Converting a Blaise 4.8 Survey Instrument for Tablet Use

Caroline Donegan, Conor MacDomhnaill, and Michelle Keniry, Central Statistics Office, Ireland

1. Abstract

In 2015 our field interviewer's laptops were reaching end of life. The dilemma we faced was to buy more laptops or look at alternative devices that were more suitable for mobile working. The focus of this paper is our experiences adapting our Blaise 4.8 survey instruments and management user interfaces to make them suitable for tablet use. There are three main aspects we will cover, firstly the technical challenges we faced with development and design, these include the requirement of a keyboard for text input, coding and searching in 'Browse' view and the problems encountered when system keyboards interacted with some Blaise functionality. The options and solutions implemented to cater for both right and left hand users and decisions on font and button images. Secondly, we will look at the expectations, challenges and training issues encountered by the field interviewer and how their feedback and interactions were invaluable when determining the scale and priority of improvements required for future development. Thirdly, our request for some functionality change to CBS Blaise developers and how Blaise 4.8.5 addresses a number of the challenges we faced.

2. Introduction

In 2015 our field interviewer laptops would reach end of life. The dilemma the organisation faced was to purchase more laptops or look at alternative devices that were more suitable to mobile working.

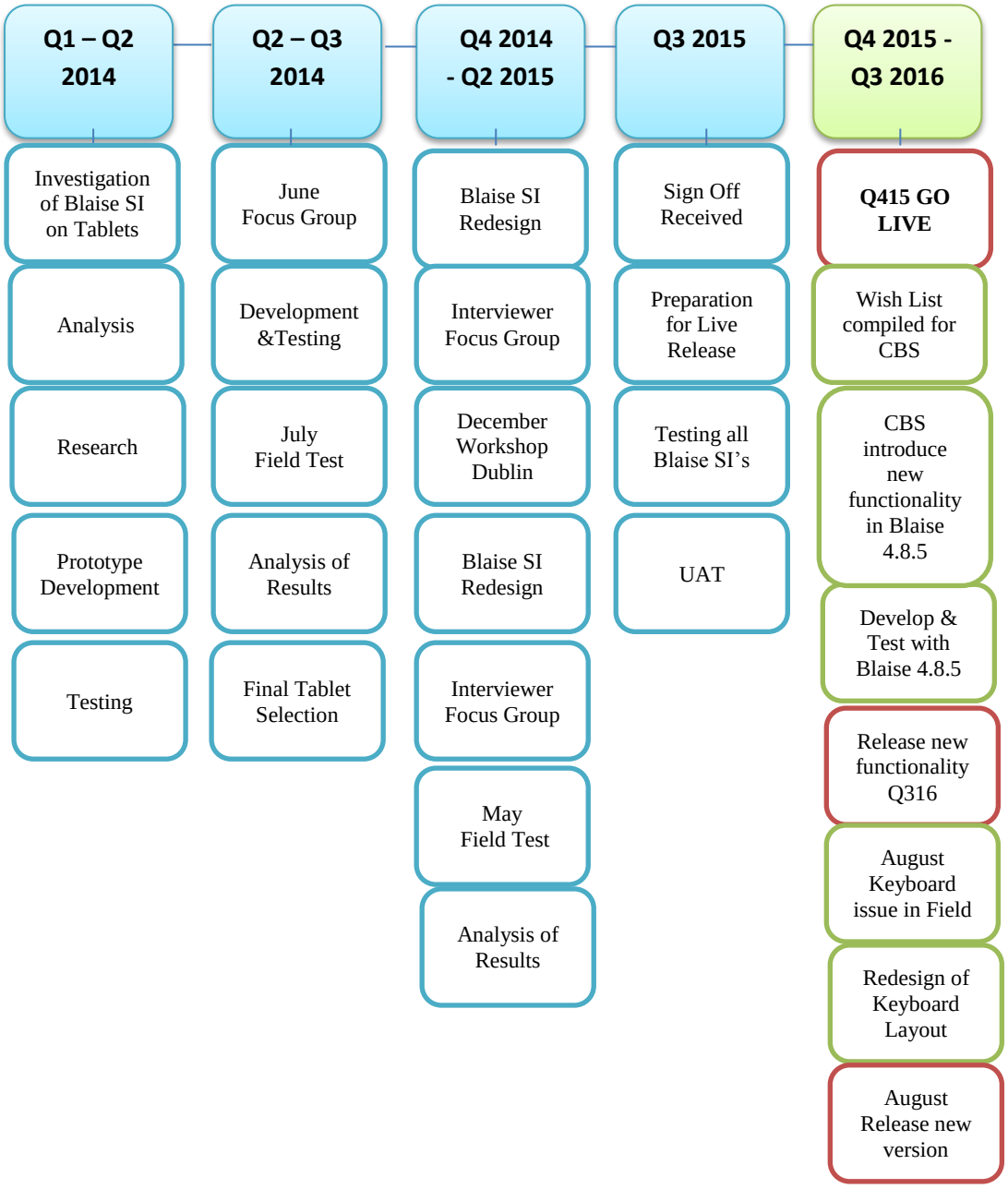
Our initial planning phase highlighted some of the risks and impacts that had to be considered and resolved before we could proceed:

- device specifications –windows device required for Blaise
- resource availability
- impact on data and interviewing techniques
- conversion of Java UI and Blaise survey instruments for touch screen device
- move from Windows XP and 7 operating systems to Windows 8.1 - its impact on our existing applications
- other organisations transitioning experiences

The CSO was also committed to the Labour Force Survey (LFS) transformation project. This is a project of significant scale involving a complete rewrite of the Labour Force Survey to introduce new mode CATI, improvements to survey design and a Case Management application. Due to the resources and timeframe required by the transformation project a stipulation that minimal changes to existing applications and questionnaire design was applied to the tablet redevelopment. Our focus for redevelopment work would include the Quarterly National Household Survey (QNHS), Survey on Income and Living Conditions (Silc) and Household Budget Survey (HBS).

