Going Green with REDCap
Objectives

- Create a “project”
- Use different formatting options
- Exporting data
- Understand graphical output
- Load standard instruments
- Recognize considerations for standard terminology
UT Southwestern, as a member of the CTSA community, offers REDCap—a self-managed, secure, web-based solution that is designed to support data collection strategies for research studies. This tool provides functionality and features enabling researchers to rapidly develop databases for collecting and managing research data.

Benefits

- Fast – Quick project start-up. Clinical report forms can be implemented by the do-it-yourselfer or staff is available for a nominal charge for programming for those not having the time to do it themselves or requesting advanced features.
- Easy – Intuitive user interface and workflow, readily available online training materials, and assistance from the AIS all make it easy to get started.
- Fully customizable – You are in control of shaping your database.
- Secure – Backed up offsite nightly and hosted in a secure environment maintained by Information Resources.
- Web-based – Enter data or build your database from anywhere in the world over a secure web connection with authentication and data logging.
- Export data to common data analysis packages – Data export function for Excel, SAS, Stata, R, and SPSS.
- Data import capability through Microsoft Excel
REDCap Survey Advantages

- Easy to create the forms.
- Easy to administer and deploy.
- Easy for the participants to use.
- Secure completion (uses https).
- Participant data can be exported.
Good Design Principles

Why is good design important?

1. More likely to obtain valid results.
   a. Easier for participant to respond.
   b. Less likely to cause confusion.
   c. More likely for participant to finish study.

2. Positive reflection on researcher.
   a. More professional.
   b. Builds participant confidence.
Good Design Principles

General project considerations.

1. Many eyes make bugs shallow.
2. What are you trying to accomplish?
   a. Is the question consistent with the purpose?
   b. Will I find out what I want to know?
   c. Can question be interpreted multiple ways?
3. Consider a trial run before production.
Good Design Principles

Use good form.

1. Simple is better.
2. Shorter is better.
3. Divide and conquer.
   a. Organize into multiple instruments.
   b. Organize into multiple sections.
4. Use technology sparingly.
Good Design Principles

Good management considerations.

1. Consider multiple segments.

2. Consider a follow up.

3. Group similar information into sections.
Good Design Principles

Consider your audience.

1. Be considerate of participants time.
2. Consider an alternate perspective.

   a. How does the survey look through the eyes of the participant?
   b. Will the participant understand the questions?
   c. Do the questions use terms that would require a medical or technical background?
   d. Are you using abbreviations that would be unfamiliar?
   e. If you were a participant, how likely would you respond to your own survey?
Good Design Principles

“When in doubt, throw it out.”
REDCap Survey Creation

- One survey per project
- Survey responses are read-only
Creating a New Project

Click the “Create New Project” tab:

Enter Project Title:

Project title: Cure for Incompetence
Title to be displayed on project webpage
Creating a New Project

Select the Project Purpose:

Project Purpose Categories:
What Kind of Project?

Select Project Type:

- Single Survey
- Data Entry Forms (e.g. traditional database)
- Single Survey + Data Entry Forms (e.g. pre-screening)
Design Your Project

• Single Survey
  
  ➢ Ideal for collecting anonymous responses from participants
  
  ➢ Applicants are emailed a link that points to a web form in order to collect responses

• Data Entry Form
  
  ➢ Intended for data capture by clinicians with a REDCap account

• Single Survey + Data Entry Forms
  
  ➢ Used to initially populate records with participant responses in order to initiate data collection (example: pre-screening survey)
Data Entry Options

Select Collection Format:

STEP 2: Choose collection format for data entry forms

- Classic (each form available for use once for each
- Longitudinal / repeating forms (each form available)

Enable the scheduling module? Tell me more
Data Entry Collection Format

• Classic Data Collection
  ✦ Data collection will be performed once per subject

• Longitudinal/Repeating Collection
  ✦ For collecting the same data multiple times per subject
  ✦ Also has optional scheduling capabilities via project calendar
Accessing Online Designer

