

AnVIL User Guide for REDCap

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Introduction

The goal of this user guide is to provide users within the AnVIL platform the tools to be able to export data from their REDCap project onto other online platforms to increase interoperability.

Base REDCap vs External Modules

One of the common misconceptions is that the API tool is either part of base REDCap or it is an external module. It is important to remember that the API is neither. While the ability to generate a token is controlled through the user rights, the API import/export process is a separate entity.

Base REDCap:

Refers to anything a user can do with their REDCap system which does not require an extension of the codebase. These are tasks a user can perform when they log into REDCap and have the appropriate user rights. It is important to note that REDCap is often releasing updates weekly and each user's system is uniquely configured. If there is a screenshot where something doesn't look exactly like your REDCap instance or you find you cannot perform a task then please contact your local REDCap administrator for assistance. Please note that the AnVIL team cannot access your system to implement any changes.

External modules:

These are add-on features built by developers to extend the functionality of the base REDCap code. There are times where an external module can be converted into base REDCap if it provides a service that the majority of users would benefit from. Whether you can enable external modules depends on your administrators, some sites will allow the use of them while others may choose to not allow their users access. It is important to remember that while the external modules are checked by local administrators before being enabled, they are often not supported by REDCap staff. This means that if a feature breaks, it often takes a study team putting a budget into place to have their local admins or the Vanderbilt team fix the issue. At this moment there are no external modules to pull information from a REDCap project onto another online platform. This function will have to be done through base REDCap tools. ***Please note that there is an API Sync module, however do not enable this specific module for this particular task because it is only designed to move data from one REDCap project to another.***

Manual Data Export From REDCap Into Terra

REDCap User Rights

In order to create reports and export the data users must have add/edit/organize report rights and access to the data via the user rights page. The highlighted options below will show what needs to be selected for a given user in order to access these features.

Editing existing user "lewisa_3"

You may set the rights for the user below by checking the boxes next to the application tools to which you wish to grant them access. You may also grant them or deny them access to individual data collection instruments, if so desired. To save your selections, click the "Save Changes" button at the bottom of the page.

Editing existing user "lewisa_3"

Basic Privileges

Expiration Date (if applicable) (M/D/Y)

Highest level privileges:

Project Design and Setup ☐

User Rights ☒ No Access
☐ Read Only
☐ Full Access

Data Access Groups ☐

Other privileges:

Manage MyCap Participants ☐

Survey Distribution Tools ☐

Alerts & Notifications ☐

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 ☐

Randomization ☐ Setup
☐ Dashboard
☐ Randomize

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, 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.

	Data Viewing Rights				Data Export Rights			
	No Access (Hidden)	Read Only	View & Edit	Edit survey responses	No Access	De-identified*	Remove All Identifier Fields	Full Data Set
Uploads (survey)	☒	☐	☐	☐	☐	☐	☐	☒
Instrument 1 (survey)	☒	☐	☐	☐	☐	☐	☐	☒
Descriptive Test Field Pdf Test (survey)	☒	☐	☐	☐	☐	☐	☐	☒
Descriptive Test Field Pdf Test 2 (survey)	☒	☐	☐	☐	☐	☐	☐	☒

* De-identified means that all free-form text fields will be removed, as well as any date-time fields and Identifier fields.

Save Changes **Cancel** **Remove user**

User rights regarding API use are discussed in the section "[REDCap API User Rights](#)".

Create Custom Report

You may create your own custom reports 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.

Custom report: Step 1

To get started, click on Data Exports, Reports & Stats on the left-hand navigation bar. In your

workspace on the right-hand side of the screen, you will see a tab 'Create New Report' – click on that.

Enter a name for the report and indicate who should be able to access the report:

- All users
- A list users specified by name
- All users from a particular user role or roles
- All users from a particular data access group or groups (see [User Rights](#) for more information about user roles and data access groups)

Indicate who should have access to editing, copying or deleting the report. This feature will only be available to users on the project who have "Add/Edit/Organize Reports" privileges. Multiple users might want to use a report in different ways and might choose to change some of the fields, filters or sorting options. This setting will allow you to restrict other users' ability to make those changes.

Custom report: Step 2

Specify the fields to include in the report

STEP 2

Fields to include in report

+ Quick Add

Add all fields from selected instrument: -- choose instrument --

Field 1	record_id "Record ID"		Instrument: Registration Survey	X
Field 2	Type variable name or field label		Instrument:	

Notes:

- If your list of fields is very long, it can be easier to find them by clicking **ABI** and opting to have a text entry box with an autocomplete dropdown.

re

record_id "Record ID"

email "Email address"

- You can click on the 'Quick Add' button to easily tick off the fields you want to see in the report
- You may reorder fields by dragging a field to a new position
- Remove fields using the red **X**

Additional report options

Additional report options (optional)

- ☐ Include the survey identifier field and survey timestamp field(s)?
- ☐ Combine checkbox options into single column of only the checked-off options (will be formatted as a text field when exported to stats packages)
- ☒ Remove line breaks/carriage returns from all text data values (only applicable for CSV Raw and CSV Label data exports)

In the report header, display the field label, variable, or both (not applicable for exports)? Both 

In the report's data, display the field label, raw data value, or both for multiple choice fields (not applicable for exports)? Both 

Include the Data Access Group name for each record

If your project has Data Access Groups, you will have the option to include the Data Access Group name as a data point in the report.

Survey Identifier field and survey timestamp fields

If your project includes surveys, you have the option to tick a box so that the survey identifier field and survey timestamp fields are included in your report.

If you use multiple-choice checkboxes in your project, you will note that each choice takes up its own column in a report or export. If you prefer to have those columns combined, tick the option to combine checkbox options.

Custom report: Step 3**Specify a filter for the records (optional).**

You can apply straightforward filters by selecting the relevant fields and specifying an operator (e.g. “equals”) and a value to match. For complex expressions involving functions or requiring parentheses click [Use advanced logic](#) to write your filter expression. The syntax for the expression follows the same rules as for [calculated fields](#) and branching logic.

Live Filters

Live filters can be selected on the report page for dynamically filtering data in real-time. With the exception of the Record ID field, only multiple-choice fields can be used as Live Filters. After applying a Live Filter, report results can be exported as filtered.

An example of when this might be useful is if you are looking at a report of all patients who have diabetes. You could have a live filter on gender and race. When you first view the report (with no live filters), you would see all patients with diabetes. If you wanted to know how many of them are female, you could click on the live filter for gender and select to only see females. You would then be looking at a subset of your data: patients with diabetes who are female. You can then click the live filter for race and select African American. That would deliver you a further sub-set of data, this one displaying only the African American female patients who have diabetes.

DAG filter

If your project has DAGS in it, you have the option to limit your results based on DAG name(s).

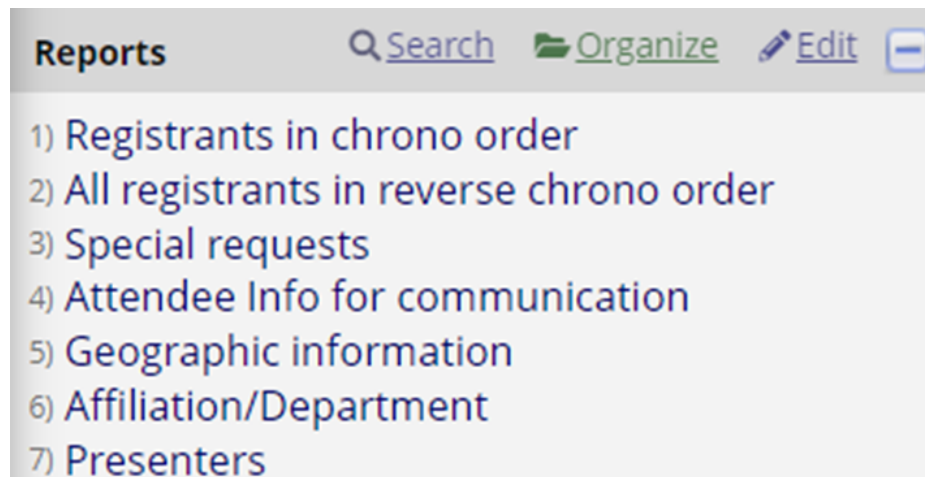
Custom report: Step 4

Specify up to three of the report fields by which the records will be sorted.

You will then click **Save Report**. You will be asked if you wish to View the Report, Return to My Reports & Exports or Continue Editing the report. Once you click View Report, your report will be added to your report list on the left-hand navigation bar.

My Reports & Exports			
	Report name	View/Export Options	Management Options
A	All data (all records and fields)	View Report Export Data Stats & Charts	
B	Selected instruments (all records)	Make custom selections	
1	Registrants in chrono order	View Report Export Data Stats & Charts	Edit Copy Delete

Reports are also listed in their own section of the left-hand menu and are available directly from any project page.



You can also download all files on a report. When viewing a report (including public reports) that contains one or more File Upload fields or Signature fields, a “Download Files (zip)” button will appear on the page to allow users to easily download all the report’s uploaded files into a single zip file for those fields for the records in the report.

Data Export From REDCap Reports

After a report has been created, the report can either be viewed in REDCap or exported. Manual data export is one method in which data can be exported from the REDCap project. The following steps will provide users the appropriate steps to export data in a way to facilitate import into the Terra system.

There are two locations in which report data can be exported. First is directly from the report after it has been run and viewed. Second is directly in the My Reports & Exports page. Both methods will export the data in the same way.

