# Help - Collecting data - Android data collection

Below, please find topics relating to Android-based data collection (collecting data via tablets and mobile phones).

Using the SurveyCTO Collect app

Using the Internet browser on your Android device, navigate to **survey.wb.surveycto.com/collect** and click on the *Download Android app* button to download and install *SurveyCTO Collect*. When installing from a URL (rather than Google Play), you will often be presented with a warning and may need to enable the manual installation of apps on that device (enable *Settings... Applications... Unknown sources*).
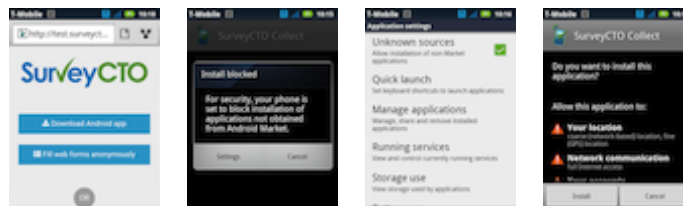

Next, run the *SurveyCTO Collect* app on that device. From the main Collect menu, click your device's menu button, then click *General Settings*. Change the server name to **survey.wb**. Also enter a username and password with which to login. If you haven't already created a user account with at least data-collection privileges, you can do so from the Configure tab of your SurveyCTO server console (scroll down to the *Your users* section and click *Add user*).
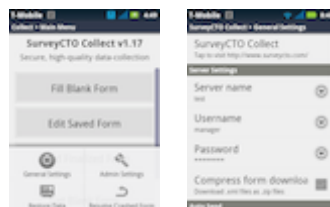

From this point, the Collect app should be fully ready for use. Back on the main Collect menu, you can press *Get Blank Form* to download copies of blank forms onto the device, then *Fill Blank Form* to fill out forms.
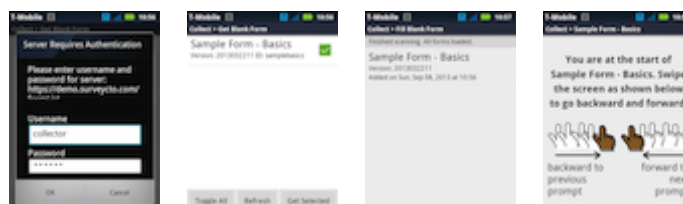
When you're filling out a form, you can click your device's back button to exit the form – with or without saving what you've entered so far. You can also click your device's menu button to change the current language (if the form includes multiple translations), or to jump forward or backward to another question in the form. When jumping forward, you will be able to skip required questions, but you will be constrained to only jump to questions that are currently *relevant*.
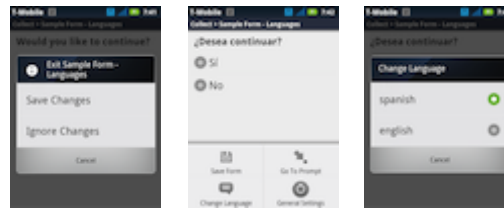

Once a form is fully filled out, you can check off *Mark form as finalized* before saving it. (If you would like the checkbox to default as checked rather than unchecked, you can configure that in the app's *General Settings* by scrolling to *User Interface* and marking *Default to finalized*.)
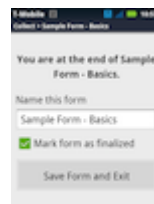
Finally, you can press *Send Finalized Form* to send one or more finalized forms to your SurveyCTO server. You can then keep track of how many submissions have come in on your server console's Monitor tab, and export, publish, or even start analyzing data from the Export tab.

If you prefer that finalized forms be automatically sent to the server whenever wi-fi or cellular data networks are available, you can return to Collect's *General Settings* and check *Auto send with Wi-Fi* and/or *Auto send with network* ("network," in this case, refers to a cellular data network).
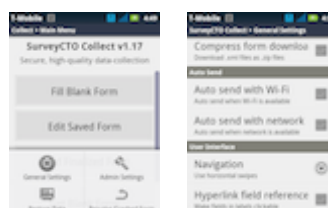
Choosing an Android device

For data collection, SurveyCTO supports a wide range of Android devices. To choose which one is right for your needs, consider the following factors:

1. **Cost.** Depending on where you intend to collect data, you may find it cheaper to purchase your devices out-of-country.

