CERC Health Equity & Community Wellbeing Training

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A regional partner of the Digital Research Alliance of Canada

Note: the following REDCap slides are taken from Intersect Australia's [Data Capture & Survey modules]

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A brief overview of REDCap for those new to it..

REDCap (Research Electronic Data Capture) is a mature, secure web application for building and managing online surveys and databases. REDCap was developed by Vanderbilt University Medical Centre in 2004, and is now used in more that 7000 institutes, universities, hospitals and government departments in more than 150 countries. It is actively developed by its core development team based at VUMC, supported by a global consortium of partner organisations who report bugs, suggest features, and contribute code.

What is REDCap?

REDCap was developed specifically to collect and manage personal health and medical data, for clinical trials and other human-related projects, and so security and participant privacy is core to the application. We will see a number of features that go to the heart of this, including:

- Full logging and audit trail
- Ability to mark fields as Identifiers
- De-identification options for collaboration and export
- Secure data sending capabilities

What can REDCap do?

At its simplest, REDCap can be used to build a database for inputting data in a number of different forms. Individual forms may also be enabled as surveys allowing data to be entered by survey participants. In more complex projects, a mixture of data collection forms and surveys can be used, with longitudinal data collection enabled, allowing REDCap to collect and manage participant data for longitudinal research projects.

Demystifying the interface

Home: Returns to this home page

My Projects: Lists all projects you have created or have been added to

New Project: Create a new project

Help & FAQ: Useful information in a searchable interface

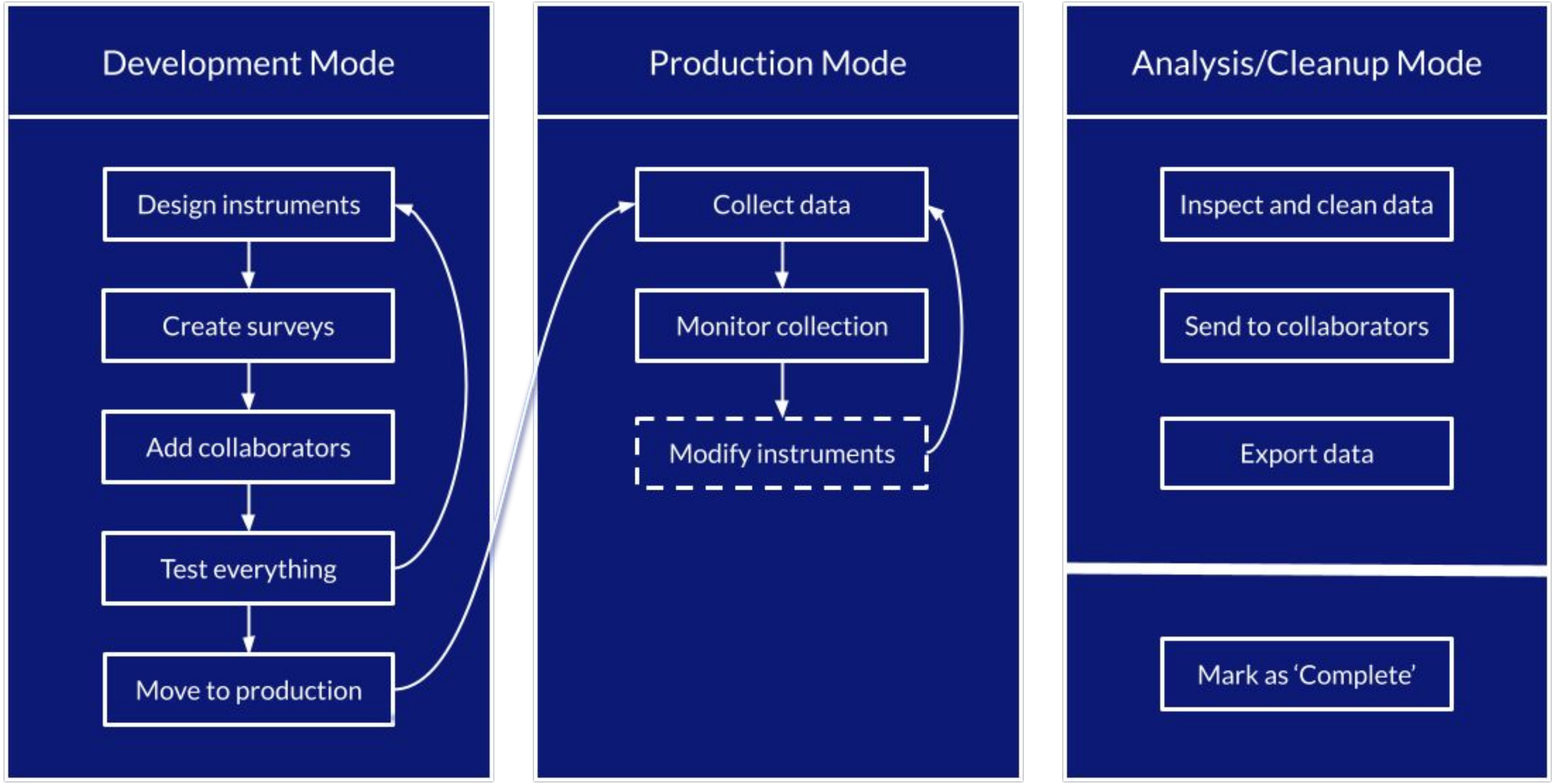
Training Videos: Instructional videos about various parts of the application

