

Blaise On A Windows 8 Tablet. The Caribbean Netherlands Implementation.

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1. Introduction

In 2010 the relationship between the Netherlands and the six ‘Dutch’ islands in the Caribbean was changed. Three of the islands, Bonaire, Saint Eustatius and Saba are since then considered to be municipalities of the Kingdom of the Netherlands⁶.

The total number of inhabitants of the three islands is around 21,000. The official language is Dutch; many speak English, Spanish or Papiamentu. The US \$ is the official currency.

Statistics Netherlands (SN) received the task to produce statistics for those three Islands and opened a very small office on Bonaire, the biggest of the three islands. The distance between Bonaire and the other two islands is considerable. It is about 800 km (500 miles) by plane.

As part of the innovation program of SN, a program was started to improve and modernize the data collection. Someone came up with the idea to use tablets and soon it was decided to buy some 10+ DELL Latitude ST2 tablets with an Intel Atom processor, all running Windows 8 Pro 32bit. The tablets are used only on Bonaire. So each survey will be partially electronic and partially on paper.

Although for each tablet also a keyboard and a mouse were bought, the idea was to use the tablets during interviewing the way a tablet is intended to be used: without a keyboard and without a mouse. So the interviewing has to be done, if possible, by using the fingers.

There were two potential projects for using the tablets. One project was the ‘Household budget’ survey. It was decided to program the data collection application using Microsoft Access. It could have been done very well using Blaise / Maniplus but the department responsible did not have Blaise / Manipula knowledge, there was only a very limited time to get the project up and running plus the questionnaire was relatively simple because of limited routing.

The second project was in a sense more challenging because of the length and the complexity of the questionnaire. The survey is called the Omnibus survey. It is a survey about many different topics like work and education, the living situation, transport, internet usage, appliances, health and so on. According to lab tests it will take about half an hour to administer the survey. This paper is about the implementation of that survey.

2. The user interface on the tablet

The screen of the DELL Windows 8 tablet is a 16 by 9 screen. It is wide and not too high in landscape mode and it is high and wide enough in portrait mode. The on-screen keyboard that can be activated when trying to enter data in an input line is rather large: it covers almost half of the screen in landscape mode.

⁶If you want to find out more about the structure of the Kingdom of the Netherlands we suggest to Google the YouTube video ‘Holland versus the Netherlands’.

When the DEP is running in full screen mode, the on-screen keyboard can potentially cover questions on the formpane and this is not desirable. In portrait mode this problem does not exist. Because it was unclear what would be the preferred operating mode by the interviewer, two sets of screens were setup for the tablet: a set of screens for the portrait mode and a set of screens for the landscape mode. This was done by defining two layout sets in the mode library.

3. The Menu file

To minimize the use of the on-screen keyboard it was decided to implement a button panel in the menu file. The panel contains buttons for the most used options plus the numeric keys. It looks as follows:

Figure 1. The provided keyboard



The first row with buttons is used for navigation between questions. The arrows implement the 'next field' and the 'previous field' action.

The next four rows are used to implement keyboard actions. Each button represents one key stroke: the numeric keys zero through nine, the decimal key and the backspace key.

The buttons on the next row can be used to activate the remark dialog and to answer 'Don't Know' or 'Refusal'.

The four buttons with a flag can be used to switch between the four languages available in the questionnaire: Dutch, English, Spanish and Papiamentu.

The questionnaire has a parallel that is used for administration. By pressing the admin button the parallel is activated. When this parallel is active another button (not visible in the image) is available to switch back to the main parallel.

To allow for switching between landscape and portrait mode two buttons are available. The button to switch to portrait mode is visible in the image; the button to switch to landscape mode is not.

4. Implementing the questionnaire

The challenge was not in the programming of the questionnaire (just a lot of work because of the four languages which were not all delivered at the same time...). The challenge was in making it 'look nice' and making it easy to operate on the tablet. Given the length of the question text, the font size used (Tahoma 18) and the number of possible choices in the enumerations there was a fair chance of input lines not being visible because of the on-screen keyboard. It was therefore decided to put only one question on each page of the DEP. An example of a typical screen is displayed below, both in portrait and in landscape mode and both with and without the on-screen keyboard.

