CONDUCTING TABLET-BASED FIELD DATA COLLECTION WITH SURVEY SOLUTIONS

A Handbook

FEBRUARY 2020

Food and Agriculture Organization of the United Nations

ADB

CONDUCTING TABLET-BASED FIELD DATA COLLECTION WITH SURVEY SOLUTIONS

A Handbook

Food and Agriculture Organization of the United Nations

and

Asian Development Bank

Bangkok, 2020

FAO and ADB. 2020. *Conducting Tablet-Based Field Data Collection with Survey Solutions: A Handbook*. Bangkok, Thailand.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) or Asian Development Bank (ADB) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO or ADB in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO or ADB.

ISBN 978-92-5-132180-5 [FAO]
© FAO and ADB, 2020

Some rights reserved. This work is made available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; https://creativecommons.org/licenses/by-nc-sa/3.0/igo/legalcode).

Under the terms of this licence, this work may be copied, redistributed and adapted for non-commercial purposes, provided that the work is appropriately cited. In any use of this work, there should be no suggestion that either FAO or ADB endorses any specific organization, products or services. The use of the respective logos of FAO or ADB is not permitted. If the work is adapted, then it must be licensed under the same or equivalent Creative Commons license. If a translation of this work is created, it must include the following disclaimer along with the required citation: "This translation was not created by either the Food and Agriculture Organization of the United Nations (FAO) or the Asian Development Bank (ADB). Neither FAO nor ADB is responsible for the content or accuracy of this translation. The original English edition shall be the authoritative edition."

Disputes arising under the licence that cannot be settled amicably will be resolved by mediation and arbitration as described in Article 8 of the licence except as otherwise provided herein. The applicable mediation rules will be the mediation rules of the World Intellectual Property Organization http://www.wipo.int/amc/en/mediation/rules and any arbitration will be in accordance with the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL)

Third-party materials. Users wishing to reuse material from this work that is attributed to a third party, such as tables, figures or images, are responsible for determining whether permission is needed for that reuse and for obtaining permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

Sales, rights and licensing. FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org. Requests for commercial use should be submitted via: www.fao.org/contact-us/licence-request. Queries regarding rights and licensing should be submitted to: copyright@fao.org.

ADB information products are available on the ADB website (www.adb.org/publications).

Contents

Foreword viii
Abbreviations ix

Chapter 1: Introduction to Computer-Assisted Personal Interviewing 1
1.1 What is CAPI? 1
1.2 Why Use CAPI? 1
1.3 Hardware Requirements 2
1.3.1 Tablets 2
1.3.2 Power Solutions 2
1.3.3 Internet Connection 2
1.3.4 Personal Computers and Laptops 2
1.3.5 Server 3
1.4 CAPI Project Workflow 3
Chapter 2: Introduction to Survey Solutions 5
2.1 Designer App (Web-Based) 6
2.2 Tester App (Tablet-Based) 7
2.3 Headquarters App (Web-Based) 8
2.4 Supervisor App (Tablet-Based) 8
2.5 Interviewer App (Tablet-Based) 9
Chapter 3: Setting Up Questionnaires in the Designer App 10
3.1 Question Types 10
3.1.1 Single Select Questions 10
3.1.2 Multi Select Questions 10
3.1.3 Numeric Questions 11
3.1.4 Date Questions 12
3.1.5 Text Questions 12
3.1.6 Global Positioning System Questions 12
3.1.7 List Questions 13
3.1.8 Barcode Questions 13
3.1.9 Picture Questions 14
3.1.10 Audio Questions 14
3.1.11 Geography Questions 14
3.2 Interviewer Comments 14
3.3 Creating a New Questionnaire 15
3.4 Creating Sections in the Questionnaire 18
3.5 Setting Up Questions 18
3.6 Compiling and Testing 21
3.7 Setting Up Rosters 22
3.7.1 Fixed Rosters 22
3.7.2 Nonfixed Rosters 25
3.7.3 Text Piping 26
3.7.4 Subrosters 27

3.8 Enabling Conditions 28
3.8.1 Basic Operators 29
3.8.2 Multi Select Operators 30
3.8.3 Logical Operators 31
3.8.4 System Variables 31
3.8.5 LINQ Expressions 31
3.9 Validations 32
3.9.1 Error and Warning Messages 33
3.9.2 Date Validations 34
3.9.3 Cascading Answer Lists 35
3.9.4 Lookup Tables 38
3.10 Setting Up Additional Languages 39
Chapter 4: Setting Up the Completed Questionnaire for Data Collection 42
4.1 Setting Up the Headquarters Server 42
4.2 Setting Up User Accounts and Apps 43
4.2.1 Setting Up the Interviewer App on Tablets 43
4.2.2 Installing the Interviewer App 43
4.2.3 Signing In to the Interviewer App for the First Time 44
4.2.4 Setting Up the Supervisor App on Tablets 46
4.3 Importing Questionnaires 47
4.4 Creating Assignments 47
4.5 Quality Control during Data Collection 49
4.5.1 Survey Statuses 50
4.6 Exporting Data 53
4.6.1 Metadata 55
4.6.2 Pictures and Audio 55
4.6.3 Questionnaire Updates while in the Field 56
Chapter 5: Advanced Features 57
5.1 Question Scope 57
5.2 Timestamps 58
5.3 Geography Questions 59
5.4 Computer-Assisted Web Interviewing 60
5.5 Randomizations 61
5.6 Variables 62
5.7 Help and Support 64
5.8 Syntax Guide 64
5.9 Users Forum 64
5.10 Updates and New Features 66
5.11 Contacting Technical Support 66

References 67

Tables

Table 1.1: Tablet Specifications for Survey Solutions, June 2019 2
Table 3.1: Relational Operators Used in Survey Solutions 29
Table 3.2: Multi Select Operators Used in Survey Solutions 30
Table 3.3: Logical Operators Used in Survey Solutions 31
Table 3.4: System Variables Used in Survey Solutions 31
Table 3.5: LINQ Operators Used in Survey Solutions 32
Table 3.6: Operators Used for Validation of Date Questions 34

Figures

Figure 2.1: The Five Components of the Survey Solutions System 5
Figure 2.2: Survey Dashboard of the Designer App 6
Figure 2.3: Questionnaire Editing in the Designer App 6
Figure 2.4: Survey Dashboard of the Tester App 7
Figure 2.5: Testing a Sample Questionnaire in the Tester App 7
Figure 2.6: Example of a Map Report in the Headquarters App 8
Figure 2.7: Access Panel for the Supervisor App 9
Figure 2.8: Access Panel for the Interviewer App 9
Figure 3.1: Example of a Single Select Question 10
Figure 3.2: Example of a Single Select Combo Box 10
Figure 3.3: Example of a Multi Select Question 10
Figure 3.4: Example of a Multi Select Ranking Question 11
Figure 3.5: Example of a Multi Select "Yes" or "No" Question 11
Figure 3.6: Example of a Multi Select Combo Box 11
Figure 3.7: Example of a Numeric Question 11
Figure 3.8: Example of a Date Question 12
Figure 3.9: Example of a Text Question 12
Figure 3.10: Example of a Global Positioning System Question 12
Figure 3.11: Example of a Completed Global Positioning System Question 13
Figure 3.12: Example of a List Question 13
Figure 3.13: Capturing Information from a Barcode 13
Figure 3.14: Example of a Completed Barcode Question 13
Figure 3.15: Example of a Picture Question 14
Figure 3.16: Example of an Audio Question 14
Figure 3.17: Example of a Geography Question 14
Figure 3.18: Example of Interviewer Comments 15
Figure 3.19: Registering for a Designer App Account 15
Figure 3.20: Registration Form for the Designer App 15
Figure 3.21: Creating a New Questionnaire in the Designer App 16
Figure 3.22: Providing a Questionnaire Name and Variable 16
Figure 3.23: Key Components of the Questionnaire Editing Screen 17
Figure 3.24: Features of the Advanced Instrument Panel 17
Figure 3.25: Creating a New Section 18
Figure 3.26: Editing an Existing Section 18

Figure 3.27: Adding a New Question 18
Figure 3.28: Setting Up a New Question 19
Figure 3.29: Selecting the Question Type 19
Figure 3.30: Assigning a Variable Name 19
Figure 3.31: Setting a Variable Label 20
Figure 3.32: Setting the Question Text 20
Figure 3.33: Adding Answer Options 20
Figure 3.34: Completed Answer Option 20
Figure 3.35: Copying and Pasting Answer Options 21
Figure 3.36: Adding an Interviewer Instruction 21
Figure 3.37: Setting an Interviewer Instruction 21
Figure 3.38: Input Box for an Enabling Condition 21
Figure 3.39: Example of a Compilation Error 21
Figure 3.40: Initiating Online Testing in the Web Browser 22
Figure 3.41: Testing the Questionnaire in the Web Browser 22
Figure 3.42: Creating a New Roster in the Designer App 23
Figure 3.43: Setting Up a Fixed Roster 23
Figure 3.44: Adding a Question to a Roster 24
Figure 3.45: Questions Set Inside a Roster 24
Figure 3.46: Asking a Multi Select Source Question in a Fixed Roster 24
Figure 3.47: Setting a Multi Select Question as the Source 25
Figure 3.48: Nonfixed Roster with a Numeric Source Question 25
Figure 3.49: Nonfixed Roster with a List Source Question 26
Figure 3.50: Activating Text Piping in a Roster Question 26
Figure 3.53: Example of a Subroster 27
Figure 3.51: Text Piping as it Appears on the Tablet 27
Figure 3.52: Text Piping as it Appears on Question Texts and Error Messages 27
Figure 3.54: Setting an Enabling Condition 28
Figure 3.55: Enabling Condition as it Appears when “Hide” Button is Disabled 29
Figure 3.56: Enabling Condition as it Appears when “Hide” Button is Enabled 29
Figure 3.57: Valid Syntax for a Basic Enabling Condition 29
Figure 3.58: Example of a Question Requiring a Basic Enabling Condition 29
Figure 3.59: Example of Valid Code for a Basic Enabling Condition 30
Figure 3.60: Example of Valid Answer Values for a Basic Enabling Condition 30
Figure 3.61: Example of a Question with an Enabling Condition Marker 30
Figure 3.62: Example of Valid Syntax for a Multi Select Operator 31
Figure 3.63: Example of a Question Requiring Use of Logical Operators 31
Figure 3.64: Example a Logical Operator in an Enabling Condition 31
Figure 3.65: Example of a Question Requiring Use of a LINQ Expression 32
Figure 3.66: Valid Syntax for a LINQ Expression 32
Figure 3.67: Example of a LINQ Expression Using the “Any” Function 32
Figure 3.68: Example of a LINQ Expression Using the “Count” Function 32
Figure 3.69: Adding a New Validation Rule 33
Figure 3.70: Example of a Validation Condition and Error Message 33

Figure 3.71: Example of Text Piping Code in a Validation Error Message 33
Figure 3.72: Example of an Error Message Displayed on a Tablet 34
Figure 3.73: Example of a Warning Message Displayed on a Tablet 34
Figure 3.74: Example of Valid Syntax for a Date Validation 35
Figure 3.75: Example of Province and District Values 35
Figure 3.76: Setting up a Cascading Answer List 35
Figure 3.78: Saving a File to Tab Delimited Format in Microsoft Excel 36
Figure 3.77: Example of a File Created for a Cascading Answer List 36
Figure 3.79: Uploading a Tab Delimited File in the Designer App 37
Figure 3.80: Example of a Cascading Answer List in Operation 37
Figure 3.81: Example of a Question Requiring Price Validation 38
Figure 3.82: Example of Expected Price Ranges in a Microsoft Excel File 38
Figure 3.83: Excel File Reformatted for Use in the Designer App 38
Figure 3.84: Uploading a Lookup File to the Designer App 39
Figure 3.85: Example of Valid Syntax for a Lookup Table 39
Figure 3.86: Example of Valid Code for a Price Validation 39
Figure 3.87: Getting the Translation Template in the Designer App 40
Figure 3.88: Example of the Template File Used for Language Overlay 40
Figure 3.89: Inserting an Alternative Language into the Excel File 40
Figure 3.90: Uploading the Language Overlay File to the Designer App 41
Figure 3.91: Example of an Alternative Language on the Tablet Screen 41
Figure 4.1: Requesting a New Server with Survey Solutions 42
Figure 4.2: New Server Request Form 42
Figure 4.3: Setting Up a User Account in the Headquarters App 43
Figure 4.4: Downloading the Install File for the Interviewer App 44
Figure 4.5: Enabling Installation of Apps from Unknown Sources 44
Figure 4.6: Locating the Install File on the Tablet 45
Figure 4.7: Installing the Interviewer App onto the Tablet 45
Figure 4.8: Sign-In Screen for the Interviewer App 45
Figure 4.9: Using a QR Code to Quickly Set the Interviewer Sign-In 46
Figure 4.10: Scanning the QR Code from Headquarters to Interviewer 46
Figure 4.11: Successful Sign-In to the Interviewer App 46
Figure 4.12: Downloading the Install File for the Supervisor App 47
Figure 4.13: Accessing Questionnaires from the Survey Setup Menu 47
Figure 4.14: Importing a Questionnaire into the Headquarters App 47
Figure 4.15: Signing In to the Designer App through Headquarters 48
Figure 4.16: Finalizing the Questionnaire Importing 48
Figure 4.17: Setting Up a New Assignment in the Headquarters App 48
Figure 4.18: Specifying the Number of Assignments 49
Figure 4.19: Assignments Downloaded to the Interviewer App 49
Figure 4.20: Viewing Overall Status and Progress of Surveys during Fieldwork 50
Figure 4.21: Signing In to the Headquarters App at Supervisor Level 51
Figure 4.22: Surveys and Statuses View in Tablet Mode 52
Figure 4.23: Accessing Completed Interviews via the Navigation Menu 52

Figure 4.24: Assessing Interview Status in Headquarters Tablet Mode 52
Figure 4.25: Approving or Rejecting Individual Interviews 52
Figure 4.26: Adding Comments to an Interview Rejection 53
Figure 4.27: Recording Multiple Reasons for Interview Rejection 53
Figure 4.28: Accessing Rejected Interviews in the Interviewer App 54
Figure 4.29: Commencing Data Export from the Headquarters App 54
Figure 4.30: Selecting Survey and Interview Status for Data Export 54
Figure 4.31: Downloading Images and Audio Files 55
Figure 4.32: Importing a Questionnaire into Headquarters for a Second Time 56
Figure 5.1: Setting Question Scope in the Designer App 57
Figure 5.2: Accessing the Speed Report in the Headquarters App 58
Figure 5.3: Setting a Date Question to Capture Current Time as a Timestamp 58
Figure 5.4: Timestamp Instruction as Viewed in the Interviewer App 58
Figure 5.5: Setting Up a Geography Question 59
Figure 5.6: Loading Map Files into the Headquarters App 59
Figure 5.7: Uploading the Correct Map File Format 59
Figure 5.8: Preparing to Download Maps in the Interviewer App 60
Figure 5.9: Syncing Maps from the Server 60
Figure 5.10: Setting the Survey for Web Interviewing 61
Figure 5.11: Customizing Text and Emails for Web Interviewing 61
Figure 5.12: Setting Spam Filters and Reminders for Respondents 61
Figure 5.13: Distributing the Web Survey by Web Links or Email Invitations 62
Figure 5.14: The Random Variable in the Designer App 62
Figure 5.15: Using the Random Variable in an Enabling Condition 62
Figure 5.16: Adding a Variable in the Designer App 63
Figure 5.17: Setting the Variable Type 63
Figure 5.18: Setting the Variable Name, Label, and Expression 63
Figure 5.19: Activating Variables in the Tester App 63
Figure 5.20: Confirming Display of Variables for Testing 64
Figure 5.21: Variables Visible during Testing 64
Figure 5.22: Survey Solutions Syntax Guide 65
Figure 5.23: Survey Solutions Users Forum 65

Foreword

The Asian Development Bank (ADB) and the Food and Agriculture Organization (FAO) of the United Nations are pleased to present this publication, *Conducting Tablet-Based Field Data Collection with Survey Solutions: A Handbook*.

ADB and the FAO strongly support the improvement of national statistical systems by building the technological capacities of national statistical offices and line ministries. Recognizing the substantial data requirements for monitoring the Sustainable Development Goals, both organizations acknowledge the need to assist producers of official statistics and actively encourage the adoption of innovative technologies that support timely and effective monitoring of the Goals.

Over the years, data collection using handheld digital devices—often referred to as computer-assisted personal interviewing (CAPI)—has gained popularity in survey research. This is largely due to its potential to improve data quality and provide quicker turnaround on results compared to traditional data collection methods. CAPI also offers scope for new question types that enable the collection of geospatial and multimedia data, including global positioning system coordinates and audio, photographic, and video files.

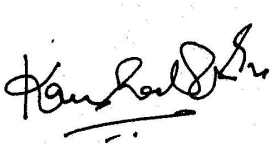
Because the capacity to adopt CAPI has been limited in many economies across the Asia and Pacific region, ADB and the FAO developed two massive online open courses (MOOCs) on CAPI, targeted at countries in the region (and around the world) more quickly and cost-efficiently. The online courses featured two freely available CAPI software platforms being used by official data collection agencies to conduct censuses and surveys—Census and Survey Processing (CSPro) Android and Survey Solutions.

This handbook has been developed to complement the MOOC on Survey Solutions. It is suitable for anyone who has experience in conducting traditional face-to-face interviews and wishes to learn the workflows and skills needed to conduct a CAPI project. The handbook's instructions are tailored toward people with beginner or intermediate experience in Survey Solutions, particularly if they are looking to reinforce existing knowledge or learn additional functionalities.

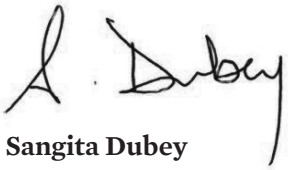
The handbook was originally written in November 2018, based on the most recent version of Survey Solutions at that time (Version 18.11). It was revised in May 2019 to reflect additional functionalities of the current software (Version 19.04).

We would like to thank those who contributed to the production of this publication for their dedication and hard work. The ADB team was supervised by Kaushal Joshi, and this publication was led by Lakshman Nagraj Rao. The main body of the text was drafted by Lachlan Bruce, with significant inputs from Pamela Lapitan, Anna Christine Durante, Dave Pipon, Guido Pieraccini, and Jude David Roque. The FAO team worked under the supervision of Sangita Dubey of the FAO Regional Office for Asia and the Pacific and included Anthony Burgard and Sanghyun Jeon. We also acknowledge the contribution of Paul Dent as the manuscript editor and Rhommell Rico as the focal person for the publication's design, layout, and typesetting. We would also like to thank the Survey Solutions team at the World Bank for providing us valuable advise during the preparation of this handbook and for developing a free CAPI platform that has revolutionized survey data collection and management across the world.

This handbook is designed to help national statistical officers and other interested readers embrace the efficiencies of CAPI-based data collection to supersede the traditional pen and paper interviewing method. We hope that it contributes to the adoption of other innovative tools and technologies that further strengthen national statistical systems.



Kaushal Joshi
Principal Statistician
Economic Research and Regional Cooperation Department
Asian Development Bank



Sangita Dubey
Regional Statistician
FAO Regional Office for Asia-Pacific

Abbreviations

ADB	Asian Development Bank
apk	Android package
CAPI	computer-assisted personal interviewing
CAPTCHA	completely automated public Turing test to tell computers and humans apart
CAWI	computer-assisted web interviewing
GPS	global positioning system
ID	identification
LINQ	language integrated query
PAPI	pen and paper interviewing
PC	personal computer
pdf	portable document format
QR	quick response
SIM	subscriber identification module
SPSS	Statistical Package for Social Sciences
tpk	tile package
URL	unique resource locator

Chapter 1: Introduction to Computer-Assisted Personal Interviewing

1.1 What is CAPI?

Computer-assisted personal interviewing (CAPI) is a viable alternative to paper-based surveying methods, or pen and paper interviewing (PAPI). As the name suggests, the key difference between CAPI and paper-based methods is that computers or handheld devices are used to display the questions to be asked by interviewers and to record the answers of the respondents.

CAPI has been used since the early 1990s, often utilizing laptop computers or older mobile technology such as Blackberry devices and personal digital assistants such as PalmPilots. In recent years, improvements in CAPI software and mobile devices has increased the use of the technique all around the world.

CAPI has emerged as a preferred option because, where surveys are conducted using tablets or smart phones, the need to digitize data is eliminated and the quality of the collection method is improved (given the checks and balances that can be built into an automated system). It generally means that datasets are ready for analysis, and for interpretation by policymakers, much faster than they might be using traditional methods.

1.2 Why Use CAPI?

CAPI has several advantages over PAPI:

Data quality. CAPI eliminates the need to digitize data, while improving quality through a series of built-in checks. CAPI has the ability to validate data in real time because the platform's programming can allow for automated skip patterns, display error messages whenever unexpected values are entered by the interviewer, and follow other validation rules (e.g., ranges of values).

Data security. Following interviews, data can be instantly uploaded to a "cloud" server or a physical server. This means the datasets are secured almost instantly, mitigating the risk of losing data by having to transfer paper forms to a central location for data entry (e.g., forms being misplaced or damaged by water, etc.).

Cost effectiveness. With CAPI, a lot of the variable costs associated with traditional PAPI are virtually eliminated. The hiring of data entry staff and supervisors is no longer necessary or can be limited, since the data is already in digital form. Moreover, data cleaning at the end of project is greatly reduced because of the checks programmed into the tablets at the point of entering interview responses. In addition, some CAPI platforms are provided free of cost.

Additional data types. CAPI allows an interviewer to record location according to global positioning system (GPS) technology as well as take photographs using the camera function built into most modern mobile devices. Other CAPI platforms also allow for voice recordings when necessary.

Preloading of data. For longitudinal or follow-up surveys, data can be preloaded into the CAPI system to make matching easier and more accurate than PAPI.

Timeliness. CAPI data can be accessed, checked, and/or analyzed almost instantly by exporting it from the cloud server. Under PAPI, paper forms need to be transported back to a central location and entered into a computer before any data can be seen by survey administrators.

1.3 Hardware Requirements

Conducting a CAPI survey requires certain hardware (Table 1.1). While this can be a significant initial investment, all of the equipment can be used for many future projects, proving to be most cost-effective for longitudinal surveys. When deciding how much to spend, the expense of each piece of hardware has to be weighed against factors such as the financial resources available, how often the hardware will be used for survey work, and conditions in the field, among others. It is also worth considering the purchase of spare devices to cover for unforeseen events such as hardware failure, breakage, theft, and/or loss during fieldwork.

1.3.1 Tablets

Table 1.1: Tablet Specifications for Survey Solutions, June 2019

Specifics	Requirements
Type of Operating System	Android 5.0 or higher
RAM	Minimum of 1.5 gigabytes
Internal Memory	At least 1 gigabyte of free memory to install the software
Wi-Fi	Required to be used for set-up, upgrades, and syncing
Connectivity	3G/4G
Screen Size	Depends on the requirement of the survey

RAM = random access memory.

Source: Survey Solutions. Support Portal and Knowledge Base: Technical Requirements. https://support.mysurvey.solutions/faq/what-tablets-should-i-buy-/

Surveys requiring mobile internet would require tablets with subscriber identity module or subscriber identification module (SIM) card slots. Not all tablets contain a slot for a SIM card: those without are often called media tablets.

It is also advisable to purchase cases for tablets, allowing protection from excessive dust, dirt, moisture, falls, and other physical damage during fieldwork. The relatively low cost of cases is quickly recouped through extended tablet lifetime.

1.3.2 Power Solutions

To recharge tablets, secondary power sources may be necessary in the event of long interviewing days and/or remote locations. Mobile power options include car chargers (usually adapted to the vehicle's cigarette lighter), portable lithium batteries or powerbanks, and solar chargers. Powerbanks are a recommended option given their portability and convenience.

1.3.3 Internet Connection

Each tablet can possess its own internet connection via a SIM card. SIM cards provide tablets with mobile internet access, which allows for data uploading to take place right after each survey is completed. However, mobile internet access can be limited and/or very costly in certain fieldwork areas. In these instances, another option might be to purchase a mobile router that shares the internet from one SIM connection to other devices using Wi-Fi. Alternatively, traditional Wi-Fi setups can be used to upload the survey data in the evenings, after fieldwork, if the interviewers are staying in a sizeable town or city. An option for when mobile internet is unavailable, usually in remote areas, would be to utilize Bluetooth to sync all of the interviewers' tablets to the supervisor's tablet. Once the datasets from the interviewers' tablets have been transferred to the supervisor's tablet, the supervisor then travels to a location where internet can be accessed to upload the survey data.

1.3.4 Personal Computers and Laptops

Personal computers (PCs) should be utilized by staff working in the head office, i.e., the staff members who will design and set up the entry system as well as those who will work on quality control during fieldwork. The apps for Survey Solutions run by these users are web-based, so any personal computer or laptop (Windows, Mac, or Linux) capable of accessing the internet and viewing web pages can be used.

1.3.5 Server

The final requirement for a CAPI survey is somewhere to store the data. Survey Solutions, a CAPI system developed and distributed by the World Bank, offers two data storage options:

World Bank[1] cloud server. This option is recommended for most projects. The server is set up automatically by the World Bank's Survey Solutions team.

Own cloud or physical server. This option is recommended for large projects requiring compliance with organizational practices to maintain the data onsite. Server specifications and set up instructions can be viewed at https://support.mysurvey.solutions/getting-started/faq-for-it-personnel/. Because data stored on a physical server will remain in country and is not accessible via the World Bank, users are responsible for data security and backup.

1.4 CAPI Project Workflow

Migrating to CAPI entails an increased level of complexity in terms of designing the questionnaire and managing changes to it before fieldwork.

CAPI is NOT a replacement for a questionnaire developed in Microsoft Word or Excel. Rather, it should be seen as having the same function as a data entry system in a traditional paper-based survey. The CAPI system is programmed to not only match the developed questionnaire, but also to serve as a vehicle to input interview-derived data.

It is still necessary to design the questionnaire in either Microsoft Word or Excel because such software provides the best means to test how a survey will read and function on paper, before migrating the survey design to CAPI. Moreover, it may be helpful to use paper copies of your questionnaire for training purposes, and to have printouts on hand as a backup in case hardware problems occur during fieldwork.

When designing a CAPI-based survey, it may be necessary to plan and lay out additional specifications or assumptions that are required to conduct the survey, but are not explicitly stated in the paper version of the questionnaire. These may include:

- assignment of a variable ID for upfront coordination with data processing and/or analysis teams;
- specification of question type (i.e., single select, multi select, etc.);
- additional text to help or guide the interviewer if required (including formatting);
- specification of question dependencies (where a question depends on a response from a previous question or a condition);
- an expected range of valid responses on which consistency checks and/or error message logic are to be based; and
- prefilling, where a response can be predetermined based on a prior response or an external source.

When dealing with a survey that needs to be conducted in more than one language, it is important to always develop the questionnaire in a master language, then translate this master version to the other languages of interest.

The workflow steps for creating a CAPI survey are as follows:

- design the questionnaire in Microsoft Word or Excel, including CAPI-specific assumptions and/or considerations, in a master language;
- translate the master questionnaire into any additional languages;

1 The World Bank developed Survey Solutions and offers free cloud-based server.

- build the data entry system to match the master questionnaire's content and features;
- test and finalize the system to ensure it is working as intended in the master questionnaire, i.e., it is capturing the intended variables;
- insert the additional language versions into the system; and
- install the survey on tablets, ready for pilot testing, followed by actual fieldwork.

It is possible that changes will be required during the process described above. These may include revised wording of questions, additional instructions, new questions, and updated skip patterns, among other things. In the event of such changes, it is important to respect the workflow outlined here, first making sure that the questionnaire in the master language reflects the changes, followed by updating for additional languages. By doing so, all variants of the questionnaire (master on paper, additional languages on paper, and different language versions programmed for CAPI) will correspond correctly with one another.

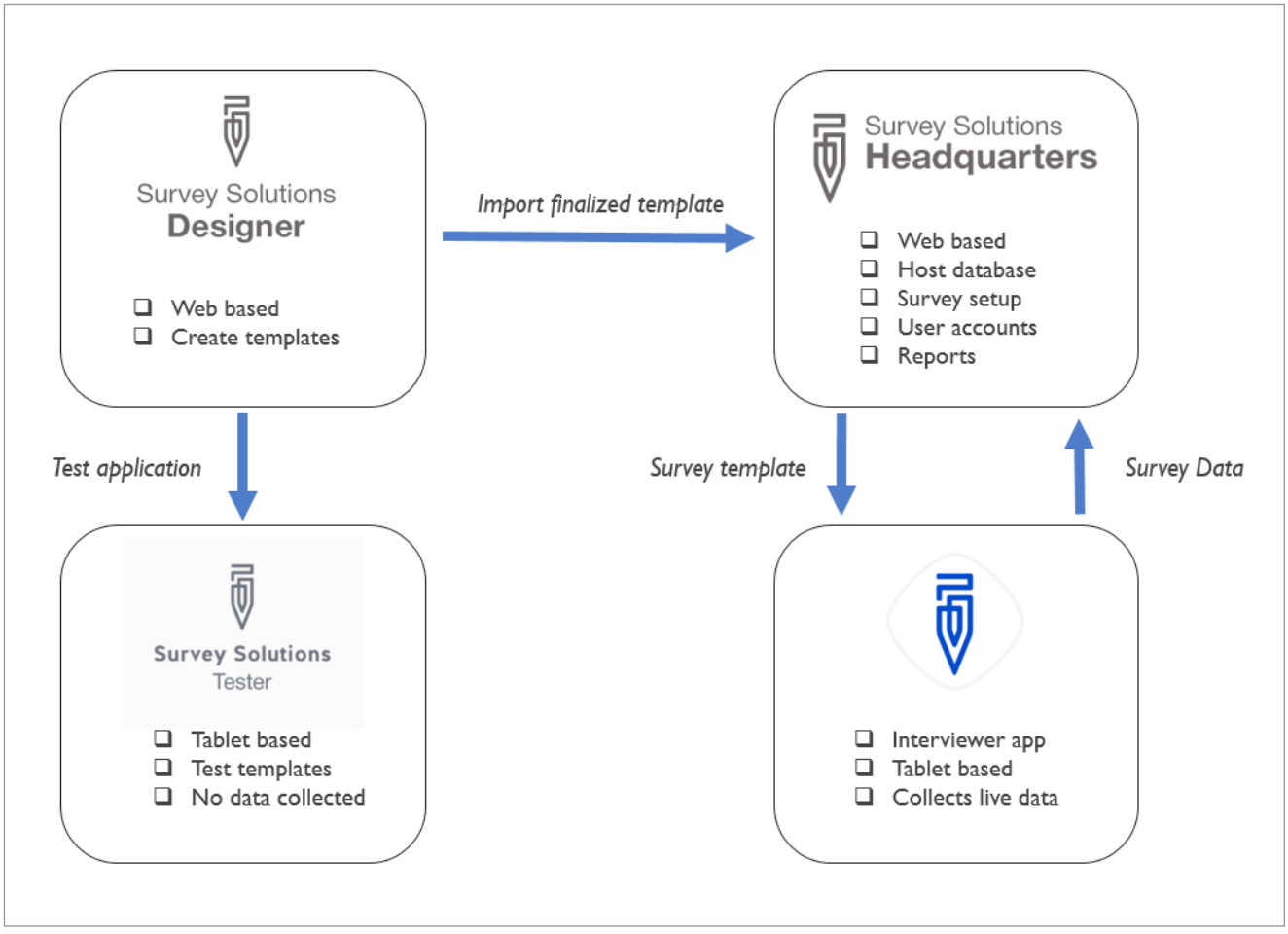
Chapter 2: Introduction to Survey Solutions

Survey Solutions is a CAPI system that was developed by the World Bank and is designed to be used for free on social research projects. The system was launched in 2012 and initially only worked with Windows 7 tablets. However, recognizing the increasing popularity of Android, the system has operated on that platform since 2013.

