

Implementing Medical Care Surveys Using DEP and Manipula

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1. Introduction

The National Center for Health Statistics (NCHS) sponsors the National Hospital Ambulatory Medical Care Survey (NHAMCS) and the National Ambulatory Medical Care Survey (NAMCS). These surveys collect information about the health problems of ambulatory patients and the treatment given to them. The NHAMCS collects this data from hospital emergency rooms and outpatient departments, and the NAMCS collects the data from office-based physicians.

Both the NAMCS and the NHAMCS have two phases of data collection. The first phase of data collection involves an "induction" interview that collects information about a physician's practice in the NAMCS and the services offered by the various departments of a hospital in the NHAMCS. In the induction phase, the instruments sample either physician's practices for NAMCS or the various eligible departments for NHAMCS. The second phase of data collection is the "abstraction" interview which collects patient information in the Patient Record Form (PRF) section of the abstraction instruments. The abstraction interview can collect up to one hundred individual PRFs with each PRF spanning multiple pages within the instrument.

Both surveys collect similar data and have similar functionality. This paper discusses three key features that the NAMCS/NHAMCS instruments have in common and how they were implemented when the surveys migrated from paper data collection. These are:

- The instrument's extensive use of Manipula to aid data collection in different areas.
- The customization of the Blaise Mode Library layout to mimic the paper PRFs.
- The requirements for navigation within and between the PRFs and having the forms look and feel the same across the two surveys.

2. Approach to Design and Development

2.1 Using Manipula in the data Collection

One of the requirements for the NAMCS and NHAMCS instruments is that the FR (i.e., the Field Representative who conducts the interview) be able to update certain information within the instruments at any point during the data collection either via a function key or as part of the normal routing within the instrument. Using simple parallel blocks displayed as tabs was one possible approach that would have allowed the FR to jump and collect information such as office schedules and office contact information. Considering the flexibility required by NCHS, the Authoring team proposed collecting this data via Manipula dialog boxes. The advantage of the "Manipula dialog box" approach is that the instrument can also automatically bring the questions on route at the time they are needed based on the routing instructions and via a function key. There were advantages, disadvantages, and some challenges to implementing the required functionality in this manner.

Advantages of using the Manipula Dialog box:

- This approach required using only one set of fields in the instrument. This means that there would not be the problem of keeping multiple sets of fields in sync with the same data.
- The dialog boxes are launched either via a function key or by using an event key handler.
- The dialog boxes offered some additional flexibility. For example, the sponsors did not want all the fields in the dialog box to be editable when the dialog box was launched from the normal routing within the instrument. The sponsor wanted the dialog box to be context sensitive and allow an FR to edit only the field that pertained to the lead in question. This was handled by the “enabled dialog element” for both controls and buttons allowing the authors to make the fields read-only or editable using a conditional statement. Doing this allowed the use of the same dialog box without having to creating multiple dialog boxes for all the different situations. Figure 1 shows how the dialog box used to enter Staff Contact information.

The screenshot shows a dialog box titled "Update Staff Contact Info". It contains three sections for staff members. Each section has fields for "Staff Name", "Title", and three phone numbers with corresponding "Type" dropdown menus. A yellow callout bubble points to the "Type" dropdown for the third staff member, containing the text "Phone type set to empty".

Staff Name	Title	Phone 1	Phone 2	Phone 3	Type
Staff Name 1: Jane Doe	Title: Head Nurse	Phone 1: (111)333-3333 x 3333	Phone 2: () - x	Phone 3: () - x	Type: Work
Staff Name 2: Bread John	Title: IT dude	Phone 1: (999)999-9999 x	Phone 2: (123)444-4444 x 4444	Phone 3: () - x	Type: Main
Staff Name 3:	Title:	Phone 1:	Phone 2:	Phone 3:	Type:

Figure 1 - Manipula dialog box collecting Contact information for NAMCS

Disadvantages with using the Manipula Dialog Box:

- The layout for the dialog boxes took time to develop. It took some trial and error before the look and feel of the dialog boxes appealed the user. This trial and error was the result of defining all the positions via pixels.
- Another disadvantage is that the data cannot be capture in the case Audit Trail file.

Challenges with implementing the Manipula Dialog Box:

Part of the data collected in the dialog box is the state abbreviation. Since the instruments are already using a state lookup, the dialog box had to interact with this external in the same manner. This created its own set of challenges. For instance, use of a text box to invoke the lookup table was not possible in the Manipula dialog box; the Authoring team implemented a button to trigger the lookup. After an FR selects the state, the information is displayed next to the button.

- Another challenge involved collecting the “type” of phone number entered (see figure 2). This field uses a drop-down box with up to ten options. The challenge here was that if an FR had entered an answer in the phone type field after realizing the phone number was entered erroneously, then the FR could not empty out the phone type field. The solution was to add code associated with the dialog

box that runs a procedure when the FR pressed the "Update" button. This code checks for data in the phone field and will empty out the phone type dropdown field if the phone field was empty.

