

Development of Survey and Case Management facilities for organisations with minimal survey infrastructure

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1. Introduction

In order to conduct a survey you need more than just a questionnaire and a computer to run it on. You also need to have a system which can manage your survey and manage the case records that will be created.

Organisations that run surveys regularly will probably have existing infrastructure which can be used to manage the conduct and operation of those surveys. For them it will be sufficient to modify their interfaces to interact with Blaise questionnaires. For smaller organisations, or ones with limited survey infrastructure, however, it will be necessary to develop some facilities that can provide some survey and case management functions.

This paper describes a basic survey management system that has been developed for use by three organisations that had minimal or no survey infrastructure before choosing to use Blaise for their surveys.

2. Typical situation

The three organisations involved were:

- The Australian Department of Family, Community Services and Indigenous Affairs (Longitudinal Study of Indigenous Children)
- Telethon Institute for Child Health Research
- New Zealand Ministry of Tourism

The typical situation that I found with these three organisations was:

- They want to conduct a survey relevant to their needs
- They want to use computer assisted interviewing
- They have heard of Blaise and obtained a licence (or evaluation licence)
- They undertake to develop or commission a Blaise questionnaire

When they get further down the track, they plan to:

- Purchase notebook computers for the survey
- Employ interviewing staff to conduct the survey

It is not until the field operations were considered in detail, however, that it was realised that some additional infrastructure would be necessary to help manage the survey. In general, these organisations had little or no existing survey infrastructure to assist with the conduct of the survey. The common assumption was that Blaise software could provide these facilities.

There is no ready-made case management facility provided with Blaise software, but the tools for developing such facilities do exist.

3. Choice of tools to develop management facilities

It is possible to develop survey and case management facilities either by using the Maniplus language of the Blaise suite or by using the Blaise API component. In Blaise 4.81 there is also the Blaise Data Centre utility which may have a role.

Maniplus has the advantage that it is part of the Blaise suite and can readily access Blaise data files. The Maniplus language provides relatively easy ways to program dialog elements containing fields and buttons that can be activated or hidden, depending on the situation. The development can be done using the Blaise Control Centre and the skill level is marginally more than needed to develop Blaise questionnaires.

To make use of the Blaise API component it is necessary to develop a separate application using a scripted language (eg. Microsoft Visual Basic, C++ or .NET) that can provide you with an interface which then can be used to interact with Blaise data files. This requires additional development software (eg. Microsoft Visual Studio) as well as suitably skilled programmers to carry out the development. There are also additional licence fees to be able to use the Blaise API component.

The Blaise Data Centre provides an interface to examine Blaise data and carry out some case management functions such as deployment and importation of cases. The facility is interactive and does not seem to provide a programmable interface so that you can tailor it to particular needs. There are also additional licence fees to be able to use the Blaise Data Centre. This utility would have functional use in the office environment and could complement facilities set up on the notebook computer.

It was decided that Maniplus would be used to develop survey management facilities because none of the organisations had ready access other software or skilled programmers. It would also be easier for survey staff, with some skills in Blaise, to maintain a Maniplus application once it was developed. It was also part of the basic Blaise software installation.

4. Facilities needed

When considering the facilities that needed to be developed for the notebook computer it was decided to focus on features that were essential for the direct operation of the survey. General business issues such as secure access to the computer, internet access and communication with the office were considered out of scope because they could be handled by existing software and protocols.

The following features were considered important and necessary to be incorporated into a basic survey and case management system that could operate on the notebook computer:

- Establishment of the survey environment
- Identification of the operator
- Installation and removal of surveys
- Display of current surveys
- Display of cases for the selected survey
- Management of the interview entry and exit
- Managing the status of cases
- Packing up of cases for return to the office

5. System design

The system was designed to have three layers of management programs.

The top layer is the Survey Manager program which provides the single point of entry for the operator to access all surveys on the notebook computer. From within the Survey Manager the operator can install or remove surveys, and/or select one to be used for the current session.

