure login to our Blaise questionnaires. SSB's plan is open source for the PWA, for other countries to use.

Receipt processing

State of affairs receipt processing CBS:

- To what extent have services already been implemented in the solution in terms of
  - UI: Receipt scanning including various interaction options are implemented and can be enabled/disabled per respondent through configuration settings.
  - Backend: Receipt processing has been developed but for now actual processing in-house is initiated from the receipt processing server. So it is manually checked whether new receipts have been submitted and these can be handled. The HBS backend itself does not give a signal that processing is required. This will likely be changed when moving forward to production.
  - Machine learning processing: In-app OCR and NLP are included to interact with respondents but not classification is done in-app. In-house both text extraction

and classification can be done. See @HBS(2) deliverables for details on train data and on ML routines.

- What interaction is assumed with the respondent? Based on field tests with randomizations across different protocols, it is concluded that in-app image cropping and in-app editing of OCR-NLP results by respondents is profitable. These two features will be kept.
- Is processing of data (supposed to be) near real-time? For OCR-NL real-time, for classification it has yet to be decided whether results are fed back to the in-app statistics.
- What specifications would you set to output of services? @HBS assumes information per product on a receipt, namely product text, product price, discount if applicable and rebate if applicable. The type of purchase, yes/no abroad and yes/no online are asked and not deduced. The shop name is asked as well for now. This may aid NL but perhaps ultimately it can be discarded. No information is assumed on metrics (kilograms, liters, etc). Information on receipt processing performance from the new service (OCR performance scores, classification probabilities) is imperative.
- Are there other smart features that (likely) interact with the services? The @HBS app also has product lists and a product search strategy. These are used for manual data entry, but respondent can also use the lists and search when editing scanned receipt texts.

State of affairs receipt processing Hbits:

- To what extent have services already been implemented in the solution in terms of:
    - UI: The concept of tentative and committed data where the ticket is shown and every purchase of the ticket can be edited is used; configurations are done on the study level via the back-office so no specific apps per set of configurations is needed.
    - Backend: The receipt scanning is part of a microservice, via an API that information can be requested by the CORE of MOTUS. Information can go both ways.
    - Machine learning processing: microservices makes use AI/ML procedures for OCR processes. Information between the CORE of MOTUS and the microservices can go both ways. Labelling to a COICOP can be done via another microservice as COICOP lists are different from country to country, from study to study. The respondent does not notice this setup in interaction with the microservice.
- What interaction is assumed with the respondent? Respondent takes a picture and can interact with the image before sending to the microservice. After the microservice has processed the image and a COICOP code is added the respondent can edit/improve/add/delete the information.
- Is processing of data (supposed to be) near real-time? Yes for extracting text from ticket and classification to COICOP codes, to presenting this information in the app.
- What specifications would you set to output of services? MOTUS can handle any (parts of) information received from the microservices (OCR + classification). This is

information on the level of the ticket (shop, country, online, ticket reduction, payment method) and on the level of the product/service (description + COICOP code, quantity, unit, unit reduction). Quality information (on OCR processing, COICOP, and other metadata) can be used to provide warnings or to signal issues.

- Are there other smart features that (likely) interact with the services? Any information that can be captured or is hold by a microservice, like e.g. information from product databases or QR codes. This can be proprietary or open source. All of this information can be used in interaction with the microservice and the CORE.

State of affairs receipt processing INSEE:

- To what extent have services already been implemented in the solution in terms of
  - UI : same as @HBS.
  - Backend : no specific backend for the moment.
  - Machine learning processing : INSEE developed ML models to perform classification from product labels.
- What interaction is assumed with the respondent? Objective to reduce the respondent burden by limiting his/her inputs to the quality check of his photo (OCR feasible, maybe check of the total amount of the ticket). We will not ask to validate the classification of the expenses.
- Is processing of data (supposed to be) near real-time? No specific need to have real-time classification in our point of view, except for a feedback to the user on the photo quality of the receipt.
- What specifications would you set to output of services? Services should be modular, so they can interact with other tools developed in-house.
- Are there other smart features that (likely) interact with the services? No.

State of affairs receipt processing SSB:

- To what extent have services already been implemented in the solution in terms of
  - The HBS in Norway has been in field all of 2022. We have about 30 % response rate (net response from about 3 000 households). Receipt scanning/OCR is optional. 80 % choose OCR for the grocery category, but for other categories manual registration is higher. For the receipt scanning OCR (and manual) the reading can be edited in-app by respondent. No COCIOP or other category is shown to the respondents.
  - Backend: The receipt is read by the app, but the processing is done by Veryfi. A large number is coded automatically to COICOP. The rest is processed through a microservice in-house that utilize a combination of machine learning and human in the loop to do the COICOP coding and updates of search word lists for shop name and products during data collection period.
  - Machine learning processing: In-app OCR and in-house classification in a microservice.
- What interaction is assumed with the respondent? Respondent takes a picture and can interact with the image (edit/improve/add/delete) before they store it. They are not

asked to verify information. A microservice process the image saved and add coding of COICOP.