Figure 2 - Dialog box showing several types of entries

- Another requirement was the need to collect office schedules. While implementing this requirement, we found a situation similar to the one in the dropdown field for the phone types. However, this situation was observed in an enumerated answer list displayed as radio buttons (see figure 3). Note that while the schedule information can be entered into the Textbox, FRs can also select one of the radio buttons to quickly identify certain types of office scheduling (i.e., office open 24 hours, office not open, office has variable hours). Originally, there were only the three-labeled choices, and this caused a problem when FRs selected one of the radio buttons by mistake. There was no way for them to de-select the erroneous entry. Consequently, we added the first (unlabeled) column and made it the default setting. This provided the FRs with a way to remove an erroneous entry if necessary (see figure 3).

Update Office Schedule

Location: 123 Main street
Any town

Default Column, to reset the other 3 options

Day(s)	From	Time	To	Open 24 hours	Not open	Hours vary
Monday	8:00AM		5:00PM	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuesday	1:00PM		5:00PM	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Wednesday	1:00PM		5:00PM	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thursday	8:00AM		5:00PM	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friday	8:00AM		5:00PM	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saturday				<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Sunday				<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Update Cancel

Figure 3 - shows a dialog box with office schedule.

2.2 The customization of Blaise Mode Library layout to mimic the paper PRFs.

Except for the Patient Record Form (PRF) sections of the NAMCS and NHAMCS instruments, the screen layouts in the instruments were straightforward. That is, the screen consisted of the usual default Infopane with the question text, the answer list, and the Formpane where the FR enters the data. The PRFs, however, presented a challenge. The goal in implementing the PRF sections of the instrument was to mimic the paper form as much as possible. After all, the abstraction activity (i.e., collection of the patient record data) was a heads down data collection task and not an interactive interview. Mimicking the paper form would provide much of the same flexibility that the paper form provided in terms of navigation and moving around in the form. It would also reduce the FR's learning curve when migrating from the paper operation to the automated system.

In order to obtain the desired form layout for the PRFs, the Authoring team combined the GRID and INFOPANE producing an "electronic paper form" with columns and rows. The team then focused on customizing the FIELDPANE used throughout the PRF in the abstraction part of the instruments.

- The GRID specifies the columns and rows where the question items are displayed as well as the vertical or horizontal navigation. Since an FR may enter data in any order and not necessarily as displayed in the form, free navigation had to be set for all data items (see figure 4).

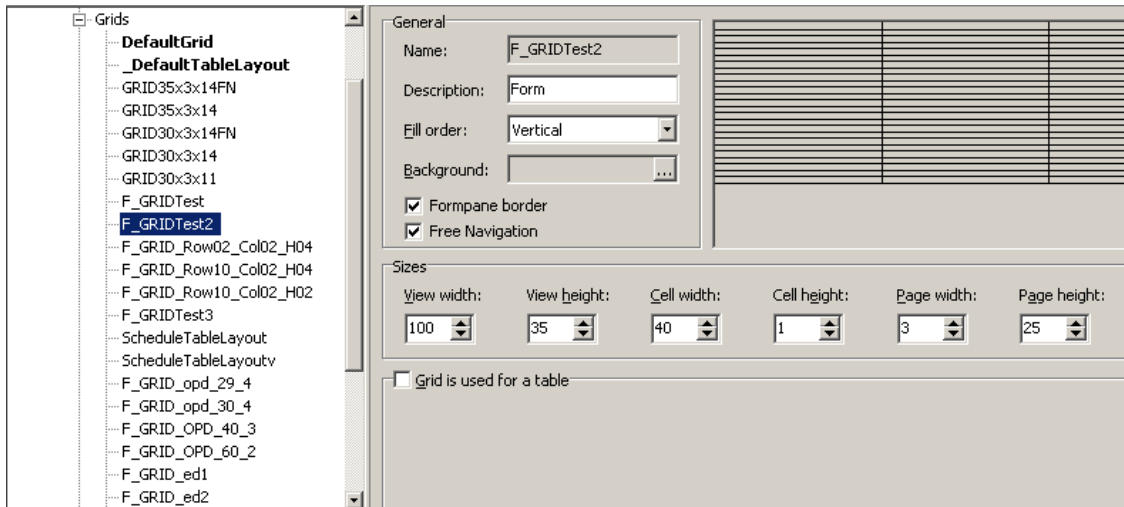


Figure 4 - Mode Library setting for the GRID showing 3 columns and 25 rows

- The INFOPANE acted as a placeholder. The settings for this object are shown in the figure below. Note that the INFOPANE is sized to '0', and the Field Text, Answer List and Answer Info are not set to Visible. This allowed the Authoring team to customize individual FIELDPANES for each question item (see figure 5).

