LEARNING OBJECTIVES

• Learn how to leverage the data dictionary
• Data dictionary basics
• Column descriptions
• Best practices
• Interplay with longitudinal features
• Interplay with repeatable forms
ITHS’ Focus

• Speeding science to clinical practice for the benefit of patients and communities.
• Promotes translation of scientific discovery by:
  ■ Fostering innovative research
  ■ Cultivating multi-disciplinary partnerships
  ■ Training the next generation of researchers

• More information: www.iths.org
Data Dictionary
What’s the data dictionary?

- CSV spread sheet that defines an entire project
  - Forms
  - Variables
- Does NOT define:
  - Events
  - Surveys, survey queues & settings
  - Project settings
  - User rights & data access groups
  - Schedules
  - Randomization
  - Data quality rules
  - Reports

Higher learning threshold, larger risk for errors, but quicker form development.
Data dictionary workflow

Recommended best practice

**Download current data dictionary and backup**

Data dictionaries can be downloaded in the data dictionary upload page located on the project setup page. Store a local backup of the data dictionary or use the snapshot feature.

**Modify the data dictionary**

Add or edit fields/forms/logic as needed. Only use one mode of design at a time to prevent overwrites.

**Upload your new data dictionary**

REDCap will provide you with an overview of any errors it detected in your data dictionary. Correct those and re-upload.

**Commit your data dictionary**

When no critical errors are detected, you can commit your data dictionary to your project.
Data dictionary basic overview

► Columns list aspects of variables
► Each row defines 1 variable:
  ◯ Exception:
    First row defines the aspect headers
  ◯ Do not mess with row 1
► Row 2 defines the REDCap record ID:
  ◯ Mandatory row, but modifiable

Four types of aspects:
  ◯ Mandatory (A, C, D, E)
  ◯ Conditionally Mandatory (F)
  ◯ Non-mandatory (B, G, H, I, J, K, L, M, N, O, R)
  ◯ Matrix fields (P, Q)
Aspects - Variable name

Column A

**Mandatory**

<table>
<thead>
<tr>
<th>Variable name</th>
</tr>
</thead>
</table>

**Conditionally mandatory**

**Non-mandatory**

| Matrix fields |

**Defines:**

- The unique variable name of the variable. Used to store and reference that variable throughout the project

**Do’s:**

- Only use lower case, numbers, underscores
- Has to have at least 2 characters
- Has to be unique within the project
- Keep the variable name as short as possible

**Don'ts:**

- Start with a number
- Make the name longer than 32 characters
- Use special characters (#,$,%,!,? etcetera)
Aspects - Form name

Column B

<table>
<thead>
<tr>
<th>Mandatory</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Form name</td>
<td></td>
</tr>
<tr>
<td>Conditionally mandatory</td>
<td></td>
</tr>
<tr>
<td>Non-mandatory</td>
<td></td>
</tr>
<tr>
<td>Matrix fields</td>
<td></td>
</tr>
</tbody>
</table>

Defines:
► The name of the form that variable lives in.

Do's:
► Use lower case, numbers, underscores.
  ❑ Can be changed later to include capitalizations or special characters.
► Needs to have at least 2 characters.
► Has to be unique within the project.
► All variables in one form have to be sequential.

Don'ts:
► Make forms names really similar.
Aspects - Section Header
Column C

<table>
<thead>
<tr>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditionally mandatory</td>
</tr>
<tr>
<td>Non-mandatory</td>
</tr>
<tr>
<td>Section Header</td>
</tr>
<tr>
<td>Matrix fields</td>
</tr>
</tbody>
</table>

### Defines:
- This column creates a bar with the provided text in it. It can be used to define page breaks in surveys. Section headers are linked to other variables.

### Do’s:
- Use any type of text you want.
- Feel free to use HTML to format the text to your liking.
- Assign it to the row of which you want the section header to appear above of.

### Don’ts:
- Create a unique row for the section header.
- Be careful when combining with fields that contain branching logic.
- Test special characters (#,$,%,!,?, etcetera) to make sure they translate well to your online form.
Aspects - Field Type
Column D

**Mandatory**

<table>
<thead>
<tr>
<th>Field Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditionally mandatory</td>
</tr>
<tr>
<td>Non-mandatory</td>
</tr>
<tr>
<td>Matrix fields</td>
</tr>
</tbody>
</table>

**Defines:**

- Defines what kind of variable this variable will be. You can only use REDCap-supported field types.

**Do’s:**

- Only use the allowed shorthand codes *(text, notes, dropdown, radio, checkbox, file, calc, descriptive, slider, yesno, truefalse).*
- Lookup the field type table in the FAQ for more info.

**Don'ts:**

- Don’t use the sql field type. That one is reserved for REDCap administrators.
- Don’t edit any existing rows with the sql field type.
# Aspects - Field label

## Column E

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandatory</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Field Label</strong></td>
<td>Defines: The question text that will be displayed to the survey participant or data entry user.</td>
</tr>
<tr>
<td><strong>Conditionally mandatory</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Non-mandatory</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Matrix fields</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Do's:**
- Use any type of text you want.
- Feel free to use HTML to format the text to your liking.
- Make the question understandable and to the point.