Early discussions with the business areas raised a number of issues. Most notable were the availability of external keyboards, design of survey instrument including screen orientation, text versus images on buttons as well as how the User Interface (Java UI) should be redesigned. This paper will look at some of the planning, technical challenges, expectations and functionality changes required to convert Blaise SI's conducted on laptop to touch screen device for survey data collection.

3. Time Line for Development



4. Initial Planning

Investigations and development work began in early 2014. The Dell Latitude 10 Pro Tablet with operating system Windows 8.1 was configured for the purpose of test and review of all required applications. Universal standards in fonts, papers on tablet design and developments in the wider Blaise community were researched.

One of the existing CAPI Surveys (QNHS) was redeveloped using a template design from CBS Netherlands. A button panel menu file replaced the previous dropdown format of the laptop. Laptop

layouts were reconfigured for tablet display and question and information text referencing actions required using a laptop where updated to reference tablet actions.

The laptop Java UI consisted of a series of inter linked dropdown menus. They were difficult to navigate on a touch screen device and not suitable for use with a stylus *(Figure 1).* A tile format similar to the tablets own window tile display was applied. The position of the tiles were categorised to the previous dropdown order. Also a one tap access was applied to each function *(Figure 2).* A new Case Management System was being developed for LFS survey through IBM Notes *(Figure 3)*