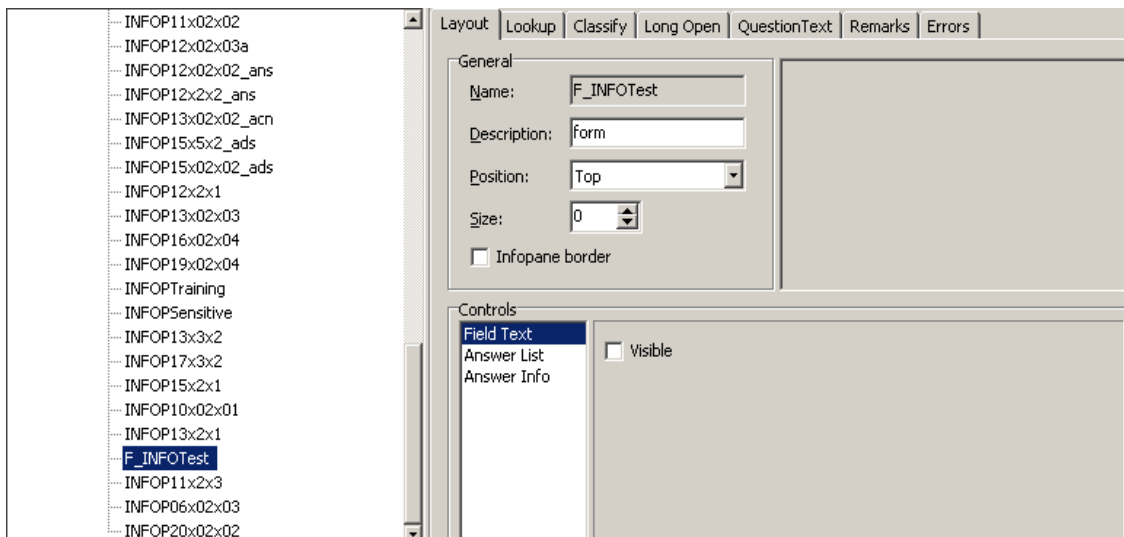


Figure 5 - Example of the INFOPANE settings used in the PRF forms

- The FIELDPANE is the element that was key to achieving the desired expected results. For the FIELDPANE, the Authoring team only used specific controls such as the Field Text, Input Line, Remark Icon, and Answer List (see figure 6). Throughout the PRF section the layout changes drastically. Since the PRF is a heads down data collection activity and the FR does not have to read question text from the PRF out loud, there is no need for extensive text description. Much of the time the question items in the PRF were just FR instructions on how or what to collect. FR instructions are displayed in Bright Blue text. This was one of the few U. S. Census Bureau screen standards the

authors adhered when implementing the PRF section. The authors had to put aside most of the other screen standards for the PRF because the standards primarily address interactive interviewing which did not apply to the PRFs.

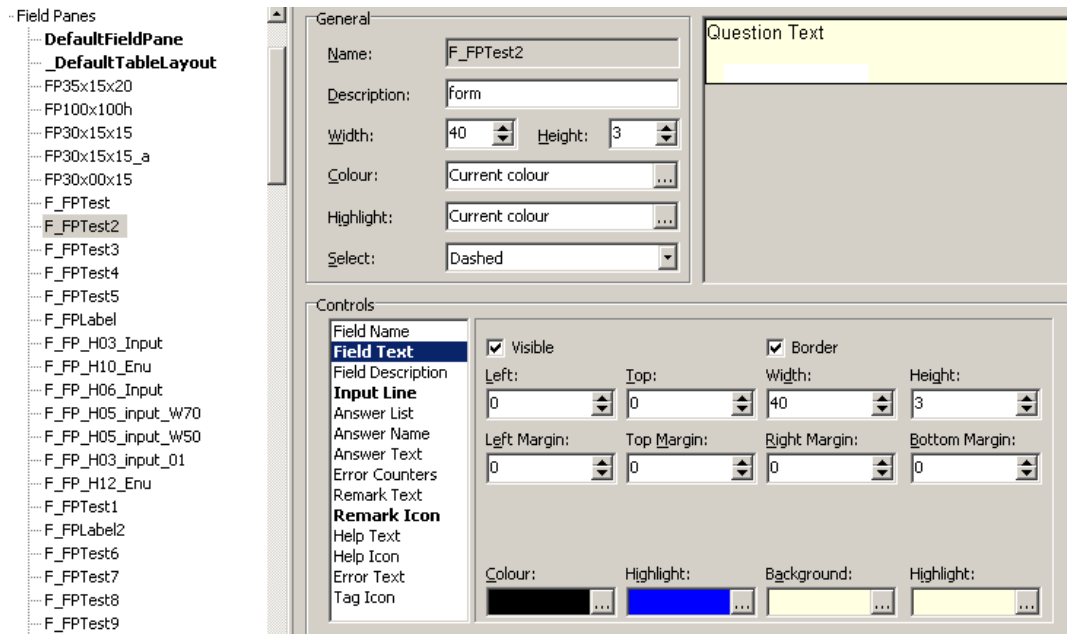


Figure 6 – Example of a more elaborate setting of the FIELDPANE setting used in the PRF

One very specific example of the appearance of a FIELDPANE used in the PRF is shown in Figure 7. The blue text represents an instruction for the FR to enter the medical record number for a patient's visit. This question item used the default layouts for entering alphanumeric information.