Survey Solutions not only offers support for CAPI, but can also be used for computer-assisted web interviewing (CAWI), computer-assisted telephone interviewing, or projects utilizing mixed methods. It has been used for over 2,000 surveys across more than 143 countries (Survey Solutions 2019).

Survey Solutions consists of five separate apps: two web-based (Designer and Headquarters) and three tablet-based (Tester, Supervisor, and Interviewer). Understanding the relationship between these five tools, the functionality of each, and how data flows between them is key to setting up a functioning CAPI data collection system (Figure 2.1).

Figure 2.1: The Five Components of the Survey Solutions System



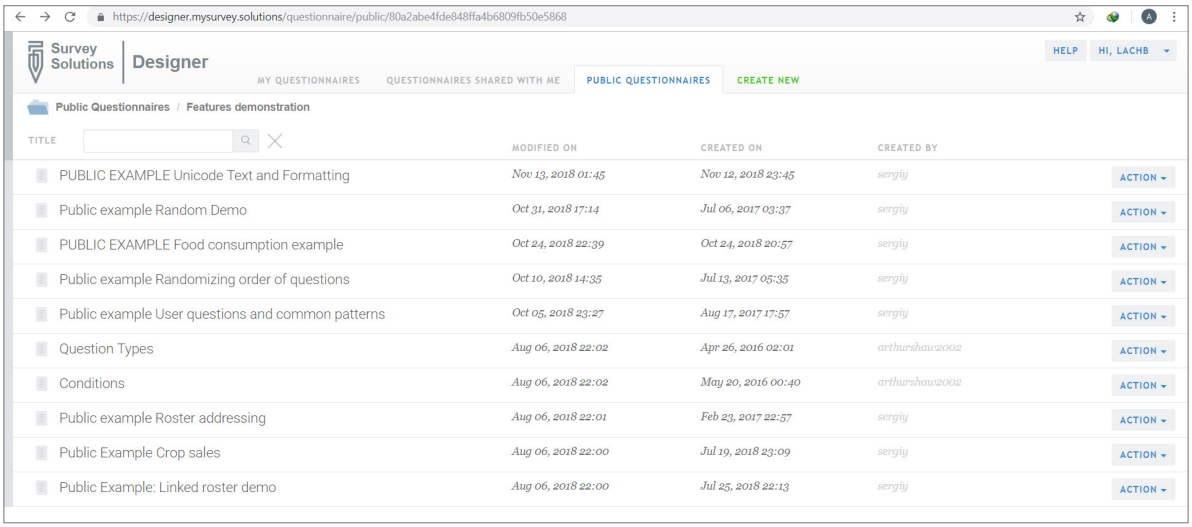
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

2.1 Designer App (Web-Based)

The Designer app is the starting point for any new CAPI project using Survey Solutions. It can be accessed via the web at https://designer.mysurvey.solutions/. A user account can be made for an individual or organization, and this same account is used to set up all future CAPI projects (Figure 2.2).

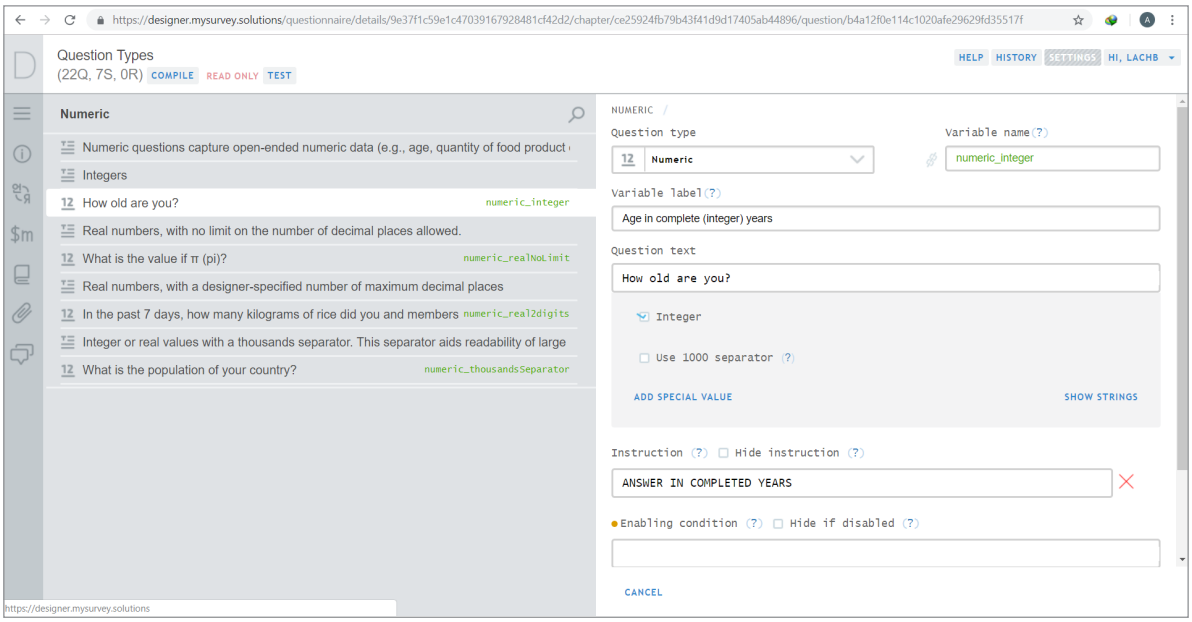
The primary purpose of the Designer app is to create a template for the CAPI data entry system. This includes setting up all of the questions as well as how they will appear on the screen, while also establishing any validations and enabling conditions (questionnaire skips and logic flow) to make the system work smoothly (Figure 2.3).

Figure 2.2: Survey Dashboard of the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 2.3: Questionnaire Editing in the Designer App

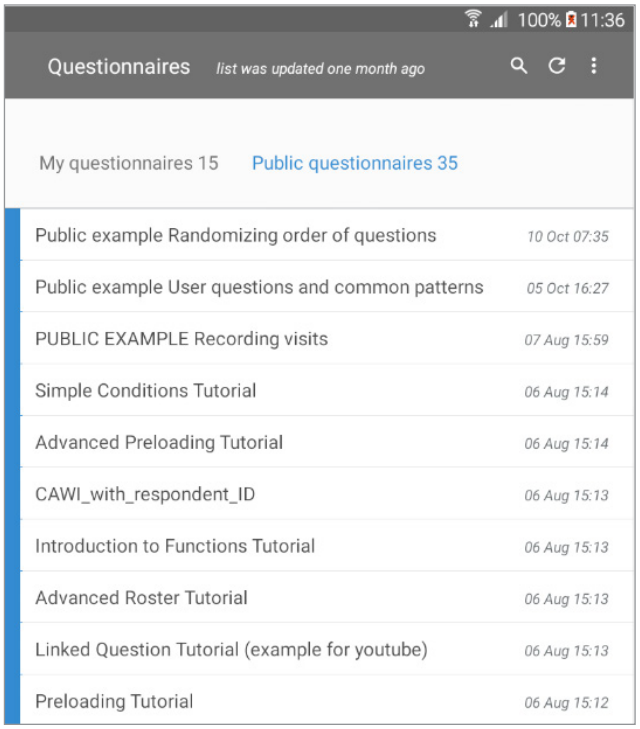


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

2.2 Tester App (Tablet-Based)

Survey Solutions Tester is an Android app that can be installed via the Google Play store. The tablet-based Tester app will sync with the web-based Designer app when accessed through the same user account (Figure 2.4).

Figure 2.4: Survey Dashboard of the Tester App



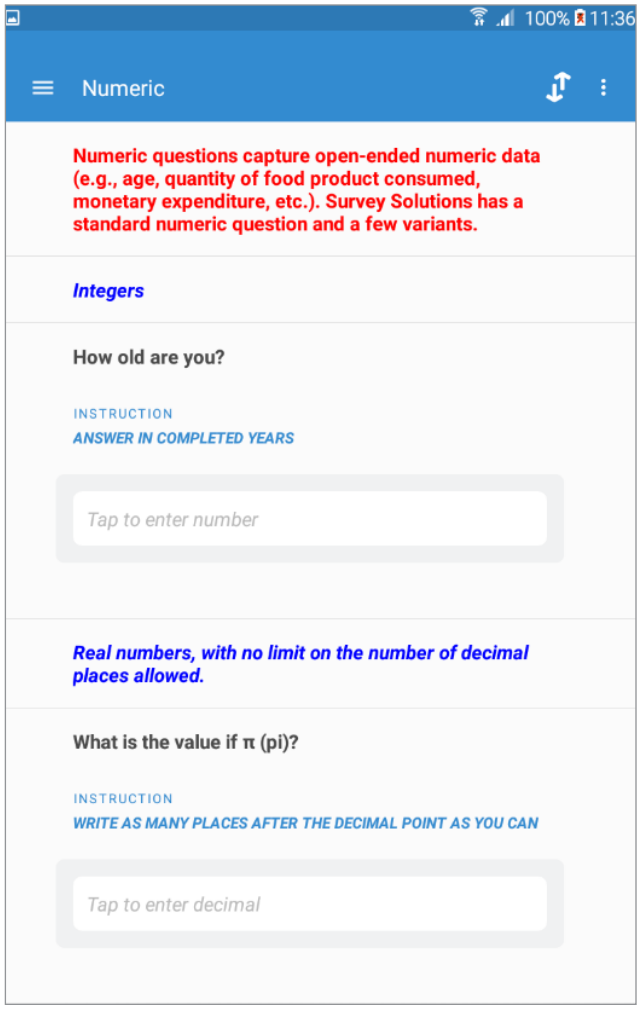
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The primary purpose of the Tester app is to test the template being created in the Designer app. This includes testing to see how the questionnaire will appear on the tablet and to ensure that the functionalities of the questionnaire, including validations and enabling conditions, are working as intended (Figure 2.5).

Testing functionality is available using the Designer app on a personal computer, but it is recommended that all surveys be assessed on a tablet using the Tester app, because some questionnaires behave differently on a tablet (operating Android) than they do on a PC (operating Windows). Additionally, some larger or more complex questionnaires may have problems loading on a tablet compared with a PC.

Finally, it is recommended to test with a tablet similar to those that will be used during fieldwork.

Figure 2.5: Testing a Sample Questionnaire in the Tester App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

2.3 Headquarters App (Web-Based)

The Headquarters app enables the overall management of CAPI surveys. This web-based tool is used specifically to set up user accounts, create assignments, view fieldwork progress reports, perform quality control checking, and export completed survey data. During fieldwork, the Headquarters app can be accessed by many different team members for quality control purposes and for checking the status of a particular case assignment (Figure 2.6).

A new Headquarters user interface is created for each CAPI project, though multiple surveys under the same project (e.g., household survey and village head survey) can be managed through one Headquarters account.

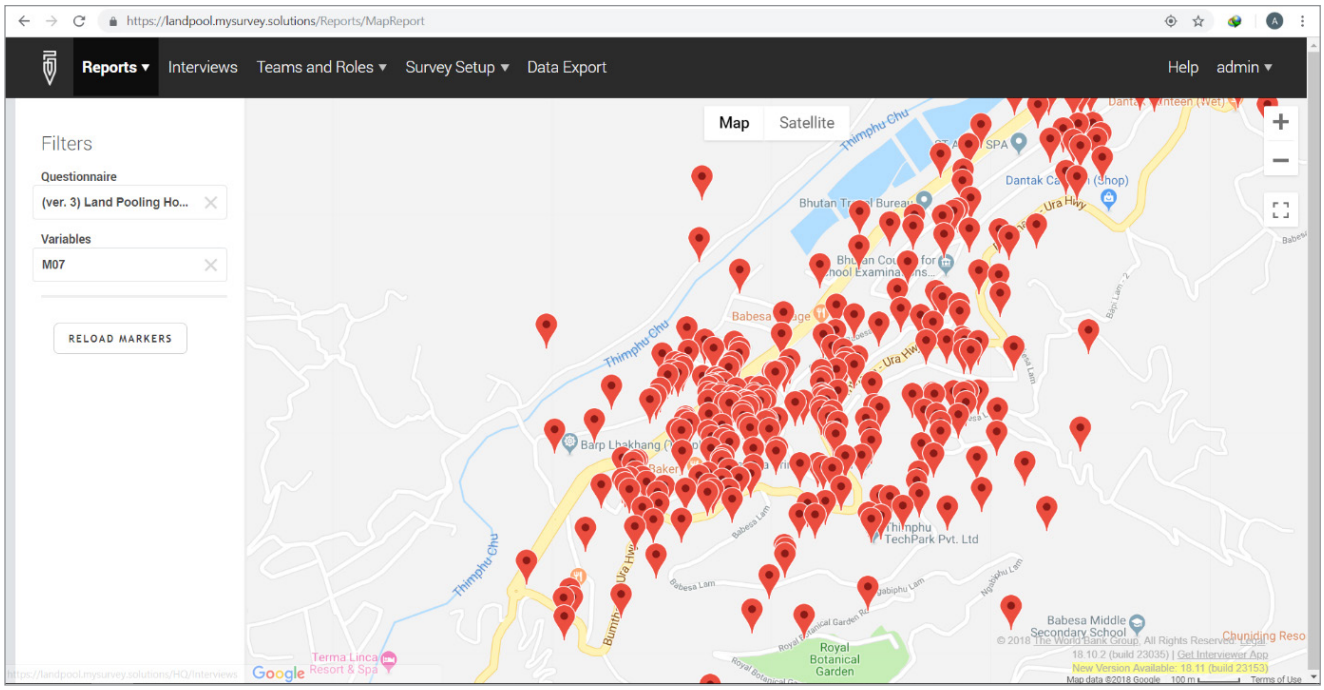
A demonstration of the Headquarters app is available (not to be used for live data collection) at https://demo.mysurvey.solutions/, which can be accessed using the sign-in details below:

Username: Headquarters1
Password: Headquarters1

2.4 Supervisor App (Tablet-Based)

The Supervisor app is not required for CAPI projects where field teams will have access to the internet for synchronizing (most projects). For CAPI projects where internet connectivity in the field is extremely limited or non-existent, this app can be a substitute for the Headquarters app by field supervisors to fulfil their main responsibilities during the data collection process (Figure 2.7). The Supervisor app offers all the functionality of the Headquarters app for supervisors, but it can be used offline. Instead of relying on an internet connection to pass cases between supervisors and field interviewers, the cases are passed back and forth using Bluetooth connectivity on tablets. It is recommended that periodically the supervisor travels to a place where internet is accessible and synchronizes their team's cases back to the Headquarters server.

Figure 2.6: Example of a Map Report in the Headquarters App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Using the Supervisor app, field supervisors can perform the following tasks:

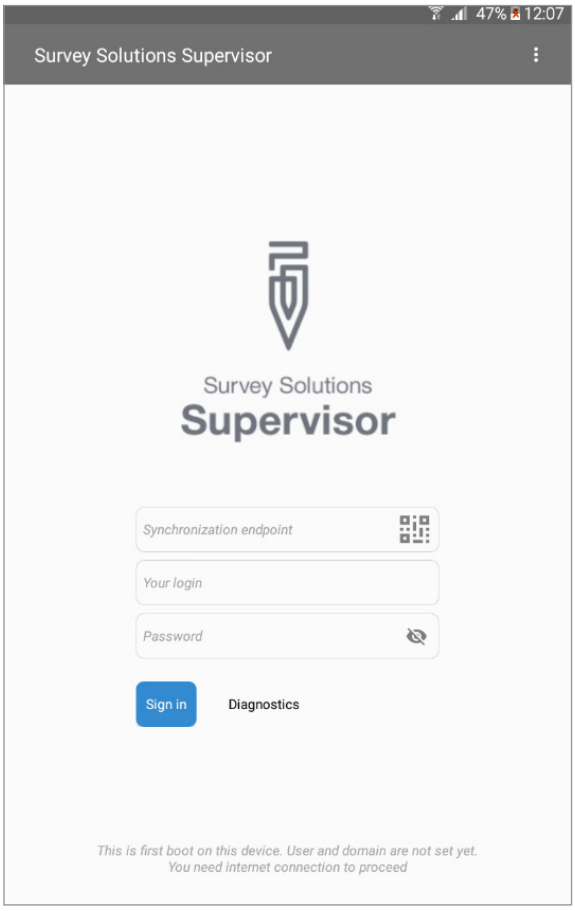
- distribute assignments to team members (interviewers);
- receive completed surveys from interviewers;
- review information in completed surveys and leave comments;
- answer questions from interviewers about data collection; and
- approve or reject the submitted surveys.

The Supervisor app then needs to use an internet connection to transfer data back to the main server and sync cases. These cases are then stored in the main database and reflected in reports available via the web-based Headquarters app.

2.5 Interviewer App (Tablet-Based)

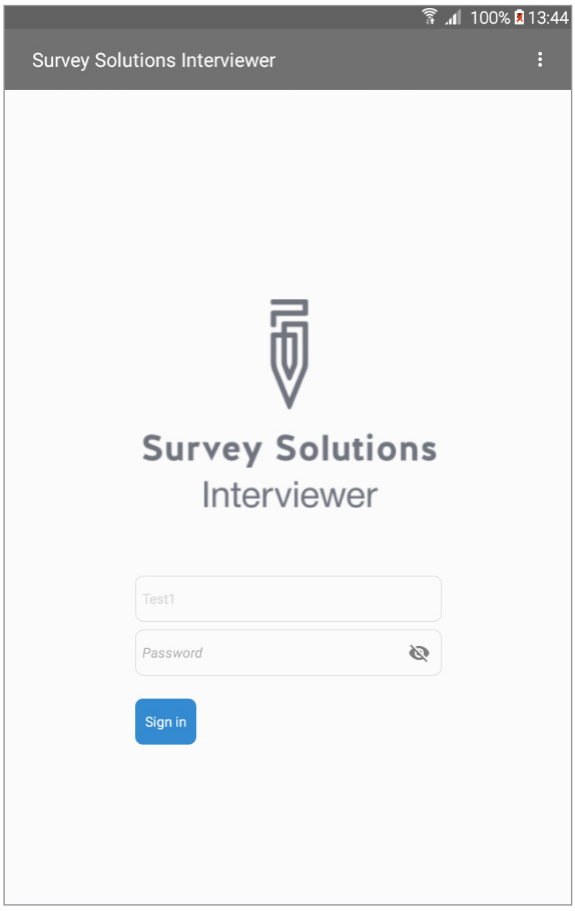
The Interviewer app is used to collect live fieldwork data and is the only app in Survey Solutions that interviewers will work with. It allows interviewers to receive new assignments and send completed survey cases back to the Headquarters app (where there is an internet connection) or to the Supervisor app (where data has been collected offline). Syncing requires either an internet connection (to Headquarters) or a Bluetooth connection (to Supervisor). The Interviewer app requires different sign-in details for each different CAPI project (Figure 2.8).

Figure 2.7: Access Panel for the Supervisor App



Source: Screen shot generated by Asian Development Bank consultant. 2019. Newcastle, United Kingdom.

Figure 2.8: Access Panel for the Interviewer App



Source: Screen shot generated by Asian Development Bank consultant. 2019. Newcastle, United Kingdom.

Chapter 3: Setting Up Questionnaires in the Designer App

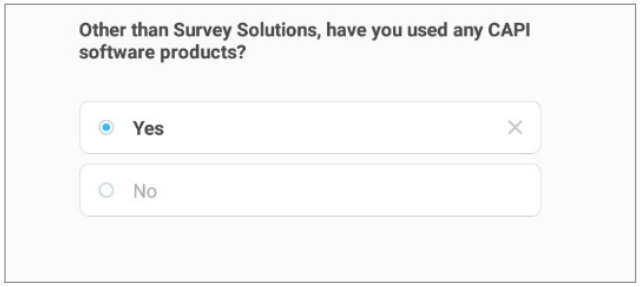
3.1 Question Types

Before setting up a new questionnaire in the Designer app, it is important to know all of the different question types available in Survey Solutions and how each one functions. This will allow users to choose the most appropriate question type for each question in the survey.

3.1.1 Single Select Questions

A single select question allows the interviewer to select only one answer from a list, by pressing on that answer on the tablet screen (Figure 3.1). The answer can be changed or removed by pressing the cross on the right.

Figure 3.1: Example of a Single Select Question



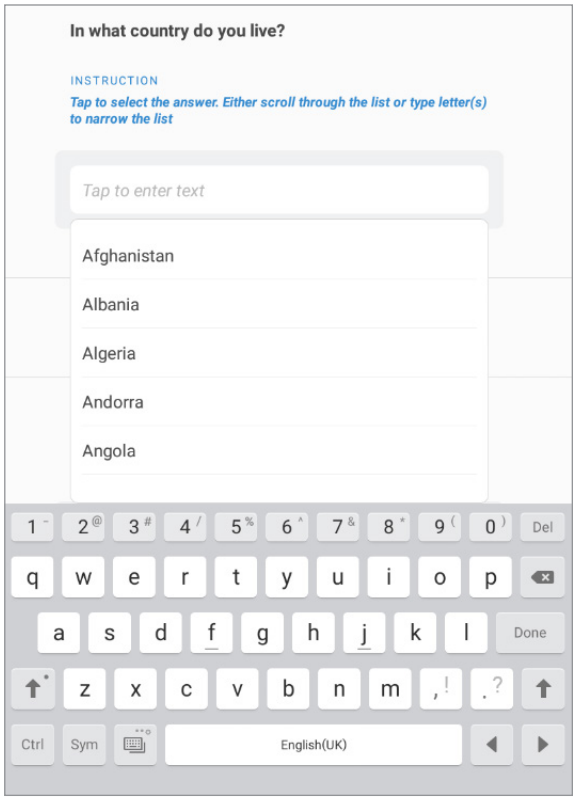
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

For questions where there is a significant number of answer options, the single select question can be set as a combo box (Figure 3.2). This allows the interviewer to scroll through the list or type the first letter(s) of the desired option to find it easily.

3.1.2 Multi Select Questions

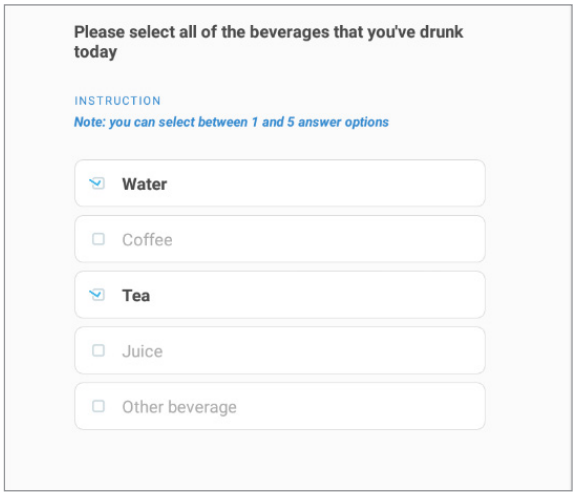
A multi select question functions in a similar way to a single select question, except that one or more answer options can be selected at the same time (Figure 3.3).

Figure 3.2: Example of a Single Select Combo Box



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

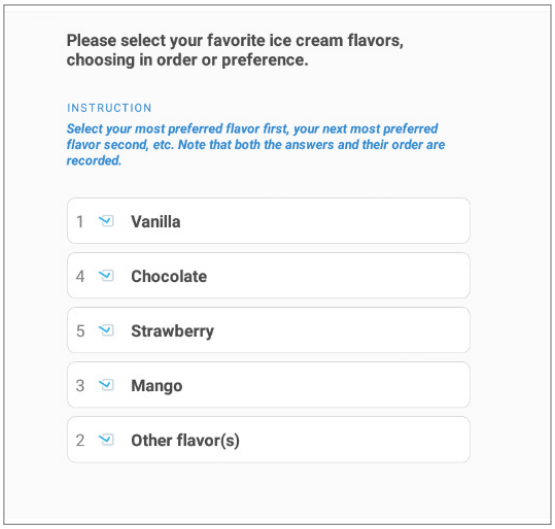
Figure 3.3: Example of a Multi Select Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

A multi select question can be set to record the order in which answers are selected. This can be useful where responses need to be ranked (Figure 3.4).

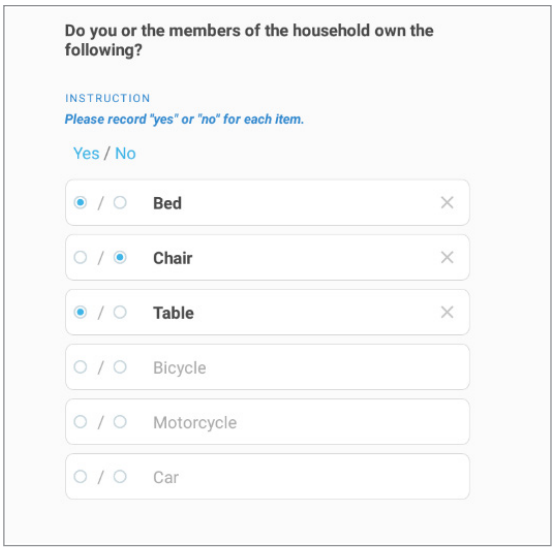
Figure 3.4: Example of a Multi Select Ranking Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

A multi select can be set to show each answer as a "yes" or "no" option (Figure 3.5).

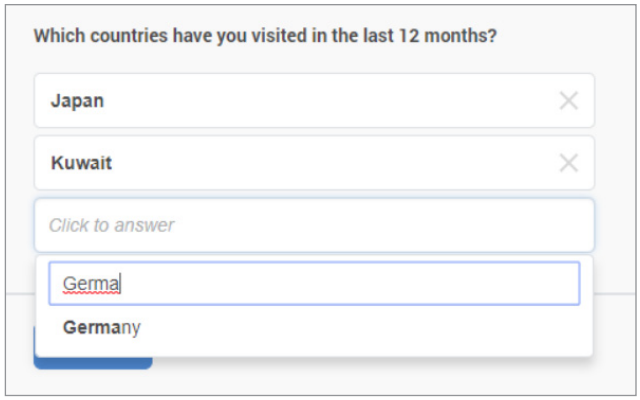
Figure 3.5: Example of a Multi Select "Yes" or "No" Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Finally, a multi select question can be set as a multi select combo box. This option is helpful when there is a large number of answer options (Figure 3.6).

Figure 3.6: Example of a Multi Select Combo Box

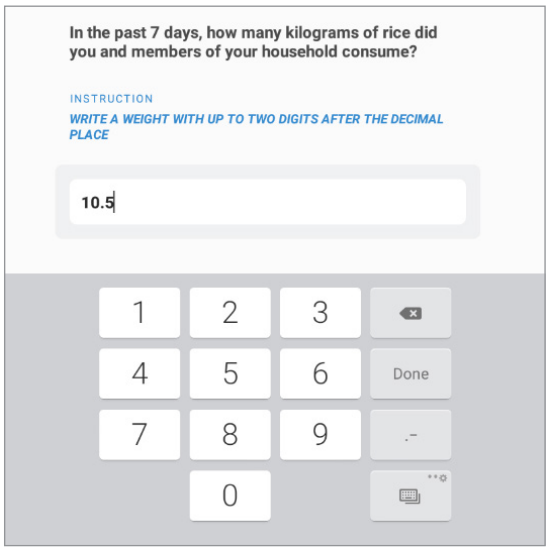


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.1.3 Numeric Questions

A numeric question allows the interviewer to input a numeric value. Interviewers may enter integers or decimals using the numeric keypad (Figure 3.7).

Figure 3.7: Example of a Numeric Question

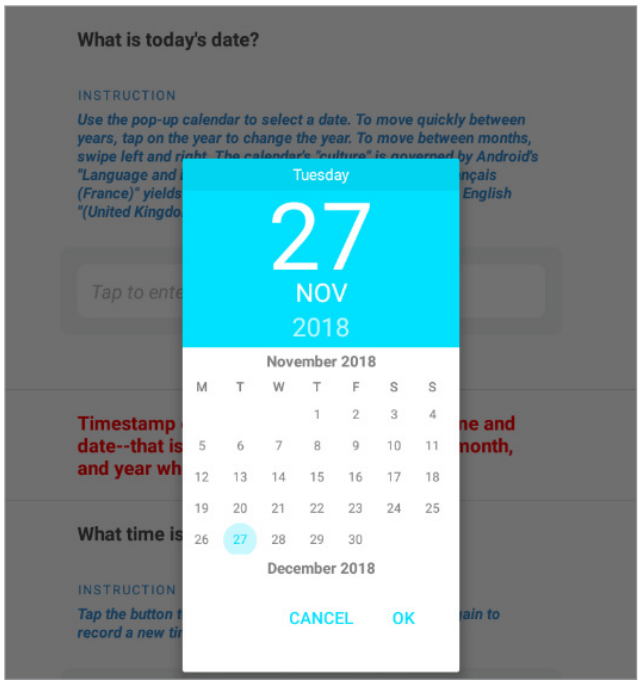


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.1.4 Date Questions

A date-oriented question allows the interviewer to select a date using a calendar (Figure 3.8).

Figure 3.8: Example of a Date Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

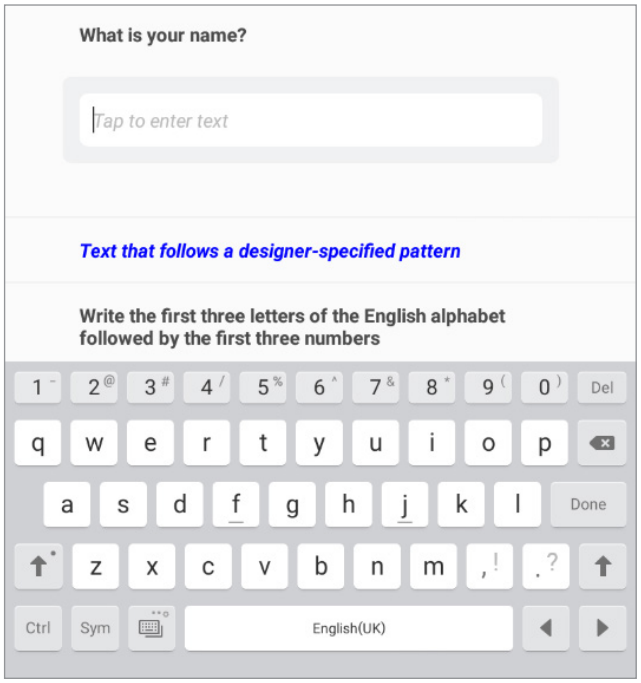
3.1.5 Text Questions

A text-oriented question allows the interviewer to write in an open-ended answer using any characters from the keypad, either alpha or numeric (Figure 3.9). Characters in other languages can be used if alternative keyboards have been installed on the tablet. Also note that there is an option to add verification patterns after a text question. This can help with response validation.

3.1.6 Global Positioning System Questions

A global positioning system (GPS) question can be used to collect the GPS coordinates of an

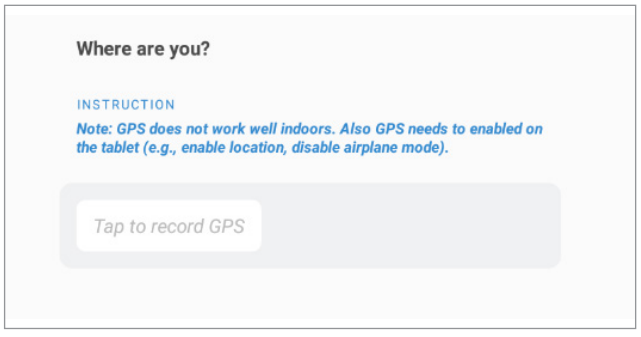
Figure 3.9: Example of a Text Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

interview location, using the "Tap to record GPS" button within Survey Solutions (Figure 3.10). To ask this type of question, the location services or mobile data need to be enabled on the tablet (Figure 3.11).

