Effective & Efficient Data Collection with REDCap

REDCapAdmin@URMC.Rochester.edu

Agenda

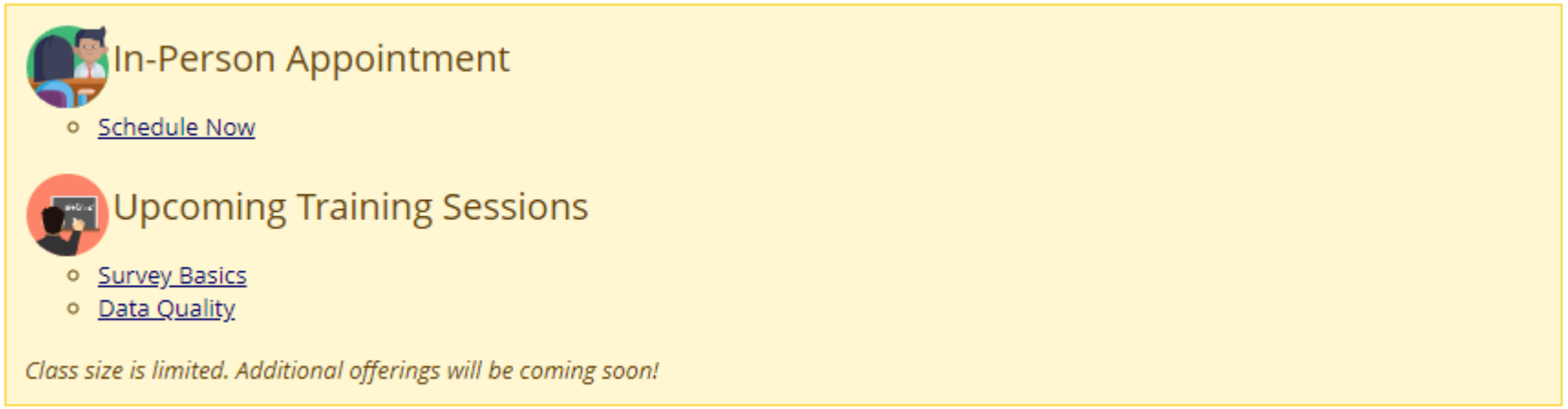
- REDCap Intro
  - Team Introductions, AIT Services & Support
- REDCap Basics
  - Overview & General Terminology
  - Transitioning into Electronic Data Capture
  - Longitudinal Data Collection
- REDCap Maintaining Data Integrity
  - Validation, Ranges & Ontologies
  - Removing Ambiguity in Answering Choices
- REDCap Auditing & Data Security
  - User Privileges, De-identification & Logging
- Data Exports

Introductions

- Yvonne Watson, Project Manager
- REDCap Admin Team
  - Kim Kaukeinen
  - Sampson Abiola
  - Amanda Davin

Research & Academic IT Services

- Research & Academic IT provides a broad range of IT services including: desktop support, application development, systems administration, server and web hosting, IT consulting, and project management for the University of Rochester School of Medicine and Dentistry and other affiliated organizations.
- More information: www.urmc.rochester.edu/smd/it



REDCap Support

- Office Hours
  - By appointment during the designated times listed on the survey.
  - Typically 30 minutes to 1 hour long.
  - Can be for anything related to REDCap or research data capture: brainstorming, learning, how-to, problem solving or consulting.
- Training Classes
  - Focused on a particular REDCap topic.
  - Usually a two-part program, a lecture component combined with a hands-on component.
  - Can be requested for personalized groups.
  - Posted on REDCap main website. (General classes will appear as links once they have been created/scheduled.)
- Email
  - REDCapAdmin@urmc.Rochester.edu

What is REDCap?