Send-It: An application for secure sending of data to collaborators

REDCap Project Workflow

When working with REDCap, there is an important workflow that must be followed, which ensures that data is collected properly and is not accidentally erased. The workflow consists of the following modes of a project:

- Development mode
- Production mode
- Analysis/Cleanup mode



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Source

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REDCap storage limits

1. Send-it secure file transfer: **20 MB limit**

2. File Repository (per project)
   a. Individual file upload limit: **20 MB**
   b. Can be increased

3. File Repository (across full platform): **50 GB**
   a. Can be increased

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Creating a survey for a research project

- Click the **New Project** button and you will be asked for a project title and purpose.
- You can give additional details in the **Project Notes field**, which will display under a tooltip on your My Projects page.
- Select a **creation option**. REDCap offers several templates for various types of studies.
- Another option is to create a project from a **REDCap project XML file**. This option is useful if you have colleagues who have created a project and have exported it as an XML file.

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Project setup

The most important part of this page is the left sidebar. The sidebar contains the following sections:

- The topmost section
- Project Home and Design
- Data Collection
- Applications
- Data Import Tool
- Data Export
- File Repository
- User Rights
- External Modules
- Help & Information

Project setup page

While your project is still in Development, this is the default page that you navigate to. It shows you the steps you need to go through before you can move your project to production and start collecting data. The steps are:

1. Main project settings
2. Design your data collection instruments
3. Enable optional modules and customizations
4. Set up project bookmarks
5. User Rights and Permissions
6. Test your project thoroughly
7. Move your project to production status

Enabling surveys

Under Project Setup > Main Project Setup > Enable Use surveys in this project??

You might notice that with surveys now enabled, you can see Survey Distribution Tools has appeared in the left sidebar.

Accessing and managing the File Repository

The File Repository allows users to store, organize, and share files used for this project. Folders and subfolders can be created, and there is no limit to the number of folders that can be created or the number of files that can be stored within them.

If you are using Data Access Groups or user roles in the project, you may limit access to a new folder so that it is DAG-restricted and/or role-restricted. All deleted files will go to the Recycle Bin where they can be restored/undeleted for up to 30 days, after which they will be permanently deleted.

