

# Towards a Modular Online Time Use Survey

- Kelly Sabbe -



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# Towards a Modular Online Time Use Survey

*Software Outreach and Redefinition to Collect E-data through MOTUS  
(SOURCETM)*

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## ABSTRACT

As is the case in most European countries, Statbel, the Belgian statistical office is confronted with a decline in the willingness of households to participate in diary-supported surveys, such as the Time Use Survey (TUS) and the Household Budget Survey (HBS). Therefore and in view of the increasing digitalisation, the further development of IT-tools for diary-supported surveys is absolutely imperative.

At present, the data collection tools for diary-supported time use surveys was still exclusively or mainly comprised paper-based records. For household budget surveys there currently are some digital solutions used by National Statistical Offices (NSIs), such as web-based tools to collect expenses. However, these tools are not incorporated in platforms, are not shareable with other countries and are difficult to maintain. That means there is an urgent need for a modern IT-tool, in order to be able to fulfil the IESS (Framework regulation for the production of European statistics on persons and households (Integrated European Social Statistics) mandate to deliver highly qualitative data regarding HBS and TUS in future.

In order to meet this need, the SOURCE™ project was set up. This project is a first step in the harmonisation towards an online modular time use survey. The general goal of the SOURCE™ project, led by a consortium coordinated by Statbel, was to get to know more about Modular Online Time Use Surveys (MOTUS) and to retrieve detailed knowledge on how MOTUS could fit into the data-collection environment of Statbel, and so later can be shared and reused in multiple countries in a flexible and qualitative way.

The MOTUS software platform has been in continuous development since 2012 by the Research Group TOR from the Vrije Universiteit Brussel (VUB) in response to a general trend in which the combination of high processing costs and on-going cuts in research funding jeopardizes the future of time-use research and other dairy-based surveys and can be used to collect data within small, medium and large scale sized surveys.

The aim of the use of MOTUS is not only to lower the costs of data collection and processing, other aspects that need to be tackled as well are lower response burden and more quality, flexibility, modularity, usability and shareability of the data via online connected devices.

In 2019 the first data collection in MOTUS using passive data input via sensors was realized. Over this development trajectory the focus has shift away from an active participation-focus to a more passive participation-focus in which less effort is needed from the respondent and more accurate information in gained without losing the essential interaction with the respondent.

In a nutshell, the more specific goals and work packages of the SOURCE™-proposal were: (1) Software Outreach, (2) Redefinition of flows, (3) Collect (4) E-data through MOTUS.

Each working package has the function of checking step by step the feasibility of introducing MOTUS to Statbel and other National Statistical Offices (NSOs). The latter was done towards the end of the project via a pilot data collection that gathered comments from 28 different NSIs both inside and outside of the European Union, consisting of the task force (TF) and working group (WG) members of the time use survey (TUS) and household budget survey (HBS).

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The entire SOURCE™ report can be found here (Minnen, 2020):

<https://statbel.fgov.be/en/themes/households/household-budget-survey-hbs#documents>

The report contains the following documents:

- Main document
- Description E-HBS TUS Belgium
- User Guide MOTUS
- Speech Recognition
- MOTUS Governance Model
- Individual Questionnaire
- Household Questionnaire
- End Questionnaire
- Evaluation Questionnaire
- Leaflet: Modernisation of data collection for time use surveys
- Poster 1
- Poster 2

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## 1 Introduction

The origin of diary research lies in the beginning of the past century and dealt with the legal restriction of working hours and the impact of free time (Bevans, 1913). In the next two decades more studies were done in the UK, Soviet Union and the United States. All with a social element in question (Pember, 1914) (Zuzanek, 1980) (Stinson, 1999). The international breakthrough of time-use surveys, however, came with the UNESCO-funded 'Multinational Comparative Time-Budget Research Project', coordinated by Alexander Szalai (Szalai, 1972). Between 1964 and 1966 respondents in twelve countries reported their activities using the same time-diary methodology. From that point on, time-use surveys were never to lose their socio-economic angle of incidence and under impulse of the United Nations the application of time-use surveys for quantifying socio-economic development expanded even more during the 80s, for example by making visible (the timing of) unpaid work (Juster & Stafford, 1991) (Nations, 2004).

This growing use of time-use data was the prelude to two important global developments in the 90s. Firstly, more and more academics started taking up time-diary methodology to analyse a wide variety of social and economic issues and, secondly, more and more national statistical offices started conducting time-use surveys. The latter led to a plea for more international comparative data (Harvey, 1993) either by post-harmonising existing databases or by pre-harmonising the time-diary methodology..

The process of pre-harmonisation, which is of major importance for the European Time Use Surveys, was not taken lightly and under the leadership of Eurostat resulted in a decade of debates and decision making that ultimately culminated in the guidelines on Harmonized European Time-Use Surveys (HETUS) (Eurostat, 2008).

The project SOURCE™ is a first step in the harmonisation towards an online modular time use survey. The coordinator of this project was Statbel (Statistics Belgium), the Belgian statistical office. There was a collaboration with Destatis (Statistisches Bundesamt), the German statistical office. The project specifies the appointment of a subcontractor. As a subcontractor the company hbits as a spin-off of the Vrije Universiteit Brussel (VUB) was appointed after a tender procedure. The general goal of the SOURCE™ project is to get to know more about Modular Online Time Use Surveys (MOTUS).

In 1982 the Research Group TOR (or Tempus Omnia Revelat; Time Reveals Everything) was established. TOR is a research group of the Vrije Universiteit Brussel. The vision of the research group is to study the use of time within small and large scale populations. In doing so, the Research Group TOR designed his own paper-and-pencil time diary. Two small scale time use studies were executed in 1984 and 1988.

At that same time Statistics Belgium adopted the Harmonised European Time Use Survey (HETUS)-guidelines to collect time use data (Eurostat, 2000). Belgium was in 1999 one of the first European countries to collect time diary information following the HETUS-guidelines. The study was repeated in 2005 and 2013. At every collection round the research group TOR was an advising partner in the collection and analysis of the data. Together with Statbel the Research Group TOR also valorizes the collected time-use data.

As is the case in most European countries, Statbel is confronted with a decline in the willingness of households to participate in diary-supported surveys. Therefore and in view of the increasing digitalisation, the further development of IT-tools for diary-supported surveys (such as HBS (Household budget survey) and TUS (Time use survey)) is absolutely imperative. At present, the data collection tools for diary-supported time use surveys still exclusively or mainly relied on paper-based



recording. That means there is an urgent need for a modern IT-tool, in order to be able to fulfil the mandate to deliver highly qualitative data regarding HBS and TUS in future.

The MOTUS software platform has been in continuous development since 2012 by the Research Group TOR in response to a general trend in which the combination of high processing costs and on-going cuts in research funding jeopardizes the future of time-use research and other dairy-based surveys. The aim of the use of MOTUS is not only to lower the costs of data collection and processing, other aspects that need to be tackled as well are lower response burden and more quality, flexibility, modularity, usability and shareability of the data via online connected devices. TOR and Statbel had a partnership in a HERCULES-funding to establish and test the MOTUS-software platform. Comparisons were made based on a mixed mode data collection online/web-based study in 2013 with two different randomly selected samples.

The MOTUS-software has been through more development cycles afterwards. The Research Group TOR used the MOTUS-software extensively to collect data within small, medium and large scale sized studies. In 2019 a first data collection using passive data input via sensors was realized. Over this development trajectory the focus has shift away from an active participation-focus to a more passive participation-focus in which less effort is needed from the respondent and more accurate information is gained without losing the essential interaction with the respondent.

Information exchange between TOR and Statistics Belgium takes place on regular basis, and TOR also presents its work together with Statistics Belgium in the Work Group and Task Force meetings TUS in Eurostat. In 2021 MOTUS is also be used to collect time use data on the national level.

The goal of this consortiums project was to retrieve detailed knowledge on how MOTUS could fit into the data-collection environment of Statbel, and so/later can be shared and reused in multiple countries in a flexible and qualitative way.

In a nutshell, the more specific goals and work packages of the SOURCE™-proposal were:

- (1) Software Outreach
- (2) Redefinition of flows and
- (3) Collect
- (4) E-data

through MOTUS.

Each working package has the function of checking step by step the feasibility of introducing MOTUS to Statbel and other National Statistical Offices (NSOs). The latter was done towards the end of the project via a pilot data collection that gathered comments from 28 different NSIs both inside and outside of Europe, consisting of the task force and working group members of the time use survey (TUS) and household budget survey (HBS).



## 2 Software Outreach

### 2.1 The MOTUS platform

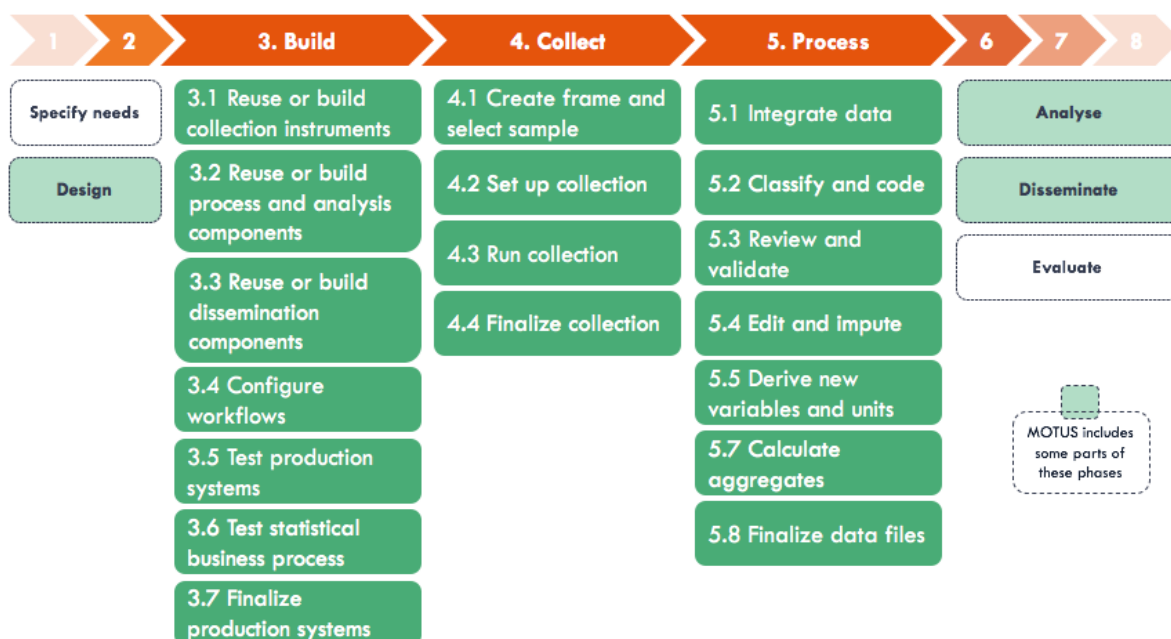
MOTUS combines a back-office ([www.motusbuilder.io](http://www.motusbuilder.io)) and a front-office ([www.motusresearch.io](http://www.motusresearch.io)). The back-office supports the researcher to design a research and to collect and disseminate data. The front-office is available to the respondents to take part in the studies.

The use of builders comprised in the back-office supports MOTUS in its most powerful asset: modularity. It is the composition of the builders, and the choices being made within these builders that define the actual set up of a particular research. As such, MOTUS makes it possible to define multiple researches, than can run at the same time, even for the same respondent.

Today the MOTUS-builder counts 11 builders:

1. Device builder
2. Survey builder
3. Diary builder
4. Event builder
5. Communication builder
6. Language builder
7. Research builder
8. Invitation builder
9. Dashboard builder
10. Data builder
11. Quality builder

Figure 1: MOTUS back-office supports different GSBPM stages



The builders above will be further updated in the future but also new builders will be created:

- Computation builder
- Visualization builder

MOTUS supports online time use surveys via a mobile (iOS and Android) and web application (via browser; [www.motusresearch.io](http://www.motusresearch.io)). To participate via a browser an internet connection is needed. Combined online-offline registration is possible via the mobile application. Respondents can use any preferred device as the design for both applications is similar and the information collected by the devices is shared and synchronized between the devices. The web app is responsive to function on different screen sizes. Behavioral information can also be captured via sensors in the smart devices.

Below we summarize this project within the envision of the concept of shareability, and this in 4 stages:

1. Share insights
2. Share knowledge
3. Share ideas
4. Share the MOTUS platform

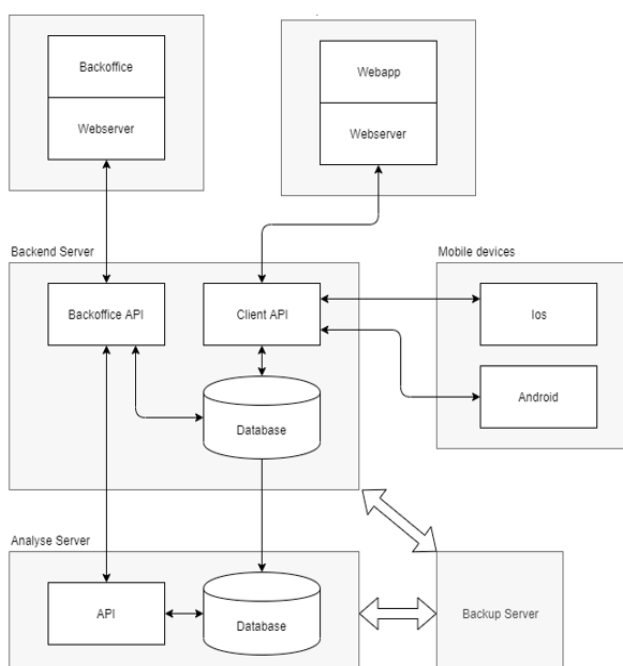
## 2.2 Share insights

In the beginning of the project the goal was to share insights by means of a Common Statistical Production Architecture (CSPA)-documentation and architectural insights.

The CSPA describes the platform on a conceptual and logical level. MOTUS is a software platform performing activities in three different core phases of the GSBPM: the build, collect and process phase. The CSPA information will be updated continuously, and can be found via an online inventory of tools and sources (Eurostat, 2021).

The MOTUS-software architecture is composed as follows:

Figure 2: MOTUS software architecture



1. **Backend server:** the backend server stands central in the software platform. It holds the database, the back-office API and the client API.
2. **Back-office:** the back-office serves as the research environment where the researcher sets up a research and the fieldwork can be followed. The back-office runs in a browser.
3. **Analyse server:** the analyse server holds a replicate of the database of the backend server and prepares the reports for the backend server, which at its part can be called by the back-office.
4. **Back-up server:** the back-up server is a replicate for secure storing from the backend server and the analyse server.
5. **Client portal:** the client portal holds the web application and an underlying webserver.
6. **Mobile devices:** the mobile application is available for Android and iOS

There are three API's that arrange the entrance to the components:

1. Back-office API: both ways webserver back-office and analyse server.
2. Analyse server API: both ways database (to prepare reports) and back-office API to send over reports and other analytics.
3. Client API: receives the input from the web & mobile app and syncs the data on both applications. Could also function as a data harmonization tool.

The CSPA and the architecture are important elements in setting up a data collection strategy. A particular strategy is developed where the different builders prepare research components, and where these components are used as 'lego' blocks to define a research flow. This research flow are the different steps a respondent has to take in order to successfully participate to a study.