- Is processing of data (supposed to be) near real-time? OCR (or manual) registration is processed in real time. Text is extracted from receipt, and when stored, sent to our server in real-time. Classification is not real-time, and it is not presented back to respondents in-app. We do not plan to feed this back to respondents in the future either, but a chart for expense categories for each household in-app is considered.
- What specifications would you set to output of services? The SSB's app reads the following information from a paper or electronic receipt: Shop name, address, date and time. Per product: Product text, product price (NOK), discount if applicable and rebate if applicable, amount and metrics (kilograms, litres, etc). To keep respondent's task simple, we do not have type of purchase/category, if it was bought abroad, and if it was bought online. We do not have information on receipt processing performance either.
- Are there other smart features that (likely) interact with the services? We have product lists and COICOP codes (5-levels) used in our microservice for coding, that is a mix of automation (ML) and manual coding in-house, but respondent can also use the lists and search when editing scanned receipt texts.

GEO tracking

State of affairs geo-tracking CBS:

- To what extent have services already been implemented in the solution in terms of
    - UI: The Mobility survey app has location tracking embedded and displays tentative stop-track decompositions. The stops and tracks need to be supplemented with travel modes and travel purposes.
    - Backend: The backend is receiving tentative and validated data but is itself not performing/initiating additional processing that is fed back to the respondents.
    - Machine learning processing: Methods have been developed to check for outliers in location data, to remove sensor noise and to impute gaps in location data. These methods are being refined and evaluated during 2023 based on field test data. Thresholds are set to minimum location data quality in terms of density and duration. Respondents that have location data for which data quality is too low are not included. In 2023 it is researched whether measurements can be improved. ML models for travel mode prediction have been developed and will be evaluated.
- What interaction is assumed with the respondent? The actual set of actions that will be allowed is not yet determined. In a 2022-2023 field test the sample was split into all possible edits and limited edit options only. It is currently investigated how the edits affected data quality and drop-out.
- Is processing of data (supposed to be) near real-time? Yes, for noise filtering, imputation of small gaps and stop-track detection, but no for imputation of large gaps and more advanced adjustments.

- What specifications would you set to output of services? Location data including information on accuracy, density, gaps, outliers and possibly predictions for travel mode and travel purpose.
- Are there other smart features that (likely) interact with the services? No.

State of affairs geo-tracking Hbits:

- To what extent have services already been implemented in the solution in terms of
    - UI: The concept of tentative and committed data where the information on geolocation is shown and every part of this information can be edited is used; configurations are done on the study level via the back-office so no specific apps per set of configuration is needed.
    - Backend: The geolocation is part of a microservice, via an API that information can be requested by the CORE of MOTUS. Information can go both ways.
    - Machine learning processing: microservices makes use AI/ML procedures to sort for outliers, to find routes and to find clusters to define a stop. Labelling to an activity can be done via another microservice as HETUS lists are different from country to country, from study to study. The respondent does not notice this setup in interaction with the microservice.
- What interaction is assumed with the respondent? Respondents give consent to switch on the sensors for capturing geolocation data. This data is sent to the microservice and flows back as tentative data in the timeline of the respondent. Here the respondent can edit/improve/add/delete the information. takes picture and can interact with the image before sending to the microservice.
- Is processing of data (supposed to be) near real-time? Yes for capturing the geolocation information and classification to HETUS codes, to presenting this information in the app.
- What specifications would you set to output of services? MOTUS can handle any (parts of) information received from the microservices (geo + classification). This is information on the private (home, work, other defined places) and public level. Quality information (estimation of correctness) can be used to provide warnings or to signal issues.
- Are there other smart features that (likely) interact with the services? Any information that can be captured or is hold by a microservice, like e.g. information from a places database. This can be proprietary or open source. All of this information can be used in interaction with the microservice and the CORE.

4. Smart survey maturity criteria

SSI is to develop and demonstrate maturity of smart solutions for at least two applications. In SSI, the focus is on the Household Budget Survey (HBS) and the Harmonized European Time Use Survey (HETUS). However, SSI also likes to create guidelines, templates and guidelines for smart surveys in general. Within SSI, WP1 is to monitor and guard convergence of applications to maturity. But what is 'mature'?

WP4 developed both a maturity model and maturity criteria. Five levels are distinguished: Awareness, Pilot, Production, Managed and Optimized. The minimal target of SSI is the Production level, but the ambition is the Managed level. The criteria for both levels are repeated below. In follow-up deliverables for WP1, the criteria will be assessed.