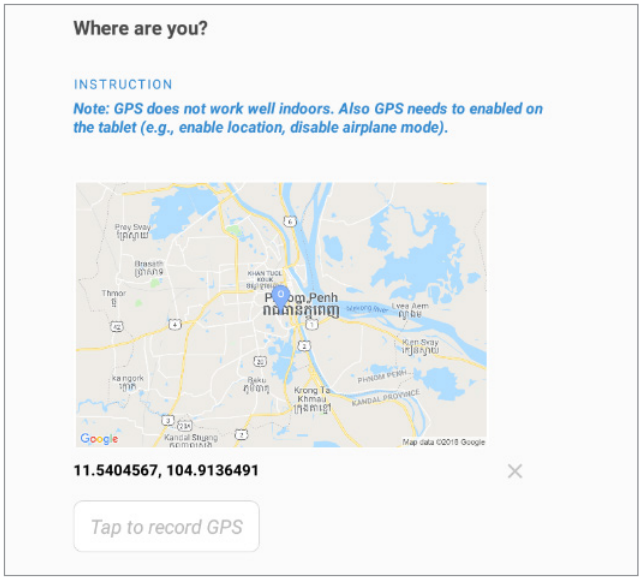
Figure 3.10: Example of a Global Positioning System Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

A map will display the location of the interview and the corresponding set of coordinates.

Figure 3.11: Example of a Completed Global Positioning System Question

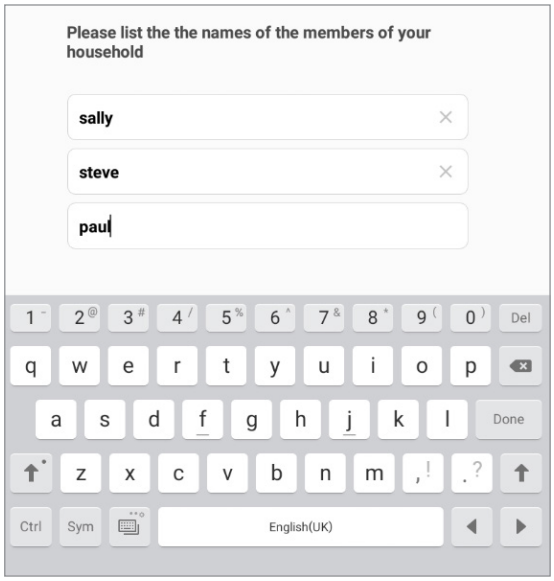


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.1.7 List Questions

A list-oriented question is similar to a text question, except that multiple text fields can be filled when responding to the same question (Figure 3.12). List questions are often used to gather information for rosters (where the same questions are asked multiple times about different subjects). For example, list questions can be used to enter all the names of household members, and these responses will later be used to create the rows for a roster. For a list question, there is also an option to specify the maximum number of list elements or text fields relating to each question.

Figure 3.12: Example of a List Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.1.8 Barcode Questions

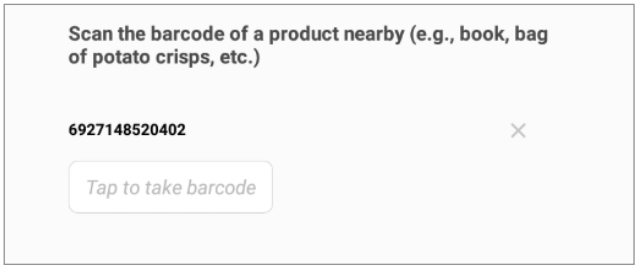
A barcode question allows for the capturing of barcodes and quick response (QR) codes (Figure 3.13). This is done by using the "Tap to take barcode" button, then pointing the tablet's built-in camera at a barcode or QR code to accurately record the information from either. Note that the autofocus capability of the tablet's camera is essential for code recognition to work properly (Figure 3.14).

Figure 3.13: Capturing Information from a Barcode

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The scanned code will be displayed once recognized by the tablet's camera.

Figure 3.14: Example of a Completed Barcode Question

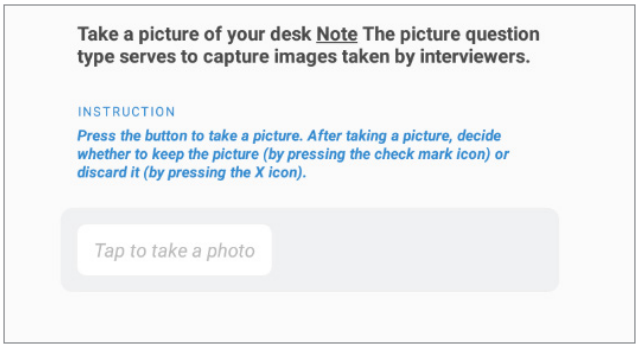


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.1.9 Picture Questions

A picture question allows the interviewer to open the tablet's built-in camera and take a photograph (Figure 3.15). The interviewer can then decide whether or not the photo is suitable and, if necessary, capture another image.

Figure 3.15: Example of a Picture Question

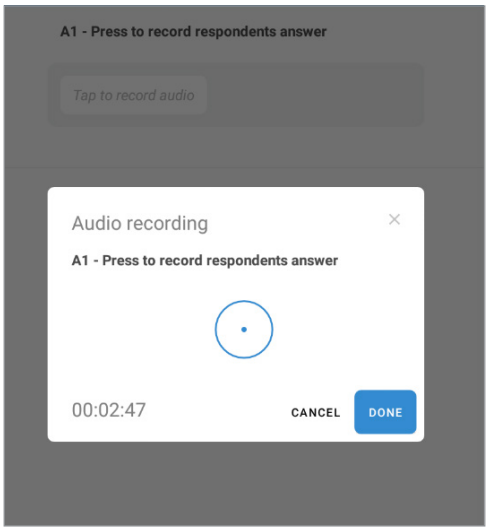


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.1.10 Audio Questions

An audio question allows the interviewer to open the tablet's audio recorder and capture an audio response, such as a respondent's answer (Figure 3.16).

Figure 3.16: Example of an Audio Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.1.11 Geography Questions

A geography question allows the interviewer to upload and display map files to the respondents. The respondents can then select GPS coordinates on the map in the format of either polygon, polyline, point, or waypoint (Figure 3.17).

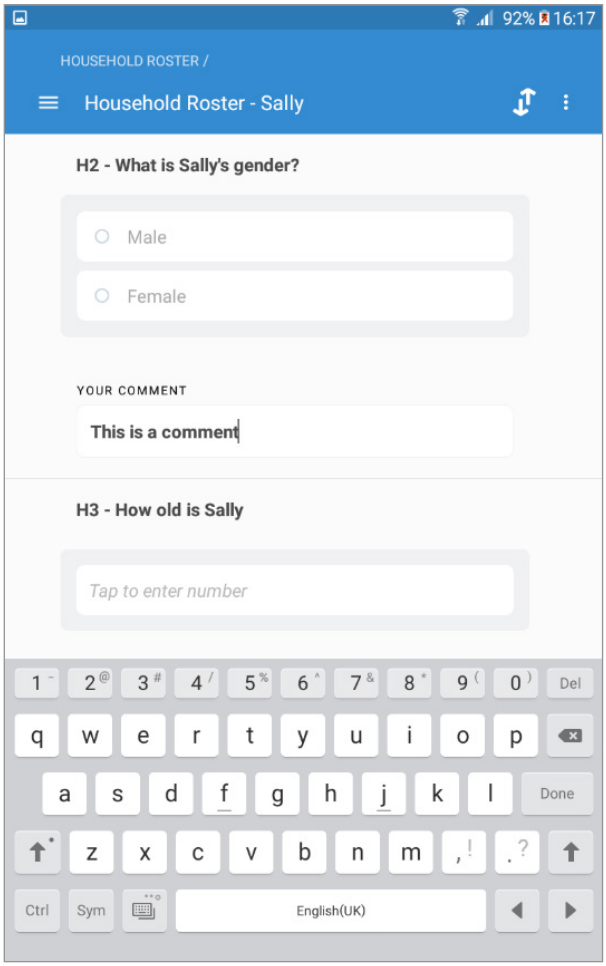
Figure 3.17: Example of a Geography Question

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.2 Interviewer Comments

Similar to paper-based surveys, interviewers can record a comment relating to a question at any point during a CAPI survey (Figure 3.18). To do this, the interviewer simply needs to press and hold on the question text. A box will appear, in which the comment can be recorded in any language.

Figure 3.18: Example of Interviewer Comments

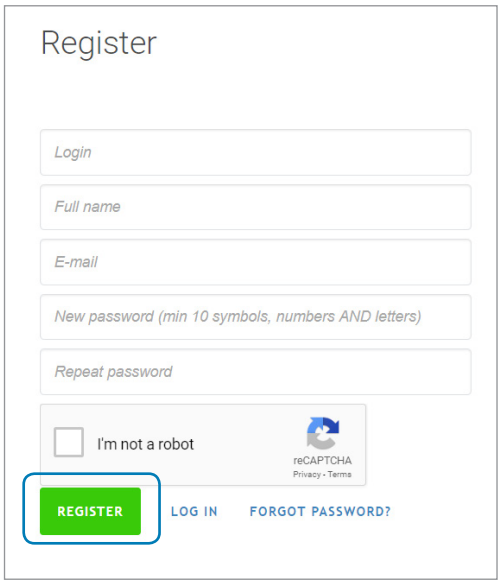


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.3 Creating a New Questionnaire

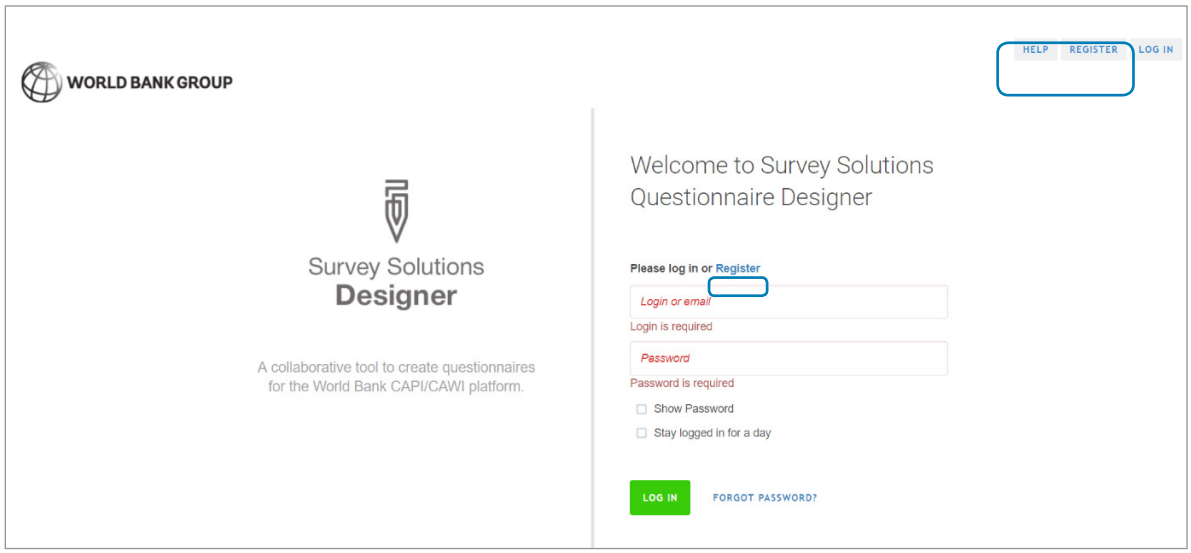
The first step in designing a CAPI questionnaire using Survey Systems is to create a user account at https://designer.mysurvey.solutions/. Users can click on "Register" on the landing page (Figure 3.19), then complete the registration form and click on the second "Register" option to create an account (Figure 3.20).

Figure 3.20: Registration Form for the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

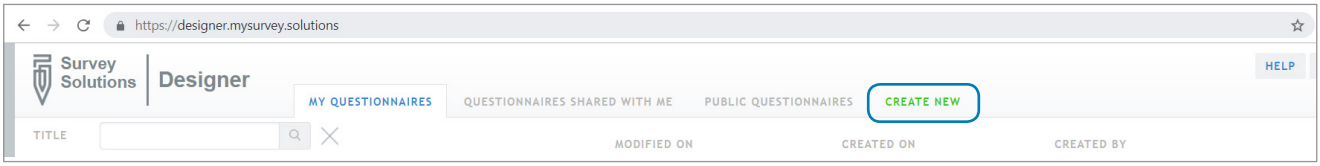
Figure 3.19: Registering for a Designer App Account



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

After registration is completed, users can sign in with the username and password they created. Once signed in, the Designer dashboard is shown. A new questionnaire can be created by clicking the "Create New" tab in green on the top right of screen (Figure 3.21). Note that eventually the dashboard will list all the questionnaires created by the account, as well as public and shared questionnaires.

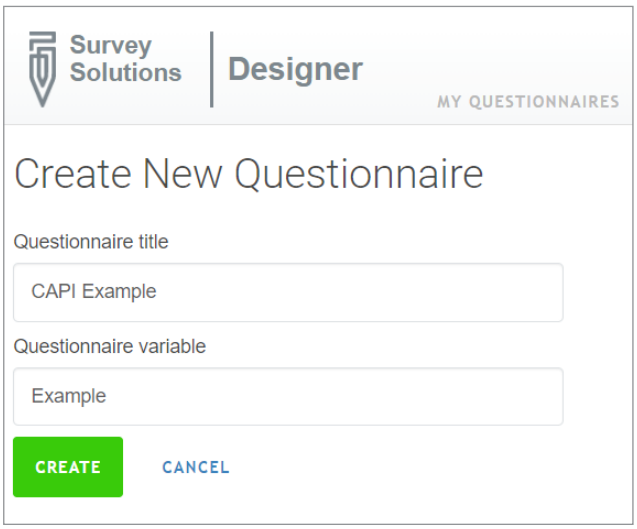
Figure 3.21: Creating a New Questionnaire in the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Next, provide a name for the questionnaire. In Figure 3.22, the questionnaire has been named "CAPI Example". Each questionnaire also requires a questionnaire variable, which is essentially the name of the master data file that will be exported once data is collected. Once the questionnaire name and variable have been entered, click on "Create".

Figure 3.22: Providing a Questionnaire Name and Variable



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

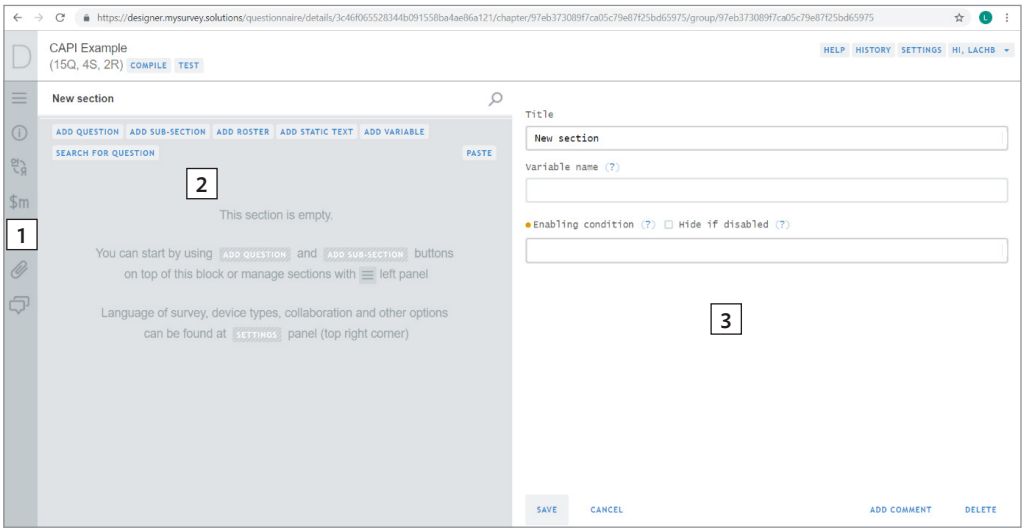
After this, the questionnaire editing screen is displayed and this provides all the key components needed to successfully construct an effective questionnaire (Figure 3.23). These components include:

- the advanced instrument panel, which contains all the advanced settings and features of the Designer app;
- the question index, which shows all the questions and variables in the current section of the questionnaire; and
- the setting panel for individual questions, where each question is set up with a variable name, variable label, answer options, enabling conditions, validations, and other settings.

The advanced instrument panel displays a number of icons that represent different features for constructing a questionnaire. Figure 3.24 provides an explanation of each of these icons.

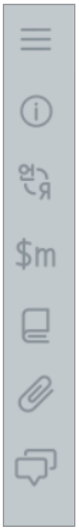
Questionnaires are usually split into several sections, like chapters in a book. In building a questionnaire in the Designer app, it is recommended to firstly set up an outline of all the sections and questions intended for the survey. This creates a framework of all the questions in the questionnaire. After this, another pass through each section of the questionnaire can be done, with validations and enabling conditions added to questions where required. This allows the user to focus on one component of the overall questionnaire at a time.

Figure 3.23: Key Components of the Questionnaire Editing Screen



1 = Advanced instrument panel; 2 = Question index; 3 = Setting panel for individual questions.
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.24: Features of the Advanced Instrument Panel



1 = Sections: This is where different sections of the questionnaire can be set up and navigated between.

2 = Questionnaire Description: Here, users can enter details about the questionnaire such as version, implementing agency, country, etc.

3 = Translation: This can be used to set up additional language overlays for the survey, if it is to be conducted in multiple languages.

4 = Macros: A macro can be defined for code segments that will be used multiple times throughout the questionnaire.

5 = Lookup Tables: If the questionnaire requires validations from external data, lookup tables can be added here.

6 = Attachments: Additional material such as images or pdf files can be uploaded for use with the questionnaire.

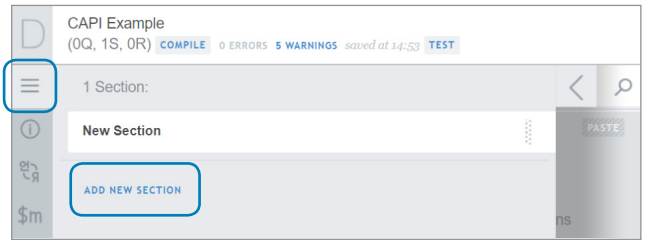
7 = Comments: Remarks and observations can be added to the questionnaire. This is useful if multiple people are working together to program one questionnaire.

pdf = portable document format.
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.4 Creating Sections in the Questionnaire

In Survey Solutions, each section of the questionnaire will be displayed on a single screen. Interviewers may scroll down to complete all the questions in that section, before moving on to the next. It is good practice to introduce new sections for different roster subjects or when the question topic changes (e.g., from household income to household expenditure). To create a new section in the Designer app, click on the top icon on the advanced instrument panel, then click "Add New Section" as shown in Figure 3.25.

Figure 3.25: Creating a New Section



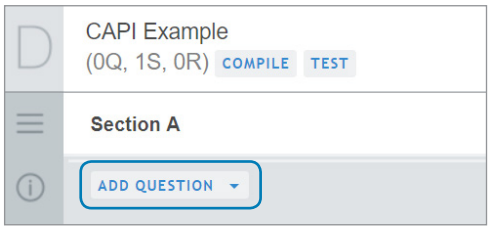
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

When the first section of the questionnaire has been created, the title can be edited to match the current questionnaire. This is done by typing a new title, then clicking on the green "Save" button on the screen (Figure 3.26). Each section can also be assigned a variable name, which can be used in enabling conditions and validations. For example, a future section could be set to display only when all questions inside the initial section have been completed.

3.5 Setting Up Questions

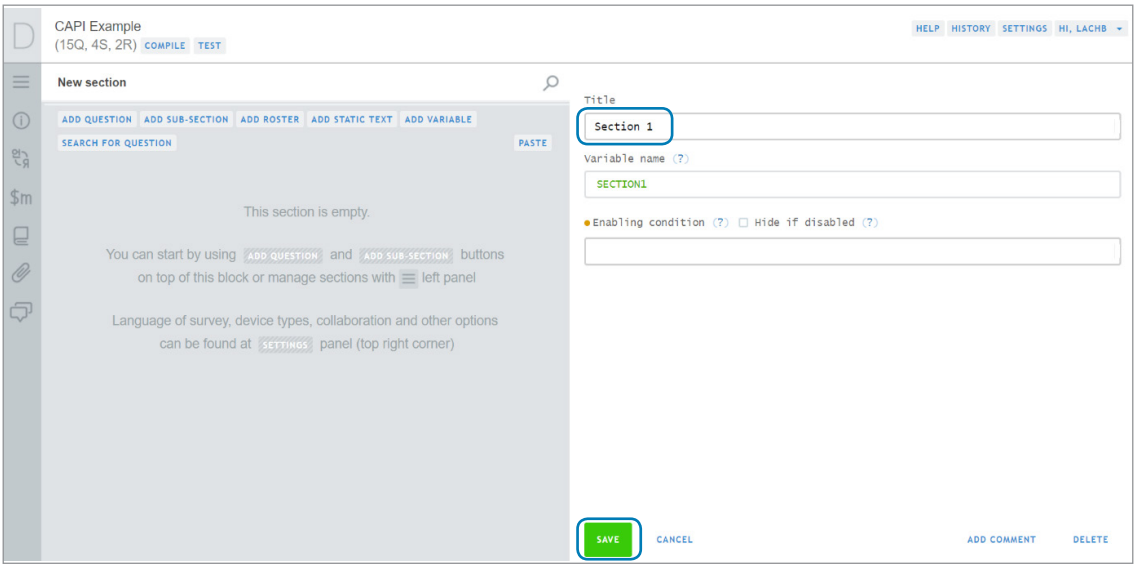
Once a section has been established, the next step is to add questions to that section. A question can be added by clicking on the "Add Question" button (Figure 3.27).

Figure 3.27: Adding a New Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.26: Editing an Existing Section



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

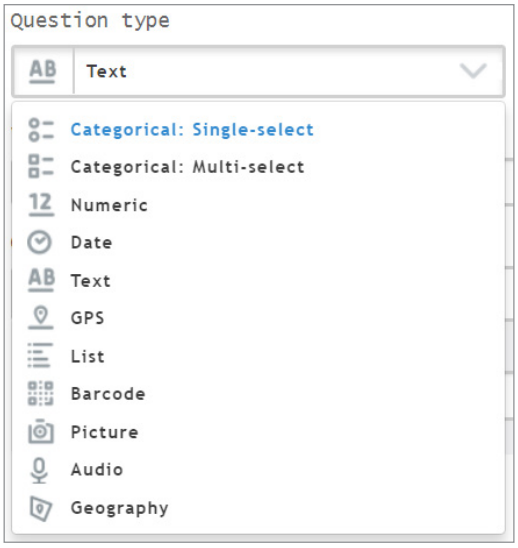
Once a question has been added, it appears in the tree on the left panel of the screen. The question editing panel shown on the right of Figure 3.28 is now ready to complete the specifications for the first question.

The first step in setting up a new question is to select the type of question by using the dropdown menu (Figure 3.29). This displays all the options for question type as discussed in section 3.1.

The next step is to assign a variable name (Figure 3.30). Variable names should be unique and appear only once in the entire questionnaire. Whatever is chosen will be the name of the variable in the final data file. Ideally, it should match the question ID in the master version of the questionnaire that was created in Microsoft Word or Excel.

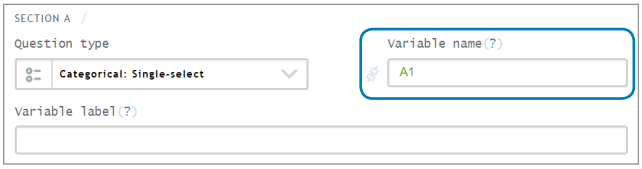
The next field to complete is the variable label (Figure 3.31). This is not explicitly displayed during the CAPI survey, but will be evident when the variable is exported in STATA / Statistical Package for Social Sciences (SPSS) format. A good practice is to include the variable name and question text, or a description of the question, in the variable label.

Figure 3.29: Selecting the Question Type



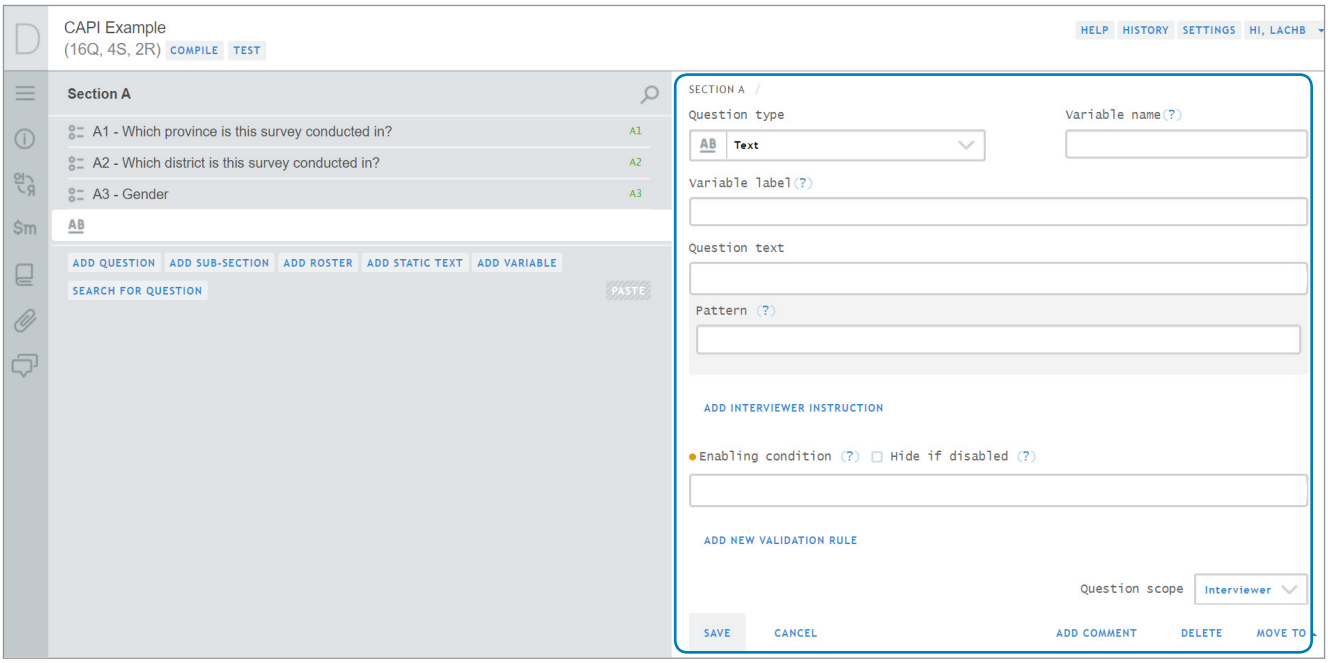
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.30: Assigning a Variable Name



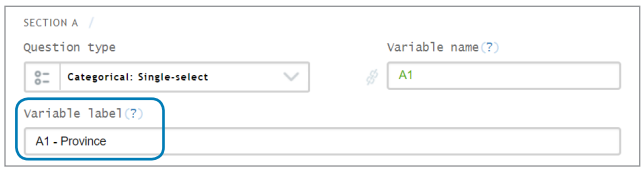
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.28: Setting Up a New Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

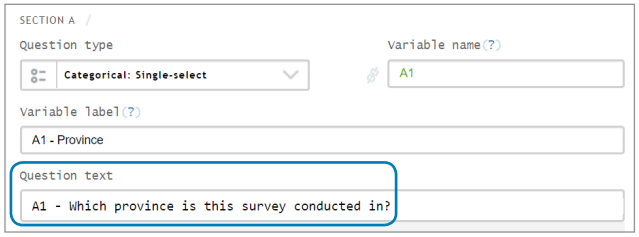
Figure 3.31: Setting a Variable Label



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once the variable label is set, it is time to specify the question text, which is the wording of the question to be displayed on the tablet screen (Figure 3.32). It is a good practice to include the variable name in the question text. Doing so means that, when interviewers in the field need to discuss a particular question with their supervisor or headquarters, it is clear which question is being referred to.

Figure 3.32: Setting the Question Text

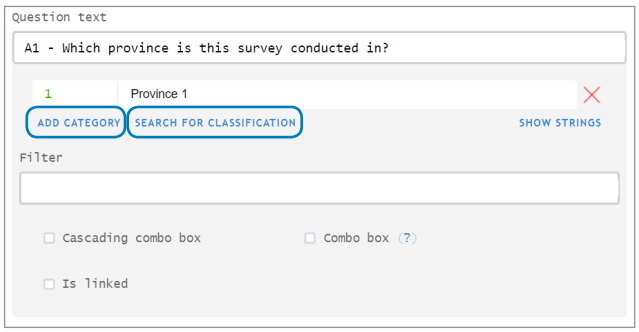


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

A question type, variable name, variable label, and question text are required for all questions.

After these mandatories, it is also necessary to specify the settings specific to the type of question being asked. For a single select or multi select question, this is where the answer options need to be added. Each answer option will require an option code (numeric for data storage) and an option label (the wording to be displayed on the tablet). New options can be added by clicking the "Add Category" button as shown in Figure 3.33. Additionally, clicking on the "Search for Classification" button will bring up a library of preset answer options that can be implemented (e.g., Likert Scales).

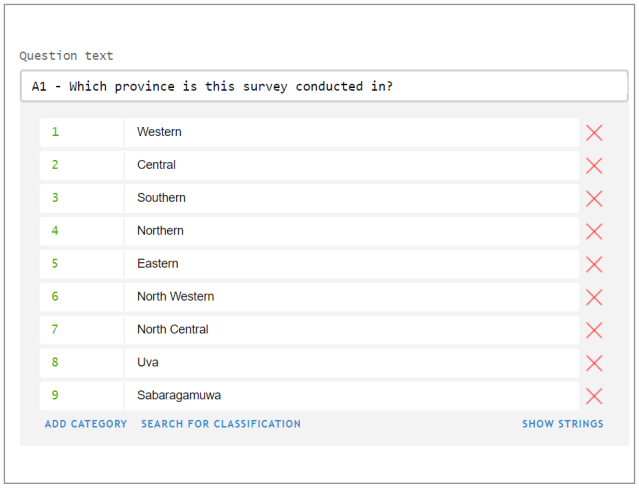
Figure 3.33: Adding Answer Options



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

As Figure 3.34 shows, each new answer option must include a unique numeric code on the left. Note that these codes will not be displayed on the tablet screen. Only the text for the answer option will appear on the tablet.

Figure 3.34: Completed Answer Option

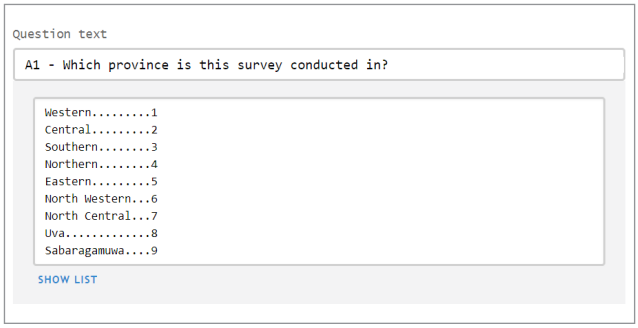


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

To save time in entering answer options, the "Show Strings" button allows options to be copied and pasted from the master survey document created in Microsoft Word or Excel (Figure 3.35).