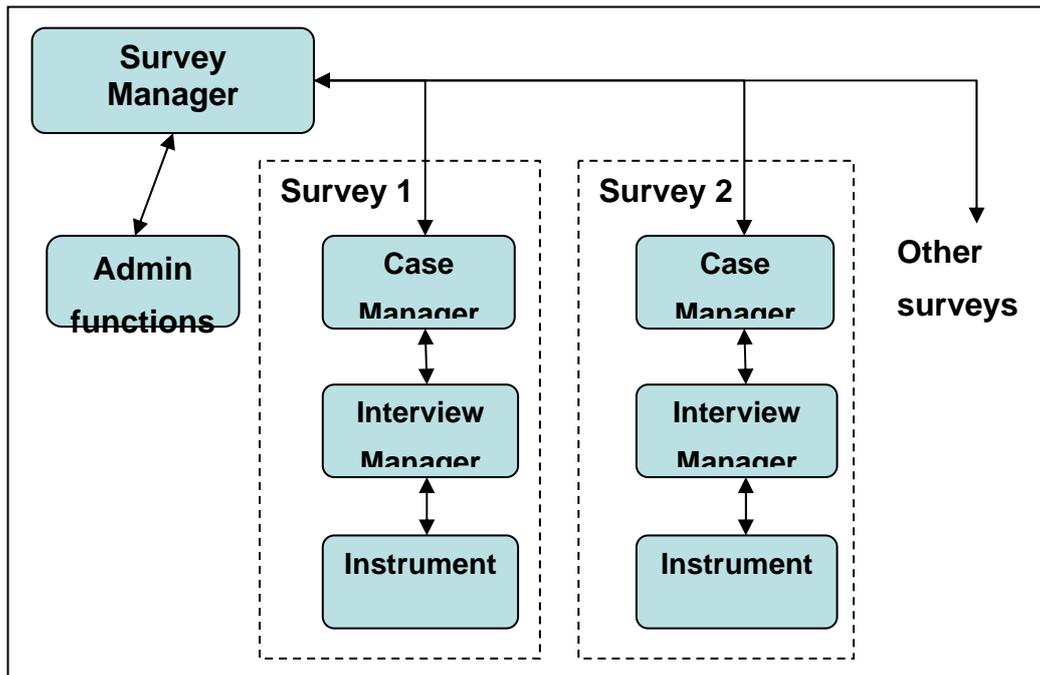
The second layer handles the Case Management functions relevant to each survey. A survey would have its own Maniplus program tailored to its particular needs.

The third layer is the Interview Management layer. Once again, each survey would have its own Maniplus program that handles the entry into and exit from the interview for a selected case record.

Underneath the management layers are the Blaise instruments (electronic questionnaires) that are used in the surveys.

The high level system design is illustrated in Figure 1. Each facility is described in more detail in the sections that follow.

Figure 1. High level system diagram showing three layers of management



6. Survey environment on the notebook computer

The main requirement for the survey environment on the notebook computer is to keep it as simple as possible. That way, it should be relatively easy to resolve any problems that might arise.

6.1 Blaise Software installation

It was decided that the easiest way to set up Blaise on the notebook computers to be used by the interviewers was to install a current complete version of Blaise using the standard Blaise installation package. That way all the necessary software elements, and more, were available on the computer should they be needed.

While it is possible to operate Blaise surveys using a cut-down version of the software (involving a small number of EXE files from the standard installation) that would have required a special installation package to be built. There were no resources to develop or maintain such a special installation package so the full installation was chosen.

It is not necessary to include the Blaise licence key in the installation because the interviewers do not need any of the licensed components.

