

# REDCap

## Advanced Database Management (303)



# Learning objectives

- How to manage bigger complexer projects?
  - User right management
  - Data quality
  - Data manipulation
  - Improving overview / workflow



# 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](http://www.iths.org)

Laboratory

Clinic

Community





## User right management

# User right management

## Uses / Reasons why?

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Roles

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Suspending users

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Data Access Groups

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## Uses / Reasons why?

- ▶ Compliance
  - ▶ HIPAA
- ▶ Data Quality
  - ▶ Blinding groups of users
- ▶ Control your own dataset
  - ▶ Exports
  - ▶ Ownership
- ▶ Prevent "Too many cooks in the kitchen"
- ▶ Relieving your training burden

# User right management

Uses / Reasons why?

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**Roles**

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Suspending users

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Data Access Groups

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## User roles

- ▶ Allows for quick assignment of previously established rights
  - ▶ E.g. Temporary users like medical students
- ▶ Forces you to think about who does what
- ▶ Examples of common roles:
  - ▶ Data entry
  - ▶ Project manager/PI
  - ▶ User manager
  - ▶ Design manager
  - ▶ Statistician
  - ▶ Research Coordinator

# User right management

Uses / Reasons why?

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Roles

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**Suspending users**

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Data Access Groups

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## Suspending users

- ▶ Two options:
  - ▶ Global suspension
    - ▶ Done by an admin
    - ▶ Great for suspending for a ton of projects at the same time
    - ▶ Usually done for people leaving an organisation
  - ▶ Project specific suspension
    - ▶ Pre-determined date
    - ▶ Good for temporary users
    - ▶ Done by user rights enabled user



# User right management

Uses / Reasons why?

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Roles

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Suspending users

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**Data Access Groups**

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## Data Access Groups (DAG)

- ▶ Separate records by group
  - ▶ Users in a DAG can only see records assigned to their group
  - ▶ Records created by a user in a DAG automatically get assigned to that DAG
  - ▶ Records can be re-assigned
    - ▶ Via the record home page
    - ▶ Via data import
  - ▶ Users not in any DAG can see all records.
  - ▶ DAG's are independent of user rights
    - ▶ Set both for new users



Q U A L I T Y

## Data Quality



**Garbage In, Garbage Out!!**

# Data Quality

## Pre-Capture

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Design

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Double Data Entry

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## During Capture

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## Post Capture

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## Before the start of data collection

- ▶ Design
  - ▶ Pre-emptive strike
  - ▶ More options than paper forms
  - ▶ Talk to your statistician
- ▶ Validation
  - ▶ Collect the "right" kind of data
- ▶ Required fields
  - ▶ Prevents missing data
- ▶ Structured fields vs unstructured fields
- ▶ Double data entry

# Data Quality

## Pre-Capture

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### Design

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Double Data Entry

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## During Capture

---

## Post Capture

---



## Design - Validation

- ▶ Think about analysis
  - ▶ e.g. "Two" vs "2"
- ▶ Validation options
  - ▶ Date/time
  - ▶ Numeric
  - ▶ Special (MRN's, email, phone, zip code)
- ▶ Minimum & Maximum's
  - ▶ Optional
  - ▶ Think about outliers
- ▶ Action tags
  - ▶ @CHARLIMIT, @WORDLIMIT



# Data Quality

## Pre-Capture

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### Design

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Double Data Entry

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## During Capture

---

## Post Capture

---



## Design – Required fields

- ▶ Soft requirement
  - ▶ Only for users
  - ▶ Good reminder
- ▶ Hard requirement
  - ▶ Survey mode
  - ▶ Unskippable
- ▶ Best practices
  - ▶ Checkboxes
  - ▶ Give people an "out"
    - ▶ e.g. Prefer not to answer, Unknown

# Data Quality

## Pre-Capture

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### Design

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Double Data Entry

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## During Capture

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## Post Capture

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## Design – Structured vs Unstructured

- ▶ Structured fields
  - ▶ E.g. dropdowns, radio buttons, checkboxes, lookup tables, calculated fields
  - ▶ Quantifiable
  - ▶ Finite predicatable answers
  - ▶ Easy analysis
- ▶ Unstructured fields
  - ▶ E.g. text boxes, note boxes
  - ▶ More flexibility
  - ▶ Higher risk for "unforeseen" answers
  - ▶ Might require some cleaning later

# Data Quality

## Pre-Capture

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Design

---

## Double Data Entry

---

During Capture

---

Post Capture

---



## Double Data Entry

- ▶ Main purpose is to prevent:
  - ▶ Transcription bias
    - ▶ From paper to electronic
  - ▶ Interpretation bias
    - ▶ Interpreting clinical notes, paper comments
- ▶ Useless when doing:
  - ▶ Direct data entry
  - ▶ Surveys
  - ▶ Extractions from other clinical systems
- ▶ Requires twice the effort, time and resources



