How to design a database for electronic data capture in REDCap
Outline

• REDCap background
• REDCap features
  - System features
  - Database design features
  - Data Entry(DE) & management features
• Real-time CRF creation
• CRF creation using a template
• DE overview
• REDCap modules overview
• Research Electronic Data Capture (REDCap) Background

– secure web-based application
– designed & developed exclusively for research studies by Vanderbilt University (VU) ([www.project-redcap.org](http://www.project-redcap.org))
– available at no cost to REDCap consortium partners
– Currently 228 consortium partners
Map of REDCap Consortium Partners

Data from REDCap Consortium

ALL REDCap Projects (Consortium-wide)
Production and Development
Features of REDCap

System Features

• **Secure and web-based**
  - Input data or build database from anywhere
  - secure web connection with authentication & data logging.
  - Installed on server(s) & configured for intranet and/or internet access.

• **21 CFR part 11 Capable**
  - server can be configured to ensure compliance
• **Fully customizable**
  - total control to shape database and features
  - written in php – source code available to partners
  - Support RDBMS but for optimal performance MySQL database is recommended.

• **Well Supported by partners**
  - Online mailing lists/ forum
  - Weekly web-seminar/ conferences
  - Online tutorials
Database Design Features

• **Stream-lined process for rapidly building a database**
  - Point/Click & drag for real-time CRF Creation
  - Or upload from csv file.

• **Database changes easily implemented**
  - database field(s) can be modified or added when study is in progress.
Data Entry & Management Features

- Supports following Advanced features:
  - Auto-validation (Range/ data checks)
  - Branching/skip logic
  - Data calculation (e.g. can automatically calculate value for Body Mass Index (BMI))
  - File uploading and sending of files (links) from REDCap database with link expiring option
  - Can set database to allow double data entry
• **Multi-site access**
  - Researchers from multiple sites and institutions can access same database.

• **Export data to common statistical packages**
  - Exports raw data and syntax files to SAS, Stata, R, and SPSS.
REDCap Database design Summary

- Create Blank database with no eCRF
- Optional Longitudinal CRF Mapping
- Optional Participant Scheduling Setup Screens
- Point/Click Drag (Ajax)
  - For Real-time CRF Creation or Uploading from csv file.
Create a new REDCap Database

You may begin the creation of a new REDCap database on your own by completing the form below and clicking the Create Database button at the bottom.

Database title:
Anaemia
Title to be displayed on database webpage

Primary use(s) of this database:
- Data Collection (typically multiple forms to capture project data)
- Data collection forms (each used once for each subject/record)
- Data collection forms (each used one or more times for the same subject/record, useful for longitudinal projects)
- Scheduling (create schedules for your project calendar that are auto-generated from project-defined time-points/events)

Purpose of this database:
(How will it be used?)
Research

Name of P.I. (if applicable): John Doe
IRB number (if applicable): 123-896-88

Please specify:
- Basic or bench research
- Clinical research study or trial
- Translational research 1 (applying discoveries to the development of trials and studies in humans)
Anaemia

This database may be used for collecting and reporting data. Please cite the REDCap project when publishing manuscripts (citation information and template methods language are available here). Contact Gerald Kandulu for additional details or help with this application.

Current Users

<table>
<thead>
<tr>
<th>User</th>
<th>Expires</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin (admin)</td>
<td>never</td>
</tr>
</tbody>
</table>

Database Statistics

- Records in database: 0
- Data exports: 0
- Logged events: 1
- Most recent activity: 12:59pm 11/30/2010
- Space usage for docs: 0 MB
- Database status: Development

Upcoming Calendar Events (next 7 days)

- No upcoming events
Online Form Editor

The Online Form Editor will allow you to make database modifications to fields and data entry forms very easily using only your web browser. Below you have the options to select an existing form to edit, to delete a form, to create a new form, and to reorder your forms as they are displayed. NOTE: While in development status, all field changes will take effect immediately in real time.

Existing data entry forms: Demographics

- Modify the fields on the form selected above, or rename the form
- Delete the form selected above (and all its fields)
- Add a new form named Enrolment to appear after the selected form above
- Move the form named Demographics to appear after the selected form above

REDCap Shared Library

The REDCap Shared Library is a repository of data entry forms that can be downloaded and used in your REDCap databases. Click the 'Download' button below to begin searching for forms in the library. In the library, you may view them on the web page or download as a PDF, and then download them back into REDCap to save them in your database. Try it out!