This knowledge is been used to document and evaluate the Statbel data collection strategies for TUS and HBS. In total six phases were discussed in general:

1. Sample selection
2. Recruitment
3. Training and selection interviewers
4. Research instruments
5. Data collection
6. Data dissemination

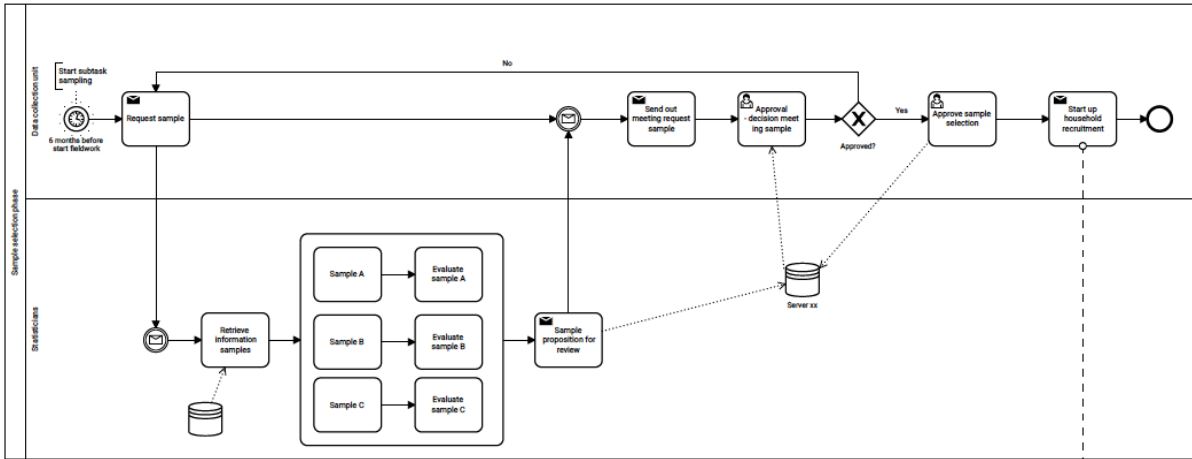
More Information about these phases can be found in the HBS methodological note (Sabbe K. V., 2019).

### **2.2.1 Sample selection**

In Belgium HBS is conducted every 2 years since 2012, TUS is collected with an interval ranging between 5 and 10 years since 1999. The fieldwork for both surveys takes one full calendar year, typically starting on the first day of the year. The business process starts with the preparation of the sample selection and is foreseen 6 months ahead of the start of the fieldwork. In case the fieldwork runs over one entire calendar year, the sample selection phase starts in June.

The sample selection model relies on the combined efforts of three directions within Statbel: the data collection unit, the methodologists and the statisticians of social statistics. The methodologists are responsible for the preparation of the sampling frame and for designing and selecting the sample. The data collection unit is responsible for sending the invitations to the selected households and directing the surveyors. The statistician's main task is overseeing the process.

Figure 3: Sample selection strategy within the data collection architecture in Belgium



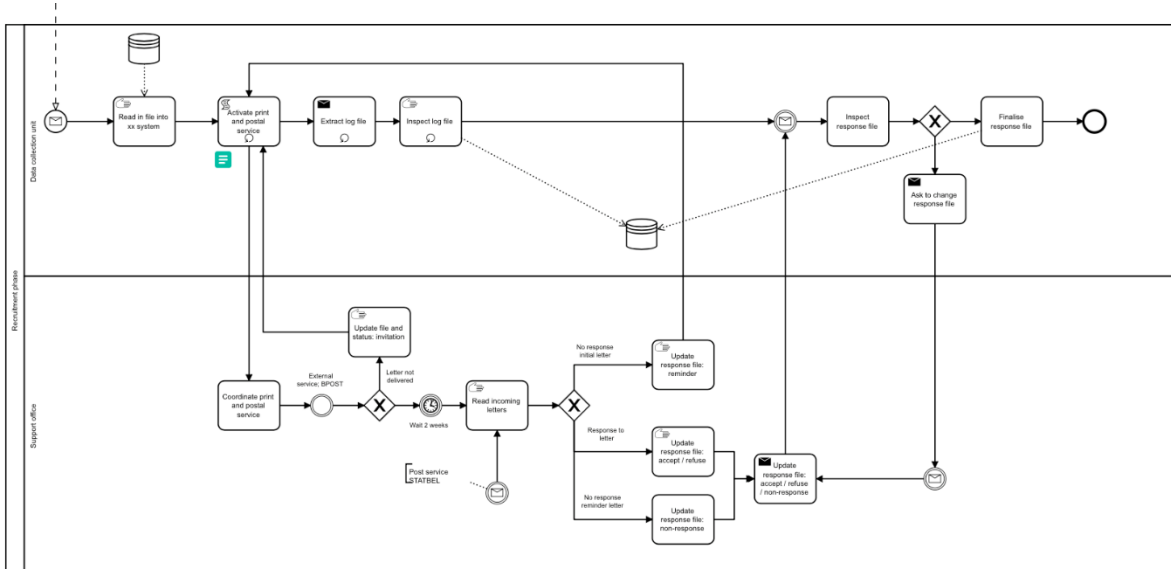
The methodologists start the preparation of the sample selection after receiving a request from the data collection unit. This request contains information on the number of households that needs to be conducted, the periodicity of the sample selection and other relevant points of attention. For the latest HBS, the sample selection was based upon 3 sources: the Labour Force Survey (LFS) from the year before, the previous HBS wave and the National Population Register. The LFS and HBS information was available internally within the datawarehouse DWH, for the drawing on the National Population Register the methodologist ran a request on the DWH server. The methodologists evaluate and combine these sources to a balanced sample proposition, being put available for review. The constructed database holds information on respondents name and address as contact details.

The sample selection and related information is being discussed by the data collection unit and approved, or subject for resampling. After final approval, the dataset is the start for the recruitment process of the households.

## 2.2.2 Recruitment

About three months before the start of the fieldwork, the recruitment phase starts. In this recruitment phase, the households receive a postal letter in order to invite them to take part in the survey. Participation in HBS is voluntary. The figure below shows an interaction between the data collection unit and the office responsible for printing and mailing the letters.

Figure 4: Recruitment strategy within the data collection architecture in Belgium



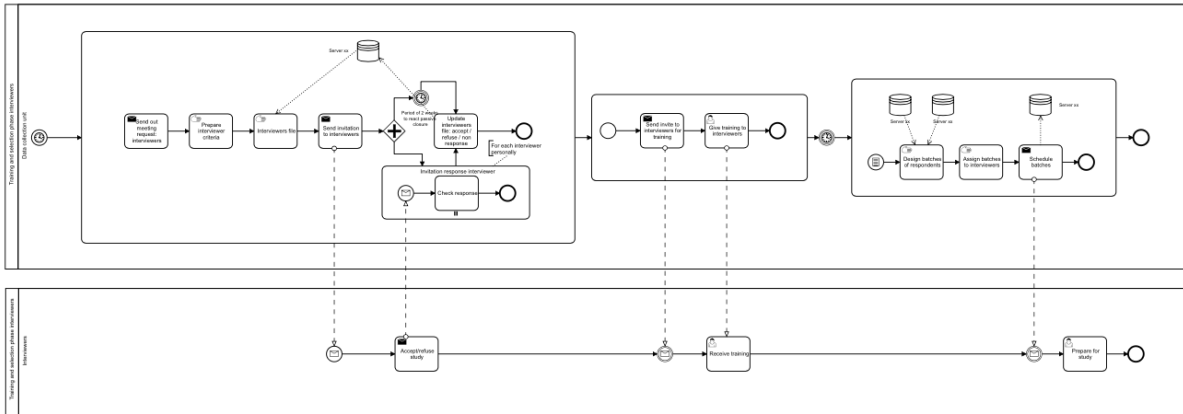
The sample is retained from the DWH and is transferred into an excel-file on the file server. This file and a model letter are sent to the prepress of the Support Office. After a validation by the Collection Department, the Support Office prints the letters. This service also coordinates the dispatch of the letters to bpost who delivers letters in Belgium. Once send out, not delivered mail can return, households can response by means of a response card, or do not respond, even not after a reminder letter. All incoming letters/cards are read and catalogued in a response file by the Data collection unit. One month before the data collection starts, the invitation phase closes and the response file gets evaluated and finalised.

The final response file is charged into the sample managing system (DBENQCIT). This system will connect the sample with the interviewers.

## 2.2.3 Training and selection interviewers

A third sub process in preparation of the fieldwork is the training and selection of the interviewers. The job content of an interviewer holds contacting the households a first time to explain the survey, a second time to follow-up on the data entrance and a third and last time to interview the households for individual and household questionnaires as activities.

Figure 5: Training and selection interviewers within the data collection architecture in Belgium



Interviewers are invited to the survey about two to three months before the start of the fieldwork. They have a 2-week period to react. After a response check, the data collection unit derives a list of interviewers which are sent an invitation for a 4-hours training. During this meeting they pass and discuss every element of the survey: contact procedure, research elements, use of a laptop, assistance, compensation, ... .

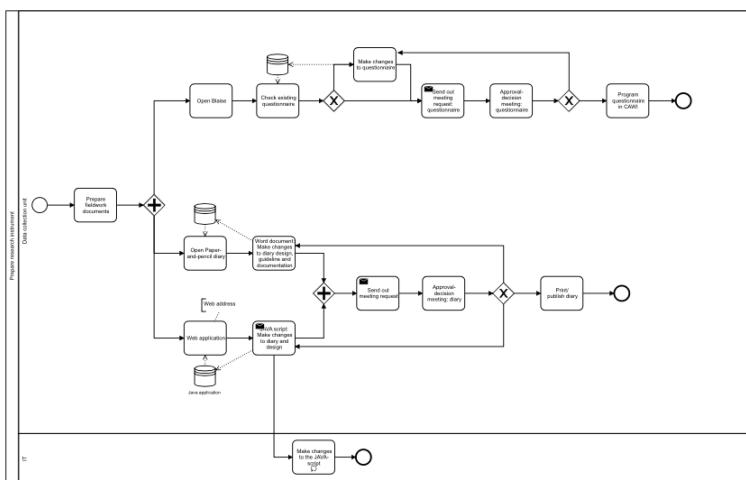
After the meeting, the responding households are organized in batches and assigned to an interviewer, who also receives a schedule about when the batches need to be activated and completed. In the meantime, the interviewer can prepare him/herself for the survey.

### 2.2.4 Research instruments

An important step is the preparation of the research instruments. Central to HBS and TUS are the diaries to be completed by the households. For HBS, households keep track of their expenditures over a period of 15 days (first or second part of the month) (Sabbe, Delclite, & Geenens, 2021). For TUS, households keep a record of their activities for 2 days, one weekday and one weekend day. Also different is that for HBS every person can add expenses, but only the reference person is questioned, while in TUS all persons 10 years and older from the household are invited to participate.

The diaries are available both offline and online for HBS (Statbel, 2021). For the offline part the Data collection unit relies on standardized designs (Statbel, 2021). The online diary is designed by the IT-department.

Figure 6: Data collection instruments within the data collection architecture in Belgium



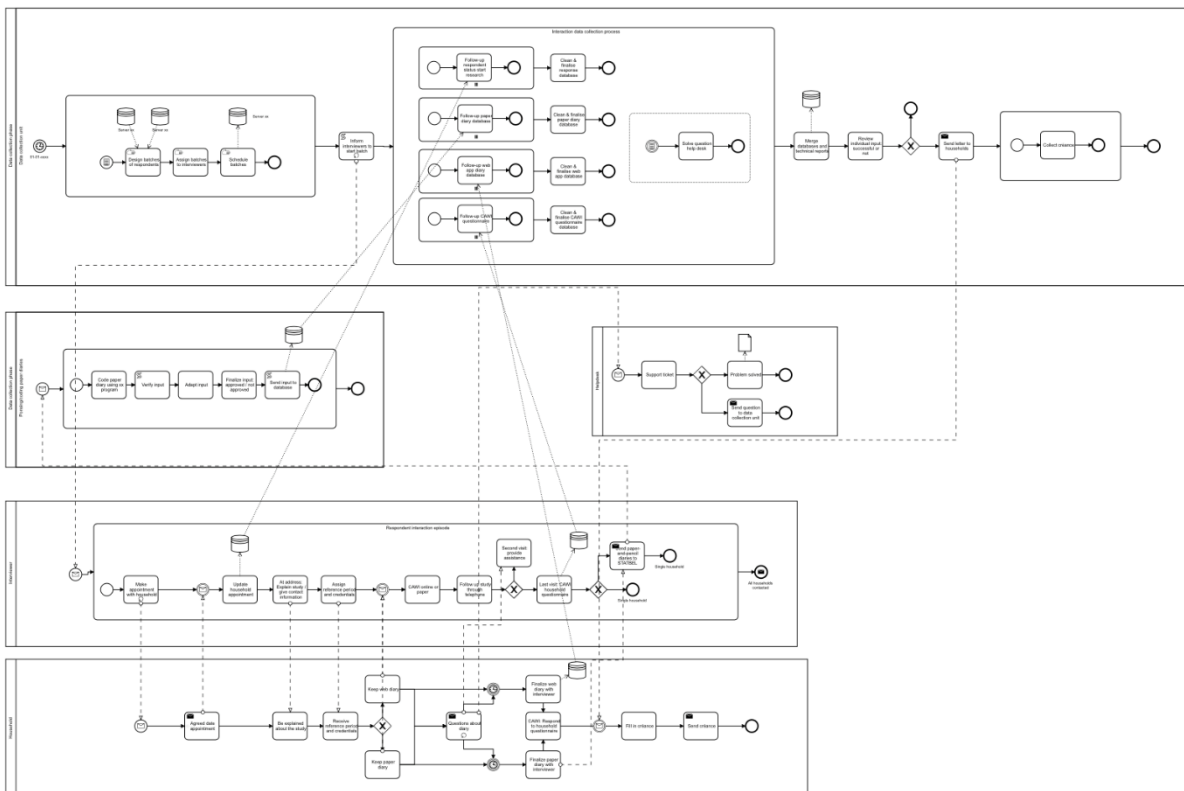
The web diary is an application running in a browser and written in JAVA. Adaptations in the web diary requires changes being made by IT in the JAVA-script. The web diary runs on Tomcat servers and a Linux operating system. The type of database behind is DB2 LUW running on Linux. For the offline diary, Statbel lets the coders use the JAVA-application to digitalise the paper diaries.

Besides the diary, the respondents have to complete a survey questionnaire (Statbel, 2021). This completion happens by means of an interview via a computer: a CAPI-survey. The CAPI survey is built via Blaise. Blaise is a computer-assisted interviewing (CAI) system and survey processing tool developed by CBS (Statistics Netherlands) and fits on different devices and screen sizes. Blaise makes use of the .NET framework. The back-end server of the questionnaires is a Microsoft windows server. When defined, the CAPI-survey is made available to the interviewers via an Ultra Mobile Personal Computer, or UMPC. Overall, the duration of the CAPI interview is estimated to be approximately 45 minutes. Once all the research elements are prepared and tested they can be approved by the data collection unit.

### 2.2.5 Data collection

After all the preparations, the fieldwork can start. Data collection is most often balanced over the entire duration of one year, including a launch phase running into the previous year and closure phase running into the subsequent year. During the data collection, different roles interfere: the data collection unit, the helpdesk, the interviewers and the households. The helpdesk is responsible for answering the most frequently asked questions. The figure below provides insight in the interaction between the various roles.

Figure 7: Data collection architecture within the data collection architecture in Belgium



The factual start of the fieldwork lies within the range of tasks of the data collection unit. They design the batches of the households selected to participate in the survey, assign them to the interviewers and schedule them. In what follows, the fieldwork engine continues with parallel running episodes of interviewers contacting households, households participating to the study, interviewers visiting the households in their task of intermediary between the households and Statbel, the helpdesk solving and canalizing questions from the households and Statbel in their role of supervising the fieldwork and inspecting the quality of the data collection process.



The role of the data collection unit is supported by nightly exports in SAS from out the DB2 LUW database (web diary) and the Blaise databases (via Blaise2DWH programming developed by the DWH team). In order to evaluate the offline response and input, the data collection unit has to rely on the continuous transmission of paper diaries in order to get encoded. As a good practise standard, interviewers have one month after the end of the reference periods batch to return all the documents to Statbel.