# Data Quality

Pre-Capture

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**During Capture**

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Data Resolution Workflow

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During Capture

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Post Capture

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## During data capture

- ▶ Deal with the unexpected
  - ▶ Easier to do "during" than "after the fact"
- ▶ Course correct midstream
  - ▶ Change process in REDCap
  - ▶ Move to production
- ▶ Track issues
  - ▶ Field comment log (default)
  - ▶ Data Resolution Workflow
- ▶ Dealing with issues
  - ▶ Data validator role
  - ▶ Make 1 person responsible

# Data Quality

Pre-Capture

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**During Capture**

---

**Data Resolution Workflow**

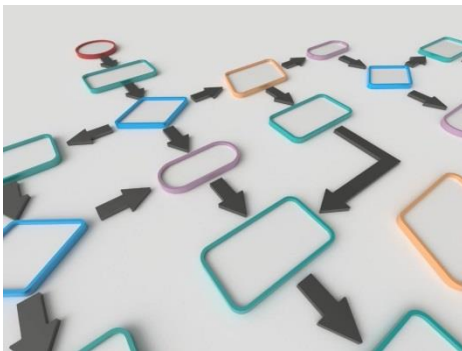
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During Capture

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Post Capture

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## Data Resolution Workflow

- ▶ Field Comment Log
  - ▶ Basic default option
  - ▶ Comment on any variable in any record
- ▶ Data Resolution Workflow
  - ▶ Turn on in the project setup page
  - ▶ Setup the appropriate user rights
  - ▶ Allows for the opening of Queries/Issues
  - ▶ Manage the issues over time
  - ▶ Asynchronous
  - ▶ HIPAA compliant (opposed to email)
  - ▶ Ideal for larger dispersed teams

# Data Quality

Pre-Capture

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During Capture

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**Post Capture**

---

Logging

---

Data Quality

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## Post data capture

- ▶ Adhere to compliance rules
  - ▶ Logging
  - ▶ Data Resolution Workflows
- ▶ Clean your datasets
  - ▶ Eases analysis
  - ▶ Good indicator of your data quality
- ▶ Do a post-mortum
  - ▶ For future studies

# Data Quality

Pre-Capture

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During Capture

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**Post Capture**

---

**Logging**

---

Data Quality

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## Post data capture - Logging

- ▶ REDCap tracks everything
  - ▶ Page views
  - ▶ Design edits
  - ▶ Data entry
  - ▶ Modifications
- ▶ Exportable in a CSV
- ▶ Filterable
  - ▶ Ton of data
- ▶ Accessible through "Logging" application
- ▶ Talk to the REDCap Administrator for more technical logging like IP addresses

# Data Quality

Pre-Capture

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During Capture

---

**Post Capture**

---

Logging

---

**Data Quality**

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## Post data capture – Data Quality

- ▶ Run checks on the entire dataset
- ▶ 8 predefined rules
  - ▶ Excute to check a rule
  - ▶ Rule H lets you update calculations in bulk
- ▶ Allows for custom rules
  - ▶ Based on branching logic
  - ▶ Look for "impossible" scenarios
    - ▶ "Pregnant males"
    - ▶ "Negative number of births"
    - ▶ Birth date after visit dates





## Data manipulation

# Data manipulation

## Data Manager

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Deleting records

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Wiping forms/surveys

---

Locking

---

Data Pre-population

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## Data Manager

- ▶ Responsible for:
  - ▶ Design
  - ▶ Data Quality
  - ▶ Data loading
  - ▶ Other data responsibilities
- ▶ Needs to know:
  - ▶ The dataset itself
  - ▶ REDCap capabilities
  - ▶ Data manipulation
    - ▶ Importing & Exporting class recommended
- ▶ Manage this role through the user rights



# Data manipulation

Data Manager

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**Deleting records**

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Wiping forms/surveys

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Locking

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Data Pre-population

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## Deleting records

- ▶ Governed by a specific user rights
  - ▶ Is turned off by default
- ▶ Delete individual record
  - ▶ Done in the record home page
  - ▶ Removes entire record
- ▶ Delete in bulk
  - ▶ "Erase all data" in "Other functionality" tab
  - ▶ API
- ▶ Irreversible unless you have a backup

# Data manipulation

Data Manager

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Deleting records

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**Wiping forms/surveys**

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Locking

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Data Pre-population

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## Wiping forms and surveys

- ▶ Also governed by the "delete records" user rights
- ▶ Does not delete the entire record
- ▶ Individual forms
  - ▶ Done on the form itself
  - ▶ Button at the bottom of the form
  - ▶ Enter "Edit survey" mode at the top of the form before you delete a survey
    - ▶ Requires "edit survey" rights
- ▶ Events
  - ▶ Done in the record home page
  - ▶ Click the little red "X" underneath an event