2. **Feature-set.** Your surveys can leverage the underlying capabilities of your chosen devices (e.g, to capture GPS coordinates, take photos or scan barcodes, record conversations, and transmit data

over cellular networks). You not only need to be sure that your chosen device has the requisite features, but that its quality meets your needs. For example, most devices have cameras, but some are poor at focusing and so are poor at scanning barcodes; others might have microphones, but poor audio recording quality.

3. **Battery life.** Device battery capabilities – both battery life and recharge time – range widely.

4. **Communication frequencies.** Different devices transmit and receive cellular data on different frequencies. If you are going to use sim cards to transmit your data over cellular data networks, you should make sure that your chosen devices support those frequencies supported by your cellular carrier(s) – particularly if you are going to purchase your devices out-of-country.

5. **Memory and CPU capacity.** The longer and more complex a form, the more memory and CPU capacity will be required for a device to handle it. Thus, you will need the power of your device to meet the needs of your particular surveys. Importantly, devices running versions of Android prior to 3.0 severely limit the amount of memory that any one app can access; from Android 3.0 on up, apps can access more memory – but the device itself still decides how much of the overall memory to allow one app to utilize. (See *Maximum form length* for more on this subject.)

6. **Fonts.** Some devices support non-Western UNICODE fonts, others do not. For example, in India, Samsung devices tend to support Tamil script; many other devices do not. (This is becoming less and less the case as newer devices tend to support a larger and larger number of common scripts.)

7. **Screen readability.** Make sure that your chosen device's screen is easily readable in the field. If your surveys will be conducted outside, you will want to be especially careful to choose a device with a good, anti-glare screen. (You may also be able to solve readability issues with some kind of case or screen cover.)

8. **Durability.** Some environments are more demanding than others. Generally speaking, you can pay more for more durable devices, or just buy extras and expect some to break. (You will want some extras in any case, for when devices become lost or broken.)

9. **Android version.** To operate fully, SurveyCTO requires Android version 2.3 (Gingerbread, released December 2010) or higher.

The only sure way to know whether a particular device meets all of your particular needs is to test it thoroughly with the survey forms you wish to implement – ideally, in circumstances that are as characteristic of your field setting and as realistic as possible.

Securely sending data via the Internet

Use the *Send Finalized Form* button on the main menu of *SurveyCTO Collect* to send finalized survey data to your SurveyCTO server. From your server console's Export tab, you can then export, publish, or even start analyzing that data. (If you are collecting sensitive data, be sure to read about encrypting your data.)

This, of course, requires that your device have an Internet connection – at least when you are transferring survey data from the device to the server (or retrieving blank forms from the server). Broadly, you have three options for Internet connectivity:

1. **2g/3g/4g cellular network.** If you put a sim card into each device and subscribe to an appropriate data plan, then each device will be able to upload data directly over a cellular network (when

available).

2. **Wi-fi.** Whenever your devices have access to a wi-fi network (e.g., in your field office), they can use that network to upload data. Alternatively, you could transport only the SD (memory) cards to your field office, insert them into a wi-fi-capable device, and upload data. That way, only the small SD cards – which contain all of the survey data – are transported to and from the field office. (This last option requires that your devices store their data on ejectable SD cards. See *Finding and safeguarding local device data* for more.)

3. **Tethered 2g/3g/4g cellular network.** An alternative option is to have just one device per team that has a sim card and data plan (perhaps the supervisor's device). This device can enable *tethering* to share its cellular Internet as a "portable hotspot"; as long as they are nearby, other team members' devices can then use this portable hotspot to send their data. Thus, everybody on a team can share a single cellular data connection.

Since no Internet connection is necessary when collecting data, it is typical to disable all communications (i.e., go into "airplane mode") in order to conserve battery power. Communications can be re-enabled when you are ready to transmit data to the server.

Depending on your SurveyCTO subscription, you may be able to pull data directly off your devices, without going through the server. See *Operating more fully offline (without the Internet)* for details.

Operating more fully offline (without the Internet)

It is best to always route data through your SurveyCTO server because it will safely aggregate data from multiple devices; the server will eliminate duplicate submissions, back up the data, ensure that changes in form versions are safe, and provide a consistent body of data to those who download and export it. In short, routing data through your SurveyCTO server is the safest, least-complicated way to collect data.

Other data flows are possible, however, which partially or fully bypass the need for a server. (With your current SurveyCTO subscription, advanced offline features are: **Supported**. To learn more about your current subscription and options for upgrades, vist the *Manage Subscription* section of the SurveyCTO website.)