Together with the SAS-outputs, Excel files are produced to monitor (by group/ mailing lists/ payment lists) the fieldwork. The data collection phase ends when all data are collected and have received a first quality check. This quality check is needed to pay out the interviewers and awards the households a compensation.

### **2.2.6 Data dissemination**

In this step new variables will be generated like age in groups or status of education. After data entry is completed and the validation is done, the generation of new variables can be started. The new variables will be specified in SAS and the same variables will be generated for each household.

To calculate the weights the data will be shared with the methodologists. The weights/extrapolation factors will be calculated using the LFS frame. The weights are getting merged to the final data set.

Further processing of the data is done in SAS. For HBS there are almost 50 different aggregated tables published on our website (Statbel, 2019). For TUS there are also aggregated data made available on our website (Statbel, 2021).

The finalized data sets can be used for further analysis and a scientific use file will be provided for researchers who request it and meet the conditions laid down by law.

## 3 Redefinition of flows

### 3.1 Harmonized European Time Use Surveys Guidelines

Since 2000, Eurostat promotes time-use surveys in its member states and associated countries. Today, comparable datasets of more than 20 countries are gathered, collecting data over two data rounds. The first version of the guidelines was published in 2000 and revised in 2008 and 2018/2020 (Eurostat, 2000) (Eurostat, 2008) (Eurostat, 2020). The Guidelines refer mainly to the following three elements:

Table 1: Elements of the HETUS guidelines

1	Sample design	<ul style="list-style-type: none"> <li>Population delimitation</li> <li>Households: all inhabitants 10 years and over</li> </ul>
2	Diary days	<ul style="list-style-type: none"> <li>Observation window: one weekday and one weekend day</li> <li>Fieldwork period: coverage of one year</li> </ul>
3	Survey forms	<ul style="list-style-type: none"> <li>Household questionnaire / Individual questionnaire</li> <li>Time diary</li> </ul>

Both survey forms are part of the time diary research setup, but it is the time diary as such that is at the center of the modernization initiative. For every step within the time diary research the intervention of an interviewer is necessary.

#### 3.1.1 Household and individual survey

The guidelines discusses the core and voluntary questions and their relation to other European Surveys. The household questionnaire is directed to the reference person within the household and rubrics relate to the household composition, provision of childcare, housing and living conditions, ownership and use of items like a tv and a washing machine, the execution of infrequent/productive activities like building a house or growing plants and breeding pets, the sources and amount of income and the occurrence of help to the family.

The individual questionnaire is presented to every household member 10 years and older and starts with questions on the respondents professional life (first and second jobs). Also, the time devoted to work and the income gained from it is questioned. A part is devoted to people without a gainful employment. Furthermore, this questionnaire collects information on the educational status of the respondent, along the ISCED classification. The questionnaire continues with questions on the health status of the respondent and the feeling of being rushed. The remainder goes about biographic information from the respondent, but also on having a driver license or not.

#### 3.1.2 Time diary

The time diary characterizes itself by its design, the variables, the Activity Classification List and the different parameters that furthermore are essential in the time diary data collection.

Countries have shown to be inventive with these standards to be more in line with the materials of their NSI, or to support the registration willingness of the respondent. In general, the time diary captures the activity being done (primary and secondary) and the context of the activity (spatial, social & temporal dimension). Variables can be filled out independently from each other, and can span more than one time slot usually indicated by dragging a downward line over all the time slots involved.

The input in plain text needs to be converted to electronic codes by post-coders. To standardize/harmonize this process the coders rely on the Activity Classification List or ACL.

All elements together define the time diary approach. The Guidelines was also a basic ingredient of the Survey on Time Use Survey Innovative Tools and Sources.

Table 2: characteristics of paper time diaries according to the HETUS-guidelines

Design	<ul style="list-style-type: none"> <li>• A5-format booklet</li> <li>• capturing 3 hours per page in time slots of 10 minutes</li> <li>• in total 8 pages to cover an entire day</li> <li>• one day is reported in 144 time slots (24 x 6)</li> <li>• per day an extra page is added to pose questions on e.g. whether or not feeling rushed or the kind of the day</li> <li>• including an introduction and a guideline for respondents, a time diary for 2 days counts between 20 and 24 pages (recto verso).</li> </ul>	
Variables	<p>Information on:</p> <ul style="list-style-type: none"> <li>• the primary and secondary activity</li> <li>• the place or transport mode</li> <li>• the social context of the activity: what people do, and where they are is being reported in the own wordings of the respondent. The with whom question is addressed via a multiple answer question and check boxes.</li> </ul> <p>Since the last round two more variables were added to the time diary:</p> <ul style="list-style-type: none"> <li>• the use of a computer or internet (check box yes/no),</li> <li>• an indicator for well-being was added to the end of day questionnaire asking whether or not the diary day was pleasant or unpleasant (scale 1 to 5).</li> </ul>	
Activity Classification List (ACL)	<p>The HETUS code list goes up to 3 digits, and so providing a 3-level classification with at the most general level in total 10 activity groups, being:</p> <ol style="list-style-type: none"> <li>0. Personal care</li> <li>1. Employment</li> <li>2. Study</li> <li>3. Household and family care</li> <li>4. Voluntary work and meetings</li> <li>5. Social life and entertainment</li> <li>6. Sports and outdoor activities</li> <li>7. Hobbies and computing</li> <li>8. Mass media</li> <li>9. Travel and unspecified time use</li> </ol> <ul style="list-style-type: none"> <li>• On the second level: 34 categories</li> <li>• On the third level: 116 categories</li> <li>• Some countries opted for a fourth level</li> <li>• Information on how to digitalize the context variables: computer/pc, with whom, location and transport mode and the satisfaction with the activity.</li> </ul>	
Parameters	Cluster	<ul style="list-style-type: none"> <li>• individual and households</li> <li>• household members fill in the same days</li> </ul>
	Length of the fieldwork	one year
	Observation window	one weekday and one weekend day
	Grain of precision	10 minutes
	Registration focus	continuous
	Input method	own wordings
	Activity list	post-coding
	Context question	standard to all activities
Quality	<ul style="list-style-type: none"> <li>• checked by interviewer</li> <li>• after coding phase</li> </ul>	

## 3.2 Survey on Time Use Survey Innovative Tools and Sources

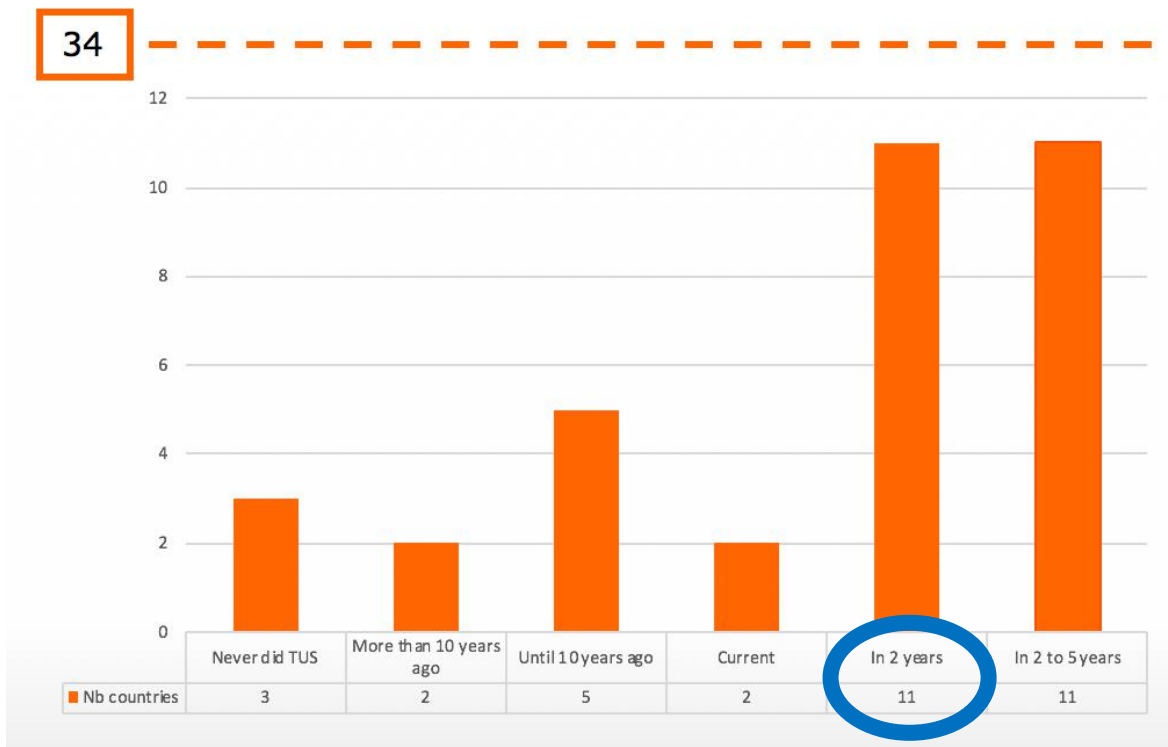
The focus of the survey dates back to 2011 when the Wiesbaden Memorandum called for better information on time use and household budgets (DGINS, 2011). In order to improve the quality and the reliability of the registration, both the participation rate needs to be improved and the registration burden needs to be lowered. A way to support this strategy is to develop/deploy modern tools and to include new sources of information.

With this specific survey Eurostat wished to get an overview of the expertise in the Member States in the field of Time Use Surveys. The survey consisted of 3 parts: past and current expertise, future interest and an inventory of innovative tools and sources developed and used by Member States. The inventory is online available at and also includes the MOTUS-software platform (Eurostat, 2021).

### 3.2.1 Expertise in Time Use Survey data collection

The image below shows a broad interest in TUS studies in general. Notwithstanding this willingness to respond, the variation in expertise is fairly extensive as shown in the figure below.

Figure 8: Country expertise in Time Use Surveys up until now



Three of the repliers never did a time use data collection before, for two of them the last data collection was more than 10 years ago. Five institutions have a more recent experience, meaning that the last data collection dated back not more than 10 years ago.

At the moment the survey responses were gathered, Q1 2018, two institutes were in the field collecting time use data, another 11 were going to conduct a new data collection within the next two years. Also 11 participants to the study, including Belgium, indicated it was very likely to field a new time use survey within the time frame of 2 to 5 years.

### 3.2.2 Adoption of the HETUS-guidelines

The HETUS-guidelines declare some recommendations to pre-harmonize the data collection and to improve the comparability of the results. As presented in the figure below, the survey asked about the adoption of six parameters during the most recent data collection. The countries who never conducted a TUS were excluded.

Figure 9: Recommendation of time diary parameters in HETUS guidelines

1 week day 1 weekend day	Continuous registration	Fixed time interval
48,4%	73,3%	87,1%
76,6%	96,6%	96,6%
Own wording	Primary & secondary	Broad contextual display

The results show a fairly large acceptance of the HETUS-recommendations. Almost all data collections included the registration of a primary and secondary activity together with input on the context of the activity. The fixed time interval of 10 minutes is also being applied by a large group. For at least three out of six parameters the HETUS-guidelines were followed to a large extent. This is also in a large sense true for the next two parameters: activities were mostly registered in their own wordings and with a continuous registration method as strategy.

The HETUS-recommendation to collect one weekday and one weekend day is with below 50% the only parameter that was not followed thoroughly. Besides the HETUS-recommendation of one weekday and one weekend day, one organisation kept a 1-day diary, two of them kept a two day-diary but consecutively. Three hold a 3-day diary (one weekday and two weekend days, or vice versa), five organisations kept a 7-day diary and another five kept a diary during an even longer period.

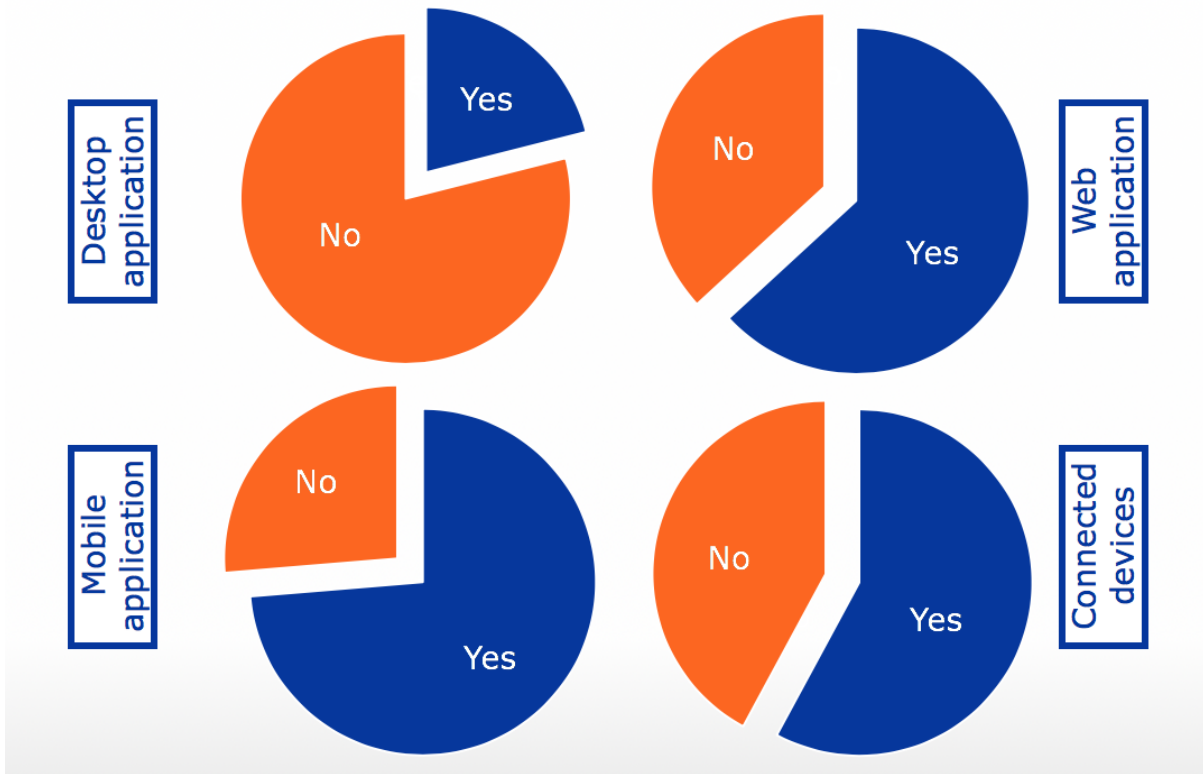
The variation in the observation window is presumable biased by the expertise level. Older studies correlate more to the 2-day approach of HETUS, the recent ones tend to collect more diary days per respondent in order to capture a larger intrapersonal variance.

Statbel has followed all six HETUS recommendations in the three previous waves. In the upcoming wave, five/six time use parameters will be followed as recommended. There will only be a deviation from the 1 week day/1 weekend day parameter, where Statbel will strive for a data collection period of one week, to decrease the number of households collected and to capture maximal intrapersonal variance.

### 3.2.3 Inclusion of modern data collection techniques

Another level of expertise deals with the use of modern data collection techniques. 15 countries have only an expertise in the traditional data collection techniques (P&P, PAPI, CAPI, CATI, CAWI). 19 organizations plan to make (or already make) use of an application for desktop, web or mobile to collect time use data, and/or include connected devices/sensors in their collection strategy. In Belgium, P&P was used exclusively for the entire data collection of TUS. For HBS, Statbel has developed a web application in 2012 for the collection of the expenditures and has adopted a CAPI program for the collection of the survey data since 2014.

Figure 10: Interest in inclusion of modern data collection techniques



The pie-charts show the interest for the inclusion of web and mobile applications, and this in contrast to the use of a desktop application. To run these applications, the smartphone is seen as the most vital device, while also 80% of the answers indicate the importance of a computer and/or a tablet. The foreseen use of a wearable is rather modest (1/3<sup>rd</sup>).