Figure 1. Java UI Laptop for QNHS and Silc

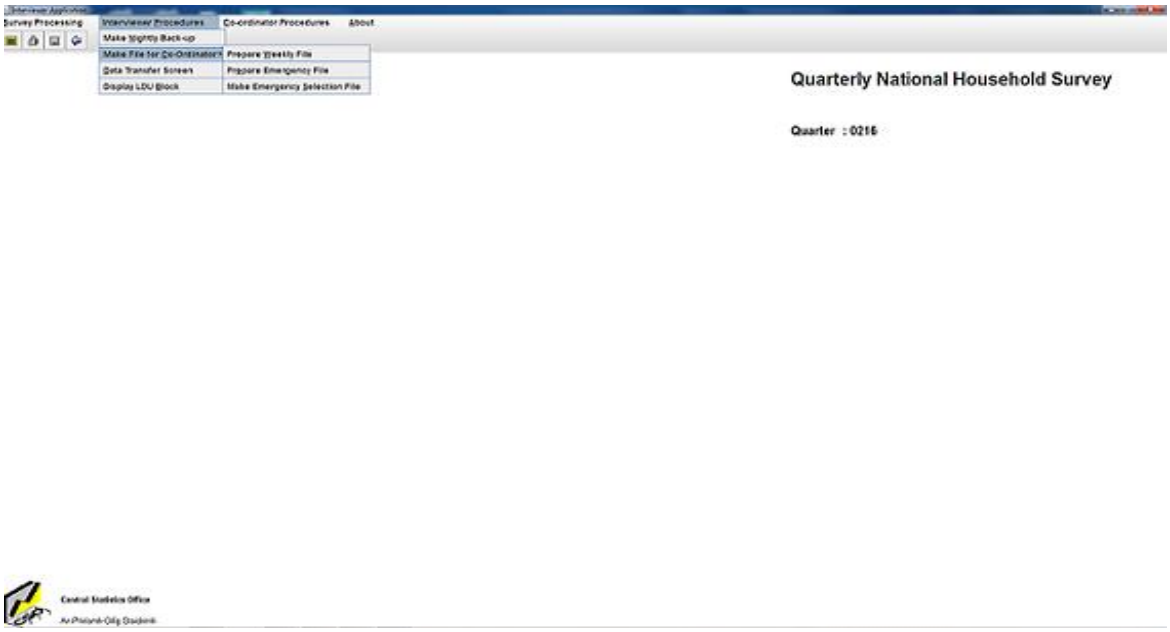


Figure 2. Java UI Tablet for QNHS and Silc

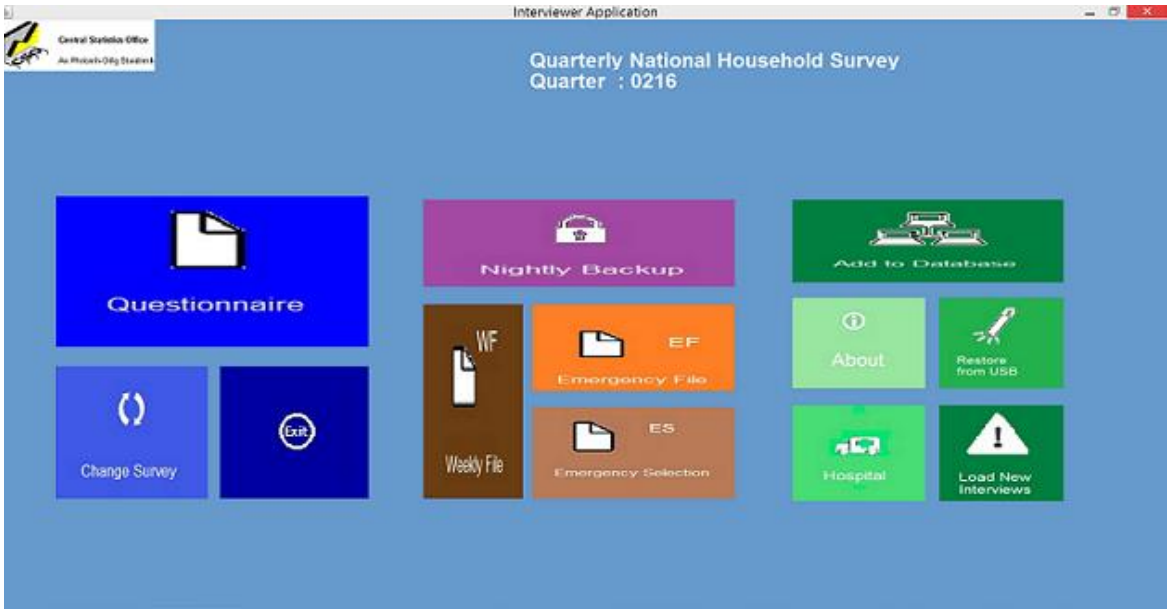
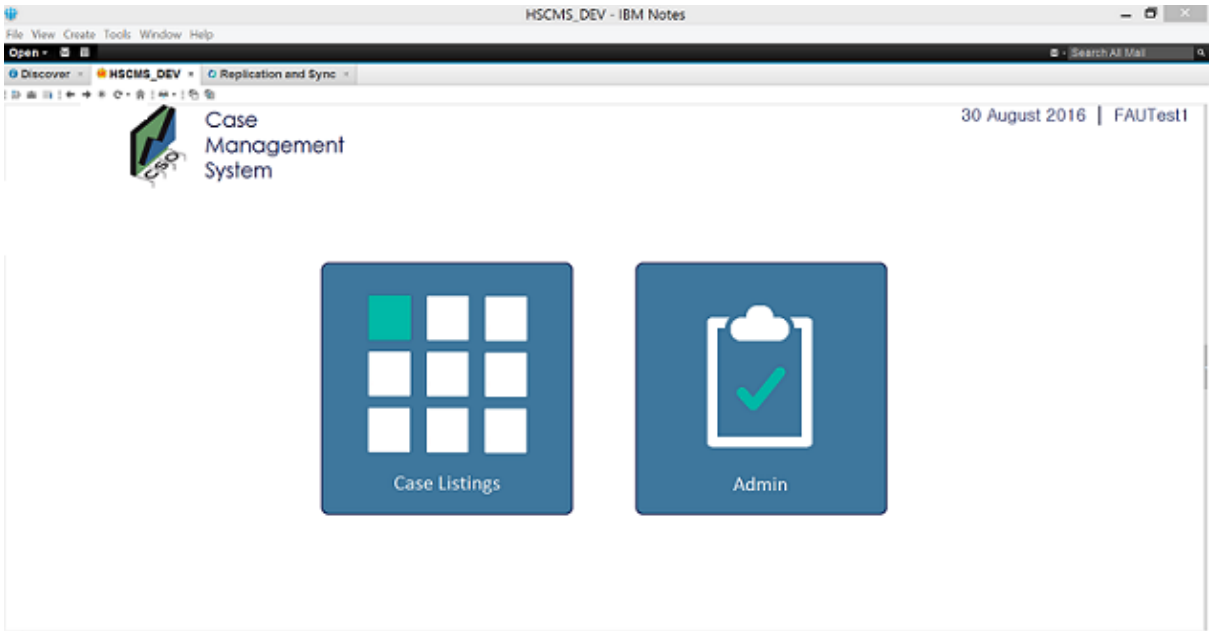


Figure 3. IBM Notes Case Management System Tablet for LFS



There were a lot of discussions on the overall design of the questionnaire for tablet however where consensus could not be reached was the layout and images of the buttons on the button panel menu file. For testing purposes we developed two separate button panel menu files, one consisting of text and numeric descriptions *(Figure 4)* while the other consisted of images using bitmaps, Blaise icons and Windings font *(Figure 5).*