If filters or other discretionary settings are required for some questions, advanced options may also be used. For instance, an instruction for the

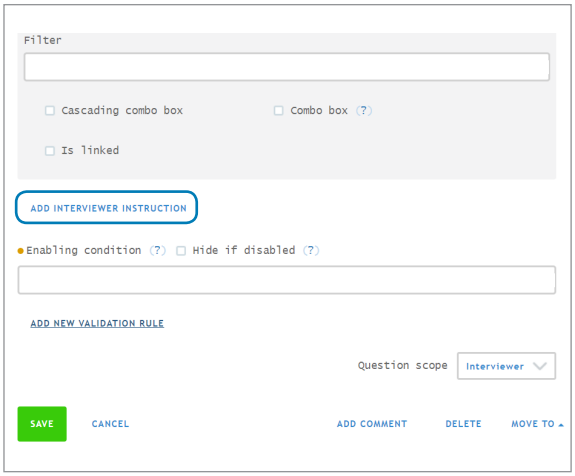
Figure 3.35: Copying and Pasting Answer Options



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

interviewer can be added to guide responses to a specific question. This can be done by clicking "Add Interviewer Instruction" (Figure 3.36).

Figure 3.36: Adding an Interviewer Instruction



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The instruction will be displayed on the tablet screen and shown in a different font beneath the question text (Figure 3.37). The "Hide Instruction" button can also be ticked, so that the instruction remains hidden until the interviewer presses a help button for it to be shown.

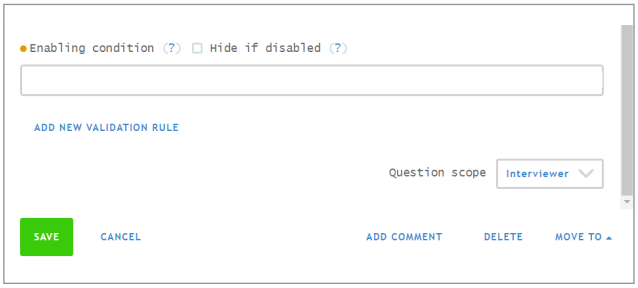
Lastly, the question editing panel provides the opportunity to specify enabling conditions, validations, and question scope. These can all be

Figure 3.37: Setting an Interviewer Instruction

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

left in the default mode during the initial setting up of questions. The green "Save" button will store the question for later review and/or refinement (Figure 3.38).

Figure 3.38: Input Box for an Enabling Condition

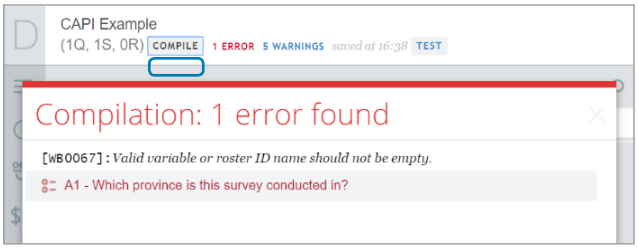


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.6 Compiling and Testing

After all questions are set, the questionnaire can be compiled by clicking on the "Compile" button at the top left of screen. The compilation function checks through all the questions for any errors. If mistakes are detected, an error prompt is displayed. An example of an error where the variable name was not set correctly is shown in Figure 3.39.

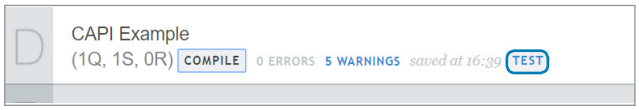
Figure 3.39: Example of a Compilation Error



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once errors have been corrected, the test function can be initiated by clicking the "Test" button (Figure 3.40). This will demonstrate how the questionnaire will appear in the web browser (Figure 3.41).

Figure 3.40: Initiating Online Testing in the Web Browser



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Note that the Tester app from Survey Solutions should be used to assess how the questionnaire will appear on a tablet.

3.7 Setting Up Rosters

A roster is a set of questions asked multiple times about different subjects. In some cases, the number of times the roster needs to be repeated is known. This type of roster is referred to as a **fixed roster.** For example, all questions are to be asked about five specific types of crop. In other instances, the number of times a set of questions is repeated may vary. Take the case of a household roster, where some households have three members, while others have six. This type of roster is referred to as a **nonfixed roster.**

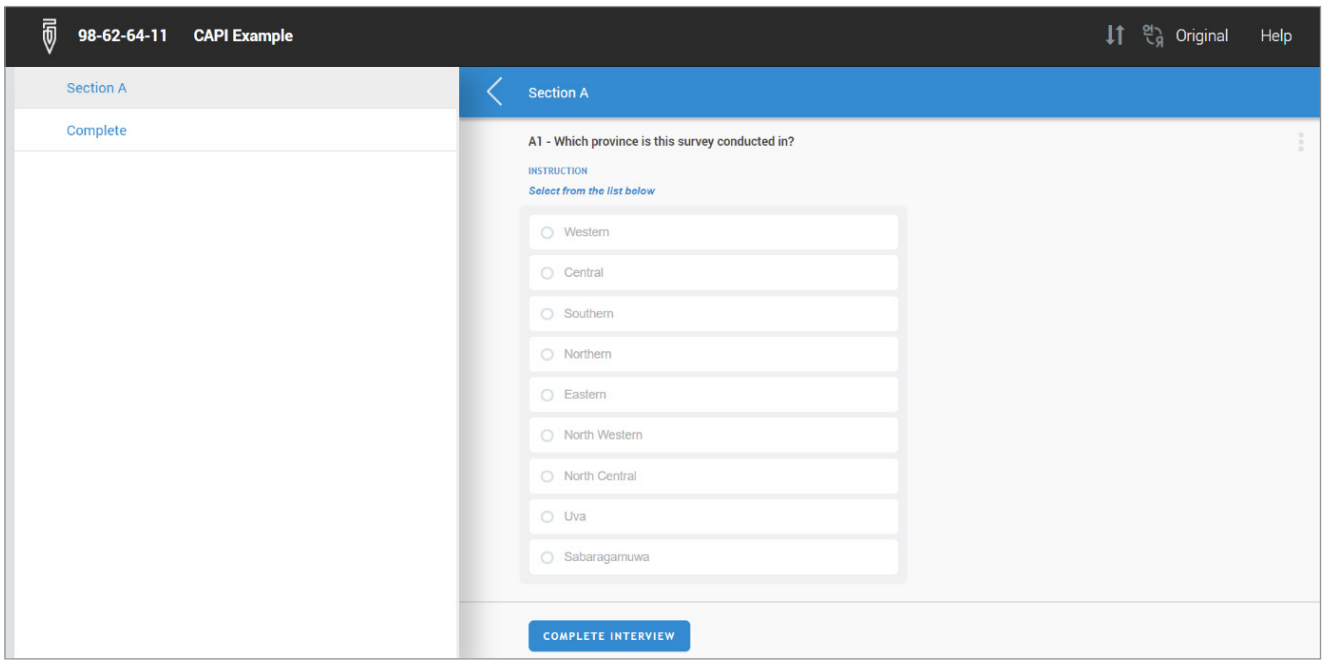
It is recommended that each roster be given its own section in the Designer app. Otherwise, the rostered and unrostered questions on one screen can become confusing for interviewers.

3.7.1 Fixed Rosters

To set up a fixed roster, go to the questionnaire editing screen and click on the "Add Roster" button in the question index panel (Figure 3.42).

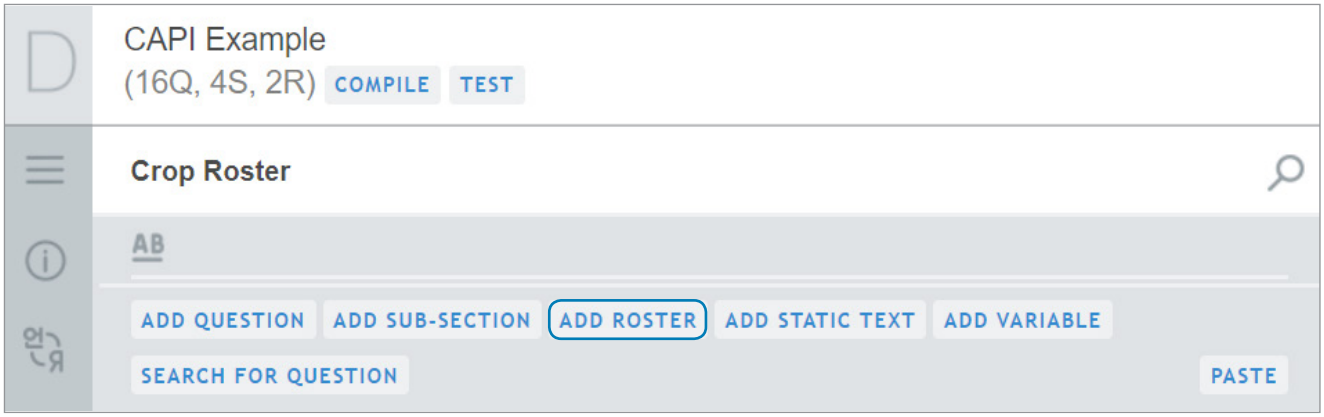
In the roster editing panel, the fields to be completed are similar to those already discussed for setting a question (Figure 3.43). For roster source, select "Fixed set of items". Give an ID and a name to the roster, then enter all of the roster subjects in the same way you would enter answer options for a single select question.

Figure 3.41: Testing the Questionnaire in the Web Browser



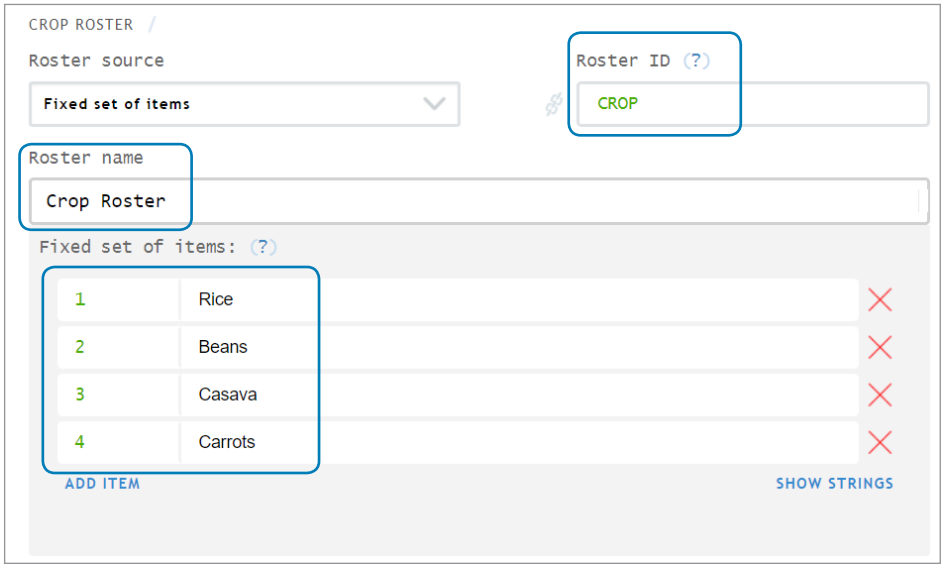
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.42: Creating a New Roster in the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.43: Setting Up a Fixed Roster



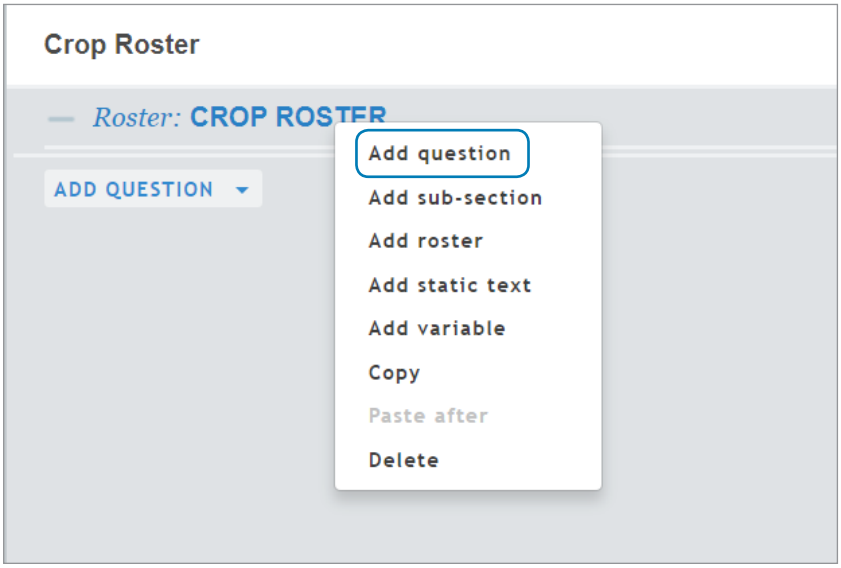
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Looking back to the questionnaire tree on the left, the roster name is set in blue font. To add questions to this roster, right click on the roster name and select "Add Question" (Figure 3.44).

After a question has been added, it appears in blue font and slightly indented beneath the roster name (Figure 3.45). This tells us that the new question is now inside the roster and will be asked for each roster subject.

Fixed rosters can sometimes be asked more efficiently using a multi select question as a source question. For example, rather than asking if each crop has been grown in the past 12 months, a multi select question can be used asking: "Which of the following crops did you grow in the past 12 months?" (Figure 3.46). Only the crops selected then form part of the roster. This approach often makes the survey faster and easier to manage for interviewers.

Figure 3.44: Adding a Question to a Roster

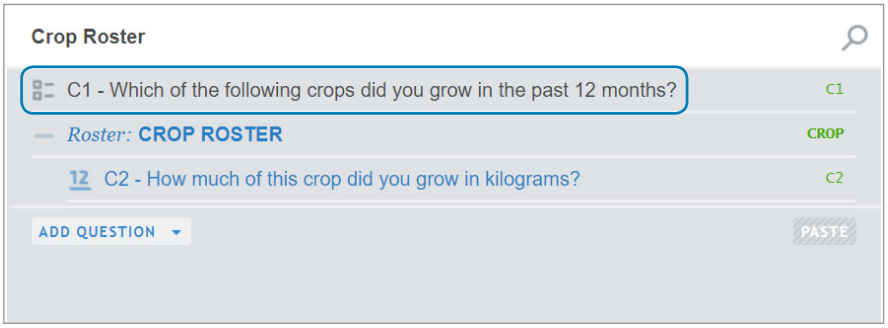


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.45: Questions Set Inside a Roster

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.46: Asking a Multi Select Source Question in a Fixed Roster

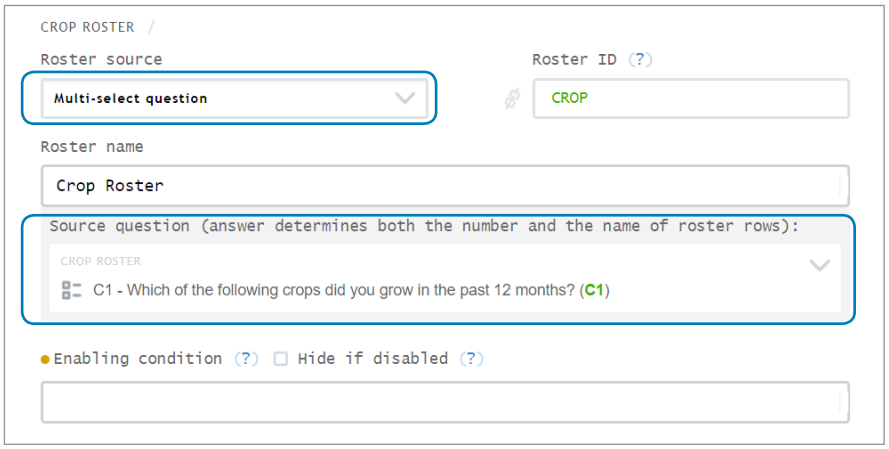


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

To set the multi select question, change the source from "Fixed set of items" to the multi select option, then select the source question. In the example shown in Figure 3.47, the source question is C1.

the source might be a list question such as: "List below the names of all the people who live in this household". This way, the number of rows to be completed in the roster will depend on the answer to the source question.

Figure 3.47: Setting a Multi Select Question as the Source



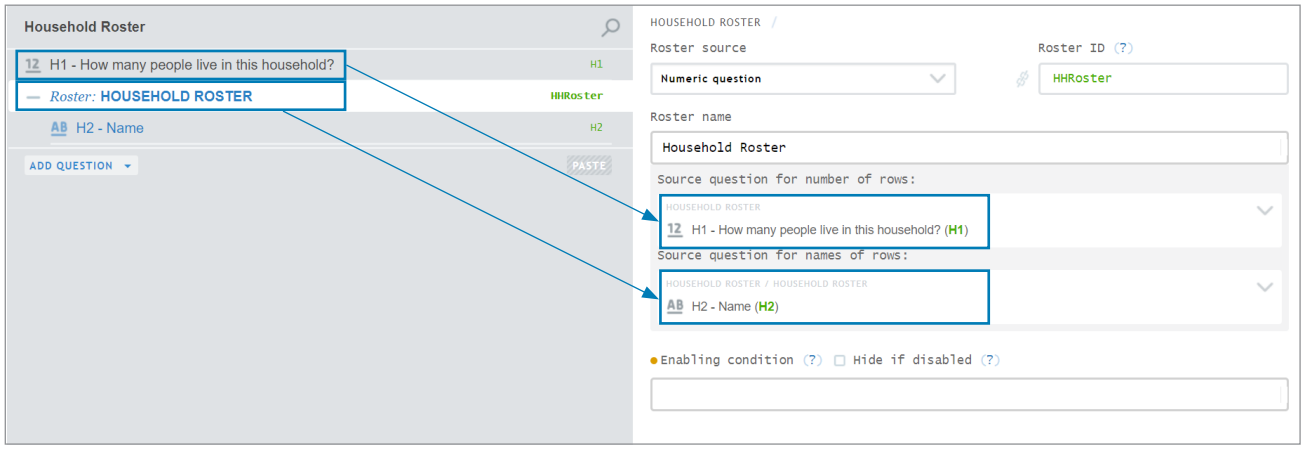
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.7.2 Nonfixed Rosters

A nonfixed roster must be set up using a source question that is either a numeric question or a list question. In the case of a household roster, the source might be a numeric question such as: "How many people live in this household?". Alternatively,

In the example shown in Figure 3.48, the number of rows is derived from the numeric question, but the Designer app also requires a title for each row. It is therefore a good idea to make the first question in a roster a text question, where the name of the subject can be entered as the row title. In Figure 3.48, question "H2" is the name of the household member.

Figure 3.48: Nonfixed Roster with a Numeric Source Question



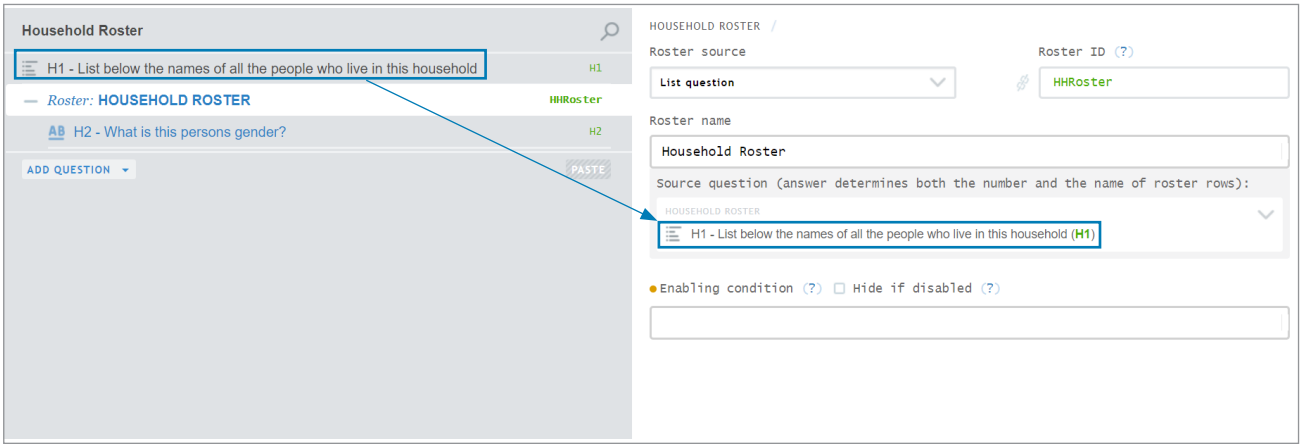
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Setting a list question as the source is similar to setting a numeric question, but the number of rows and the names of the rows come from the list question (Figure 3.49). Be sure to set a limit on the maximum number of list elements in the question. This value should be set higher than expected so that there is space for outliers. For example, a household roster might be set at 40 or 50 maximum members, just in case there is a very large household in the field.

3.7.3 Text Piping

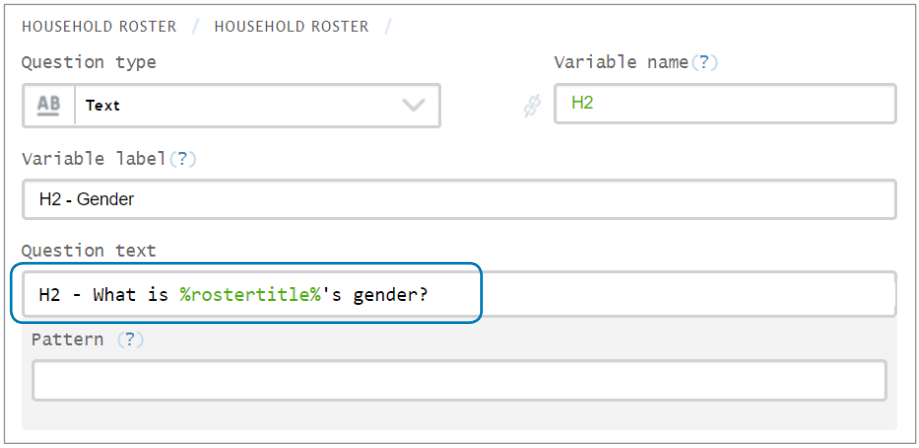
Sometimes referred to as "text substitution", text piping allows you to insert or "pipe" text from a previous question to the next. This means the dynamic text (e.g., a person's name) will change as each row of the roster is being completed. To activate this function, the code "%rostertitle%" should be included in the question text. When entered correctly, the code will turn green (Figure 3.50).

Figure 3.49: Nonfixed Roster with a List Source Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.50: Activating Text Piping in a Roster Question



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

In the case of a roster, the title of the row (e.g., the name of the household member) is displayed dynamically within the text of the subsequent question in the roster (Figure 3.51).

Answers to previous questions can also be piped or displayed into question text, static text, or error messages, using the variable name between percentage signs, e.g., %Q1% (Figure 3.52).

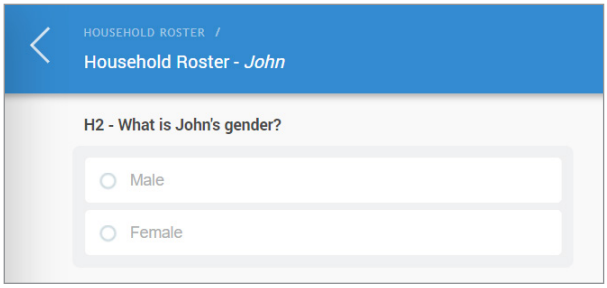
3.7.4 Subrosters

The Designer app also allows for the creation of subrosters (rosters inside rosters). An example of this would be creating an illness roster inside a household roster in order to collect details about each recent illness of each household member (Figure 3.53).

To create a subroster, simply add another roster inside an existing roster. Note that, in the questionnaire tree, the subroster will be indented further to the right than the initial roster.

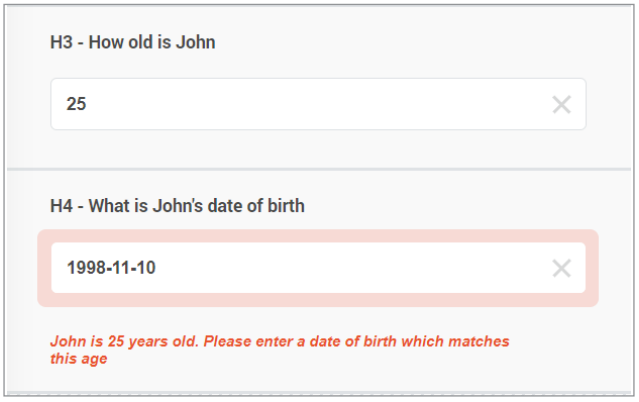
Survey Solutions allows three levels of rosters: the initial roster, the subrosters, and rosters within the subrosters. When using subrosters, keep in mind how the number of questions can quickly multiply and result in a very long questionnaire.

Figure 3.51: Text Piping as it Appears on the Tablet



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.52: Text Piping as it Appears on Question Texts and Error Messages



Source: Screen shot generated by Asian Development Bank consultant. 2019. Newcastle UK.

Figure 3.53: Example of a Subroster

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.8 Enabling Conditions

Enabling conditions are sometimes referred to as questionnaire skips, skip pattern, or logic. They define the conditions for when respondents should be asked certain questions. For example, there is no need to ask a male respondent if they are pregnant, so the question for pregnancy should only be enabled for female respondents.

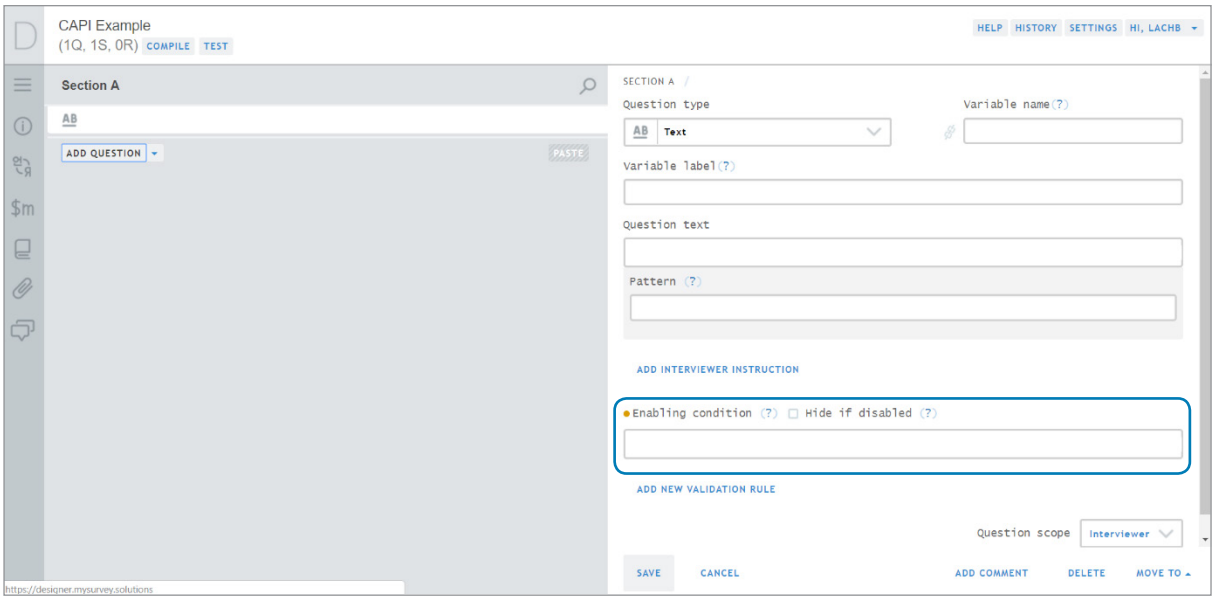
Enabling conditions also exist within paper-based questionnaires, but they are implemented manually and through an instruction that the interviewer needs to read and follow correctly. This is limiting in a couple of ways. Firstly, it is possible for the interviewer to make a mistake or miss the instruction altogether. Secondly, the complexity that can be applied to such instructions is limited because the interviewer needs to be able to understand the conditions.

Using CAPI alleviates these problems because the interviewer does not need to follow any instructions: the system is automatically able to hide irrelevant questions. The interviewer then only asks the questions that appear on the screen, without needing to think about skips. Using CAPI, more complex enabling conditions can also be implemented, drawing on responses to numerous previous questions, mathematical formulae, or other conditions.

To set an enabling condition in the Designer app, a short syntax will need to be written in the enabling condition field within the question editing panel (Figure 3.54).

Leaving the enabling condition field blank will mean that the question is always enabled and will be asked to all respondents. If an enabling condition is set and the checkbox for "Hide if disabled" is

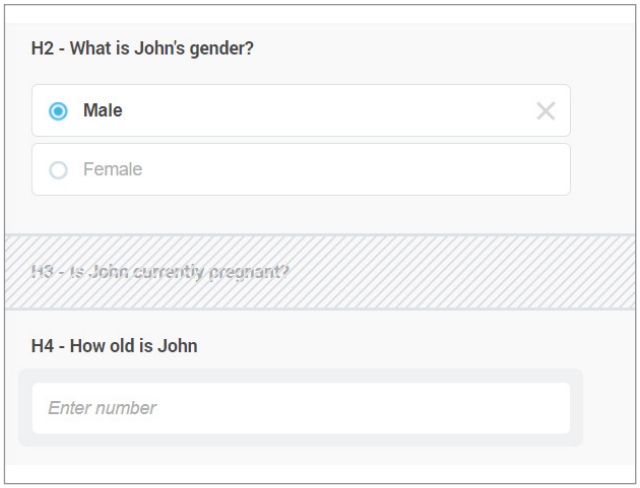
Figure 3.54: Setting an Enabling Condition



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

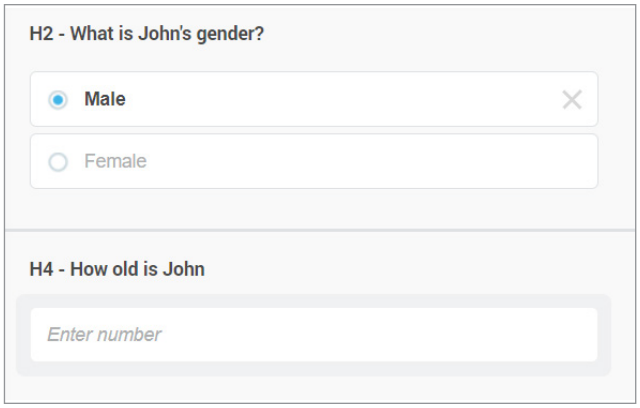
selected, then the question will be completely hidden from screen whenever it is not enabled. If an enabling condition is set and the checkbox is not selected, the question will be greyed out on screen (but not accessible to the interviewers) whenever it is not enabled. This setting is a preference best decided by fieldwork teams. In some cases, it is preferable to leave it unchecked because interviewers like to see what has been skipped, especially if they are still transitioning from paper-based work.

Figure 3.55: Enabling Condition as it Appears when "Hide" Button is Disabled



Source: Screen shot generated by Asian Development Bank consultant. 2019. Newcastle UK.

Figure 3.56: Enabling Condition as it Appears when "Hide" Button is Enabled



Source: Screen shot generated by Asian Development Bank consultant. 2019. Newcastle UK.

3.8.1 Basic Operators

A basic enabling condition requires syntax that contains three elements: the variable name of a previous question on which the current questions depends, a relational operator that sets a condition in relation to a given value, and the nominated value (Figure 3.57).

Figure 3.57: Valid Syntax for a Basic Enabling Condition

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The variable name needs to be the ID of the previous question that is conditional to the current question. The relational operator can be selected from a range available in Survey Solutions (Table 3.1). The value needs to be a numeral, so the answer from a numeric question (e.g., age), or the value of an option in a single select question, can be captured.

Table 3.1: Relational Operators Used in Survey Solutions

Operator	Meaning
==	Is equal to
!=	Is not equal to
>	Is greater than
>=	Is greater than or equal to
<	Is less than
<=	Is less than or equal to
.InRange(x,y)	Numeric value is in the range of x and y
.InList(x,y,z)	The answer is any of x, y, or z

Source: Survey Solutions. Support Portal and Knowledge Base: Syntax Guide: Operators. https://support.mysurvey.solutions/syntax-guide/cslanguage/syntax-guide-operators/.