The future of time-use research is online. Therefore, the next part of the questionnaire posed questions on future requirements for a data collection tool.

### 3.2.4 Setting up a data collection tool

Looking to future TUS data collections the questionnaire addressed the sample composition, the fieldwork setup and the parameters for the time diary. All these various aspects define the qualities of a data collection tool.

The main importance is to acquire an application to collect online and offline time diary data via an application. A majority of NSIs would also like to collect questionnaires via an application. There is less interest for a tool that would also be helpful to the communication with the respondent, to follow-up on the process of the fieldwork, to support the construction of the database (including calibration and metadata) and to support the analysis of the data.

The parameters of a diary are linked to four different elements:

1. duration
2. precision
3. content
4. quality

In respect to duration the survey shows that a majority still opts for a weekday and a weekend day as the observation window for future data collections. In contrast, another group is in favour for a 7-day registration and even longer, to synchronise diary data collection periods with HBS.

The main topic related to precision is about the registration method, where a combination of methods seems to be the way forward according to the responders. The methods were: retrospective, continuous (most favourite) and time tracking. The continuous approach is the current HETUS-recommendation where respondents are asked to fill in the diary close to the end of an activity/begin of the next activity (Eurostat, 2020).

A third element is the content, and deals with whether or not a pre-defined Activity Coding List (ACL) can be part of the diary setup, and whether or not the same context questions should be attached to all activities recorded, or whether this can vary from activity to activity. The responses to the questionnaire show that a pre-coded activity suits better with an online application but that open recording still should be possible. Also, the specific context questions are found to be an extra value.

The quality assessment deals mainly with when and how, and who to do the quality assessment. The results show that the respondent should be informed about problems during, and after the diary day (period) but with the option to correct/improve the data input.

To get a better grip on the composition of these parameters within an actual time diary, the questionnaire proposed a particular configuration:

- a pre-defined activity list, classified in 3 (or 2) levels, including detailed activities and attached codes;
- a combination of selection and search (and the possibility to typing and/or speech recognition);
- a specification of other activities in an open box through typing and/or speech recognition.



### 3.3 Reusability of components

For Statbel, the fact that in MOTUS the available research components can be (re)defined within the platform itself, was one of the main interests. At the same time the platform can assure within a given context comparability, reliability and quality of the data.

In doing so, an NSI can design survey questionnaires, time diaries, activity-based questionnaires and communication strategies within the same platform, which increases user friendliness. Next, all research elements can be combined into an automated flow. Once configured, the research flow runs automatically, including communication with respondents.

Clearly the HETUS-guidelines provide the boundaries within which comparable TUS-data need to be collected for the European Statistical System (ESS) (Eurostat, 2020). This means that we will use the components of MOTUS to program the TUS-ecosystem as being known from the HETUS-guidelines. For the e-diary it means the setup of:

- a household grid,
- a household survey,
- an individual pre-survey,
- a time diary,
- extra questions linked to the completed diary day.
- an individual after-survey

However, the HETUS-guidelines are P&P oriented while the modernization trajectory for TUS pushes forward to collect time data online via web and mobile applications and the inclusion of other data sources. In that respect, we also take into account the outcomes from the questionnaire on tools and sources as highlighted above to arrive to a HETUS e-diary. This mainly is linked to the different parameters of the e-diary, such as number of diary days, length of the observation period, start of day cycle, ...

An additional task included was the translation of the Activity Classification List (ACL) from the HETUS guideline. The ACL is aimed at coders. To get to an online Activity Classification List aimed at respondents requires the use of tags or a 'fourth level' underlying the ACL. This again shows the reuse of components.

#### 3.3.1 Research flow general study

One of the main characteristics of MOTUS is that the platform supports online data collection via automated processes. The presented research flow discusses the various stages the respondents have to go through in order to complete their participation successfully. The research flow also takes into account the various actions and communications that are part of every stage. The figures below shows the research flow in MOTUS that Statbel prepared for the next national TUS. For every research (as well as for every country) this flow can be different, as it is been build up by modular components.

Figure 11: Research flow as determined by Statbel



**STAGE 7: TIME DIARY PERIOD 1**

- PROGRESSION - SEND MESSAGE AFTER COMPLETION FIRST 12 HOURS
- PROGRESSION - SEND MESSAGE NO LOGS FOR 12 HOURS
- TIME DIARY INSTRUCTIONS
- PROGRESSION - SEND EMAIL NOT STARTED AFTER 1 DAY
- PROGRESSION - SEND EMAIL NOT STARTED AFTER 2 DAYS
- WHEN COMPLETE CONTINUE TO NEXT STAGE
- END PHASE

**STAGE 8: EVALUATION QUESTIONNAIRE TIME DIARY PERIOD 1**

- SEND THANK YOU EMAIL COMPLETION FIRST DAY
- PARTIAL COMPLETION EMAIL EVALUATION QUESTIONNAIRE TIME DIARY 1
- WHEN COMPLETE CONTINUE TO NEXT STAGE
- END PHASE

**STAGE 9: PAUSE BEFORE DIARY PERIOD 2**

- SEND EMAIL ONE DAY BEFORE THE SECOND DIARY DAY
- PAUSE PHASE UNTIL ENTRANCE TO THE TIME DIARY

**STAGE 10: TIME DIARY PERIOD 2**

- PROGRESSION - SEND MESSAGE AFTER COMPLETION FIRST 12 HOURS
- PROGRESSION - SEND MESSAGE NO LOGS FOR 12 HOURS
- PROGRESSION - SEND EMAIL NOT STARTED AFTER 1 DAY
- PROGRESSION - SEND EMAIL NOT STARTED AFTER 2 DAYS
- WHEN COMPLETE CONTINUE TO NEXT STAGE
- END PHASE

**STAGE 11: EVALUATION QUESTIONNAIRE TIME DIARY PERIOD 2**

- SEND THANK YOU EMAIL COMPLETION FIRST DAY
- PARTIAL COMPLETION EMAIL EVALUATION QUESTIONNAIRE TIME DIARY 2
- WHEN COMPLETE CONTINUE TO NEXT STAGE
- END PHASE

**STAGE 12: THANK YOU SCREEN**

- SEND THANK YOU EMAIL
- END OF RESEARCH

Table 3: Explanation of the research flow as determined by Statbel

Stage	Explanation	
<b>1</b>	<b>Read in of the respondents</b>	
	In order to invite the respondent to participate to the study, MOTUS needs to know the contact details of the respondent, and more in particularly the email address. In the best-case scenario also other background information is provided.	
	Options	<ul style="list-style-type: none"> <li>• Upload a file of respondents</li> <li>• Enter the respondents via an API-link</li> </ul>
	Action	Once respondents are linked to the study the respondents will automatically go to the next stage
<b>2</b>	<b>Send invitation to participate</b>	
	An automatic invitation to the respondent is send over by email. This email contains information about the project and contact details, but most importantly also the credentials to participate to the study and the information how to participate via the web and/or mobile application.	
	Communication	<ul style="list-style-type: none"> <li>• Send invitation email (1)</li> <li>• Send reminder email (1)</li> <li>• Send reminder email</li> </ul>
	Action	When logged in continue to next stage
<b>3</b>	<b>Complete household questionnaire</b>	
	The completion of the household questionnaire. The household questionnaire is based on the HETUS-guidelines.	
	Communication	<ul style="list-style-type: none"> <li>• Send thank you email completion of the questionnaire</li> <li>• Send email to continue the completion of the questionnaire (1)</li> <li>• Send email to continue the completion of the questionnaire (2)</li> </ul>
	Action	When completed continue to next stage
<b>4</b>	<b>Complete individual questionnaire</b>	
	The completion of the individual questionnaire. The individual questionnaire is based on the HETUS-guidelines.	
	Communication	<ul style="list-style-type: none"> <li>• Send thank you email completion of the questionnaire</li> <li>• Send email to continue the completion of the questionnaire (1)</li> <li>• Send email to continue the completion of the questionnaire (2)</li> </ul>
	Action	When completed continue to next stage
<b>5</b>	<b>Allocation of the diary periods</b>	
	An allocation algorithm defines the diary days that needs to be completed. These diary days will be communicated to the respondent via an email.	
	Communication	Send email with diary days to be completed
	Action	When allocated continue to next stage
<b>6</b>	<b>Pause before diary period 1</b>	
	Waiting time and provide (extra) information to the respondent.	
	Communication	Send email one day before the first diary day
	Action	Pause phase until entrance to the time diary
<b>7</b>	<b>Time diary period 1</b>	
	The completion of a 1-day diary starting at 4 am in the morning and a 24-hour registration condition (begin first activity to end last activity > 24 hours). The respondents register their activities (primary & secondary) using the Online Activity Classification List. The begin and ending time of the activities is defined by the respondent. In addition, the respondents answer extra context questions. The context questions differ according whether or not it is a transportation activity	
	Communication	<ul style="list-style-type: none"> <li>• Send email with time diary instructions</li> <li>• Send message after completion of the first 12 hours</li> <li>• Send message when no logs for 12 hours</li> <li>• Send email when not started after one day</li> <li>• Send email when not started after two days</li> </ul>
	Action	When completed continue to next stage
<b>8</b>	<b>Evaluation questionnaire time diary period 1</b>	
	The completion of the evaluation questionnaire for the first diary period. The household questionnaire is based on the HETUS-guidelines.	
	Communication	<ul style="list-style-type: none"> <li>• Send thank you email completion first day</li> <li>• Send email to continue the completion of the questionnaire</li> </ul>
	Action	When completed continue to next stage
<b>9</b>	<b>Pause before diary period 2</b>	
	Waiting time and provide (extra) information to the respondent.	
	Communication	Send email one day before the second diary day
	Action	Pause phase until entrance to the time diary
<b>10</b>	<b>Time diary period 2</b>	
	The completion of a 1-day diary starting at 4 am in the morning and a 24 hour registration condition (begin first activity to end last activity > 24 hours). The respondents register their activities (primary & secondary)	

	using the Online Activity Classification List. The begin and ending time of the activities is defined by the respondent. In addition, the respondents answer extra context questions. The context questions differ according whether or not it is a transportation activity.	
	Communication	<ul style="list-style-type: none"> <li>• Send message after completion of the first 12 hours</li> <li>• Send message when no logs for 12 hours</li> <li>• Send email when not started after one day</li> <li>• Send email when not started after two days</li> </ul>
	Action	When completed continue to next stage
<b>11</b>	<b>Evaluation questionnaire time diary period 2</b>	
	The completion of the evaluation questionnaire for the second diary day. The household questionnaire is based on the HETUS-guidelines.	
	Communication	<ul style="list-style-type: none"> <li>• Send thank you email completion first day</li> <li>• Send email to remind respondent to continuously report activities</li> <li>• Send email to thank respondent to have completed the first 12 hours</li> </ul>
	Action	When completed continue to next stage
<b>12</b>	<b>Thank you screen</b>	
	The participation is completed.	
	Communication	Send thank you email
	Action	Put the respondent to end after 2 days

### 3.3.2 Multi-language capability

Another strength of MOTUS is the multi-language capability. The study can be designed in multiple languages, and the respondent can choose the language. During the data collection period, the respondent can change between languages. The preference is remembered. If the language preference of the respondent is known before the start of the study, all settings are immediately in place. This information can be extracted from the browser language, the installation language of the device or an administrative preference (or even an administrative obligation). When the language preference cannot be detected, the default language is shown to the respondent.

## 4 Collect e-data

Since 2017, Statbel started working with representative panels for LFS (Termote, 2018). Since 2012, HBS was linked to LFS, where respondents for HBS were recruited at the end of the LFS survey. Due to the decrease of LFS respondents since the panel setup, HBS has to rely on at least 3 sources to include respondents/households since 2018: LFS, the previous HBS wave and a fresh draw on the Population Register (Sabbe K. V., 2019). These changes have some consequences:

- There is no possibility to link TUS in 2021 to another survey.
- For HBS, the possibility of a new way to draw a sample is needed.

Because there is not yet a database with emails available in Belgium, the initial invitation to the households to invite them to participate in a diary survey still needs to be sent by letter through the post office. Some specifications need to be taken into account:

- How to persuade respondents to participate in a diary based survey?
- How to invite them to participate only online (through a web application of mobile application)?
- What with respondents who do not have the possibility nor the knowledge to participate digitally?

With all the knowledge in hand, a test environment was setup for all members of the task forces and working groups of TUS and HBS within the European Union. In total 157 NSI employees were invited to evaluate the test applications of MOTUS. Test respondents were guided through the different steps of the TUS-survey with a household questionnaire, an individual questionnaire, a one day time diary and an end of diary day questionnaire. After the test the respondents were asked to complete the evaluation questionnaire.

### 4.1 Evaluation of the tool testing from the respondents

The evaluation questionnaire asked the test persons to give comments (both positive and negative) and ratings on 4 different domains: the content, the design, the functional qualities and the non-functional qualities.

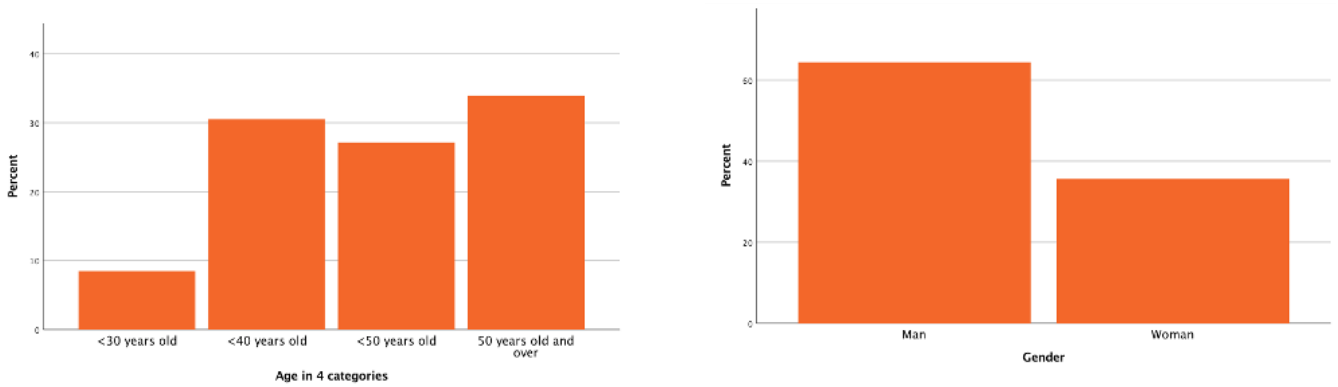
Table 4: Information on the invitation phase of the pilot test of MOTUS

When	Who	Number
March 16, 2020	Statbel & Destatis	3
<b>MOTUS update to v4 on April 8th</b>		
April 15, 2020	Statbel	37
April 15, 2020	Destatis	7
April 16, 2020	IATUR	5
April 16, 2020	TF/WG TUS & HBS	103
April 16, 2020	Sogeti	2
<b>Countries with participating respondents</b>		
Albania / [Australia] / Austria / Belgium / Bosnia and Herzegovina / Bulgaria / [Chile] / Denmark / Finland / France / Germany / Hungary / Italy / Latvia / Malta / North Macedonia / Norway / Poland / Portugal / Romania / Serbia / Slovakia / Slovenia / Sweden / The Netherlands / Turkey		
<b>Countries with respondents having completed the test but not the evaluation questionnaire</b>		
Estonia / Ireland / Luxembourg / Spain		

