INNOVATION OF THE DUTCH NATIONAL TRAVEL SURVEY; IMPLEMENTATION OF THE NEW DESIGN

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1. INTRODUCTION

Over the years 2015-2017 an innovation programme for the Dutch National Travel Survey (NTS) is conducted with the aim of implementing a new design in 2018. This paper describes the new design for the NTS to be implemented in January 2018.

Traditional travel surveys serve as the 'backbone' of many models, and source of overall insight in mobility and (developments in) travel behaviour at regional / national level. It is to be expected that such surveys will continue to be an important source of information and explanation of (developments in) travel behaviour.

An NTS is complex, and the costs are high. Because it is getting harder to have people participate in the survey the costs increased considerably over the years. In order to realize better control of the costs versus quality an innovation program was started in 2015. The goal of this program is to innovate the Dutch NTS by using new techniques of data collection and survey design. In 2015 a broad exploration of possible innovations was conducted. In 2016 the program focussed on some promising options that were identified. In 2017 the lessons learned are implemented into a new design of the research that will be implemented in January 2018.

1.1. Structure of the paper

This paper will first describe the basic assumptions and chosen structure for the innovation research. After that a short description of the current NTS and information profile (which people are part of the survey, which information is collected in the survey) will be given. Then the steps of 'broad exploration' (in 2015) and 'focussing on promising options' (in 2016) are presented. Finally the chosen design for the travel survey for 2018 onwards is described.

2. BASIC STRUCTURE FOR THE RESEARCH PROGRAM

In order to define the scope for the innovation research the following basic principles were defined:

- The research will focus on finding improvement for the NTS that will lower the costs whilst maintaining/improving the quality of the survey and/or improve quality at equal costs
- Improvements and innovations need to be stable over the years: a new design will be used for many years
- The existing information profile that is covered by the current NTS is to be maintained
- Both incremental improvements of the current data collection as well as radical innovations for data collection could be investigated
- Results are to be implemented in a new survey that will start in January 2018

CLASSIFICATION OF HOW THE NTS IS USED

Improvements or changes to the design of the NTS can have impact on how the results can be used for different purposes. Two main types of usage were defined:

1. Monitoring of mobility trends: in order to understand the main characteristics of mobility, and how they change over the years, the NTS is used to monitor modal split, kilometres travelled per mode / purpose etcetera.
2. Explanation and analysis of travel behaviour: to answer (policy) questions about developments in mobility and travel behaviour, and as an (estimation) database for models