Figure 4. Text Descriptions

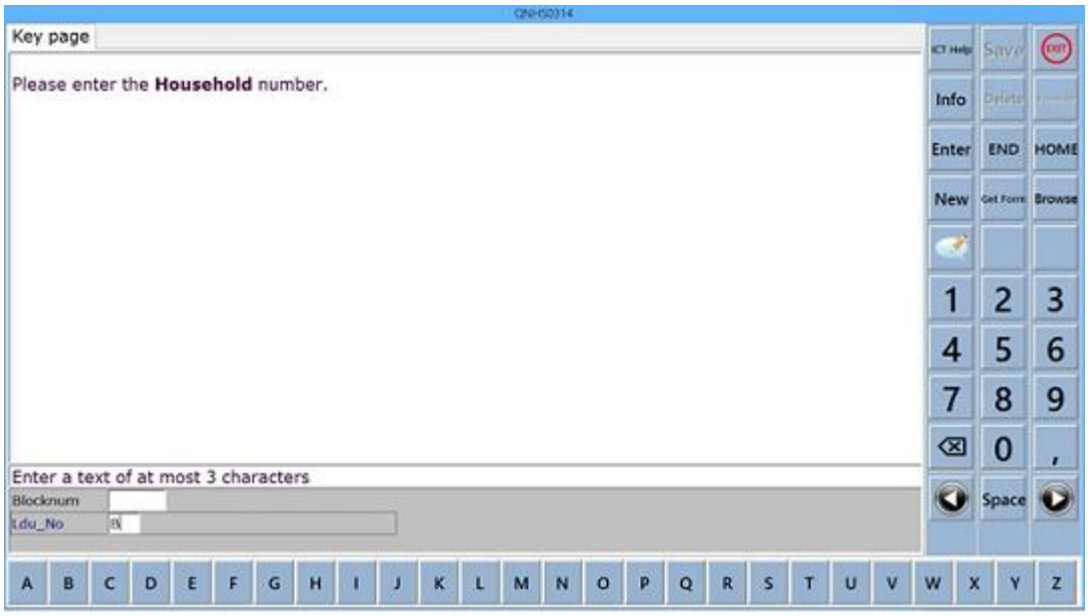
Figure 5. Images

We encountered significant difficulties sourcing a keyboard which would interact with dialogues and not mask text input. Some of the difficulties included:

- When actioned dialogues would not interact with the tablet system keyboards.
- With the layout of our questionnaire, the tablet keyboard (Tabtip.exe) covered the Grid when inputting text.
- Accessing the keyboard for a search in browse view could not be automated.

To mitigate these issues, we created an additional button panel of Alpha A-Z *(Figure 6)*. This activated at the bottom of the screen when text input was required. Lookup dialogues would not allow the input of more than one character for a search. The solution implemented was to recompile lookups to default to Alfa search for questions where descriptive text was unavailable for direct read. For the browse search the tablet keyboard (Tabtip.exe) was accessed through a number of steps from the tablet charms bar

Figure 6. Additional button panel of Alpha A-Z



5. Initial Focus Groups and Field Test

In the summer of 2014 a focus group of six interviewers was formed and a field test conducted. Interviewer's interactions with the applications, button bar, as well as general tablet use were evaluated and we found some aspects were not conducive to doorstep interviewing.

Feedback included:

- Current tablet screen too small for interviewing.

- Change of font style and size from the existing laptop settings Courier New Baltic (Form pane 10, Rich text 12) to the recommended Verdana font (Form pane 11, Rich text 16) was easier to read on screen.

- Scrolling was present in questions and answer types containing large volumes of text. Could lead to answer options being missed thus affecting data return. Layouts, font and information instructions would need review.

- Text descriptions on the button panel menu file were deemed too cluttered and illegible. A simple self- explanatory image would be more conducive to the nature of the work.

- Button panel menu files should have a consistent layout across all surveys. Position memory would be very important for hand-eye coordination preventing errors and enabling the interviewer to maintain eye contact with participants.

- Use of a stylus for interviewing was the preferred option. Buttons should be of sufficient width for a larger stylus.

- Portrait orientation allowed additional space for keyboards and large answer types but was cumbersome and not suitable as a hand held device for long interviews.

- Button panel menu files developed for right positioning only. We had not considered left hand persons interaction with right positioning. It was awkward and not user friendly.

- The increase in display text on the Browser from laptop setting Ms San Serif 8 to Verdana 16 was clear on screen and suited the width of the stylus for selection. Scrolling required when viewing blocks of work, meant being prone to select an incorrect record.

- Interviewers did not use the search facility in the Browser during the test because accessing the keyboard from the charms bar was frustrating and cumbersome.

- Coding in Alfa search was a big change to work practice. Interviewers found the process very time consuming and frustrating for both interviewers and participants as it was easier to lose position in the file.

- All Interviewers particularly touch typists disliked the Alpha keyboard *(Figure 6)*. The position and format of a straight line at the bottom of the screen was not suitable for text input. All agreed that if the Alpha keyboard was the only solution to a keyboard within the questionnaire an external keyboard would have to be provided.

- Existing help application (RoboHelp with Java Interface) did not work well with touch screen devices. The application consisted of drop down functionality and did not fit correctly to screen.

- The Java UI tile structure was a good design however there was an increase in the instance of locked files with the Blaise SI. It was determined this was caused by multiple taps of the Open Questionnaire tile. Interviewers requested an egg timer or prevention measure to prevent locked files being generated.

Analysis of the data collected identified no inconsistencies between laptop and tablet devices. The results of the tests determined that using the tablet device and the applications in their current form were not suitable for CAPI interviewing. Due to the given timeframe a decision was made to exclude the Household Budget Survey from tablet redevelopment and remain with laptops.

6. Planning for Second User Acceptance Testing

IT teams began redeveloping aspects of the applications and tendering for tablets and cases suitable to mobile working. A number of tablets were sourced for investigation and a focus group again conducted with the Fujitsu Windows 8.1 Pro 32 Bit (10.1 screen) and Dell Venue 11 Pro Windows 8.1 32 Bit (10.8 screen).

Table 1. Sample of testing results

Fujitsu 10.1	Dell Venue 11 Pro 10.8
10.1 screen Resolution: 2560 x 1600 Due to increase in screen height all layouts and Menus would require redesign	10.8 screen Resolution : Screen size closer to the look and feel of the laptop view. Minimum redesign of layouts and menus required.

Active stylus not user friendly	Would require robust stylus with some form of attachment.
Tablet white in colour does not work well with current colour scheme of questionnaire or email. Hard on the eyes. Would require a darker screen surround or redesign of questionnaire colour scheme.	N/A
Ports water proof	Case with port protection required

After multiple rounds of testing The Dell Venue 11 Pro Windows 8.1 (10.8 screen) with larger screen was selected.