### 4.1.1 Socio-demographic and work related information

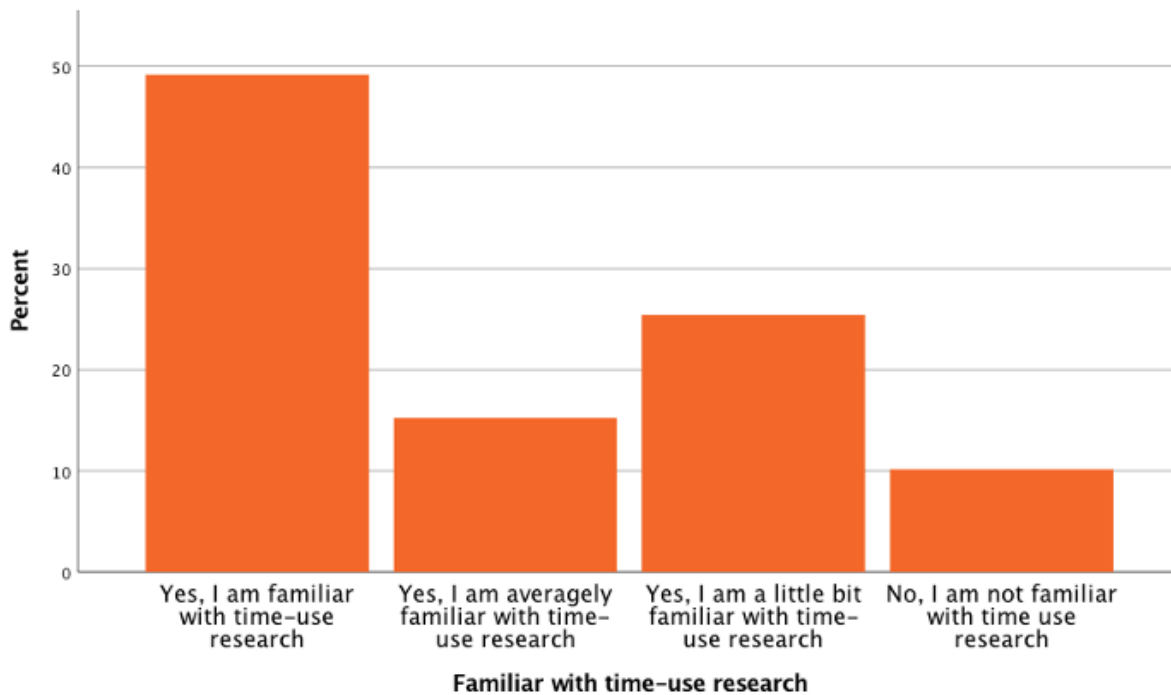
The respondents are spread over 4 defined age classes: (<30 years old, from 30 to 40 years old, from 40 to 50 years old and 50 years old and over), as shown in the figure below. Besides the first category, there is a more or less equal representation of the age classes in the pilot test. In relation to gender, the figure shows that men more than woman have completed the evaluation questionnaire.

Figure 12: Breakdown of the test respondents by age and gender



The figure below presents the division of expertise with time use research. It shows a division between respondents with a high expertise in time use research versus those with at maximum a moderate expertise in time use research.

Figure 13: Breakdown of the test respondents by expertise with time use research



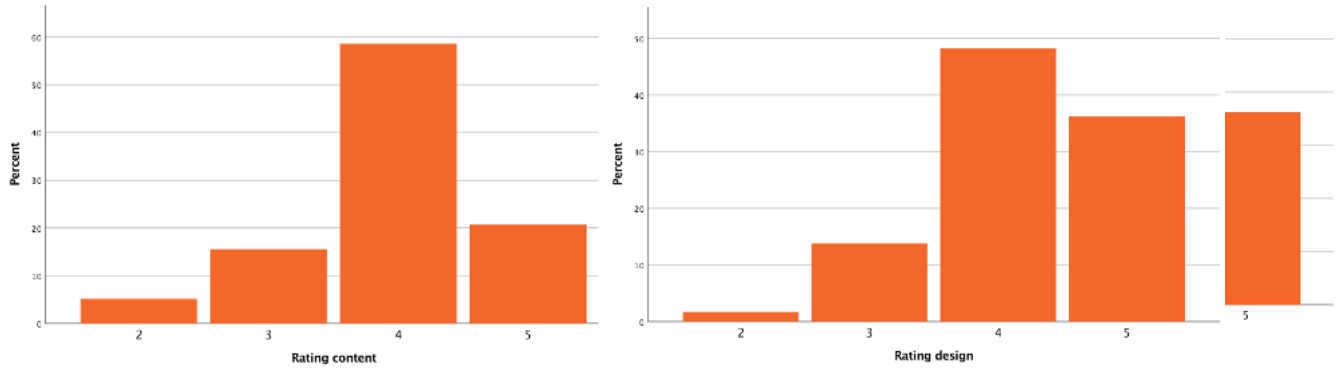
65 evaluation questionnaires were completed. In total respondents from 28 different NSIs took part in the test. The output of the questionnaire showed that content, design and technicality go hand in hand. Overall an average score of 4,18 on 5 was given by all respondents completing the test application.



### 4.1.2 Rating of the qualities of the MOTUS application

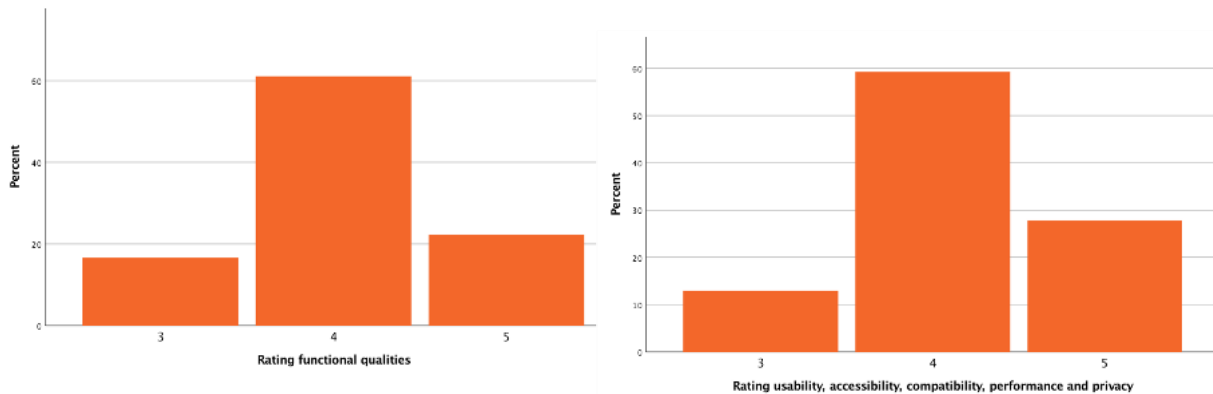
The figure below presents the average score for the content and the design of the application. Based on all respondents a 3,95 on 5 is given to the content, and a 4,19 on 5 for the design of the application. The Statbel employees gave with a 3,77 on 5 a lower score to the content in comparison to the 4,09 on 5 given by the other NSI employees. For the design of the application the scores were, respectively, a 4,09 vs. 4,29 on 5.

Figure 14: Rating given by the test respondents to the content and design



The technical aspects of the application were rated with the same appreciation from the Statbel employees and the others (4,06 average, 4,02 for Statbel employees and 4,09 for the others). A larger difference was noted for the non-functional qualities (4,15 average, 4,03 for Statbel employees and 4,24 for the others). For every rating the majority of the respondents gave a 4 on 5.

Figure 15: Rating given by the test respondents

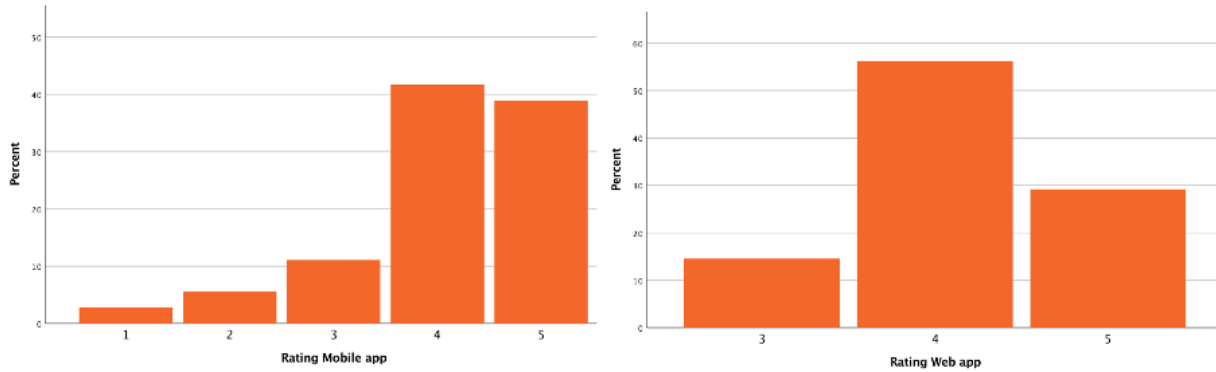


*Rating given by the test respondents to the functional, usability, accessibility, compatibility, performance and privacy qualities*

### 4.1.3 Overall rating of the application

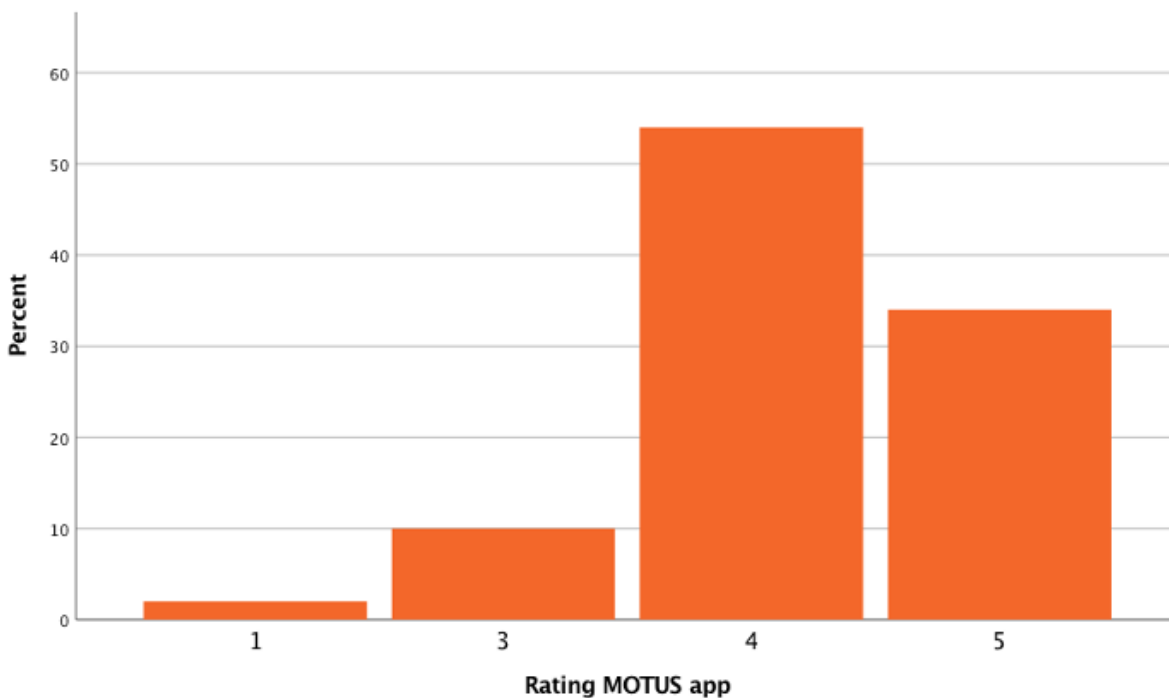
At the end of the evaluation questionnaire, when all the technical and non-technical components were evaluated, the questionnaire asked the respondent to evaluate the Mobile and the Web app separately and MOTUS in general. The Mobile application showed an interesting variation between the Statbel employees and the other NSIs: 3,82 vs. 4,20, and a total average of 4,08. This gap is closed for the Web app which received a total average of 4,15 (4,11 vs 4,17).

Figure 16: Rating given by the test respondents to the Mobile and the Web app



The effect of the Mobile app is noticeable in the overall MOTUS rating, scoring on average 4,18 on 5. The Statbel employees gave a score of 4,01, while the others marked a 4,27 on 5.

Figure 17: Rating given by the test respondents to the MOTUS application (overall)



In the continuation of the report the focus lies on the remarks, therefore we don't break-out the results anymore between Statbel employees and other NSI test respondents.

Nevertheless some essential remarks were made and not in the least these remarks were made to the most novel part of the test application, being the time diary. It shows that some development work needs to be undertaken to the core-purpose of the application, but also that the HETUS-guidelines need to be evaluated, and especially the Activity Classification List.

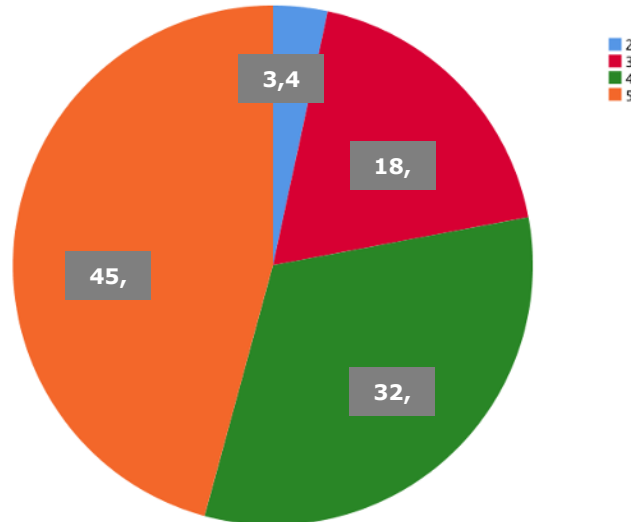
On the other hand the responses to the questionnaire showed a large appreciation for the technical setup. This technical appreciation is for an important part related to the operational qualities, which at their part are related to the modular character of the back-office to define and execute a fieldwork.

## 4.1.4 General usage information

### 1.1.1.1 Understanding the modular character

The test respondents were introduced to the modular idea behind MOTUS. As indicated in the figure below, 78% respondents gave at minimum a 4 on 5 and therefore are considered to have understood the philosophy of the platform to define components and to organize these components in a research flow in order to run a study independently from the aid of an interviewer.

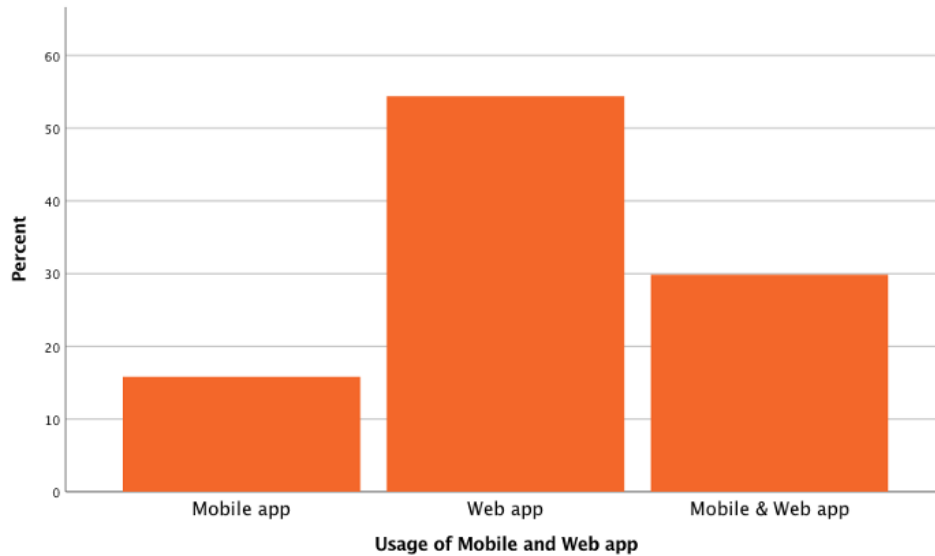
Figure 18: Test respondents being familiar with the modular idea of MOTUS



### 1.1.1.2 Use of the Mobile app & Web app

The evaluation questionnaire asks the respondents which devices they have used during the test. The largest share of the test respondents used the web application to complete the questionnaires and the diary. Near to 30% used the web application together with the mobile application. A smaller percentage only used the mobile application. The usage of both of the applications is probably related to the setup of the test, but a combination between a mobile and web application seems at least to be essential. In addition, for the future of the collection of official statistics.