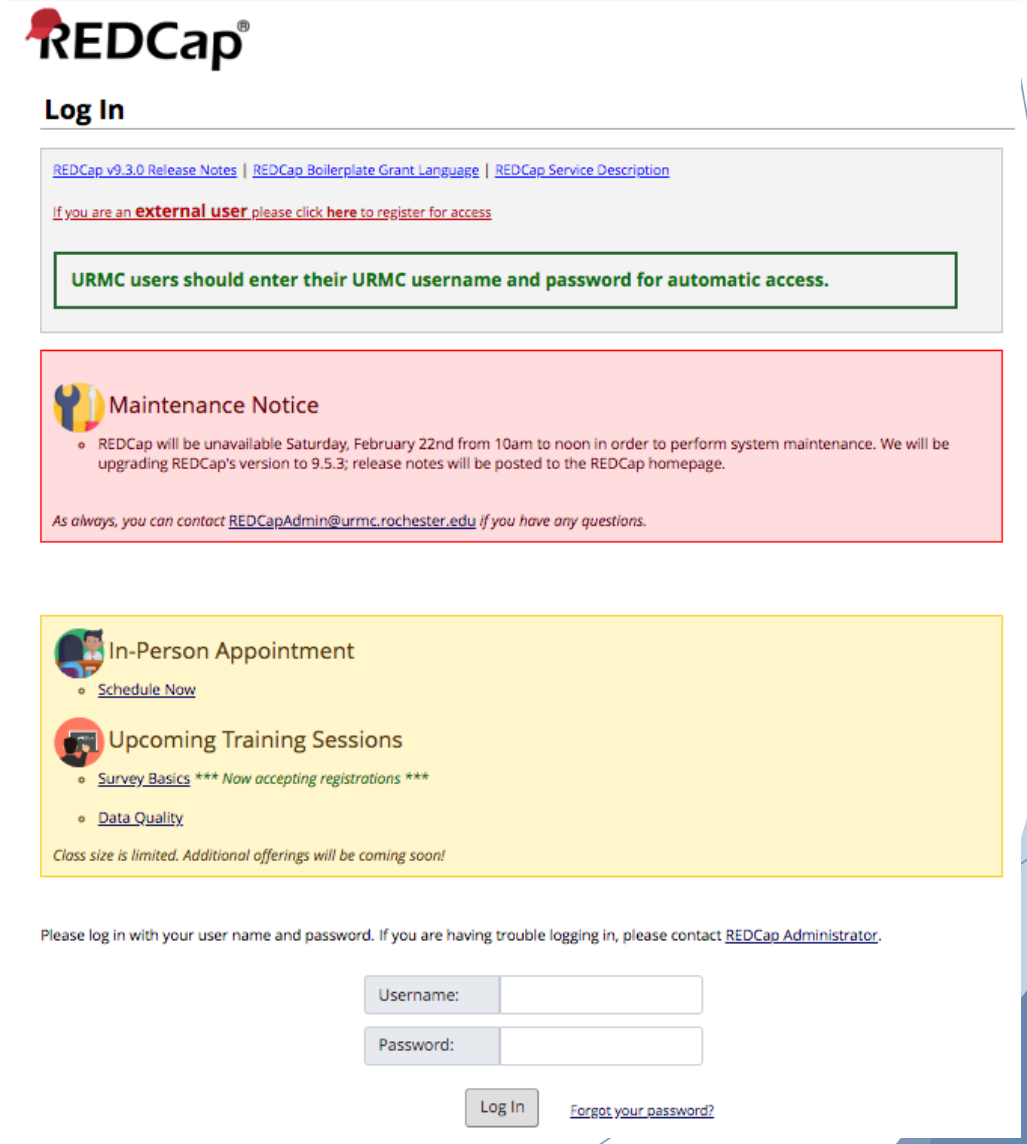
Research Electronic Data CAPture

REDCap is a secure web-based application that supports data capture and data management for research studies.

- Data entry operators or people taking an online survey enter data in a web browser, either locally or from remote locations. The data is stored centrally in a secure MySQL database.
- REDCap should be considered for any research study in which web-based data entry is desired. It can accommodate multiple-site studies.
- Over 6,500 people have used REDCap here at the University of Rochester, either using it here on campus or from any other location where they have an internet connection.

REDCap Account Setup

- **URMC users** - login using URMC username and password
- **External users** (multi-site studies) – fill out survey to register for access – red link at top of Log In page



REDCap Project Types

- Data Entry Instruments
  - Surveys – can have multiple per project
    - Completed by participant
    - Emailed as link or link on website
    - Automated invitations
    - Survey Queue
  - Forms
    - Completed by study staff logged in to REDCap
- Repeated visits over time
  - Longitudinal
    - Defined number of events
  - Repeated forms or events
    - Undefined number of events such as Adverse Events

Longitudinal Data Collection

- Use a form or survey a finite number of times – for example, a follow-up form over 3 visits for the same subject.
- Allows for use of scheduling module.

	Event #	Days Offset	Offset Range Min / Max	Event Name	Custom Event Label (optional)	Unique event name (auto-generated)
	1	0	-0/+0	Baseline		baseline_arm_1
	2	7	-0/+0	Week 1 Follow up		week_1_follow_up_arm_1
	3	14	-0/+0	Week 2 Follow up		week_2_follow_up_arm_1