Let's take the example in Figure 3.58, where question "H4" about occupation should only be asked if the household member is 16 years of age or older.

Figure 3.58: Example of a Question Requiring a Basic Enabling Condition

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

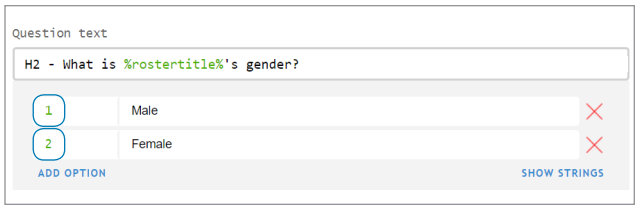
In the enabling condition field for "H4", the following code should be entered: "H3 >= 16". When valid code has been entered, the variable name will turn to green text and the value will turn to blue text (Figure 3.59). When all combined, this gives the effect that question "H4" will only be enabled (displayed on screen) if the value of "H3" is 16 or higher.

Figure 3.59: Example of Valid Code for a Basic Enabling Condition

1 = Variable Name, 2 = Relational Operator, 3 = Value.
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

To create an enabling condition based on a single select question, the value of the answer option (rather than its label) needs to be specified in the syntax. In Figure 3.60, this needs to be the value of "1" or "2", rather than "Male" or "Female".

Figure 3.60: Example of Valid Answer Values for a Basic Enabling Condition

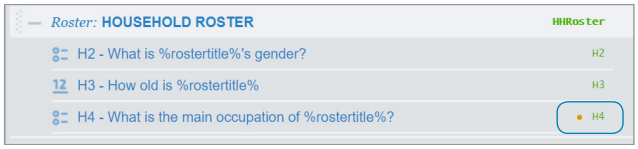


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

After an enabling condition has been set, the question ID will be marked with a small orange dot in the question listing on the right (Figure 3.61).

It is recommended to test in the web browser and/or use the Tester app to ensure that the enabling condition is functioning correctly both on PC and on tablet.

Figure 3.61: Example of a Question with an Enabling Condition Marker



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.8.2 Multi Select Operators

In some cases, an enabling condition needs to be based on the answer or answers to a previous multi select question. Basic operators cannot be used in such cases. This is because multi select questions can hold more than one answer, so relational operators such as "equals" or "does not equal" cannot work as there may be more than one value to be compared. As a result, the Designer app provides special operators for working with multi select questions and these are shown in Table 3.2.

Table 3.2: Multi Select Operators Used in Survey Solutions

Operator	Meaning
.Contains()	This answer is amongst those selected
.ContainsOnly()	Only this value is selected
.ContainsAll()	All of these values are selected
.ContainsAny()	Any of these answers are selected.
.!Contains()	This answer is not amongst those selected
.Length	Counts how many answers selected

Source: Survey Solutions. Support Portal and Knowledge Base: Syntax Guide: Multi-Select Questions. https://support.mysurvey.solutions/syntax-guide/questions/syntax-guide-multi-select-questions/.

To use multi select operators, the question ID of the conditional multi select question needs to be placed before the full stop, and the nominated value or values need to be placed inside the parentheses (separated by commas for multiple values). This is demonstrated in Figure 3.62, where a question is to be enabled if any of the option codes "1", "3", or "5" are returned for the multi select question with ID of "Q1".

Figure 3.62: Example of Valid Syntax for a Multi Select Operator

```
Q1.ContainsAny(1,3,5)
```

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.8.3 Logical Operators

There are cases when enabling conditions can be based on the answers to two or more previous questions. In these cases, logical operators need to be used to specify the relationship between each question. The logical operators available in Survey Solutions are shown in Table 3.3.

Table 3.3: Logical Operators Used in Survey Solutions

Operator	Meaning
&&	AND
||	OR
!	NOT

Source: Survey Solutions. Support Portal and Knowledge Base: Syntax Guide: Operators. https://support.mysurvey.solutions/syntax-guide/cslanguage/syntax-guide-operators/#logical.

Figure 3.63 provides an example of a question that requires the use of logical operators to set an enabling condition. Here, question "H5" about pregnancy should only be asked of female respondents who are 16 years of age or older. To set the enabling condition, the answers from "H2" (specifying gender) and "H3" (specifying age) must be combined.

Figure 3.63: Example of a Question Requiring Use of Logical Operators

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

In this instance, the "&&" operator tells the CAPI system that both the gender and age conditions must be satisfied, i.e., the respondent is a female **and** aged 16 or older, for question "H5" to be enabled (Figure 3.64).

Figure 3.64: Example a Logical Operator in an Enabling Condition

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.8.4 System Variables

In addition to all the custom variables that can be created in a questionnaire, there are some variables that are created by default in Survey Solutions (Table 3.4). These are referred to as system variables. They are useful for dealing with enabling conditions relating to rosters. For example, the system variable "@rowcode == 4" would enable a question for only the fourth row in a roster.

Table 3.4: System Variables Used in Survey Solutions

Operator	Meaning
@rowcode	Specifies a row ID in roster
@optioncode	Specifies an option code in single or multi select question
@current	Refers to the current row being completed in a roster

Source : Survey Solutions. Support Portal and Knowledge Base: Syntax Guide: System Generated Variables. https://support.mysurvey.solutions/syntax-guide/cslanguage/syntax-guide-system-generated-variables/.

3.8.5 LINQ Expressions

A language integrated query (LINQ) expression is used to search through all of the rows in a roster and count how many times a condition has been met. For example, a survey may include a question that should be asked only if the household has school-aged children in it: "Are any of the children currently not attending school?" (Figure 3.65). To set this enabling condition, we would need to check the household roster to find out if the age of any of the members is between 4 years and 18 years (school age).

Figure 3.65: Example of a Question Requiring Use of a LINQ Expression

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The LINQ expression needs to first define which roster it should search through, the operator that is applicable, then the condition to check for (Figure 3.66).

Figure 3.66: Valid Syntax for a LINQ Expression

```
ROSTERNAME.OPERATOR(x=>x.CONDITION)
```

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

There are many operators that can be applied in a LINQ expression, but the most useful for survey work are those shown in Table 3.5.

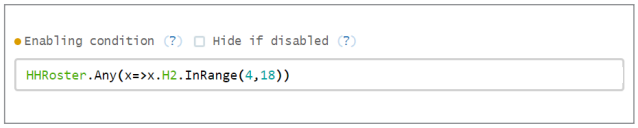
Table 3.5: LINQ Operators Used in Survey Solutions

Operator	Meaning
All	Checks if condition is true for ALL roster rows
Any	Checks if condition is true for ANY roster rows
Count	Returns a count of how many times the condition is true in roster

Source: Survey Solutions. Support Portal and Knowledge Base: Syntax Guide: Using LINQ Expressions for Conditions in Rosters. https://support.mysurvey.solutions/syntax-guide/cslanguage/syntax-guide-using-linq-expressions-for-conditions-in-rosters/.

Following the example involving school-aged children, the "Any" operator can be used in the LINQ expression to check through the household roster and enable question "H10" only if any member of the household is aged between 4 years and 18 years (Figure 3.67).

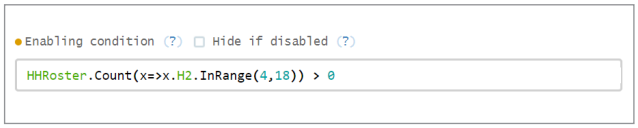
Figure 3.67: Example of a LINQ Expression Using the "Any" Function



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Alternately, the same outcome could be accomplished using the "Count" operator in the LINQ expression. This operator will return the total number of times a particular condition is true. If the count is greater than 0, then the question will be enabled. In Figure 3.68, the function will count the total number of times a household member is aged between 4 and 18 years. If this count is greater than 0, then the question will be enabled.

Figure 3.68: Example of a LINQ Expression Using the "Count" Function



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.9 Validations

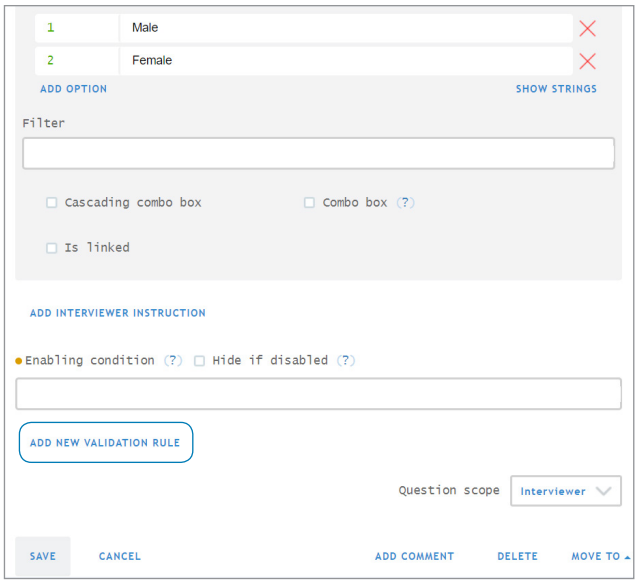
While enabling conditions are set to determine whether or not a question should be asked, validations deal with checking that the answer provided is acceptable. For example, the interviewer is not allowed to enter an age that is equal to or greater than 120 years.

The codes for validations are written using the same syntax and operators as for enabling conditions. The only difference is that these codes should be entered in the validation condition field within the question editing panel. In addition, an error message for each validation must be specified. This message

will then be displayed on the tablet screen to provide an explanation of why certain answers cannot be accepted.

To set up a validation, click on "Add New Validation Rule" at the bottom of the question editing panel (Figure 3.69).

Figure 3.69: Adding a New Validation Rule



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once the "Add New Validation Rule" button has been pressed, the input boxes for the validation condition and error message will appear (Figure 3.70). The code entered for the validation condition needs to specify when the condition is true and the answer is therefore valid. In Figure 3.70, it is specified that the answer is only valid if the value entered is less than 120. Any values of 120 or higher will be invalid and the corresponding error message will be displayed to the interviewer.

Figure 3.70: Example of a Validation Condition and Error Message

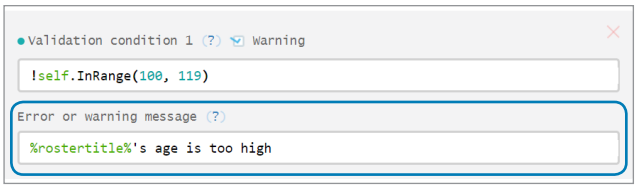
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

When the validation is dependent on an answer to the current question, it is good practice to use the "self" operator, which references the current question, rather than the question's specific variable name. This is because, if the variable name (question ID) is updated later on, the code will still reference the current question and the validation will still work. Note that the 'self' operator can only be used for validations, it can never be used for enabling conditions because a question cannot be enabled or disabled based upon its' own answer.

3.9.1 Error and Warning Messages

Text for error and warning messages should be easily understandable and clearly inform the interviewer of the issue with the attempted answer, so the problems can be rectified and acceptable answers provided. Using text piping, roster titles or variable values can also be dynamically displayed in error and warning messages to make them clearer for interviewers (Figure 3.71).

Figure 3.71: Example of Text Piping Code in a Validation Error Message



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Survey Solutions allows two kinds of validation messaging: an error and a warning. As a general rule, an error message is used when the answer is completely impossible, while a warning message is used when the answer is possible but unusual and/or could be an entry mistake. In Figure 3.72, an error message has been used for an impossible age (123). Meanwhile, in Figure 3.73, a warning message has been used for an unusually high but not impossible age (111). This has been done because there is a

remote chance that a household member could be 111 years old, but it could also be an entry error on the part of the interviewer.

An error or warning message is created in the same way, i.e., it is entered in the "Error or warning message" field. The only difference is that the "Warning" checkmark should be ticked wherever it is more desirable to display a warning than an error.

The other difference between the two types of messages is that, during quality control, error messages are more easily identified by supervisors and users of the Headquarters app.

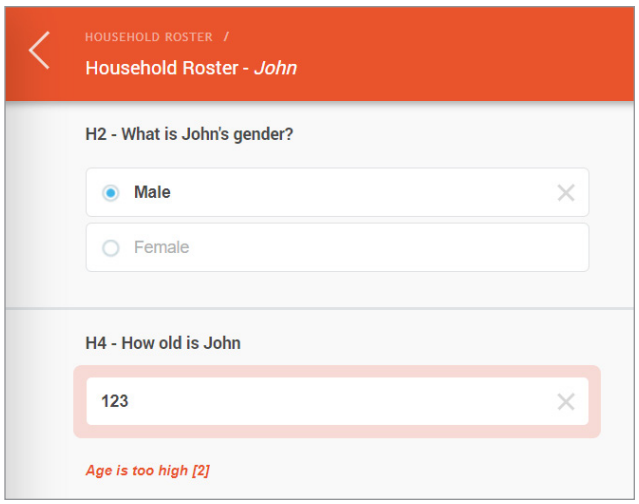
It should also be noted that each question can contain multiple validation rules, and therefore more than one validation message can be used on an individual question.

3.9.2 Date Validations

Validations should generally be used on date questions in case the interviewers make mistakes when selecting the date in the calendar. Table 3.6 contains the operators that can be used to code a validation for date questions in Survey Solutions.

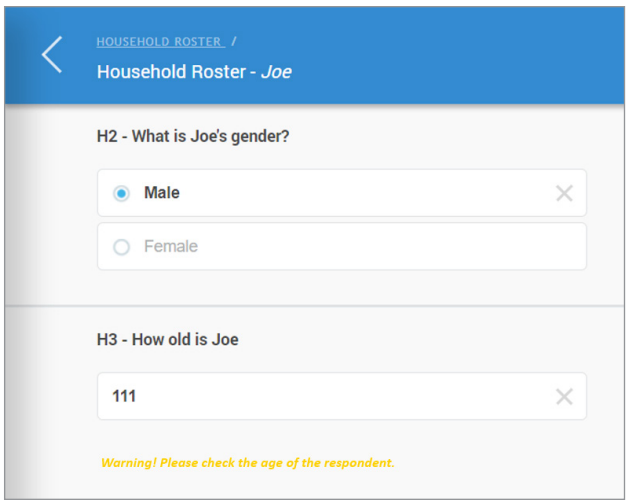
In many questionnaires, the respondent's age in years is asked, as well as the date of birth. To validate that these two values are correct, the "FullYearsSince" operator can be used. The difference in years between the birthdate and the date of the survey can be calculated, and the value returned should match the age input in years (Figure 3.74).

Figure 3.72: Example of an Error Message Displayed on a Tablet



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.73: Example of a Warning Message Displayed on a Tablet



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Table 3.6: Operators Used for Validation of Date Questions

Operator	Meaning
== or !=	Dates are the same or not the same e.g. Date1 != Date2 – two things cannot take place on the same day.
<, >, >=, <=	Relational operators .e.g. Date1 > Date2 – Date 1 is later in time than Date2
FullYearsSince	Returns a numeric number of years between a later date and an earlier date e.g. Date1.FullYearsSince(Date2)

Source: Survey Solutions. Support Portal and Knowledge Base: Syntax Guide: Date Questions. https://support.mysurvey.solutions/syntax-guide/questions/syntax-guide-date-questions/

Figure 3.74: Example of Valid Syntax for a Date Validation

```
InterviewDate.FullYearsSince(Birthdate) == AgeInYears
```

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.9.3 Cascading Answer Lists

In some cases, the answer options that are valid for the current question will depend on the answer option selected in a previous question. Instead of writing a validation syntax to determine which answers should be permitted, the answer option list can be changed to show only the valid answers to the current question. This is known as a cascading answer list and is often useful for programming regional identifiers (state, district, village, etc.) of a survey.

Figure 3.75 shows a typical example of the relationship between province and district.

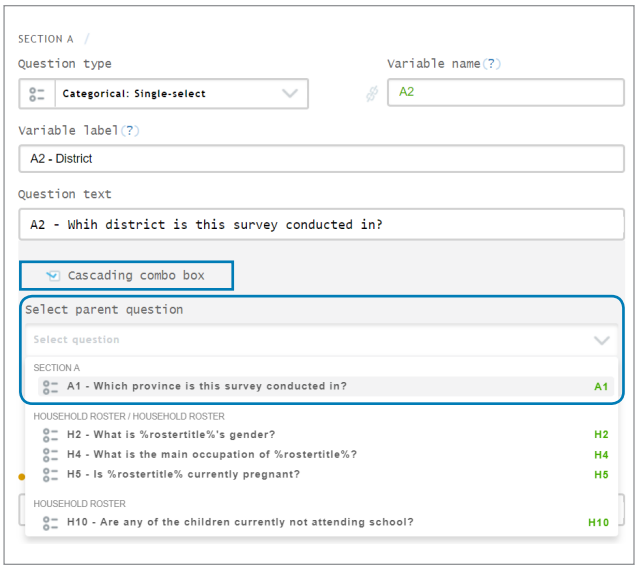
Figure 3.75: Example of Province and District Values

	A	B	C	D
1	Province Name	Province Code	District Name	District Code
2	Western	1	Colombo	11
3	Western	1	Gampaha	12
4	Western	1	Kalutara	13
5	Central	2	Kandy	21
6	Central	2	Matale	22
7	Central	2	Nuwara Eliya	23
8	Southern	3	Galle	31
9	Southern	3	Matara	32
10	Southern	3	Hambantota	33
11	Northern	4	Jaffna	41
12	Northern	4	Mannar	42
13	Northern	4	Vavuniya	43
14	Northern	4	Mullaitivu	44
15	Northern	4	Kilinochchi	45
16	Eastern	5	Batticaloa	51
17	Eastern	5	Ampara	52
18	Eastern	5	Trincomalee	53
19	North Western	6	Kurunegala	61
20	North Western	6	Puttalam	62
21	North Central	7	Anuradhapura	71
22	North Central	7	Polonnaruwa	72
23	Uva	8	Badulla	81
24	Uva	8	Moneragala	82
25	Sabaragamuwa	9	Ratnapura	91
26	Sabaragamuwa	9	Kegalle	92

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Where the current question relates to a particular province, rather than showing the same long list of all districts, a cascading combo box can be used to show only the districts located in the relevant province. To set this up in the Designer app, select the option for a cascading combo box, then select the earlier province-related question as the parent question, which should be a single select question (Figure 3.76).

Figure 3.76: Setting up a Cascading Answer List



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Note that a file containing the list of districts in each province must be created. It should look like the one in Figure 3.77, without headers, and with the district ID in the first column, the district name in the next column, and the ID of the parent value (province) in the final column.

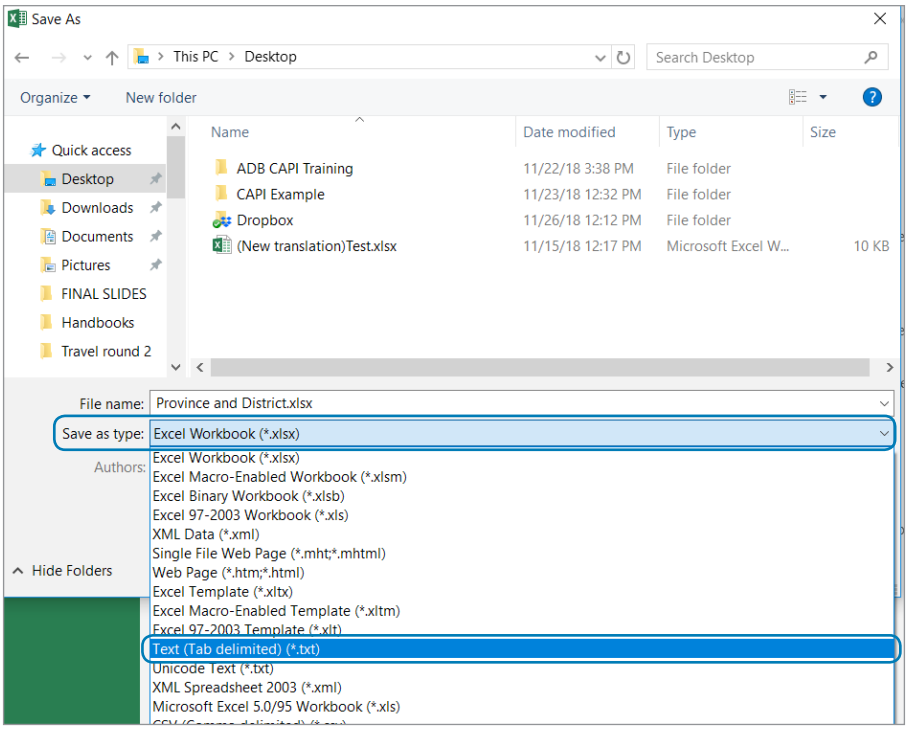
The example list shown was created in Microsoft Excel. This file needs to be saved as a ".txt" tab delimited file before it can be uploaded (Figure 3.78).

Figure 3.77: Example of a File Created for a Cascading Answer List

	A	B	C
1	11	Colombo	1
2	12	Gampaha	1
3	13	Kalutara	1
4	21	Kandy	2
5	22	Matale	2
6	23	Nuwara Eliya	2
7	31	Galle	3
8	32	Matara	3
9	33	Hambantota	3
10	41	Jaffna	4
11	42	Mannar	4
12	43	Vavuniya	4
13	44	Mullaitivu	4
14	45	Kilinochchi	4
15	51	Batticaloa	5
16	52	Ampara	5
17	53	Trincomalee	5
18	61	Kurunegala	6
19	62	Puttalam	6
20	71	Anuradhapura	7
21	72	Polonnaruwa	7
22	81	Badulla	8
23	82	Moneragala	8
24	91	Ratnapura	9
25	92	Kegalle	9

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.78: Saving a File to Tab Delimited Format in Microsoft Excel

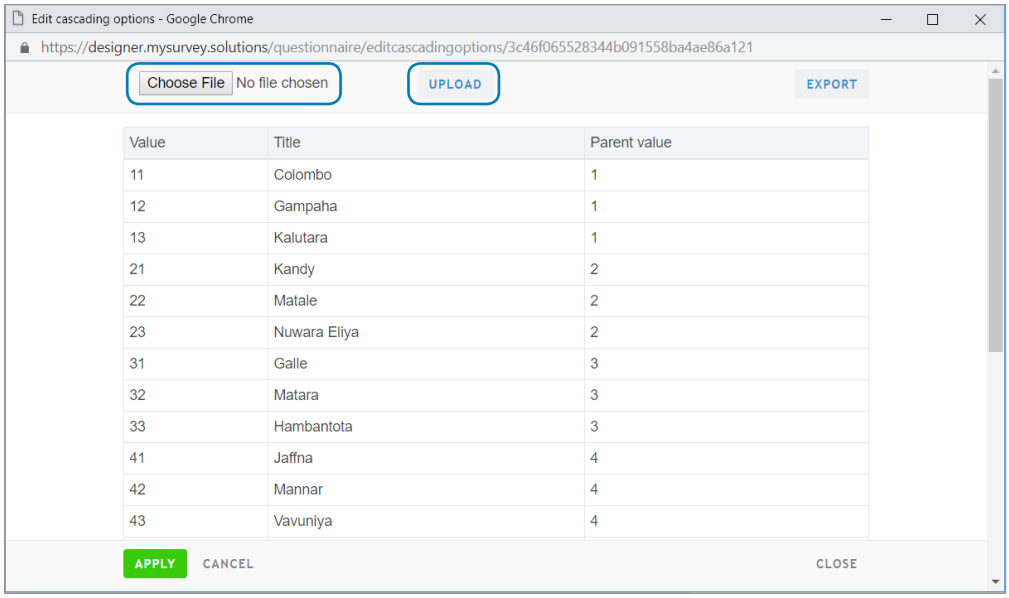


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once saved in Microsoft Excel, the file can be uploaded to the Designer app by clicking "Choose File" and "Upload" (Figure 3.79).

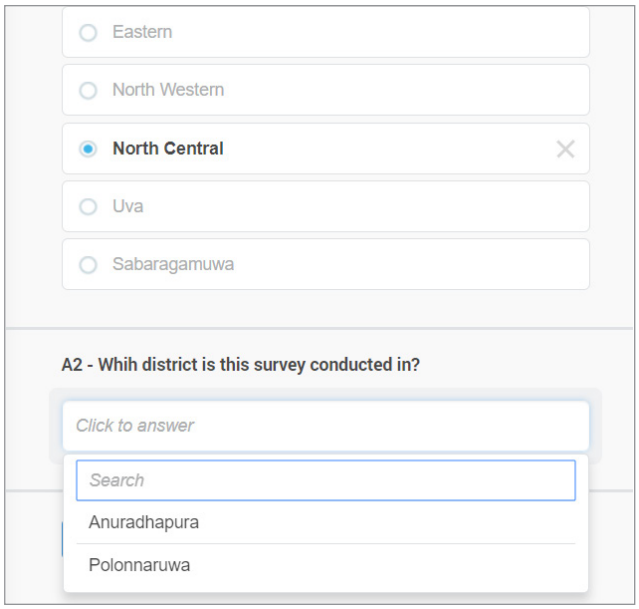
Now, the current question "A2" in Figure 3.80 will only display the district answer options for the province selected in the previous question.

Figure 3.79: Uploading a Tab Delimited File in the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.80: Example of a Cascading Answer List in Operation



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.9.4 Lookup Tables

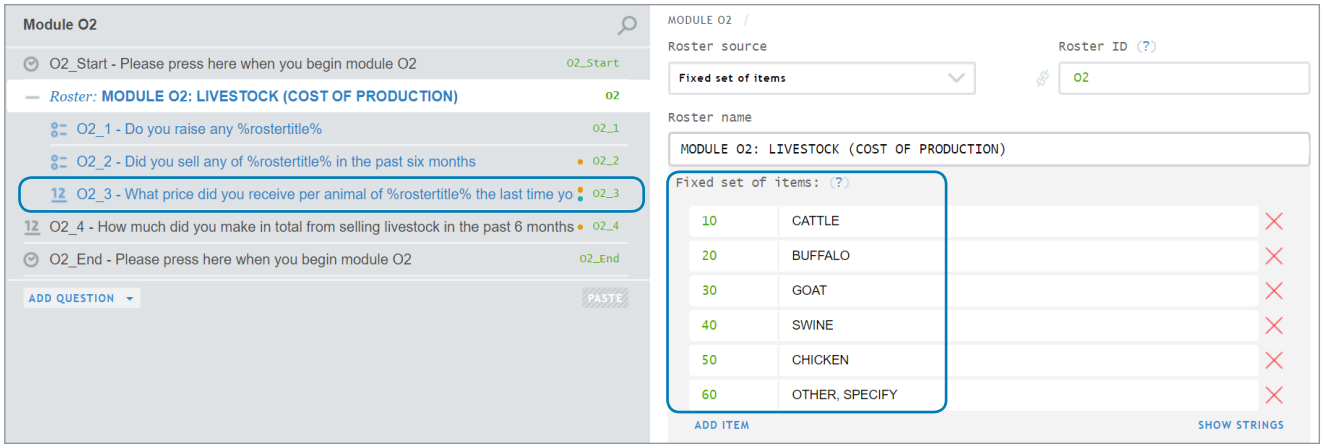
A lookup table can be used when external data needs to be referenced for a validation. A common example is when prices of various commodities need to be validated within their expected range inside a roster.

In the simple example in Figure 3.81, there is a fixed roster for different types of livestock (cattle, buffalo, etc.). The question to be validated is "O2_3", which is the price per animal for each type of livestock sold.

The expected price for each type of livestock will be different. It would be possible to write a long validation condition using "or" statements, but this is prone to errors and would not be efficient for 100 different prices, for example. Therefore, a lookup table can be loaded into the Designer app, with the price range expected for each type of livestock, and this can be used in a simpler validation. The price ranges or values expected will often be provided in an Excel file (Figure 3.82).

This file must be reformatted before it can be uploaded to the Designer app (Figure 3.83). Column "A" must contain the rowcodes as used in the Designer roster setup, i.e., the numerals assigned to

Figure 3.81: Example of a Question Requiring Price Validation



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.82: Example of Expected Price Ranges in a Microsoft Excel File

	A	B	C
1	Animal	MinPrice	MaxPrice
2	CATTLE	15000	25000
3	BUFFALO	30000	40000
4	GOAT	10000	17000
5	SWINE	20000	30000
6	CHICKEN	2000	8000

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.83: Excel File Reformatted for Use in the Designer App

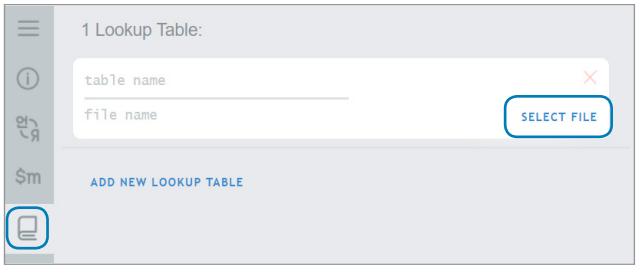
	A	B	C
1	rowcode	MinPrice	MaxPrice
2	10	15000	25000
3	20	30000	40000
4	30	10000	17000
5	40	20000	30000
6	50	2000	8000
7	60	0	999999999

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

each row, rather than the livestock types or names. Additionally, a seventh row for rowcode "60" ("Other, Specify") has to be added. For rowcode "60", the maximum (max) and minimum (min) prices have been given the broadest possible range because there is no way to know what price to expect when the type of livestock is not yet specified.

Once the reformatted Excel file has been saved as a ".txt" tab delimited file (following the same process as in Figure 3.78), it can be uploaded to the Designer app through the lookup table tab, which is the fifth icon from the top in the advanced instrument panel on the left of screen (Figure 3.84). Click on the "Add New Lookup Table" to select the file to upload.

Figure 3.84: Uploading a Lookup File to the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once the lookup table is successfully uploaded, the next step is to write a validation syntax that will look up the relevant row in the table to get the maximum and minimum price values. The example syntax in Figure 3.85 will select a lookup table (pink), then scan the table to the correct row (blue), and finally return the value from the specified column in that row (green).

Figure 3.85: Example of Valid Syntax for a Lookup Table

```
Lookup table name [value to be looked up] . Return value column name
```

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

In the livestock example, when the sale price for a type of animal is entered by the interviewer, the "InRange" operator will be used with the lookup function (looking up the current "@rowcode") to return two values ("minprice" and "maxprice") from the lookup file to specify a valid price range for that type of livestock (Figure 3.86).

Figure 3.86: Example of Valid Code for a Price Validation

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

3.10 Setting Up Additional Languages

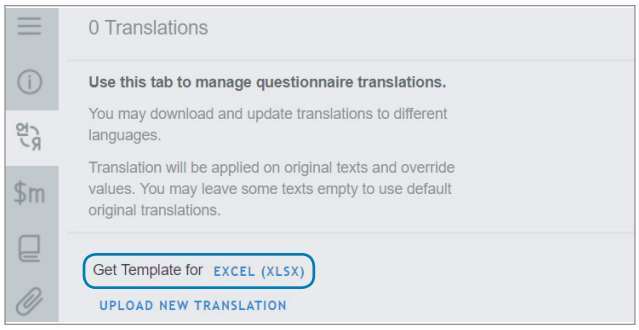
Some CAPI surveys need to be completed in different languages. A version of each alternative language questionnaire should be kept updated in Microsoft Word or Excel, and remain consistent with the master questionnaire version (generally created in English). The process of copying and pasting the alternative language version of the questionnaire into the Designer app is referred to as the "language overlay". The ideal time to do this is once the programming of the master questionnaire has been completed in the Designer app—including all enabling conditions, interviewer instructions, and validation messages—or when every piece of text that will appear on the tablet screen has been finalized. If the language overlay is performed before the master version is finalized, any changes made to the master questionnaire will also need to be made to each alternative language version, thus creating additional work.