Figure 1 summarizes this

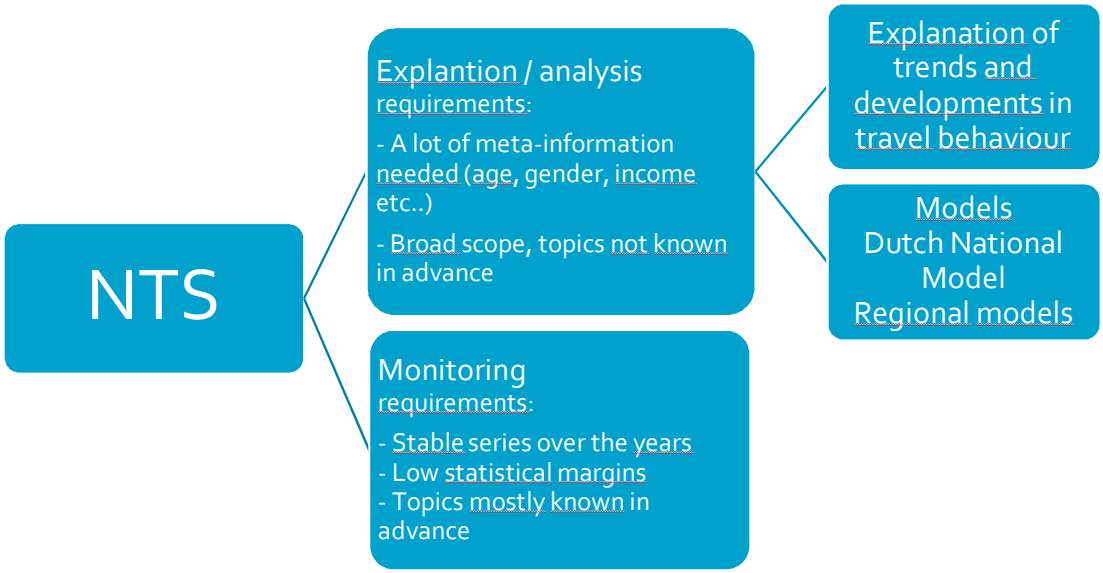

Figure 1: classification of use of NTS data

INFORMATION PROFILE OF THE CURRENT DUTCH NTS

One of the basic principles was that the existing information profile will be maintained. The Dutch NTS is a person survey (1 person in a household is asked to participate). The goal of the Dutch NTS is to provide information about the daily mobility in the Netherlands by the Dutch population. This is the regular mobility of people living in The Netherlands that are member of a normal household. Vacation mobility is not part of the data collection.
From each respondent, a lot of meta information is collected: Age, gender, education level, marital status, social participation, driver licence ownership, ownership of bicycle, car, motor, moped, scooter. Socio-economic information of the other members of the household is also collected.
For the reported trips the following information is collected:

- Departure time
- Departure Postal code
- Arrival time
- Arrival Postal code
- Purpose
- Used main modality (detailed: for example, also a distinction by regular bike or e-bike)
- In case of a trip chain with more modalities: used modalities, time spent and distance travelled per modality
- For train access and egress station
- For car trips, how many people were in the car
- Whether the trip is escorted by some else or is to escort someone

DESIGN

The sample is drawn from the national base registration ('Basisregistratie Personen'). The people in the sample receive a letter in which they are asked to report their mobility for a given day in a web questionnaire (CAWI), after 2 recalls people with a known telephone number are called to participate in a telephone interview (CAWI) and the rest is visited at home for a CAPI survey. Currently the sample is set up that 35.000 responses are collected each year. People in all age classes (0 -100+) can be selected for the survey. Approximately 1.200 extra responses are selected for the Amsterdam region commissioned by the Amsterdam transport region.

3. PHASE 1 AND 2, BROAD EXPLORATION AND FOCUSSING

2015

In 2015 a broad program was defined with the following topics:

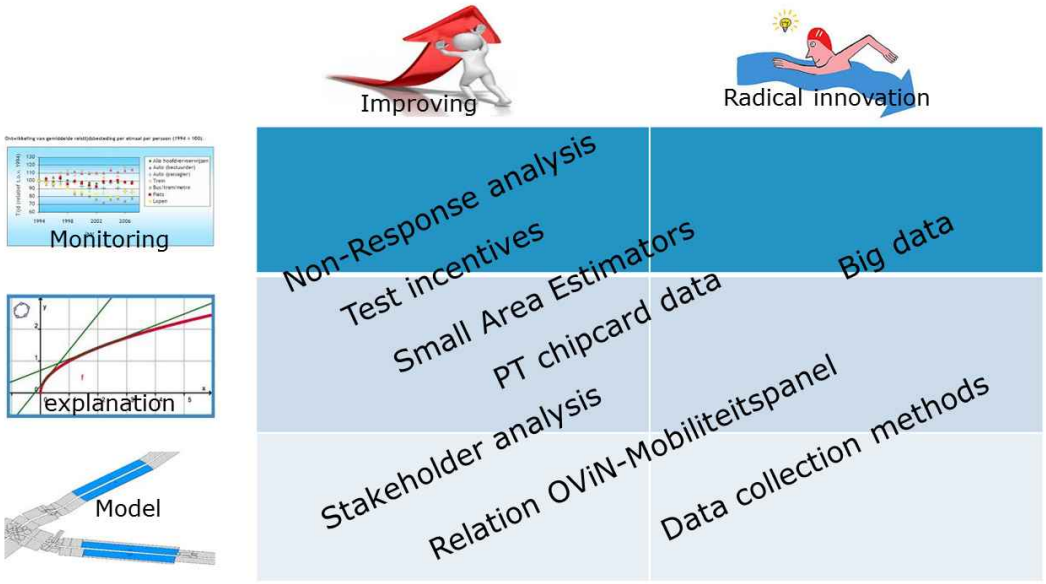

Figure 2: work program 2015

MAIN CONCLUSIONS OF THE 2015 RESEARCH TOPICS

From the 8 research projects that were conducted in 2015 the following main conclusions and lessons were learned:

1. **Non-response analysis**: Detailed knowledge about the response for different population segments, and per research mode CAWI, CATI, CAPI. Main insight is that there are some differences in the response per mode for specific population segments (for example higher CATI response for the segment 65+). The main indicators average number of trips per day and mean travelled distance per trip also show a small difference per research mode (CAWI a slightly lower number of trips

per person per day, but a slightly higher average trip distance). Differences between the CAWI, CATI and CAPI mode were identified, but were small and can partially be corrected, for example in the sampling. By interviewing non-respondents, insight in the reasons why people did not participate was also developed.

2. **Incentives**: Both unconditional (€5 gift cheque in the first letter) and conditional (possibility to win an i-pad for participants) were tested. the main results are given in the table below:

	CAWI			CATI			CAPI			Total		
	Gift cheque	i-Pad	regular	Gift cheque	i-Pad	regular	Gift cheque	i-Pad	regular	Gift cheque	i-Pad	regular
…	1500	1500	2530	499	625	1128	393	479	812	1500	1500	2530
Response	551	347	455	271	316	537	180	244	388	1002	907	1380
Response%	36,70%	23,10%	18,00%	54,30%	50,60%	47,60%	45,80%	50,94%	47,78%	66,80%	60,47%	54,55%

Overall response improved from ca. 55 to ca. 65%. The conditional incentive also improved overall response from 55 to 60%. The response of the tests with incentives was analysed to investigate if the use of the incentive had an impact on the quality of the response collected. It was concluded that the incentive had no negative impact on the quality of the data collected.
The conclusion is that response can be improved by incentives, probably in a cost-effective way.

3. **Small area estimators**: this research focussed on the question if it is possible to use the technique of small area estimators to improve the statistical reliability of results for sub-population estimates (for example estimates at provincial level). It proved to be difficult to find adequate models for this.

4. **Stakeholder analysis**: through interviews with stakeholders, potential improvements for the survey were investigated. Overall stakeholders were satisfied with the information provided through the NTS. Small additions and changes in the information profile were identified.

5. **Data collection techniques, big data, PT chip card data and relation with the Mobility Panel**: These four items are related. For **big data,** it was concluded that the lack of meta data of the 'respondent' typically for big data sources makes it difficult to use big data sources in combination with a NTS. The conclusion with respect to the (promising) technique of **smart phone technology** for data collection is that this technology is not yet mature enough to implement in a full scale national travel survey. **PT chip card data** is promising but

privacy issues to use this data will not be easily solved. The **mobility panel** is a longitudinal household survey with a smaller sample than the NTS. This survey is complementary to the NTS and can fill knowledge gaps that are not covered by the NTS.
Within these research topic the possibility to use **register data** was also investigated. Statistics Netherlands has the possibility to use national registrations in combination with data collection. It was investigated what socio-economic data can be coupled with the responses. It appears that nearly all relevant socio-economic data of respondents can be coupled with good quality. This means that a new questionnaire can be significantly simplified because the so-called 'household box' is not needed anymore.