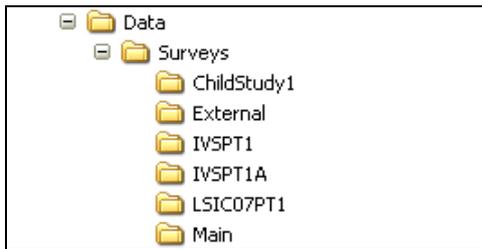
In the event that survey managers are concerned about interviewers running parts of the Blaise software which they should not, it is possible to remove access to the Blaise Control Centre by removing the Blaise.EXE file from the installation. This would have to be done manually.

6.2 Folder structure

In order to manage the surveys to be conducted on the notebook, a simple folder structure was devised.

The primary folder under which the survey manager application and all surveys would be placed was called 'Surveys' and this was placed in a folder on the C drive called 'Data'. The Survey Manager application was placed in a folder called 'Main' and this was located in the 'Surveys' folder. Each survey would then be placed in its own named folder, also in the 'Surveys' folder. In order to share the use of external look-up files across multiple surveys, an 'External' folder may also be useful. See Figure 2 for a screen-capture of the folder structure.

Figure 2. Screen-capture view of survey folders once 4 surveys have been installed



There is no need to set up these folders because the installation processes take care of that.

6.3 Other software

No other software is required to conduct Blaise surveys but it would be expected that some standard software would be available to handle security, internet connection and communications (eg. E-mail client software).

7. Survey Manager application

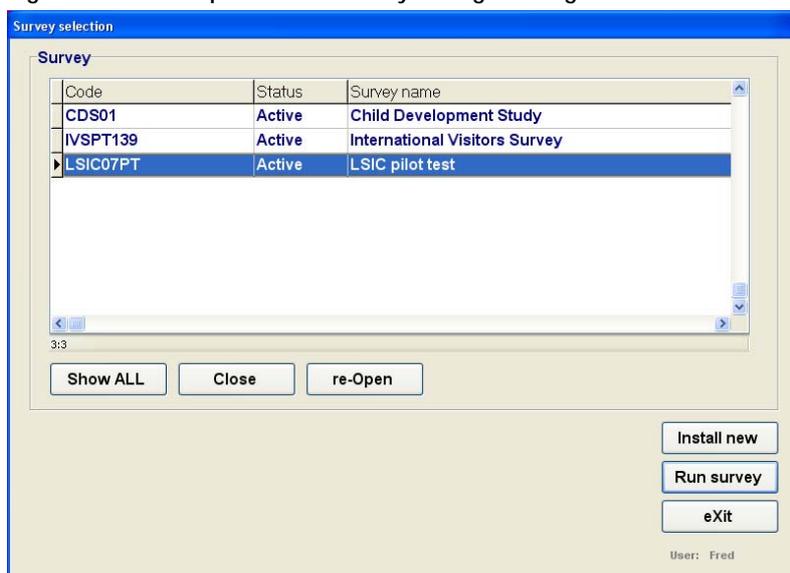
The Survey Manager application provides:

- Single start-up point
- User identification
- Survey/instrument installation
- List of available surveys (for selection)
- Buttons to start a session using a selected survey

7.1 Interface

The interface consists of a screen that lists all available surveys with buttons for installing new surveys and activating current ones (See Figure 3).

Figure 3. Screen-capture of the Survey Manager dialog



7.2 User identification

User identification occurs when the Survey Manager application is run for the first time. At that point a small dialog screen is provided showing a field into which the user can enter his/her user name.

Once a user's identity has been recorded then that is passed down to the other management programs and can eventually be inserted into the case record to identify the operator who has been collecting or working with the data.

It is also possible to assign different roles to different users by storing a list of available users for a survey.

The user identification developed for this application is fairly open. Once a name has been given it is stored and all future uses of the application on that computer assume the same user name. Essentially the application is identifying the computer rather than the operator but this was considered adequate for the needs of the organisations involved.

Access to the Survey Manager application is not restricted in any way as that was considered unnecessary because access to the notebook computer was presumed to be controlled by normal Windows user and password control.