Design your data collection instruments

Add or edit fields on your data collection instruments. This may be done by either using the Online Designer (online method) or by uploading a Data Dictionary (offline method), in which you may use either method or both. Quick links: Download PDF of all data collection instruments OR Download the current Data Dictionary

Have you downloaded the For Identifiers page to ensure all identifier fields have been tagged Finish

Data Collection

Edit instruments

Demographics
Data Collection Instruments

Add, modify, rename, delete, and move the order of existing forms
Data Collection Instruments

Click instrument name link to:
- Modify an existing form
- Add additional fields to form
- Modify existing questions
- Change attributes of questions
Navigation Pane and Work Area

The image shows a screenshot of a software interface with a focus on navigation and work area. The navigation pane on the left includes options such as My Projects, Project Home, and Data Collection. The work area in the center displays sections for Project Home, Project Setup, Other Functionality, and Project Revision History. The screen also shows a task for modifying project settings or making customizations.
The Study ID is the unique identifier (e.g. MRN, SSN, email address, etc.) for each record (similar to a row in a spreadsheet). It becomes the handle by which data is associated with a specific participant.
Study ID: Requirements

- Should *not* be deleted.
- Must be first field in your form.
- Must be unique.
Online Designer Operations

Online Designer enables easy, interactive creation of form fields.

The icons identify what operations can be performed on each field.
Copying a Field

The copy option duplicates all the field characteristics except the variable name.
Editing a Field

The edit option enables the modification of all the attributes of a field.
Defining Field Type and Label

Field Type:
Text Box (Short Text)

Field Label
Middle Name:
Field Types

----- Select a Type of Field -----

- Text Box (Short Text)
- Notes Box (Paragraph Text)
- Calculated Field
- Multiple Choice - Radio Buttons (Only One Answer)
- Multiple Choice - Drop-down List (Only One Answer)
- Checkboxes (Check All That Apply)
- Yes - No
- True - False
- Slider / Visual Analog Scale
- File Upload (for users to upload files)
- Descriptive Text (with optional Image/File Attachment)
- Begin New Section (Section Header with Descriptive Text)
- Dynamic Query (SQL)
Defining the Field Attributes

- **Variable Name**
  - Data column handle

- **Validation**
  - Field type constraint

- **Required**
  - Mandatory field

- **Identifier**
  - Mark identified data

- **Custom Alignment**
  - Question arrangement

- **Field Note**
  - Additional instruction
Variable Name: A Data Handle

The handle associated with data. Similar to a spreadsheet *column* name. Follow the rules for a variable.
Variable Name: Requirements

• Should be descriptive (not a1, b2, etc.). The name is how the analysis data is referenced.

• Must begin with an alpha character (e.g. A-Z).

• May contain only the characters A-Z, 0-9, and the underscore (no spaces, punctuation, special characters or symbols).

• Should be less than 26 characters (due to risk of truncation in a statistical analysis package).

• Must be unique across all forms.
Text Field Validation

Restrict text input in order to catch data entry errors before form submission.
Text Field Validation Types

Verifies data input to prevent invalid entry prior to form submission.
Invalid Text Field Indicator

Invalid text is indicated by displaying the string in bold font along with a red underline in the text box of a validated text field.
Required Field

If field is left blank, an error results.
Required fields are indicated with the string *must provide value* in a red font and displayed below the field label on the input form.
Required Field Dialog

If a field is left blank, a warning dialog is displayed before saving.

NOTE: Some fields are required!

Your data was successfully saved, but you did not provide a value for some fields that require a value. Please enter a value for the fields on this page that are listed below.

Provide a value for...
- Middle Name:

Okay  Ignore and leave record
Fields that reveal information regarding the patient’s identity may need to be marked as an “Identifier”. These fields can then be excluded so “de-identified” data can be exported for analysis.
Custom Alignment controls the position and orientation of the responses on the data entry form.
Custom Alignment Types

Defined: Screen location of the question response.
Alignment: Right / Vertical

These responses are aligned right of the Field Label (or Question) and arranged vertically.