Instead of pushing data from devices to the server (i.e., into the cloud), you can instead push data from devices directly onto laptops or desktop computers. Once on a computer, that data can be exported – and it can also be pushed to the server, or even to other computers that are aggregating the data in lieu of the server. Because data can pass from devices to computers and then from computers to other computers and/or the server, many workflows are possible.

Using local wi-fi networks for offline data transfers

To share data while offline (i.e., without an Internet connection), there is one key requirement: devices and computers must be connected to the same wi-fi network. This means that there must be a wi-fi router that acts as a connection between the relevant devices and computers.

Most Android devices and many computers can act as a "wi-fi hotspot," which means that they can act as a wi-fi router for other computers and devices. Thus, rather than having a separate wi-fi router to which your devices and computers connect, you might be able to use an existing device. However, please note two caveats:

1. Some devices and computers will not act as wi-fi hotspots unless they have an active Internet connection that they can share. Macs running newer versions of OSX have this property, for example:

they will not act as a hotspot unless there is a working Internet connection. Computers running Windows 7 and later, however, can use Microsoft Wireless Hosted Network to create a hotspot even when offline, and many Android devices do not require an Internet connection. Key takeaway: if you are planning to use a computer or mobile device as a hotspot, be sure to first test its capacity to work without an Internet connection.

2. A device acting as a wi-fi router will not itself be able to send or receive data; if you use a mobile device as a hotspot, you will not be able to transfer data from the *SurveyCTO Collect* app on that particular device. In other words, if a device is acting as the router, it can't also participate in the wi-fi network it creates.

Ultimately, your best and easiest option may be to buy one or more little "travel routers" that can act as local hotspots. For example, the *HooToo Wireless TripMate Nano Travel Router* costs $20 (at the time of writing) and provides an easy-to-use USB hotspot; the computer hosting the hotspot and any nearby devices can share the same wi-fi network and thus transmit forms and data to each other. And innumerable other wi-fi router options exist, of course.

Using SurveyCTO Sync as a local server

When you are operating offline, the software that receives, aggregates, and stores your data is *SurveyCTO Sync*, the same software you usually use to download and export data. In advanced offline uses, Sync receives data directly from devices, aggregates it, and stores it – then exports it and/or forwards it along.

To act as a local server:

1. Connect your computer to a local wi-fi network.

2. Run *SurveyCTO Sync*.

3. From the *Tools* menu, select *Sync via local wi-fi network*.

4. If your OS or firewall software issues a pop-up warning, be sure to authorize (or "whitelist") Sync so that it can receive HTTP connections. If you do not authorize it, your OS firewall may prevent any incoming connections from reaching Sync. (In your firewall configuration, you will need to add an inbound rule to allow javaw.exe to accept incoming connections on port 7968, and you will need to delete any rules explicitly blocking javaw.exe from accepting incoming connections.)

Devices and other computers can then exchange forms and data with your computer – as long as the *Wi-fi sync enabled* window remains open (i.e., do not close that window until you are done transferring data).

When Sync is acting as a local server, it can provide any form definition available in its local storage for form updates or *Get Blank Form* requests. Form definitions become available in local storage in one of three ways:

1. Any time Sync is used to download data from the SurveyCTO server, the latest form definition is also downloaded and installed in local storage.

2. Any time a device or computer sends submissions directly to Sync over a local wi-fi network, it also sends its version of the form definition. If there isn't already a copy in Sync's local storage – or if the local copy is older – then the version from the device is automatically saved.

3. Any time you validate a form definition using Sync's offline-validation support and then click the button to save the form in local storage, the newly-validated form is installed locally.

The last of these options, offline installation of a new form definition, allows for easy revision of survey forms even when you're in the field.

Connecting devices to the local server

To get forms and/or send data to a local server:

1. Connect your device to the same local wi-fi network as the computer acting as your local server.

2. Run the *SurveyCTO Collect* app.

3. From the main menu, press your device's menu button and choose *Local Wi-fi*. Collect will automatically find the local server and connect to it (see the section above for how to start a local server).

4. Once connected, click *Get Blank Form* and/or *Send Finalized Form*.

5. When finished, click the option at the top of the main menu to disconnect from the local server.

Please note that if you have the Collect settings enabled to automatically download form updates and/or automatically send finalized forms, Collect will auto-download and auto-send as soon as you connect to the local server.