	Production	Managed
Organization	1. The decision has been made to apply a smart solution for at least one survey. So, there is a positive business case. The organisation had determined that smart surveys have added value. 2. The production department has the lead. The focus is on: "the job has to be done". Focus is not yet on the full chain, but on the individual departments. 3. The organization needs to plan how to implement the innovation into production processes and systems. 4. Relevant personnel have been trained and has the necessary knowledge for conducting the concerning surveys. However, knowledge is not yet widespread in the organization.	1. Smart solutions are applied for different surveys. 2. The production department has the lead. The focus is on efficiency and standardizing. 3. Knowledge of smart surveys / solutions is quite widespread. Mainly in the data collection, methodology and IT departments. More and more personnel are involved.
Methodology	1. The methodology used is effective. 2. For the smart solution(s): a. used methodology is recorded and documented, b. the strategy is done with a proven methodology, c. there are specific, defined, measurable acceptable goals for response rate and representativity, d. response rates are calculated according to international standards, e. representativity is assessed, f. registration and completion rates for relevant population subgroups are monitored, g. proven methodology is used to process collected data to statistical output,	1. Methodology is proven and effective. 2. Effective methodology is available regardless of the type of smart solution. 3. Quantitative monitoring and analysis of the methodology is done. 4. Relevant summaries of in-device paradata/audit trails for smart services have been defined.

	h. plausibility checks are specified, and the smart data satisfies these plausibility checks. 3. It is clear what information the used smart solution is providing. 4. Machine learning routines follow literature best practices and result in sufficient quality for the concerning smart solution. The performance of these algorithms satisfies specified thresholds in out-of-sample use. 5. UI/UX design of the smart solution is usable and works for the specific solution. It is not yet optimized and cannot be shared between solutions. 6. In multi-mode settings: a. smart nonresponse and selection differences can be evaluated, b. smart measurement differences can be evaluated, and c. smart measurement differences can be adjusted for, to warrant comparability in time and between relevant subgroups.	
Logistics	1. The process is not standardized. The process is rather ad hoc. The process is probably shaped as a stovepipe for a given survey. 2. There is a process for the data collection, but also for the processing and analyses sub processes. 3. Fieldwork is monitored via a minimum set of indicators based on the process data. Process data is collected; however not per se in a standardized way. 4. Interviewer feedback, if applicable, is evaluated and summarized 5. The contact centre / helpdesk has the capability to answer questions of respondents regarding the use of the smart solution. 6. App store analytics are performed (downloads, ratings, etc.). 7. App usage traffic measured by responses (data is received by NSI).	1. Monitoring of app store analytics (downloads, ratings, etc.) is performed regularly. 2. Monitoring of app usage traffic measured by responses (data is received by NSI) has been setup. 3. There is a process in place where machine learning predictions with low classification probabilities (so, input that cannot be classified automatically), can be recognized and handled manual by personnel in the back-office. 4. There is a standardized process in place to update machine learning routines, to preserve the required performance. 5. Helpdesk and other interactions with respondents are evaluated and summarized
IT	1. Smart services have been demonstrated to follow input and output specifications as provided by the	1. Process to incorporate changes (including improvements of user experience and usability) and bug-fixes into

	methodology level (quality metadata) and legal level (PET). 2. The IT architecture and all levels of the IT solution (smart solution, smart feature/service, machine learning algorithms, backend) are described. 3. Stress tests and technical tests for the smart solution(s) have been performed. 4. Process to incorporate changes (including improvements of user experience and usability) and bug-fixes into the smart solution is ad hoc. 5. Process to evaluate new operating systems and devices is ad hoc. 6. Process to update smart solutions for new version of libraries and operating systems is ad hoc. 7. Process to upload and manage smart solutions (e.g. apps) on app stores (like Google Play and Apple's App Store) using a company account is managed centrally. 8. The mainstream devices are available for testing purposes. 9. A testing infrastructure to test smart solutions is available and supported. 10. Deployment strategy has been described explicitly to host microservices and to connect to platforms 11. Pentest and LaP tests have been carried out and critical levels are addressed 12. Interaction with external databases is agreed on a functional, technical and legal level	smart solutions is well-defined and managed. 2. Process to evaluate new operating systems and devices is well-defined and managed. 3. Process to update apps for new version of libraries and operating systems is well-defined and managed. A backlog is maintained on a continuous basis. 4. Monitoring of new versions of libraries used (libraries update frequently) has been setup 5. Monitoring of new version of operating systems has been setup.
Legal	1. A DPIA is available for each smart solution and assessed by a legal officer. The process complies with the applicable rules and legislation. Thereby the privacy-by-design choices are motivated, documented and approved. 2. The privacy-enhancing-techniques (PET) applied (privacy-by-design) are described. 3. In-house monitoring and handling of smart data errors have been motivated, documented and seconded by legal officers 4. Risks (e.g. security) in smart solution(s) have been assessed, evaluated	1. Risks (e.g. security) are regularly re-evaluated in terms of prevalence, likelihood and impact and discussed with security officers. Action is taken where necessary. 2. Data collection reports (respondent requests, communications) are checked against PET and discussed with legal officers, through a standardized process.

