REDCap: Research Electronic Data Capture

All Purpose Data Tool

Mary Geda
Sui Tsang
January 23, 2023
How many years have you used REDCap?
• Learn about REDCap:
  – What it is
  – How to access it
  – Quality control and compliance functions
  – What steps are used to build projects
  – How you can get data into REDCap
  – Tools: reports, statistics, and exports
  – Resources to help you get started
  – [If time]: Advanced features
• REDCap (Research Electronic Data Capture) is a secure web-based application for data capture and study management.

• Developed at Vanderbilt in 2004 by Paul A. Harris and colleagues
  ▪ Clinical and Translational Science Award (CTSA) funding

• REDCap Consortium: >6,000 institutions in >150 countries around the world

https://projectredcap.org/about/
How does REDCap work?

- Direct data entry (i.e., form), survey, or data import
- Exports to Excel, CSV, SPSS, SAS, Stata and R, and CDISC ODM.
- Anyone can learn to use it
Advantages: User Friendly

REDCap Learning Curve

Knowledge/Capabilities

- 1st build: Basic Features, Exports, User Rights
- Advanced: Features, Customization, Imports, APIs
- Third party: resources: libraries, external modules from repository
- Custom built: software (external modules)

Time/Effort

- Do it yourself. Confidence Building.
- Where the hard stuff lives.
- Might work. Might not.
- Welcome to software development
Advantages

- Accessible
- Organized
- Secure
- Quality & Accuracy
- Cost Effective
1. Yale NETID credentials and multi-factor authentication

Coming Soon: InCommon®

2. Secure servers behind an enterprise firewall, encrypted with TLS

3. Regulatory Requirements

HIPAA, FDA 21 Part 11, GDPR

https://portal.redcap.yale.edu/resources/security-compliance
Navigating - How do I get access?

Research Project Data Triage Team (YCCI)

HIPAA

GDPR

21 PART 11

REDCap at Yale University

Yale New Haven Health

Yale Center for Clinical Investigation
QUESTIONS or COMMENTS?

Next: Quality Control/Compliance Functions
Quality Control and Compliance

1. Logging: Audit trails
2. User Rights and Access
3. Data Quality
4. Field Level Controls

REDCap 201
Spring Session
**Logging: Audit trails**

This module lists all changes made to this project, including data exports, data changes, and the creation or deletion of users.

<table>
<thead>
<tr>
<th>Time / Date</th>
<th>Username</th>
<th>Action</th>
<th>List of Data Changes OR Fields Exported</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/22/2021 2:52pm</td>
<td>[survey respondent]</td>
<td>Manage/Design</td>
<td>Copy project as PID=2139 (&quot;Copy of eConsent Scanned Image Demo&quot;)</td>
</tr>
<tr>
<td>09/14/2021 12:54pm</td>
<td>[survey respondent]</td>
<td>Manage/Design</td>
<td>Download instrument ZIP file</td>
</tr>
<tr>
<td>07/08/2021 2:53pm</td>
<td>[survey respondent]</td>
<td>Manage/Design</td>
<td>Edit project field</td>
</tr>
<tr>
<td>07/08/2021 2:52pm</td>
<td>[survey respondent]</td>
<td>Manage/Design</td>
<td>Reorder project fields</td>
</tr>
<tr>
<td>05/04/2021 9:08pm</td>
<td>[survey respondent]</td>
<td>Updated Response 224</td>
<td>date_signed = '2021-05-04', fname = 'aaa', lname = 'bbb', participant_sign = '156712', participant_consent_v2_complete = '0'</td>
</tr>
<tr>
<td>05/04/2021 8:42pm</td>
<td>[survey respondent]</td>
<td>Updated Response 225</td>
<td>participant_sign = '156705'</td>
</tr>
<tr>
<td>05/04/2021 8:42pm</td>
<td>[survey respondent]</td>
<td>Updated Response 225</td>
<td>date_signed = '2021-05-04', fname = 'test', lname = 'test', participant_sign = 'test'</td>
</tr>
</tbody>
</table>
User Rights & Access