Method #1

Data Exports, Reports, and Stats

[VIDEO: How to use Data Exports, Reports, and Stats](#)

[+ Create New Report](#)
[My Reports & Exports](#)
[Other Export Options](#)
[View Report: Terra Data](#)

Number of results returned: 1
 Total number of records queried: 1
 Report execution time: 0.2 seconds

[Stats & Charts](#)
[Export Data](#)
[Print Page](#)
[Edit Report](#)

Terra Data

Gender SEX	Date of birth dob	Ethnicity ethnicity	Race race
Decline to state (1002)	04-26-2024	NOT Hispanic or Latino (1)	American Indian/Alaska Native (0)

Method #2

REDCap

Logged in as lewis7 | Log out

My Projects or Control Center

REDCap Messenger

Contact REDCap administrator

View project as user: -- select a user --

Enter PID to go to project

Project Home and Design

Project Home | Project Setup

Designer | Dictionary | Codebook

Project status: Development

Data Collection

Survey Distribution Tools

Record Status Dashboard

Add / Edit Records

Applications

Project Dashboards

Alerts & Notifications

Multi-Language Management

Data Exports, Reports, and Stats

Test PID 163674

Data Exports, Reports, and Stats

[+ Create New Report](#)
[My Reports & Exports](#)
[Other Export Options](#)

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.

My Reports & Exports		View/Export Options	Management Options	Report ID (auto-generated)	Unique report name (auto-generated)
A	All data (all records and fields)	View Report Export Data Stats & Charts			
B	Selected instruments (all records)	Make custom selections			
1	Terra Data	View Report Export Data Stats & Charts	Edit Copy Delete	342817	R-988YR39CFT

[+ Create New Report](#)

After clicking the Export Data button for a report, you must select the export format and any de-identification options.

Exporting "Terra Data"

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 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?](#)

☐ Also shift all survey completion timestamps by value between 0 and 364 days (shifted amount determined by algorithm for each record)

[Deselect all options](#)

Advanced data formatting options

Export blank values for gray Form Status?

All Form Status fields with a gray status icon can be exported either as a blank value or as "0" (Incomplete). Hint: Blank values are recommended if the data will be imported back into REDCap, in which this preserves the gray status icons for all the imported records.

Export gray Form Status fields with value of "0"

Set CSV delimiter character

Set the delimiter used to separate values in the CSV data file (only valid for CSV Raw Data and CSV Labels export formats):

, (comma) - default

Force all numbers into a specified decimal format?

You may choose to force all data values containing a decimal to have a specified decimal character (comma or period/full stop). This will be applied to all calculations and number-validated text values in the export file.

Use period/full stop (.) as decimal for all numbers

NOTE: Your data formatting selections above will be remembered in the future and will be pre-selected upon your next export.

Export Data

Cancel

Export Formats

Choose how you would like to download the data. Either in csv or for a specific statistical software.

CSV Format

Raw data: When exported in raw format the variable names will be in the first row with the associated raw data value below.

	A	B	C
1	record_id	participant_complete	consent_survey_complete
2	112	2	2
3	211	2	0
4	212	2	0

Labeled data: When exported with labels the field labels will show in the first row with the labels for the data appearing in the record rows below.

	A	B	C
1	Record ID	Complete?	Complete?
2	112	Complete	Complete
3	211	Complete	Incomplete
4	212	Complete	Incomplete

Use the "Raw" option if you are wanting to make a backup of your data or if you want to use the data for producing charts or to prepare a file to import back into REDCap (or indeed another

system).

Remember that CSV files are NOT Excel files, and Excel may not display CSV data exactly how it is in the CSV file.

Statistical Software

For each stats package option (SPSS, SAS, R and Stata) REDCap will give you a raw data file in CSV format and a syntax file that will read in the data from the CSV file and apply the appropriate column formatting, variable labels and value labels.

De-Identification

- **Known identifiers:** obfuscate record identifiers and/or ensure all fields that are flagged as identifiers in the online designer or data dictionary are excluded from the export
- **Free-form text:** text entry fields with no validation (and particularly Notes-type fields) may well have identifying information entered into them. You can opt to exclude such fields from the export
- **Date and datetime fields:** can be excluded or date-shifted whereby all dates for each record are shifted by a random but consistent number of days (for example, record 1 dates all +23 days, record 2 dates all +201 days, etc.)

For users whose export permissions are set to **De-identified only** (see User Rights) these options (with the exception of record identifier hashing) are always applied.

Downloading

After the export is run and you have confirmed the citation reminder you are presented with buttons for downloading the files in the format you chose. For example, here a raw data file and Stata syntax (.do) file:

Notes on CSV files:

- Note the reminder to cite your use of REDCap in any published material. See [Citing REDCap](#) for example text.
- The data in the Excel CSV Raw and stats package DATA CSV files are identical – raw, unlabeled data in [CSV format](#) – but the stats package DATA CSV files do not contain header rows (field information is included in the syntax files).
- The [Pathway Mapper](#) files for SPSS and SAS are Windows batch files. When you have downloaded the associated syntax and data files, you can run (double-click) the pathway mapper. It will update the syntax file's file handle/in file statement so that it includes the full file path to the location where the files are saved.

Using the [Pathway Mapper](#) is optional (and not possible if you use Mac or Linux). You can perform the same task by manually setting the path in the syntax file, or by setting the current working directory to the appropriate location.



- [Send file?](#) loads the export files into REDCap's [Send-It](#) application, enabling you to send the files securely to anyone. The maximum file size is 125 MB.
- All exports are saved to the database and can be downloaded again using the [File Repository](#)

PDF & Other Export Options

The [PDF & Other Export Options](#) tab gives you options for downloading:

- A ZIP file containing all files uploaded to all of your project records
- A single PDF containing all data for all forms for all of your project records. Further information is available in the text on the page.

Data Import into Terra

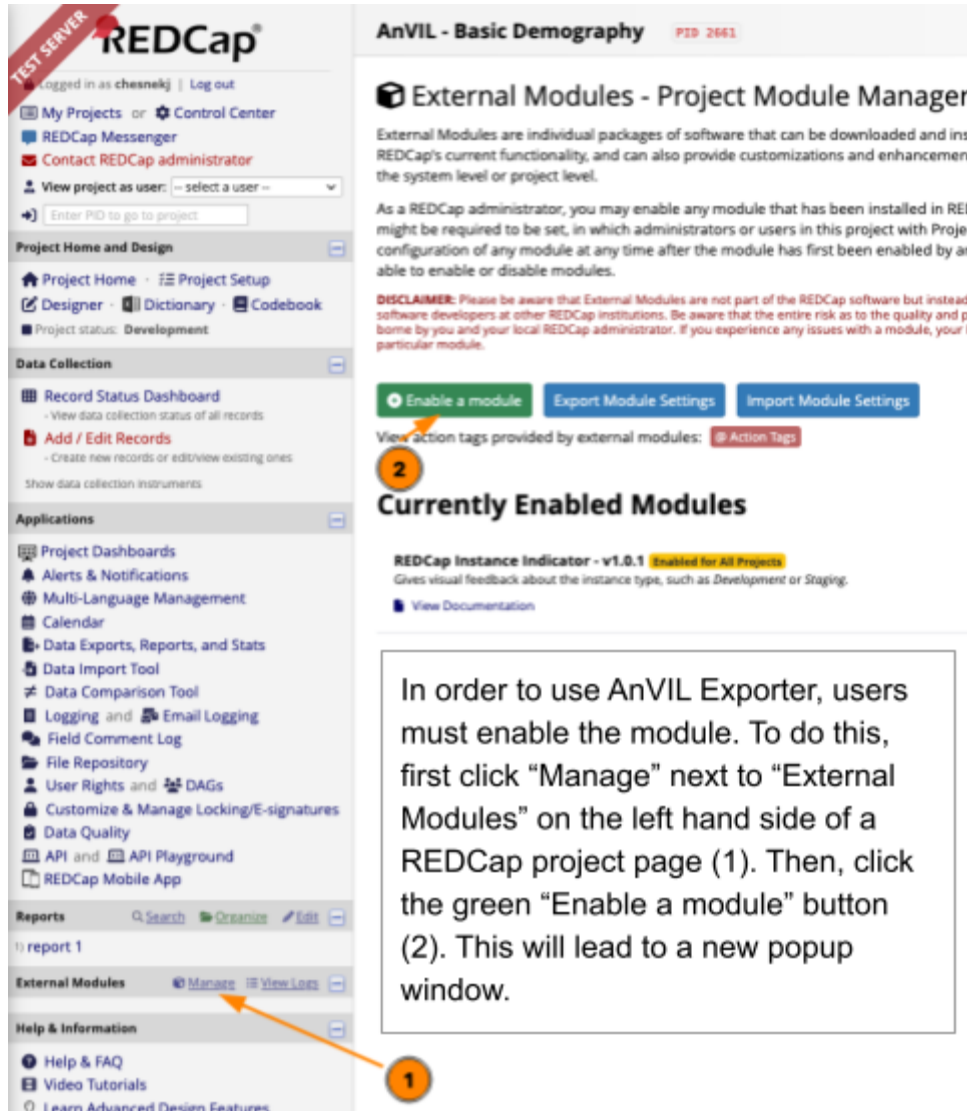
Now that the data has been exported you should proceed with importing the data into the Terra tables. The below links will help guide you through the process of formatting and importing the data appropriately for the Terra system.