	and sufficiently mitigated according to the relevant officers. 5. Respondent data control has been tested and evaluated. 6. Informed consent procedures (like the use of sensors) are tested, optimized and compliant with legal requirements. 7. Internal monitoring and handling of smart data errors are motivated, documented and approved by legal personnel. 8. Respondent data control requests are evaluated and approved. 9. It has been proved that the smart solution does not lead to potential security breaches. 10. Data collection reports (are checked against PET and discussed with legal officers, but there is not yet a standard process in place	

5. Perception Survey

One of the main goals of SSI is to develop effective push-to-smart recruitment and motivation strategies. It is conjectured that different instances of smart surveys, such as a smart household budget survey allowing for scanning and uploading receipts and a smart time use survey offering daily stop-track segmentations, require tailored strategies. However, it is also conjectured that persons/households have common objections and hesitations against smart features in general. The SSI smart perceptions survey is designed to identify both general and topic-specific motivations and objections general populations may have. The formal name of the survey is New Ways of Measuring Survey (NWMS) and it is fielded in Italy, Netherlands and Slovenia. Here, the status and reporting timeline are described. First results are expected in December 2023 and will be just in time to inform WP2 field tests in IT and NL. DE and NO may use part of the results in interviewer training and/or helpdesk training.

The NWMS has the following specific goals:

- Get input for tailoring and addressing respondent concerns in smart survey data collection strategies, in particular instruction and introduction materials and interviewer training;
- Get input for addressing the need to offer alternative modes to respondents next to apps;
- Learn how respondents like to keep control over data and what minimal respondent involvement during data collection is needed;
- Inform legal-ethical officers about respondent perceptions, in particular proportionality of the smart tasks and trade-offs in data minimization;
- Learn if and in what way achieving the above goals depend on the topic;
- Learn how achieving all of the above goals depend on the country/NSI;

To reach the goals, NWMS employs two questionnaires that are sequential but offered to respondents simultaneously. Population samples in NL, IT and SI are invited to fill in a paper survey first and then to proceed to an online survey. The paper survey contains questions on device ownership and usage, and perceptions and requirements towards the use of smart features of these devices in surveys. The online survey combines questions and measurements in short modules on four themes: travel, physical activity, consumption and energy. We will term the surveys NWMS-G(eneral) and NWMS-S(mart). The questionnaires are added in the annex to this deliverable.

Table 1 contains details on the fieldwork in the three countries. At the time of writing, NL and SI have fielded the NWMS. IT will do so during the first half of November.

	IT	NL	SI
Sample size	4000	4000	2000
Sampling design	Two-stage SRS from population register (municipality is PSU)	SRS from population register	Stratified two-stage sample from population register 18-74
Contact modes	Advance letter F2F interviewer	Invitation letter	Invitation letter F2F interviewer
Incentive strategy	None	5 Euro unconditional Lottery 400 Euro for NWMS-S	The first 1000 respondents will receive a gift card. Conditional gift card (5 Euro) for general perception survey.
Reminder strategy	Interviewer call or visit (return after 2 weeks to collect)	Mailed letter after two weeks based on online response Mailed letter after five weeks based on paper response	Mailed letter after three weeks based on paper response (including announcement of follow up with field interviewers) Thank you mailed letter and a reminder in one (thank you note on completed paper questionnaire or interview and a reminder on online response after few weeks after completed PAP/CAPI)
NWMS-G administration	Paper	Paper	PAP, CAPI
NWMS-S software	Limesurvey with plug-in	Blaise with plug-in	Blaise with plug-in for web, Blaise for CAPI
Fieldwork period	Nov 15-Dec 20	Sept 15 – Nov 15	Sept 25 – Dec 12
Admin variables	Age Gender HH composition Marital status Income household Socio-eco status (employed, unemployed, allowance, student, retired, self-employed, other) House value Educational level Country region Urbanization	Age Gender HH composition Place HH/mar status Ethnicity/migration Income household Socio-eco status (employed, unemployed, allowance, student, retired, self-employed, other) Ownership house House value Educational level (not for migrants) Country region Urbanization	Age Gender Personal income Socio-eco status Educational level Urbanization

Table 1: Sampling and data collection design of NWMS in IT, NL and SI

To support SSI, WP2 and WP5 activities and decisions, three types of analyses will be performed:

- A quick & dirty analysis per country: Analyses to inform decisions in preparations for SSI field tests within WP2 for 2024;
- An elaborated analysis per country: Analyses to inform overarching smart survey guidelines and recommendations;
- A cross-country evaluation: Analysis to determine the country dependence and nuance overarching smart survey guidelines and recommendations;

The following research questions will be answered within the analyses:

- General:
  - What modes do respondents prefer for invitation and for responding?
  - What are device ownership and smartphone usage?
  - How does mode preference relate to device ownership?
- Response:
  - How does response to NWMS-G depend on background characteristics?
  - How does response to NWMS-S depend on background characteristics (cumulatively)?
  - Which respondents do fill out NWMS-G, but not NWMS-S? Does this depend on background characteristics or hesitations?
  - How does response to NWMS-S depend on background characteristics and NWMS-G variables on mode preference, device ownership and perceptions (conditionally)?
- Motives
  - What motives/hesitations are most prevalent?
  - How do motives/hesitations depend on background characteristics?
  - How do motives/hesitations depend on mode preference, device ownership and usage?
  - If and how are motives mutually related?
  - Do respondent motives/hesitations affect GDPR proportionality principles?
  - Do respondent motives/hesitations affect response propensities (on the different smart survey tasks)?
  - Can we identify different respondent 'perception' profiles?
- Topic
  - If and how does smart task item-nonresponse in NWMS-S vary per topic?
  - If and how does smart task item-nonresponse in NWMS-S relate to substantive questions in NMWS-S on the same topic?
  - If and how does smart task item-nonresponse in NWMS-S relate to hypothetical willingness to participate in that task in NWMS-G?
  - If and how does smart task item-nonresponse in NWMS-S vary per topic depend on background characteristics and NWMS-G variables on mode preference, device ownership and perceptions (where perceptions need to be elaborated as part of the analysis)?

- Respondent control
    - How do respondents feel about data control?
    - What suggestions do respondents make to understand/perform data control? And how can we classify them?
    - Do respondent data control requirements impact GDPR decisions?
- Country
    - What country dependencies exist in all of the above questions?

The three analyses follow a different timeline. The quick and dirty analyses are delivered one month after the end of fieldwork in a country. The elaborated analyses are delivered three months after data collection. The cross-country comparison is drafted two weeks after the last country quick & dirty analysis. The analyses are combined into a report for WP1 Baseline smart stage at M14 of the project. This leads to the following planning:

- Q&D NL: 01-12-23
- Q&D SI: 15-01-24
- Q&D IT: 30-02-24
- Cross-country draft: 30-02-24
- Elaborated NL: 01-02-24
- Elaborated SI: 15-03-24
- Elaborated IT: 01-04-24
- Draft deliverable WP1: 15-05-24
- Final deliverable WP1: 01-07-24

Findings from the NWMS-G and NWMS-S, in particular on those participating in NWMS-G but not NWMS-S is used in designing field tests within WP2.1 and WP2.4. In fact, fieldwork design for ISTAT and CBS field tests is postponed until, respectively, Q3 2024 and Q 2024. The conclusions will be used in tailoring recruitment letters and brochures to specific subgroups based on their known background characteristics such as age and household size. Results are also used to strengthen clarifications on how data are stored and processed. The most prominent follow-up action will be in revisiting interviewer tactics, in particular in objections interviewers may encounter at the doorstep. Interviewer training for CBS and ISTAT field tests takes place in Q3 and Q4 2024, so that there is enough time to evaluate results and talk them through with interviewer trainers.

Appendix: design general questionnaire SSI Smart Perceptions

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DESIGN GENERAL QUESTIONNAIRE SSI SMART PERCEPTIONS V20230426

BLOCK 0 - PARTICIPATION IN CBS/ISTAT/SURS SURVEYS IN GENERAL

Q0.1: How would you like to be invited for a CBS/ISTATI/SURS survey?
Choose all that apply.

a) Invitation letter by mail
b) Invitation sent by e-mail
c) Invitation by SMS
d) A phone call
e) Other (please specify):

Q0.2: Which form of participating in a survey would you prefer <u>the most</u>?

a) With interviewer – personal visit at home
b) With interviewer - telephone interview
c) With interviewer – video interview
d) Online questionnaire
e) Paper questionnaire
f) Mobile application
g) Other (please specify):

Q0.3: What would for you be the <u>most important</u> reason to participate in a CBS/ISTAT/SURS survey?
Select a single answer.

a) To contribute to research/statistics about society
b) Because I find the topic interesting
c) Because I see this as a sense of duty
d) A monetary compensation
e) Another compensation or reward
f) Other (please specify):
g) Nothing

Q0.4: What would for you be the most important reason to <u>not</u> participate in a CBS/SURS/ISTAT survey?
Select a single answer.

a) Lack of time
b) I get too many requests for participation
c) Lack of information about the importance of participation
d) Length of the questionnaire
e) Questions being too personal
f) Privacy concerns
g) I never participate in surveys out of principle
h) Other (please specify):
i) Nothing

BLOCK 1 – SMART DEVICES

CBS/ISTAT/SURS is considering using data from smartphones and other devices to replace part of the data collection with questionnaires. This could make data collection easier and better.