**Basic Privileges**

- Expiration Date
- Project Design and Setup
- User Rights
- Data Access Groups
- Calendar
- Add/Edit/Organize Reports
  Also allows user to view all reports (but not necessarily all data in the reports)
- Stats & Charts
- Data Import Tool
- Data Comparison Tool
- Logging
- File Repository
- Data Quality
  - Create & edit rules
  - Execute rules

**Privileges for Viewing and Exporting Data**

Data Viewing Rights pertain to a user's ability to view or edit data on pages in the project (e.g., data entry forms, reports). Users with 'No Access' Data Viewing Rights for a given instrument will not be able to view that instrument for any record, and nor will they be able to view fields from that instrument on a report. Data Export Rights pertain to a user's ability to export data from the project, whether through the Data Exports page, API, Mobile App, or in PDFs of instruments containing record data. Note: Data Viewing Rights and Data Export Rights are completely separate and do not impact one another.

<table>
<thead>
<tr>
<th>Data Viewing Rights</th>
<th>No Access</th>
<th>Read Only</th>
<th>View &amp; Edit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening Form</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Information Form</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consent Call Log</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consent Form</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview Call Log</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview Start</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESAS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Function: Activities Of Daily Living</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Activity: Leisure Time (Baseline)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Export Rights</th>
<th>No Access</th>
<th>De-Identify*</th>
<th>Remove All Identifier Fields</th>
<th>Full Data Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening Form</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Information Form</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consent Call Log</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consent Form</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview Call Log</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview Start</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESAS</td>
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</tr>
<tr>
<td>Physical Activity: Leisure Time (Baseline)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
REDCap allows you to create rules that can be used to monitor and check data quality.

<table>
<thead>
<tr>
<th>Rule #</th>
<th>Rule Name</th>
<th>Rule Logic</th>
<th>Total Discrepancies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Missing values*</td>
<td></td>
<td>313 view</td>
</tr>
<tr>
<td>B</td>
<td>Missing values* (required fields only)</td>
<td></td>
<td>0 view</td>
</tr>
<tr>
<td>C</td>
<td>Field validation errors (incorrect data type)</td>
<td></td>
<td>0 view</td>
</tr>
<tr>
<td>D</td>
<td>Field validation errors (out of range)</td>
<td></td>
<td>0 view</td>
</tr>
<tr>
<td>E</td>
<td>Outliers for numerical fields (numbers, integers, sliders, calc fields)</td>
<td></td>
<td>0 view</td>
</tr>
<tr>
<td>F</td>
<td>Hidden fields that contain values**</td>
<td></td>
<td>0 view</td>
</tr>
<tr>
<td>G</td>
<td>Multiple choice fields with invalid values</td>
<td></td>
<td>0 view</td>
</tr>
<tr>
<td>H</td>
<td>Incorrect values for calculated fields</td>
<td></td>
<td>0 view</td>
</tr>
</tbody>
</table>
Field-Level Controls

Add New Field

You may add a new project field to this data collection instrument by completing the fields below and clicking the Save button at the bottom. When you add a new field, it will be added to the form on this page. For an overview of the different field types available, you may view the Field Types video (4 min).

Field Type: Text Box (Short Text, Number, Date/Time, ...)

Field Label

Variable Name (utilized during data export)

ONLY letters, numbers, and underscores

Enable auto naming of variable based upon its Field Label?

Validation? (optional) ---- None ----

—or-

Enable searching within a biomedical ontology?

Field Annotation (optional)

Explanatory notes - not displayed on any page

Required? * No ○ Yes

* Prompt if field is blank

Identifier? ○ No ○ Yes

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

Custom Alignment Right / Vertical (RV)

Align the position of the field on the page

Field Note (optional)

Small reminder text displayed underneath field

Save  Cancel

REDCap 101 Fall Session
QUESTIONS or COMMENTS?