7. Questionnaire Redesign

The button panel menu files were redesigned using bitmaps and symbol images from specific open source fonts (Icon Works, Windings and Heydings). The cost of fonts had to be taken into account as 100+ tablets would be issued to the field. Buttons were categorised and those most frequently used placed in a position to limit wrist movement. The layout of panels was standardised across all surveys *(Figure 7).*

Left position button panel menu files were added for left hand users. A facility to select user preference was required. A Maniplus menu was developed to input the selection to an external datamodel which could be read into all survey questionnaires. Conditions set in the button panel menu files then determine which position panels should invoke. Flexibility was required in the selection to allow tablet exchange in the field.

The Alfa coding system remained and a specific coding and comments button panel menu was developed in the style of the main button panel menu files *(Figure 8).* An access control button panel menu file panel was also required when the rules were not invoked. For example when Browse view is cancelled, the interviewer requires options to exit or return to the Blaise questionnaire *(Figure 9).*

Figure 7. Main Button panel

Figure 8. Coding Button panel

Figure 9. Access Control Button panel

Access to keyboard for text input was still a technical issue to overcome. We had hoped to develop a keyboard which would activate when required, work with all dialogues and allow control within the Blaise SI. As a solution we included a button on the button panel menu which used a manipula script to launch the tablets on-screen keyboard (osk.exe). While the keyboard had to be manually opened

and closed there were options to move the keyboard up and down the screen, fade to review question text and resize.

In December 2014 a workshop was held in Dublin Ireland. Those in attendance were Gerrit de Bolster and Peter Sinkiewicz (CBS Statistics Netherlands), Karl Dinkelmann (University of Michigan), Johnny Wallace (NISRA Northern Ireland), and Jacqueline Hunt, Conor MacDomhnaill, Edward Dwane, Garry Dunphy, Michelle Keniry (CSO Ireland). The group discussed their experience with mobile devices and looked at development work being carried out in each organisation.

The NISRA Northern Ireland had been using Blaise with tablet devices for 13years. The positive experience outlined by Johnny Wallace encouraged our move to tablets. The sharing of knowledge and code also enabled us to adapt our button functionality making the execution of the rules more efficient as well as incorporating help text into the existing questionnaires.

Karl Dinkelmann's (University of Michigan) keyboard functionality was incorporated into our button panel menu. Due to the structure of our existing questionnaires overall expressions using $Basetype could not be implemented, instead Field tags were assigned to relevant String fields.

In January 2015 a focus group consisting of two interviewers was conducted. The result of this test was disappointing. The interviewers felt that as the keyboard did not auto adjust and covered the Formpane especially in a table displaying multiple lines; it would not work in the field environment. The option of the use of the on-screen keyboard would be more suitable to the field. The coding dialogues while not resolved could be released to the field with the solution provided.

8. Second Field Test for User Acceptance Testing

In May 2015 a second field test was conducted over a two week period using live interviews across six regions capturing rural, urban and apartment demographics. This test would not only evaluate the interviewer's interaction with the tablet but also differences highlighted in data returns from both the laptop and tablet. The test included interviewers with varying levels of computer and typing skills and for consistency included one interviewer involved in all previous tests.

A one day training program on tablet and application functionality was provided. Participating interviewers would retain their laptops for the duration of the test, however a tablet version number was included in the Blaise questionnaire to insure that all assigned work was completed on the tablet.

The test was successful and feedback from the majority of interviewers was very positive. There was however some resistance to change especially from experienced touch typists.

Positive Feedback Included:

- The tablet was light weight and easier to interview at the doorstep. The case was robust and the stylus attachment sufficient. The stand adaption of the case was useful for longer interviews. Some interviewers in urban areas felt there could be more vulnerability with the tablet being snatched while those in rural areas felt that the tablet was prone to damage from the elements.

- The font style's, colours and images of the buttons and panels were suitable for day and night time interviewing.

- The inclusion of help within the questionnaire was better

- The Coding Dialogues and on screen keyboard while not entirely suitable were workable.

Negative Feedback included:

- Eye contact and personal interaction with respondents was diminished.
- Blaise questionnaire prone to lock and freeze especially when reviewing work – interviewers tapping next or previous arrows too quickly.
- Interviewers found it difficult to adjust to touch reaction and this caused large number of miskeys. The reaction also caused navigation problems when screen was accidentally touched during an interview.
- Position of next and previous arrows required review to minimize wrist movement
- Browse view required review as Primary key not locked when swiping to review additional fields. Keyboard access cumbersome.
- Other applications posed problems especially access to email and pay.
- Some interviewers reported a loss of familiarity with the questionnaire.

Data analysis showed that the results between laptop and tablet devices were not skewed however the time taken to conduct interviews was increased slightly.

9. Release to the Field

The field test was deemed a success and the tablet in its current form was considered suitable for release to the entire field force. Due to compatibility issues this release was planned to coincide with the release of all quarterly and Bi annual surveys. As a contingency plan laptop versions of the Blaise SI's were also compiled.

The volume of testing involved required a large amount of time and resources. The planning for this testing required significant organisation, not only were routine quarterly tests required but also the testing of all layouts, menus, text changes, routing, field tags, user interfaces and Manipula applications.

A one day training course was delivered to each region before live interviewing began. This day was also used to set up tablets for each user and transfer some data required during the roll-out. A restricted survey properties file containing access to the new quarter of each survey was applied to the tablet. This allowed the interviewer to practice interviewing prior to live release. On the day of live interviewing the interviewers ran an AutoIt* executable to remove the practice data files from their tablets.