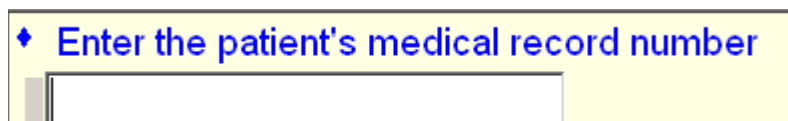


Figure 7 - shows FIELDPANE used for alphanumeric entry.

A more complete example of the PRF display is shown in Figure 8 on the next page. Here some of the question items have embedded in them the Answer List. The Authoring team could have disabled the input field for the enumerated type questions, but we did not do so. We discovered that the FR could select an entry type via the mouse and move to the next question successfully. However, there was no way for the FR to deselect an enumerated response entered by mistake. Furthermore, if we hid the input field for enumerated types, the FR would not be able to correct the entry causing issues in data processing. Since most of the questions in the PRF were not enforced by the rules, there would be an increased likelihood for getting erroneous data in the output processing.

The authors also considered using the auto-entry setting in the Mode library. Initial testing proved successfully. However, there was some resistance to the use of this feature. One of the concerns was that the FRs should be able to see the data as they enter a value and press the <Enter> key as means to validate the entry.

1 of 1 PRF's		MRN: ABCDEFG	NHAMCS-100(ASC) PATIENT INFORMATION
Enter the patient's medical record number <input type="text" value="ABCDEFG"/>		Race (Enter all that apply, separate with commas) <input checked="" type="checkbox"/> 1. White <input checked="" type="checkbox"/> 2. Black or African American <input checked="" type="checkbox"/> 3. Asian <input type="checkbox"/> 4. Native Hawaiian or Other Pacific Islander <input type="checkbox"/> 5. American Indian or Alaska Native <input type="text" value="1,2,3"/>	Date/Time into operating room 08/20/2013 (MM/DD/YYYY) 2:00PM (HH:MMAM/PM/ML)
Date of visit (Format MM/DD/YYYY) <input type="text" value="8/10/2013"/>		Expected source(s) of payment for THIS VISIT. Enter all that apply, separate with commas <input checked="" type="checkbox"/> 1. Private Insurance <input checked="" type="checkbox"/> 2. Medicare <input type="checkbox"/> 3. Medicaid or CHIP or other state-based program <input type="checkbox"/> 4. Workers' compensation <input type="checkbox"/> 5. Self-pay <input type="checkbox"/> 6. No charge /Charity <input type="checkbox"/> 7. Other <input type="checkbox"/> 8. Unknown <input type="text" value="1,2"/>	Date/Time surgery began 08/20/2013 (MM/DD/YYYY) 3:00PM (HH:MMAM/PM/ML)
Patient's 5-digit zip code. (Enter "1" if homeless) <input type="text" value="22222"/>			Date/Time surgery ended 08/20/2013 (MM/DD/YYYY) 4:00PM (HH:MMAM/PM/ML)
Date of birth <input type="text" value="1/3/1970"/>			Date/Time out of operating room 08/20/2013 (MM/DD/YYYY) 4:30PM (HH:MMAM/PM/ML)
Age <input type="text" value="43"/>			Date/Time into postoperative care 08/20/2013 (MM/DD/YYYY) (HH:MMAM/PM/ML)
Enter time <input type="text" value="1"/> period <input checked="" type="radio"/> 1. Years <input type="radio"/> 2. Months <input type="radio"/> 3. Days			Date/Time out of postoperative care 08/21/2013 (MM/DD/YYYY) (HH:MMAM/PM/ML)
Sex <input type="text" value="2"/> <input type="radio"/> 1. Female <input checked="" type="radio"/> 2. Male			
Ethnicity <input type="text" value="2"/> <input type="radio"/> 1. Hispanic or Latino <input checked="" type="radio"/> 2. Not Hispanic or Latino			

Figure 8 – Example of a more elaborate use of the FIELDPANES used in the NHAMCS instrument

Another example of a PRF display created using the layout from the Mode Library appears in Figure 9. This example is from the PRF for an Emergency Department.