2016

An important conclusion of the 2015 research was that implementation in 2018 of potentially promising new technologies in the national travel survey is not yet feasible. A lot of knowledge on response characteristics and preferences and reasons for participating in the survey was also gained. The 2016 research program focussed on how a new design, respondent approach and questionnaire can be developed that can be production ready in January 2018.
This resulted in the following work program for 2016:

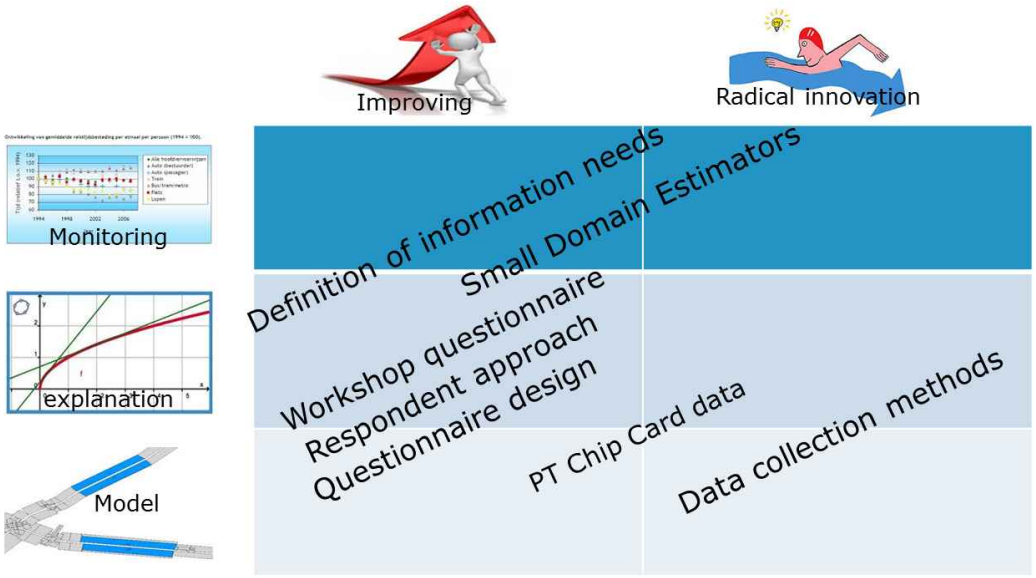

Figure 3: work program 2016

MAIN CONCLUSIONS OF THE 2016 WORK PROGRAM

1. **Definition of information profile**: One of the basic principles formulated at the start of the paper was that the current information profile that is covered by the NTS is leading. However, from stakeholder information, and assessment of policy issues that can become relevant in the coming years some small changes to the information profile were identified: Some more detail in the ownership status of cars that are used for trips (also hired / shared car concepts). The decision was also made to only set out the NTS to respondents of 6 years and older. From the age of 6 there is a good chance that respondents will be making trips on their own (for example walk to the friend some blocks away). Children under 6 will nearly always be guided when making a trip. The new questionnaire will contain questions to establish whether a trip is made to accompany someone under the age of 6. In that way mobility of this age group will still be (partially) observed.
2. **Questionnaire design, respondent approach**:
   In 2016 an evaluation was held with interviewers that conducted a post survey amongst non-respondents in the non-response analysis. In this survey also feedback about the letters that are used was collected. The general feedback was that the letters were not very clear and 'formal' which was not always appealing. Feedback that the questionnaire was complex / long was also collected. The reason why the 'mobility survey' starts with a lot of questions about the personal and family characteristics is also not clear for respondents and is in some cases a reason for non-response. Therefore, a study was undertaken to investigate if the personal and household information could also be added to the database by coupling register data with the response. This appeared to be possible, giving the opportunity to remove the household box in a new survey to make it easier and more user friendly.
   By combining the lessons of the non-response analysis, definition of the information needs and possibilities of the new generation software for questionnaire design, a start is made to develop new questionnaires. The next section will give some more details on this topic. In order to improve the way in which the respondent is approached, a short clip was made to explain the survey, and motivate respondents to participate. In making this clip also a consistent line of reasoning and communication style was developed that helps to improve the communication with respondents.

3. **Data collection methods, Small domain estimators and PT chip card data**: These topics partially continued in 2016. For data collection methods, a field test with GPS loggers was executed, and the potential of SDE and PT chip card was further investigated. As a follow-up of the research into innovative data collection methods a field test with GPS loggers was executed. The 2016 ETC paper 'Practical experiences with GPS loggers and smartphones in travel surveys' discusses the results of this test.