Next: Building a Project
Before You Start:
Decide What Type of Project Design is Needed

• Classic Database
• Longitudinal
Before you Start: Decide How to Collect the Data

- Case Report Form/Data Collection Form
- Survey

REDCap projects can have both FORMS and SURVEYS.
Overview: How a project is built

Create a new REDCap Project

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

Project title:
Training Demo
Title to be displayed on project webpage

Purpose of this project:
Practice / Just for fun

Assign project to a Project Folder?

Project notes (optional):
training

Start project from scratch or begin with a template?
- Create an empty project (blank slate)
- Upload a REDCap project XML file (CDISC ODM format)
- Use a template (choose one below)

Choose a project template:
- Basic Demography
- Classic Database
- Human Cancer Tissue Biobank
- Longitudinal Database (1 arm)
- Longitudinal Database (2 arms)

Create Project  Cancel

REDCap 101 Fall Session
Setting up a Project: Step-by-Step

- Main project settings
  - Use longitudinal data collection with repeating forms?
  - Use surveys in this project?
  - Modify project title, purpose, etc.

- Design your data collection instruments
  - Add or edit fields on your data collection instruments. This may be done by either using the Online Designer (off-line method) or by uploading a Data Dictionary (on-line 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.
  - You may also browse for pre-built data collection instruments in the REDCap Shared Library.
  - Have you checked the Check For Identifiers page to ensure all identifier fields have been tagged?

- Enable optional modules and customizations
  - Auto-numbering for records
  - Scheduling module (longitudinal only)
  - Randomization module
  - Designate an email field to use for invitations to survey participants

- Set up project bookmarks (optional)
  - You may create custom bookmarks to webpages that exist inside or outside of REDCap. These bookmarks will be shown as links on the left-hand project menu and can be accessed at any time by users who are given privileges to do so. Every project bookmark has custom settings that allow one to control its appearance and behavior.

- User Rights and Permissions
  - You may grant other users access to this project or edit the privileges of current users on this project by navigating to the User Rights page. Additionally, if you wish to limit user access to certain records/resources for this project, you may want to use Data Access Groups, in which only users within a given Data Access Group can access records created by users within that group.

- Test your project thoroughly
  - It is important to test the essential components of your project before moving it into production. Try creating a few test records and entering some data for each to ensure that your data collection instruments look and behave how you expect. Essentially, testing logic and calculations. Then review your test data by printing reports and exporting your data to View In Excel or a statistical analysis package. If you have surveys, complete the surveys as if you were a participant by using the Public Survey Link or Participant Link by sending a survey invitation to yourself. If other project modules will be used regularly, test them out a bit too. The best way to test your project is to use it as if you were entering real production data, and it is always helpful to have colleagues (especially team members) take a look at your project to get a fresh set of eyes looking at it.

- Move your project to production status
  - Move the project to production status so that real data may be collected. Once in production, you will not be able to edit the project fields in real-time anymore. However, you can make edits in Draft Mode, which will then need to be approved by a REDCap administrator before taking effect.
Example of a Build: Field Bank

Using the Field Bank, search for fields in various catalogs below by selecting a catalog and entering specific keyword. When reviewing the results of your search, click the "Add Field" button for the field to add that field to the current data collection instrument.

Select a catalog to search: NIH/NLM Catalog U.S. National Library of Medicine

race

61 fields found for NIH/NLM Catalog -> All Classifications - Keyword: race

- Race OMB.1997
  - Native Hawaiian or Other Pacific Islander
  - American Indian or Alaska Native
  - Asian
  - Black or African American
  - White

Classification: NLM
Description: The race of a person based on the Office of Management and Budget (OMB). Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity (Oct. 30, 1997).
Example of a Build: Creating Fields

Add New Field

You may add a new project field to this data collection instrument by completing the fields below and clicking the Save button at the bottom. When you add a new field, it will be added to the form on this page. For an overview of the different field types available, you may view the Field Types video (4 min).