**Don'ts:**
- Double barrel the question.
- Create a leading question.
- Leave it totally empty. *(technically allowed, but considered bad form design)*
Aspects - Choices, Calculations, or Slider labels
Column F

**Mandatory**

**Conditionally mandatory**

**Choices, Calc's or sliders**

**Non-mandatory**

**Matrix fields**

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**Defines:**

- Defines question choices, calculations or slider labels depending on the chosen field type.

**Do’s:**

- Use the following syntax for choices:
  
  - raw value, label | raw value, label

- Use the following syntax for slider labels:
  
  - label | label or label | label | label

- For calculations, use the same syntax as for branching logic. Main difference is that the calculation has to end in a number instead of a true or false statement.

- Use special functions for calculations.

- Add shortcuts for enabling a Bioportal lookup (see FAQ).

**Don'ts:**

- Add a comma to a raw value.

- Make overly complex calculations.
Aspects - Field Note
Column G

<table>
<thead>
<tr>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditionally mandatory</td>
</tr>
<tr>
<td>Non-mandatory</td>
</tr>
<tr>
<td>Field Note</td>
</tr>
<tr>
<td>Matrix fields</td>
</tr>
</tbody>
</table>

**Defines:**
- The field note will allow you to add a short instruction to variable (e.g., adding a date format to a date validated field).

**Do’s:**
- Use any type of text you want.
- Feel free to use HTML to format the text to your liking.
- Make the note short and to the point.

**Don'ts:**
- Put a lot of text in the field note.
Aspects - Text validation type or show slider number
Column H

<table>
<thead>
<tr>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditionally mandatory</td>
</tr>
<tr>
<td>Non-mandatory</td>
</tr>
<tr>
<td>Text validation type or slider #</td>
</tr>
<tr>
<td>Matrix fields</td>
</tr>
</tbody>
</table>

**Defines:**
- The type of validation a text field might have or if you want to display the numeric value behind a slider field.

**Do’s:**
- Fill in the text “number” to enable the number counter behind a slider.
- Only use the allowed shorthand codes for text validation.
- Lookup the text validation shortcuts table in the FAQ for more info.

**Don'ts:**
- Put in a text validation shortcut or the slider shortcut in this column for other field types. REDCap will not accept this and won’t allow you to import the data dictionary.
Aspects - Text validation minimum and maximum
Column I & J

Defines:
► These two columns define a minimum and/or maximum value for a validated text variable.

Do’s:
► Use a minimum, maximum, or both when appropriate.
► Always build in a bit of extra space to allow for outliers.
► Match the entered value to the field type (e.g., date for a date field).

Don'ts:
► Put in a minimum or maximum in this column for other field types. REDCap will not accept this and will not allow you to import the data dictionary.
Aspects - Identifiers
Column K

Mandatory

Conditionally mandatory

Non-mandatory

ID’s

Matrix fields

Defines:
► Flags the variable as an identifier or not. This does not have any effect on the data entry process but does impact the data export process.

Do’s:
► Use a single “y” to flag a variable as an identifier.
► Leave the field blank to flag the variable as a non-identifier.

Don'ts:
► Make everything an identifier.
► Put in anything other than the allowed “y” code. REDCap will not accept the data dictionary.
Aspects - Required
Column M

**Mandatory**

**Conditionally mandatory**

**Non-mandatory**

**Required**

**Matrix fields**

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**Defines:**

► Makes a variable required. This does have any effect on the data entry process but does not impact the data export process.

**Do’s:**

► Use a single “y” to flag a variable as required.
► Leave the field blank to flag the variable as optional.
► Add a field note to unstructured required fields to explain what to do when no answer can be given.

**Don'ts:**

► Make a checkbox required.
► Make a variable required without “exit” options.
► Put in anything other than the allowed “y” code. REDCap will not accept the data dictionary.
Aspects - Branching Logic
Column L

<table>
<thead>
<tr>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditionally mandatory</td>
</tr>
<tr>
<td>Non-mandatory</td>
</tr>
</tbody>
</table>

**Branching logic**

**Matrix fields**

---

**Defines:**
- The branching logic attached to this specific variable.

**Do’s:**
- Make use of the copy and paste features to quickly add logic to a lot of variables.
- Use excel function to craft custom branching logic quickly.
- Test your logic to work out the bugs.

**Don'ts:**
- Craft logic that never can be true.
- Use double quotes instead of single quotes.
Aspects - Custom alignment

Column N

Mandatory

Conditionally mandatory

Non-mandatory

Custom alignment

Matrix fields

Defines:

► Allows you to slightly modify the way REDCap displays variables.