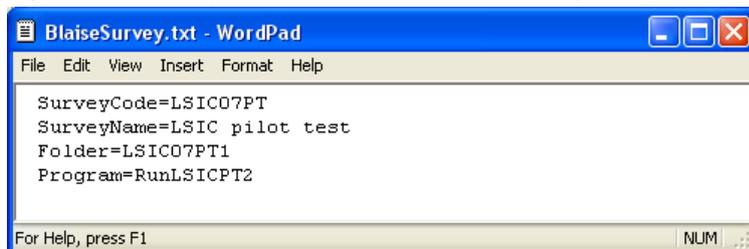
7.3 Installation of a survey through the Survey Manager

The interface provides a button that enables the operator to install a new survey into the system. A new survey would generally be supplied on CD or USB drive which would contain a folder holding all required Blaise instruments, Maniplus programs and any other files needed for the survey.

To control the installation process a small text file called **BlaiseSurvey.TXT** is included with the installation files (see Figure 4). This text file contains the following four items of information

- The full name of the survey
- An identifying code name for the survey
- The target folder name
- The name of the Maniplus case management program to be run

Figure 4. Screen-capture of the content of BlaiseSurvey.TXT



The installation process uses the supplied information to create the target folder and copy the survey files into it. Once the survey files are installed the list of available surveys is updated to show the new survey.

The Survey Manager is set up to prevent the same survey (ie. one with the same Survey identification code) from being installed a second time. This was done to avoid accidentally over-writing collected data.

7.4 List of surveys

The Survey Manager maintains two lists of surveys for the operator. One list contains the names of all surveys ever installed and the other contains the list of active surveys only. The default list is the list of active surveys. Surveys can be moved between the lists using the **Close** and **Re-Open** buttons.

Surveys are never deleted by the system. If a survey actually needs to be deleted then that could be done manually next time the notebook computer is in the office.

7.5 Running a survey from the list

Once a survey is selected then it can be run from the Survey Manager using the **Run Survey** button. When that is done then the system executes a command to the corresponding Maniplus Case Management program, passing in the user name as a parameter. Control is then passed to the Case Management program. When that program finishes then control returns to the Survey Manager.

7.6 Installation of the Survey Manager

The Survey Manager is installed from a CD or USB drive which contains the program and simple Install.BAT file. The install process creates the target folder and copies the program elements.

8. Case Manager applications

The Case Manager application provides:

- Access to a List of cases for the survey
- Ability to operate on the list (load, remove, package)
- Buttons to start an interview using a selected case
- Management of the case records in the survey folder

Each survey generally has a different set of needs and each will therefore require a tailored program. The sections that follow discuss some of the issues and how they can affect the Case Management program.

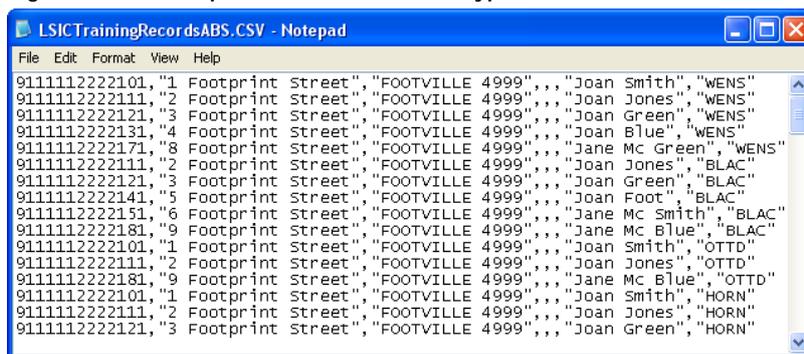
8.1 Pre-defined and allocated list

Many surveys operate on a list of addresses (or cases) which are allocated to particular interviewers.

To manage this kind of survey it is important to maintain a single central list (in the office) which keeps track of the case identifiers and which interviewer has been assigned each case. Whenever a case is moved from one interviewer to another the list needs to be updated in the central repository.