4. 2017; PREPARING FOR A NEW DESIGN

By combining the insights and knowledge of the 2015 and 2016 research the conclusion was drawn that it will be possible to use a CAWI-only design for the new survey that will start in 2018. The following innovations to realize optimal quality of the survey will be implemented:

- Designing a new letter based on the new communication style developed in 2016, making use of simpler, less form text, clearer instructions how to participate
  In 2017 tests were done to see if adding a folder with extra information about the survey, and adding a memory jogger to help the respondent to log his mobility, had a positive impact on response rate. Small effects were identified, but it was not possible to formulate a conclusion which combination was the best. For the start in 2018 a combination of letter and folder will be used.
- Introduce a conditional incentive, in order to improve response rates. Although an unconditional incentive had a larger impact on the CAWI response rate, overall a conditional incentive is more cost effective.
- From the non-response analysis knowledge is obtained about groups that have a significantly different response rate in CAWI compared to the average response rate. These groups will be over- or under sampled in such a way that their share in the response will be proportional with the share they have in the total population.
- The new questionnaire will be developed in a new software generation that has a more user friendly and modern interface, and has more capabilities of using lists of Point of interest etc. to help respondents
- The household box will be dropped, making the questionnaire much more logical and user friendly
- The new questionnaire will start by asking the respondent which locations he or she visited. Later in the questionnaire the details about the purposes, used modes, etc. are asked. From literature and other

travel surveys there are indications that this 'location based' approach is easier, and minimizes the chance of forgetting to report trips. The current questionnaire uses a 'trip based' approach where respondents are asked to consecutively report their trips and all details of each trip. Some examples are given in the section below

4.2. Examples of questionnaire improvements

The questionnaire of the current survey is programmed in an older version of the Blaise software. Figure 4 gives an example of the interface, and indicates which improvements will be realized using the new version of the questionnaire software.