Upload Data Dictionary

This module may be used for making changes to the database, such as adding new fields or modifying existing fields, by using an offline method called the Data Dictionary. The Data Dictionary is a specifically formatted CSV (comma delimited) file within which you may construct your database fields and afterward upload the file here to commit the changes to your database.

Click the 'Browse' button below to select the file on your computer, and upload it by clicking the 'Upload File' button. Once your file has been uploaded, changes will NOT immediately be made but will be displayed and checked for errors to ensure that all the formatting in your Data Dictionary is correct before official changes are made to the database.
Field type on eCRF

Field type in database if Text Box
Add New Field

You may add a new database field to this data entry form by completing the fields below and clicking the Save button at the bottom. When you add a new field, it will automatically be appended to the form on this page. For an overview of the different field types available, you may view the Field Types video (5 min).

Select a Type of Field
Text Box

Field Label
1. Study Number

Variable Name (utilized during data export)
enrd1std
ONLY letters, numbers, and underscores

Validation? (optional)
Integer
Minimum: 1000
Maximum: 2000

Required?*  No  Yes
* Prompt if field is blank

Identifier?  No  Yes
Does the field contain identifying information (e.g. name, SSN, address)?

Field Note (optional)

Branching/Skip Logic (optional)  How do I use this?

Save
Defining field note to aid clarity during DE

Defining range check and data type validation

2. Date of interview

Variable Name (utilized during data export)
enrd2lte

ONLY letters, numbers, and underscores

Validation? (optional) Date

Minimum: 2010-12-01

Maximum: 2012-01-01

Required?* No Yes

* Prompt if field is blank

Identifier? No Yes

Does the field contain identifying information (e.g., name, SSN, address)?

Field Note (optional) YYYY-MM-DD

Branching/Skip Logic (optional) How do I use this?
defining coded response for radio buttons
defining coded response for drop-down list
Creating check responses
Creating auto-calculations
Using date difference and rounding functions in calculations
defining branching or skip logic

(questions are available when condition is true)
Creating field that allows to upload files

**Select a Type of Field**

- File Upload

**Field Label**

- 8. Chest X-ray image

**Variable Name** (utilized during data export)

- enrs8xray

**Required?**

- No
  - Prompt if field is blank
- Yes

**Identifier?**

- No
- Yes

**Field Note (optional)**

- 

**Branching/Skip Logic (optional)**

- How do I use this?

**Save**
Allow value to be retrieved from REDCap or other database based on query e.g. pull list of medications from SPINE
You may add a new database field to this data entry form by completing the fields below and clicking the Save button at the bottom. When you add a new field, it will automatically be appended to the form on this page. For an overview of the different field types available, you may view the Field Types video (5 min).

Select a Type of Field
Begin New Section (Section Header with Descriptive Text)

Field Label
Medication Given

Define Section heading on eCRF

Save
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Variable / Field</td>
<td>Form Name</td>
<td>Section Head</td>
<td>Field Type</td>
<td>Field Label</td>
</tr>
<tr>
<td>2</td>
<td>en1pid</td>
<td>enrolment</td>
<td>CRF Header</td>
<td>text</td>
<td>1. Participant ID</td>
</tr>
<tr>
<td>3</td>
<td>enrd2dte</td>
<td>enrolment</td>
<td>text</td>
<td>2. Date of interview</td>
<td>YYYY-MM-dd date</td>
</tr>
<tr>
<td>4</td>
<td>enrs1gen</td>
<td>enrolment</td>
<td>Social Details</td>
<td>radio</td>
<td>1. Participant Gender</td>
</tr>
<tr>
<td>5</td>
<td>enrs2dob</td>
<td>enrolment</td>
<td>text</td>
<td>2. Participant Date of Birth</td>
<td>YYYY-MM-dd date</td>
</tr>
<tr>
<td>6</td>
<td>enrs21age</td>
<td>enrolment</td>
<td>calc</td>
<td>enrolment</td>
<td>datediff([enrd2dte],[enrs2dob],&quot;y&quot;)</td>
</tr>
<tr>
<td>7</td>
<td>enrs3hgt</td>
<td>enrolment</td>
<td>text</td>
<td>3. Participant Height(cm)</td>
<td>To 1 decim number</td>
</tr>
<tr>
<td>8</td>
<td>enrs4wgt</td>
<td>enrolment</td>
<td>text</td>
<td>4. Participant weight (kg)</td>
<td>To 1 decim number</td>
</tr>
<tr>
<td>9</td>
<td>enrs4bmi</td>
<td>enrolment</td>
<td>calc</td>
<td>Mass Index (BMI)</td>
<td>round([enrs4wgt]<em>10000/([enrs3hgt]</em>[enrs3hgt]),3)</td>
</tr>
<tr>
<td>10</td>
<td>enrs5stt</td>
<td>enrolment</td>
<td>dropdown</td>
<td>6. Urine pregnancy test done</td>
<td>1, Yes</td>
</tr>
<tr>
<td>11</td>
<td>enrs51res</td>
<td>enrolment</td>
<td>dropdown</td>
<td>6.1. Urine pregnancy test result</td>
<td>1, Positive</td>
</tr>
<tr>
<td>12</td>
<td>enrs7syp</td>
<td>enrolment</td>
<td>checkbox</td>
<td>7. Participant symptoms</td>
<td>1, Headache</td>
</tr>
<tr>
<td>13</td>
<td>enrs8xray</td>
<td>enrolment</td>
<td>file</td>
<td>8. Chest x-ray image</td>
<td></td>
</tr>
</tbody>
</table>
Upload Data Dictionary