From time to time the updated case list, in the form of a comma-separated text file, would then be sent to the interviewers for loading. Figure 5 shows an example of such a list.

Figure 5. Screen-capture of the content of a typical case list

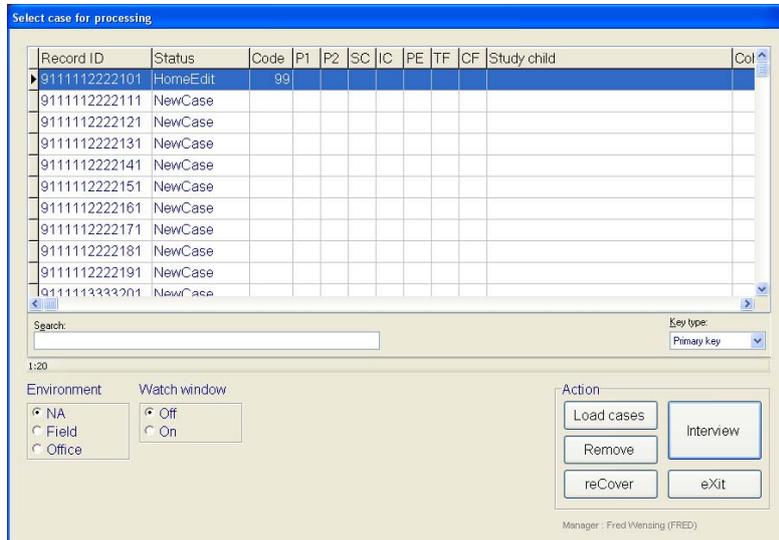


The Case Manager application for such a survey should be able to load the latest case list whenever it is updated. The system also needs to keep track of all the case lists that have been loaded so that it does not re-load an old list.

Where cases are allocated to specific interviewers, the Case Manager would need to select, for display, only those cases that match the user name.

Figure 6 shows a screen-capture of the Case Manager developed for the Survey of Indigenous Children where cases were assigned to particular interviewers. Note the button for loading updated case lists.

Figure 6. Screen-capture of the Case Manager where an assigned list is involved



For convenience of the operator, options exist in the Case Manager interface to remove completed cases from view.

8.2 Dynamic sample

For some surveys, there is no predefined sample. Instead, the sample is defined at the time of interview. This can happen when there is random selection at a venue such as an airport. In this situation the Case Manager needs to create uniquely identified cases.

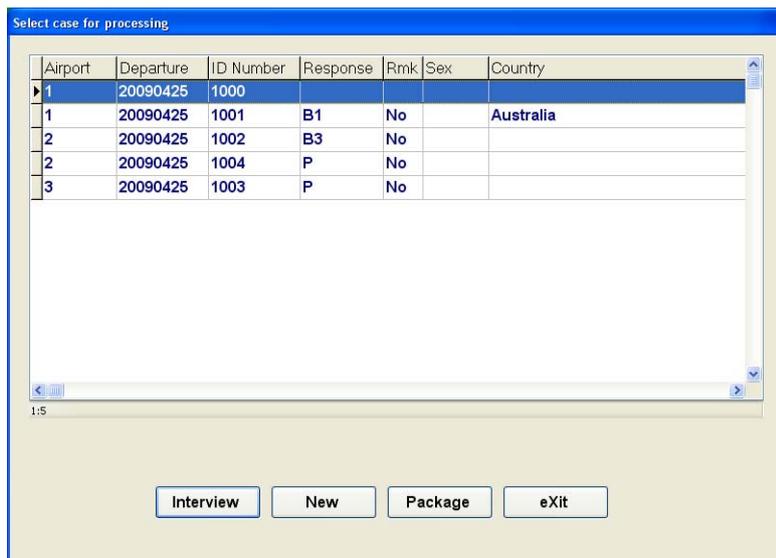
The International Visitor Survey run by the New Zealand Ministry of Tourism is just such a survey. The Case Manager was programmed to set up unique identifiers based on airport, current date and interviewer code. At the commencement of each session the operator is required to identify the airport and date (see Figure 7). The system keeps track of the last used case number and assigns new numbers to new cases.