Field Type: Text Box (Short Text, Number, Date/Time, ...)

Field Label

Field Annotation (optional)

Variable Name (utilized during data export)

Validation? (optional)

Enable searching within a biomedical ontology

Required?

Identifier?

Custom Alignment

Field Note (optional)

Explanatory notes - not displayed on any page

Enable auto naming of variable based upon its Field Label?

Choose ontology to search

Prompt if field is blank

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

Align the position of the field on the page

Small reminder text displayed underneath field

Save Cancel
Example of a Build: Uploading Metadata

Data Dictionary

- The Data Dictionary is a formatted spreadsheet in CSV (comma separated format) containing the metadata used to construct data collection instruments and fields.

This is recommended for advanced users.
QUESTIONS or COMMENTS?

Next: Collecting Data
Collecting Data: How Data is Captured

- Chart abstractions
- Telephone interviews
- Face-to-face interviews
- Transcriptions from paper forms

**Third-Party Cloud Data** (e.g., Fitbit)

**Third-Party API**

**REDCap API**

**External Application**

**Data Warehouse** (e.g., Epic)

**Open Standards Data Layer**

**Data Exports** (e.g., JDAT)

**Study Documents**

**Direct Entry**
- Self-completed online surveys
- Offline entry (mobile app)

**Sync**

**Upload**

**Pull**

**Push**

**API** Application Programming Interface

**JDAT** Joint Data Analytics Team

**FHIR** Fast Healthcare Interoperability Resources

**Resources**
Example of Case Report Form
Data Collection Form

Data Entry Form – completed by study staff
Example of Data Collection Form: Surveys

Survey – completed by a participant
QUESTIONS or COMMENTS?

Next: Data Management Tools
Advanced Overview: Data Management

**STATISTICAL SOFTWARE**
(e.g., SAS, SPSS, R, STATA)

**PROJECT ARCHIVE**
(CDISC-ODM)

- **OFFLINE STORAGE**
- **DATA SHARING**
- **TRANSFER TO OTHER INSTITUTION**

**TRANSFER TO OTHER DBMS**

**DE-IDENTIFIED DATAMART**

**REDCap API**

**SPECIALIZED SAS PROGRAM**

**EXTERNAL DATABASE**

**MANUAL DATAMART**

**AUTOMATED DATAMART**

**PRINTED FORMS**

**CODEBOOKS**

**STATISTICS and DATA VISUALIZATIONS**

**USER-DEFINED REPORTS**

**DATA EXPORT**

**GENERATED CODE**

**EXTERNAL APPLICATION**

Reports and Data Import/Export

Spring Session
Data Management Tools: Reporting

Reports can be used to facilitate data management, interim results and analysis.

This module allows you to easily view reports of your data, inspect plots and descriptive statistics of your data, as well as export your data to Microsoft Excel, SAS, Stata, R, or SPSS for analysis (if you have such privileges). If you wish to export your *entire* data set or view it as a report, then Report A is the best and quickest way. However, if you want to view or export data from only specific instruments (or events) on the fly, then Report B is the best choice. You may also create your own custom reports below (if you have such privileges) in which you can filter the report to specific fields, records, or events using a vast array of filtering tools to make sure you get the exact data you want. Once you have created a report, you may view it as a webpage, export it out of REDCap in a specified format (Excel, SAS, Stata, SPSS, R), or view the plots and descriptive statistics for that report.
Data Management Tools: Statistics and Graphs/Charts
Data Management Tools: Exports

Exporting "Test"

Select your export settings, which includes the export format (Excel/CSV, SAS, SPSS, R, Stata) and if you wish to perform de-identification on the data set.