Once ready to set up an alternative language questionnaire, go to the translations tab (third icon

from the top) in the advanced instrument panel, then click on the "Get Template for Excel" option (Figure 3.87). This will download the master questionnaire as an Excel file, containing every piece of text in every row of the entire questionnaire (Figure 3.88).

To add the alternative language and avoid typing mistakes, each text component should be copied and pasted into the template file from the Microsoft Word or Excel version of the alternative language questionnaire. The translated text in each cell in the "Translation" column must match the instructions of the wording in the "Original text" column (Figure 3.89).

Figure 3.87: Getting the Translation Template in the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.88: Example of the Template File Used for Language Overlay

	A	B	C	D	E	F
1	**Entity Id**	**Variable**	**Type**	**Index**	**Original text**	**Translation**
2	216b8bd3fae84fe7be36528eae72d7af		Title		Module A	
3	e8d3354898575f7c09b5dd6a99585f14		Title		Module B	
4	6daa86175e212dd8bd2fa54c98f8747f		Title		Module C	
5	7752535468f80c988ceb61d20a2af545		Title		Module D	
6	2fa7e24c836b096ec61f4d169436c377		Title		Module F	

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 3.89: Inserting an Alternative Language into the Excel File

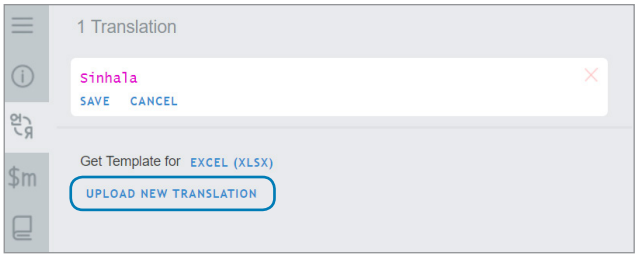
	A	B	C	D	E	F	G	H
202	8d6464ad19d6e93e5f0ca40427c031e8	B3	Title		B3 - What is %rostertitle%'s relationship to household head	B3 - ගෘහ මූලිකයාට %rostertitle %ඇති නෑකම		
203	8d6464ad19d6e93e5f0ca40427c031e8	B3	Validation Message	1	Can have only one household head	එක් ගෘහ ඒකකයක් පමණක් තිබිය හැකිය		
204	8d6464ad19d6e93e5f0ca40427c031e8	B3	OptionTitle	1	HEAD OF HOUSEHOLD	ගෘහ මූලිකයා		
205	8d6464ad19d6e93e5f0ca40427c031e8	B3	OptionTitle	2	WIFE/HUSBAND	භාර්යාව/ ස්වාමිපුරුෂයා		
206	8d6464ad19d6e93e5f0ca40427c031e8	B3	OptionTitle	3	SON/DAUGHTER	පුතා/ දුව		
207	8d6464ad19d6e93e5f0ca40427c031e8	B3	OptionTitle	4	SON/DAUGHTER IN LAW	ලේලි/බෑනා		
	8d6464ad19d6e93e				GRAND/S			

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Question IDs and system headers (e.g., "B3" and "Title" in Figure 3.89) should be left in the master language (generally English). Any code for text piping (e.g., "%rostertitle%") must also remain in the original language and must be inserted into precisely the same place in the translated text. Every cell in the translation column should be completed as cells left blank will revert to the original language.

Once completed, the Excel language overlay file can be uploaded to the Designer app by selecting the translation tab in the advanced instrument panel, then clicking the "Upload New Translation" option (Figure 3.90). Rename the file according to the language used, then click on "Save".

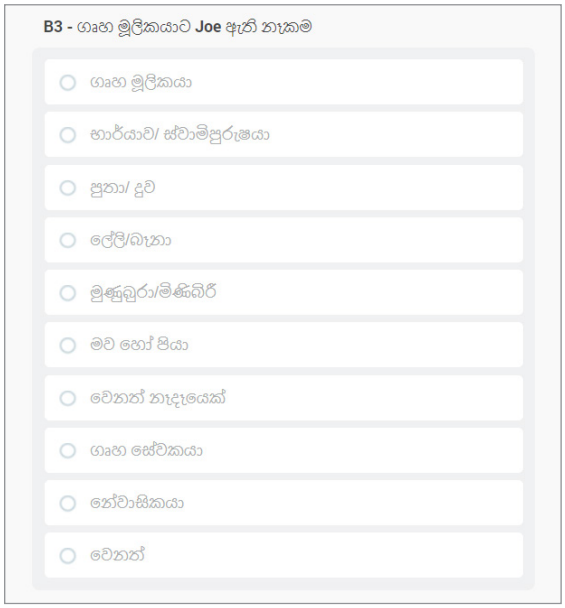
Figure 3.90: Uploading the Language Overlay File to the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

After compiling, the questionnaire can be toggled between the master and alternative languages in the Survey Solutions Tester and Interviewer apps (Figure 3.91).

Figure 3.91: Example of an Alternative Language on the Tablet Screen



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Chapter 4: Setting Up the Completed Questionnaire for Data Collection

Once the questionnaire has been fully compiled and tested, the next step is to establish the settings for data collection or fieldwork. This is primarily done through the Headquarters app, which acts as a bridge between the Designer app, where the questionnaire was created, and the Interviewer app, which is installed on the tablets that will be used to collect data from respondents in the field.

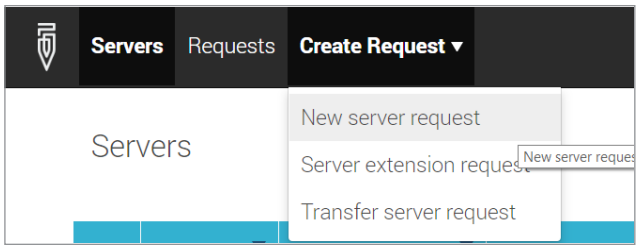
4.1 Setting Up the Headquarters Server

The first step is to set up a Headquarters server for the survey project. One Headquarters server should be used per project (defined as a "data collection effort"), which may require data collection for more than one questionnaire. This guide will cover how to set up a cloud server, which is recommended for the majority of projects. If a local server is required, more information can be found at https://support.mysurvey.solutions/getting-started/faq-for-it-personnel/.

Setting up a cloud server usually takes less than 24 hours, so it can be requested shortly before data collection is ready to begin. The first step is to make a request for a new cloud server. To do so, visit https://mysurvey.solutions/ and sign in with the same user account name and password used for the Designer app. This portal can be used to manage all of your requests for new servers and extensions of existing servers.

To create a request for a new server, click on the "Create Request" tab at the top right of screen, then select "New server request" (Figure 4.1).

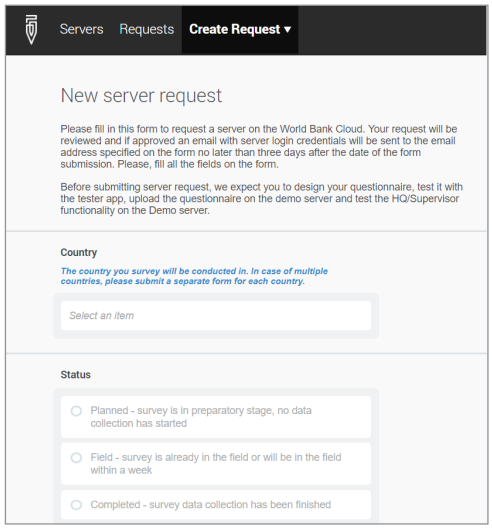
Figure 4.1: Requesting a New Server with Survey Solutions



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Next, complete and submit the request form (Figure 4.2).

Figure 4.2: New Server Request Form



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once the request is processed, you will receive an automated email with the unique resource locator (URL) of the server (https://(headquartersname).mysurvey.solutions/) and an administrator username and password. This email will be sent to the email account you registered in the Designer app. Note that the headquarters name will be different for each project. Enter the URL received in the email into any web browser and sign in to begin using the new Headquarters account.

4.2 Setting Up User Accounts and Apps

The first step in preparing for fieldwork is to create accounts for all the users of the system, which include the following:

Headquarters users. These users will work in the Headquarters app on PCs at the project office. This includes any users who will work on quality control checks, assignments, or system setup.

Supervisors. These can be either field-based or office-based depending on the project setup. In a typical CAPI project, each supervisor is generally in charge of four to eight field interviewers. The supervisors will access the Headquarters app to assign questionnaires to interviewers for completion, view progress reports, and do quality control checks on completed cases from their team.

Interviewers. These are the people who conduct and administer the surveys. The usernames and passwords set up for them in the Headquarters app will act as their sign-in details for the Interviewer app. Note that if supervisors intend to complete some interviews themselves during fieldwork, they will also need an interviewer-level account created.

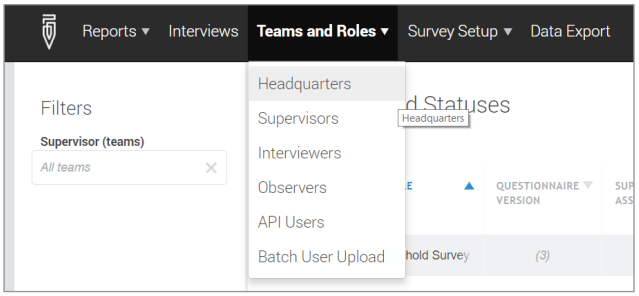
Some other optional types of users that can be set up are:

Observers. An observer can be anyone who would like to view progress reports on the project, but will not do any work related to quality control. A project can have an observer account, where reports can be viewed only through the Headquarters app.

API Users. An application program interface (API) account allows system developers and programmers to make external applications for data requests from the server, e.g., to create custom dashboards that display real-time results of data collected through fieldwork.

To set up each user account, click on the "Teams and Roles" menu in the top navigation of the Headquarters app (Figure 4.3). Users of each administrative level can be set manually or, if many users are required, the "Batch User Upload" option can be used to create a tab delimited file of all user details to be uploaded and created simultaneously.

Figure 4.3: Setting Up a User Account in the Headquarters App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

4.2.1 Setting Up the Interviewer App on Tablets

Once the user accounts are set up, the next step is to configure the tablets to collect data. This involves installing the Interviewer app on the tablets that are to be used for fieldwork, and signing in using the usernames and passwords specified when the user accounts were created in the Headquarters app. The Interviewer app needs to be installed manually, as described in section 4.2.2.

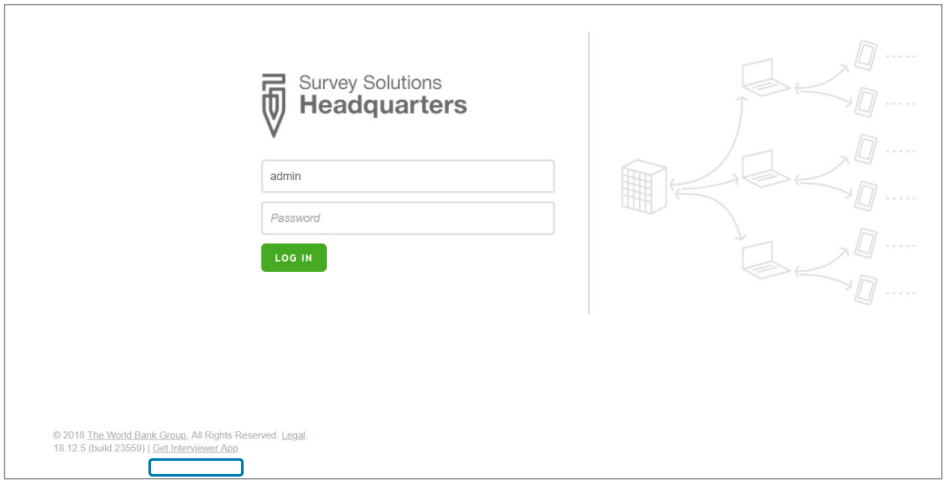
4.2.2 Installing the Interviewer App

To install the Interviewer app, an Android package (.apk) install file needs to be downloaded from the internet and saved onto each tablet. The file can either be individually downloaded onto each tablet, or it can be first downloaded onto a PC then copied across to each tablet. To download the install file, go to the Headquarters sign-in page and look for

the small "Get Interviewer App" link in the bottom right corner of the screen (Figure 4.4). Click on this link to download the ".apk" file.

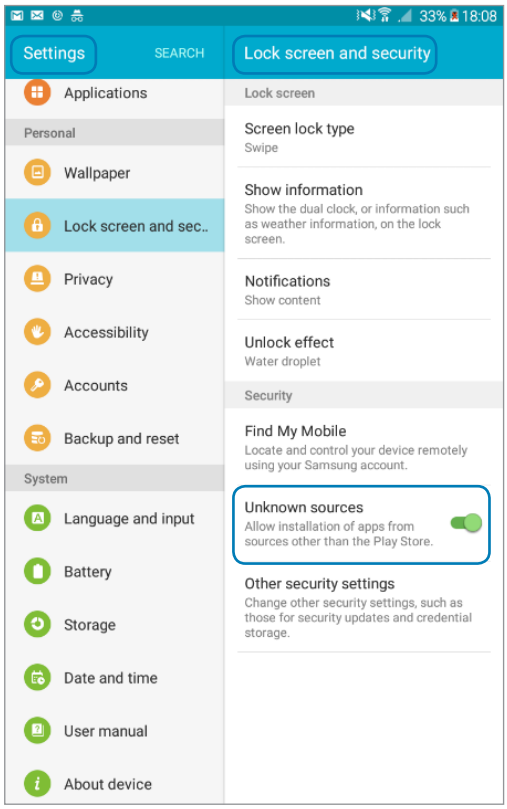
On the tablet, enter the "Settings" menu, followed by the "Lock screen and security" menu, then find the option for "Unknown sources" and shift the toggle to activate it (Figure 4.5). This allows the tablet to install apps that are not from the Google Play store.

Figure 4.4: Downloading the Install File for the Interviewer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 4.5: Enabling Installation of Apps from Unknown Sources



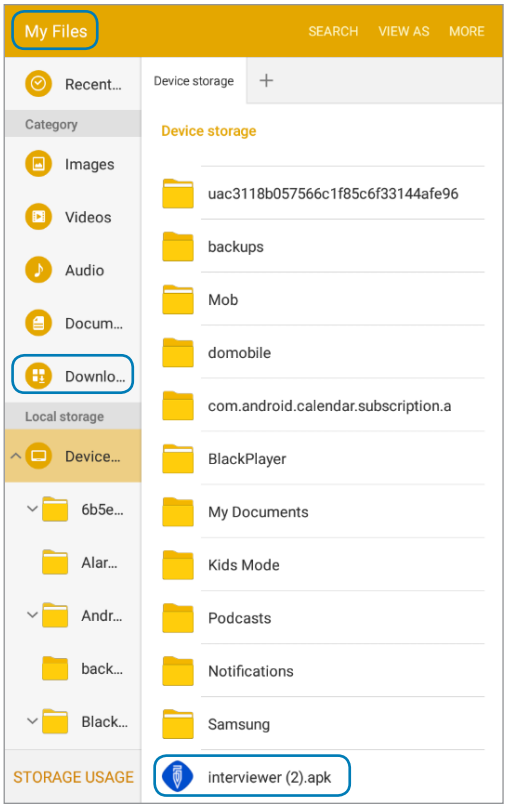
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Next, using the "My Files" function on the tablet, navigate to the folder where the ".apk" install file was copied or downloaded . If the file has been manually copied across from a PC, the destination folder will be known. If the ".apk" file has been downloaded onto the tablet from the Headquarters link, it will likely be in the "Downloads" folder (Figure 4.6). Once located, click (or double-click) on the ".apk" file and follow the prompts to install (Figure 4.7).

4.2.3 Signing In to the Interviewer App for the First Time

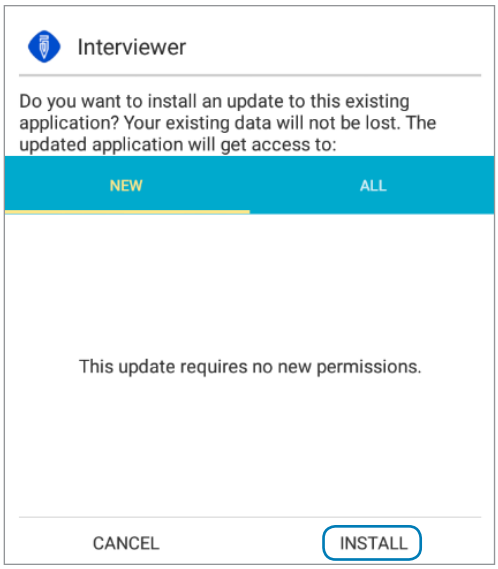
When opening the Interviewer app for the first time, there will be prompts to specify a synchronization endpoint, user login, and password. For the synchronization endpoint, enter the full URL of the headquarters server (including 'https://'). For the login, enter the username created in the Headquarters app. For the password, enter the password created in the Headquarters app.

Figure 4.6: Locating the Install File on the Tablet



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

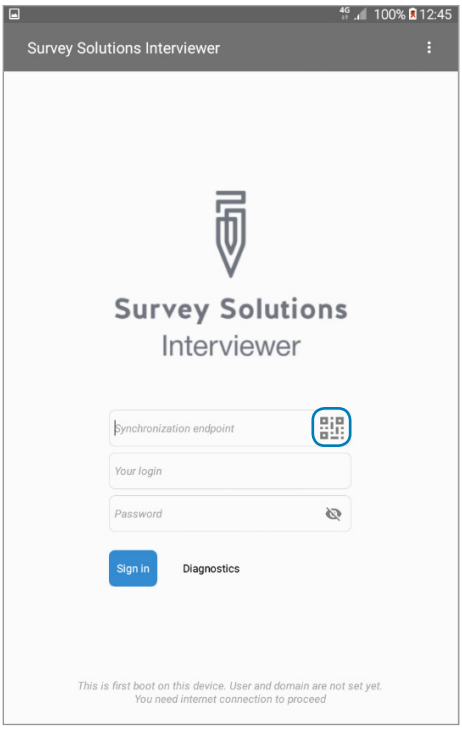
Figure 4.7: Installing the Interviewer App onto the Tablet



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

This information can be typed in manually, although if setting up many tablets, the work can become laborious. In this case, Survey Solutions offers QR code scanning to speed up the process (Figure 4.8).

Figure 4.8: Sign-In Screen for the Interviewer App

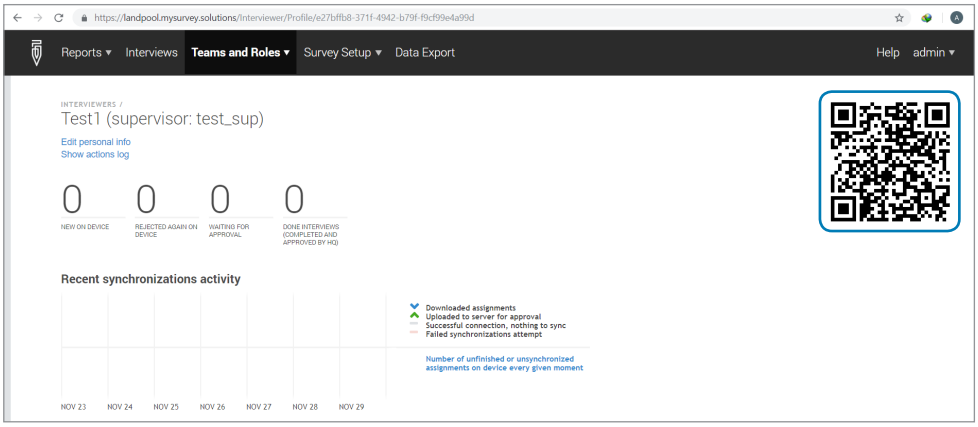


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

To use the QR code functionality, sign in to the Headquarters app on a PC, navigate to the "Teams and Roles" menu, choose the "Interviewers" option from the dropdown, then click on the name of the user you are about to set up the Interviewer app for. On the top right of this screen, there is a QR code ready to be scanned using a tablet (Figure 4.9).

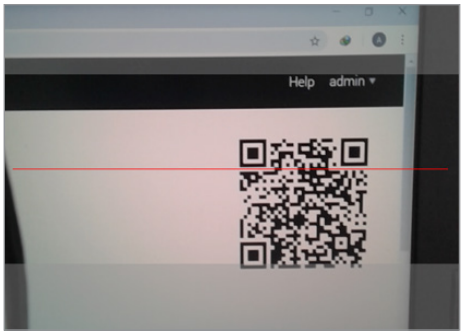
On the tablet, press the QR code icon next to "Synchronization endpoint" on the Interviewer sign-in screen, then point the tablet towards the Headquarters screen on the PC to scan the code (Figure 4.10). Next, enter the password manually.

Figure 4.9: Using a QR Code to Quickly Set the Interviewer Sign-In



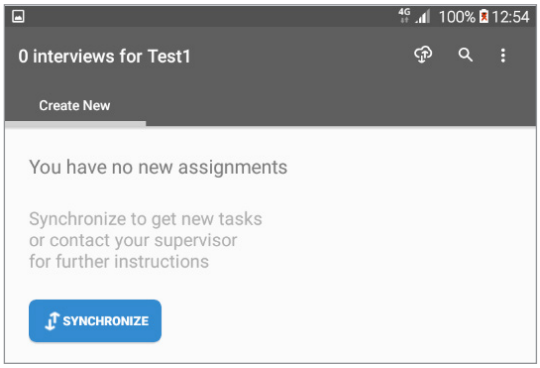
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 4.10: Scanning the QR Code from Headquarters to Interviewer



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 4.11: Successful Sign-In to the Interviewer App



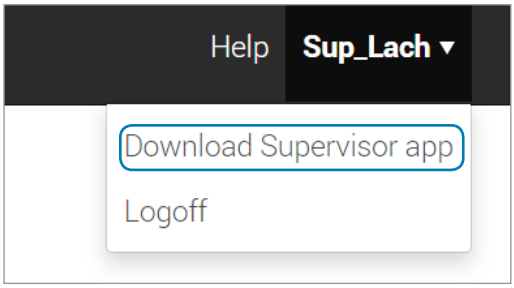
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once signed in, the tablet in use will be linked to the corresponding interviewer's account for the duration of fieldwork (Figure 4.11). The next step is to return to the Headquarters app to set up the questionnaire and assignments that will be downloaded when the tablets are synced (section 4.3).

4.2.4 Setting Up the Supervisor App on Tablets

If the Supervisor app (the offline version of Headquarters) is required for fieldwork where internet access is poor or unavailable, it needs to be installed on the supervisor's tablet using an ".apk" install file. To download this file, first set up a supervisor-level user account in the Headquarters app, then sign out of Headquarters and sign in again using the supervisor-level account details. Pressing on the username of the supervisor in the top right corner of the screen will open a dropdown menu that includes the option "Download Supervisor app" (Figure 4.12). Press on this option to download the ".apk file" and install it on the supervisor's tablet (using the same method described in section 4.2.2).

Figure 4.12: Downloading the Install File for the Supervisor App



Source: Screen shot generated by Asian Development Bank consultant. 2019. Newcastle, United Kingdom.

4.3 Importing Questionnaires

The questionnaire (or questionnaires) completed in the Designer app needs to be imported to the Headquarters app before assignments can be created and sent to the interviewers' tablets. To do this, click on the "Survey Setup" menu at the top of screen and then click "Questionnaires" (Figure 4.13).

Next, click on the green "Import Questionnaire" button (Figure 4.14).

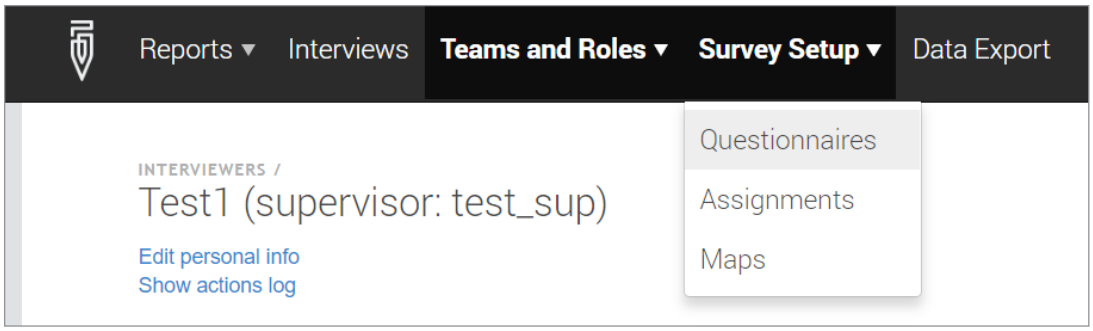
Next, sign in to the Designer app using the username and password for this app, not the username and password set for Headquarters, as shown in Figure 4.15.

After signing in, select the survey you would like to import, then click the blue "Import" button to finalize (Figure 4.16).

4.4 Creating Assignments

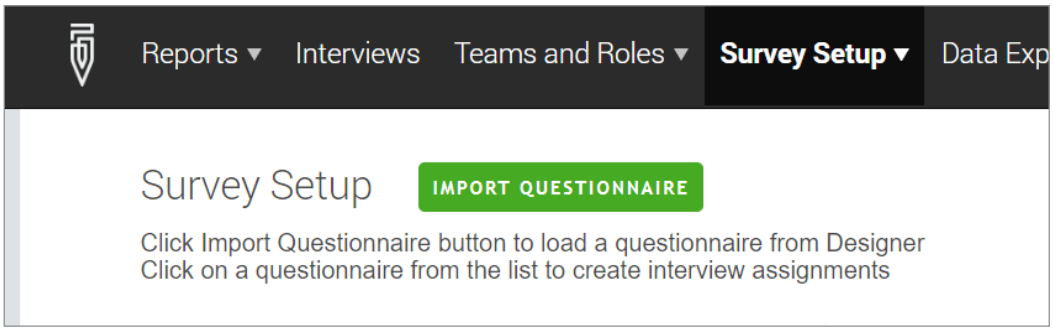
Once the questionnaire template has been imported into the Headquarters app, the last step prior to fieldwork is to create assignments. Assignments can be thought of as the equivalent of individual paper forms, which are handed to interviewers to

Figure 4.13: Accessing Questionnaires from the Survey Setup Menu



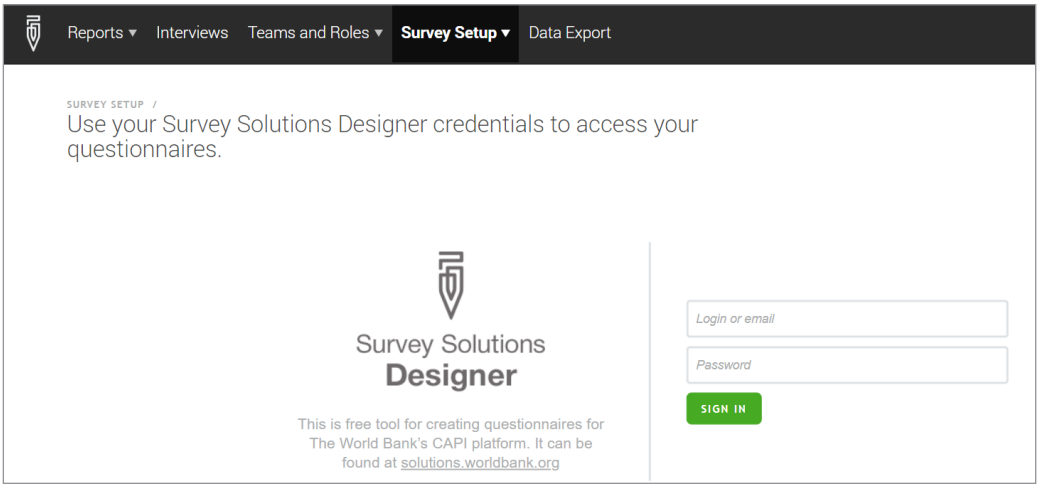
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Figure 4.14: Importing a Questionnaire into the Headquarters App



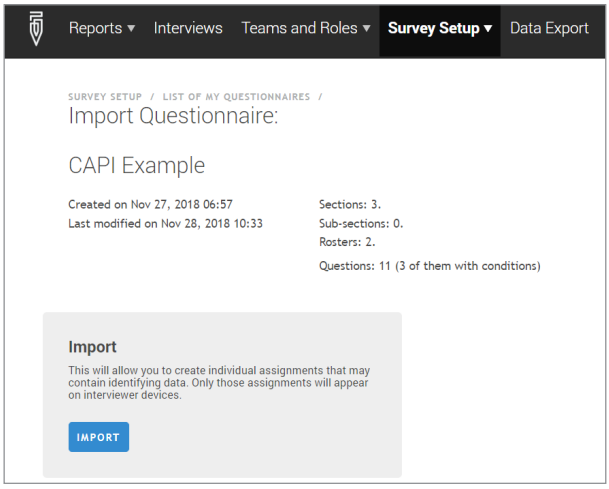
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Figure 4.15: Signing In to the Designer App through Headquarters



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Figure 4.16: Finalizing the Questionnaire Importing

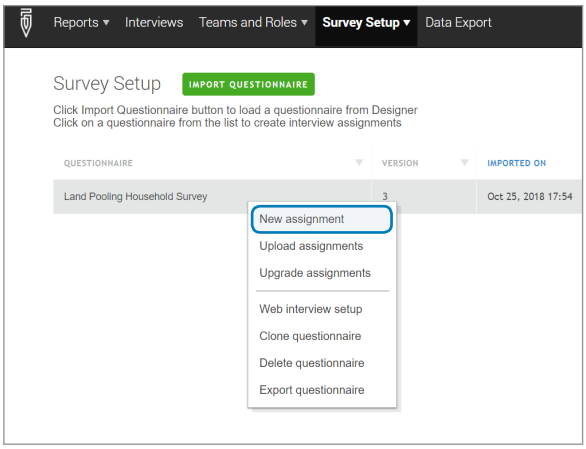


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

complete. The same action takes place between the Headquarters app and the Interviewer app. Any number of assignments can be assigned to each interviewer, and these can be blank or have some information, such as regional identifiers or household IDs, prefilled. In this section, we cover setting up an unlimited amount of blank assignments for interviewers[2].

An assignment can be created manually by clicking on the "Survey Setup" menu, then selecting "New assignment" (Figure 4.17).

Figure 4.17: Setting Up a New Assignment in the Headquarters App

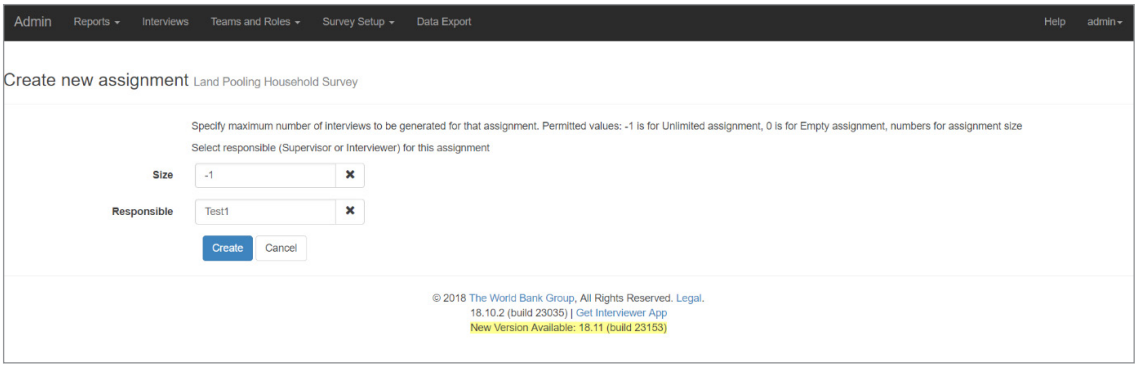


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

On the screen, specify the user (interviewer or supervisor) responsible and how many survey forms you would like them to be assigned (Figure 4.18). The value of -1 can be used to specify unlimited surveys.