1 of 1 PRF's		MRN: ABCDEFG	NHAMCS-100(ED) PATIENT INFORMATION
Enter the patient's medical record number <input type="text" value="ABCDEFG"/>		Date and time of visit (1) Date of Arrival (2) Seen by MD/DO/PANP (3) Date of ED departure, if released or transferred 8/20/2013 (MM/DD/YYYY) 6:00AM (HH:MM AM/PM/ML) 8/20/2013 (MM/DD/YYYY) 8:00AM (HH:MM AM/PM/ML) 8/21/2013 (MM/DD/YYYY) 2:00PM (HH:MM AM/PM/ML)	
Patient Residence <input type="text" value="2"/> <input type="radio"/> 1. Private residence <input checked="" type="radio"/> 2. Nursing home <input type="radio"/> 3. Homeless <input type="radio"/> 4. Other <input type="radio"/> 5. Unknown	Patient's 5-digit zip code. (Enter "1" if homeless) <input type="text" value="22222"/>	Date of birth <input type="text" value="3/15/1970"/>	
Age <input type="text" value="43"/>	Enter time period <input type="text" value="1"/> <input checked="" type="radio"/> 1. Years <input type="radio"/> 2. Months <input type="radio"/> 3. Days		
Sex <input type="text" value="2"/> <input type="radio"/> 1. Female <input checked="" type="radio"/> 2. Male	Ethnicity <input type="text" value="2"/> <input type="radio"/> 1. Hispanic or Latino <input checked="" type="radio"/> 2. Not Hispanic or Latino	Race Enter all that apply, separate with commas <input type="text" value="1,3,2"/> <input checked="" type="checkbox"/> 1. White <input type="checkbox"/> 4. Native Hawaiian or Other Pacific Islander <input checked="" type="checkbox"/> 2. Black or African American <input type="checkbox"/> 5. American Indian or Alaska Native <input checked="" type="checkbox"/> 3. Asian	
Arrival by ambulance <input type="text" value="1"/> <input checked="" type="radio"/> 1. Yes <input type="radio"/> 2. No <input type="radio"/> 3. Unknown		Expected source(s) of payment for THIS VISIT. Enter all that apply, separate with commas <input type="text" value="1"/> <input checked="" type="checkbox"/> 1. Private Insurance <input type="checkbox"/> 3. Medicaid or CHIP or other state-based program <input type="checkbox"/> 2. Medicare <input type="checkbox"/> 4. Workers' compensation <input type="checkbox"/> 5. Self-pay /Charity <input type="checkbox"/> 6. No charge	

Figure 9 – Example of a Form for the NAMCS instrument

2.3 Navigation of the Abstraction Instrument

The NAMCS and NHAMCS projects had requirements for navigation within and between the PRFs and having the forms look and feel the same across the two surveys. As a result, the authors had to address several navigation issues relating to Parallel Tabs, free form navigation in tables, buttons, and shortcuts. The authors defined Tabs to allow for data collection of more than one hundred PRFs. The Tabs were defined using temporary Auxfields. The authors then passed data into the Auxfields from the Blaise database array for editing. The authors could not call all the PRFs from the main data model level because that would place several PRFs on route at the same time. Moving from one PRF to another would have been slow and cumbersome. We needed to have one PRF at a time and we needed to be able to move from one to another for rapid data collection.

2.3.1 Parallel tabs navigation

Navigating with parallel Tabs has some interesting considerations. The instrument needed to allow movement between fields on the screen and provide movement to the next logical group of questions within the PRF (i.e., the next parallel block). The user could click on a Tab to activate those questions or use the Ctrl-Tab key combination to move from Tab to Tab in a forward direction or use Ctrl-Shift-Tab to move in a backward direction. The authors used the paper forms of the questionnaire to group questions that were similar for each Tab. Some Tabs have one screen page and others have multiple screen pages. The authors showed the number of potential pages on the status bar at the bottom of the instrument. When you are on a Tab only the pages that are valid with that Tab are counted.

To implement the parallel Tabs we needed to segment the code into blocks. We did this by grouping several questions together into blocks and defined each block as a separate Tab. In figure 10 note the dot notation for each Tab defined.

```
PARALLEL
mASLs = ASLs
FAQs = FAQ
Appointment = F10
ASC_P1 = PV_PRF.tempASC_PRF.Page1
ASC_P2 = PV_PRF.tempASC_PRF.Page2
ASC_P2b = PV_PRF.tempASC_PRF.Page2b
ASC_P3 = PV_PRF.tempASC_PRF.Page3
ASC_P4 = PV_PRF.tempASC_PRF.Page4
ASC_P5 = PV_PRF.tempASC_PRF.Page5
ASC_P6 = PV_PRF.tempASC_PRF.Page6

OPD_P1 = PV_PRF.tempOPD_PRF.Page1
OPD_P5 = PV_PRF.tempOPD_PRF.Page5
OPD_P2 = PV_PRF.tempOPD_PRF.Page2.Reason_for_Visit
OPD_P2Injury = PV_PRF.tempOPD_PRF.Page2.Injury
OPD_P3 = PV_PRF.tempOPD_PRF.Page3
OPD_P4 = PV_PRF.tempOPD_PRF.Page4
OPD_P6 = PV_PRF.tempOPD_PRF.Page6
OPD_P9 = PV_PRF.tempOPD_PRF.Page9
OPD_P10 = PV_PRF.tempOPD_PRF.Page10
OPD_P11 = PV_PRF.tempOPD_PRF.Page11
```

Figure 10 - Parallel Tab definitions

Each block defined as Page1 through Page n... was designated as a group of logical questions. We used Page1 as the basic patient information and PRF identification. An example of Page1 can be seen in Figure 11.

Figure 11 – Example of the ASC patient information and PRF identification

To allow the FR to quickly identify where in the abstraction process they were, the authors used an Auxfield to show some text with important information. As noted in the Blaise help, an important use of the Auxfield is to place a label in the page of the interviewing screen. This kind of label can be used to announce a section and to give the interviewer a landmark that can be used for page-based navigation.