**AutoIt -AutoIt v3 is a freeware BASIC-like scripting language designed for automating the Windows GUI and general scripting. Reference AutoITScript.com*

10. Blaise 4.8.5

Once the tablets and new style questionnaire were established in the field we began reviewing the feedback from the 100+ interviewers in the field. Feedback was broken down into categories of what issues being reported frequently by the field force as a whole and those reported as individual cases. We looked at what was relevant to mobile working and questionnaire completion versus individual preferences.

Each item was prioritized and discussions where held on improvements that could be implemented. We also began communication with CBS Statistic Netherlands on the possibility of including some functionality for tablets in Blaise 4.8.4

A wish list was compiled and sent to CBS Statistics Netherlands, our requests included:

- Lookups, Remarks, Browser Shells
  Keyboard built into Lookups, Coding, Browser and Make Remarks Dialogue boxes.

  Dialogue buttons and scroll bars increased or a possible way of setting these elements through the lookup section in the Modelib info panes.

- Buttons and Panels
  Increase size of parallel entry box and buttons on other dialogue boxes (e.g. browser, errors)

  Increase and/or provide a way of setting these elements through the Modelib info panes.

Over a number of months Blaise CBS Statistics Netherlands developed a Beta version of Blaise 4.8.5 to include tablet functionality. We began testing and working with CBS to implement the changes while redeveloping our button panel menu file, Run Parameters, BCF files and Modelibs.

The improvements included

- Tablet mode and Scale factor options.

- Keyboard facility contained in the button panel menu file which interacts with the dialogues and browser and auto –adjusts in blocks and tables when the keyboard displays allowing the constant display in Formpane.

- Increase to warning and instruction dialogues making stylus use easier

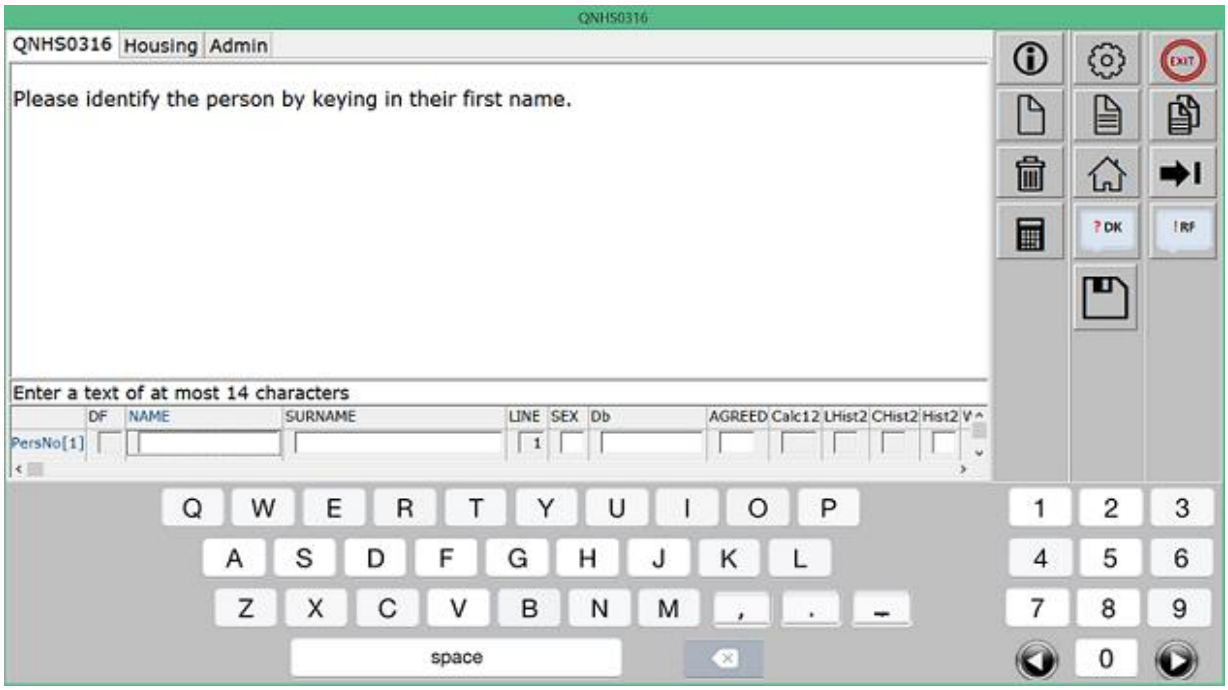
We redesigned the button panel menu file using the sample style supplied by CBS Netherlands as the colour scheme and bitmap images were uncluttered and fresh. We again reviewed the positioning of each element trying to keep the flow and position of the buttons throughout all surveys *(Figure 10 & 11).*

Figure 10. Blaise 4.8.5 Main Button panel

Button Bar images : Fonts setting in Dep Menu.bmf			
	Help : Caption: i Font :Webdings	Settings Caption: j Font :Icon Works	Exit : Paint image converted to Bitmap
	New Form : Caption: A Font : Icon Works	Get Form: Caption: a Font : Icon Works	Browse Form : Caption : c Font : Icon Works
	Delete Form : Caption: o Font: Icon Works	Home : Caption: Ç Font: Icon Works	End : Bitmap
	Space	Don't Know : Paint image converted to Bitmap	Refusal : Paint image converted to Bitmap
	Space	Calculator Caption : U Font : Heydings Icon	Populate : Caption :1 Font : Icon Works
	1 : Bitmap	2: Bitmap	3 : Bitmap
	4: Bitmap	5: Bitmap	6 : Bitmap
	7 : Bitmap	8: Bitmap	9 : Bitmap
	Backspace : Bitmap	0: Bitmap	Period : Bitmap
	Q : Bitmap	Y: Bitmap	Space

	Previous : Bitmap	Save: Caption : } Font IconWorks	Next : Bitmap

Figure 11. Blaise 4.8.5 with keyboard



The keyboard availability in the coding dialogue *(Figure 12)* allowed us to return to Trigram search and previous laptop work practices. This had been the highest level of complaint from the field force.