Figure 19: Test respondents using Mobile and/or Web app



When testing the web application, the most popular browser was Google Chrome with more than half of the NSI employees using it. Second was Firefox with 30%. Apple users also tested the web app via Safari. In general no problems were reported for these browsers.

Respondents using Internet Explorer encountered difficulties to start the questionnaire. They received a 'blanc' screen. Advised was to use another browser because IE is outdated since 2017 and considered to be unsafe. Therefore IE is not supported by MOTUS. It is generally assumed that this browser will disappear as these computers are going to be replaced and IE cannot be pre-installed anymore. However, some NSIs still use IE as their standard browser.

#### 4.1.5 Future developments of MOTUS

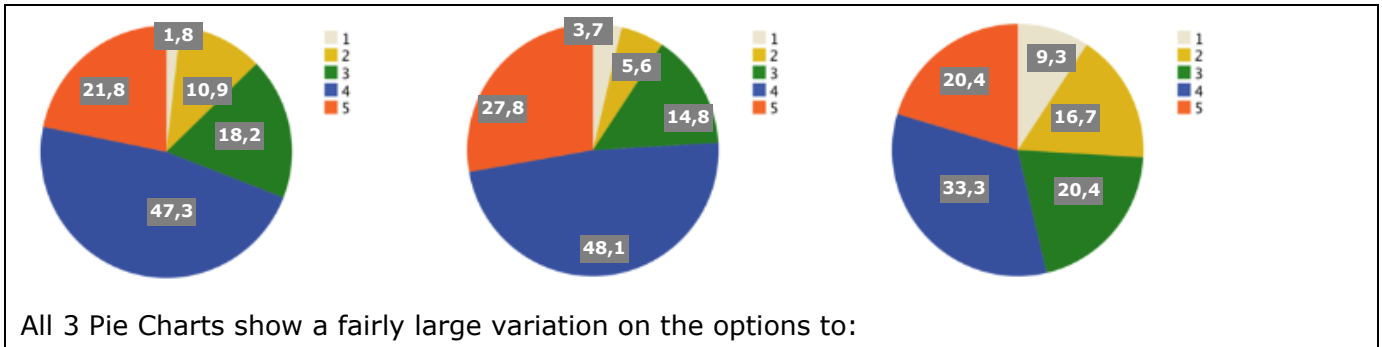
Although TUS is seen as the most valid and reliable method to capture the micro-behavioral elements of our daily life, the method suffers from a high respondent burden and, as a result, from low response rates. On the output side, this means a lower quality (e.g. less activities reported) and a selective representation of the population. For NSIs this means a higher data collection cost.

In order to reverse this trend the collection of time use data needs to be modernized via technological developments. These technological developments would need:

- to improve the participation of the respondent
- to better integrate other sources of information, and
- to arrive to a more efficient data collection for Member States

As introduced to the test participants, the setup of MOTUS makes it possible to provide/include personal data in different ways. In the evaluation questionnaire 3 scenarios were presented and which were by the test respondents rated from 1 to 5. The figure below shows the results.

Figure 20: Ratings given by the test respondents to use personal data



- Include administrative data (e.g. from the National Register) [Mean 3,76 – S.D. 0.981]
- To use earlier research input of the respondent [Mean 3.91 – S.D 0.996]
- To use passive data registration via sensors (e.g. your location tracked via the GPS on your phone [Mean 3.39 – S.D 1.250]

While some test participants have their doubts about including administrative data or even to retrieve earlier given information by the respondent, still more than 2/3th is in favor. For the inclusion of passive data (e.g. geolocation data), the pro-majority is reduced to 54%. For all three options the group in favor consist more of respondents that gave a 4 on 5.

The evaluation questionnaire also introduced the position towards the inclusion of personal data with the question whether the tester 'would be for or against a central position of the respondent having control of their own data'?

The answers show that 31% of the test participants is totally in favor (score 5), and another 55% gave a 4 on 5. This element is important when including external data, and the test respondents seem to support this in a strong way.

## 4.2 The same platform for TUS and HBS

The correlation between ideas and innovation is high. Without sharing ideas, without organizing debates and reflection there would not be a fertile sole for innovation.

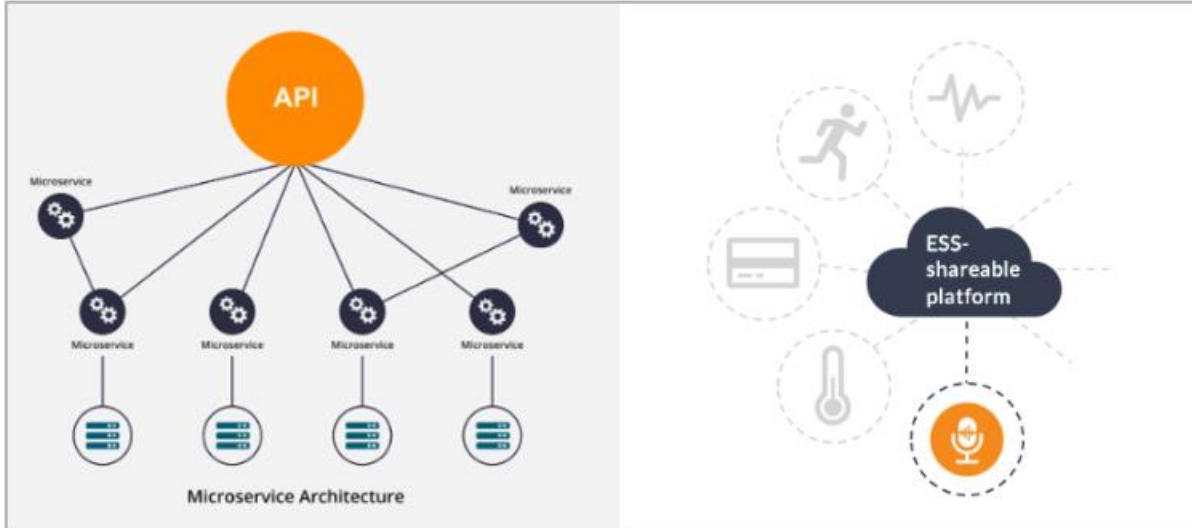
A first innovative take-up was to evaluate the current qualities of MOTUS in the light of organizing a HBS data collection. More concrete the underlying questions were 'Which are the components that are already available in MOTUS that can be reused for HBS?' and 'Which are the components that need to be developed to be able to organize HBS via MOTUS in the future?'.

To start this work a detailed review has been made of the different MOTUS-builders. This review resulted in the finding that the platform already has an important amount of elements included that are essential to collect HBS data.

1. One of these elements is the availability over the builders to define a questionnaire, to define communication, to define diary parameters, to define extra languages, to define an invitation strategy, to define a dashboard for fieldwork follow-up and to download the datasets.
2. Another element is that also the task-to-task functionality that was evaluated positively by the test respondents is an absolute necessity within the ecosystem of HBS. HBS respondents also get questionnaires on the household and individual level and have to complete a consumption diary over a longer period, be it 15 days, a month or even longer. This task functionality gives NSIs the opportunity to organize a data collection without the use of an interviewer, or to reduce these costly interventions (both in time and budget).
3. A third and last element is that TUS and HBS can be organized via one and the same (web and mobile) application. The MOTUS application receives its content at the moment the respondent logs in. This is called the 1-to-N strategy. Therefore the app is really flexible and content can be (re)defined at every moment. It is even possible to include more than one research for the same respondent.

Nevertheless there is also a strong todo-list, which need to be translated into the development story. This list contains the creation of an HBS database structure, the creation of specific HBS diary functionalities, the design of a COICOP-classification structure and the adaptation of a dashboard system that fits HBS purposes. In this list, new ideas are also taken into account. These ideas discuss the inclusion of external sources and more specific the inclusion of plugins or Microservices.

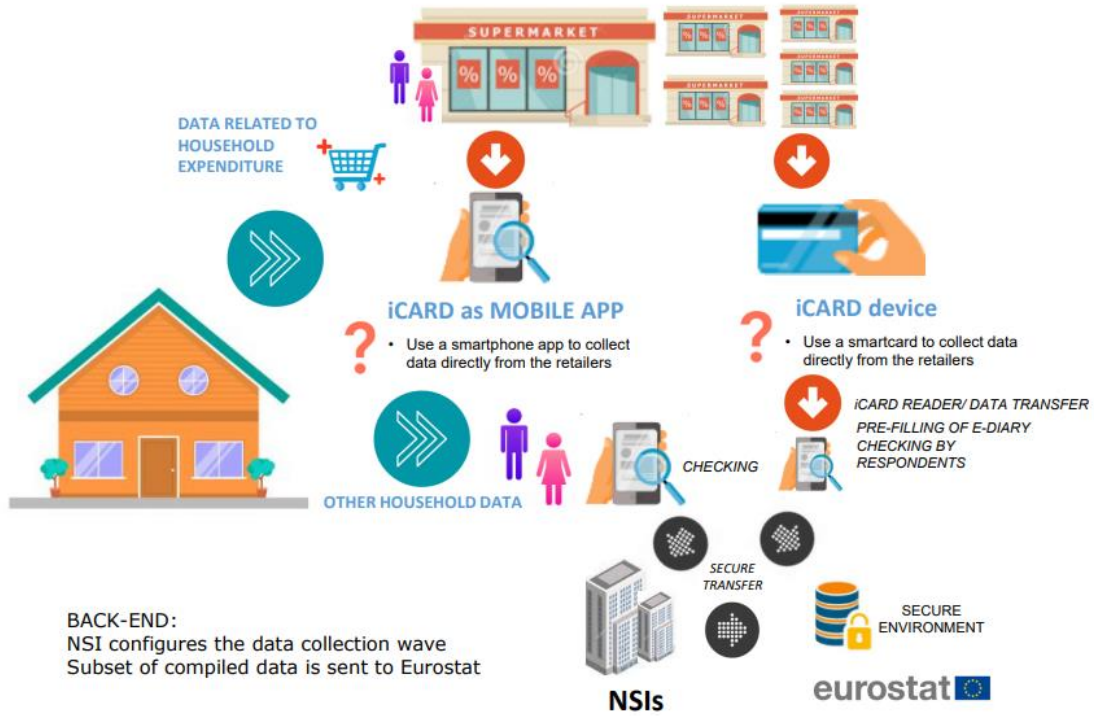
Figure 21: Microservice Architecture as an example of a plugin



Time research collects rich data, but the data collection process is burdensome for respondents, especially when respondents are being asked to keep a record of their activities on the go. When moving more to an online data collection, and the use of Smartphones and applications from the iOS and Android platforms are growing, it is not a surprise that new features to improve the registration by the respondent are investigated. With the use of Microservice MOTUS becomes extra modular as these services can be plugged in and plugged out depending on the research that has been defined in the research builder of MOTUS. An example for HBS is the iCard and receipt scanning, for TUS it is the geolocation plugin.

An iCard device is a smartcard to collect data directly from the retailers, where the data can be used for pre-filling the e-diary of the respondents as you can see on figure 22 below.

Figure 22: iCard data as an innovative way to collect HBS data



The figure below shows a visualization of a geolocation tracking, and next of the determination process of a geofence. Both aspects belong to the Event builder of MOTUS.

Figure 23: Output of a geolocation tracking

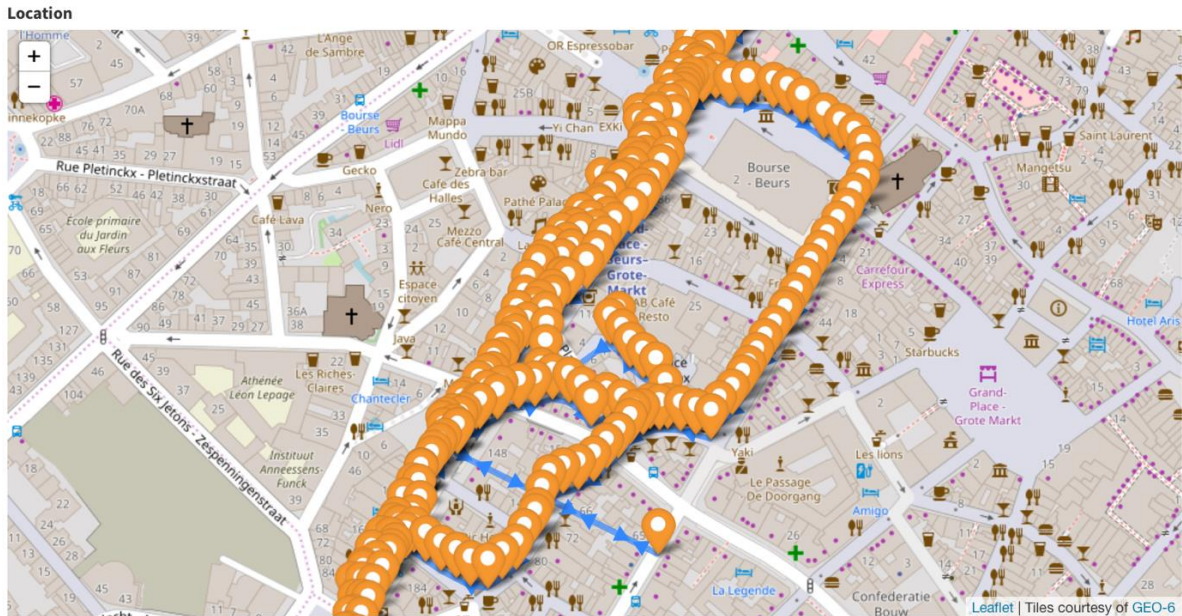




Figure 24: The determination of a geofence

**Name**

Boulevard Anspach (nord)

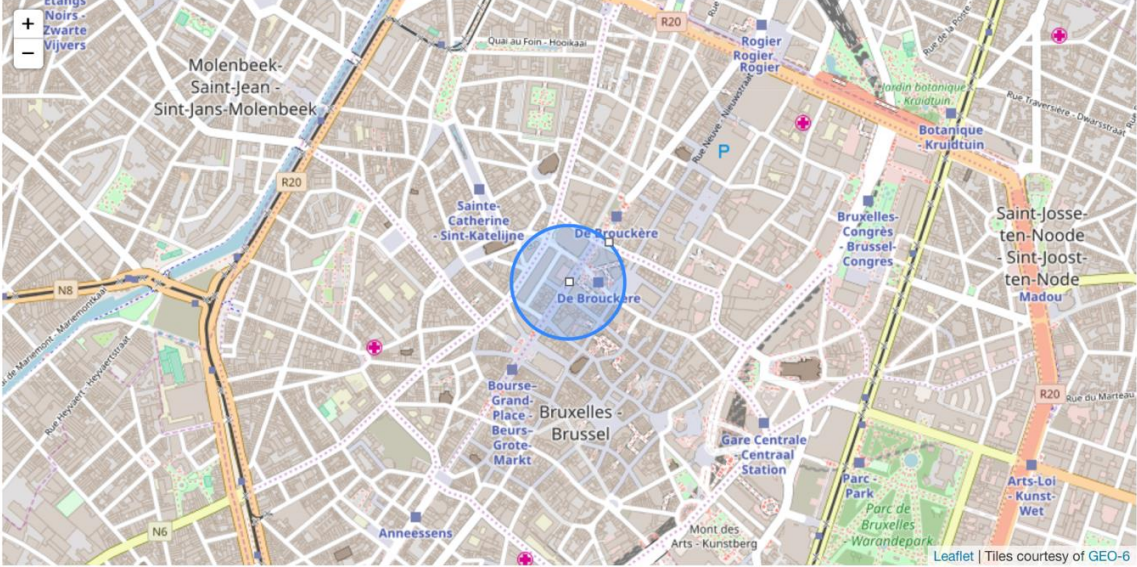
---

**Address**

Boulevard Anspach (nord)

---

**Location**



Leaflet | Tiles courtesy of GEO-6

**Radius (meter)**

150

**Settings**

Tracking



### 4.3 How to work with the MOTUS platform as an NSI

The WG/TF TUS & HBS have discussed the criteria to which a tool and platform should comply to. These domains are:

1. Functionality & maintainability
2. Reusability
3. Online availability
4. Usability, user friendliness & accessibility
5. Data comparability
6. Statistical aspects
7. Costs

The first five requirements are used as a guideline to evaluate MOTUS and the methods of TUS and HBS. This resulted in a 42-action list which should lead the way to arrive to a state of Trusted Smart Statistics.