Q1.1 a to h: Do you have or use the following smart devices?

A smart device is a device that connects to an app, the internet, a local network or another device with wireless connection.
Please check all devices that apply.

☐ Smartphone
☐ Tablet
☐ Activity tracker
☐ Smart watch
☐ Smart speaker
☐ Smart electricity meter
☐ Smart gas meter
☐ Smart water meter
☐ Smart indoor air quality monitor
☐ Other, please specify _____

If you do not have or use a smartphone please go to BLOCK 2

Q1.2: How often do you use a smartphone for activities other than phone calls or text messaging (e.g. browsing websites or taking photos)?
o Several times a day
o Once a day
o Several times a week
o Several times a month
o Once a month or less

Q1.3: For which of the following activities do you use a smartphone?
☐ Browsing websites
☐ Reading and/or writing emails
☐ Taking photos
☐ Taking videos
☐ Looking at content on social media
☐ Posting content to social media
☐ Making purchases
☐ Online banking
☐ Installing new apps
☐ Using GPS/location-aware apps (for example Google Maps, Foursquare, Yelp)
☐ Connecting to other electronic devices via Bluetooth (for example smart watches, fitness headphones, car)
☐ Playing games
☐ Streaming videos or music
☐ Other, please specify _____

Q1.4: Generally, how would you rate your skills of using a smartphone on a scale from 1 = Beginner to 5 = Advanced?

- o 1 Beginner
- o 2
- o 3
- o 4
- o 5 Advanced

BLOCK 2 PARTICIPATION IN SMART SURVEYS AND SHARING DATA

Q2.1: Would you participate in a [CBS/ISTAT/SURS] survey which asks you to:
YES, , MAYBE, NO, DK

a) Let your location be tracked for statistics on roads, public transport and travel behaviour
b) Take pictures of your house for statistics on conditions of housing
c) Share data on energy use for statistics on energy
d) Use an air quality monitor provided by [CBS/ISTAT/SURS] for statistics on air quality
e) Give the step counts on your mobile devices for statistics on fitness
f) Wear a activity tracker provided by [CBS/ISTAT/SURS] for statistics on fitness
g) Take pictures of receipts or upload digital receipts for statistics on how households spend their money

Q2.2: Suppose you would participate in a survey by [CBS/ISTAT/SURS]. How concerned would you be about your data being stolen or misused by others?
NOT CONCERNED, SOMEWHAT CONCERNED, QUITE CONCERNED, VERY CONCERNED

Q2.3: How concerned are you that data collected through smart devices by [CBS/ISTAT/SURS] would be stolen or misused by others than [CBS/ISTAT/SURS]?
NOT CONCERNED, SOMEWHAT CONCERNED, QUITE CONCERNED, VERY CONCERNED

Q2.4 a to f: What should [CBS/ISTAT/SURS] do in your opinion to ensure that the security of data you share with [CBS/ISTAT/SURS] feels secure?

	YES	NO	DK
Develop CBS apps that are available in Google and Apple stores			
Questionnaires on paper or other offline options			
Let data be collected by an interviewer (for example over the phone or at home)			
A report from an independent party that states that [CBS/ISTAT/SURS] handles data securely			
Use smart devices that are provided by [CBS/ISTAT/SURS]			

Q2.4f: Is there anything else [CBS/ISTAT/SURS] can do to ensure that the security of data you share with [CBS/ISTAT/SURS] feels secure?
OPEN QUESTION

Q2.5: Suppose you are invited to a survey that collects data through smart devices. How important or unimportant would it be for you to be informed about what data will be collected?
NOT IMPORTANT, SOMEWHAT IMPORTANT, QUITE IMPORTANT, VERY IMPORTANT, DK

Q2.8: How should [CBS/ISTAT/SURS] help to explain what data will be collected?
OPEN QUESTION

Q2.6: And how important or unimportant would it be for you to be able to control what data will be collected?
NOT IMPORTANT, SOMEWHAT IMPORTANT, QUITE IMPORTANT, VERY IMPORTANT, DK

Q2.7: Here a number of options are mentioned that [CBS/ISTAT/SURS] could do. Would this help you in determining what data will be collected?

	YES	NO	DK
A personal login webpage where you can check your data			
A mobile app that allows you to check data before they are submitted			
A retention period before your data are allowed to be used			

Q2.7d: Is there any other way [CBS/ISTAT/SURS] could help you to determine what data will be collected?
OPEN QUESTION

BLOCK 3 – ONLINE SURVEY

We have created an online survey to test how we can collect in new ways. This survey looks like a normal survey, but allows you to share data from your smartphone or tablet.