Please also note that submissions successfully sent to the local server will disappear from the *Send Finalized Form* list. To see your completed forms listed again – and to have the option to re-send them to a different server – press *Send Finalized Form*, click your device's menu button, choose *Change View*, and then select *Show Sent and Unsent Forms*; all previously-sent submissions will then re-appear in your list of finalized forms.

Exporting data

Once you have received data in Sync's local storage, you can always export that data to review it. Just run Sync, then select *Local* as the data source and *Local CSVs* as the data destination. You will be able to export data as usual – with the full range of export options supported by SurveyCTO – only your data will be exported directly from the local storage rather than first retrieving new data from the server.

Connecting other computers to the local server

You can push data from one computer running Sync to another computer running Sync:

1. Connect your other computer to the same local wi-fi network as the computer acting as your local server.

2. Run *SurveyCTO Sync*.

3. Select *Local* as the data source to transfer data from local storage.

4. Select *Server* as the data destination.

5. Check the *Sync on local wi-fi* checkbox to the right of the server name box.

6. Press *GO!*, select the forms for which you would like to send data, and press *GO!* again to send the data. Sync will automatically find the local server and connect to it (see the section further above for how to start a local server).

All selected form data that is in local storage will be sent to Sync, which will automatically add the incoming submissions to those it already has in its local storage (automatically eliminating duplicates).

Sending aggregated data to the SurveyCTO server

If you wish, you can also push data from a computer's local Sync storage up to the SurveyCTO server. This is the opposite of the regular data flow, but it may make sense if (a) you are using the server to aggregate data collected by one or more laptops, and/or (b) you still want partners or collaborators to be able to download or otherwise access data via the server (e.g., when a subset of data is published to Google Sheets). To push data from local Sync storage to the server:

1. Connect your computer to the Internet.

2. Run *SurveyCTO Sync*.

3. Select *Local* as the data source to transfer data from local storage.

4. Select *Server* as the data destination.

5. Enter your server name **(survey.wb)** , username, and password into the boxes provided.

6. Press *GO!*, select the forms for which you would like to send data, and press *GO!* again to send the data.

A word of caution

Many complex workflows are possible involving many moving parts. Once you begin using advanced offline support, there become more opportunities for people to become confused and for data to become misplaced. You should think carefully about how to track your data so that nothing gets lost or misplaced.

There are redundancies built into the system (e.g., after being sent, copies of sent submissions remain on devices), but you can also add redundancies of your own. For example, if you have two laptops in the field, you might aggregate data from your devices onto one laptop, then also send that data to the second laptop – just in case. Both Sync and the server will automatically avoid duplicating data, so you don't have to worry that pushing overlapping data will ever cause any kind of problem.

Finally, be sure to always make back-ups of any data that you download and/or export.

Managing device settings

When configuring your Android devices, there will be a number of settings that you'll want to consider, both within *SurveyCTO Collect* and for the device overall:

1. **Collect's general settings.** From the main Collect menu, you can click your device's menu button and then choose *General Settings* to find a range of options, including how large text should be. You'll want to set all of those settings according to your particular needs.

2. **The device's locale settings.** You will want to configure the overall device to respect the appropriate language and regional settings.

3. **The device's GPS settings.** If you will collect GPS locations, you will also want to configure your device's GPS support. Often, searching the web with a query like "GPS settings for x" (where "x" is the make and model of your device) will yield a variety of helpful tips from other users.

4. **The device's camera settings.** If you will collect pictures, you will definitely want to reduce your device's camera resolution to a more reasonable level. Modern devices default to taking super-high-resolution photos that are stored in super-large files that, when attached to your data, will make that data very difficult to send. For example, if you take just 2 photos with each survey and conduct 50 surveys, that would require transmitting 100MB if each photo is 1MB in size.

<u>Restricting user access</u>

You will probably want to use some kind of app to prevent users from changing your overall device settings, installing new apps (like battery-draining games), or surfing the Internet. Search *Google Play* for "app blocker" for a wide range of options.

Then, once you have configured *SurveyCTO Collect* the way you want it, you may also want to restrict the actions that users can take when they use it to fill out surveys. Most commonly, you may want to prevent users from changing certain settings.