Figure 2. A DEP page in portrait mode

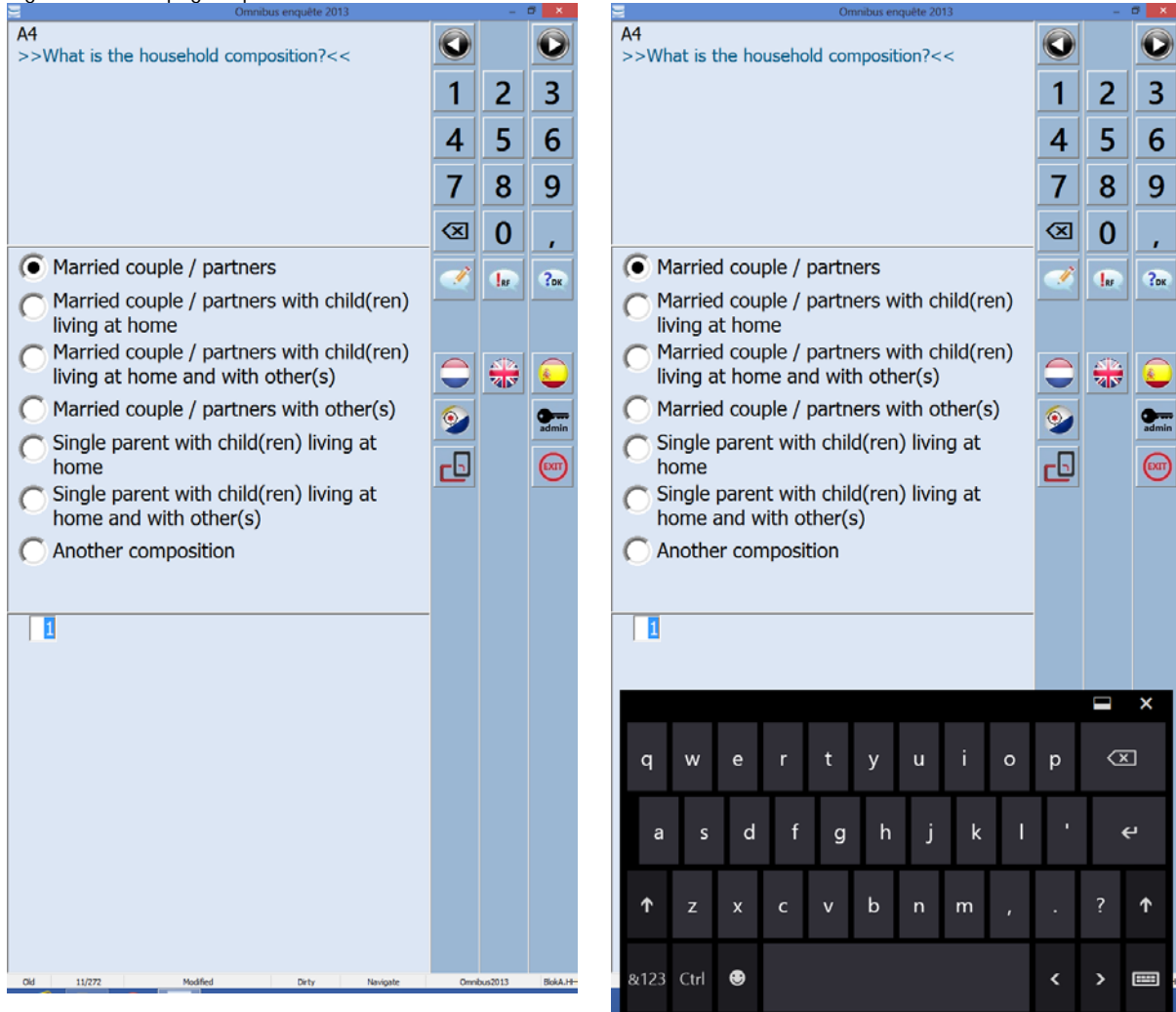
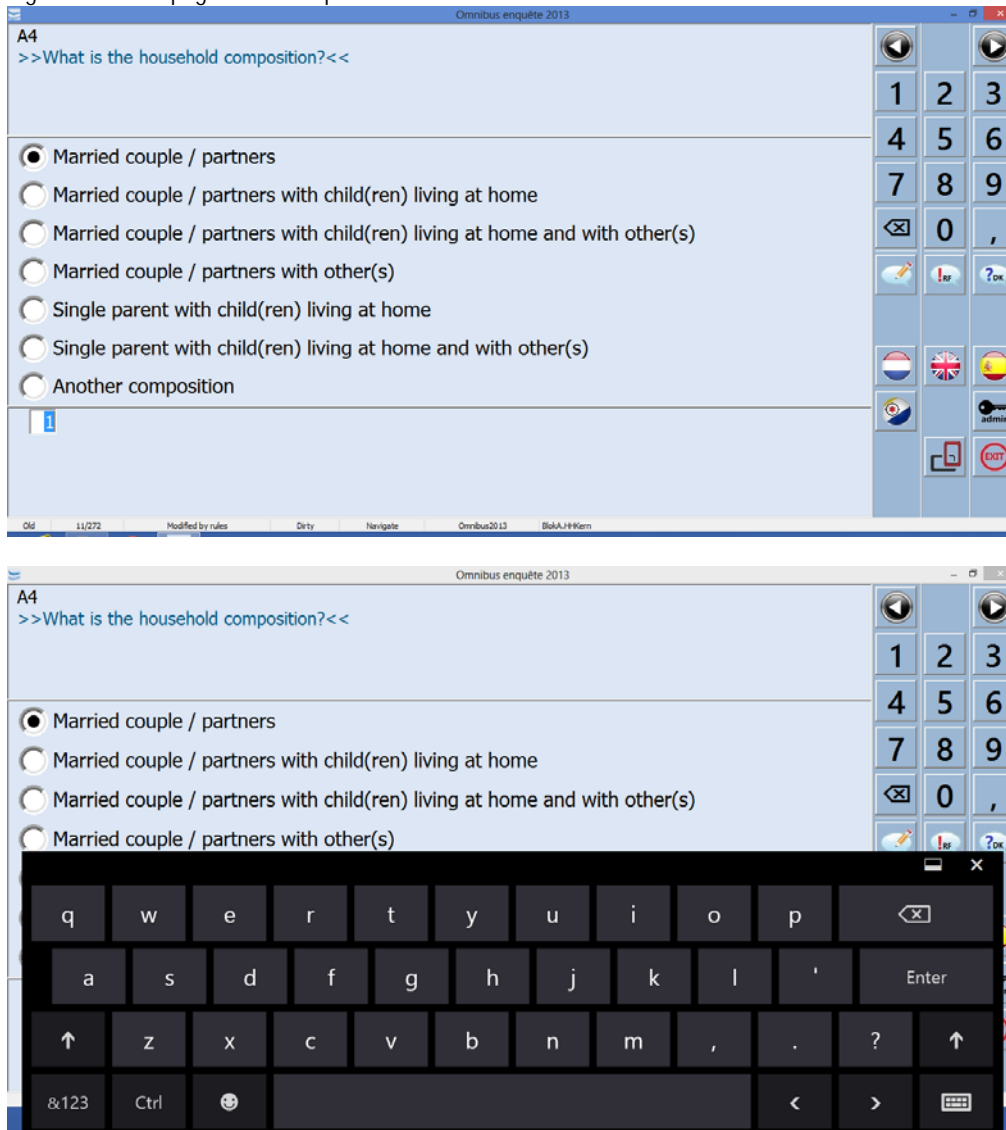


Figure 3. A DEP page in landscape mode



For each of the orientations a layout section has been defined in the questionnaire. The grid has been setup in such a way that only one fieldpane fits (a grid with a page width and a page height of 1). Most often an infopane instruction is used to get the correct page layout. Some 10+ infopane definitions have been defined. They differ for instance in height and in the number of columns in the answer list.