Not despite all points are essential, it is in particular the first criteria that holds the basic ingredients for MOTUS to become a usable tool for NSIs for multiple surveys. The most important question is how to govern the code, so that the outcome of the code is available to the NSIs while at the same time comparability in the data collecting is guaranteed. In doing so this report looked into four different architectures to implement MOTUS.

These four architectures are:

- A - MOTUS as a service
- B - MOTUS as a data collector
- C - MOTUS virtualized
- D - MOTUS native installation

In total 21 criteria are scored with + and - with three different grades (+++/---). In this way it offers an architecture quality assessment. Based on all these criteria it shows that the installation of a virtual machine (Architecture C) is the most promising to arrive to a true platform that gives high values to shareability and comparability. The option of a virtual machine will also be used by Statbel as the chosen option to perform the next TUS data collection.

Below a schematic overview is given of Architecture C, including the position of MOTUS as a Docker image. Architecture C provides the building blocks for the 'industrialization' of the MOTUS-software, and so the flexibility towards the NSIs to choose from the list of virtual containers and at the same time the possibility to develop solutions of their own that can communicate with each other. In this perspective NSIs can exclusively handle their own surveys.

Figure 25: Architecture C – MOTUS virtualized

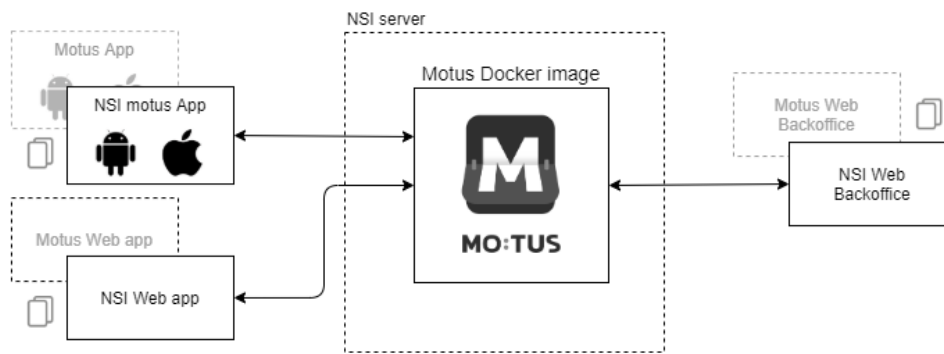


Table 5: Architecture quality assessment of MOTUS

Criteria	MOTUS-governance: options			
	A	B	C	D
	Full Service	Data collection	Virtual application	Native installation
Simplicity	+++	+++	--	---
Stability	++	+	+++	-
Relational cohesion	+++	-	+	--
Maturity	+++	+	++	---
Efficiency	+	+	+++	-
Maintainability	+++	-	+++	---
Responsibility	+	++	++	--
Support	+++	+	+++	--
Usability	--	--	++	+++
Suitability	+++	-	+	++
Extensibility	+++	+	+++	---
Scalability	++	+	+++	---
Interoperability	+++	--	+++	--
Availability	+++	+++	+	-
Security	+	-	++	+++
Comparability	--	-	+++	---
Country specific	--	+	+++	---
Shareability	+	-	+++	---
Cost installation	+++	+++	-	---
Cost update	+++	++	+	--
Legal	+	++	+++	---

## 5 Conclusion and recommendations

### 5.1 MOTUS as a platform

The use of builders comprised in the back-office supports MOTUS in its most powerful asset: modularity. It is the composition of the builders, and the choices being made within these builders that define the actual set up of a particular research. As such, MOTUS makes it possible to define multiple researches, than can run at the same time, even for the same respondent.

MOTUS supports data collection online and offline combined via a mobile (iOS and Android) and online via web application ([www.motusresearch.io](http://www.motusresearch.io)). Respondents can use any preferred device as the design for both applications is similar and the information collected by the devices is shared and synchronized between the devices. Behavioral information can also be captured via sensors in the smart devices.

The MOTUS-CSPA describes the platform on a conceptual and logical level. MOTUS is a software platform performing activities in three different core phases of the GSBPM: the build, collect and process phase. Through the CSPA-documentation the NSIs and other interested parties are now informed about the possibilities of MOTUS, and what the inputs and outputs are. This information can be found via an online inventory of tools and sources that is been designed by EUROSTAT.

### 5.2 Testing MOTUS for TUS

After having documented information about MOTUS it was important to share the knowledge through testing.

1. First a prototype diary for the TUS was defined using the MOTUS back-office. To show the power of the MOTUS back-office country specific variations were introduced. Variations are within the questionnaires and the online activity list but also in the definition of the time diary periods. For Belgium this was one weekday and one weekend day. Within this project also the communication towards the respondents was defined.
2. Next, the goal was to collect information about both the front and back-office of MOTUS and to evaluate MOTUS as a software platform. The defined shortcomings need further software development, or belong more in the atmosphere of communication. MOTUS has by design a privacy and security requirement included. Nevertheless it is up to the national and international institutions to make their evaluation and, subsequently, to the development team of MOTUS to respond to this in a positive way.
3. With all the knowledge in hand, a test environment was setup for all TF and WG members TUS and HBS. In total 157 NSI employees were invited to evaluate the test applications of MOTUS. Test respondents were guided through the different steps of the TUS-survey with a household questionnaire, an individual questionnaire, a one day time diary and an end of diary day questionnaire. After the test the respondents were asked to complete the evaluation questionnaire.

The evaluation questionnaire asked the test persons to give comments and ratings on four different domains: the content, the design, the functional qualities and the non-functional qualities of MOTUS. 65 evaluation questionnaires were completed. In total respondents from 28 different NSIs took part in the test.

- Overall a 4,18 on 5 was given by all respondents completing the MOTUS test application.
- On average MOTUS scored a 4,02 on 5 as a platform. However, when respondents are hesitant it is mostly related to the aspects of ownership, architecture, development, license and privacy.
- Looking to the inclusion of IoT and external sources the test respondents were more in doubt, but at the same time there is a high average rating of 4,15 on 5 when respondents receive a central position in the control of their own data, which means that Privacy, Security and Going Smart go hand in hand.

### 5.3 MOTUS for HBS

The correlation between ideas and innovation is high. Without sharing ideas, without organizing debates and reflection there would not be a fertile soil for innovation.

A first innovative take-up was to evaluate the current qualities of MOTUS in the light of organizing a HBS data collection. More concrete the underlying questions were:

*'Which are the components that are already available in MOTUS that can be reused for HBS?'*

and

*'Which are the components that need to be developed to be able to organize HBS via MOTUS in the future?'*

1. To start this work a detailed review has been made of the different MOTUS-builders. This review resulted in the finding that MOTUS already has an important amount of elements included that are essential to collect HBS data. One of these elements is the availability over the builders to define a questionnaire, to define communication, to define diary parameters, to define extra languages, to define an invitation strategy, to define a dashboard for fieldwork follow-up and to download the datasets.
2. Another element is that also the task-to-task functionality that was evaluated positively by the test respondents is an absolute necessity within the ecosystem of HBS. HBS respondents also get questionnaires on the household and individual level and have to complete a consumption diary over a longer period, be it 15 days, a month or even longer. This task functionality gives NSIs the opportunity to organize a data collection without the use of an interviewer, or to reduce these costly interventions (both in time and budget).
3. A third and last element is that TUS and HBS can be organized via one and the same (web and mobile) application. The MOTUS application receives its content at the moment the respondent logs in. This is called the 1-to-N strategy. Therefore the app is really flexible and content can be (re)defined at every moment. It is even possible to include more than one research for the same respondent.

## 5.4 Recommendations

Time research collects rich data but the data collection process is burdensome for respondents, especially when respondents are being asked to keep a record of their activities on the go. With the use of Microservices MOTUS becomes extra modular as these services can be plugged in and plugged out depending on the research that has been defined in the research builder of MOTUS. Therefore, they are a crucial component to develop in the future.

It is clear that developing a software platform is far more reaching than only having a good User Interface, 'Multi-client capability' and 'Role management' are important subjects as well. The daily actions and roles within a NSI should also be covered. Only then a platform can be stretched out over different phases of the GSBPM architecture.

After testing the MOTUS platform, Statbel is of the opinion that based on the long existing strategy of the application and its shown merits like flexibility, adaptability and the most important one: modularity, the platform and the academic researchers behind the platform are well-suited to conduct diary-based surveys on a national and international level.

## 6 References

- Bevans, G. (1913). How working men spend their spare time. *Columbia University Press*.
- DGINS. (2011). *Wiesbaden Memorandum*. Opgehaald van [https://circabc.europa.eu/https://circabc.europa.eu/sd/a/51a4bcbd-2ac2-46a8-8992-cfb9e6009522/Item\\_3.3.%20Modernisation%20of%20Social%20statistics\\_annex.pdf](https://circabc.europa.eu/https://circabc.europa.eu/sd/a/51a4bcbd-2ac2-46a8-8992-cfb9e6009522/Item_3.3.%20Modernisation%20of%20Social%20statistics_annex.pdf)
- Eurostat. (2000). *Guidelines on Harmonised European Time Use Surveys*. Opgehaald van <https://ec.europa.eu/eurostat/ramon/https://ec.europa.eu/eurostat/ramon/statmanuals/files/KS-CC-04-007-EN.pdf>
- Eurostat. (2008). Guidelines on Harmonized European Time Use Surveys. *Eurostat*.
- Eurostat. (2020). *Harmonised European Time Use Surveys (HETUS) – 2018 guidelines – Re-edition*. Opgehaald van <https://ec.europa.eu/eurostat/web/products-manuals-and-guidelineshttps://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-gq-20-011>
- Eurostat. (2021, 03 11). *Inventory of tools and sources for diary-based data collections*. Opgehaald van ISTLCS/INVENTORY: <https://webgate.ec.europa.eu/fpfis/wikis/display/ISTLCS/INVENTORY>
- Harvey, A. (1993). Guidelines for time use data collection. *Social Indicators Research*, 197-228.
- Juster, T., & Stafford, F. (1991). The allocation of time - Empirical findings, behavioural models and problems of measurement. *Journal of Economic Literature*, 471-522.
- Minnen, J. E. (2020). *SOURCE TM: Software Outreach and Redefinition to Collect E-data Through MOTUS. Towards a Modular Online Time Use Survey*. Brussels: Statistics Belgium, Destatis, hbits CV and Vrije Universiteit Brussel. - TOR.
- Nations, U. (2004). Guide to producing statistics on time use. *Statistic Devision, Department of Economic and Social Affairs*.
- Pember, R. (1914). Round about a pound a week. *Garland Publishing*.
- Sabbe, K. V. (2019). *Huishoudbudgetonderzoek 2018 - methodologische nota*. Opgehaald van <https://statbel.fgov.be/nl/https://statbel.fgov.be/sites/default/files/files/documents/Huishoudens/10.1%20Huishoudbudget/Met%20methodologische%20nota%202018.pdf>
- Sabbe, K., Delclite, T., & Geenens, G. (2021). *Change in the duration of the household budget survey: analysis of a transition to 15 days*. Brussels: Statistics Belgium.
- Sabbe, k., Delclite, T., & Geenens, G. (2021). *Wijziging van de duur van het huishoudbudgetonderzoek: analyse van een overgang naar 15 dagen*. Brussel: Statistics Belgium.
- Statbel. (2019). *Cijfers van het huishoudbudgetonderzoek*. Opgehaald van <https://statbel.fgov.be/nl/https://statbel.fgov.be/nl/themas/huishoudens/huishoudbudget/plus>
- Statbel. (2021, 03 04). *Huishoudvragenlijst*. Opgehaald van [https://statbel.fgov.be/nl/https://statbel.fgov.be/sites/default/files/files/documents/Huishoudens/10.1%20Huishoudbudget/Questionnaire\\_m%C3%A9nage\\_2018.pdf](https://statbel.fgov.be/nl/https://statbel.fgov.be/sites/default/files/files/documents/Huishoudens/10.1%20Huishoudbudget/Questionnaire_m%C3%A9nage_2018.pdf)
- Statbel. (2021, 03 04). *Online huishouddagboekje*. Opgehaald van <https://statbel.fgov.be/nl/https://hbs.statdata.be/hbs/login.xhtml?jsessionid=9AB80ED44AB6A28F6DF773A1B3359D9.worker12>
- Statbel. (2021, 03 04). *Papieren huishouddagboekje*. Opgehaald van [https://statbel.fgov.be/nl/https://statbel.fgov.be/sites/default/files/files/documents/Huishoudens/10.1%20Huishoudbudget/carnet2016\\_NL.pdf](https://statbel.fgov.be/nl/https://statbel.fgov.be/sites/default/files/files/documents/Huishoudens/10.1%20Huishoudbudget/carnet2016_NL.pdf)
- Statbel. (2021, 03 11). *Time Use Survey*. Opgehaald van <https://statbel.fgov.be/https://statbel.fgov.be/en/themes/households/time-use-survey>
- Stinson, L. (1999). Measuring how people spend their time - A time use survey design. *Monthly Labour Review*, 12-19.
- Szalai, A. (1972). The use of time - daily activities of urban and suburban populations in twelve countries. *Mouton*.
- Termote, A. e. (2018). *De hervormde enquête naar de arbeidskrachten in 2017*. Opgehaald van [https://statbel.fgov.be/nl/https://statbel.fgov.be/sites/default/files/Over\\_Statbel\\_FR/Analyse\\_eak\\_2017\\_nl\\_20181220.pdf](https://statbel.fgov.be/nl/https://statbel.fgov.be/sites/default/files/Over_Statbel_FR/Analyse_eak_2017_nl_20181220.pdf)
- Zuzanek, J. (1980). Work and leisure in the Soviet Union - A time budget analysis. *Praeger*.

# ANNEXES

## Description of the data collection architecture in Belgium

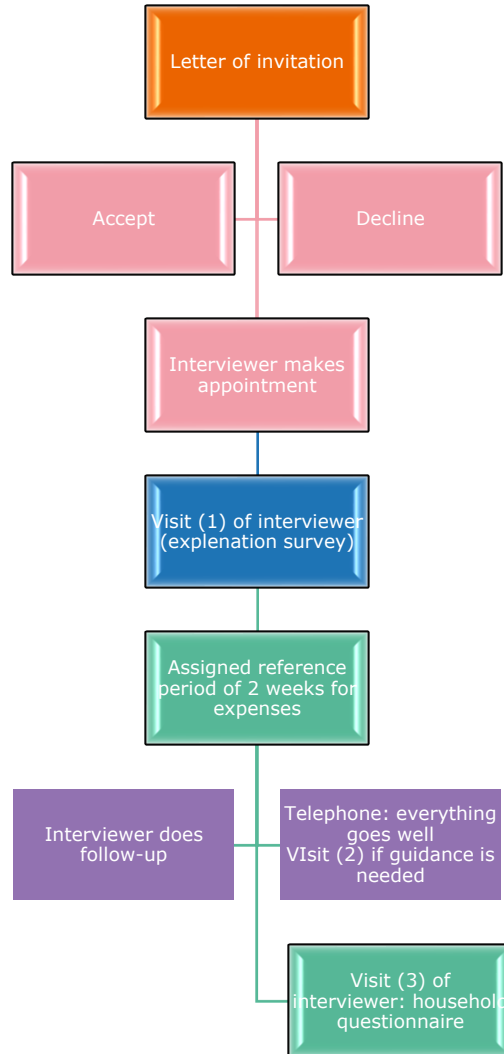
Evaluation of the Statbel data collection architecture, and a functional and technical comparison with the software architecture of MOTUS. This subtask includes steps for implementation through IT.