Figure 7. Screen-capture of the session identification dialog



New cases are added to the case list as the interviewing session progresses. Figure 8 shows a screen-capture of the Case Manager developed for the International Visitor Survey where cases were created dynamically using the **New** button. Previously created cases can be accessed using the **Interview** button.

Figure 8. Screen-capture of the Case Manager for a dynamic sample



8.3 Management of case records in the survey folder

There are two ways to handle the Blaise case records which are created:

- Have a single file containing all case records, or
- Treat each case record as a file in its own right

The single file approach is satisfactory provided that there is no need to move individual cases between interviewers. This was the case with the International Visitor Survey.

However, as soon as there is a possibility that cases may need to be moved around then it is best that each case record be stored in a separate file. This was the situation with the Longitudinal Study of Indigenous Children.

8.3.1 Managing a single file of all records

Using a single Blaise data file to hold all the case records is relatively easy provided that each case has a unique identifier. The Blaise file is set up with the corresponding primary keys for the unique identifier and access to the record is done by using the relevant key.

No special file management is required until the data needs to be sent back to the office. This is discussed in section 8.5.

8.3.2 Managing separate files for each case record

Using separate files for each case record does make the Case Manager programs more complicated to write, but gives the advantage of being able to manage each case separately.

Management of the cases is handled by using the ZIP functions of Blaise (available from version 4.8 onwards) or by using the Winzip command line utilities.

Essentially, once an interview is closed the Case Manager collects all the relevant Blaise files and copies them to a Zip file for storage. If the case record is revisited then the Case Manager removes the Blaise files from the Zip file and places them back into the system before running the Interview Manager program.

The relevant Blaise files are identified using the Blaise database name with the * wildcard to pick up all files. Metadata files are excluded from the Zipping process through the use of a list of exclusions, recorded in a text file called **Exclude.TXT**.

Figure 9 shows the procedure used to Zip the data for one case record (using Blaise commands). In this procedure **IDCode** is the identifier of a case and **aFormName** is the name of the survey instrument (Blaise

datamodel) and **Exclude.TXT** contains a list of files to be excluded from the Zip process. Note that the Audit trail file is also added when present.

Figure 9. Procedure to Zip current data

```
{Procedure to Zip current data file to backup folder using Blaise commands}
PROCEDURE Run_Zip
  DAYFILE('Zip current files to '+IDcode+'.Zip')
  aResult := ZIPFILES ('Backup\'+IDcode+'.zip '+aFormName+'.* /X@Exclude.txt')
  IF ADTEXists=1 THEN
    DAYFILE('Zip ADT file to '+IDcode+'.Zip')
    aResult := ZIPFILES ('Backup\'+IDcode+'.zip '+IDcode+'.adt')
  ENDIF
ENDPROCEDURE
```

Before an interview is started, any existing survey data file is copied to another Zip file called Remove.ZIP then deleted. This is important to ensure that new records are not adversely affected by old data.

Note that unlike the Winzip command line program the ZIPFILES command does not have a 'Move' option that enables removal of the data files but not the datamodel. For that reason the program then deletes all the files then restores the datamodel from the Remove.ZIP file.

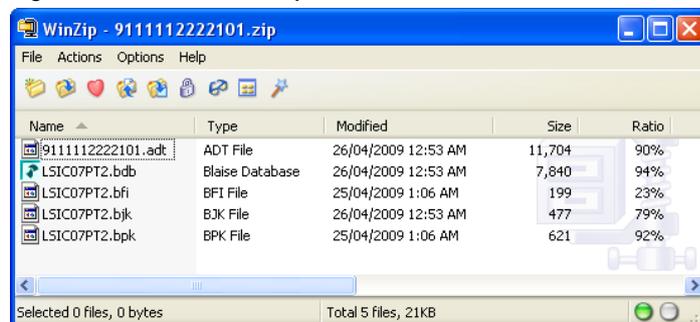
Figure 10 shows the commands that are used to remove any current data and restore a selected case from a Zip file (when it exists). In this part of the program **IDCode** is the identifier of a case, **aFormName** is the name of the survey instrument (Blaise datamodel), **aInstallFolder** is the location of the current survey installation and **Exclude.TXT** contains a list of files to be excluded from the backup Zip process.