Add new event | Days | - 0 + 0 | Descriptive name for this event | Custom

Convert from

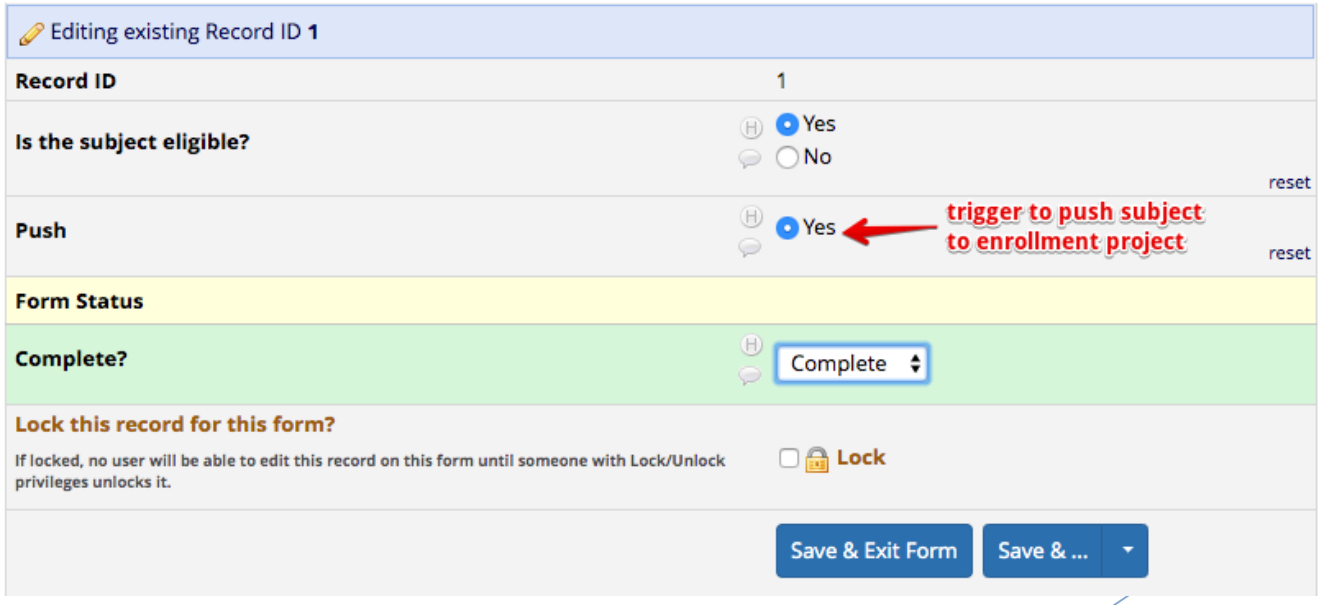
Begin Editing | Save

Data Collection Instrument	Baseline (1)	Week 1 Follow up (2)	Week 2 Follow up (3)
Demographics	✔		
Follow-up form	✔	✔	✔

Example of Advanced Project Setup

- Screening Project
- Enrolled Project

- Use Auto Record Generation module to automatically push eligible subject information to enrollment project
  - Any field from screening can automatically be populated in enrolled project
  - All enrolled subject IDs will be chronological



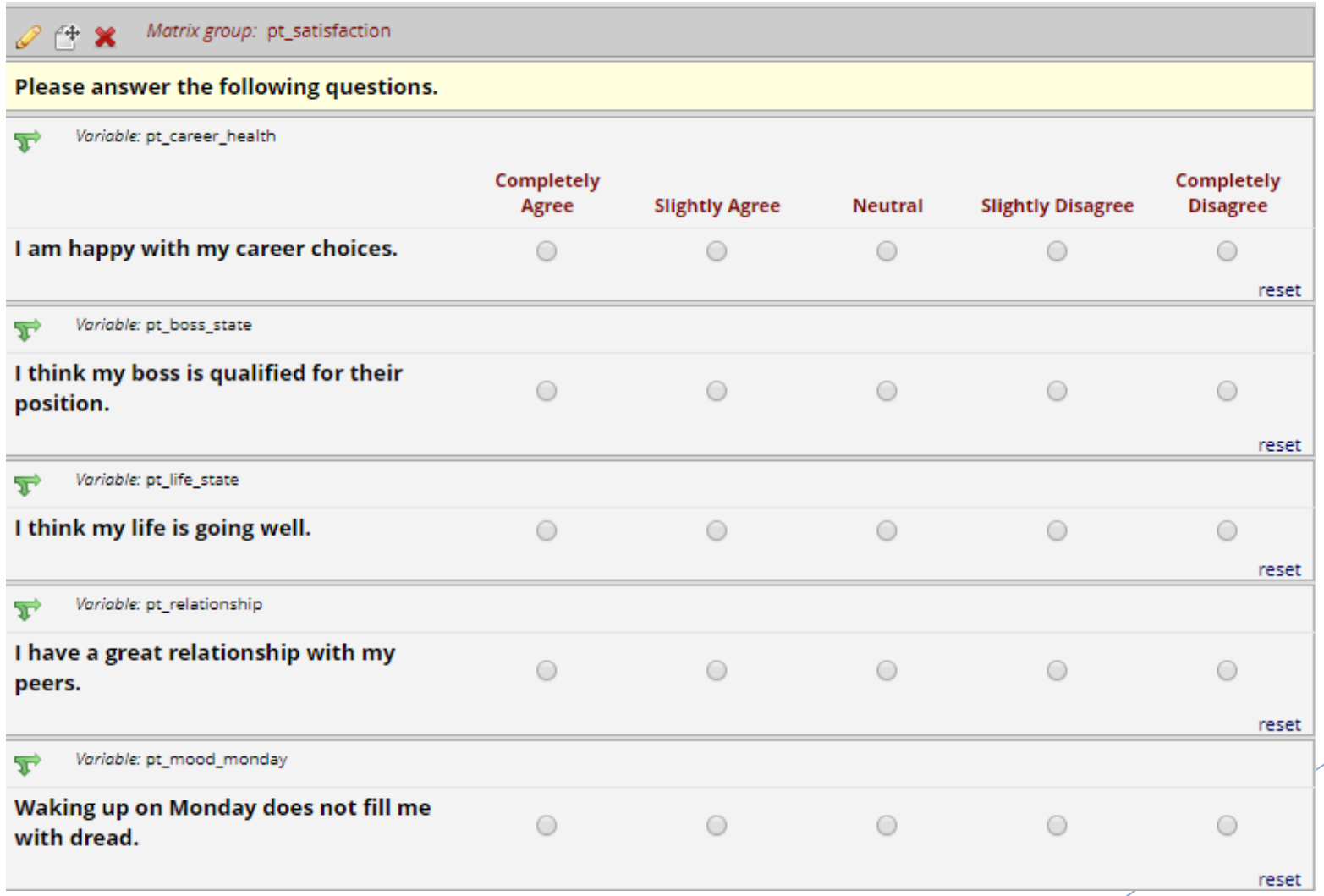
General REDCap Design/Terms

- Project
  - Contains all of your instruments, settings and general template design.
- Instrument (aka Form/Survey)
  - Unique forms used to hold the fields, “questions”, to collect your data.
- Field
  - Individual questions that are designed to collect a singular point of data.
  - Multiple field types.
  - Unique variable name.
  - Optional validation.
  - Identifier?
  - Required?