In the layout section a very handy but not very well know layout option is used: layout instructions based on user defined types. In the source code it looks as follows:

```
LAYOUT Interviewing_1 {portrait mode}
  AT TInteger2  INFOPANE InfoPaneWithInputLine
  AT TString140 INFOPANE InfoPaneWithInputLineOther
  AT TGebLand  INFOPANE InfoPaneWithAnswerList2Columns
```

By cleverly defining and using the types, this is an easy way to get to the right layout.

The questionnaire has a total of 272 pages in portrait mode and the same number in landscape mode. Plus there are four languages. To make sure that the right choices were made in the layout sections all pages needed to be inspected in both modes and in all four languages. That is a lot of work when this is done in dynamic routing mode. To guarantee that all pages have been inspected you have to enter data and you have to make sure that all routing paths are visited. Much easier is to switch to the editing toggle set. This toggle set allows you to navigate through the questionnaire without entering any data and when paging, all pages are visited, also the pages that contain off-route fields. It turned out that for most questions the Spanish texts were the longest. Making sure the screens were okay in that language was most often enough. Only a limited number of questions have text fills and the pages of those questions were inspected separately.

5. Security of the tablet

The following security measures were considered sufficient to run surveys:

1. Each interviewer was provided a username and password. They have limited user rights, just enough to run the surveys but for instance not enough to make changes to the Windows registry.
2. The USB-port and the SD-card reader are both disabled for mass-storage devices (so no USB-key or SD-card can be accessed) and the wireless internet is not available for the interviewer. So it is impossible for the interviewer to communicate with the outside world.
3. Access to the machine by USB/SD-card is only allowed for the administrator. He has to enable the reading of mass-storage devices by making a change in the Windows registry.
4. Once installed the access to the mass-storage devices is handled by the shell application.

6. The installation

A small installation was made using Microsoft Visual Studio 2005. The installation of the survey on the tablet was handled by the staff of the Statistical office on Bonaire. It was designed to be simple (which caused some challenges given the way security and shortcuts are handled by Window 8) and to prepare the tablet for the use of the Omnibus survey. The installation contains an encrypted sample file and it creates the shortcut on the desktop to start the survey. The installation package is provided to the staff by a secure download portal from Statistics Netherlands. The staff stored it on a USB-key for installation on the tablets.

To install the Omnibus survey on an interviewer tablet, the staff had to do the following:

- Enable the USB-port for mass-storage devices. This is done by changing a value in the registry.
- Plug in the USB stick with the installation package.
- Run the “Setup[Omnibus2013].msi”.
- Enter a password when prompted to decrypt the sample file.

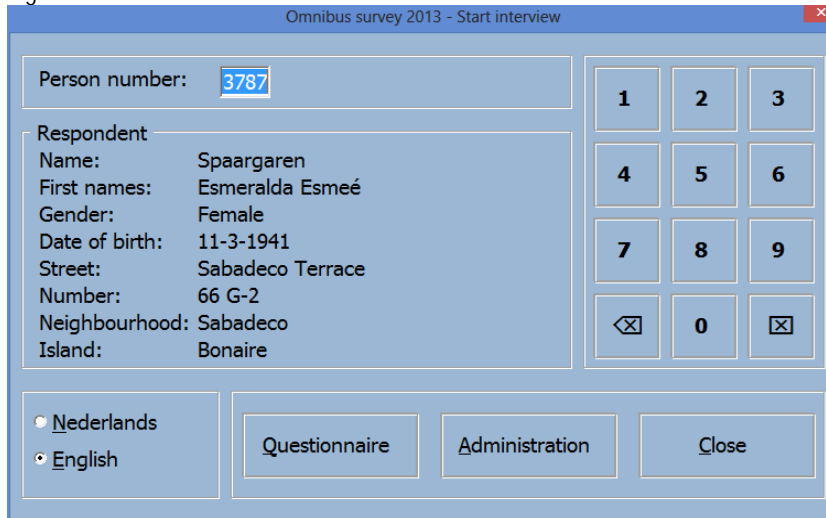
When ready, the installation automatically disables the mass-storage device and prepares the USB-key for safe removal.