Figure 12. Blaise 4.8.5 coding with keyboard

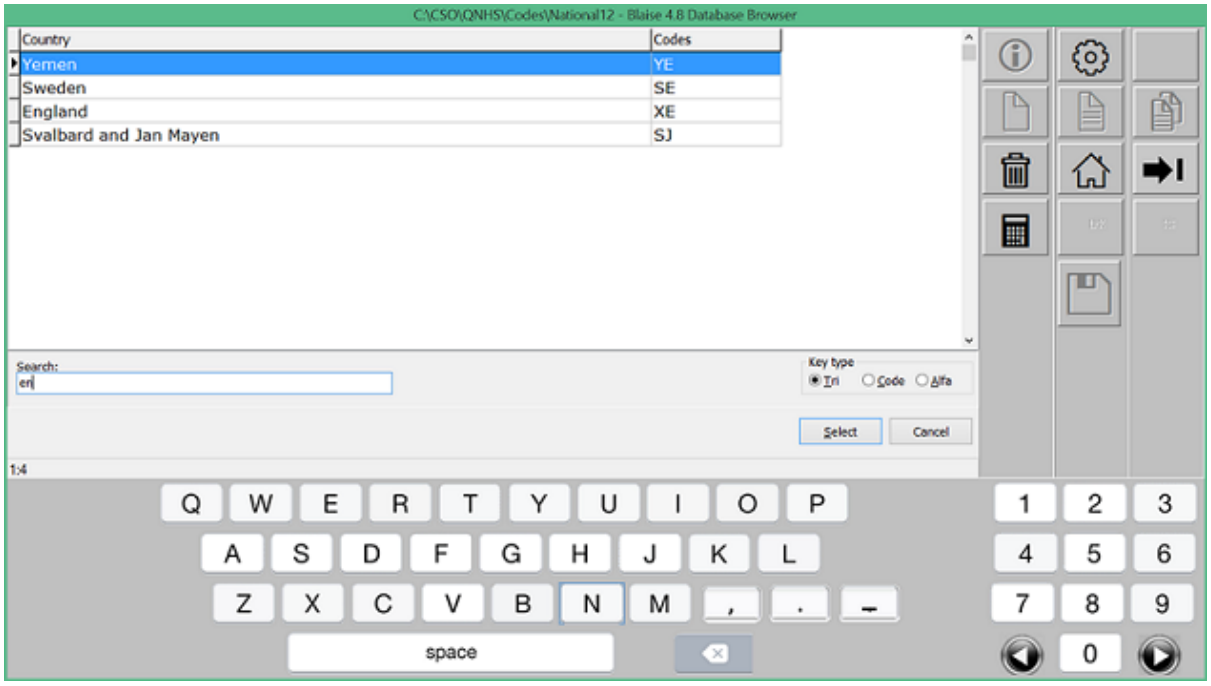
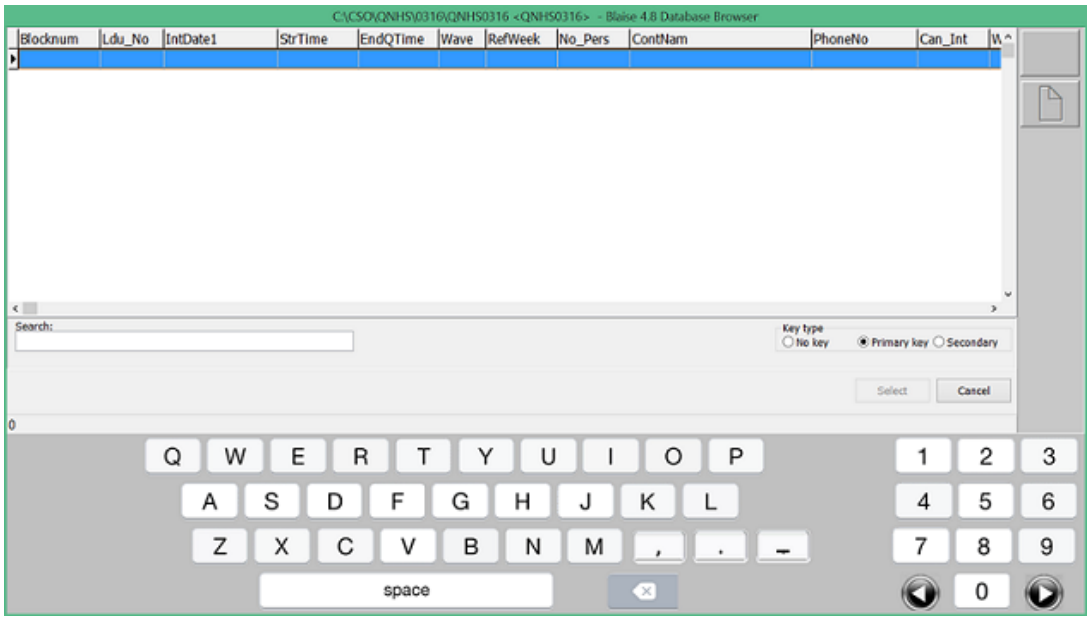