Text	-single line box for free text
Notes	-larger, expandable box for free text
Dropdown	-dropdown menu with answering options
Radio	-selectable buttons for single answer options
Checkbox	-selectable boxes for multiple answer options
File	-file upload for capturing documents
Calc	-calculating field to display results
Yes/No or True/False	-radio buttons hardcoded to yes and no

General REDCap Design/Terms cont'd

- Matrix of Fields



Matrix group: pt_satisfaction

Please answer the following questions.

	Completely Agree	Slightly Agree	Neutral	Slightly Disagree	Completely Disagree
Variable: pt_career_health **I am happy with my career choices.**	○	○	○	○	○
Variable: pt_boss_state **I think my boss is qualified for their position.**	○	○	○	○	○
Variable: pt_life_state **I think my life is going well.**	○	○	○	○	○
Variable: pt_relationship **I have a great relationship with my peers.**	○	○	○	○	○
Variable: pt_mood_monday **Waking up on Monday does not fill me with dread.**	○	○	○	○	○

reset

Codebook

Print page

Data Dictionary Codebook

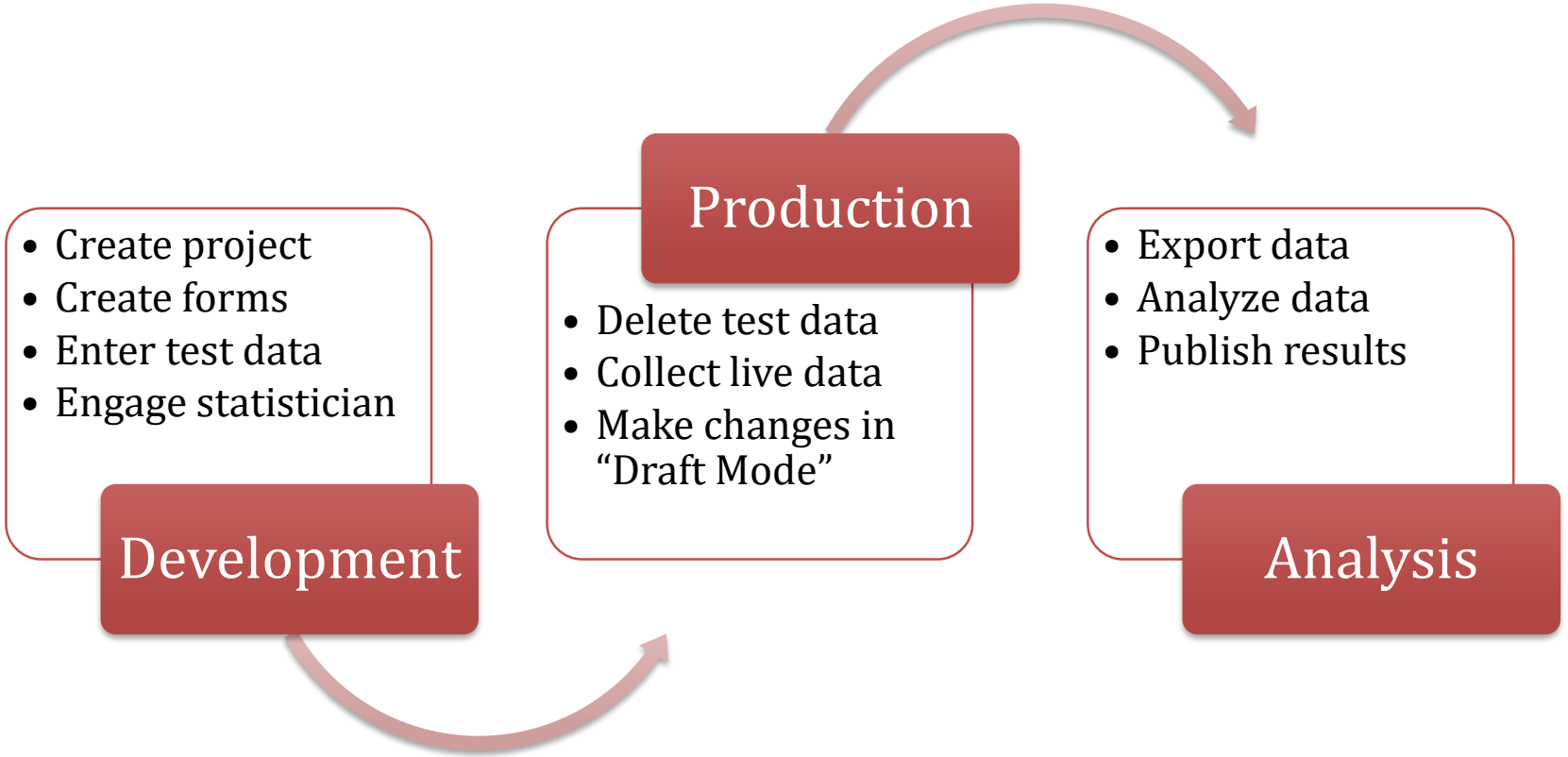
Collapse all instruments | Collapse all instruments