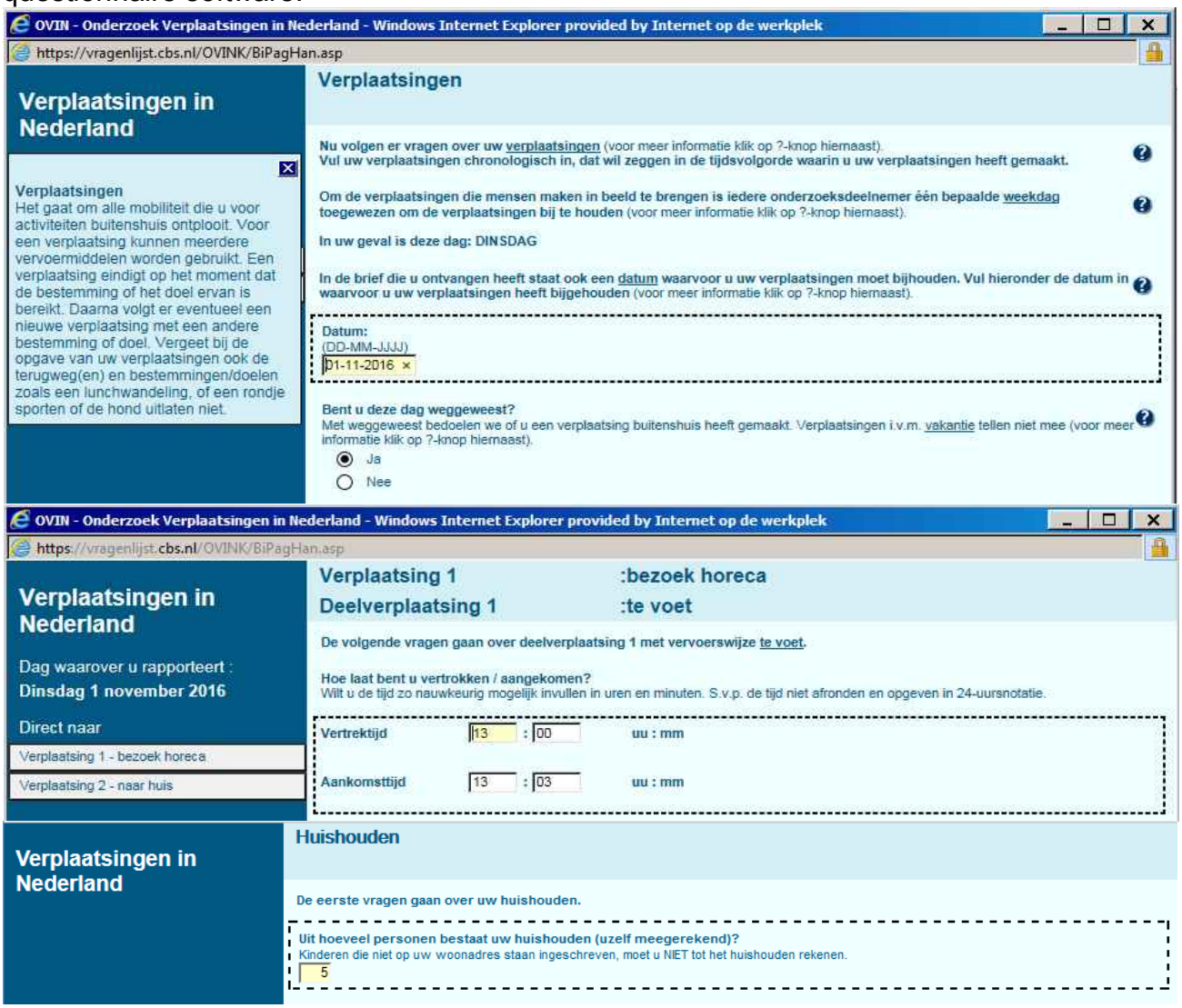

Figure 4: screenshots of the current questionnaire

The following improvements in the lay-out will be implemented in the new questionnaire:

Figure 5, improvements of the current questionnaire

1 Introtext → bigger letters, more clear formulation
2 Selection field → clearly highlighted
3 Main question → bigger letters, more clear formulation
4 Sub question / clarification → bigger letters, more clear formulation
5 Filling in field →wherever possible also tablet-friendly (for example clickable selection bars)

The new questionnaire will also be 'location based', meaning that first the locations that are visited are asked. In the left hand side of the interface the trip diary is built. After building this diary the details of the trips to the visited locations are asked. It is known from literature that people can more easily reproduce where they have been compared to a trip-based questionnaire where for each trip directly all the trip details are asked as well.

The following figures give an example of the questionnaire that will be implemented. These are screenshots of the questionnaire still in the development phase. The final result can differ slightly.