2 For information on prefilling assignments, see "Question Scope" in the advanced section of this handbook.

Figure 4.18: Specifying the Number of Assignments

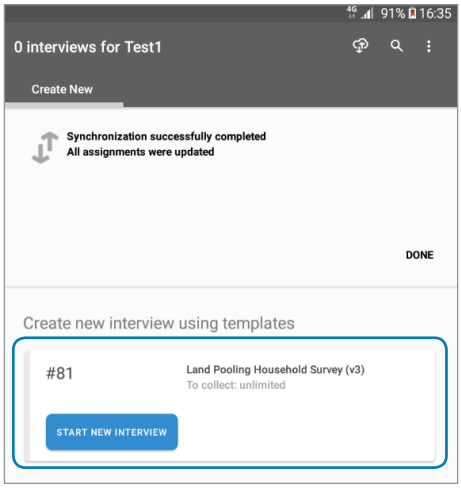


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Note that assignments can be assigned to a supervisor and the supervisor can then distribute those assignments to their team members through the Headquarters app or the Supervisor app. This is useful for longitudinal or follow-up surveys, where the supervisor can have all the required prefilled forms for a specified area, then distribute the correct forms to the interviewer who will be doing the interviews in that location.

Once the assignments are created and distributed, the interviewers can then sync their tablets and receive the assignments ready to be completed by pressing the "Start New Interview" button in the Interviewer app (Figure 4.19). This can be conceptualized as an unlimited pile of blank surveys that the interviewer can take with them each time they start a survey.

Figure 4.19: Assignments Downloaded to the Interviewer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

4.5 Quality Control during Data Collection

Once the interviewers have left for fieldwork, Survey Solutions has quality control functions that can be utilized by field supervisors and office-based staff. It is recommended that these quality control tasks are included in interviewer training, and practiced during pretesting, so that everyone is aware of their roles and responsibilities in this important aspect of data collection.

Quality control within Survey Solutions can be categorized into two broad functions.

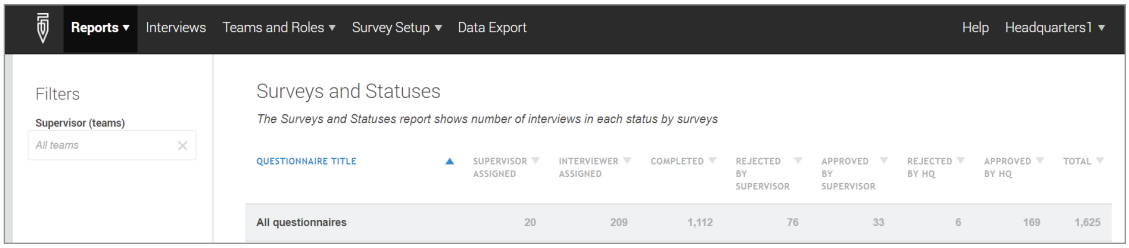
The first is case-by-case checking, which is designed to mimic (electronically) the process of manual checking during paper-based data collection. In this approach, the interviewer completes a questionnaire, then passes the form to their supervisor for review using the Headquarters app or the Supervisor app. After checking for mistakes, the supervisor then sends back the forms to the interviewer to make corrections where necessary.

The second function is the overall checking that is done by Headquarters users on the collected data as a whole. Reviewing progress reports and comparing data between teams and/or interviewers enables identification of problems if one team or one interviewer is completing questions differently.

4.5.1 Survey Statuses

After a case is completed by the interviewer, it needs to be approved by the supervisor and by a Headquarters user to be considered to have passed the quality control regime. By the end of fieldwork, all cases should have passed quality control. The default report "Surveys and Statuses" within Headquarters gives an overview of how many interview cases are at each stage of the quality control process, as shown in Figure 4.20.

Figure 4.20: Viewing Overall Status and Progress of Surveys during Fieldwork



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

The "Total" column on the far right shows the total number of cases that have been completed and synced from the interviewer's tablet. The columns to the left show the number of cases currently at each stage of the quality control process (these will always add up to the total in the final column). Each status can be broadly described as follows.

Supervisor Assigned. When using a sample with preloaded variables, this shows the cases assigned to the supervisor and ready to be distributed to interviewers. If the sample has no preloaded variables, this column will always read "0".

Interviewer Assigned. When using a sample with preloaded variables, this shows the number of cases sent to interviewers' tablets and awaiting completion. If the sample has no preloaded variables, this column will always read "0".

Completed. An interview case is deemed to be completed after it has been finalized on the tablet and synced to the Headquarters app or the Supervisor app. The completed status is also shown if an interview case has been rejected by the supervisor, amended, and resynced. Any cases in this column are theoretically in the "to do" pile for supervisors to check.

Rejected by Supervisor. This status arises when a supervisor has checked an interview and found an issue or issues that warrant rejection within the Headquarters app. The next time the relevant interviewer syncs their tablet, the rejected case will be returned to him or her, along with comments from the supervisor regarding corrections to be made. Cases in this column are considered to be in the "to do" pile for interviewers.

Approved by Supervisor. These are the cases that the supervisor has checked and found no problems with. Interviews of this status are considered to be in the "to do" pile for Headquarters quality control users.

Rejected by Headquarters. These are the cases that have been checked by Headquarters quality control users and are found to have problems. Such cases become the relevant supervisor's responsibility to correct. However, since the supervisor is not able to edit any answers in each case, he or she will often need to reject the case in order to send it back to the interviewer for correction.

Approved by Headquarters. These are the cases that Headquarters quality control staff have checked and found no problems with. These cases can be considered to have passed quality control.

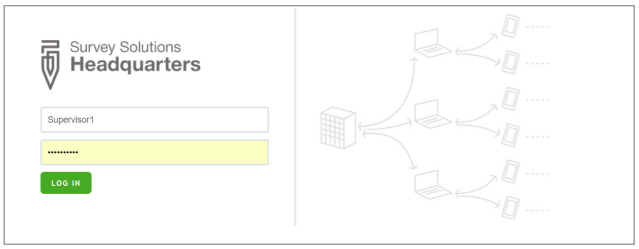
The key to understanding Headquarters quality control is that the process is fluid until the interview case reaches final approval (Approved by Headquarters). Cases can be rejected multiple times or approved straight away, depending on the quality of data collected. The early stages of fieldwork will often see a higher number of rejections. However, as interviewers come to understand the mistakes made, the quality of their work generally improves, resulting in fewer rejections as fieldwork goes on.

Although the Headquarters process is electronic, and comments are passed through the system, team members should be encouraged to discuss and clarify issues with each other in person or over the phone. This can help resolve issues in a more timely manner. Thinking back to paper survey checking, a supervisor would rarely write a comment on the paper form and hand it back to the interviewer without saying anything. The same logic should apply to CAPI surveys.

4.5.2 Case Checking Processes

To check an interview case, and decide to approve or reject it, supervisors will begin by signing in to the Headquarters app on either a PC or a tablet (using an internet browser). They can do so by navigating to the Headquarters URL (a good tip is to bookmark this on each users' tablet) and entering their individual username or password (Figure 4.21). The instructions that follow detail the process using the Headquarters app, but the tasks can also be completed using the Supervisor app in the same way.

Figure 4.21: Signing In to the Headquarters App at Supervisor Level



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

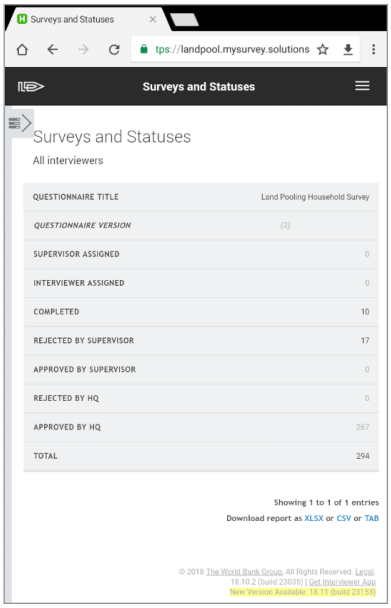
Once signed in to the Headquarters app, supervisors will see only the cases relating to their team of interviewers. Headquarters quality control users, on the other hand, will see all cases (for large surveys, they may therefore need to find a way to divide the cases, such as monitoring specific field teams). The "Surveys and Statuses" screen layout is slightly different depending on whether Headquarters has been accessed using a PC or on a tablet. Figure 4.22 shows the tablet view.

At this point, supervisors can check the status listings to make sure that all expected interview cases have been successfully synced from interviewers' tablets. If any are missing, the supervisor may need to assist interviewers with syncing.

To check the cases, the supervisor can take a shortcut by pressing on the number next to "Completed". In Figure 4.22, is the number 10. Supervisors can also navigate to the menu in the top right of screen and select "Interviews" (Figure 4.23).

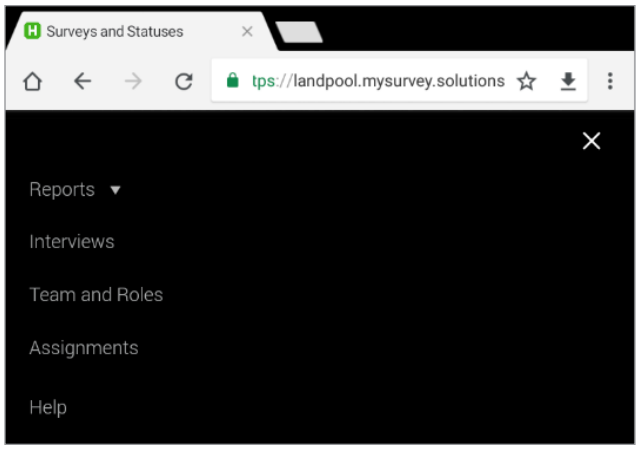
The "Interviews" page shows all cases sent by the specific supervisor's team of interviewers

Figure 4.22: Surveys and Statuses View in Tablet Mode



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

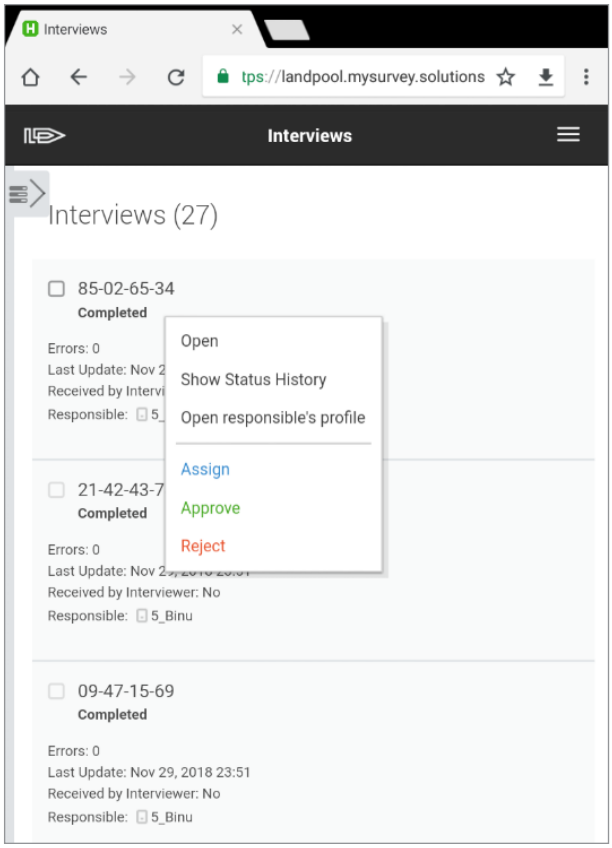
Figure 4.23: Accessing Completed Interviews via the Navigation Menu



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

(Figure 4.24). The supervisor can then use the filter menu (grey button on the left of screen) to focus on a specific case. Again, the cases the supervisor should be paying attention to are those marked "Completed" and "Rejected by Headquarters". Pressing on an interview case and selecting "Open" will allow the supervisor to check that particular case.

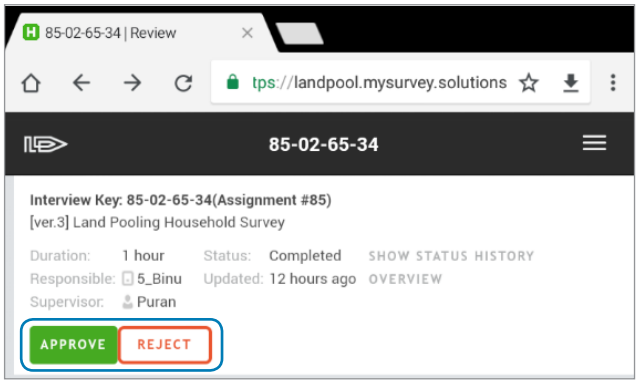
Figure 4.24: Assessing Interview Status in Headquarters Tablet Mode



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

The primary responsibility here is to press either the red "Reject" button or the green "Approve" button relating to each survey case as seen in Figure 4.25.

Figure 4.25: Approving or Rejecting Individual Interviews



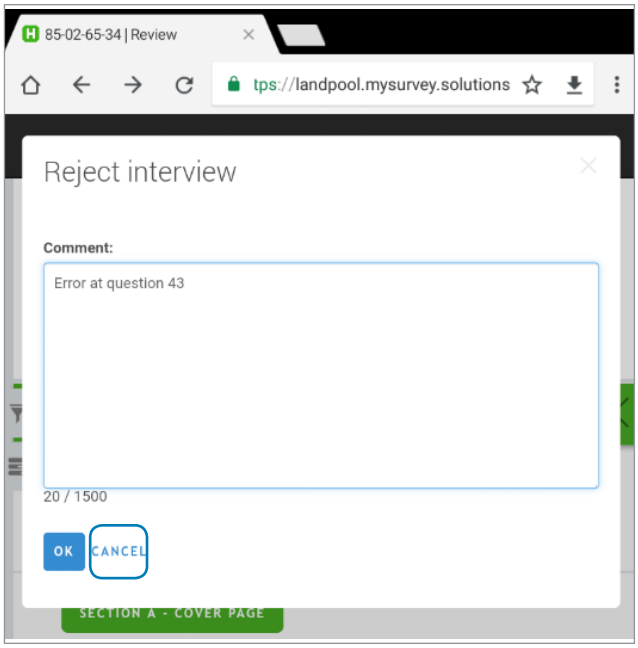
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Depending on the fieldwork circumstances and questionnaire complexity, the supervisor may be instructed to review all questions in each interview (this should be done at least in the early days of fieldwork). Individual questions can be accessed by pressing the navigation button at the bottom of the screen, beginning with "Section A – Cover Page", then reviewing the entire case before deciding to approve or reject it.

Alternatively, to conduct a faster check for simple questionnaires, the supervisor can use the grey filter button on the left-hand side to filter for any questions that have not been answered, have an error, or have comments from the interviewer.

If any problem is found, the supervisor can press the reject button, then enter the reason for rejection (Figure 4.26).

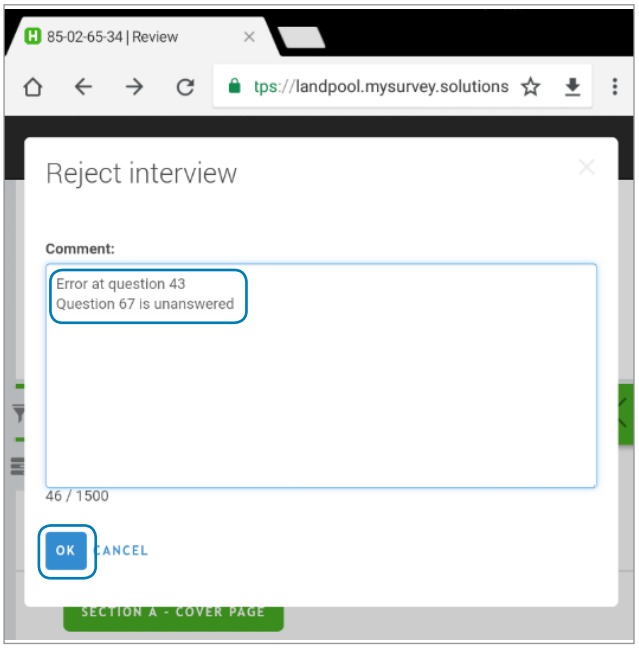
Figure 4.26: Adding Comments to an Interview Rejection



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Pressing "OK" after entering a comment will reject the case immediately. It is, however, recommended to press "Cancel" as this will save the comment and allow the checking to continue for further questions in the interview case. This is recommended because an individual case might have several problems (Figure 4.27).

Figure 4.27: Recording Multiple Reasons for Interview Rejection



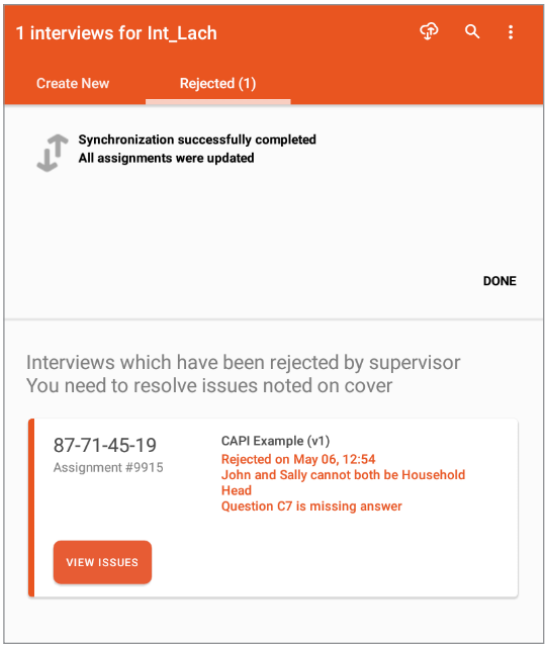
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Once a case with known problems has been checked in its entirety, it can then be rejected. This way all problems can be corrected by the interviewer at once. The status of this case is now changed to "Rejected by Supervisor" and the relevant interviewer should be instructed to sync their tablet to receive the returning case and correct the problems in the Interviewer app, as shown in Figure 4.28.

4.6 Exporting Data

Data can be exported from Headquarters as soon as interview cases are completed. These data can be transferred while other fieldwork is still in progress, and provided to the analyst to begin setting up tabulations and preliminary analysis.

Figure 4.28: Accessing Rejected Interviews in the Interviewer App



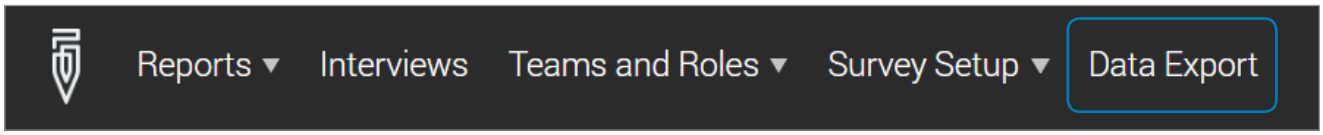
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

A data export can be used for quality control purposes. Viewing the data as a whole can identify new problems, e.g., outliers that are difficult to spot on a case-by-case basis. The export can also allow analysts to view survey metadata.

To export data from Headquarters, click on "Data Export" in the top navigation menu (Figure 4.29).

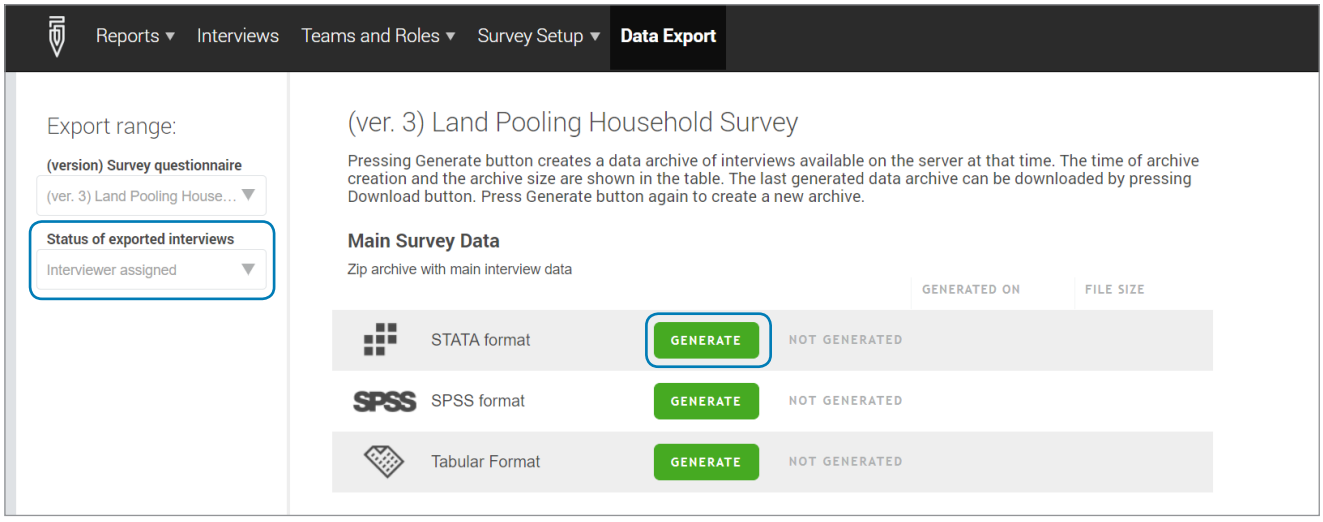
On the data export screen, begin by selecting the export range on the left-hand side to identify the relevant survey and the corresponding status of interviews to be exported (Figure 4.30). To export all data collected, the "All" status can be used. To review the data for quality control purposes, it is helpful to export only the "Approved by Supervisors" status, so that the analyst can see if any problems are getting through the quality control process.

Figure 4.29: Commencing Data Export from the Headquarters App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Figure 4.30: Selecting Survey and Interview Status for Data Export



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

Next, simply press the green "Generate" button once the data is generated. A blue "Download" button will then appear to download the data in the required format. The main survey data will download in a zip file that contains (i) a master data file (all unrostered questions), (ii) a data file for each roster, and (iii) metadata files.

4.6.1 Metadata

The metadata consists of four files in the main data export:

- "Interview_comments" (a log file of all comments made by all users);
- "Interview_actions" (a log file of all actions, completions, rejections, etc.);
- "Interview_errors" (a log file of all errors in submitted cases, i.e., red validation messages); and
- "Interview_diagnostics" (summary variables about each case, e.g., number of errors, duration, etc.)

These can be reviewed and analyzed to identify problems with specified survey questions, teams, or interviewers. Some examples of the analyses that could be performed include:

- running a frequency of "interview_errors" to see if any questions are showing a high volume of errors (the validation may have been implemented incorrectly);
- cross-tabbing interviewer by action in "interview_actions" to see if any particular interviewer is struggling and having more rejections than others (the interviewer might require more supervision or a refresher training); and/or
- checking "interview_comments" to see if any particular question is attracting more comments than others (the question may not be well understood by interviewers or further instructions may be required).

4.6.2 Pictures and Audio

If the survey has captured audio or picture files, these can be downloaded by following the same process as for interview data, but by instead selecting "Binary Data" and pressing the green 'export' button instead of 'generate' (Figure 4.31). This will download a .zip file containing a subfolder for each interview case that captured audio or video data. These subfolders are each named with the variable "interview_id" from the main data file, so they can be linked.

Figure 4.31: Downloading Images and Audio Files

Source: Screen shot generated by Asian Development Bank consultant. 2019, Newcastle, United Kingdom.

4.6.3 Questionnaire Updates while in the Field

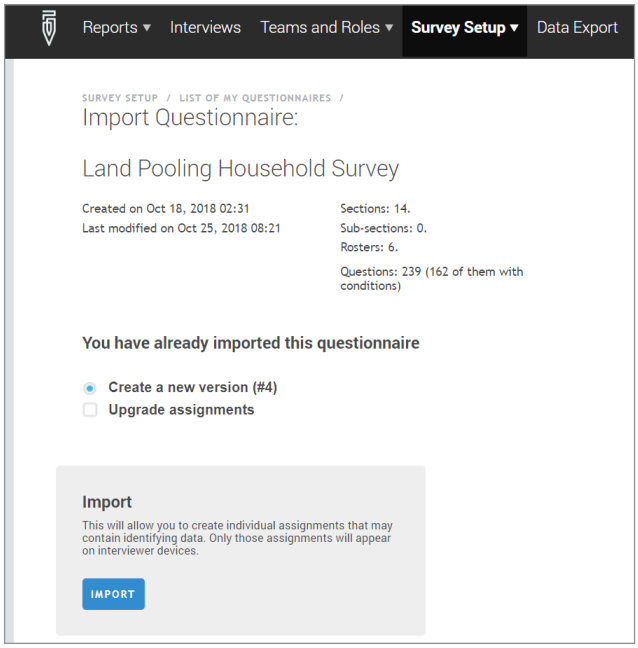
Although not usually desirable, in some cases an update to the questionnaire may be required after fieldwork has already started. This might be because a mistake (e.g., a dysfunctional enabling condition or incorrect question text) has been found in the questionnaire, or because an immediate and necessary change has been requested by stakeholders.

Though changes are inevitable in some instances, mistakes should be minimized by thoroughly testing the questionnaire before commencing fieldwork. Revisions should also be minimized by giving deadlines for survey changes to all interested parties.

If a questionnaire needs an update during fieldwork, the desired changes should be made in the Designer app. Be sure to test the revision thoroughly, so that a mistake is not replaced by another mistake. Once completed, tested, and compiled, the questionnaire can be imported into the Headquarters app using the same process as a new setup.

This time, however, a notice will appear that the questionnaire has already been imported (Figure 4.32). Ticking the "Upgrade assignments" checkbox will automatically update all assignments to the new version of the questionnaire the next time each interviewer syncs his or her tablet. Any interviews that have been started but not synced at this point will remain as the old version of the questionnaire.

Figure 4.32: Importing a Questionnaire into Headquarters for a Second Time



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia

The important thing to note in this process is that any update—even if edits have been made only on text and there are no changes to the logic or data map—will result in a second database being created. The original database should not be deleted because it will still hold all cases completed before the update. In addition, at the conclusion of fieldwork, the two databases will need to be merged for analysis.

Chapter 5: Advanced Features

5.1 Question Scope

When designing a questionnaire in the Designer app, a "question scope" can be applied to each question. This is done by selecting one of four possible scopes from the dropdown menu at the bottom right of the question editing panel as shown in Figure 5.1.

The four possible scopes are:

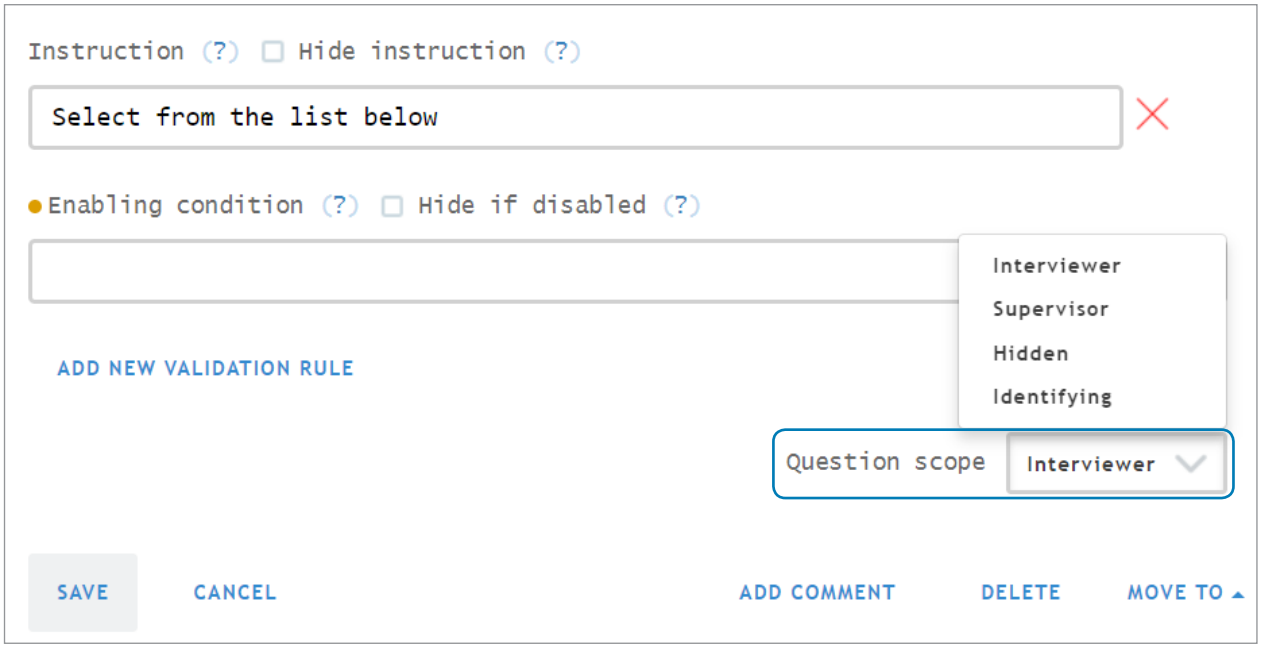
Interviewer. This is the default and most commonly used scope, generally a normal question that will be asked by the interviewer.

Supervisor. This is a scope that will be visible only to the supervisors when they are performing the case-checking function in the Headquarters app. Such scopes are useful for setting up a callback interview, which the supervisor can conduct.

Hidden. This is a preloaded scope that is not visible to the interviewer. For example, in a longitudinal survey it could be an answer from a previous survey round, which informs enabling conditions or validations in the questionnaire, but which is not needed to be seen by the interviewer.

Identifying. This is a preloaded scope that is visible to the interviewer, but is not changeable. For example, preloading the respondent's name or address for a longitudinal study, whereby it can be not deleted and altered by the interviewer. The answer to a question with this kind of scope will be clearly visible in the Interviewer app and the Headquarters app to help identify cases without referring to the ID number.

Figure 5.1: Setting Question Scope in the Designer App

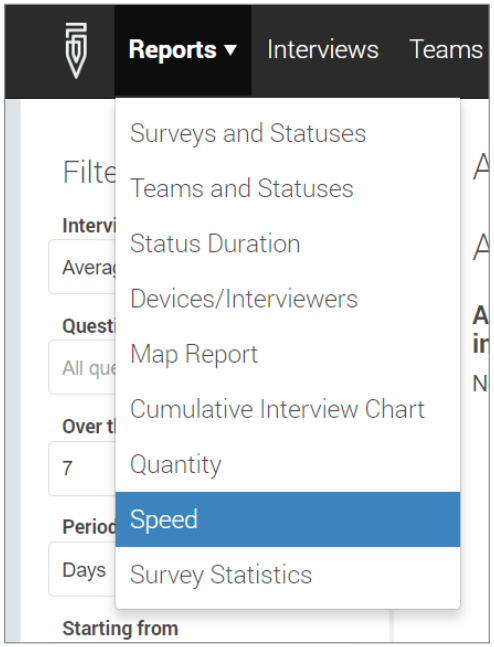


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

5.2 Timestamps

Timestamps are a commonly used feature of CAPI surveys. Survey Solutions offers some built-in timestamp functions, which can be seen in the "Speed" report within the Headquarters app or in the metadata file containing interview diagnostics (Figure 5.2).