- [T101 - Data Tables Quickstart Guide – Terra Support](#)
- [Upload data and populate the table with linked file paths – Terra Support](#)

Data Export into Terra Using “AnVIL Exporter” REDCap External Module

A new external module “AnVIL Exporter” has recently been deployed to REDCap. This module allows users of REDCap to submit clinical or survey data collected on REDCap into Terra through an easy, push-button export. A video on the full process can be found [here](#). The README file for the AnVIL Exporter External Module can be found [here](#).

Module Activation



External Modules - Project Module Manager

External Modules are individual packages of software that can be downloaded and installed on REDCap's current functionality, and can also provide customizations and enhancement to the system level or project level.

As a REDCap administrator, you may enable any module that has been installed in REDCap. As a REDCap administrator, you might be required to be set, in which administrators or users in this project with Project configuration of any module at any time after the module has first been enabled by an administrator. You are able to enable or disable modules.

DISCLAIMER: Please be aware that External Modules are not part of the REDCap software but instead software developed by other REDCap institutions. Be aware that the entire risk as to the quality and performance of any module is borne by you and your local REDCap administrator. If you experience any issues with a module, your local REDCap administrator should be contacted.

Enable a module **Export Module Settings** **Import Module Settings**

View action tags provided by external modules: **Action Tags**

2

Currently Enabled Modules

REDCap Instance Indicator - v1.0.1 **Enabled for All Projects**
Gives visual feedback about the instance type, such as Development or Staging.
[View Documentation](#)

In order to use AnVIL Exporter, users must enable the module. To do this, first click "Manage" next to "External Modules" on the left hand side of a REDCap project page (1). Then, click the green "Enable a module" button (2). This will lead to a new popup window.

1



Available Modules **3**

anvil_exporter - v2.2.0
AnVIL Exporter
[View Documentation](#)

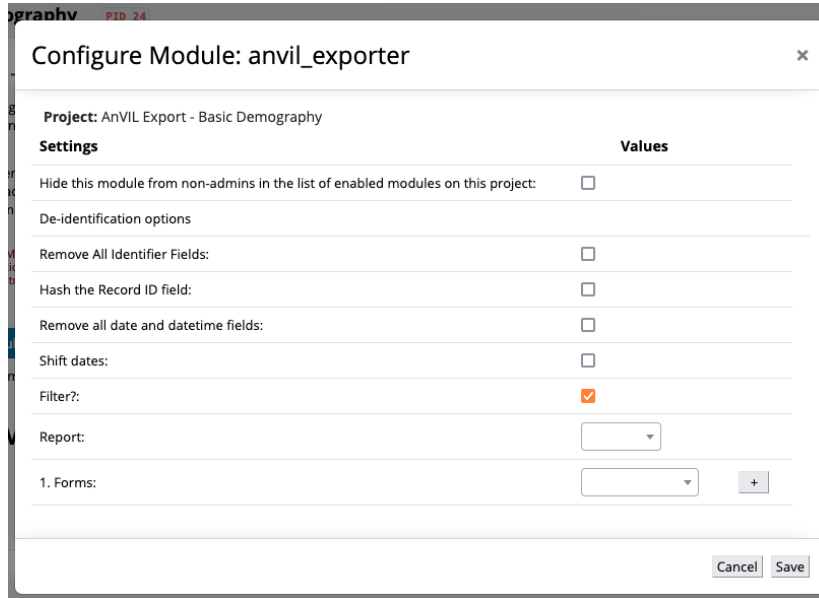
Enable **4**

In the popup window, search for "anvil" in the search bar (3). Click "Enable" (4) for the module "anvil_exporter" to enable the module.

Once the external module is activated, a link "Import to Terra (redirect)" will appear under "External Modules" on the left hand column of the REDCap project.

Module Configuration

External modules have a “configure” button on the External Modules REDCap page. The AnVIL Exporter module configuration options allow for de-identification, export of a specific report, and export of specific forms.



The de-identification options are identical to the de-identification options available when performing a base REDCap data export.

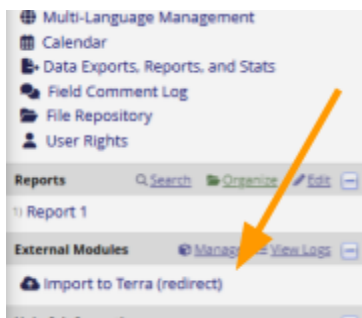
These options include:

- Remove all identifier fields as tagged in the data dictionary
- Hash the record ID field (converts record name to an unrecognizable value)
- Remove all date and datetime fields
- Shift all dates by a value between 0 and 364 days

Users also have the option to limit the export to a report or specific forms in the project. Selecting a report will override any forms selected. Leaving the report option blank will enable form filtering.

Click “Save” to save the configuration options.

Initiating Export to Terra from REDCap

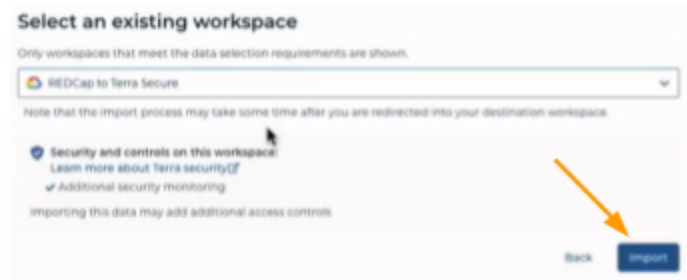


Once the AnVIL Export module is activated and configured, users can initiate the export by selecting “Import to Terra (redirect)” in the External Modules section on the left hand side of the REDCap project.

This will open a new window redirecting the user to their Terra instance, where they can sign in to their Terra account.

Simultaneously, when “Import to Terra (redirect)” is clicked, a PFB file will be generated and stored in the project’s file repository. This file will be deleted after it has been imported into Terra.

Once users log in to their Terra account, they can select the workspace to which the data will be imported to.



Users will select “Import” to prompt the import.

Product in Terra

Based on the previously selected module configuration options, a table will be created in Terra for each form, along with an additional table containing the REDCap project’s codebook. Each record and instance will result in a row in the corresponding table.

Programmatic Export Using REDCap API

In the previous section we discussed ways to manually export data from REDCap into Terra. The following section gives users an overview of REDCap’s API feature and ways to implement it for data transfer. Some of the specifics covered included user right requirements, API token creation, and how to use said API token. Along with the general API principles we included a great hand-on practice scenario for those wanting to explore the API in real practice.

What is the API?

API stands for Application Programming Interface and, in this instance, it allows an external application to connect to REDCap remotely. For details on the capabilities of the REDCap API and how to use it, please see the [REDCap API documentation](#).

Please note that while you do not have to be proficient in programming languages to utilize the API, a working knowledge of R or other similar language will be helpful in some instances.

REDCap API User Rights

The first step in this process is to ensure you have the necessary user rights for using the API feature built into base REDCap to export and import data. To access the user rights you must



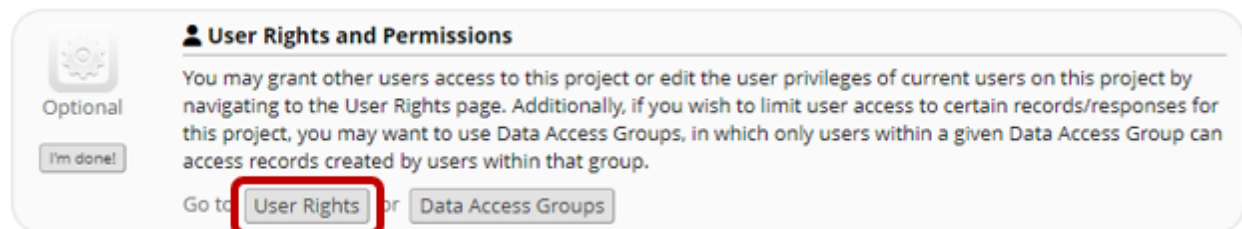
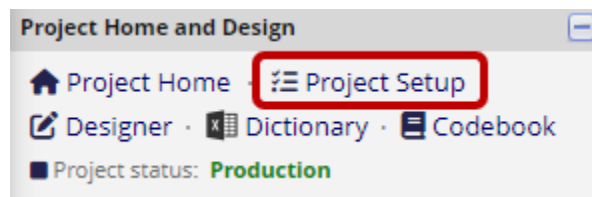
first have the necessary permissions, usually granted to you by the owner of the project or the person who is in charge of the study.

If you do not have access to the user rights section please contact study team personnel at your local site. Unless the project is owned by Vanderbilt no one on the Vanderbilt AnVIL team nor any REDCap administrators will have access to the project to make any changes for you.

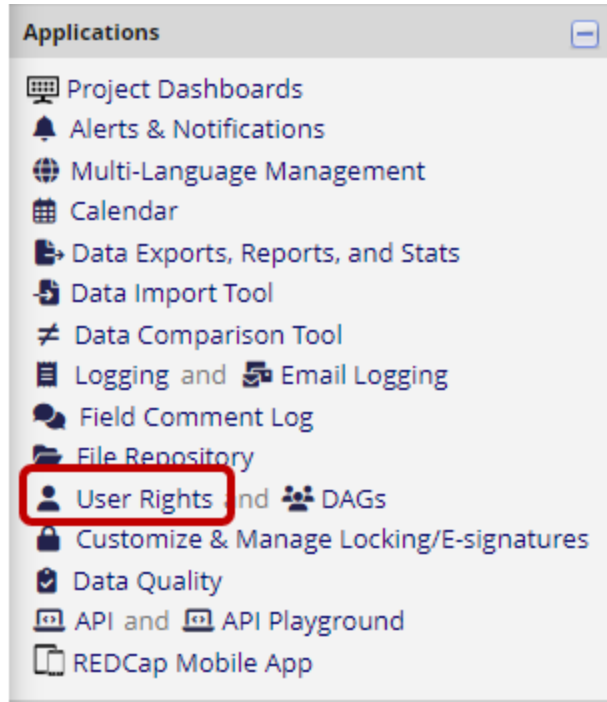
If you do not see API import/export rights as an option on the user rights page, please contact your local REDCap administrator.