Designing data collection instruments

Designer

1. Go to Project Home and Design > Designer
2. Let's create an instrument from scratch by clicking on "Create."

The first instrument contains a single field, called Record ID. This is a special field that must exist on the first instrument in the project. The Record ID value is used as the primary key in REDCap's database, and ensures data integrity across the project. REDCap automatically handles adding data to the database using this field. You cannot move this field, and you are limited as to how you can modify it.

Variable names

It is important that your variable names are:

- Easy to remember
- Meaningful
- Short

There are rules for variable names: they can only contain lowercase letters, numbers, and underscores, and they must start with a letter.

The reason for these rules is so that REDCap is consistent with the common programming languages that researchers use to analyse their data, such as R and SPSS.

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Radio or dropdown fields

We use **radio** or **dropdown** fields when we have a set of known options that the participant can choose from. In the case of provinces (or territories) of Canada, there are 13 possible options.

The difference between a radio and a dropdown field is that a **radio field displays all options** and the user clicks the right one, and a **dropdown hides the choices in a drop-down menu**, and the user opens the menu and selects the right one.

Generally, **you would use a radio field when you only have a few options to select from**, and a **dropdown field when you have too many to display all at once**.

Identifier fields

Any time you create a variable that might store personally identifiable information, you should mark it as an identifier field in the data dictionary. The reason for this is that REDCap can automatically treat values in identifier fields differently; it can be configured to automatically redact them in data exports, and you can allow collaborators to have access to your project but prevent them from being able to export identifiers.

This is one of the many features that REDCap offers for securely managing participant data.

Selecting “other”

When someone selects ‘Other’ for an answer, we want them to be able to enter their answer manually. To do this, we will create a text field, and **we will use Branching logic so that it only appears in the right circumstances**.

- Create a text field with a label ‘Please Specify’, and a variable name province_other. If you like, you can also make it required. Then save it.
- To add branching logic to this field, click the **green branching icon** on the online designer.

There are two ways to compose this logic:

1. Drag-and-drop logic builder
2. Advanced syntax

Data Dictionary

Using the online designer can be time consuming if you have lots of changes to make. Luckily, REDCap provides a way to make bulk changes outside of REDCap in an application like a text editor or spreadsheet editor, using the data dictionary.

The data dictionary is a CSV representation of all of the fields in your project; their label, field type, choices or calculation equation, validation, branching logic, action tags and more.

As it is a CSV file, you can export it from REDCap and edit it directly in your favourite spreadsheet editor, before uploading it to REDCap again.

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Enabling surveys

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Enabling instruments as surveys

REDCap is a little different from regular survey applications like Qualtrics, Survey Monkey or Google Forms. In those applications, one ‘project’ is one survey.

In REDCap, surveys are specific to each instrument. Individual instruments can be enabled as surveys, meaning you can build a single project with multiple surveys. And since not all instruments must be enabled as surveys, you can have a hybrid project comprising some surveys and some data entry forms.

Go to the Online Designer, and look for the button on each instrument, to enable it as a survey.

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Survey settings

Enabling each instrument as a survey will open that instrument’s Survey Settings page. You must review and save these settings in order for the instrument to become a survey.

Check the option to Auto-Continue to the next survey. This will mean that upon completion of this instrument, the participant is automatically forwarded to the next instrument that is enabled as a survey.

Piping

To pipe values, all you need to do is reference the variable name in square brackets.

We can use piping in various places in REDCap; in field labels, choices, field notes, survey instructions, in fact just about anywhere you can think of where you configure any text, you can probably pipe values into it.

Look out for the **‘How to use piping here’** links to read more thorough information about piping.

Testing for user experience

Once all of our instruments are enabled as surveys, and each is configured to auto-continue to the next upon completion, we can now test our project. REDCap has no specific ‘test’ method; instead, we will open it up using the public survey link.