We would like to ask you to do the survey. On the next page it is mentioned how you can participate. If you do not like to share certain data, then you can indicate this. To thank you for participation, you can win gift cards of 400 euro or an iPad. At the end of the online survey you will be directly informed whether you have won

Q3.1: Will you participate in the online survey?
YES, MAYBE, NO

If NO or MAYBE to Q3.1:

Q3.2: What are your reasons for not doing the survey?
Please list all the reasons, hesitations or doubts that came to your mind.
OPEN QUESTION

IF BACKGROUND CHARACTERISTICS LIKE EDUCATION ARE ASKED THIS WOULD BE THE BEST PLACE

Q3.3: Do you have any additional remarks? Your comments are very welcome!
OPEN QUESTION

Thank you for participating in the survey. [Country specific: Please return this questionnaire through the attached free return envelope.]

How can you participate in the online survey?
Please first fill in this paper questionnaire. The online survey is a follow-up to this paper questionnaire. You can do the online survey on your smartphone or tablet. The survey can be found at the internet address below or by scanning the QR-code on your smartphone or tablet.

Appendix: design smart questionnaire SSI Smart Perceptions

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DESIGN SMART QUESTIONNAIRE SSI SMART PERCEPTIONS

NB : THE SMART BLOCKS IN THIS QUESTIONNAIRE ARE RANDOMIZED IN FOUR DIFFERENT ORDERS:

- TRAVEL – HEALTH – CONSMPTION – ENERGY
- ENERGY – CONSUMPTION – HEALTH – TRAVEL
- HEALTH – ENERGY – TRAVEL – CONSUMPTION
- CONSUMPTION – TRAVEL – ENERGY - HEALTH

THE FOUR OPTIONS ARE ALLOCATED RANDOMLY TO FOUR EQUALLY SIZED SUBSAMPLES

INTRO: REMOVED

QIN.1: On what type of device are you performing this survey?
SMART PHONE, TABLET, DESKTOP COMPUTER (PC) OR LAPTOP, OTHER DEVICE

IF SCREENSIZE >1024, THEN GIVE MESSAGE
If possible, we advise you to switch to a smartphone or tablet

NB THE SURVEY IS NOT STOPPED. IT IS A SOFT WARNING.

BLOCK TRAVEL

Currently, [CBS/ISTAT/SURS] uses questionnaires for research into traffic. Maybe sharing locations Is easier and also better to measure persons' travel.

We would like to test whether we can use the location data from your smartphone or tablet. This is a one time only measurement for this survey only.

QLO.1: Please give permission to share your current location.

Make sure your location is turned on on your mobile device

[ ] Record location

[ ] I could not measure my location

[ ] I prefer not to share my current location

IF QLO.1 = I prefer not to

QLO.2: What are your considerations for not sharing your location?

OPEN QUESTION

(FOR ALL)

QLO.3: Where are you right now?

AT HOME, AT WORK, AT SCHOOL/STUDY, SHOPPING, TRAVELLING, OTHER (CATEGORIES FROM EXISTING SURVEY), prefer not to say

IF (QLO.3 <> HOME) AND (QLO.3 <> WORK AT HOME)

QLO.4: How far is this location from your home?

OPEN≥0, DK, REF

QLO.5: What kind of transport modes do you use during an average week? Please check all that apply

BY FOOT, BICYLE, E-BIKE, CAR AS DRIVER, CAR AS PASSENGER, BUS, TRAM, TRAIN, OTHER

BLOCK PHYSICAL ACTIVITY

In the Health survey of [CBS/ISTAT/SURS] there are many questions on how active people are. We investigate whether we can make this easier.

Therefore, we would like to ask you to share the number of steps you made (measured ny your smartphone or activity tracker).

QPA.1: Do you have an activity tracker? Think for example about an app on your phone, a smartwatch or an activity tracker such as a Fitbit or Polar.

YES NO

IF YES

QPA.2: Please report your step count from yesterday.

[ ] ___ steps counted yesterday
[ ] I have a step count, but not for yesterday
[ ] I do not have any step counts
[ ] I prefer not to report a step count

IF QPA.2 = I have a step count, but not for yesterday

QPA.3: Please report your most recent step count

[ ] ___ steps counted on _____ date
[ ] I prefer not to report a step count

IF QPA.1 OR QPA.2 = I PREFER NOT TO PROVIDE A STEP COUNT

QPA.4: You prefer not to report your step count. What are your reasons?

OPEN QUESTION

IF QPA.2 or QPA.3 = step count

QPA.5: From what device did you use the step count?