### Research Flow: the respondent journey

There are two ways households are contacted:

- 1) After the last wave of LFS, the household is asked the question if they would be willing to participate in HBS.
- 2) All households receives a letter of invitation from Statbel. They can confirm or decline to participate.

Figure 26: Overview of the respondents journey in Belgium



There are some tasks the household need to perform:

- 1) The small expenses are captured through continuous/daily registration. This is a retrospective registration.
- 2) The larger expenses are captured through the household questionnaire.

### **Interaction with households**

The NSI: sends letter of invitation.

Afterwards, the interviewer:

- 1) Calls to make appointment
- 2) First visit: explanation of survey
- 3) Second contact: by telephone or visit
- 4) Last visit: to conduct household questionnaire

### **Communication between NSI and households**

Before survey:

- NSI sends invitation letters
- Letters contain general phone number and email for NSI
- General phone number is answered in general contact centre (first line). Contact centre can forward the call to the data collection unit (back office).
- Email is read by the data collection unit (1 responsible + 1 backup in both languages)

During survey:

- Interviewer will get in contact with households.
- Interviewer gives his personal contact information to households.

After successful survey:

- NSI sends letter.
- This letter contains: thank you – letter + evaluation survey + forms for payment (=“creance”)

### **Settings of the study**

Table 6: Settings of HBS in Belgium

Periodicity	Every even year since 2012 (2014 – 2016 ...)
Duration	Assigned 15 days reference period Last interview about 45 minutes
Interviewer involvement	Three visits, Interviewer has one month after the end of the reference period to return all the documents to NSI
Expenses	Daily registration and household questionnaire
Cluster	All household members fill in the same book or have the same account Individual: interview with the reference person or other adult

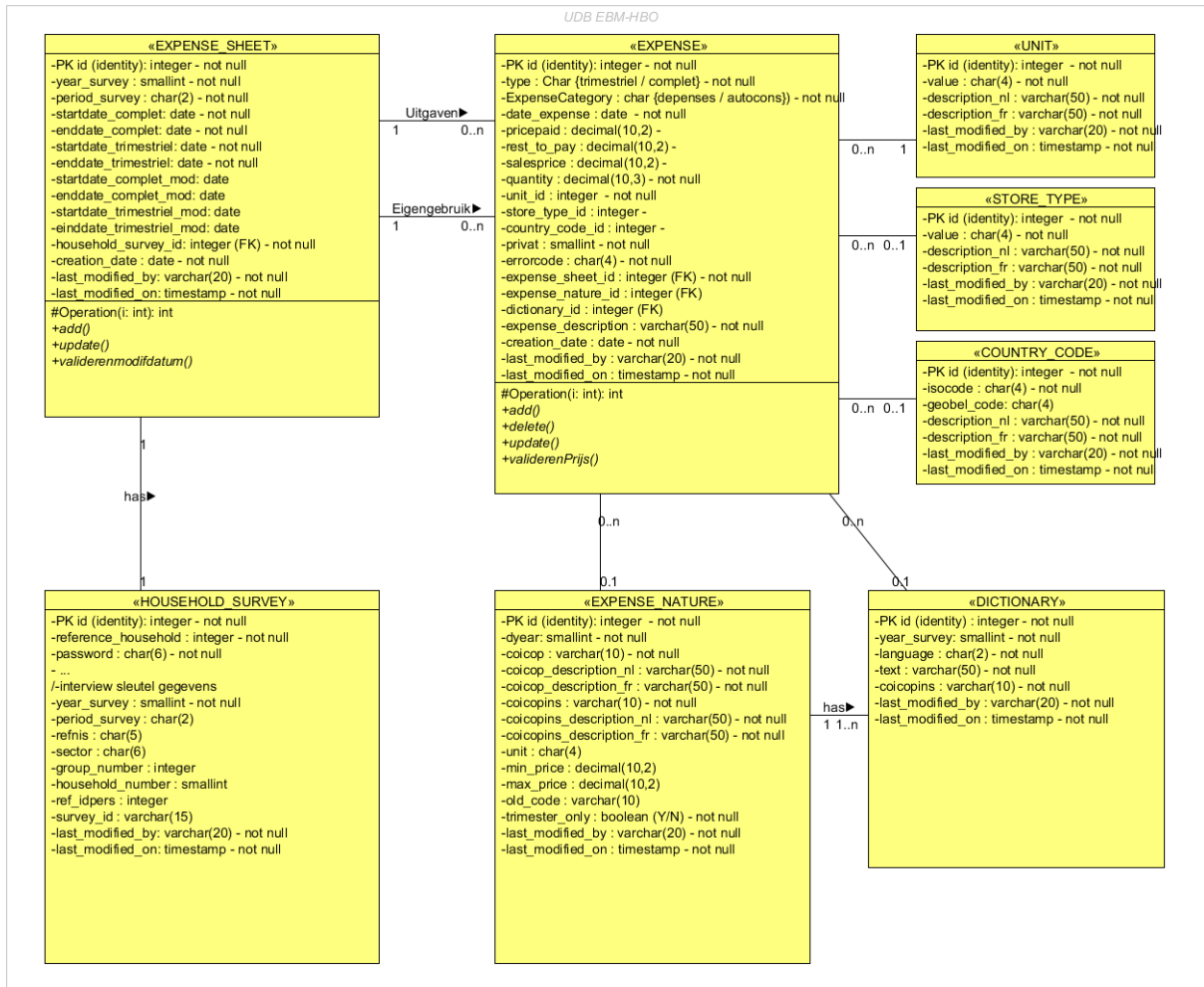


## Setup of the infrastructure

Table 7: Front-and back office: mode of data collection in Belgium

<b>Front-office</b>		
	<b>Expenses</b>	<b>Household questionnaire</b>
PAPI/CA(P-T-W)I/Online/Connected devices – sensors	Choice between paper&pencil and online 2016: 46% paper and pencil / 54% online	CAPI
Native/Hybrid/Web based application	Web based application	Program installation on umpc
Cross-platform/browser usability	– Computer – Smartphone – Tablet  OR paper and pencil, later encoded by survey organisation using web-program	UMPC for the interviewer
Characteristic of the application (download time, memory, load time, ...)		
Programming language	JAVA application	Blaise
Framework	JAVA application	.NET framework
User interface/user logic	Webpage	Blaise
<b>Back-office/Back-end server: environment to setup surveys</b>		
Native/Hybrid/Web based application	Tomcat servers linux	Microsoft windows servers
Platform/browser usability		
Programming language	Linux	Windows
Framework		
User interface/user logic (incl. screenshots)		
<b>Database</b>		
Type RDBMS (Relational Database Management System)	DB2 LUW	Fieldwork monitoring: SAS
Characteristics RDBMS	Expenses tables	<ul style="list-style-type: none"> <li>– DB2 databases are exported to SAS (automatised transfer every night)</li> <li>– Blaise databases are also exported to SAS (via Blaise2DWH programming developed by E8-DWH team)</li> <li>– Production of excel files to monitor fieldwork by group / mailing lists / payment lists</li> </ul>
OS	Linux	Windows 7

Figure 27: RDBMS expenses table



## Security

- Authentication protocols: https
- Token/UUID: none
- Password encryption: 8 characters
- Household questionnaire password encryption : Public/private encryption
- Transmission of data to/from front and back-office: SFTP – SSH file transfer protocol
- There are no API available.

Figure 28: Schematic overview of expenses collection in Belgium

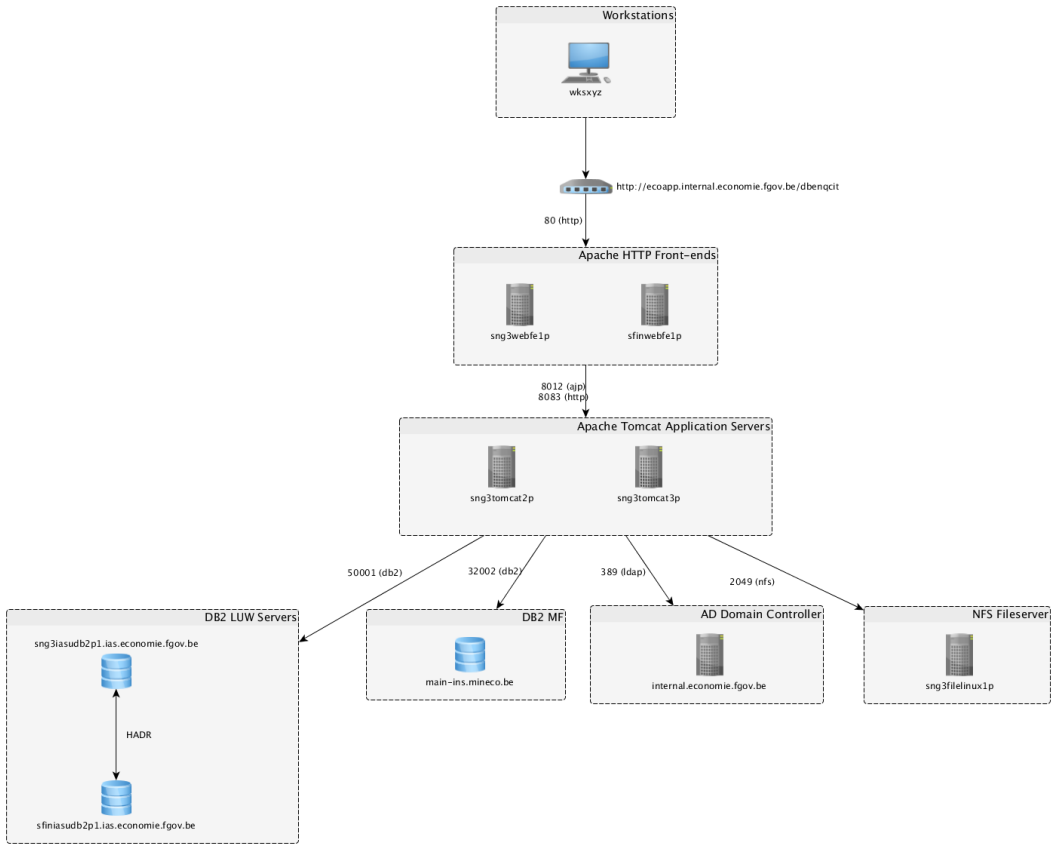
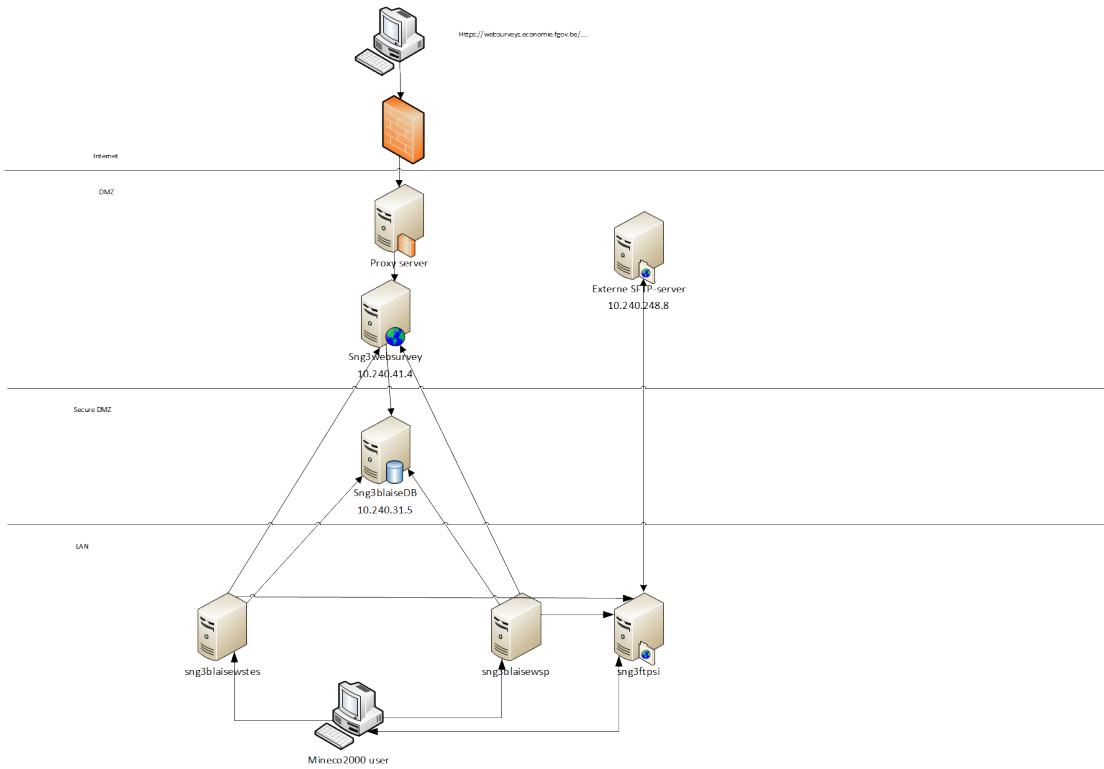


Figure 29: schematic overview of the household questionnaire data collection in Belgium



## Other data sources

	Expenses	Household questionnaire
<b>Population Register</b>	Used for sampling Offline	
Content	No	<ul style="list-style-type: none"> <li>Name</li> <li>Gender</li> <li>Date of birth</li> <li>Nationality</li> <li>Reference person / relationship to RP</li> </ul>
<b>Tax registry</b>	Used for calibration Offline	
Content	No	Household incomes

## Archive

The archive is held by Blaise2DWH program so that information can be recovered.

Table 8: SWOT-analysis of the Belgian and German data collection

Strengths	Weaknesses
Registration tool: <ul style="list-style-type: none"> <li>Stable</li> <li>User friendly</li> <li>Easy to do yearly adaptation</li> <li>Harmonised and concerted processes</li> <li>High security standards</li> </ul>	<ul style="list-style-type: none"> <li>Fieldwork monitoring not automatized</li> <li>Lots of paper: does not correspond to respondent's needs</li> <li>Shortened timelines cannot be met</li> </ul>
Opportunities	Threats
Modern techniques in smartphones can lead to easy ways to collect data, for example scanning will be possible for every household. Modernisation of techniques: by this: <ul style="list-style-type: none"> <li>decrease of respondent burden and</li> <li>increase response rates, data quality and actuality</li> </ul>	Survey climate and concern for privacy can lead to lower response rates as people do not want to share their information. <ul style="list-style-type: none"> <li>Timing and costs of developing a new application (encapsulation of an additional mode)</li> <li>Risk of failing: becoming outdated in a fast moving development of market; no/bad acceptance due to concern of privacy/data security, usability</li> </ul>

## ABOUT STATBEL

Statbel, the Belgian statistical office, collects, produces and publishes objective and relevant figures on the Belgian economy, society and territory.

Statbel produces scientific statistics based on administrative data sources and surveys. The statistical results are published in a user-friendly way, and are available to everyone at the same time.

The data collected are used by Statbel for statistical purposes only. As statistical office, we guarantee at all times the privacy and the protection of confidential data.

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