Do’s:

► Use the shortcuts codes for the four options:
  - LV: Left Vertical
  - LH: Left Horizontal
  - RH: Right Horizontal
  - RV: Right Vertical (the default option when left blank)

Don'ts:

► Put in anything other than the allowed shortcut codes. REDCap will not accept the data dictionary.
### Aspects - Question numbering

**Column O**

<table>
<thead>
<tr>
<th>Mandatory</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditionally mandatory</td>
<td></td>
</tr>
<tr>
<td>Non-mandatory</td>
<td></td>
</tr>
</tbody>
</table>

**Question numbering**

**Matrix fields**

---

**Defines:**

- Allows you to add a custom number per variable in survey mode.

**Do’s:**

- Use logical ordering.
- Take branching logic into account.
  - Create sub-numbers (1a, 1b, etcetera).
- Leave blank if you don’t want any numbers for questions.

**Don'ts:**

- Add question number for non-surveys.
Aspects – Matrix group
Column P

**Mandatory**

**Conditionally mandatory**

**Non-mandatory**

**Matrix fields**

**Matrix group**

---

**Defines:**
- Groups variables into a matrix.

**Do’s:**
- Only use lower case, numbers, underscores.
- Has to have at least 2 characters.
- Has to be unique within the project.
- Matrices have to be sequential and need to have the same options for all variables.
- Use a section header in the top variable of a matrix to create a matrix header.

**Don'ts:**
- Add a matrix name for field types that are not radio buttons or checkboxes.
- Create matrices with a lot of options.
Aspects – Matrix ranking

Column Q

Mandatory
Conditionally mandatory
Non-mandatory

Matrix fields
Matrix ranking

Defines:
► Flags whether or not a matrix is a ranking matrix or not.

Do’s:
► Use a single “y” to flag a variable as required.
► Leave the field blank to flag the variable as optional.
► Ranking matrices are only allowed for radio button matrices.

Don'ts:
► Create a checkbox ranking matrix.
► Put in anything other than the allowed “y” code. REDCap will not accept the data dictionary.
Aspects - Field annotation & Action tags

Column R

Mandatory
Conditionally mandatory
Non-mandatory
Field annotation & Action tags
Matrix fields

Defines:
► Ability to add a note about the field for the designer. Or enable 1 or more action tags for this field.

Do’s:
► Use any text you want for an annotation
► Use the following shorthand codes for action tags:
  @HIDDEN, @HIDDEN-FORM, @HIDDEN-SURVEY, @HIDDEN-APP, @READONLY, @READONLY-FORM, @READONLY-SURVEY, @READONLY-APP, @LATITUDE, @LONGITUDE, @PASSWORDMASK, @NOW, @TODAY, @BARCODE, @DEFAULT
► Use piping in combination with the default tag to prefill a variable with a previously entered value.

Don'ts:
► Start typing the @ sign into the cell. Format the cell first as a text field. Excel will register an error if you do not.
Data Dictionary Best Practices

► Format Optimizing
  - Mobile devices
  - REDCap mobile app
  - Matrices

► Interplay with Longitudinal
  - First form
  - Splitting up forms
  - Merging forms

► Interplay with repeatable forms
  - Form vs event
  - Scaling down
  - Branching logic
Best Practices
Format Optimizing

Mobile devices
► Some field types work better on a smartphone than others
► Try to keep things short
► Test on your own device

REDCap Mobile App
► Limited functionality due to offline nature
  ► e.g. Ontology Lookup
► Limit to 500 variables per form
  ► Less if the form contains a ton of calculations/logic

Matrix formatting
► Scroll effect (header)
  ► Use a maximum of 5 or 6 rows
  ► Easy to split up matrix in the data dictionary
Best Practices
Interplay with longitudinal features

Format Optimizing

Longitudinal

Repeateable forms

Generalize your forms
► Use the same form in multiple events
  ► e.g. Clinical measurements, follow up questionnaire

Splitting up / merging forms
► Change the form name in Column B
  ► Not possible in the online designer

Record ID / First form
► REDCap needs a record ID to store data
  ► Always in the very first form as a text box
  ► Needs to be assigned to the first event

Branching Logic / Calculations
► Add event identifiers if necessary
  ► e.g. [baseline_arm_1][dob]
Best Practices
Interplay with repeatable forms and events

Format Optimizing

Longitudinal

Repeateable forms

Form vs Event
► Can't repeat a form instead a repeated event
► Design for your desired repeat method
► e.g. Adverse Events

Scale down your form size
► Only include variables for a single repetition
► Allows for quick data entry
► Add a label variable unique enough to identify the repetition

Branching logic / Calculations
► No capability (yet) to identify a specific repetition
  ► Can't setup a calculation to average a score in repeated forms
► Keep your logic / calculation "local" (as in with that form)
General Excel Wizardry

**Sorting & Filter**
*Sorting on a form name or field type will allow you to modify specific things quickly without having to hunt for them.*

**Find and Replace**
*Update variable names, logic, calculations, etc quickly.*

**Crafting dynamic branching logic**
*When repeating the same variable over and over, you can have excel craft the logic for your with cell references.*

**Auto fill variable names**
*Excel can automatically increment numbers when using "Fill series". Only works when the text ends in a number.*

**Split screens**
*Allows you to keep the header row and variable names visible (found in the View menu ➔ "Split" button)*
Thank You
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