Please note that not everyone in your project will need an API token/user rights. Once an API token is generated they will have full user rights for this feature and any data breaches are not the responsibility of the AnVIL team.

- 1) There are two ways to access the User Rights for the project:
 - a) The first way is to go to the “Project Setup” page which is located on the left hand side of the screen under the Project Home and Design section.



- b) The second way is to go to the Applications section on the left hand side of the screen and click on “User Rights.”



- 2) This will take you to the user rights section. From here you can either add a user to the project or you can alter the user rights of someone who already has access to the project.

Please note that anyone who has API import/export rights has the potential to import/export data to and out of the project. This could include PHI (protected health information) if they have access to this within the project. If you do not want someone accidentally exporting PHI then you will need to ensure their user rights prohibit them from exporting a full data set. Please follow your institution's best practices when dealing with sensitive information.

- 3) Adding API rights to a new user:
 - a) This step will vary per institution. Adding a new user will depend on how REDCap access is managed. It is usually done through either a username or an email address. Once you have found the correct person click on “Add with custom rights” or “Assign to role” if your project is controlling access through roles.
Please note that if you change the user rights of a role EVERYONE in that role has the potential to generate an API token.

This page may be used for granting users access to this project and for managing the user privileges of those users. You may also create roles to which you may assign users (optional). User roles are useful when you will have several users with the same privileges because they allow you to easily add many users to a role in a much faster manner than setting their user privileges individually. Roles are also a nice way to categorize users within a project. In the box below you may add/assign users or create new roles, and the table at the bottom allows you to make modifications to any existing user or role in the project, as well as view a glimpse of their user privileges.

[Upload or download users, roles, and assignments](#)

Add new users: Give them custom user rights or assign them to a role.

[+ Add with custom rights](#)

[Assign to role](#)

Create new roles: Add new user roles to which users may be assigned.

[+ Create role](#)

(e.g., Project Manager, Data Entry Person)

- b) The API rights should be unchecked and you will also notice that the viewing and export rights default to the full data set, this means that anything marked as an identifier will be able to be viewed and potentially exported.

Basic Privileges

☐ Expiration Date (if applicable)

Highest level privileges:

☐ Project Design and Setup

☒ User Rights

☐ No Access

☐ Read Only

☐ Full Access

☐ Data Access Groups

Other privileges:

☒ Survey Distribution Tools

☐ Alerts & Notifications

☒ 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

☒ API

What is the REDCap API?

☐ API Export

☐ API Import/Update

Settings pertaining to the REDCap Mobile App:

☐ REDCap Mobile App

What is the REDCap Mobile App?

☐ Allows user to collect data offline in the mobile app

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, 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.

	Data Viewing Rights				Data Export Rights			
	No Access (Hidden)	Read Only	View & Edit	Edit survey responses	No Access	De-identified*	Remove All Identifier Fields	Full Data Set
Birth Record (survey)	☐	☐	☒	☐	☒	☐	☐	☐
Parent Consent (survey)	☐	☐	☒	☐	☒	☐	☐	☐
Demographics (survey)	☐	☐	☒	☐	☒	☐	☐	☐
Contact Info (survey)	☐	☐	☒	☐	☒	☐	☐	☐
Demos (survey)	☐	☐	☒	☐	☒	☐	☐	☐

* De-identified means that all free-form text fields will be removed, as well as any date/time fields and Identifier fields.

Assign user to a Data Access Group

New User Notification

☒ Notify user of their project access via email?

- c) Change the user rights of the individual as needed. Please note that the person may not need API import rights and the form viewing and export rights will vary per project. If you have any questions about which rights should be granted please reach out to study personnel.

Basic Privileges

Expiration Date

(if applicable)

(M/D/Y)

Highest level privileges:

Project Design and Setup

☐

User Rights

☒ No Access
☐ Read Only
☐ Full Access

Data Access Groups

☐

Other privileges:

Survey Distribution Tools

☒

Alerts & Notifications

☐

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

☐

What is Data Quality?

API

☒

What is the REDCap API?

Settings pertaining to the REDCap Mobile App:

☐ REDCap Mobile App

What is the REDCap Mobile App?

☐ Allows user to collect data offline in the mobile app

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, 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.

	Data Viewing Rights				Data Export Rights			
	No Access (Hidden)	Read Only	View & Edit	Edit survey responses	No Access	De-Identified*	Remove All Identifier Fields	Full Data Set
Birth Record (survey)	☐	☐	☒	☐	☐	☐	☐	☒
Parent Consent (survey)	☐	☐	☒	☐	☐	☐	☐	☒
Demographics (survey)	☐	☐	☒	☐	☐	☐	☐	☒
Contact Info (survey)	☐	☐	☒	☐	☐	☐	☐	☒
Demos (survey)	☐	☐	☒	☐	☐	☐	☐	☒

* De-identified means that all free-form text fields will be removed, as well as any date/time fields and Identifier fields.

Assign user to a Data Access Group

Assign To DAG:

[No Assignment]

New User Notification

☒ Notify user of their project access via email?

Add user

Cancel

d) Select “Add user” to add this person to the project.

4) Changing the user rights for an existing user:

- a) On the user rights page you will see a list of everyone who had access to the project as well as their role name if you are using this feature of REDCap. **Please note that changing the user rights for a role name will allow anyone assigned to that role to potentially generate an API token.**

Role name (click role name to edit role)	Username or users assigned to a role (click username to edit or assign to role)	Expiration (click expiration date to edit)	Data Access Group (click DAG to assign user)	Project Design and Setup	User Rights	Data Access Groups	Data Viewing Rights	Data Export Rights	Alerts & Notifications	Reports & Report Builder	Stats & Charts	Survey Distribution Tools	Cal
	lewis3 (Adam Lewis)	never	—	×	×	×	s View & Edit	s No Access	×	✓	✓	✓	

- b) Click on the blue hyperlink for the individual and then select “Edit user privileges.” If a REDCap user already has an API token then you will see a gold coin like the one in the above image.

Username or users assigned to a role
(click username to edit or assign to role)

Expiration
(click expiration date to edit)

lewis3 (Adam Lewis)

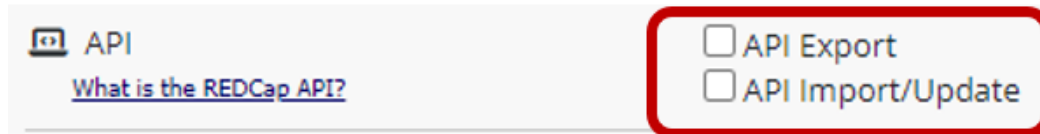
lewis7 (Adam Lewis)

User actions:

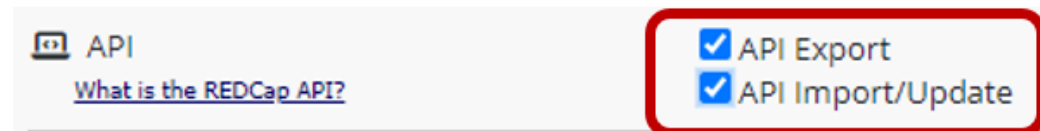
Edit user privileges

Assign to role

- c) If the person does not have the API user rights then the checkboxes will be empty. You can check one, both, or neither depending on your project and what the individual user or role name needs to do to support the study.



- d) Once you make your selections then a blue checkmark will appear. This can be altered at any time by either the individual or the study team personnel if they have user rights privilege. An individual can have API access but not have access to the user rights page.

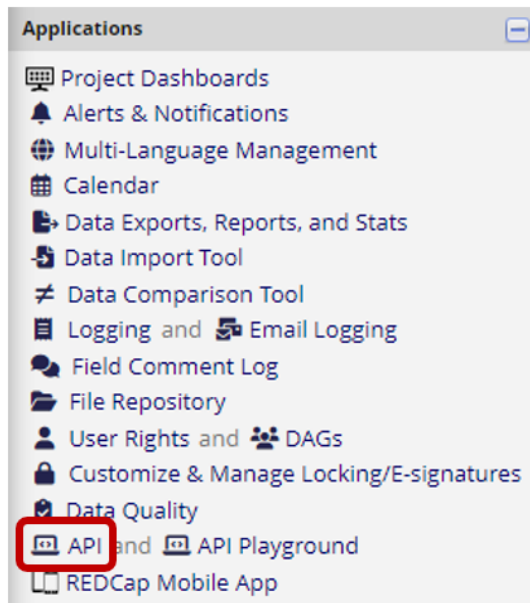


- e) Now that they have export/import rights an API token can be generated.

Generate an API Token

Each user will need to generate their own API token. Not every user will need one, if there are any questions about who should have this user right please contact local study personnel.

- 1) On the left hand side of the screen select “API” from the Applications section.



- 2) Select “Generate API token,” this is a necessary step because you cannot utilize any of the features without a valid API token.

API

The REDCap API is an interface that allows external applications to connect to REDCap remotely, and is used for programmatically retrieving or modifying data or settings within REDCap, such as performing automated data imports/exports from a specified REDCap project. For details on the capabilities of the REDCap API and how to use it, please see the [REDCap API documentation](#).