This module may be used for making changes to the database, such as adding new fields or modifying existing fields, by using an offline method called the Data Dictionary. The Data Dictionary is a specifically formatted CSV (comma delimited) file within which you may construct your database fields and afterward upload the file here to commit the changes to your database.

Click the 'Browse' button below to select the file on your computer, and upload it by clicking the 'Upload File' button. Once your file has been uploaded, changes will NOT immediately be made but will be displayed and checked for errors to ensure that all the formatting in your Data Dictionary is correct before official changes are made to the database. If you wish to view an example of how your Data Dictionary may be formatted, you may download the Data Dictionary demonstration file, or you may view the Data Dictionary Tutorial Video (14 min).

Steps for making database changes:
1.) Download the current Data Dictionary
2.) Edit the Data Dictionary
3.) Upload the Data Dictionary using the form below
4.) The changes will be made to the database after the Data Dictionary has been checked for errors

Upload your Data Dictionary file (CSV file format only)

[Upload File]
Data Entry Overview

This database may be used for collecting and reporting data. Please cite the REDCap project when publishing manuscripts (citation information and template methods language are available here). Contact Gerald Kandulu for additional details or help with this application.
**Anaemia**

### enrolment

Adding new 1. Participant ID "1002"

<table>
<thead>
<tr>
<th>1. Participant ID</th>
<th>1002</th>
</tr>
</thead>
<tbody>
<tr>
<td>(To rename this record, modify the value immediately below.)</td>
<td></td>
</tr>
</tbody>
</table>

**CRF Header**

<table>
<thead>
<tr>
<th>1. Participant ID</th>
<th>1002</th>
</tr>
</thead>
<tbody>
<tr>
<td>* must provide value</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Date of interview</th>
<th>YYYY-MM-DD</th>
</tr>
</thead>
<tbody>
<tr>
<td>* must provide value</td>
<td></td>
</tr>
</tbody>
</table>

**Social Details**

<table>
<thead>
<tr>
<th>1. Participant Gender</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>* must provide value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Participant Date of Birth</th>
<th>YYYY-MM-DD</th>
</tr>
</thead>
<tbody>
<tr>
<td>* must provide value</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.1. Participant age at enrolment</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3. Participant Height(cm)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>* must provide value</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Participant weight (kg)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>* must provide value</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Participant Body Mass Index (BMI)</th>
<th></th>
</tr>
</thead>
</table>

- **PDF download option** for eCRF with or without Data
- eCRF ready for DE
Adding new 1. Participant ID "1002"