To control what users can and cannot do, press your device's Menu button from the main Collect menu, then choose *Admin Settings*. From there, you can set an *Admin Password* to restrict who can alter the overall administrative settings.
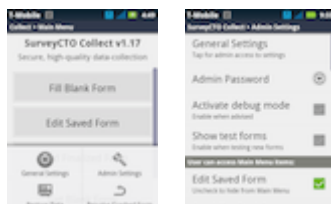
Below the password setting, you will find a series of checkboxes with which you can control the following:

1. **Which main menu options will appear to users.** It might be wise, for example, to disable the option to delete saved forms (since there's generally no harm that can come from leaving copies of forms on the device and much harm that can come from deleting the wrong thing).

2. **Which settings users can modify.** You might, for example, disable all settings except those having to do with navigation or font size. In particular, you may want to disable users' ability to take high-resolution video, which would occupy considerably more storage space and take a long time and/or require a high-speed connection to upload.

3. **Which options are available to users when they are filling out forms.** You might, for example, prevent users from using the "Go To Prompt" option to jump forward or backward in the survey.

As soon as you change the settings, you can review the changes by navigating to the main menu or to the *General Settings*, or by filling out a blank form. You can change the access settings at any time by simply going back into *Admin Settings* (and supplying the password if you set one).
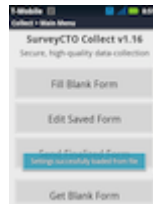
<u>Copying device settings</u>

Once you have the settings just the way you want them on one device, you may want to copy those settings to other devices so that you don't have to manually enter all of the settings on every device. You can do this by following these steps:

1. Save your desired settings to a file. Press your device's Menu button from the main Collect menu and choose *Admin Settings*. Enter your admin password (if any), then click your device's menu button again and select *Save Settings to Disk*. This will save all of your current settings to the */SurveyCTO/settings/collect.settings* file on your device's SD card.
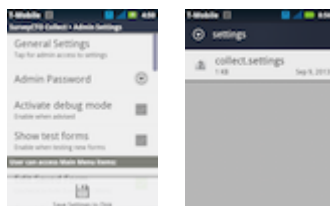
2. Copy that *collect.settings* file to your computer or to another location. (How you access the SD card and copy its files will depend on the device.)

3. Once you have installed *SurveyCTO Collect* onto another device and run it at least once, locate the /SurveyCTO directory on its SD card.

4. Copy the *collect.settings* file into the device's existing /SurveyCTO directory.

5. Run *SurveyCTO Collect* on the device and confirm that it has loaded all of your settings; when it finds the *collect.settings* file at start-up, Collect will show a small message to indicate that it has restored saved settings. If your settings are not restored when you run Collect, use your device's Task Manager to end the *SurveyCTO Collect* app, then run it again (or, alternatively, restart your device).

You can repeat this process to copy the same configuration to all of your devices. That way, you can ensure that they are all configured in exactly the same way.

Copying both forms and settings

If you want to copy *everything* from one device to another – including saved forms – then you can copy the entire */SurveyCTO* directory tree from your model device, copy the *collect.settings* file from */SurveyCTO/settings* into */SurveyCTO*, then copy that entire directory tree onto another device's SD card. You can even copy the */SurveyCTO* tree onto a new device before *SurveyCTO Collect* has been installed onto it; in that case, you can install Collect and the first time it is run it will inherit all settings and data from the copied directory.

If you start copying */SurveyCTO* directories around, the one thing you need to be careful about is to never combine the contents of multiple devices' */SurveyCTO* directories. So before pasting in a new one, always delete the old one if there is already one present.

Un-selecting a radio button

Once you select a response to a *select_one* question, you can easily change the response by clicking on a different radio button.

If you want to un-select the current response without selecting another (i.e., if you do not want to respond to the question at all), you can press and hold on the currently-selected option. After holding for two seconds, a pop-up will offer you the option to remove the response.
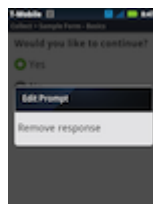
Troubleshooting

If you are having trouble contacting the server – either to download blank forms or to upload finalized forms – double-check your settings. From the main *SurveyCTO Collect* menu, press your device's menu button, then press *General Settings*. Verify that your server name, username, and password are all correct. If they are, use your device's Internet browser to confirm that your Internet connection is working well.

If your form takes a long time to load, you may need a more powerful device (i.e., a device with a faster CPU and maybe more memory). Bear in mind that Collect will typically take much less time to re-load a form after it has been loaded once. Also, you can always consider splitting a very long form into multiple pieces linked with a unique ID or even a scanned barcode. (See *Maximum form length* for more on this subject.)