Choose export format

- CSV / Microsoft Excel (raw data)
- CSV / Microsoft Excel (labels)
- SPSS Statistical Software
- SAS Statistical Software
- R Statistical Software
- Stata Statistical Software
- CDISC ODM (XML)

De-identification options (optional)

The options below allow you to limit the amount of sensitive information that you are exporting out of the project. Check all that apply.

Known Identifiers:
- Remove all tagged Identifier fields (tagged in Data Dictionary)
- Hash the Record ID field (converts record name to an unrecognizable value)

Free-form text:
- Remove unvalidated Text fields (i.e. Text fields other than dates, numbers, etc.)
- Remove Notes/Essay box fields

Date and datetime fields:
- Remove all date and datetime fields
  - OR -
- Shift all dates by value between 0 and 364 days (shifted amount determined by algorithm for each record)
  - What is date shifting?

Re-select all options

Export Data  Cancel
The Data Dictionary Codebook is a ‘human’ readable, read-only version of the project data dictionary.

### Data Dictionary Codebook

<table>
<thead>
<tr>
<th>#</th>
<th>Variable / Field Name</th>
<th>Field Label</th>
<th>Field Attributes (Field Type, Validation, Choices, Calculations, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>subjId</td>
<td>Subject ID</td>
<td>text (integer, Min: 8000, Max: 9999), Required</td>
</tr>
<tr>
<td>2</td>
<td>demo_date</td>
<td>Date Completed Demographics Form</td>
<td>text (date, mdy), Required</td>
</tr>
<tr>
<td>3</td>
<td>demo_init</td>
<td>Staff Initial</td>
<td>text, Required</td>
</tr>
<tr>
<td>4</td>
<td>age</td>
<td>Section Header: Demographics Form</td>
<td>text (integer, Min: 40), Required</td>
</tr>
<tr>
<td>5</td>
<td>sex</td>
<td>Gender</td>
<td>radio, Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Male</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 Female</td>
</tr>
<tr>
<td>6</td>
<td>ethnic</td>
<td>Ethnicity</td>
<td>radio, Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Hispanic or Latino</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 Not Hispanic or Latino</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 Declined to answer</td>
</tr>
<tr>
<td>7</td>
<td>race</td>
<td>Race</td>
<td>radio, Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 American Indian or Alaskan Native</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 Asian</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 Black or African American</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 Native Hawaiian or Pacific Islander</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 Mixed race</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7 Unknown</td>
</tr>
</tbody>
</table>

Instrument: Demographics (demographics)
QUESTIONS or COMMENTS?

Next: Resources to help you get started
REDCap Support

DIY

+ Training Sessions Consultations
25 training video tutorials
Help & FAQ

Embedded text and videos throughout.
For example, in the online designer:
FAQ Library: Step-by-step instructions

**How do I build an eConsent?**

[Copy & Paste or Type Content]

There are two ways to build an electronic consent document (eConsent) using REDCap. These instructions explain how to copy and paste (or type) content into REDCap. To build an eConsent by scanning an image of the consent form, please refer to FAQ: Build an eConsent [Scanned Image].

Other Videos & Libraries
Upcoming Spring Trainings

- REDCap 201
- Managing Data in REDCap: Reports, Import, Export
- Yale Study Support Suite (YES3): Exporter

Fall Training: REDCap 101, New Features, Survey Development
Trainings & Audience

https://portal.redcap.yale.edu/resources/training

How many years have you used REDCap?