1. Participant ID
   * must provide value
   1002
   (To rename this record, modify the value below.)

2. Date of interview
   * must provide value

Social Details

1. Participant Gender
   * must provide value

2. Participant Date of Birth
   * must provide value

2.1. Participant age at enrolment

3. Participant Height (cm)
   * must provide value

4. Participant weight (kg)
   * must provide value

5. Participant Body Mass Index (BMI)
   * must provide value

7. Participant symptoms
   - Headache
   - Fever
   - Sweats
   - Cough
   - Vomiting
   - Chest pain

To 1 decimal place (XXX.X) cm
To 1 decimal place (XXX.X)(kg)
## Data Entry Forms

### enrolment

**CRF Header**

1. Participant ID
   - **must provide value**
   - **Value:** 1003

2. Date of interview
   - **must provide value**
   - **Value:** 2010-12-02

### Social Details

1. Participant Gender
   - **must provide value**
   - **Value:** Female

2. Participant Date of Birth
   - **must provide value**
   - **Value:** 1985-12-02

2.1. Participant age at enrolment
   - **Value:** 25

3. Urine pregnancy test done
   - **Value:** Yes

3.1. Urine pregnancy test result
   - **Value:** Positive

4. Participant Height (cm)
   - **must provide value**

5. Participant weight (kg)
   - **must provide value**

6. Participant Body Mass Index (BMI)
   - **must provide value**

### Participant symptoms

7. **must provide value**

### Chest x-ray image

8. **must provide value**

**Medication Given**

- Headache
- Fever
- Sweats
- Cough
- Vomiting
- Chest pain

*tick as per observation*

**Upload document**
file upload dialogue

Upload Document for:

8. Chest x-ray image (enr8xray)

Select a file then click the 'Upload Document' button

Upload Document (Max file size: 64 MB)
data check pop-up message during DE (value no with range)
data check pop-up message during DE (required field values not specified)

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...
- 3. Participant Height (cm)
- 4. Participant weight (kg)
- 5. Participant Body Mass Index (BMI)
- 6. Chest x-ray image
- 1. Antibiotic given

Okay | Ignore and leave record

2. Participant Date of Birth
   * must provide value

2.1. Participant age at enrolment

3. Participant Height (cm)
   * must provide value

4. Participant weight (kg)
   * must provide value

reset value

1985-12-02 | YYYY-MM-DD
25 | View equation | Disclaimer
To 1 decimal place (x.x) cm
To 1 decimal place (x.x) (kg)
### Completed eCRF

**1. Participant Gender**
- **Female**
- **Male**

**2. Participant Date of Birth**
- **1985-11-10**
- **Today**

**2.1. Participant age at enrolment**
- **25.05**

**3. Participant Height (cm)**
- **90.5**
- **To 1 decimal place (XXX.X) cm**

**4. Participant weight (kg)**
- **75**
- **To 1 decimal place (XXX.X) kg**

**5. Participant Body Mass Index (BMI)**
- **91.572**

**6. Urine protein**
- **No**

**7. Participant symptoms**
- **Headache**
- **Fever**
- **Sweats**
- **Cough**
- **Vomiting**
- **Chest pain**

**8. Chest x-ray image**
- **redcap_graph.jpg (0.02 MB)**

### Form Status

**Complete?**
- **Complete**

**Lock this record for this form?**
- **[ ] Lock**
- **[ ] E-signature** (What is this?)

**Save Record**
- **Save and Continue**
Please supply reason for data changes

You must now supply the reason for the data changes being made on this page in the text box below.

Reason for changes:
- typing error

Save
Listed below is the history of all data entered for the variable "enrs2dob" for 1 Participant ID "1001".

<table>
<thead>
<tr>
<th>Date/Time of Change</th>
<th>User</th>
<th>Data Changes Made</th>
<th>Reason for Data Change(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:06pm 11/30/2010</td>
<td>admin</td>
<td>1984-11-10</td>
<td>typing error</td>
</tr>
<tr>
<td>6:59pm 11/30/2010</td>
<td>admin</td>
<td>1985-11-10</td>
<td></td>
</tr>
</tbody>
</table>
Only sends download link for specified file
REDCap modules overview

- Dynamic project status
- Participant scheduling
- Data Export and Import
- Data Comparison Tool
- User rights & activity Logging

- File Repository

- Data visualization/ Cleaning and Reports

- Record locking & e-Signatures

- API & Shared Library

- Online Tutorials & Citing REDCap in publications
A user can only view project(s) for which s/he has Read/ Edit rights.
Adapt Screening

This database may be used for collecting and reporting data. Please cite the REDCap project when publishing manuscripts (citation information and template methods language are available here). Contact Gerald Kandulu for additional details or help with this application.