Figure 10. Segment of source code showing extraction of case data from backup files

```
{First remove any (old) data files that may be present}
IF FILEEXISTS(aFormName+'.bfi') THEN
  DAYFILE('Clean up files to Remove.zip')
  {Copy the instrument files to a local Zip}
  aResult := ZIPFILES ('Remove.zip '+aFormName+'.*')
  {Delete all survey files}
  aResult := RUN ('DEL '+aFormName+'.*')
  {Extract the survey datamodel from the Remove.Zip file}
  aResult := UNZIPFILES ('Remove.zip /D'+aInstallFolder+' @Exclude.txt')
ENDIF
{If a backup file exists then extract the data and use it}
IF FILEEXISTS('Backup\'+IDcode+'.Zip') THEN
  DAYFILE('Unzip files from '+IDcode+'.Zip')
  aResult := UNZIPFILES ('Backup\'+IDcode+'.Zip /D'+aInstallFolder+' *')
ELSE {otherwise create a new record}
```

Figure 11 shows the content of a single Zip file containing the Blaise data files for one case record and the corresponding Audit trail file. Notice that only the data files are present and that the datamodel is not included.

Figure 11. Content of the Zip file for one case record



8.4 Running the interview(s)

Once a case record has been selected for interview and the data restored (if present) then the Case Manager hands control over to the Interview Manager program, passing in parameters to identify the user and the case.

8.5 Packaging the cases for sending to the office

Depending on the survey, the Case Manager can also be programmed to carry out other case administration tasks such as packaging for return to the office.

The packaging process is a separate Maniplus program that makes use of the ZIP functions of Blaise to put all cases for a designated survey into one Zip file. This makes it easier for the operator to send the data back because the program has made the selection of files and it produces just one file to be attached to an e-mail.

The packaging process is activated through the **Package** button on the Case Manager screen.

Because the packaging process removes those records from the system, the operator is warned that they will no longer have access before execution takes place.

When the packaging is complete a small report is shown on the screen for the operator (see Figure 12).

Figure 12. Screen-capture of the packaging report



9. Interview Manager applications

The Interview Manager application provides:

- Program control over the entry and exit from the interview
- Check of the clean/dirty status of the record and inserts the status value into the data
- Handling of the setting of response status

9.1 Controlling the entry and exit from the interview

The Interview Manager is a Maniplus program that provides a shell around the interview. The program accepts parameters from the Case Manager and then starts up the interview for the identified case using the Manipula EDIT command.

The following command line options are applied to the EDIT command to:

- Identify the case to be opened (option /K)
- Specify the Menu file to be used (option /M)

- Identify whether the Audit trail is to be activated (option /C)
- Turn on the watch window if required (option /!)
- Exit the data entry process when the interview is closed (option /X)

Other options may be added if needed but these are the common ones.

Figure 13 shows a typical activation of the interview using the EDIT command. In this part of the program **aWatchW** is for the watch window setting and **aRecordID** contains the identifier of the case record as supplied via parameters from the Case Manager.

Figure 13. Segment of source code showing the start-up of the interview

```

{Set the watch window based on Parameter 2}
IF PARAMETER(2) = 'ON' THEN
  aWatchW := '/!'
ELSE
  aWatchW := ' '
ENDIF

{start-up the interview}
IF PARAMETER(3) <> ' ' THEN
  {apply the Audit trail settings}
  aResult := fInterview.EDIT('/MIVS.bmf /X '+aWatchW+' /K'+aRecordID
    +' /C'+PARAMETER(3)+' .DIW')
ELSE
  {without the Audit trail}
  aResult := fInterview.EDIT('/MIVS.bmf /X '+aWatchW+' /K'+aRecordID)
ENDIF

```

The most important function that the program provides, however, is to take over when an interview is closed. This is covered in the next two sections.