On a scale of 1 to 5, how much of a pain is your husband? Alignment: Right / Vertical (RV)

1 2 3 4 5
Alignment: Right / Horizontal

These responses are aligned right of the Field Label (or Question) and arranged horizontally.

On a scale of 1 to 5, how much of a pain is your husband? Alignment: Right / Horizontal (RH)

Multiple fields with a right or left horizontal alignment specified is a good way to create a matrix.
Alignment: Left / Vertical

These responses are aligned left of the Field Label (or Question) and arranged vertically.

On a scale of 1 to 5, how much of a pain is your husband? Alignment: Left / Vertical (LV)

- 1
- 2
- 3
- 4
- 5
Alignment: Left / Horizontal

These responses are aligned left of the Field Label (or Question) and arranged horizontally.

Note: Use when creating a matrix
Field Note

The field note allows you to place additional text below the form control in order to provide the participant with additional information.
Adding a Field

Inserting a New Field

![Adding a Field](image-url)
Inserting a New Field

• Select Field Type

• Enter Field Label (Question or Data Value Prompt)

• Specify Variable Name
Insert a Second Field

Field Type: Checkboxes (Check All That Apply)

Field Label
What kind of pet do you have?

Variable Name (underline)
pet_kind

Choices (one choice per line)
Cat
Dog
Bird
Other

Field Note (optional)
Please select all that apply.
Small reminder text displayed underneath.
Choices
(Radio, Drop Down, Check)

An integer value is assigned to each item
Same Choices, Different Field Types

Field Type: Multiple Choice - Radio Buttons (Only One Answer)
- Cat
- Dog
- Bird
- Other

Field Type: Multiple Choice - Drop-down List (Only One Answer)
- Cat
- Dog
- Bird
- Other

Field Type: Checkboxes (Check All That Apply)
- Cat
- Dog
- Bird
- Other

Please select all that apply.
Creating a Conditional Field

Branching logic can be used to show (and hide) fields that meet a certain condition.
Using Advanced Branching Logic

Conditional fields can be created by specifying the variable and value of the field that makes the condition true.
Creating a Conditional Field

Alternatively, the Drag-N-Drop Logic Builder makes defining the condition easier.
Starting Data Collection

The Data Collection section in the navigation pane, lists the forms (also called instruments) that help organize data retrieved by the project.

In order to create a new record, the form that contains the Study ID must be entered first.
### Incomplete Records (1)

- [ ] -- select record --

### Complete Records (0)

- [ ] -- select record --

**Enter a new or existing Study ID**

```
fmcclurg
```

- A new record is created when a non-existing identifier is entered on the first page to data collection interface.

- If the record already exists, that Study ID is retrieved.
Using an Existing Study ID

An existing Study ID can also be selected from the appropriate dropdown list on the first page of the data collection interface.
User Rights and Permissions

Allows you to grant a user full or partial access to the database.
Adding a New User

A new user can be added to the database by entering their Southwestern ID.
Granting User Privileges

Define user’s role:

- Identifier Data visibility
- Ability to grant privileges to other users
- Allow/Deny other’s access to project specifics
Record Locking Privileges

An entire form can be locked which prevents modification of any record.

Settings pertaining to record locking and E-signatures:

- **Record Locking Customization**
  - **Lock/Unlock Records**
    - Users with locking privileges also have access to the E-signature and Locking Mgmt page on the left-hand Applications menu.
    - Watch video about locking
    - Allow locking of all forms at once for a given record?
Record Privileges

Control of record creation, renaming, and deletion can be specified.
Data Entry Rights

Data entry rights are granted on a per form basis.