Figure 5.2: Accessing the Speed Report in the Headquarters App

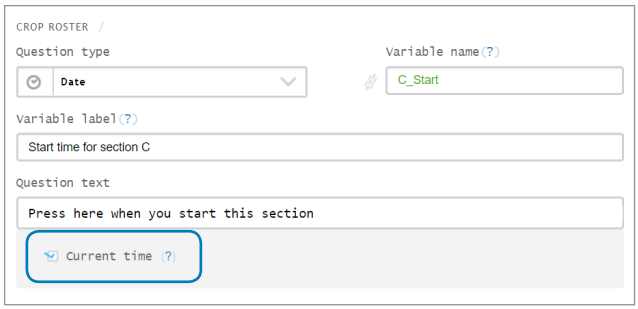


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The problem with these variables is that they are captured by calculating the difference between the timestamp when the interview case is opened and the timestamp when the final "complete" button is pressed on the summary page at the end of the interview. This can be inaccurate in some instances because the interviewer may finish the interview, but later goes back to check through answers or add comments and only then finalizes the case. Further, the system timestamp only gives total interview duration and doesn't give the length of time spent per section or roster. This can present an issue when the interviewer is asked to return at another time to complete the interview, because the system does not account for the time elapsed between interview sessions.

An alternative way of gathering timestamps is to set an instruction that interviewers are required to respond to at certain points (e.g., at the beginning or end of each section). These instructions are easy to set in the Designer app by using a date question and selecting the checkbox for "Current time" (Figure 5.3).

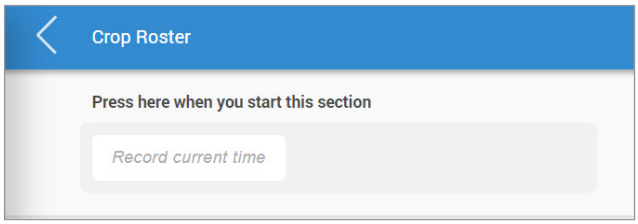
Figure 5.3: Setting a Date Question to Capture Current Time as a Timestamp



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

During the interview, the instruction will appear as a button for the interviewer to press (Figure 5.4).

Figure 5.4: Timestamp Instruction as Viewed in the Interviewer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

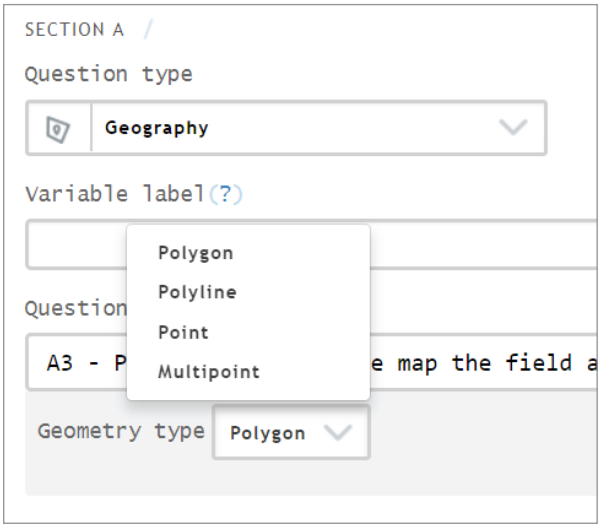
The only problem with this method is that it relies on interviewers to remember to press the button, and to press it at the correct moment during the interview. If the button is not pressed, or pressed at a later time, the data cannot be corrected. So, when using this method, it is important to train interviewers well on this task, and check for it thoroughly during quality control.

5.3 Geography Questions

Geography questions allow the interviewer to work with respondents to select areas or points on a satellite-style map. This type of question can work independently of a GPS connection.

To use the geography feature, it firstly needs to be set up in the Designer app. To do this, select the geography option as the question type, then specify how you would like the data to be captured: polygon, polyline, point, or multipoint (Figure 5.5).

Figure 5.5: Setting Up a Geography Question



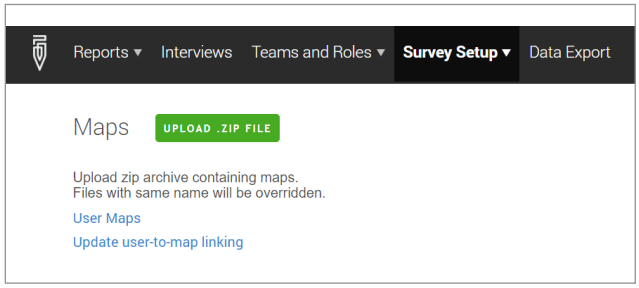
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

A map file or files will need to be used with the question once fieldwork begins. The file formats required for this task are either tile package (.tpk) or geotiff type files. You may need to consult with a GPS expert for the creation and management of these files.

Once the files are prepared, they need to be loaded into the Headquarters app. This can be done by selecting "Maps" from the "Survey Setup" menu as shown in Figure 5.6.

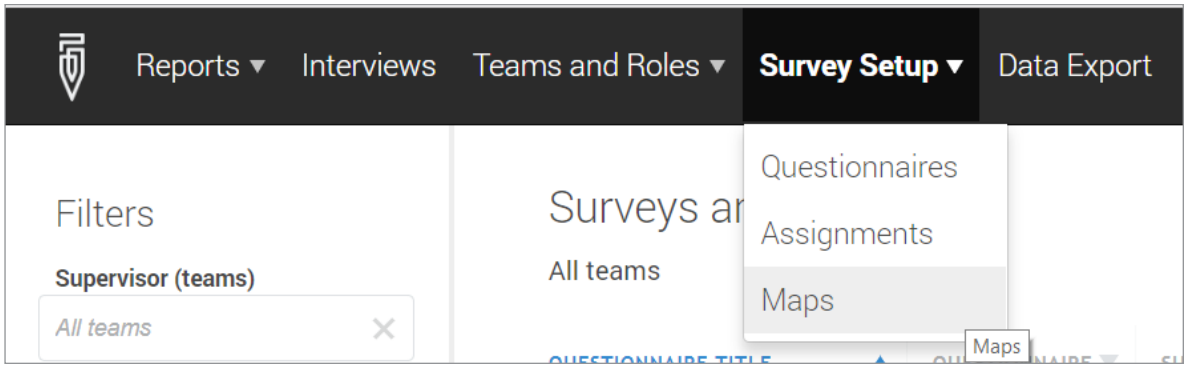
The map files must be uploaded in a zip file format (Figure 5.7). The .tab delimited file for the user-to-map linking also needs to be updated. This will tell the system which interviewers should have access to which maps.

Figure 5.7: Uploading the Correct Map File Format



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

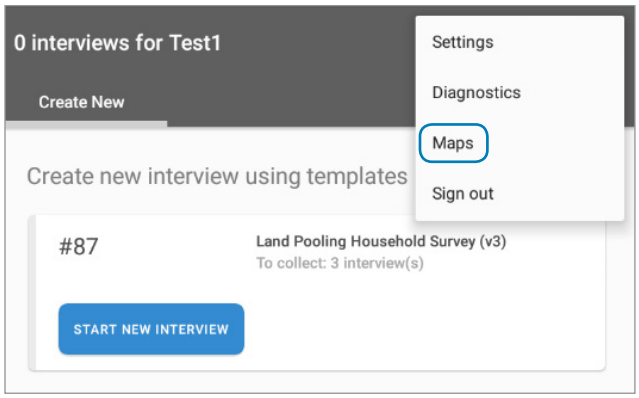
Figure 5.6: Loading Map Files into the Headquarters App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once uploaded into the Headquarters app, the maps then need to be downloaded to each interviewers' tablet. Note that this is done only once at the start of fieldwork, or again if additional maps are added during the fieldwork. To download maps, enter the Interviewer app and press the menu button on the top right-hand corner of the dashboard, then select "Maps" (Figure 5.8).

Figure 5.8: Preparing to Download Maps in the Interviewer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Once on the maps page, press the sync button to download the maps for this user from the server (Figure 5.9).

Figure 5.9: Syncing Maps from the Server

Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

5.4 Computer-Assisted Web Interviewing

Survey Solutions can be used as a computer-assisted web interviewing (CAWI) system instead of, or in addition to, using CAPI for data collection. The main difference between CAWI and CAPI is that the respondent will complete the questionnaire him or her self via a web browser, rather than being interviewed by an interviewer. There are two common scenarios related to setting up a CAWI survey:

- You have one contact person who will distribute your survey link for you.

In this scenario, set up one Supervisor account and one Interviewer account. Next, create one assignment for the sole interviewer, with quantity of "-1".

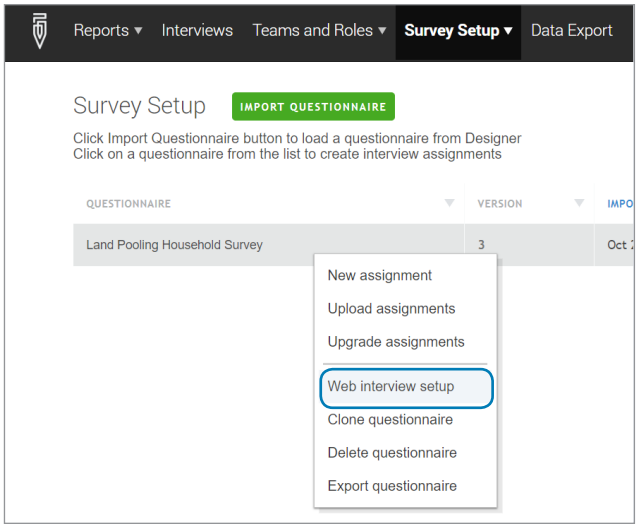
- You have a list of emails and names or other identifying information.

In this scenario, set up one Supervisor account, with an Interviewer account for each name in your list of potential respondents. Create a hidden question in the Designer app for the respondent's name, email address, or other identifying variables. Then create an assignment for each interviewer account, with quantity "1" and populating the hidden variables with relevant information e.g., name, email address.

Once one of these two scenario setups is complete with user accounts and assignments, go to the "Survey Setup" menu in the Headquarters app, click on the survey to be conducted using CAWI, then select "Web interview setup" (Figure 5.10).

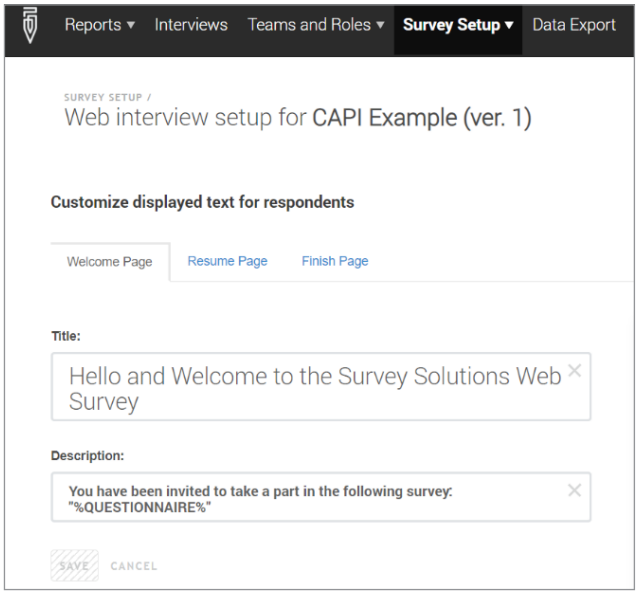
The next page in the system allows you to customize the headers and other messages for the web survey (Figure 5.11). The default settings are usually fine, although, if the web survey is running in a language other than English, you may wish to translate these pieces of text into your preferred language. If you plan to send your web survey via email, you can edit the invitation and reminder emails on this page also.

Figure 5.10: Setting the Survey for Web Interviewing



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

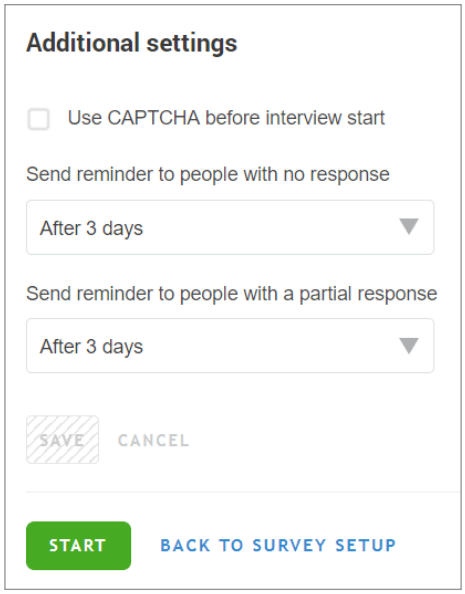
Figure 5.11: Customizing Text and Emails for Web Interviewing



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Under "Additional Settings", a checkbox can be selected if you would like respondents to complete a Completely Automated Public Turing test to tell Computers and Humans Apart (CAPTCHA) type authorization before starting the interview (Figure 5.12). Then press the green "Start" button at the bottom of the screen to enable CAWI mode.

Figure 5.12: Setting Spam Filters and Reminders for Respondents



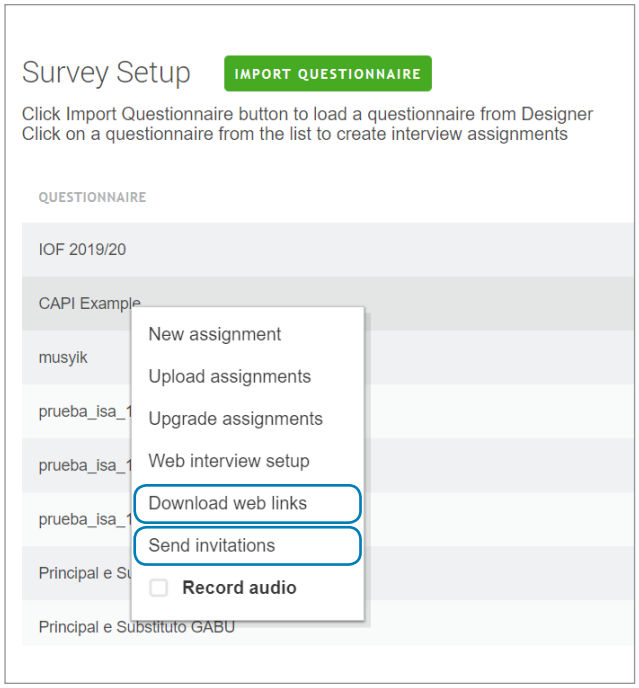
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The survey can be distributed either by email invitation sent through Survey Solutions or by downloading links and distributing through another means. To distribute via email invitation, an email address needs to be included in each assignment. To distribute the web survey, click on the survey name on the "Survey Setup" page of the Headquarters app, then select the desired method (Figure 5.13).

5.5 Randomizations

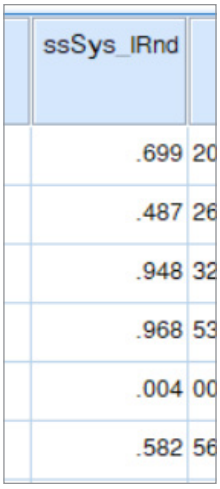
In some instances, a random selection will be required when creating a questionnaire in the Designer app. This function is useful for selecting a respondent at random, or for randomly displaying a question or questions to some respondents but not to others. For these purposes, each case in Survey Solutions will be assigned one random number, with its values ranging from 0 to 1 as shown in Figure 5.14. This random number is stored in the main data export, towards the end of the file with the variable name "ssSys_Irnd".

Figure 5.13: Distributing the Web Survey by Web Links or Email Invitations



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

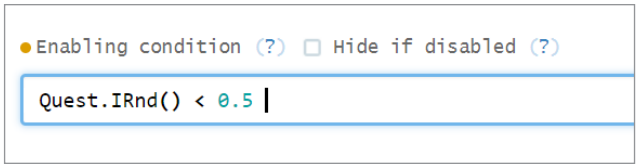
Figure 5.14: The Random Variable in the Designer App



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

To access this functionality in the Designer app, the reference "Quest.IRnd()" can be used along with a value to define the chance of a respondent being selected. For example, to show a question to half of the respondents, the enabling condition shown in Figure 5.15 could be used. The chance of selection could be adjusted by using "0.25" to display the question to one quarter of respondents, etc.

Figure 5.15: Using the Random Variable in an Enabling Condition



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

One thing to keep in mind is that there is only one random number per case, and this number will remain the same no matter how many times it is used. If multiple randomizations are required in a single questionnaire, a workaround would be to include extra hidden variables that contain a random number for each case.

5.6 Variables

Variables can be set up in the Designer app. These are used to store information to be populated automatically by the system, as opposed to being entered by the interviewer as an answer to a question. There are two purposes for using variables:

- For use in enabling conditions or text piping in the questionnaire.

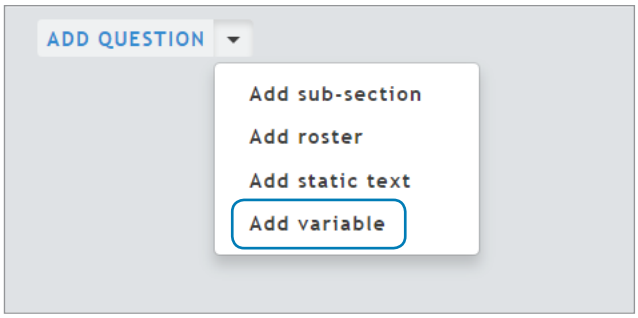
These can be called working variables in that they are used to assist in the functioning of the questionnaire.

- For use in analysis.

Variables created in the Designer app will be exported in the data files. In some cases, variables can be created specifically for use in analysis following fieldwork.

Creating a variable in the Designer app is similar to creating a question, except that "Add variable" is selected, as shown in Figure 5.16.

Figure 5.16: Adding a Variable in the Designer App

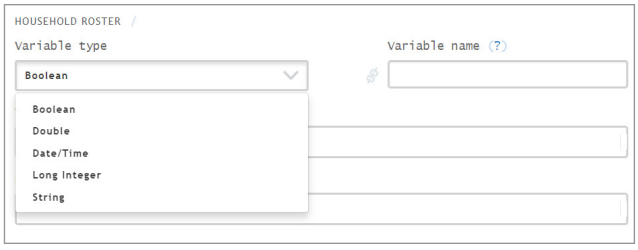


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

As with each question, each variable needs to be given an ID and a label, both of which will appear in the data file. There are several different variable types available in the Designer app (Figure 5.17). These variable types are as follows:

- Boolean: holds a binary value, true or false
- Double: holds a decimal-type value
- Date/Time: holds a date or time in the same format as date questions
- Long integer: holds a number without decimal places
- String: holds alpha and or numeric data.

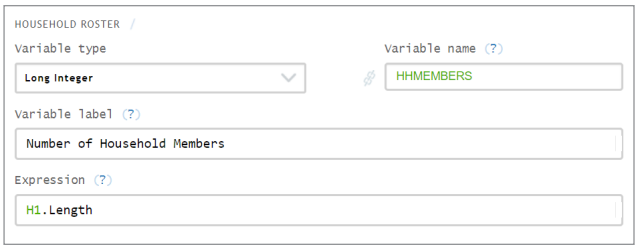
Figure 5.17: Setting the Variable Type



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

To set up a variable, some syntax needs to be written into the field expression. This can be the same type of syntax used in validations and enabling conditions, as well as C# language for more advanced functions. The example in Figure 5.18 creates a variable to hold the number of members in a household roster, where "H1" is the list question used to source the roster.

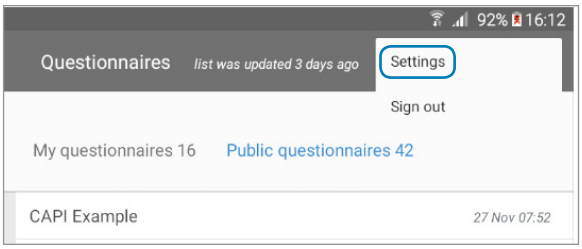
Figure 5.18: Setting the Variable Name, Label, and Expression



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The variable can be viewed using the Tester app, but not in the web-based version of the app. To show variables during testing, choose "Settings" from the menu in the top right corner of Designer's question editing panel (Figure 5.19).

Figure 5.19: Activating Variables in the Tester App

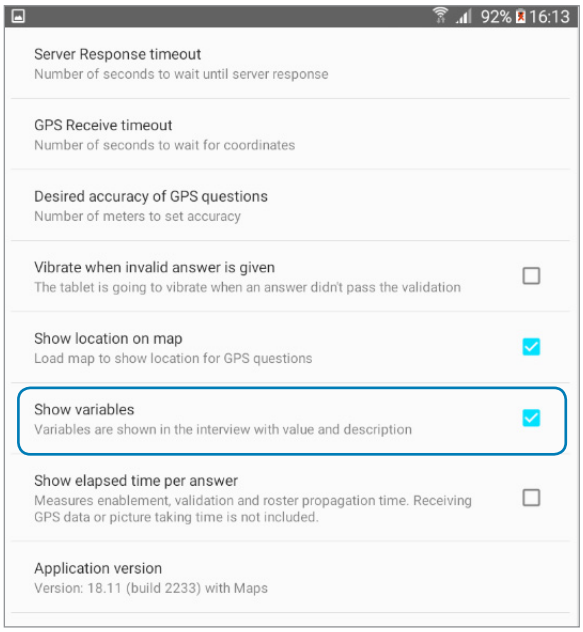


Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Ensure that the option to show variables is selected (Figure 5.20).

The variables will now be visible during testing, so users can check that they are working correctly. For example, at the bottom of Figure 5.21, you can see the number of members in the household roster.

Figure 5.20: Confirming Display of Variables for Testing



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Remember that these variables will not be visible to interviewers in the Interviewer app during fieldwork. If you would like the interviewers to be able to see the value of a variable, a piece of static text with text piping—"%VARNAME%"—can be used to display it in the Interviewer app.

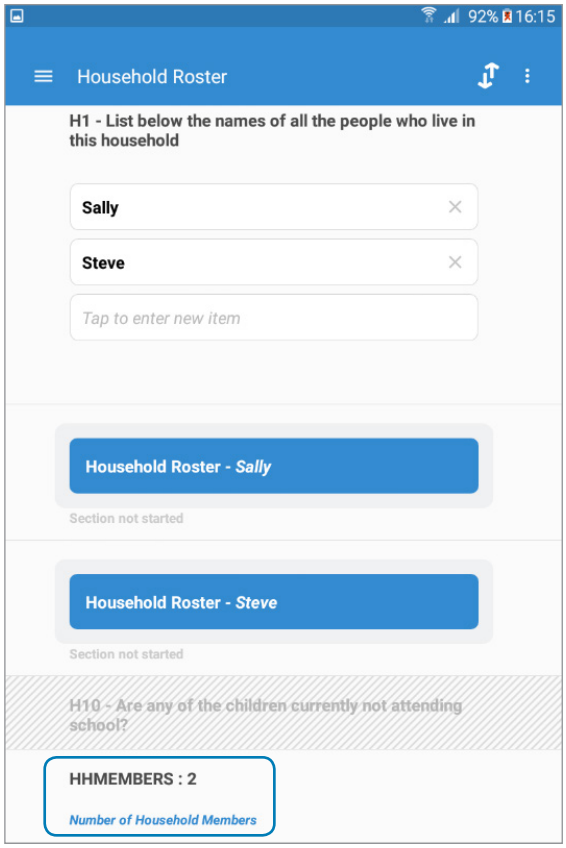
5.7 Help and Support

There is significant help and support available to Survey Solutions users. Simply visit the online Survey Solutions Support Portal, which can be accessed at https://support.mysurvey.solutions/

5.8 Syntax Guide

There is an almost infinite choice of enabling conditions and question setups that can be used for a CAPI survey. When facing difficulties in making an enabling condition or a validation work correctly, an excellent resource is the syntax guide contained in the Survey Solutions Support Portal (Figure 5.22).

Figure 5.21: Variables Visible during Testing



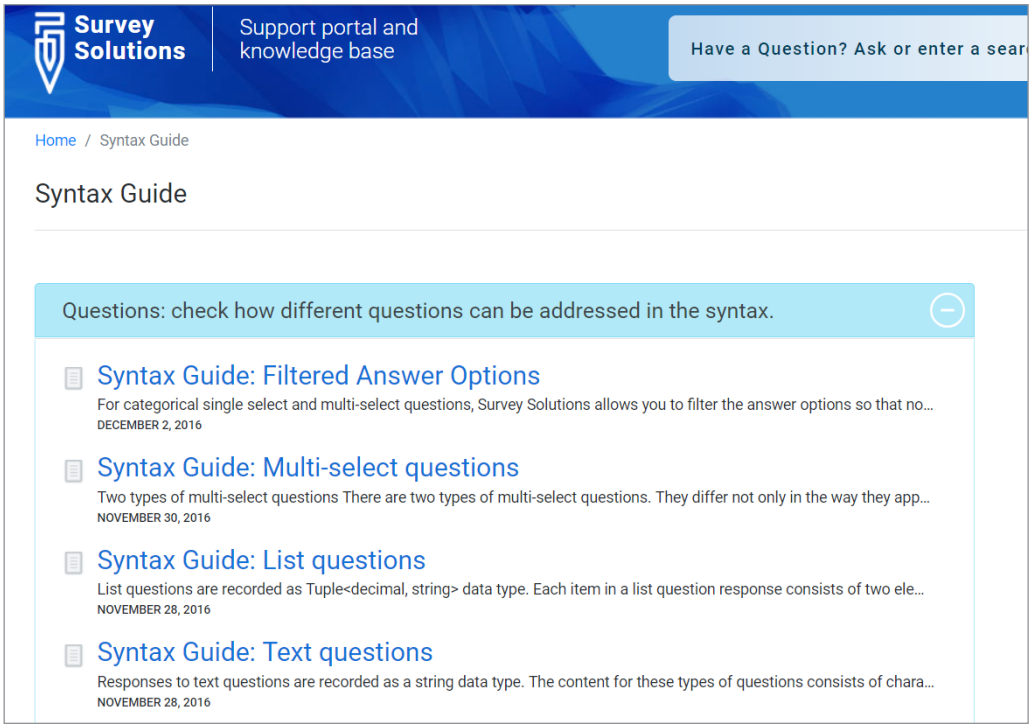
Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

The guide can be used to find all functions and working examples of different question types. To access these, press on "Syntax Guide" from the main navigation within the portal, or visit https://support.mysurvey.solutions/syntax-guide/.

5.9 Users Forum

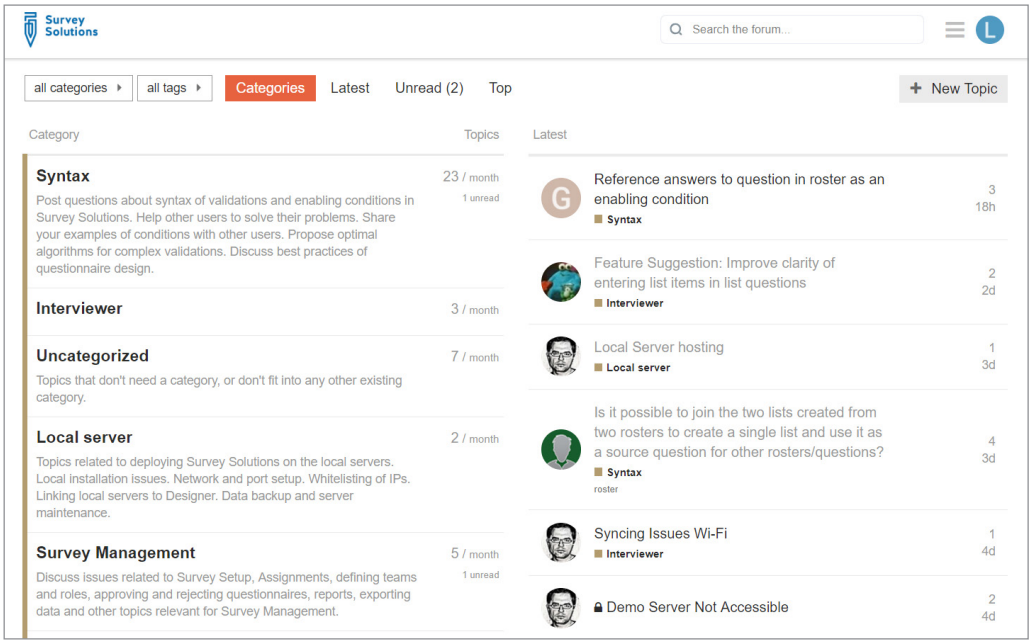
The Survey Solutions Support Portal contains a forum where users from all around the world can ask and answer questions about the system (Figure 5.23). If you have a problem that you are unable to solve, this forum can be a useful place to seek advice from other users who may have experienced the same problem. The forum can be accessed at https://forum.mysurvey.solutions/. Users can sign in using the same details as for the Designer app.

Figure 5.22: Survey Solutions Syntax Guide



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

Figure 5.23: Survey Solutions Users Forum



Source: Screen shot generated by Asian Development Bank consultant. 2018. Phnom Penh, Cambodia.

5.10 Updates and New Features

To ensure system efficiency and compatibility, new versions and updates of Survey Solutions are released almost every month. You can stay up to date by reading automated emails, which are sent with every new update, or by viewing the release notes through the Survey Solutions Support Portal.

Users can also suggest a new feature or functionality improvement to the Survey Solutions development team. To do this, a link is available on the main page of the support portal.

5.11 Contacting Technical Support

The technical support team at Survey Solutions can be contacted directly, but doing so is only recommended for serious technical issues, such as when the Headquarters app is not available online. The Designer app will go into maintenance mode from time to time, but this is not a reason to email for technical support.

References

Asian Development Bank (ADB). 2018. Screen Shot Generated by ADB Consultant. Phnom Penh, Cambodia.

_____. 2019. Screen Shot Generated by ADB Consultant. Newcastle, United Kingdom.

Survey Solutions. https://mysurvey.solutions/

_____. Support Portal and Knowledge Base: Technical Requirements. https://support.mysurvey.solutions/faq/what-tablets-should-i-buy-/

_____. Support Portal and Knowledge Base: Syntax Guide: Operators. https://support.mysurvey.solutions/syntax-guide/cslanguage/syntax-guide-operators/.

_____. Support Portal and Knowledge Base: Syntax Guide: Multi-Select Questions. https://support.mysurvey.solutions/syntax-guide/questions/syntax-guide-multi-select-questions/.

_____. Support Portal and Knowledge Base: Syntax Guide: System Generated Variables. https://support.mysurvey.solutions/syntax-guide/cslanguage/syntax-guide-system-generated-variables/.

_____. Support Portal and Knowledge Base: Syntax Guide: Using LINQ Expressions for Conditions in Rosters. https://support.mysurvey.solutions/syntax-guide/cslanguage/syntax-guide-using-linq-expressions-for-conditions-in-rosters/.

Conducting tablet-based field data collection with Survey Solutions

A Handbook

Conducting tablet-based field data collection with Survey Solutions: A Handbook is a joint initiative of the Asian Development Bank and the Food and Agriculture Organization of the United Nations to support national statistics offices and line ministries to develop human capacities to conduct tablet-based field data collections for official statistics in the Asia and Pacific region for more robust, accurate and timely data.

The adoption of tablet-based data collection methods, also referred to as Computer-Assisted Personal Interviewing (CAPI), is part of an overarching development in official statistics to adopt new cost-effective technologies to move from traditional pen and paper questionnaires to more cost-efficient, high quality and timely methods using electronic devices.

This Handbook seeks to support this transition by providing step-by-step instruction and guidance to develop, test and run CAPI field data collection using one of the free software's currently available on the market – Survey Solutions.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members —49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

About the Food and Agriculture Organization of the United Nations

FAO is a specialized agency of the United Nations that leads international efforts to defeat hunger.

Our goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. With over 194 member states, FAO works in over 130 countries worldwide. We believe that everyone can play a part in ending hunger.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Viale delle Terme di Caracalla
00153 Rome, Italy
www.fao.org

ASIAN DEVELOPMENT BANK
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org

ISBN 978-92-5-132180-5

9 789251 321805

CA7691EN/1/02.20