**Current Users**

<table>
<thead>
<tr>
<th>User</th>
<th>Expires</th>
<th>Data Entry Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin (admin admin)</td>
<td>never</td>
<td>Reviewer</td>
</tr>
<tr>
<td>emmanjamwada (Eliza Mmanjamwada)</td>
<td>never</td>
<td>Reviewer</td>
</tr>
<tr>
<td>Janet (Janet Kambwiri)</td>
<td>never</td>
<td>#1</td>
</tr>
<tr>
<td>ikanada (Lyness Kanada)</td>
<td>never</td>
<td>Reviewer</td>
</tr>
<tr>
<td>lifa (Liney Lify)</td>
<td>never</td>
<td>#2</td>
</tr>
<tr>
<td>mmukaka (Mavuto Mukaka)</td>
<td>never</td>
<td>Reviewer</td>
</tr>
<tr>
<td>mzihwoya (Milton Zhwoya)</td>
<td>never</td>
<td>Reviewer</td>
</tr>
</tbody>
</table>

**Database Statistics**

<table>
<thead>
<tr>
<th>Records in database</th>
<th>169</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data exports</td>
<td>13</td>
</tr>
<tr>
<td>Logged events</td>
<td>1505</td>
</tr>
<tr>
<td>Most recent activity</td>
<td>9:33am 12/01/2010</td>
</tr>
<tr>
<td>Space usage for docs</td>
<td>1.87 MB</td>
</tr>
<tr>
<td>Double Data Entry module</td>
<td>Enabled</td>
</tr>
<tr>
<td>Database status</td>
<td>Production</td>
</tr>
</tbody>
</table>

**Upcoming Calendar Events**

<table>
<thead>
<tr>
<th>Time</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No upcoming events</td>
</tr>
</tbody>
</table>
Study Calendar – Participant Scheduling

The Calendar application can be used as a project calendar within this database to help organize your schedule and keep track of any upcoming events. It will allow you to add or modify calendar events and then view them either in a daily, weekly, or monthly format below. To add a new note or calendar event to any day, click + New at the top of that day's box to begin entering the information. Since you have already defined multiple events for this project, you may additionally generate a schedule using your pre-defined Events, which will then be added to the calendar.

Participant Scheduling Module Optional
Visit-Level View Shows Status + CRFs (Longitudinal Model)
Data Export Tool

Use the page below to select fields you wish to extract from the database. Each row contains language from the original data entry form, plus a parenthetic listing of the actual database field name.

You may use the buttons at the top of the form to select or deselect all fields for a given data entry form, duplicate your last data retrieval, or select all fields in the database for export. Once all fields are selected, go to the bottom of this page and click the Submit button. After submitting this page, wait for a page to appear allowing you to save the file to your computer. The files are comma-delimited and may be read into SPSS, Excel, R, SAS or other analysis packages. If any fields in the database have been tagged as Identifiers, those particular fields will be displayed below in red.

Use the buttons below to select fields by form - or click individual fields below. Click the SUBMIT button at bottom of page to finalize data export procedure.

<table>
<thead>
<tr>
<th>Select All</th>
<th>Deselect All</th>
<th>Every field in the database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select All</td>
<td>Deselect All</td>
<td>Repeat field selection from your last export</td>
</tr>
<tr>
<td>Form: enrolment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CRF Header**

1. Participant ID (enr1pid)  
2. Date of interview (enrd2dte)  

**Social Details**

1. Participant Gender (enrs1gen)  
2. Participant Date of Birth (enrs2dob)  
2.1. Participant age at enrolment (enrs21age)  
3. Participant Height(cm) (enrs3htg)  
4. Participant weight (kg) (enrs3wgt)
Data Export + De-ID Tools