API Security: Best Practices

It is important to remember that when making requests to the REDCap API, you should always validate the REDCap server's SSL certificate to ensure the highest level of security during communication with the API. For details on what this means and how to do it, see the 'API Security: Best Practices' section in the [REDCap API documentation](#).

My Token Manage All Project Tokens

Obtain API token for "simple test (no mycap)"

Use the button below to generate an API token for this project. You will need a different token for each project you would like to access.

Generate API token

- 3) You can now see the details of your API token. If you ever need to delete or regenerate your token you can also do that from this page. **How long an API token is valid for will vary per institution.**

My Token Manage All Project Tokens

Your API token for project "(Adam's)SAVE-O2 Trauma (API Sync test)"

The API token below is **ONLY** for you and will work **ONLY** with this project. This token allows special access to REDCap data and **should NOT be shared with others**. If you think your token has been compromised, then please contact your REDCap administrator immediately **AND** either delete or regenerate your token by using the buttons below.

API Token: [REDACTED]

Delete token Finished using the API for this project? If so, please delete your token for security reasons.

Regenerate token Think someone else knows your token? If so, please regenerate your token for security reasons.

The following user(s) have API tokens for this project: lewisa7

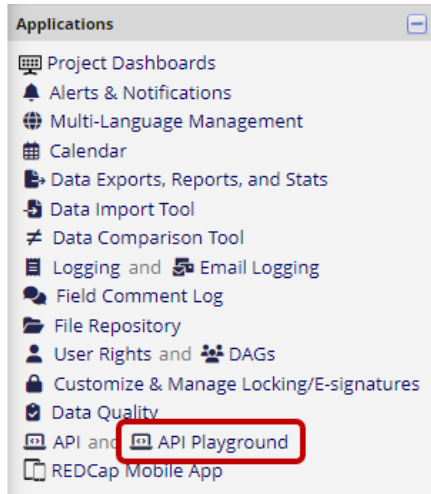
Manage API Tokens

This feature is available only to REDCap administrators and can be a way to add an extra layer of security for the API feature. It is important that if a user leaves the institution or if an API token is no longer needed that the user rights are revoked.

API Playground

The API playground is where you are going to customize the API request to export data from REDCap and import into another platform.

- 1) On the left hand side of the screen select "API Playground" from the Applications section.



- 2) The first step is to choose the API method or what you are going to be exporting from REDCap to the online platform. In this example, the API method we have selected is 'delete records'.

API Playground

The API Playground is an interface that allows experimentation with the REDCap API without actually writing any code. You can explore all the different API methods and their various options to customize a given API request. You may even execute a real API request and see the exact response that REDCap returns from the request. If you are interested in creating an API script, the section at the bottom will provide code samples for various programming languages to give you a head start. For details on the capabilities of the REDCap API and how to use it, please see the [REDCap API documentation](#).

Select an API method from the drop-down list below, after which it will load any other options that are specific to that method.

API Method: **Delete Records**

Format: **Import a File into the File Repository**
Delete a File from the File Repository

Instruments: **Export Instruments (Data Entry Forms)**
Export PDF file of Instruments
Export Instrument-Event Mappings
Import Instrument-Event Mappings

Arms: **Logging**
Export Logging

Instrument: **Metadata**
Export Metadata (Data Dictionary)
Import Metadata (Data Dictionary)

Event: **Projects**
Import Project Info
Export Project Info
Export Project XML

Errors: **Records**
Export Records
Import Records

Displayed in the API request based on the selections above.

token: **[REDACTED]**
action: **delete**
content: **record**
records: **5**
returnFormat: **json**

- 3) Select your format for exporting the data.

Select an API method from the drop-down list below, after which it will load any other options that are specific to that method.

API Method: **Delete Records**

Format: **JSON**
CSV
JSON

Records: **XML**
6

Arms: **--**

Instrument: **--**

Event: **--**

Errors: **JSON**

- 4) Select the format to receive any error messages.

Select an API method from the drop-down list below, after which it will load any other options that are specific to that method.

API Method:

Format:

Records:

Arms:

Instrument:

Event:

Errors:

CSV

JSON

XML

- 5) What you selected in the above three steps will be reflected in the raw request parameters.

Raw Request Parameters

Displayed in the box below are all the POST parameters that would be sent in the API request based on the selections above.

```
token: [REDACTED]
action: delete
content: record
records: 5
returnFormat: json
```

- 6) The API response is the data that will be returned from a server when the request is sent. This is the step where knowing some programming language may become useful to exclude any identifiers or other fields that may not need to be exported. Excluding identifiers is another layer of security, however it is not a necessary step as long as the user rights prohibit exporting of identifiers.

Response

Click the Execute Request button to execute a real API request, and it will display the API response in a text box below.

Execute Request

PHP Perl Python Ruby Java R cURL

Displayed in the box below is the code you would use to execute this API request in the selected programming language.

```
<?php
$data = array(
    'token' => '[REDACTED]',
    'action' => 'delete',
    'content' => 'record',
    'records' => array('5'),
    'returnFormat' => 'json'
);
$ch = curl_init();
curl_setopt($ch, CURLOPT_URL, 'https://redcap.vanderbilt.edu/api/');
curl_setopt($ch, CURLOPT_RETURNTRANSFER, true);
```

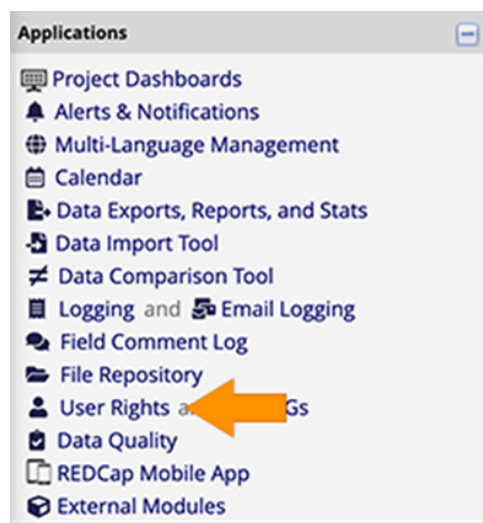
Uploading Data into Terra

The below links detail how to upload data into Terra.

- [T101 - Data Tables Quickstart Guide – Terra Support](#)
- [Upload data and populate the table with linked file paths – Terra Support](#)

Hands-On Practice: Setup

For the next part of this module, we'd like you to work with a real REDCap database that you create or in which you have User Rights (a very high level of privilege that you may not have on projects you didn't create).



If you have a REDCap project in mind, log in and open that project. On the left side, under **Applications**, do you see **User Rights**? If so, congratulations, you can use this project to experiment with the REDCap API. We will only be using the API to access project data, not change or destroy it or add new data, so what we're going to describe here is safe to perform on a real dataset.

Warning!

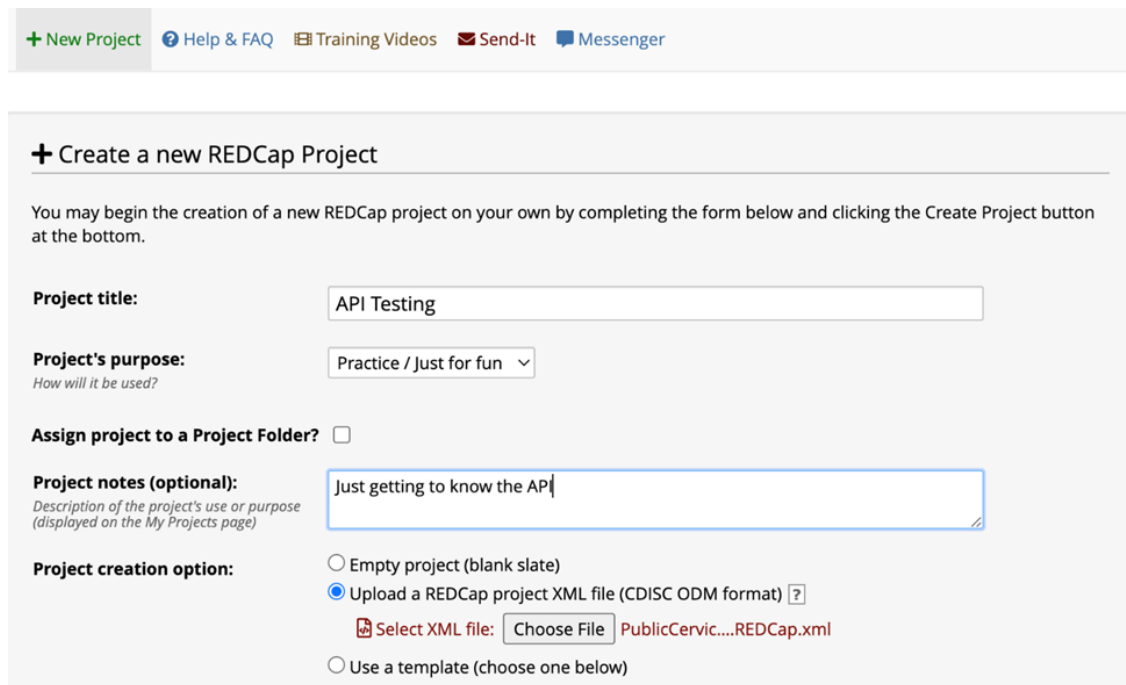
Just because we're not going to break any of your data doesn't mean that it's okay from a regulatory perspective to use the API to download data to your computer. Think about whether the use of this data is governed by a protocol or data use agreement, and whether your computer is an approved place to do analysis of the data.