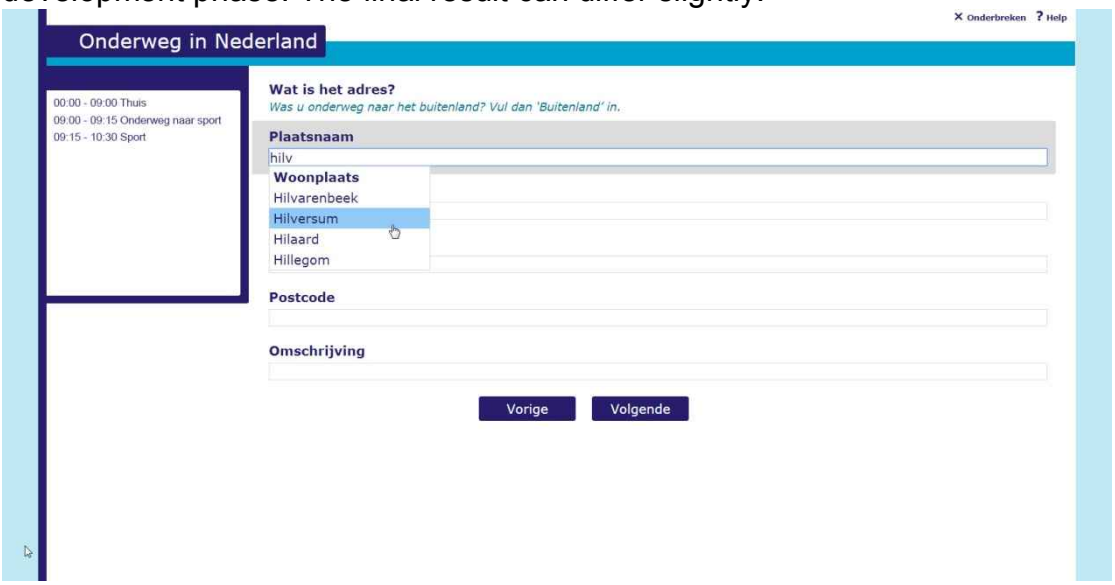

Figure 6: new questionnaire, filling in address information using lookup tables

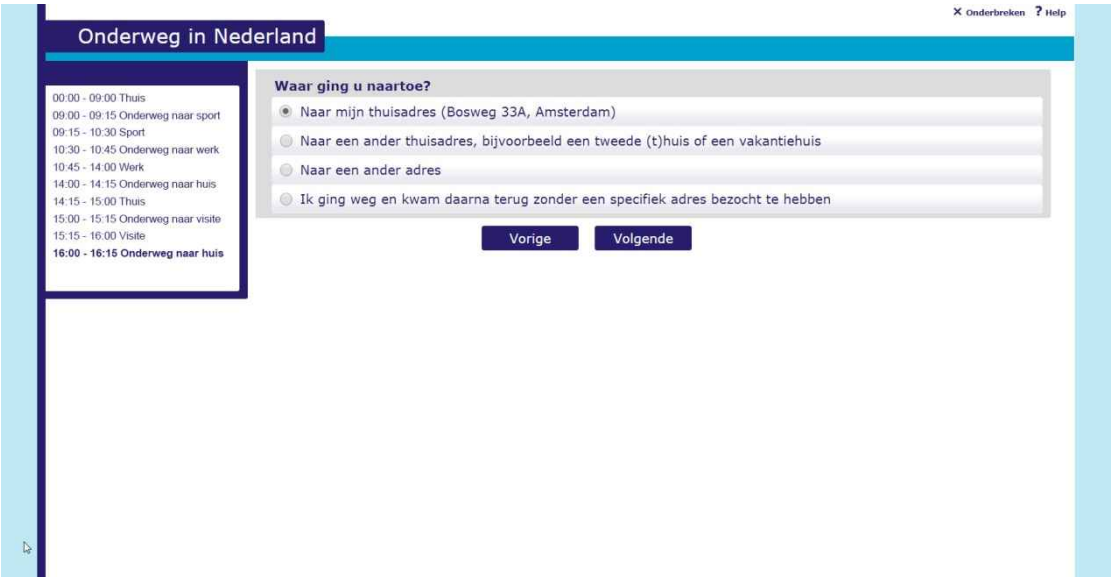

Figure 7: building up the diary

Figure 8: filling in the details of the trip-legs

5. CONCLUSIONS

A three-year innovation and collaboration program was executed by Statistics Netherlands, KiM Netherlands Institute for Transport Policy Analysis and Rijkswaterstaat. In this research program a new design for the Dutch National Travel Survey was developed that will be implemented in January 2018.
The new design will be based on a CAWI only approach. The respondent approach will be improved, and, a modern and 'location based', user friendly questionnaire will be implemented. This questionnaire makes optimal use of register data making it possible to focus on the mobility data that needs to be recorded.

One point became clear during the innovation program. That is that developments go much faster than before. To secure the efficiency and

quality of the survey for a long term, continuous attention to possible innovations is necessary. For example, the use of new (Smartphone) technology is not yet mature enough for implementation in a NTS, but may be in a couple of years.

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NOTES

1: The views expressed in this paper are those of the author(s) and do not necessarily reflect the policies of Statistics Netherlands