#	Variable / Field Name	Field Label *Field Note*	Field Attributes (Field Type, Validation, Choices, Calculations, etc.)
Instrument: **Survey Basics Registration** (survey_basics_registration)			Collapse | Collapse
1	record_id	Record ID	text
2	intro	Research & Academic IT presents: REDCap Survey Basics This class covers how to setup and run surveys in REDCap. A simple survey example will be presented in class. Attend this class if you wish to learn about how to best setup surveys, denote fields as identifiers, apply branching logic and field validations, use the Participant List, and export your data. REDCap administrators will be available to help guide users through basic survey project setup. Laptops are required for this session. It is highly recommended that users already have a REDCap account before coming to class. Also, if not familiar with REDCap users should watch this video prior to attending the training. Hosted by Research & Academic IT.	descriptive
3	fname	First Name	text, Required
4	lname	Last Name	text, Required
5	email	Email	text (email), Required
6	training_date	Please select a training date for the Survey Basics training session. If the class is grayed out, registration has closed.	radio 2019_10 | (SRB 4.412) Lecture: 10/21 from 10-11am (SRB 4.412) Lab: 10/25 from 1-2pm (Laptop required) 2020_02 | (SRB 1.412) 2/25/2020 from 10-11:30am (Laptop required) Custom alignment: LV Field Annotation: @HIDECHOICE='2019_10'
7	accommodations	Do you require any special accommodations?	notes Custom alignment: LH
8	survey_basics_registration_complete	Section Header: *Form Status* Complete?	dropdown 0 | Incomplete 1 | Unverified 2 | Complete
Instrument: **Survey Basics Eval** (survey_basics_satisfaction)			Collapse | Collapse
9	which_session	Which Survey Basics session(s) did you attend?	checkbox, Required 1 | which_session___1 | Lecture 2 | which_session___2 | Hands-on lab 3 | which_session___3 | None Stop actions on 3
10	improved Show the field ONLY if: [which_session(1)] = '1' or [which_session(2)] = '1' **branching logic**	Section Header: *Please consider the overall course when answering these questions.* This course improved my ability to develop surveys in REDCap.	radio (Matrix) 1 | Strongly Disagree 2 | Disagree 3 | Neutral

Preparing for Data Collection

- Review how fields are worded for clarity
- Choose appropriate field type for data being collected
- Decide which validation should be used
- Determine ranges
- Identify fields to be branched
- Note which fields should be required
- Identify PHI fields
- Use field note to show example
- Field vs. Matrix
- Check for duplicate fields (especially when using multiple forms)
- Avoid textboxes – instead try to categorize answers
- Explore the use of ontologies when appropriate

Project Workflow



Data Integrity - Validation Types

- Field Formats
- Ranges
  - Min
  - Max
- Ontologies
  - ICD-9/ICD-10
  - RxNorm

Date (D-M-Y)	Time (HH:MM)
Date (M-D-Y)	Email
Date (Y-M-D)	Integer
Datetime (D-M-Y H:M)	Letters only
Datetime (M-D-Y H:M)	MRN (10 digits)
Datetime (Y-M-D H:M)	Number
Datetime w/ seconds (M-D-Y H:M:S)	Number (1 decimal place)
Datetime w/ seconds (Y-M-D H:M:S)	Number (2 decimal places)
Phone (North America)	Zipcode (U.S.)
Time (MM:SS)	

Data Integrity – Response Options

- Avoid Ambiguity
  - Use finite answering options wherever possible, e.g drop downs, radio buttons, checkboxes.
  - Add options for unknown, N/A, refused to answer and so on.
  - Consider standardizing “data missingness” - (e.g., '-999, Not asked' or 'UNK, Unknown’)
    - New missing data codes functionality coming with upgrade this Saturday!

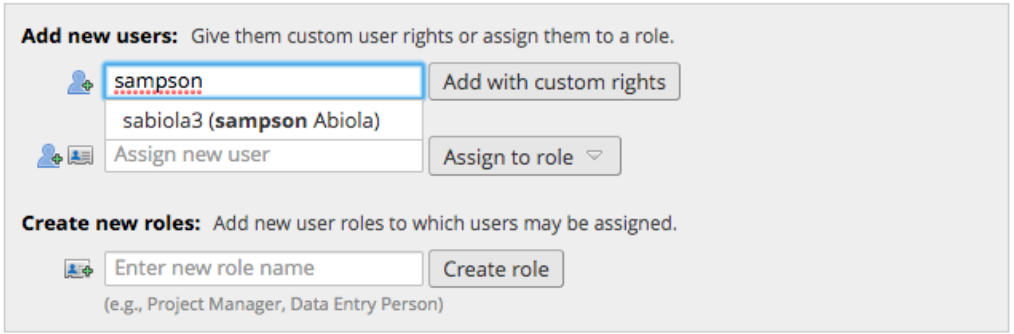
      Fields that have a blank/missing value may be marked with a custom 'Missing Data Code' to note why the value is blank. These missing codes may be used to aid in data analysis by specifying why a field lacks a value. Users may enable custom missing data codes at the project-level in the Additional Customizations popup on the Project Setup page. The missing codes should be coded just like the choices of a multiple choice field with code + comma + label, in which the codes can only have letters, numbers, dots, dashes, and underscores (e.g., '-999, Not asked' or 'UNK, Unknown'). If no codes are entered, this feature will remain disabled. After missing data codes have been set up in a project, you will see an 'M' icon next to each field when viewing a data entry form. Click the icon to open your list of missing data codes, and select one. Once selected, it will save the missing code as the literal data value for the field. Missing data codes can be used for any field type (e.g., date, slider, file upload fields).