If your device is acting funny, you should first try restarting it to see if that fixes the problem. (Very occasionally, Android devices just need to be restarted.)

There are two primary reasons why Collect itself might crash:

1. **An error in the form.** If Collect always crashes at the same point in your form, it is likely caused by some kind of error that was not caught when the form was uploaded to the server. The timing of the crash is your best clue as to where you might find the error. If the crash always happens moving forward from a certain question, scrutinize your form's workbook for the last working question (e.g., there may be an error in its *constraint* expression), for any subsequent questions that may be skipped (e.g., there may be errors in their *relevance* expressions), and for the next question that may be displayed. See *Debugging form errors* for additional troubleshooting tips.

2. **Insufficient memory.** If your form is long and Collect crashes while loading the form or intermittently while you are filling it out, you may be bumping up against your device's memory limits. In order to confirm that this is the problem, try testing the form on a more powerful device that has more memory. If this is the problem, you can either upgrade your devices or shorten your form. One way to shorten your form is to split it into multiple pieces linked with a unique ID or even a scanned barcode. See *Maximum form length* for more.

When you fill out a survey form with Collect, it saves your data as you go along. If you run out of battery or Collect crashes in the middle of a survey, don't worry: you won't lose any data. In the event of an abnormal termination, Collect offers to resume where it left off the next time you select the same form to fill out (or revise); if for any reason Collect does not auto-resume, you can go to the main Collect menu, press your device's menu button, and select *Resume Crashed Form*.

If you experience a failure of your device or SD card, see *Finding and safeguarding local device data* below.

Finally, if you have contacted SurveyCTO support and have been asked to submit a crash report: click your device's menu button from the main Collect menu, select *Admin Settings*, then click your device's menu button again and select *Submit Crash Report*. A report will be sent directly to SurveyCTO support staff. (But keep in mind that you will need a working Internet connection to send the crash report.)

Finding and safeguarding local device data

SurveyCTO Collect stores its settings in your device's internal storage, and it stores forms and data primarily on an external SD card. (Android will also allow you to install the Collect app itself onto external storage, but this is not recommended. It is better to keep the app installed on internal storage.)

Since many newer devices support multiple external SD cards – one or all of which tends to be non-removable – the actual location of form and data storage can differ depending on the device. Once you have installed and run Collect at least once, you can use a file browser on your device to locate the */SurveyCTO* directory; it will be at the root of one of your device's storage locations. All forms and data are stored in that directory.
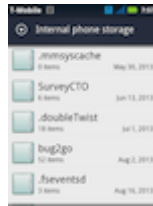

Unfortunately, removable SD cards occasionally fail. In order to safeguard against data loss in the case of an SD card failure, SurveyCTO can automatically maintain a backup of all finalized form data on your device's internal storage.

In Collect's settings (from the main menu, press your device's menu button, then *General Settings*), you can configure the number of days worth of data you wish to maintain in the internal storage backup. The default setting is to keep copies of finalized form data for 14 days in the device's internal storage. You can change this default to whatever number of days you prefer, with 0 indicating that you want to disable these internal backups altogether.
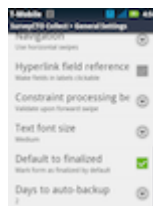
If you do experience an SD card failure and lose your form data, just insert a new SD card, run Collect, press your device's menu button, and choose *Restore Data*; if you don't see the *Restore Data* option, click *Admin Settings* instead, scroll down, and enable the *Restore Data* option first. After restoring, you can upload the restored data to the server. (However, in order to edit or fill out any new forms you will need to select *Get Blank Form* to re-download the form definitions from the server. Blank forms are not backed up locally.)
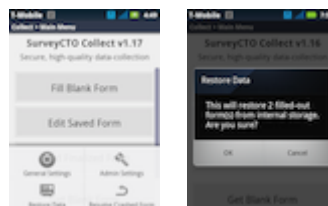
If you would like to simulate an SD card failure before deploying your survey, follow these steps: (1) stop Collect from running (using your device's Task Manager app), (2) use your computer or an on-device file manager to delete the entire */SurveyCTO* directory from your device's SD card, and (3) re-run Collect.

If your actual device fails and your data is stored on a removable SD card, then just remove the SD card from the failed device and insert it into a working one. All forms and data will go with the SD card.