# Data manipulation

Data Manager

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Deleting records

---

Wiping forms/surveys

---

**Locking**

---

Data Pre-population

---



## Locking

- ▶ Governed by the "Lock/Unlock records" user right
- ▶ Individual forms
  - ▶ Done on the form itself
  - ▶ Checkbox at the bottom of the form
  - ▶ Enter "Edit survey" mode at the top of the form before you lock a survey
    - ▶ Requires "edit survey" rights
- ▶ Entire record
  - ▶ Done in the record home page
  - ▶ Select option in the "Choose Action" dropdown
- ▶ Locking can be undone by users with locking rights

# Data manipulation

Data Manager

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Deleting records

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Wiping forms/surveys

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Locking

---

**Data pre-population**

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## Data pre-population

- ▶ Three main methods
- ▶ @DEFAULT tag
  - ▶ Hard coded value
  - ▶ Piped in value from elsewhere in the record
  - ▶ Variable must not be hidden with logic
- ▶ @PLACEHOLDER tag
  - ▶ Shows a suggestion
  - ▶ Does not save when untouched
- ▶ Importing
  - ▶ Pre-load most kinds of data
  - ▶ Great for demographics or EMR data dumps



## Improving overview / workflow

# Improving overview / workflow

## Custom labels

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Custom dashboards

---

Creative report uses

---

"To do" lists

---

"Dynamic" reports

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## Custom labels

- ▶ Pipe in entered values
- ▶ Use piping syntax
- ▶ Record label
  - ▶ E.g. Last name, first name (*Doe, John*)
  - ▶ Setup in "Additional customizations"
- ▶ Event label
  - ▶ E.g. Visit date (*06-06-2018*)
  - ▶ Setup in "Define my events"
- ▶ Repeated instrument label
  - ▶ E.g. Medication name (*Tramadol*)
  - ▶ Setup in "Repeated instruments and events"

# Improving overview / workflow

Custom labels

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**Custom dashboards**

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Creative report uses

---

"To do" lists

---

"Dynamic" reports

---



## Custom dashboards

- ▶ Need "project design/setup" rights to setup
- ▶ Found in the "Record Status Dashboard"
- ▶ Viewable by every user
  - ▶ But limited by individual user rights
- ▶ Filter based on:
  - ▶ Branching logic
  - ▶ Completion status
  - ▶ Events
  - ▶ Forms
- ▶ Assorted display options available



# Improving overview / workflow

Custom labels

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Custom dashboards

---

**Creative report uses**

---

"To do" lists

---

"Dynamic" reports

---



## Creative report uses

- ▶ You can build as many reports as you want
- ▶ Take advantage of the fact that REDCap runs the report every time you access it
- ▶ Useful options
  - ▶ Filter logic
  - ▶ Live filters
  - ▶ Sorting
  - ▶ Event limits
- ▶ Main purpose is to export data
- ▶ Other uses:
  - ▶ To do lists
  - ▶ Data quality

# Improving overview / workflow

Custom labels

---

Custom dashboards

---

**Creative report uses**

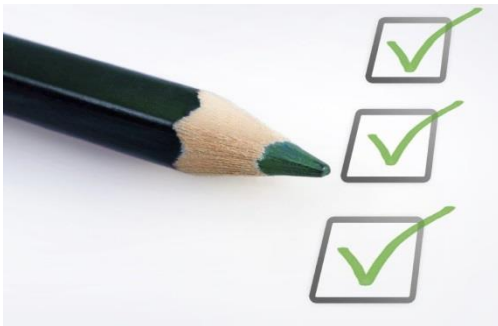
---

**"To do" lists**

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"Dynamic" reports

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## "To do" lists

- ▶ Create a status variable
  - ▶ E.g. processing status
- ▶ Build logic to show all records where that status variable is empty or has a specific value
  - ▶ Run the report
  - ▶ Select a record
  - ▶ Process the record
  - ▶ Update status variable
  - ▶ Rinse and repeat until empty

# Improving overview / workflow

Custom labels

---

Custom dashboards

---

**Creative report uses**

---

"To do" lists

---

**"Dynamic" reports**

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## "Dynamic" reports

- ▶ Create a date variable
  - ▶ E.g. Time stamp
- ▶ Have the date variable automatically filled in
- ▶ Build logic that compares that date variable (or smart variable) against today's date
- ▶ Specify a range
  - ▶ E.g. Last week would be 0 and -7 \*
- ▶ Run the report
- ▶ The report will change based on:
  - ▶ Data entry (new records)
  - ▶ Time (older records drop off)

*\*Check notes for example code*

# Thank You

# Questions?

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*Members can connect with collaborators across the CTSA consortium.*