Navigating from one Tab to the next was accomplished by using the Action from the "At end" property. Each Tab allows for an event, an action that defines what to do at the end of the parallel Tab. The authors used that event to activate the next Tab. Moving from the first Tab to the next both activates the specific Tab and places the focus on the first field. On the last active question of the last parallel Tab, the Manipula event evaluates the maximum number of rows allowed using a Manipula procedure. Depending on the number of active PRFs, it either goes to the first PRF or adds a new PRF and then sets the focus on the first active question for the active Tab. The "At end:" property with the Action option is used to provide a method to move to the next parallel block and land on the first question of the next screen. In figure 12 we show how to select a parallel Tab and provide a Manipula procedure to activate at the end of all questions on the Tab. Navigating from one Tab to another is done sequentially while moving from field question to the next field question. If the navigation needs to skip field questions then the user can click on the Tab with the specific data required. This way data from the office folders can be collected in any order and skipping around the PRF is quick and convenient.

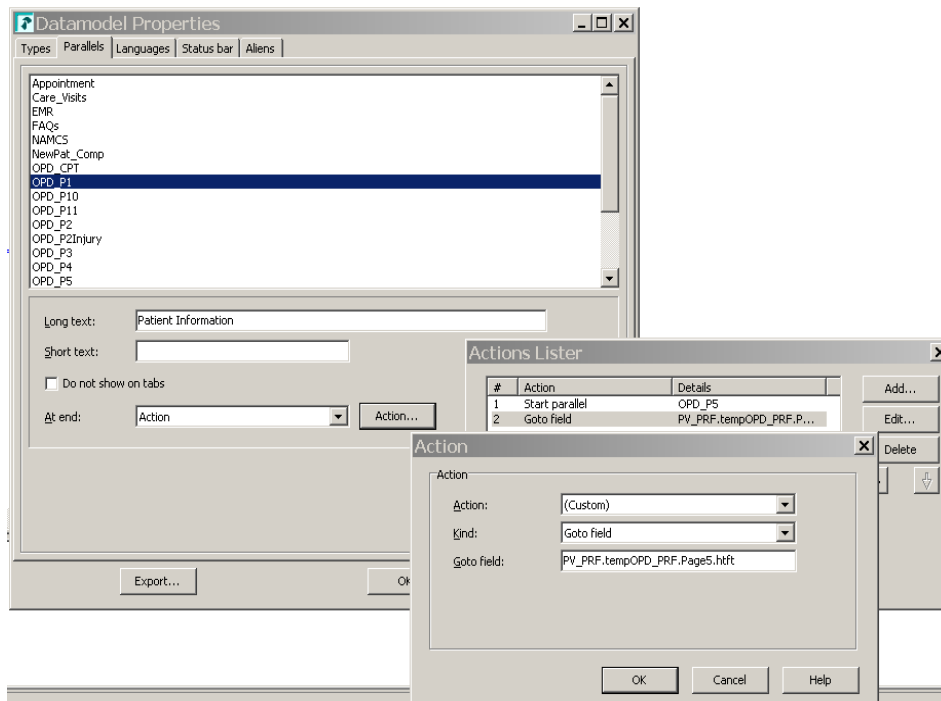


Figure 12 – Set the parallel Tab action with Manipula procedure

The organization of the Tab pages are as follows.

- Patient Information – Visit date, Birth date, zip code, age, Race, etc.
- Vital Signs – Height, Weight, temperature, blood pressure
- Reason for visit – 5 user input and 5 lookup reasons plus the major reason question
- Injury – the injury and/or cause of the patient visit
- Continuity of care – what happens after the patient leaves the facility
- Diagnosis – 5 user input and 5 lookup diagnosis plus additional general diagnosis
- Services – exams, tests ordered, treatments
- Medications – user input and lookup medications list
- Disposition – final patient outcome after visit
- Tests – Cholesterol, HDL, LDL, TGs, HbA1c, FBG, and Serum creatinine
- CPT – current procedural terminology lookup

2.3.2 Free form navigation

Another requirement for the PRF section in the abstraction instrument is to provide the FR with the ability to move around freely to record patient data. This is necessary during the abstraction process because the information in a physician's and a clinic's records does not necessarily appear in the order in which the instrument collects it. As a result, an FR might encounter a data item in a patient's medical record and then have to navigate to the correct field in order to enter that bit of information.

Free form navigation was implemented with the use of the arrow keys and the page up and page down keys. The instrument allows movement from one field to another without requiring the FR to enter data. Questions can be left blank and then answered later in the abstraction process. The instrument performs data validation at the end of each group of questions (i.e. parallel block).

This type of navigation allows movement of field questions on a page and movement from one Tab to another. Jumping around is allowed to facilitate quick data entry for the PRFs. When moving from the first Tab to another and then back to the first Tab again it will allow the active focus to remain on the field question that was left off on.

For a table, the authors specified the direction of the ENTER / TAB key when free navigation was active. To accomplish this, we used the property 'Fill order' for the grid in the Mode Library. Note the grid in figure 13 shown below uses the horizontal fill to allow for data collection across the screen.