If you can't or don't want to use your own existing REDCap project, you can clone a sample project from us. We've taken data from the University of California, Irvine Machine Learning

Repository, specifically, their dataset on [cervical cancer risk factors](#), and made that data into a REDCap project. Here are the steps to take our REDCap project and make it yours!

1. Download our [REDCap xml file](#), saving it to a place you'll be able to find it (like your Downloads folder). We suggest doing a right click on the link and choosing **Save Link As**, or **Download Linked File As**.
2. Log in to your REDCap server and choose **New Project**.
3. Fill out the Project title, Project purpose, Assign project to Folder, and Project notes fields as you like. We called our project "API Testing" but that's only a suggestion.
4. Choose **Upload a REDCap project XML file** as the Project Creation option.
5. Click **Choose File**, and in the file picker, navigate to where you saved our XML file.

An image below shows what you might see after steps 1-5, although your institution may have different colors, layouts, etc. on their page.



[+ New Project](#) [Help & FAQ](#) [Training Videos](#) [Send-It](#) [Messenger](#)

+ 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:

Project's purpose: How will it be used?

Assign project to a Project Folder? ☐

Project notes (optional): Description of the project's use or purpose (displayed on the My Projects page)

Project creation option:

☐ Empty project (blank slate)

☒ Upload a REDCap project XML file (CDISC ODM format) [?](#)

PublicCervic....REDCap.xml

☐ Use a template (choose one below)

6. At the bottom of the page, click **Create Project**. It may take a few minutes to digest that giant XML file!

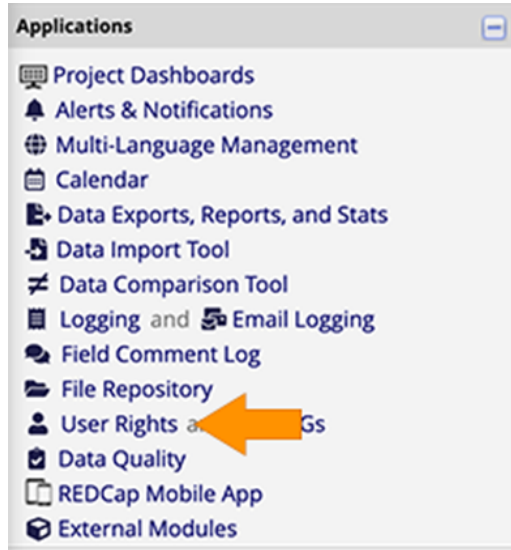
Congratulations, now you have a project that you created, which means you have User Rights capabilities. That will come in handy in our next step!

Enabling the API

In REDCap, the project owner (or people with user rights) have to explicitly give permission to use the REDCap API to project users who need that capability. In fact, when you create a new

REDCap project, REDCap does not provide you with these permissions by default, even though you're the project owner! Take a look at your REDCap project and look on the left hand side of the screen to look at the menu of options. Chances are, you won't see anything that says "API." If that's the case, don't worry. We're going to walk you through how to give yourself API access.

Open your REDCap database (one that belongs to you or in which you have the ability to change user rights). On the left side of the screen, choose **User Rights** from the list of applications.



The User Rights panel will open in the main part of your screen. Click on your user id (or your role) and choose **Edit User Privileges**. Give yourself API Export access, as shown in the image below. For now, we'll leave API Import/Update turned off, so that you feel secure knowing you can't accidentally upload anything that could mess up your data.

Editing existing user

Also allows user to view ALL reports (but not necessarily all data in the reports)

Stats & Charts ☒

Other privileges:

Calendar ☒

Data Import Tool ☒

Data Comparison Tool ☒

Logging ☒

File Repository ☒

Data Quality ☒ [What is Data Quality?](#)

API ☒ [What is the REDCap API?](#)

API Export ☒ **API Import/Update** ☐

Settings pertaining to the REDCap Mobile App:

REDCap Mobile App ☒ [What is the REDCap Mobile App?](#)

Allow user to download data for all records to the app? ☒

Settings pertaining to project records: [Explain these settings](#)

Create Records ☒

Rename Records ☐

Delete Records ☐

The next step depends on your version of REDCap. Do you see a box on the right side of your User Rights panel labeled **Privileges for Viewing and Exporting Data**? If you do, give yourself some Data Export Rights. We recommend **Full Data Set**, but you can choose a less privileged level of access if you're working with identified data and want to be extra careful. Note that our sample project on cervical cancer risk factors is already deidentified.

This is what we're talking about:

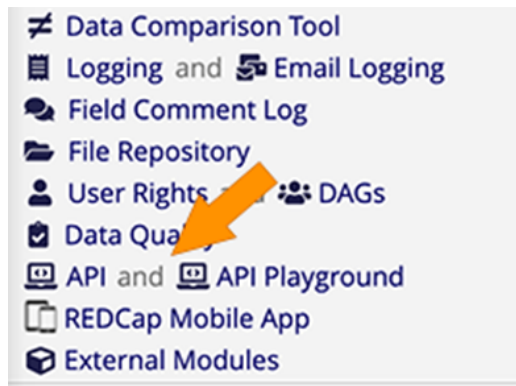
Privileges for Viewing and Exporting Data

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, 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.

	Data Viewing Rights			Data Export Rights			
	No Access (Hidden)	Read Only	View & Edit	No Access	De-Identified*	Remove All Identifier Fields	Full Data Set
Form 1	☐	☐	☒	☐	☐	☐	☒

Once you're all done giving yourself API export rights and (if applicable) data export rights, click **Save Changes**.

Refresh your browser (reload the page) so that your new permissions are included in what you get shown in your project. Now, on the left hand side of the project, you should see something new under Applications – **API** and **API Playground**.



API Token

So now you have the **right** to use the API, but you can't start using it just yet. You have to generate an API token. Click on the **API** application in the left side menu and in the main part of your screen, click on the button to **Generate API Token**. Depending on your institution's rules, you might automatically be granted a token immediately, or it might be generated manually by an administrator a few minutes or hours later.

Obtain API token for "API Testing"

Use the button below to generate an API token for this project. You will need a different token for each project you would like to access.

Generate API token

The API token is unique to the combination of user and project. It's a code that allows access only to the data in a single project and only the data that the person who generated the API token is allowed to see. If you have three different projects, your token is different for each one. Importantly, if you feel like you may have accidentally given your API token away, it's a good idea to regenerate it, which is a single-click operation. It makes your old token invalid and creates a new token.

Soon, your API token will show up in that same API Application. It will look something like this (note, I've obscured my token – sharing this in a post like this one would be a terrible idea!).

Your API token for project "API Testing"

The API token below is **ONLY for you** and will work **ONLY with this project**. This token allows special access to REDCap data and **should NOT be shared with others**. If you think your token has been compromised, then please contact your REDCap administrator immediately *AND* either delete or regenerate your token by using the buttons below.

 API Token:

$$g_1 = g_2 = \dots = g_{n-1} = 2\alpha_1 + 2\alpha_2 + \dots + 2\alpha_{n-1} + \alpha_n = 2\alpha + \alpha_n = 2\alpha + \alpha_n$$

Delete token

Finished using the API for this project? If so, please delete your token for security reasons.

Regenerate token

[Regenerate token](#) Think someone else knows your token? If so, please regenerate your token for security reasons.

You'll use this token when you request data in your R or Python script.

Hands on Practice: API Playground

So, you have some data in a REDCap database, and you have an API key that gives you access to that data. How do you use this key, though? Learning how to use an API can be tricky, because it requires you to pass not only the key, but your actual request like "give me only the field called species" or "give me only the form called inclusion_criteria." Luckily, REDCap provides you an **API Playground** that gives you not only a view into what the API can do, but provides a good start to giving you the actual code. Let's take a deeper look.

The API Playground has several parts:

- The API Method selector menus
- Raw Request Parameters
- Response
- Code Examples

Let's look at how each part of the API Playground helps you learn the API.

API Method

In your REDCap project, head over to the **API Playground** – click on that phrase in the Applications pane on the left. Then, at the top of your screen, you'll see the menu-driven selection box. The first selection you have to make is **API Method**.



For now, choose **Export Records** as the API method. This will allow you to download records (rows of data). Make sure that:

- The "Format" (second option down) is "CSV" and
- The "Type" (third option down) is "flat."

You don't have to change any other fields. Leaving everything else alone means you'll download all the records (rows) and all of the forms/instruments with all of their fields (columns) into a single .csv file.

Troubleshooting help

Be careful not to choose .json as the format -- .csv, or **comma separated values**, is the file format you want to download!

The **Raw Request Parameters** box below your selection will change to reflect whatever you chose. Here's an example of what you might see, if you're using the cervical cancer data. If you're using your own dataset, things will look different. Note that we've blurred out the API key here -- that's not something we want to share!

Select an API method from the drop-down list below, after which it will load any other options that are specific to that method.

API Method: Export Records ▾

Format: CSV ▾

Type: flat ▾

Records: 1 ▾
2
3
4
5

Fields: record_id
age
n_sex_partners
first_intercourse
n_pregnancies

Forms: form_1 "Form 1"

Events: event_1_arm_1

Raw Labels: raw ▾

Raw Headers: raw ▾

Checkbox Labels: false ▾

Survey Fields: false ▾

Data Access Groups: false ▾

Filter Logic:

Records Created or Modified in Timespan (begin)
(YYYY-MM-DD HH:MM:SS format):

Records Created or Modified in Timespan (end)
(YYYY-MM-DD HH:MM:SS format):

Set CSV delimiter character: , (comma) - default ▾

Errors: CSV ▾

Raw Request Parameters

Displayed in the box below are all the POST parameters that would be sent in the API request based on the selections above.

```
token: [REDACTED]
content: record
action: export
format: csv
type: flat
csvDelimiter:
rawOrLabel: raw
rawOrLabelHeaders: raw
exportCheckboxLabel: false
exportSurveyFields: false
exportDataAccessGroups: false
returnFormat: csv
```

This **Raw Request Parameters** gives you a quick look at the information you're passing to REDCap, to make sure you selected what you really wanted in the menu part above. Go on to the next page to see how to submit this API request!