PERSONAL ACTIVITY TRACKER LIKE FITBIT, GARMIN OR POLAR
SMART WATCH
APP ON SMARTPHONE
OTHER PLEASE SPECIFY

QPA.6: In general, how would you rate your health?

VERY GOOD, GOOD, MODERATE, BAD, VERY BAD

QPA.7: How many minutes do you walk or run on an average day of the week?

OPEN≥0, DK

QPA.8: Do you do sports other than hiking or running for at least one hour per week?

YES, NO, DK

BLOCK CONSUMPTION

For the household budget survey [CBS/ISTAT/SURS] asks people to report their expenses for a week. We would like to investigate whether this can be made easier.

We, therefore, like to ask you to share one paper receipt and one digital receipt of your groceries

If you do not have any receipts, then you can indicate this.

QSR.1: Please take a photo of your receipt

Make sure the total amount and as many products as possible are on the photo

Make sure there is enough light

Check whether the photo is readable

SCAN IMAGE

I do not have any paper receipts on groceries

I prefer not to submit receipts

QSR.2: Please upload your digital receipt

UPLOAD DIGITAL RECEIPT

I do not have any digital receipts on groceries

IF QSR.1/QSR.2 =" I do not have any receipts on groceries"

QSR.3 : **"If you would have receipts on groceries, would you share these receipts?** YES/NO.

If QSR.1/QSR.2 = "I prefer not to submit receipts" OR QSR.4=NO OR Tech = NO

QSR.4: You did not share a receipt. What are your reasons for not sharing?

OPEN QUESTION

QSR.5: How much does your household spend on food and drinks in an average week? Please give a global estimate.

AMOUNT≥0, DK, REF

BLOCK ENERGY

For research into how people live [CBS/ISTAT/SURS] asks questions about use of energy. We investiaget whether we can make this easier. Therefore, we would like to ask you to take pictures of your your electricity, gas and water meter.

QEN.1: What type of energy meters do you have? Please check all that apply

ELECTRICITY, GAS, WATER

QEN.2 Are you at home now?

YES/NO

IF QEN.2=NO

QEN.3 If you were at home, would you make a picture of the meter readings of your

Electricity meter yes/no

Gas meter yes/no

Water meter yes/no

IF QEN.2= YES

QEN.1 ELECTRICITY = TRUE

QEN.4: Please take a picture of the meter reading of your electricity meter.

Make sure there is enough light

Does your meter display multiple readings? One photo of one of the readings is sufficient

Please check whether the reading is readable on the photo

[ ] Take picture IMAGE

[ ] I cannot access my electricity meter

[ ] I prefer not to take a picture of my electricity meter

IF QEN.1 GAS = TRUE

QEN.5 Please take a picture of the meter reading of your gas meter.

Make sure there is enough light

Does your meter display multiple readings? One photo of one of the readings is sufficient

Please check whether the reading is readable on the photo

[ ] Take picture IMAGE

[ ] I cannot access my gas meter

[ ] I prefer not to take a picture of my gas meter

IF QEN.1 WATER = TRUE

QEN.6: Please take a picture of the meter reading of your water meter.

Make sure there is enough light

Does your meter display multiple readings? One photo of one of the readings is sufficient

Please check whether the reading is readable on the photo

[ ] Take picture IMAGE

[ ] I cannot access my water meter

[ ] I prefer not to take a picture of my water meter

IF (QEN.4 OR QEN.5 OR QEN.6 OR QEN.7 = I prefer not to OR any item in QEN.2 =NO)

QEN.7 1-3: You did not take a picture of your ELECTRICITY/GAS/WATER meter. What are your reasons for this?

OPEN QUESTION

IF (QEN.4 OR QEN.5 OR QEN.6 OR QEN.7 = I cannot access my meter)
QEN.8: Why are you not able to access your meter(s)?
OPEN QUESTION

QEN.9: What kind of dwelling do you live in?
FREE STANDING, SEMI-FREESTANDING, BLOCK/CORNER, LOWER/UPPER, APPARTMENT, OTHER

QEN.10: How many persons live in your household?
Please also include yourself and children who live only part of the time at home.
OPEN, INTEGER≥0

BLOCK EVALUATION

Finally, we would like your feedback on this survey.

IF no smart measurements conducted: QBE.2

QBE.1 How easy or difficult was it to do the following?
(ONLY SHOW MEASUREMENTS RESPONDENTS HAVE CONDUCTED)
Sharing your current location
Sharing your step count
Taking a picture of a receipt
Uploading a digital receipt
Taking picture(s) of meter reading(s)
VERY EASY, SOMEWHAT EASY, NEITHER EASY NOR DIFFICULT, SOMEWHAT DIFFICULT, VERY DIFFICULT

QBE.2 Do you have any remarks regarding this survey? Your comments are very welcome! OPEN FIELD

THANK YOU FOR YOUR HELP!