Embedded De-Identification Tools
<table>
<thead>
<tr>
<th>Syntax &amp; Data</th>
</tr>
</thead>
</table>
| **Microsoft Excel**  
NOTE: If you are using a version of Microsoft Excel prior to Excel 2007, due to limitations the data will only be read to 255 columns when opened.  
| **SPSS Statistical Analysis Software**  
Instructions: Download and save all 3 files on the right to a common location. First, double-click on the Pathway Mapper (.bat) file, which will run quickly and invisibly. (If you are not using a Windows operating system, such as Mac or Linux, please see the Additional Instructions.) Now double-click on the *.sps file, which will open SPSS. When the file is loaded and displayed, choose Run-->All from the top menu options. This action will launch the script that will automatically read in all data and manipulate data fields with labels, option values, etc.  
Additional Instructions  
| **SAS Statistical Software**  
Instructions: Download both files to common location and double-click on *.sas file. When the file is loaded and displayed, choose from the menu options: Run-->Submit. This action will launch the script that will automatically read in all data and manipulate data fields with labels, option values, etc. Before running the syntax file, be sure to change the SAS current working folder to the folder where both files were saved.  
| **R Statistical Software**  
Instructions: Use command read.csv('filename') to read in data file.  
| **STATA Analysis and Statistical Software**  
Instructions: Download both files to common location and double-click on *.do file. This action will launch the script that will automatically read in all data and manipulate data fields with labels, option values, etc.  
| **EXCEL CSV**  
| **DATA CSV**  
| **DATA CSV**  
| **DATA CSV**  
| **DATA CSV**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**  
| **Send file?**
Data Import Tool

This module may be used for importing data into this database from a CSV (comma delimited) file. Below are the steps you will need to follow in order to import your data successfully into this database.

Instructions:

1.) Click the link below to download your data import template as a CSV (comma delimited) file. Save it locally to your computer and then open it to begin filling it with the data you wish to import.

- Download your Data Import Template (with records in rows)
- OR
- Download your Data Import Template (with records in columns)

2.) In each column of the Data Import Template file that you downloaded, place the data for each record that you wish to import. Once all your data has been added, save the file.
   - Be sure not to change the Variables/Field Names in the file or an error may occur.
   - Also, for all of the ‘dropdown’ or ‘radio’ fields in the database, you must make sure that the numerical value (rather than the text value) is entered in those cells, or else it cannot be processed.
   - Any empty rows or columns in the file can be safely deleted before importing the file. Doing this reduces the upload processing time, especially for large databases.

3.) Click the ‘Browse’ button below to select the file on your computer, and upload it by clicking the ‘Upload File’ button.

4.) Once your file has been uploaded, the data will NOT be immediately imported but will be displayed and checked for errors to ensure that all the data is in correct format before it is finally imported into the database.
Differences were found between the two records!

The table below compares the two records named 9898 and 8887. Only the fields that have differing values are listed below. If you need to correct or change the value of one of the records below, simply click on the data displayed in red, and it will take you to that form for that particular record.

<table>
<thead>
<tr>
<th>Label (field name)</th>
<th>Form Name</th>
<th>Study ID</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date subject signed consent (date_enrolled)</td>
<td>Demographics</td>
<td>2008-01-30</td>
<td>2009-01-02</td>
<td></td>
</tr>
<tr>
<td>First Name (first_name)</td>
<td>Demographics</td>
<td>Paul</td>
<td>John</td>
<td></td>
</tr>
<tr>
<td>Last Name (last_name)</td>
<td>Demographics</td>
<td>Harris</td>
<td>Doe</td>
<td></td>
</tr>
<tr>
<td>Street, City, State, ZIP (address)</td>
<td>Demographics</td>
<td>123 Wilson Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone number (telephone_1)</td>
<td>Demographics</td>
<td>(388) 388-3888</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second phone number (telephone_2)</td>
<td>Demographics</td>
<td>(388) 299-2888</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-mail (email)</td>
<td>Demographics</td>
<td><a href="mailto:paul.harris@vanderbilt.edu">paul.harris@vanderbilt.edu</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the subject given birth before? (given_birth)</td>
<td>Demographics</td>
<td>Yes (1)</td>
<td>No (0)</td>
<td></td>
</tr>
<tr>
<td>How many times has the subject given birth? (num_children)</td>
<td>Demographics</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity (ethnicity)</td>
<td>Demographics</td>
<td>Hispanic or Latino (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race (race)</td>
<td>Demographics</td>
<td>Asian (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height (cm) (height)</td>
<td>Demographics</td>
<td>132</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kilograms) (weight)</td>
<td>Demographics</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (bmi)</td>
<td>Demographics</td>
<td>34.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient document (patient_document)</td>
<td>Demographics</td>
<td>7347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete? (demographics_complete)</td>
<td>Demographics</td>
<td>Complete (2)</td>
<td>Incomplete (0)</td>
<td></td>
</tr>
</tbody>
</table>
eCRF access rights

REDCap
Project Owners
Autonomously Control Access
To Their Applications

REDCap Module Access

ecRF access rights
Database expiration date: 2011-12-31
# User Rights

This page may be used for granting new users access to the database and for editing the rights of current database users. You may edit the rights of a current user by selecting them from the dropdown list below or add a new user by entering their user name in the text box and hitting the Tab key.