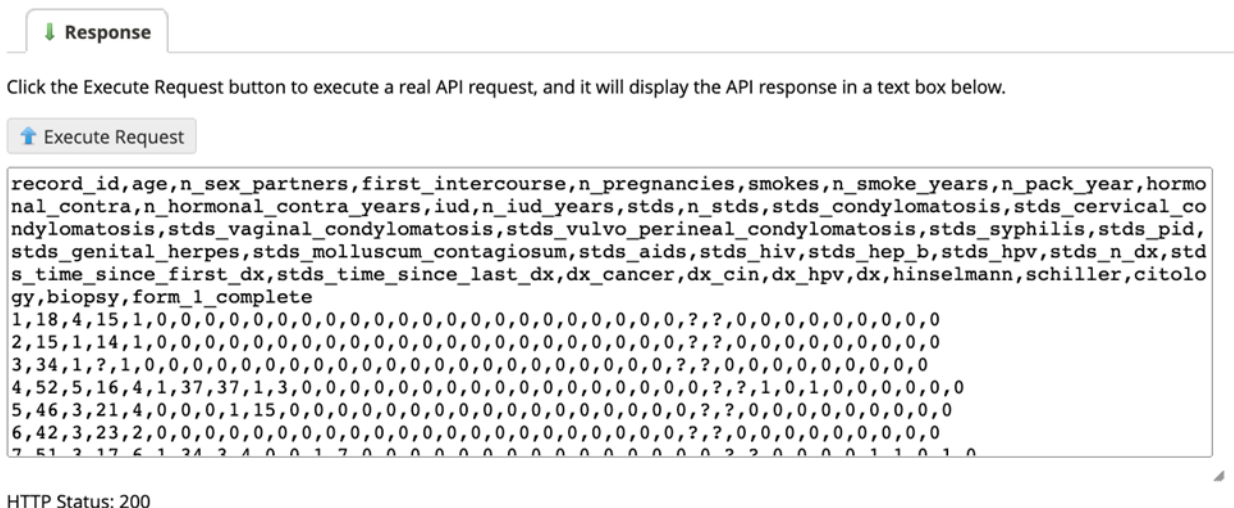
Execute Request

Look further down the API Playground page, in the **Response** area, and click on the button that says **Execute Request**. You might get a "waiting" spinner, and then a box will appear below the button with the data that REDCap returned from your request.

You requested your data to be in a .csv, so you should get some data that's "comma separated" – a bunch of fields that are separated by commas, with each new line of data being separated by a line break.

Troubleshooting help

In the **Response** box, data is presented in plain text, not in a table, so it might look confusing or overwhelming. If you want to, you can copy that plain text by clicking on the contents of the box and then using your browser's "Select All" function, followed by "Copy." Then paste it into a text editor like Visual Code Studio or Notepad, saving it with the .csv extension. That will allow you to then open it in Excel to see if the .csv is what you intended. Below, here's the cervical cancer data before, as comma separated values in plain text, and after, as text saved as a .csv and opened in Excel:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	record_id	age	n_sex	partn	first_intercoi	n_pregnanci	smokes	n_smoke_ye	n_pack_year	hormonal_cc	n_hormonal	iud	n_iud_years	stds	n_stds	stds_condylcs
2	1	18	4	15	1	0	0	0	0	0	0	0	0	0	0	0
3	2	15	1	14	1	0	0	0	0	0	0	0	0	0	0	0
4	3	34	1	?	1	0	0	0	0	0	0	0	0	0	0	0
5	4	52	5	16	4	1	37	37	1	3	0	0	0	0	0	0
6	5	46	3	21	4	0	0	0	1	15	0	0	0	0	0	0
7	6	42	3	23	2	0	0	0	0	0	0	0	0	0	0	0
8	7	51	3	17	6	1	34	3.4	0	0	1	7	0	0	0	0
9	8	26	1	26	3	0	0	0	1	2	1	7	0	0	0	0
10	9	45	1	20	5	0	0	0	0	0	0	0	0	0	0	0
11	10	44	3	15	?	1	1.26697291	2.8	0	0	?	?	0	0	0	0
12	11	44	3	26	4	0	0	0	1	2	0	0	0	0	0	0
13	12	27	1	17	3	0	0	0	1	8	0	0	0	0	0	0
14	13	45	4	14	6	0	0	0	1	10	1	5	0	0	0	0
15	14	44	2	25	2	0	0	0	1	5	0	0	0	0	0	0
16	15	43	2	18	5	0	0	0	0	0	1	8	0	0	0	0
17	16	40	3	18	2	0	0	0	1	15	0	0	0	0	0	0
18	17	41	4	21	3	0	0	0	1	0.25	0	0	0	0	0	0
19	18	43	3	15	8	0	0	0	1	3	0	0	0	0	0	0
20	19	42	2	20	?	0	0	0	1	7	1	6	1	2	1	1
21	20	40	2	27	?	0	0	0	0	0	1	1	0	0	0	0
22	21	43	2	18	4	0	0	0	1	15	0	0	0	0	0	0
23	22	41	3	17	4	0	0	0	1	10	0	0	1	1	0	0
24	23	40	1	18	1	0	0	0	1	0.25	0	0	1	2	1	1
25	24	40	1	20	2	0	0	0	1	15	0	0	0	0	0	0
26	25	40	3	15	3	0	0	0	1	3	0	0	0	0	0	0
27	26	44	3	19	1	0	0	0	0	0	0	0	0	0	0	0
28	27	39	5	23	2	0	0	0	0	0	1	1	0	0	0	0

Below the Response box with the comma separated values data, you'll see an HTTP status. You want that to be 200, which means no errors occurred.

The example reviewed is an example of trying out and learning about the API without having to write code. You can experiment with various methods and learn easily without having to go through the frustration of writing a lot of code to find out how to do things.

In some API methods, like **Export Records**, you'll have a number of drop down menus you can choose from to tailor your request, including which "forms" and which "fields" you want to retrieve. You can make multiple choices in menus like these by holding down control while clicking (Windows) or command while clicking (Mac). Helpfully, however, if you want **every** item listed (say, you want every form and every field), you don't click any selection at all, and REDCap assumes you mean everything that appears in the drop-down list.

Troubleshooting help

Do take a look and make sure your Response box contains comma separated values and shows a good return code (200). If not, something has gone wrong -- either you don't have the correct rights, which means you need to take another look at your rights in the User Rights section of REDCap, or you've issued an API call that is incorrect in some way (for instance, maybe you requested a .json format instead of .csv).

API Playground: Code

So, you've experimented in the API Playground and you know the kind of API call you want to make. Now, how do you automate this selection so that your R or Python code will issue exactly the same request using code? REDCap's API playground comes to the rescue again, with code snippets.



In the tabs at the bottom of the API Playground, you'll see names of programming languages, including Python and R. Below you can see what the Python code looks like for the API request to retrieve all records from the cervical cancer database:

A screenshot of the API Playground interface. At the top, there is a row of tabs for different programming languages: PHP, Perl, Python (which is selected and highlighted), Ruby, Java, R, and cURL. Below the tabs, a text box contains the following Python code:

```
#!/usr/bin/env python
import requests
data = {
    'token': '...',
    'content': 'record',
    'action': 'export',
    'format': 'csv',
    'type': 'flat',
    'csvDelimiter': '',
    'rawOrLabel': 'raw',
    'rawOrLabelHeaders': 'raw',
    'exportCheckboxLabel': 'false',
    'exportSurveyFields': 'false',
    'exportDataAccessGroups': 'false',
    'returnFormat': 'csv'
}
```