Data Integrity – Required Fields

- Surveys
  - Enforceable, participant cannot proceed until they provide an answer.
  - Use when appropriate, don't make all fields required if they are truly not.
- Data Collection Instruments
  - Non-enforceable, it will prompt the user but will not constrain them.
  - Great for reminding or indicating a situation where later data may be invalid due to dependencies.

Data Security – User Privileges

- Controlled by anyone who has the “User Rights” privilege assigned to them.
- New users can be added by typing their name or username but must be selected from the drop down list. (Pre-requisite – user being added must have REDCap account)
- Granular options to control almost all aspects of REDCap and provide only needed access for each individual user.
- Use roles/groups to make managing large amounts of users easier.
- As an owner you can be removed, there is no default prevention against this.



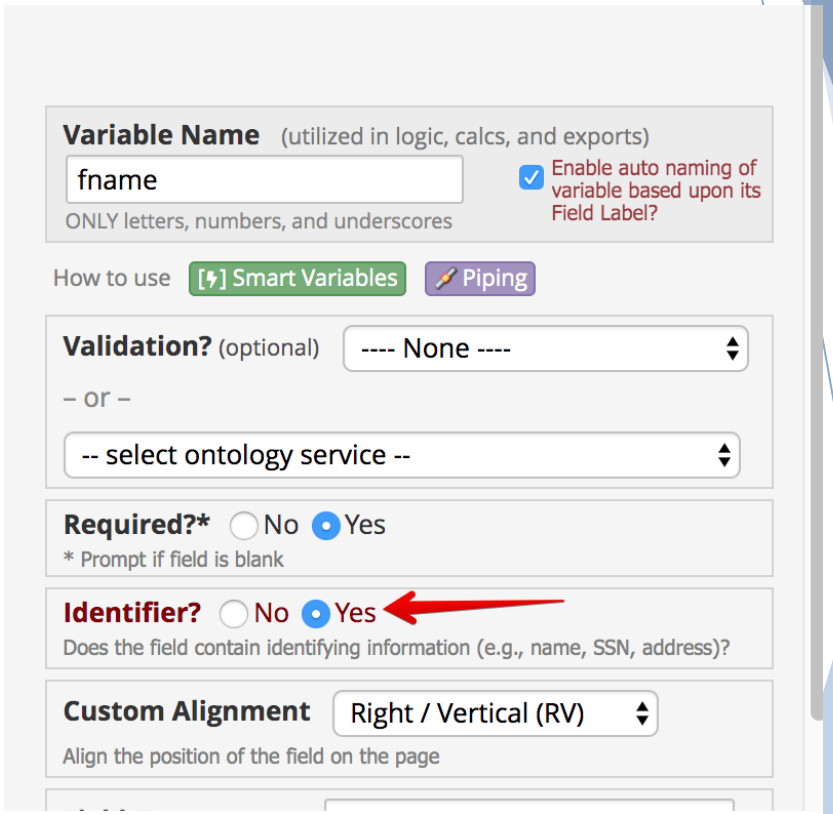
Data Security – Logging

- All actions from the start of project creation are logged.
- Logs cannot be deleted directly, however certain actions can cause logged events to be deleted such as moving to production.
- Can be sorted by record, project user, time stamp and type of action such as update/create/delete.
- Can be exported for storage or providing to regulatory agencies.
- Also can be used to track down errors or inexplicable events within your data.

Data Security – De-Identification

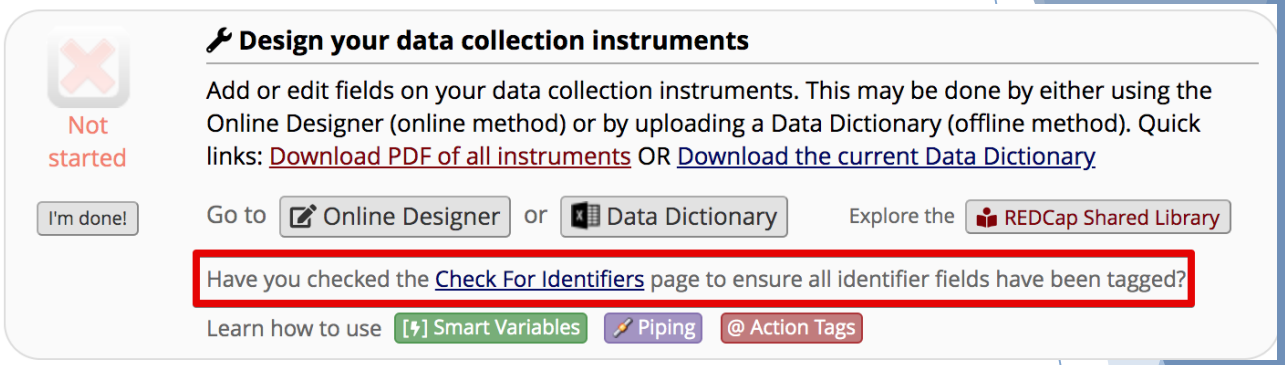
- REDCap will only remove identifiers if the fields which contain them have been specifically indicated as identifier fields.