Choose existing database user

OR type a new user and hit the TAB key

New user name

## Comprehensive User Rights View

<table>
<thead>
<tr>
<th>User name</th>
<th>Expiration</th>
<th>Calendar</th>
<th>Data Export Tool</th>
<th>Data Import Tool</th>
<th>Data Comparison Tool</th>
<th>Logging</th>
<th>File Repository</th>
<th>Double Data Entry</th>
<th>User Rights</th>
<th>Data Access Groups</th>
<th>Reports &amp; Report Builder</th>
<th>Record Locking Customization</th>
<th>Lock/Unlock Records</th>
<th>Database Setup/Design</th>
<th>Create Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>never</td>
<td>✓</td>
<td>Full Data Set</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Reviewer</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>emmanjamwada</td>
<td>never</td>
<td>✓</td>
<td>De-Identified</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>DDE Person #1</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Janet</td>
<td>never</td>
<td>✓</td>
<td>Full Data Set</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Reviewer</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ikanada</td>
<td>never</td>
<td>✓</td>
<td>Full Data Set</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Reviewer</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ilifa</td>
<td>never</td>
<td>✓</td>
<td>De-Identified</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>DDE Person #2</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>mmukaka</td>
<td>never</td>
<td>✓</td>
<td>Full Data Set</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Reviewer</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>mziwoya</td>
<td>never</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Reviewer</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Time / Date</td>
<td>User name</td>
<td>Action</td>
<td>List of Data Changes OR Fields Exported</td>
<td>Reason for Data Change(s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>----------------------------------------</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5:51pm 12/01/2010</td>
<td>admin</td>
<td>Updated Record 1002</td>
<td>enrs4wgt = ‘60.2’, enrs4bmi = ‘92.898’</td>
<td>typing error</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:49pm 12/01/2010</td>
<td>admin</td>
<td>Updated Record 1001</td>
<td>Action: Save e-signature Record: 1001 Form: enrolment</td>
<td>locking record</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:49pm 12/01/2010</td>
<td>admin</td>
<td>E-signature 1001</td>
<td>Action: Lock record Record: 1001 Form: enrolment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:49pm 12/01/2010</td>
<td>admin</td>
<td>Lock/Unlock Record 1001</td>
<td>Create report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:42pm 12/01/2010</td>
<td>admin</td>
<td>Manage/Design 1001</td>
<td>enr1pid = ‘1002’, enrd2dte = '2010-12-01',</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Project File Repository

Project-Specific Files Uploaded Here

Project-Specific Files Downloaded Here

Data Export Files Auto-Saved
You may use this page to build and save custom reports, which will query the database in real time and display the resulting data in a table format. Once created, you may view your reports at any time as well as modify or even delete them. Your saved reports be displayed on the right-hand menu as links, which can be clicked to display the report.

Create a New Report

You may create a new report by selecting the fields/variables below that you want to include in the report. You may add as many fields to your report as you wish. You will also need to provide a name for your report, which will then be displayed on the database’s right-hand menu. When you are finished selecting the fields you wish to include in the report, click the Save Report button at the bottom. The new report will then be added to your list of reports above.

<table>
<thead>
<tr>
<th>Name of Report:</th>
<th>under_18_pregnants</th>
</tr>
</thead>
</table>
| Field Name/Label | Field 1: enr1pid (1. Participant ID)  
Field 2: enrs1gen (1. Participant Gender)  
Field 3: enrs21age (2.1. Participant age at en...)  
Field 4: enrs51res (6.1. Urine pregnancy test ...)  
Field 5: |  |
| Limiters (optional) | Operator/Value  
Field 1: = Female  
Field 2: < 18  
Field 3: = Positive |  |
| Order the Results (optional) | First by  
Then by: | Ascending order  
Ascending order |  |  |
### Anaemia

**Number of results returned:** 1  
Total number of records queried: 2

**under_18_pregnants**

<table>
<thead>
<tr>
<th>1. Participant ID (enr1pid)</th>
<th>1. Participant Gender (enrs1gen)</th>
<th>2.1. Participant age at enrolment (enrs21age)</th>
<th>6.1. Urine pregnancy test result (enrs51res)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1002</td>
<td>Female (0)</td>
<td>17.93</td>
<td>Positive (1)</td>
</tr>
</tbody>
</table>
Data Visualization / Cleaning

- **Age (years):** missing values (90.1%)
- **Height (cm):** Refresh Plot | missing values (45%) | lowest values | highest values
- **Weight (kilograms):** Refresh Plot | missing values (61.8%) | lowest values | highest values

Automatically Graphs Categorical & Continuous Variables

**Primary Use Case: Data Cleaning**

-- Requires R-Apache Server Connection
What is an E-signature?