Modify based on testing

Most people test their REDCap surveys by emulating a survey respondent that does everything properly. But this is fundamentally wrong. ***Thorough testing involves emulating a respondent who does things incorrectly***. Try to break the survey by:

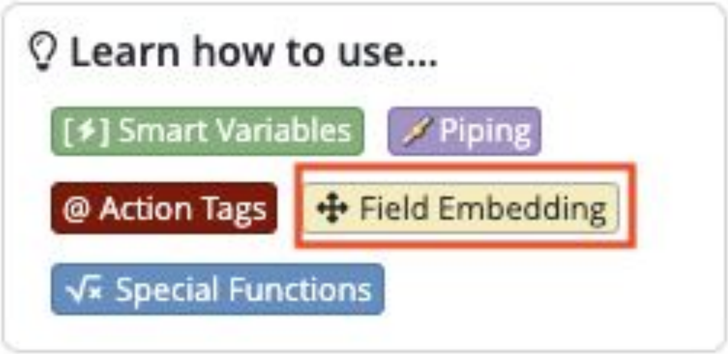
- answering ‘No’ to consent questions and seeing what happens
- deliberately ignoring the instructions and entering rubbish data
- trying to enter bad data, like words instead of numbers, dates in the wrong format, badly formatted email addresses, or negative values when positive values are expected.

Action tags

Action Tags are annotations that you can add to specific fields to alter their behaviour. There are a range of available action tags available to do a variety of different things, including hiding things, pre-filling values, or setting placeholder text in a text entry field.

You can explore the action tags using the red Action Tag help button in the Online Designer.

Field embedding



Field Embedding allows you to reposition field elements on a survey page or data entry form so that they get embedded in a new location on that same page. This is as simple as referencing the field you wish to move with its variable name in curly braces {field}, wherever you would like to place that field.

You can read more about field embedding and see helpful examples in the documentation, by clicking the yellow Field Embedding help button in the Online Designer.

Distributing surveys via anonymous URLs

The anonymous URL is a link that can be used by anyone to access the survey. You can distribute the anonymous URL in any way you like; social media, via email to a list of people, or a shortlink or QR code on a flyer. The anonymous URL will not track any personal information about the person who clicks the link; this is what makes it anonymous.

It also means that you cannot limit who takes your survey, so if you put the link up on social media, or if someone who finds the link passes it on to someone else, then you may have many more people than you anticipated taking your survey.

Distribute surveys via participant list

If you have a list of known individuals that you would like to invite to complete your survey, for example if you are creating a survey for a class of students, your colleagues, the members of a professional society, or some other known group, then you will want to use the Participant List to add them to your project, send survey invitations to them, and have REDCap track who has completed, and who has not.

In the Survey Distribution Tools page, click the Participant List tab. You should see a few ‘participants’ already. These correspond to any survey completions via the Public Survey URL; each time you opened the survey previously.

Record Status dashboard

Let's take a whole-of-project look at what data exists in the project. Click on the Record Status Dashboard in the left sidebar. You should see a table of records with an status icon against each instrument in the project.

We are able to see how many participants have completed the survey(s), which data instruments they completed, and any data instruments that are incomplete (i.e. participant exited survey or declined to consent).

Reports

Reports provide a means to retrieve a large amount of data from our project and display it all at once.

Navigate to the Data Exports, Reports and Stats section in the left sidebar, and you'll notice there are two built-in reports.

- **Report A, the All Data report**, is the quickest way to see everything in the project in a single view.
- **Report B, Selected Instruments**, can be used to run up a quick report on a subset of our instruments.

Custom reports

Most often, these built-in reports won't be sufficient for our needs. They may still return too many fields, and it might be that we want to filter down to only certain records that match some logic.

Go back to the Data Exports, Reports and Stats page, and click the 'Create New Report' button.

After entering a name (choose something simple), an optional description, we can also select which users and user roles that we want to be able to view and edit the report.

Exporting data

Being able to add and view reports is useful, but we usually want to perform some data analysis outside of REDCap. To do this, we will need to export our data.