	Most recent result	Date of Test
[F1] Was blood for the following laboratory tests drawn on the day of the sampled visit or during the 12 months prior to the visit? Reference Time: 4/24/2010 - 4/24/2011		
[F1] Total cholesterol? (1 = yes 2 = none found)	Total cholesterol mg/dL	
[F1] High density lipoprotein (HDL)? (1 = yes 2 = none found)	HDL mg/dL	
[F1] Low density lipoprotein (LDL)? (1 = yes 2 = none found)	LDL mg/dL	
[F1] Triglycerides (TGs) ? (1 = yes 2 = none found)	TGs mg/dL	
[F1] HbA1c Glycohemoglobin ? (1 = yes 2 = none found)	A1C %	
[F1] Fasting blood glucose (FBG) ? (1 = yes 2 = none found)	Blood glucose mg/dL	
[F1] Serum creatinine? (1 = yes 2 = none found)	Serum creatinine mg/dL	

Figure 13 - Data collection using horizontal grid

2.3.3 Button navigation

As noted earlier, an FR can collect over one hundred separate PRFs within an abstraction instrument. As a result, it was necessary to provide the FRs with a way to move between the PRFs.

To implement this type of navigation, the authors used Blaise menus to create a button panel. The button panel is only active and visible when in the PRF section of the instrument. We assigned the “Alt-1” through “Alt-7” function key combinations to the buttons in the panel. This satisfied the requirement that all instrument functionality is keyboard accessible. Buttons not needed in a particular context are deactivated and greyed out, but they remain visible. For example, if you are on the first PRF then the “previous” button would be greyed out. If you were on the last PRF then the “next” button would be greyed out. The “exit” button was implemented to finalize the PRF data collection and complete the case.

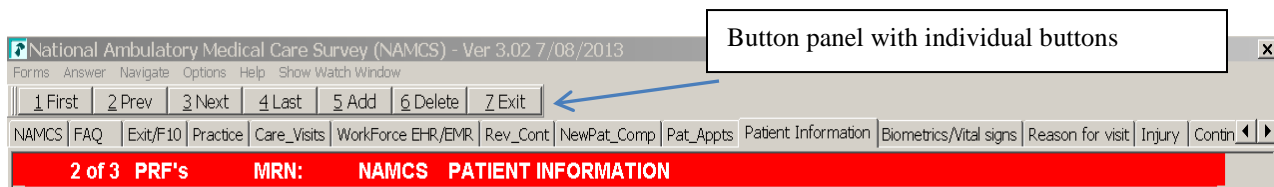


Figure 14 - Button bar for PRF navigation

The button panel used in the PRF section is shown in figure 14 above. The functions for the seven buttons in the panel are specified in the following list.

- First – moves to the first PRF unless on the first PRF
- Previous – moves to the previous PRF unless on the first PRF
- Next – moves to the next PRF unless on the last PRF
- Last – moves to the last PRF unless on the last PRF
- Add – adds an additional PRF unless maximum has been reached (set to 150 PRF's at this time)
- Delete –deletes a PRF and moves all PRF's up unless on the last PRF
- Exit – allows an FR to exit the PRF section

For the buttons to be active, some logical criteria had to be set to "True" in the "Enabled" criteria box (see figure 15). Using the panel design, the authors added the buttons and associated Manipula procedures with the buttons to implement the necessary movement.

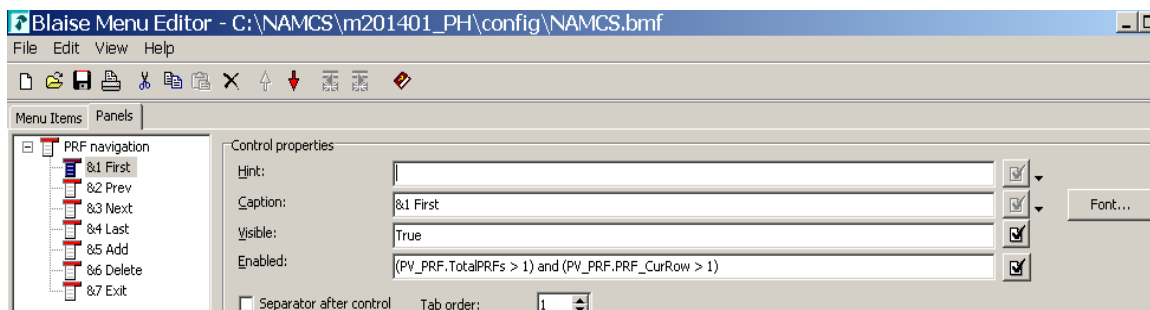


Figure 15 - Button definition

In figure 16 note how the "/Q" option is used to launch the Manipula script in the quiet mode. This ensures that there was no screen blinking when navigating between PRFs. In addition, the authors also found there was no time lag when the procedure was called. The instrument moved quickly among the PRFs.