E-signatures are an extension of the record locking/unlocking functionality. Once a data entry form has been locked for a given record in the database, a person with e-signature privileges may then apply an e-signature to that form, if they wish. The e-signature option appears as a check box that says E-signature, which appears just above the Save buttons and immediately below the Locked check box.

How it works:

Although locking a record prevents its data from being modified, the e-signature goes a step farther, and serves as the equivalent of a handwritten signature. If a record has been e-signed, then it denotes that its data has been both locked (to prevent further changes) and authorized (i.e. by a user with e-signature privileges). It is also important to note that anyone with locking privileges (even if lacking e-signature authority) will negate the e-signature on a form when unlocking the record, after which data changes can be made to the record. The e-signature can be re-applied after such data changes. For any given record, an e-signature can be saved and negated on a form an unlimited number of times. When saving an e-signature, a user will be asked to enter their username and password for verification. If the username/password verification fails three times in a row, the user will be automatically logged out of REDCap.

How to view the log of e-signature activity:

Similar to the record locking functionality, the e-signature history is also stored in REDCap's data audit trail on the Logging page. If one wishes to view the historical record of e-signatures in the database, one may do so by filtering the audit log by 'Record locking & e-signatures' either for a specific record or for all records in the database.
Before forms can be locked using an e-signature, you must enter your REDCap username and password so that they may be validated. After three consecutive unsuccessful attempts, you will automatically be logged out of REDCap, thus ending this session.

User name: gkandulu
Password: **********
• **REDCap API** - allows programmers to customize REDCap tasks like Export/Import of data using programming platforms of choice e.g. php, .Net, Python.

This page may be used for obtaining information for constructing or modifying REDCap API requests. Click any of the categories in the table below to expand its section.

**What is an API?**
The acronym "API" stands for "Application Programming Interface". An API is just a defined way for a program to accomplish a task, usually retrieving or modifying data. In REDCap's case, we provide an API method for both exporting and importing data in and out of REDCap (more functionality will come in the future). Once we expand the REDCap API's abilities to a more comprehensive feature set in the future, programmers may then use the REDCap API to make applications, websites, widgets, and other projects that interact with REDCap. Programs talk to the REDCap API over HTTP, the same protocol that your browser uses to visit and interact with web pages.

### Basic Info:

- Obtaining Tokens for API Requests
- HTTP Response Codes and Errors
- API Examples

Although the REDCap API can be called from a variety of clients using any popular client-side or web development language that you are able to implement (e.g. .NET, Python, PHP), we are providing examples here of the API data import, data export, and metadata export, which are written in PHP and can be downloaded using the link below. You may use these files to test the REDCap API if you have a server running PHP.

**NOTE:** You must modify the example PHP files contained therein so they correspond to the REDCap server's API URL and other values that you wish to set for your API request. These example files require the PHP cURL library to be installed on the web server on which these files are hosted.

[Download example file (.zip)]

### Supported Actions:

- Export Records
- Import Records
- Export Metadata (i.e. Data Dictionary)
Repository for REDCap eCRFs that can be used by other institutions
Online Video resource accessed through Internet
How to cite REDCap in Study manuscript that used it for DE & DM

Citing REDCap

Please cite the publication below in study manuscripts using REDCap for data collection and management. We recommend the following boilerplate language:

Study data were collected and managed using REDCap electronic data capture tools hosted at [YOUR INSTITUTION]. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.


Link to article: [http://www.sciencedirect.com/science/article/B6WHD-4TJTX8-1/2/e77f1e54bba8c75de397340dad11aac6](http://www.sciencedirect.com/science/article/B6WHD-4TJTX8-1/2/e77f1e54bba8c75de397340dad11aac6)
• Acknowledgements

- Paul Harris, Vanderbilt University
  (www.project-redcap.org)

- REDCap project (www.project-redcap.org)

Thank you