<table>
<thead>
<tr>
<th>Data Entry Rights</th>
<th>None</th>
<th>Read</th>
<th>Edit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Data Entry Rights

Data entry rights are granted on a per form basis.
User Rights View

User rights can be modified by clicking on the SWID link or by selecting the SWID from the dropdown list.
Deleting a REDCap Project

The procedure for deleting a project (which includes all the forms and the data):

1. Select the project

2. Click “Other Functionality” tab

3. Press “Delete the project” push button
Deleting a Project (continued)

The procedure for deleting a project (which includes the all the forms and the data):

4. Type the word “delete” in the dialog text box.

5. Click “Ok” on the confirmation dialog.
EDC Best Practices

Note: The term “Column” here refers to Excel spreadsheet data dictionary columns. Also, the terms “field” and “variable”, as used here, are essentially interchangeable. Both terms refer to a unique item of data to be collected and analyzed. “Field” is a database term, while “variable” is a data analysis term.

- The first variable on the first form should be the record identifier (e.g. Participant ID) because it will be used by REDCap as a key variable linking forms for a particular record. The default variable name is “Study_ID”. Demographics is normally the first form, but this is not required. All new projects are provided with a sample Demographics form, but you are free to modify/replace this.

- Use categorical response (dropdown, radio button, checkbox) field types when possible to reduce risk of data entry error. If these fields are not feasible, use text fields with validation (date, phone, email, integer, number) whenever possible to reduce the use of free-text fields.

- When using a text field with validation types of number or integer, define range minimum/maximum as much as possible to allow REDCap to perform basic data validation/quality control.

- Put variables collected together on the same form to improve data entry workflow. Putting demographics together and labs together on separate forms makes data entry more reliable.

- Include Field Notes describing units, formats, etc. whenever appropriate. Do not assume the data entry person knows the expected units or formats.
Benefits of Using Data Standards

• Allows rapid data exchange by eliminating the need for mapping
• Allows for consistent reporting across protocols, across projects for related studies
• Promotes monitoring and investigator staff efficiency
• Makes data integration easier
• Provides increased efficiency in processing and analysis of clinical data
Survey Division

A section header can be used as a divider to define the beginning of a new section.
Survey Page Division

- A section header can also be used to define the beginning of a new page.
- Project Setup => Modify Survey Settings
Survey Multiple Page Results

• Each page will be labeled “Page 1 of 3”, “2 of 3”, etc.
• First page has “Next Page” button.
• Middle pages have “Previous” and “Next” buttons.
• Last page has “Previous” and “Submit” buttons.

Requirements

1) Date of Birth:
   1996-04-23

2) Age:
   15

3) Are you less than 18 years of age?
   * must provide value
   - Yes
   - No

Geography

4) Have you ever lived near water?
   - Yes
   - No

Exposures

5) Have you ever been exposed to silicon dust?
   - Yes
   - No
Public or Private Survey Link

There are two different ways to invite individuals to participate in a survey. Each method was designed for a specific purpose. Which method you choose depends upon the requirements of your project. The methods are:

1. Public Survey Link

2. Private Survey Link
Public Survey Link

• The Public Survey Link may be the easiest way to promote your survey. The attributes of this survey type are:

  • 1. Responses are anonymous (unless the survey contains identifying questions).

  • 2. All participants access the same URL.

  • 3. The same participant may take the survey multiple times.
Private Survey Link

The Private Survey Link offers the greatest control over the survey responses. The attributes of this survey type are:

1. Responses are anonymous (unless the survey contains identifying questions).

2. A unique URL is generated for each participant.

3. Each participant may respond to the survey only once.
Private Survey Link

A participant e-mail list is created within REDCap.
Private Survey Link

REDCap maintains the list of participants. It also keeps a record of those that have responded, have not responded and the ones that have submitted partially complete responses.
### Which Survey Link should I use?

<table>
<thead>
<tr>
<th>Use Public Link when ...</th>
<th>Use Private Link when ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>A link to the survey URL is posted to a website.</td>
<td>A unique survey link is auto-generated by REDCap.</td>
</tr>
<tr>
<td>The URL is sent via a standard e-mail client.</td>
<td>The e-mail list must be maintained within REDCap.</td>
</tr>
<tr>
<td>The survey URL is sent via an external mailing list.</td>
<td>Need ability to contact those who have not responded.</td>
</tr>
<tr>
<td>The user may forward the e-mail to someone else.</td>
<td>The survey is targeted for a specific set of individuals.</td>
</tr>
<tr>
<td>Each participant may need to respond to the same survey multiple times.</td>
<td>Each participant should respond to the survey only once.</td>
</tr>
</tbody>
</table>
Triggers & Notifications

• A trigger can be enabled to provide notification via e-mail every time a participant completes a survey.