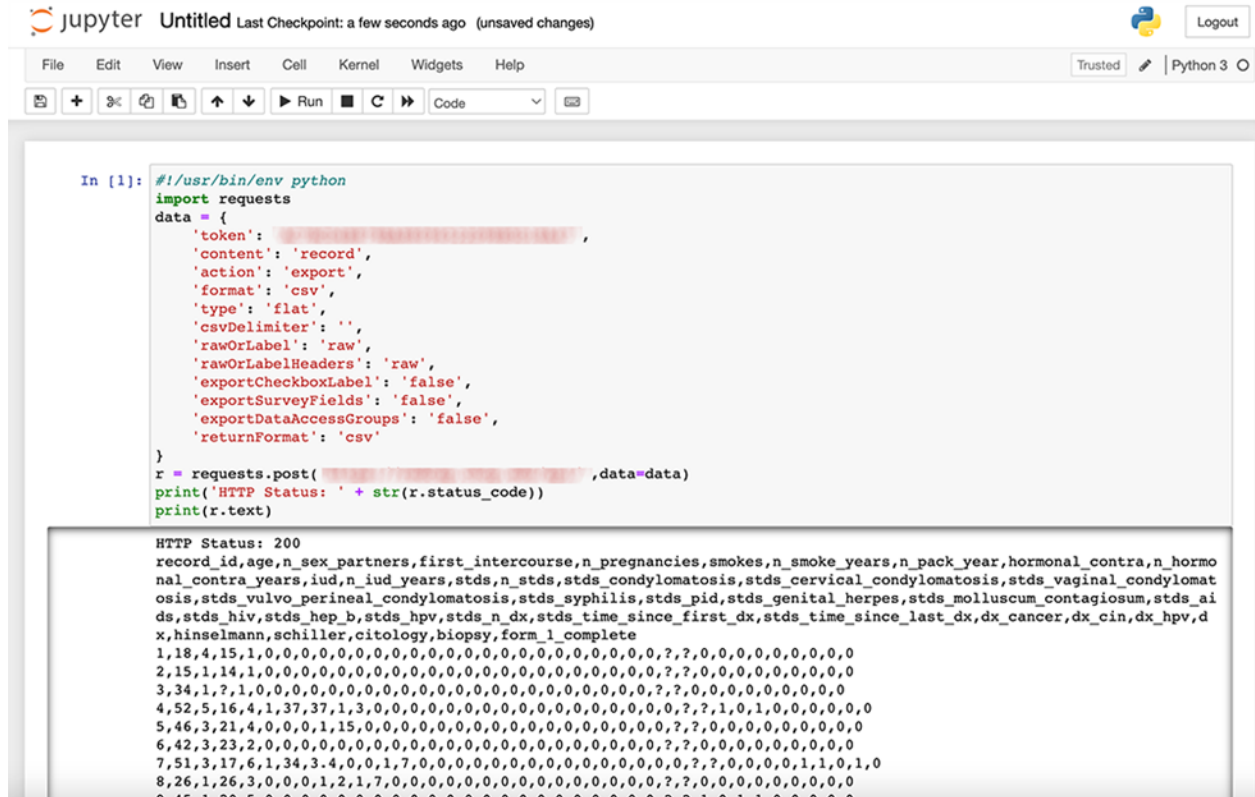
We'll show you how to use Python and R in two separate sections, so you can feel free to look at either one, or both!

Python and the REDCap API

There is a useful Python library that makes importing REDCap data into Python simpler than the code REDCap suggests. Nevertheless, we think it's important to show you how to use the code REDCap provides, because it is reliable and reflects the current state of the REDCap API.

The Python library, PyCap, that streamlines this effort is great and seems very stable, and we provide a link to it toward the end of this module, but Python libraries depend on volunteers who keep them updated. Therefore, we think it's useful to know how to use the basic method we'll share here, even if in the future you prefer a different approach.

Open a Jupyter notebook (running Python 3) and paste the code from the API Playground's "Python" tab into your first cell and run that cell. It works! Kind of. Take a look below to see what the result of our API call for the records of cervical cancer data looks like.



```
import pandas as pd
from io import StringIO
df = pd.read_csv(StringIO(r.text))

df
```

```
In [2]: import pandas as pd
        from io import StringIO
        df = pd.read_csv(StringIO(r.text))
        df
```

```
Out[2]:
```

	record_id	age	n_sex_partners	first_intercourse	n_pregnancies	smokes	n_smoke_years	n_pack_year	hormonal_contra	n_hormonal_contra_years	...	std
0	1	18	4	15	1	0	0	0	0	0	...	0
1	2	15	1	14	1	0	0	0	0	0	...	0
2	3	34	1	?	1	0	0	0	0	0	...	0
3	4	52	5	16	4	1	37	37	1	3	...	3
4	5	46	3	21	4	0	0	0	1	15	...	15
...	...	...	...	...	...	...	...	...	...	...	...	...
853	854	34	3	18	0	0	0	0	0	0	...	0
854	855	32	2	19	1	0	0	0	1	8	...	8
855	856	25	2	17	0	0	0	0	1	0.08	...	0.08
856	857	33	2	24	2	0	0	0	1	0.08	...	0.08
857	858	29	2	20	1	0	0	0	1	0.5	...	0.5

858 rows x 38 columns

Now, your data is in a pandas data frame and you're ready to do all sorts of work with that data (like cleaning question marks out of the data, getting summary statistics, finding correlations, visualizing data, and modeling data). Importantly, you can re-run the cells in this notebook at any time to get the latest version of the data from REDCap!

R and the REDCap API

REDCap assumes you're going to use an R script and not an R Markdown document, but we advocate using R Markdown for just about everything you do in R, so we're going to teach that approach.

There are useful R packages that make importing REDCap data into R simpler than the code REDCap suggests. Nevertheless, we think it's important to show you how to use the code REDCap provides, because it is reliable and reflects the current state of the REDCap API.

The R packages that streamline this effort (we like REDCapR and redcapAPI) are great and seem very stable, and we provide links to them toward the end of this module, but R packages depend on volunteers who keep them updated. Therefore, we think it's useful to know how to use the basic method we'll share here, even if in the future you prefer a different approach.

First, open RStudio and create a new R Markdown (File > New File > R Markdown). Give your R Markdown the title and author information you want, leave the default output choice (HTML), and click on **OK**.

New R Markdown

Document

Presentation

Shiny

From Template

Title: Cervical Cancer Data

Author: Ima Coder

Default Output Format:

HTML

Recommended format for authoring (you can switch to PDF or Word output anytime).

PDF

PDF output requires TeX (MiKTeX on Windows, MacTeX 2013+ on OS X, TeX Live 2013+ on Linux).

Word

Previewing Word documents requires an installation of MS Word (or Libre/Open Office on Linux).

Create Empty Document

OK

Cancel

Remove all the "boilerplate" text after the setup chunk (so, delete all the lines after line 10) and add a new empty chunk:

```

1 ---
2 title: "Cervical Cancer Data"
3 author: "Ima Coder"
4 date: "4/7/2022"
5 output: html_document
6 ---
7
8 ```{r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10 ```
11
12 ```{r}
13 |
14 ```
15
16

```



Then:

- Copy the R code from the API Playground and paste it into the empty chunk
- Remove the first line (the one that starts `#!/usr/bin`).
- Run that chunk!

After running that chunk, you should have some new objects in your **Environment**. Of particular interest is the object called result. See below what we see when we run the chunk of code to get records from the cervical cancer database:

The screenshot displays the RStudio environment with the following components:

- Source Editor (Left):** Contains an R script for a web API call. The script defines a `token`, constructs a `url`, creates a `formData` list with various parameters, and uses `httr::POST` to send the request. The response is then printed.
- Environment (Right):** Shows the current environment with variables `formData`, `response`, and `result`. `formData` is a list of 12 elements, `response` is a list of 10 elements, and `result` contains 858 observations of 38 variables.
- Values (Right):** Displays the values of the selected variables. The `token` and `url` values are visible, both appearing to be redacted or masked.

Click on "result" in the environment pane to open a file viewer.

Untitled2* ×		result ×							
		Filter							
	record_id	age	n_sex_partners	first_intercourse	n_pregnancies	smokes	n_smoke_years	n_pack_yea	
1	1	18	4	15	1	0	0	0	
2	2	15	1	14	1	0	0	0	
3	3	34	1	?	1	0	0	0	
4	4	52	5	16	4	1	37	37	
5	5	46	3	21	4	0	0	0	
6	6	42	3	23	2	0	0	0	
7	7	51	3	17	6	1	34	3.4	
8	8	26	1	26	3	0	0	0	
9	9	45	1	20	5	0	0	0	
10	10	44	3	15	?	1	1.266972909	2.8	
11	11	44	3	26	4	0	0	0	
12	12	27	1	17	3	0	0	0	
13	13	45	4	14	6	0	0	0	
14	14	44	2	25	2	0	0	0	
15	15	43	2	18	5	0	0	0	
16	16	40	3	18	2	0	0	0	
17	17	41	4	21	3	0	0	0	
18	18	43	3	15	8	0	0	0	
19	19	42	2	20	?	0	0	0	

Now, your data is in a data frame and you're ready to do all sorts of work with that data (like cleaning question marks out of the data, getting summary statistics, finding correlations, visualizing data, and modeling data). Importantly, you can re-run the chunks in this R Markdown at any time to get the latest version of the data from REDCap!

Don't accidentally share your API token!

Your API token is a secret. If someone else finds your API token, they can get unauthorized access to your REDCap project.

Behind the scenes

There is so much code online, what are the chances of someone malicious just happening to find your API token?

Unfortunately, it's more likely than you may think. Stealing API tokens can be lucrative; there's money in both illicitly accessing valuable private data and also misusing servers for things like cryptocurrency mining. People write scripts to automatically scan posted code for patterns that look like API tokens and other sensitive information, so they can efficiently process millions of lines of code posted all over the web. In fact, [companies like GitHub offer automatic scanning as a service](#), letting customers know if it looks like they've accidentally pushed a secret to their



repository. If the GitHub engineers can make software to catch API tokens being posted to repositories, people with bad intentions can, too.

By far the best approach is to make sure your API token is never included in any code that could get pushed to an online repository.

Warning!

If you use a system like git to version control your code (which we recommend you do!), then your token is compromised if it has **ever** been committed in a repository that is now public, even if it has since been overwritten.

Troubleshooting help

What should you do if you think your API token has been compromised?

No matter how brief the exposure was, if your API token was online, you need to discard it and generate a new one. See the section above on [generating API tokens](#) for instructions on how to get a new one.

If your REDCap project contains protected information, such as protected health information (PHI), you may need to file a breach report. Consult with legal and ethics support at your institution if you're not sure how the law applies to you.

The example code from the REDCap API playground saves your API token in the first line of the script. Although this is okay if that script is saved in a secure way on your computer and will never be shared or published, it's very dangerous if you might end up sharing your code at some point.