- Enforceable through user privileges as well as an available option for everyone in the data export tool.



Data Security – De-Identification

- Use Check for Identifiers module to ensure all identifier fields have been tagged.



Check For Identifiers

This module will help you assess whether or not some fields may be identifiers, and then allows you to easily ta identifiers for greater data security. While this same process can be accomplished in the Data Dictionary or Onli page provides a streamlined way of tagging fields as identifiers very quickly. Based off the variable name or fielc listed below may possibly contain identifiers (e.g., name, phone number, address). Please review the entries anc where appropriate. Any fields already tagged as identifiers will already be checked below.

Basic Demography Form

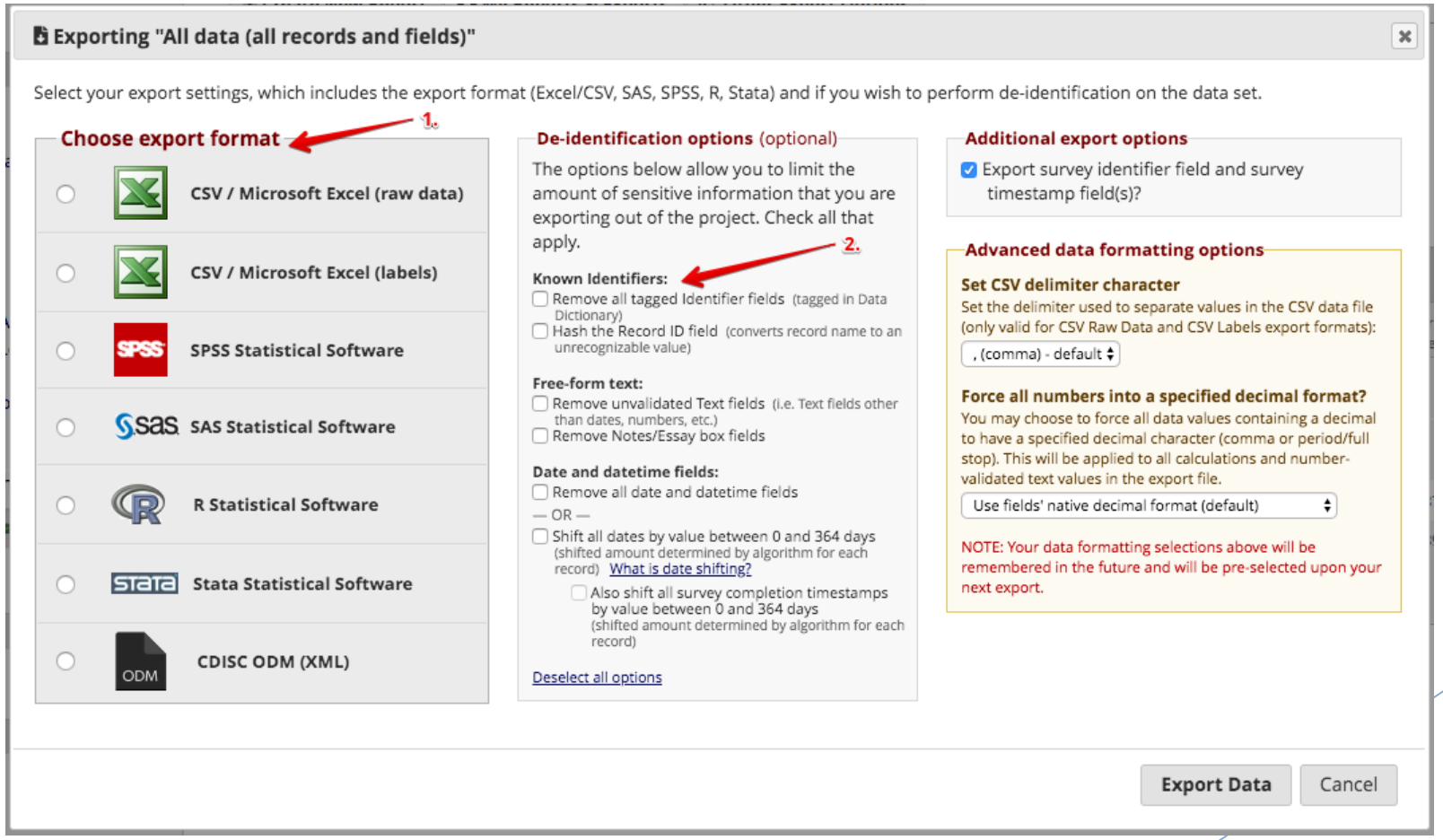
Variable Name	Field Label	Identifier?
record_id	Study ID	☐
first_name	First Name	☑
last_name	Last Name	☑
address	Street, City, State, ZIP	☑
telephone	Phone number	☑
email	E-mail	☑
dob	Date of birth	☑
age	Age (years)	☐