Figure 13. Blaise 4.8.5 browser with keyboard

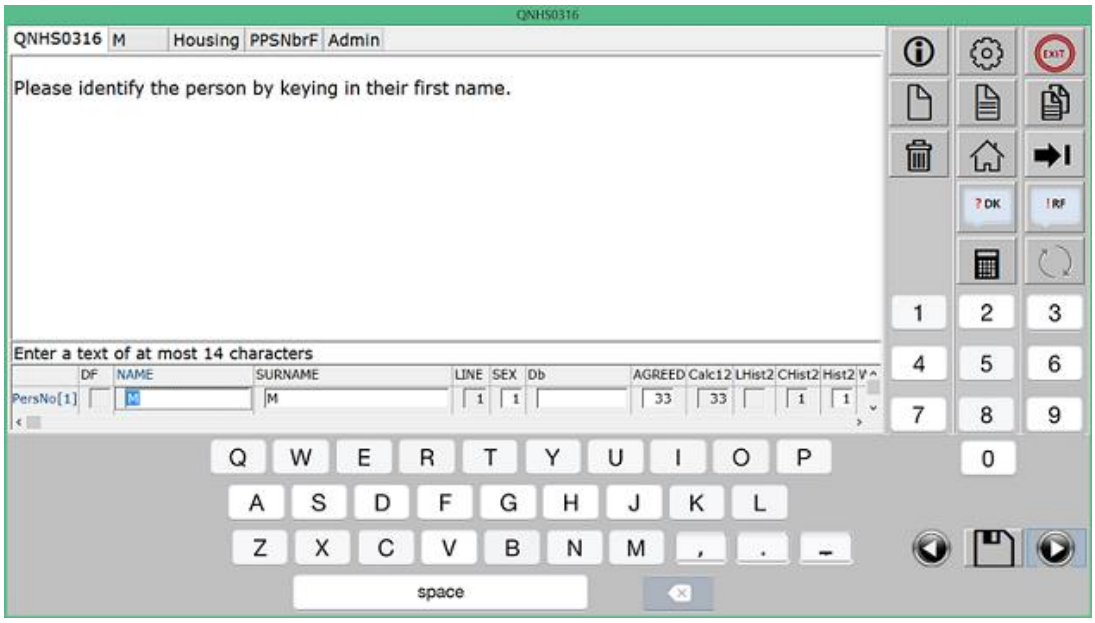


In June 2016 two interviewers tested and approved the changes. These changes went live to the field in July 2016. Interviewers noted an improvement to CAPI interviewing especially when coding. During week 4 – 6 however interviewers reported problems with the new keyboard. The position of the navigation arrows on the main button panel menu file were a fraction higher than the position on the keyboard. Interviewers were inadvertently tapping the 7 or 9 buttons when the keyboard launched

thus overwriting the original entry. They also reported that the questionnaire appeared sluggish when reviewing cases or completing longitudinal interviewers.

Once brought to our attention we understood the problem and a redesign was actioned. This again highlighted the importance of consistent positioning. Redesign entailed removal of numeric keys from the keyboard and placing them in the same position as the main button panel menu file. The navigation arrows were placed in the positions previously held by 7 and 9 *(Figure 14).*

Figure 14. Blaise 4.8.5 redesign of Keyboard



Regarding the sluggishness we felt that the processing of the questionnaire routing and rules for the button pane menu files were slowing the application and movement from one field to the next. The DepMenu.bmf files were split into survey specific menus and rules. The redesigned menu was released to the field a week later. We have yet to receive feedback.

11. Conclusion

- At the start of this project we hadn't anticipated the amount of resistance we would experience in introducing a new tool for interviewing. Interviewers had become very comfortable with their laptops and some felt that the value of their skill as typists was being diminished.

- While we in the Blaise team were focused on the instrument menus, appearance, layout, impact on routing or data collection, initially interviewers placed a higher emphasis on the equipment that came with the tablet, e.g. stylus, type of case or straps.

- In view of this resistance to change as well as a review of helpdesk requests from interviewers after live release, it became apparent that more interviewer training sessions would have been beneficial. Refresher training would also have been useful for some interviewers.

- The design and usability of the button panel menu is very important. Positioning of the buttons and ensuring consistency across menus prevents errors and redesign at a later date. There were many different opinions on requirements for the various fonts, images and position of buttons etc. We had a limited timeframe available and felt that more time spent at requirements gathering stage would have been useful.

- Again this limited timeframe for our transition to tablet meant that the Blaise Workshop held in Dublin was very beneficial and saved a lot of time when researching keyboards & menus in

particular. This would suggest that this style of meeting would be beneficial within the Blaise community as a whole.

- Likewise work with CBS Statistics Netherlands greatly improved usability and overall experience within Blaise SI's

- In adapting for tablet we were unable to continue using our previous method of calling Help, forcing us to include question help as a second language within the questionnaire. This was a welcome change for the interviewers and was a useful selling point to encourage reluctant interviewers to embrace the changes.

- Although initial issues with the tablet port did have some negative impact. Ultimately the majority of our interviewers are very happy with the change from laptop to tablet.

- Most importantly, after testing our business areas have assured us there was no effect on survey data.