The installation creates a folder in C:\ProgData with all the necessary files, including the sample file. By using the shortcut on the desktop the interviewer can then start the Omnibus shell.

7. The omnibus shell

The omnibus shell has been designed to be simple to use. Each interviewer has on paper a list of cases to interview. The interviewer enters a valid person number from the list in the shell. Once a correct number has been entered the credentials of the respondent are automatically displayed to enable the interviewer to verify that she/he is visiting the correct person. Two buttons are enabled when a valid person number has been entered: one button to start the main parallel of the questionnaire and one button to start the administration parallel of the questionnaire. The language of the shell can be switched between Dutch and English. That was considered to be sufficient.

Figure 4. The 'Start interview' shell



The screenshot shows a software window titled "Omnibus survey 2013 - Start interview". It features a text input field for "Person number:" containing the value "3787". To the right of this field is a numeric keypad with buttons for digits 1-9, 0, and backspace. Below the input field is a section titled "Respondent" with the following details: Name: Spaargaren, First names: Esmeralda Esmée, Gender: Female, Date of birth: 11-3-1941, Street: Sabadeco Terrace, Number: 66 G-2, Neighbourhood: Sabadeco, and Island: Bonaire. At the bottom left, there are radio buttons for "Nederlands" and "English", with "English" selected. At the bottom right, there are three buttons: "Questionnaire", "Administration", and "Close".

When the questionnaire is started, the orientation of the tablet (landscape or portrait) and the selected language are provided to the DEP. The landscape and the portrait mode both use a different modelib layout set.

Once the case has been completed (this is established based on a question in the questionnaire), the main parallel is closed for further editing. The administration parallel can still be edited.

Only the administrator is allowed to export collected data from the tablet. When he starts the shell the following dialog is displayed:

Figure 5. The 'Management' shell

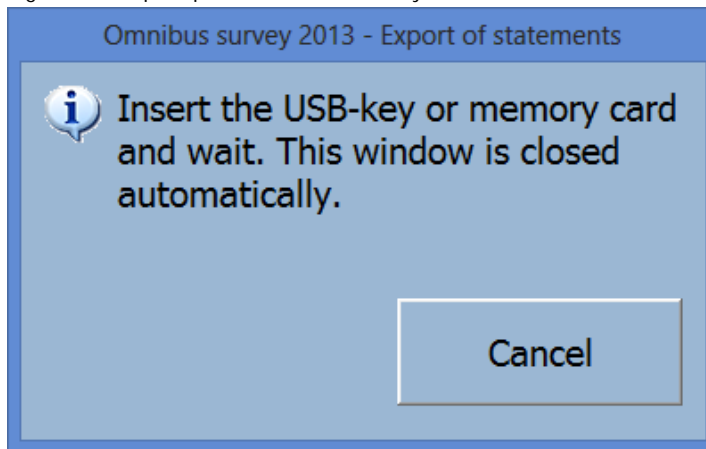


The screenshot shows a software window titled "Omnibus survey 2013 - Management". It features a section with radio buttons for "Nederlands" and "English", with "English" selected. To the right of this section are two buttons: "Export" and "Close".