• Project Setup => Modify Survey Settings
Triggers & Notifications

The survey trigger notifies specified individuals each time a survey is submitted.
“Save & Return Later” Option

- This setting gives participants the option to save portions of the survey that are already answered and complete the survey at another time in the future. This is capability is enabled via:
  - Project Setup => Modify Project Settings

![](Allow_Save_Return_Later_option.png)
“Save & Return Later” Button

- After enabling this option, a “Save & Return Later” button will be displayed on the bottom of each survey form.
Validation Code Dialog

- Press the “Save & Return Later” button to display a unique validation code that allows the participant to return and complete the survey in the future.
Validation Code Reminder

• A final reminder of the validation code is displayed.

• In addition, a link to the survey can be e-mailed to the participant.
Validation Code Dialog

In order to return to an incomplete survey, the participant must:

1. Return to the URL of the survey.

2. Enter the validation code value.
Validation Code Disadvantages

Before enabling the “Save & Return Later” capability, there are several issues to consider:

1. The additional “Save and Return” buttons add an extra level of complexity to the form.

2. This capability may actually discourage the completion of forms by enabling well intentioned procrastinators to put off their submissions forever.

3. The extra burden to record and recall the validation code and associated URL is placed on the participant.

4. Questions regarding the validation code may result in a significant number of support requests.

5. If the validation code is misplaced
Validation Code Alternatives

There may be several alternatives to the “Save & Return Later” option.

1. Consider making the survey simpler.
   a. Throw out redundant questions that ask the same question over and over again repeatedly.
   b. Eliminate questions that won’t or can’t be analyzed.
   c. Remove “interesting” questions that are outside the scope of the project.

2. Break up the massive survey-to-end-all-surveys into multiple mini-surveys.

3. Instead of a colossal survey for a broad population, generate a series of smaller surveys that target a more focused audience.
Enabling View Survey Results

- You can allow the participants to view previous survey results.
- Project Setup => Modify Survey Settings
Enabling View Survey Results

If this option is enabled, the “View Survey Results” button will be displayed.

In addition, a survey results code is generated so participant can return to the results page.
Survey Results: Scatter Plots

Age:: Refresh Plot

<table>
<thead>
<tr>
<th>Total (N)</th>
<th>Missing</th>
<th>Unique</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>StDev</th>
<th>.05</th>
<th>.10</th>
<th>.25</th>
<th>.50</th>
<th>Median</th>
<th>.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1 (14.3%)</td>
<td>6</td>
<td>15.00</td>
<td>54.00</td>
<td>31.50</td>
<td>16.63</td>
<td>15.00</td>
<td>15.00</td>
<td>18.00</td>
<td>24.00</td>
<td>52.00</td>
<td></td>
</tr>
</tbody>
</table>

Lowest values: 15, 21, 23, 25, 51
Highest values: 21, 23, 25, 51, 54
## Survey Results: Pie Charts

### Are you less than 18 years of age?:

<table>
<thead>
<tr>
<th>Total (N)</th>
<th>Missing</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0 (0%)</td>
<td>2</td>
</tr>
</tbody>
</table>

**Counts/frequency:**

- Yes (1, 14.3%)
- No (6, 85.7%)
Survey Results: Bar Charts

Have you ever lived near water?:

<table>
<thead>
<tr>
<th>Total (N)</th>
<th>Missing</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2 (28.6%)</td>
<td>2</td>
</tr>
</tbody>
</table>

Counts/frequency: Yes (3, 60%), No (2, 40%)
Survey Status

The survey offline/active status toggle is available via the Project Setup tab.