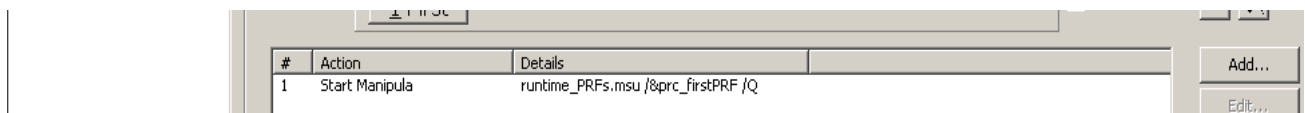


Figure 16 - Button action using Manipula procedure

2.3.4 Navigation shortcuts

Using the Blaise menu options there are several Manipula boxes that allow the user to enter data about the survey. Contact information, Office schedule, Interview status, Web setup information, and PRF status. Using the PRF status Manipula box we can view the PRFs and get details about a specific PRF. Because there could be over one hundred PRF's we wanted to be able to move to a specific PRF with confidence the correct one was selected. Each PRF number is defined by array row. Each PRF status is displayed by parallel block as a group of questions. Using this method the user can review a PRF plus pick a PRF to be edited. See figure 17.

PRF #	Medical Record Number	Visit Date	Patient Info	Reason for Visit	Care	Diagnosis	Vital Signs	Diagnostic	Meds	Disposition
1	1	4-20-2011	Yes	No	No	No	No	No	Yes	No
2	2	4-21-2011	No	No	No	No	No	No	No	No
3	3	4-22-2011	No	No	No	No	No	No	No	No
4	4	4-22-2011	No	No	No	No	No	No	No	No
5	5	4-23-2011	No	No	No	No	No	No	No	No
6	6	4-24-2011	No	No	No	No	No	No	No	No

Select PRF
Details
Close

Figure 17 - PRF selection and section status

When the Details button is activated, the Page layout for the Manipula box provides status on each of the parallel blocks as a group of questions. Note the use of color where red shows critical data missing. See figure 18.

Show PRFs Status for PRF's 1
Total PRFs = 2

PRF #	Medical Record Number	Patient Information	Vital Signs	Meds	Disposition
1	1	Patient Zip: 1 Birthdate/Age: 01/01/1970 / 41 Years Sex: Female Pregnancy: No Ethnic: Not_Hisp Race: Black Payment Source: Medicare Tobacco Use: Current	Height: 5 ft 5 in Weight: 120 lbs 0 ozs Temperature: 100 Fahrenheit Blood Pressure: 1 / 1	Yes	Yes
2	2	Reason for Visit Injury: Yes, injury/trauma Reason for Visit: 2 Continuity of Care Prime Care: Yes Referred: Seen Before: Yes, established patient Past Visits: 1 Major reason for visit: New problem (Diagnostic Screening Services: NO SERVICES Meds Medications: Disposition Providers Seen: Physician Duration: 1 minutes Visit Disposition: Critical data missing	No	No
		Diagnosis Diagnosis: 1 Patient Have: Asthma: Cancer:	Lookback Tests Cholesterol Test: HDL Test: LDL Test: TGS Test: A1c Test: FBG:		

1:2
Select PRF
Previous
Next
Close

Figure 18 - PRF details Manipula box with buttons

Using the Manipula boxes Contact information, Office schedule, and Interview status from anywhere in the instrument allows the user to view case status and case level data. The contact information can be updated. The information is provided for both names and phone numbers. The Office schedule is provided as a tool for data collection of office times and places. The interview status is used to identify

when a case needs to be completed and where any data elements are missing. This can be very helpful when jumping around in the instrument, something can be skipped and the user would need to be reminded where to data needs to be completed.

3. Conclusions

The Authoring team is very familiar with Manipula and Maniplus. Nevertheless, the extensive use of Manipula and Maniplus in the NAMCS and NHAMCS instruments turned out to be a challenge and provided us with the opportunity to expand on their capabilities on a large scale. In the end, Manipula/Maniplus proved to be robust and reliable tools for implementing many of the requirements for the two medical surveys. Manipula was a great aid. Using it allowed the team to quickly resolve a number of challenges using alternative and innovative methods.

Working with the Blaise Mode Library was challenging in the beginning. Once the pattern was established however, the Authoring team did not have to invest a great deal of time in creating Fieldpanes for each item because the Fieldpanes were used for multiple questions. In the end, we found great flexibility in the layout which enabled us to mimic the paper forms successfully.

This approach to the layout provided some feedback on the use of the auto-enter option in the Mode Library. While this setting was not used for the surveys because it is a global setting, it might have been useful if it could have been implemented for the Patient Record Forms only.

Another realization while working on this project was that the layout of the PRF's could easily be used as a Web Form.

4. Acknowledgements

Many individuals have worked and continue to work on the NAMCS and NHAMCS to ensure their successful operation. We would like to include grateful acknowledgement to our colleagues from the U.S. Census Bureau whose work directly contributed to the instrument development discussed in this paper. We thank Johanna Rupp and Michael Johnson for their work and efforts in the design, programming and testing of the instruments for this project.

5. Disclaimer

The views expressed on (statistical, methodological, technical, or operational) issues are those of the author(s) and not necessarily those of the U. S. Census Bureau.