The export button takes care of extracting the data and storing the data on the USB-key. It works as follows:

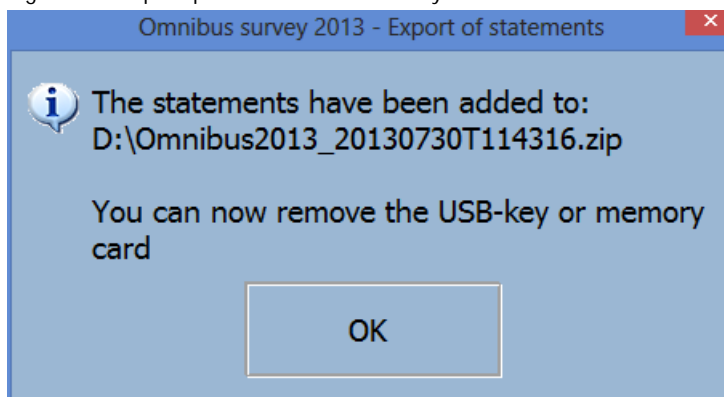
- The administrator presses the export button
- The application opens the USB-port for mass-storage devices and waits until an event occurs that a mass-storage device has been inserted. The administrator is prompted to insert his USB-key.

Figure 6. The prompt to insert the USB-key



- Once the USB-key has been detected the cases on the tablet are extracted and added to an encrypted zip-file on the USB-key.
- When successful the USB-port is closed again and the USB-key is prepared for safe removal. The administrator is then prompted to extract the USB-key.

Figure 7. The prompt to remove the USB-key



Once the data of all the tablet has been extracted the administrator can upload the encrypted zip file to Statistics Netherlands through an upload portal by using a PC with internet connection.

8. CADI

All the paper forms are entered by the staff of CN using the virtual environment of Statistics Netherlands. The same datamodel is used, but now in CADI mode and using a special layout set that mimics the pages of the paper questionnaire.

9. A few words on technologies used

Besides the Blaise tool Manipula.exe the following was used:

- VBScript. This is used for instance to detect events (the plug-in of the USB-key), create shortcuts during installation and detect the orientation of the tablet.
- HTA (HTML application). This is used for non-modal displays such as a splash screen and to prompt the administrator to insert the USB-key.
- Two freeware programs: RemoveDrive.exe and EjectMedia.exe to safely remove mass-storage devices.

10. Extending Blaise a little bit

Once you have to operate the DEP without a keyboard or a mouse, you immediately notice that there is something missing: an easy way to navigate between the pages. The operating system on a tablet is able to recognize many touch screen gesture. In case of Windows, a gesture that is recognized will be translated to something that could also have been done by a mouse. Because of this, many Windows controls like a menu and a radio button can be operated by tapping with the finger on the screen. So by default, when you run the DEP on a touch screen enabled device, it is possible to operate the DEP by tapping. No changes to the DEP were required for this. But not all gestures can be translated to a mouse action. Such gestures are recognized by Windows but they do not influence how the DEP behaves. Correct DEP behaviour can only be achieved by making a change to the DEP by the Blaise team. An example of such a gesture is the left/right swipe. Nothing happens because it is not detected by the DEP, but it would be nice if the DEP would do something that seems logical to the user.

Although not a requirement for the use of the tablets in CN, we decided to make a small change to the DEP. The 'left swipe' has been implemented as 'go to next page' and the 'right swipe' has been implemented as 'go to previous page'. In theory there is room for the support of more gestures.

One thing that is missing is an auto detect of the orientation of the tablet by the DEP and to automatically choose an appropriate layout set when the orientation changes. This will require some changes to the DEP. Currently there are no plans to add this to the system.

In the omnibus survey it was solved in two ways:

- The omnibus shell written in Manipulus uses VBScript to detect the orientation, and when an interview is started, the DEP is started with the correct layout set for that orientation.
- When the interviewer changes the orientation during interviewing, buttons are provided in the menu of the questionnaire to switch manually.

Note that in Blaise 5 this functionality is available, the user can specify resource sets specifically for certain resolutions or orientations, and the DEP will automatically choose the right one.

11. Some final remarks

The Omnibus project has not been fully evaluated yet but everything points in the direction of a success. The interviewers were able to handle the survey with limited instructions and the data quality (as expected with CAPI) is much better in the electronic part of the survey compared to the paper part of the survey.