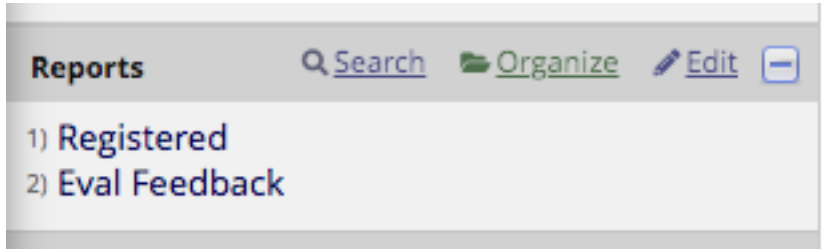
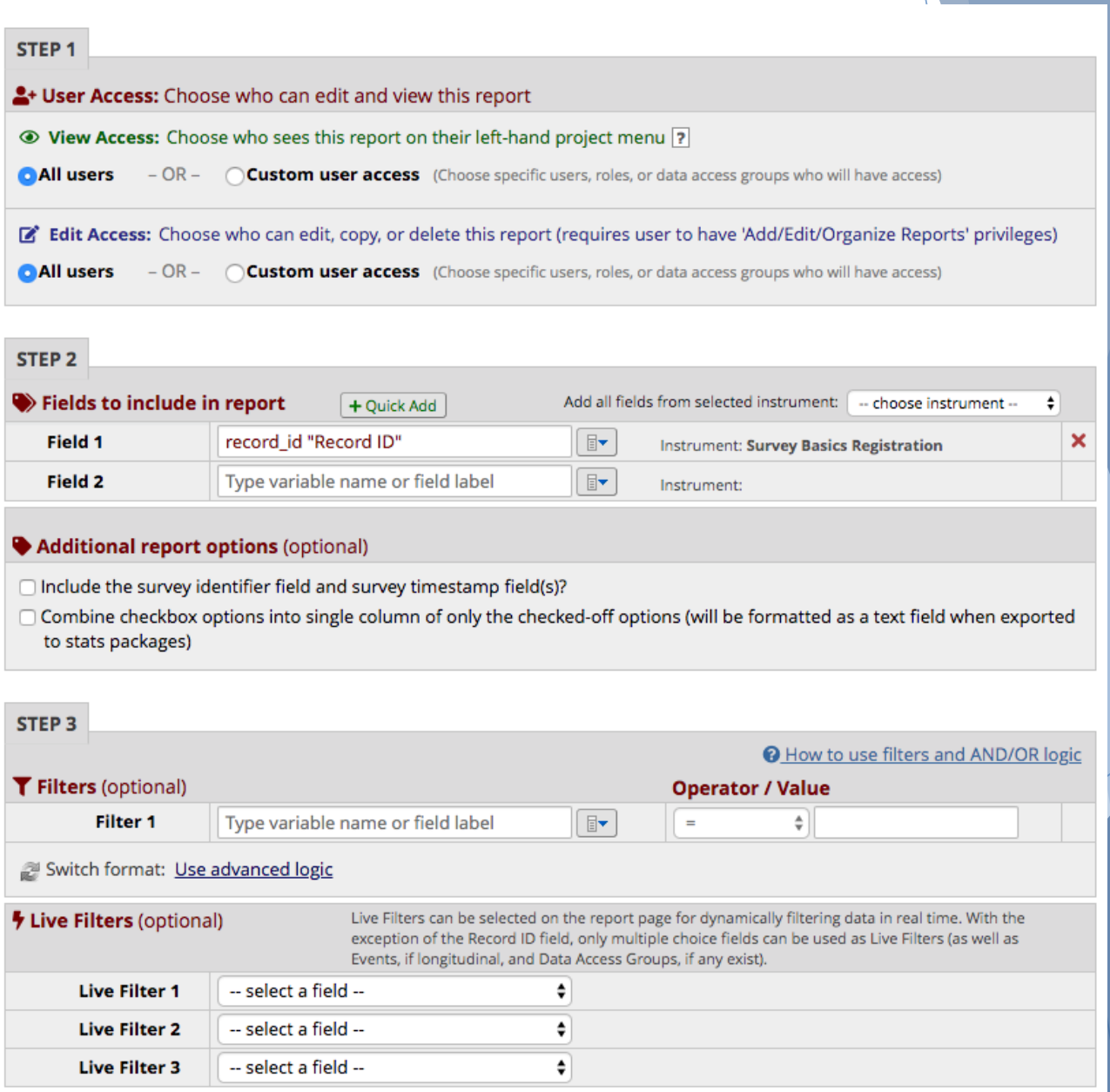
Data Security – Miscellaneous

- Date Shifting
  - All dates are shifted by the same amount of random days, maintaining their relative importance but obscuring their identification properties.
  - Available as an option during data export.
- Locking Records
  - Allows those with specific privileges to lock or unlock records.
  - Can be implemented with a e-signature requirement.

Data Exports

- Export to variety of formats (1.)
- Specify de-identification options to remove PHI (2.)



Reports

- Easy to build simple reports
  - Choose fields
  - Add filters
  - Save
- Always up to date – under Reports in left menu