Exporting data is something that pertains to reports; a report may be exported. If you want to export the entire dataset, you would export the All Data report.

Go back to the **Data Exports, Reports and Stats page**, find the **All Data report**, and instead of clicking ‘View Report’, click ‘**Export Data**’. A dialogue will open with some export options. Select the ‘CSV / Microsoft Excel (raw data)’ option, and click ‘Export Data’.

Deidentifying data exports

Option	Description
Remove all identifier fields	Any field that has been marked as an identifier in the online designer will **not** be included in the exported data.
Hash the Record ID field	The Record ID field will be modified to an unrecognisable value, and this change cannot be reversed.
Remove unvalidated text fields	Any text field that does not have a validation type (like our `[state_other]` field) will not be included in the exported data, since someone might use it to enter something identifiable.
Remove Notes/Essay box fields	This is a field type we haven't seen yet, but it allows the user to enter a longer block of text, and as with the unvalidated text fields, it might contain identifying information.
Remove all date and datetime fields	Any date and datetime field will not be included in the exported data, in case these could be used with internet access logs (library computer use logs or phone records) to re-identify an individual.
Shift all dates by value between 0 and 364 days	Include dates, but shift them by the same amount of days per record. This is very useful if you need to retain the relative interval between dates but want to obscure the actual dates.
Also shift all survey completion timestamps by value between 0 and 364 days	As above, but specifically for the survey completion timestamp.

Sending REDCap data securely to others

Personal information about your study participants should never be sent over email. REDCap provides a way to send data securely to others, such that instead of attaching the data to an email; the recipient is sent a link that they can click to access the data directly from the REDCap server.

When generating data exports, there is an option, just prior to finally downloading the data, to send the data using the **Send-It application**. Send-It is a tool that comes built-in to REDCap that allows you to securely send data to collaborators who don't have access to the REDCap application.

User privileges

Option	Description
Expiration date	Date on which this user's access will be automatically expired, for example the end of their engagement with the project.
Project Design and Setup	Allows the user to access the Online Designer, to upload a data dictionary, and to modify project and survey settings.
User Rights	This allows the user to modify their own and other users' privileges.
Survey Distribution Tools	Allows the user to access the survey distribution tools page, and send survey invitations to respondents.
Alerts & Notifications	Allows the user to configure alerts and notifications, which we have not seen so far in this course.
Data Import Tool	Allows the user to import data into the project by uploading a spreadsheet.
Logging	Allows the user to view the project logging. **Note:** The project log contains identifying information, so you should be very careful with this privilege.
Create Records	Allows the user to create new records in the project via the Add/Edit Records page.
Rename Records	Allows the user to rename records.

Data viewing rights

Privilege	Description
No Access (Hidden)	User cannot see data in this instrument, or even see that this instrument exists.
Read Only	User can see the data in this instrument.
View & Edit	User can see and edit the data in this instrument.
Edit Survey Responses	If left *unchecked* and data was entered by a survey participant, then this user will *not* be able to edit the response, even if they have *View & Edit* rights.Possible only if the instrument is enabled as a survey.

Data export rights

Privilege	Description
No Access	Fields in this instrument will not be included in exports.
De-Identified	Any data exported from this instrument will be de-identified, meaning all free-form text fields will be removed, as well as any date/time fields and Identifier fields.
Remove All Identifier Fields	Identifier fields will be removed, but other de-identification options above won't be applied.
Full Data Set	All fields in this instrument will be included in exports.

Create user roles

We can define any number of user roles and then we can assign users to roles. This greatly simplifies the process as we only need to think about the privileges a particular kind of user needs to have once, and then we can more easily apply those privileges, like a template, to new users, or change a user's privileges, by assigning them to a role.

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Moving to production

To move to production, navigate to the Project Setup page and scroll to the end, to find the section of the workflow labelled ‘Move your project to production status’ and click the button.