- 0 yrs - I'm new to...
- < 1 yrs
- 1 - 3 yrs
- 4 - 5 yrs
- > 5 yrs

- REDCap: All Purpose Data Tool
- REDCap 101
  - Survey Development
- REDCap 201
  - YES3 Exporter
  - Reports & Data Import/Export
- New Features
QUESTIONS or COMMENTS?
REDCap@Yale Team

Top Row
Denise Acampora
Katy Araujo
Peter Charpentier
Kraig Eisenman
Brian Funaro
Mary Geda

Bottom Row
Tyler Hamilton
Dana Limone
Janet Miceli
Jesse Reynolds
Sui Tsang
Maxwell Wibert

redcap@yale.edu
EXTRA CONTENT

Next: Advanced Data Management Tools
Individual packages of software that extend REDCap's functionality.
External Modules (EMs)

- Commonly used external modules
  - Form Render Skip Logic
    - Show and hide forms based on branching logics
  - Image Map
    - User can click on image regions to select field options, e.g. pain map
  - Cross-project piping
    - Pipe data from one project to another project
  - Auto Complete Form Status Based on Required Fields

*Contact us for suitability of external modules for your project*
REDCap@Yale team secures NIH funding to support REDCap External Modules

October 5, 2021

Coming Soon:

Powerful REDCap software tools to support your research.

We are happy to announce that the REDCap@Yale team has secured funding through a NIH NOSI award along with two Development Projects under the Yale OAIC Pepper Center to make components of the Yale Study Support Suite (YES3), a Dashboard EM and a Study Portal EM, widely available.

As part of our 2021-2022 NIH award for the Yale Study Support Suite (YES3), we are sponsoring two internships.

Click the link below for more information.

External link: https://medicine.yale.edu/news-article/yale-program-on-a-new-redcap-platform-to-help-researchers-get-common-data-correctly-stored
Sneak Peek: The YES3 Exporter

FEATURES

- A "horizontal" layout for longitudinal studies.
- Optimized for datamart integrations.
- Speed - good performance on large exports.
- Can write directly to host file system
- Daily activity summary emails
- Audit logs

YES3 Exporter Training
Thursday, May 11 1:00 – 2:00
QUESTIONS from the audience

How do users choose between REDCap and Qualtrics?
## REDCap versus Qualtrics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Qualtrics</th>
<th>REDCap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expense/Cost</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Learning Curve</td>
<td>Easy</td>
<td>Moderate</td>
</tr>
<tr>
<td>Classic or Longitudinal Design</td>
<td>Classic</td>
<td>Both</td>
</tr>
<tr>
<td>Randomization</td>
<td>Yes (limited)</td>
<td>Yes</td>
</tr>
<tr>
<td>Instrument type (survey, direct data entry)</td>
<td>Survey</td>
<td>Both</td>
</tr>
<tr>
<td>Editable look-and-feel (graphic customization)</td>
<td>Yes</td>
<td>Yes (limited)</td>
</tr>
<tr>
<td>Data Quality Checks</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>File uploads- scans, images, documents</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>API integration</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data Dictionary format</td>
<td>None (.qsf/JSON file)</td>
<td>Excel/CSV</td>
</tr>
<tr>
<td>Ability to import datasets</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Automated survey invitations and email alerts</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data Export Types</td>
<td>SPSS, CSV, TSV, Excel, XML</td>
<td>SPSS, Stata, R, SAS, Excel, CSV, CDISC-ODM</td>
</tr>
</tbody>
</table>
REDCap Advantages
Features not available in Qualtrics

- Export to SAS, STATA, R, SPSS, .csv
- Data quality rules
- Longitudinal or repeated measures
- Audit trails in logins
- Automated Survey Invitation and email alert options
- Ability to use a survey as both a survey and a case report form
- eConsent frameworks in Survey Settings

Qualtrics Advantages:
Features not available in REDCap

- Export to .tsv
- Flexibility to graphically customize survey forms, web browser format (e.g., page at a time), and mobile device format (e.g., one question at a time)
- Nice library of pre-built surveys, blocks, and questions
- Survey flow features not available in REDCap: Question Randomizer, Web Service, authenticator, embedded data, table of contents
- Additional survey question types: Side by Side, Constant Sum, Hot Spot, Drill down, Gap Analysis, Timing, Pick Group Rank, Heat Map, Graphic Slider, record browser information
  - Some of these additional field types may be supported by REDCap external modules
- Additional survey applications: Survey Scoring