9.2 Checking the clean/dirty status

Once the interview is closed it is possible for the Interview Manager program to check whether the record is clean or dirty. This is done by examining the FORMSTATUS of the record (see Figure 14). It is then possible to record that status in a field in the record for ease of access by users or other systems.

Figure 14. Segment of source code that checks the clean/dirty status

```

{check the instrument status and record the result in the BlaiseStatus field}
IF fInterview.FORMSTATUS = NOTCHECKED THEN
  fInterview.CHECKRULES
ENDIF
IF fInterview.FORMSTATUS = CLEAN THEN
  fInterview.BlaiseStatus:=BLClean
  aStatus := 'CLEAN' {Instrument status is CLEAN}
ELSEIF fInterview.FORMSTATUS = DIRTY THEN
  fInterview.BlaiseStatus:=BLDirty
  aStatus := 'DIRTY' {Hard errors exist in the instrument}
ELSEIF fInterview.FORMSTATUS = SUSPECT THEN
  fInterview.BlaiseStatus:=BLSuspect
  aStatus := 'SUSPECT' {Soft errors exist in the instrument}
ELSEIF fInterview.FORMSTATUS = NOTCHECKED THEN
  fInterview.BlaiseStatus:=BLNotchecked
  aStatus := 'NOT CHECKED' {Instrument status is NOT CHECKED}
ENDIF

```

9.3 Setting response status

Once the interview is closed the Interview Manager can intervene and provide the operator with a screen where the response status can be set.

The response status options are modified to match the completeness of the interview. The logic for completeness is best done within the Blaise instrument because then it is available to any system that needs this information. Completeness can be tested by placing particular points within the instrument flow then checking how many of those points have been triggered (see Figure 16).

Depending on the completeness of the interview, then only particular response status options are possible. The response status screen is set up so that only the relevant response settings are activated and others are not (see Figure 17). At this point there is also an option for the operator to re-enter the case record if desired. Remarks can also be added in the Response Status dialog and these will be inserted into the case record.

Figure 16. Segment of source code with typical logic for completeness of an interview

```
IF StartInterview=Continue THEN
  IF Endsurvey=Continue THEN
    IF Eligible=No THEN
      StatusFlds.Condition1:=3 (ineligible)
    ELSE
      StatusFlds.Condition1:=1 (full response)
    ENDIF
  ELSE
    StatusFlds.Condition1:=2 (partial response)
  ENDIF
ELSE
  StatusFlds.Condition1:=4 (empty record)
ENDIF
```

Figure 17. Screen capture of the response status dialog with relevant entries activated

Select Response Status

Codes available

- A. Complete interview
- B1. Partial interview, refused**
- B2. Partial interview, boarding**
- B3. Partial interview, other**
- C. Eligible, refused
- D. Eligible, refused entry
- E. Eligible, boarding
- F. Eligible, language
- G. Eligible, other
- H. Unknown, refused
- I. Unknown, boarding
- J. Unknown, language
- K. Unknown, other
- L. Missed, no interviewer available
- M. Missed, other
- N. Ineligible (Out of scope)
- O. Quota full
- P. Other

Response remarks:

Initial response status:

Re-enter eXit

Information
No remarks in this interview.

Upon completion of the Response Status dialog, control is returned to the Case Manager.

10. Summary

The programs described in this paper illustrate the kind of facilities that are needed to manage one or more surveys that involve the use of notebook computers in the field. It shows how there are three layers of management that need to be supported: survey management, case management and interview management.

For organisations that have little or no existing survey infrastructure, Maniplus clearly has sufficient functionality and versatility to provide the solution.