

# HARMONIST DATA TOOLKIT: A SHINYDASHBOARD APPLICATION

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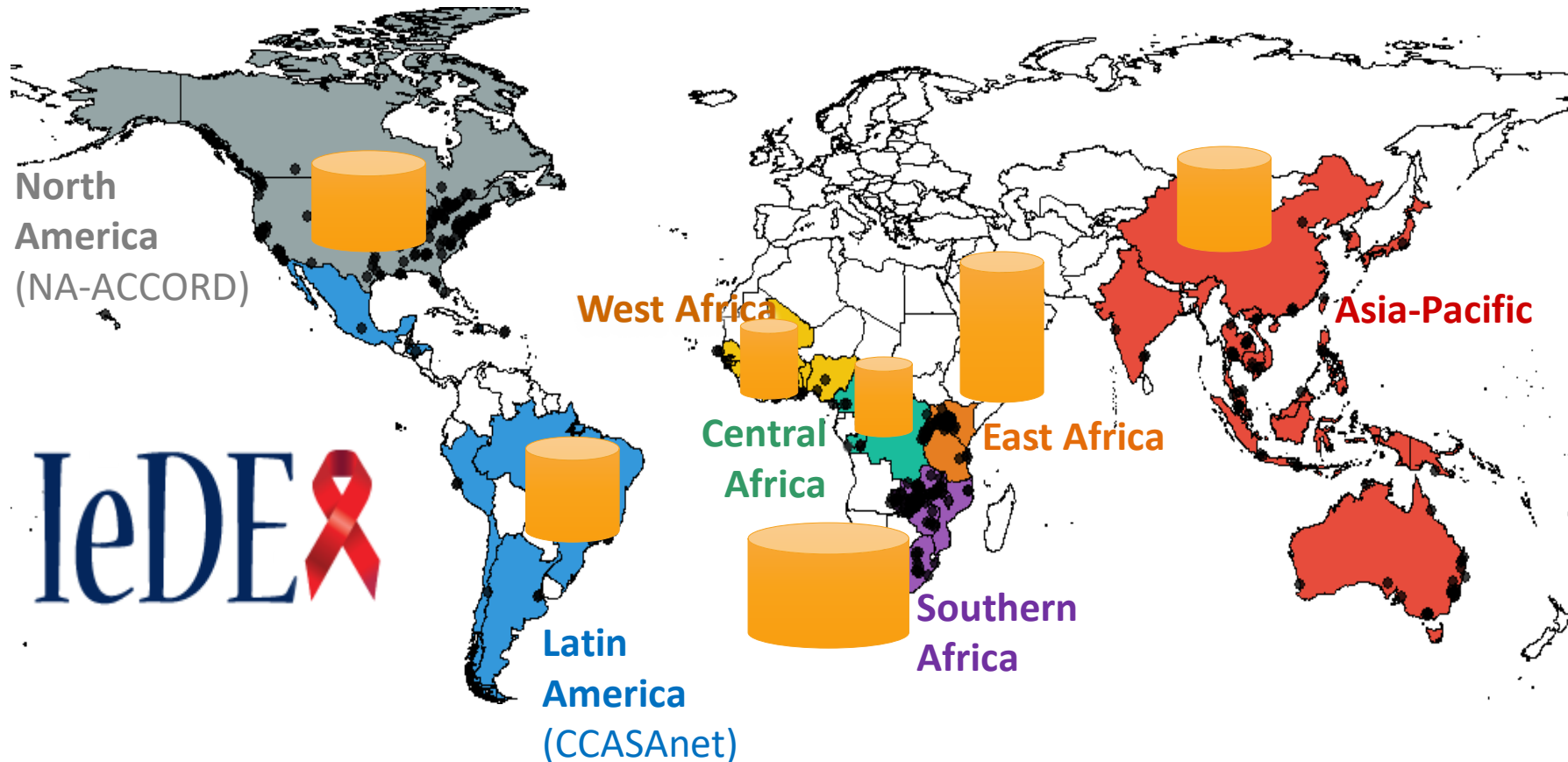
Vanderbilt Department of Biomedical Engineering

# TOPICS

- Motivation for leDEA Harmonist Data Toolkit
- Demonstration
- Explore reactivity
- Overview of code structure
- Favorite Shiny resources

# IeDE HARMONIST PROJECT

## International epidemiologic Databases to Evaluate AIDS



- Established in 2005
- Now:
  - 46 countries
  - >1.7 million patients
  - 100's of publications



# ieDE HARMONIST PROJECT

- **iedeades.org**: Common data model
- **iedeahub.org**
  - Data requests
  - Research project management
- **iedeadata.org**
  - Data quality checking
  - Report generation
  - Secure file transfer

# IEDEAHUB.ORG

[Home](#)[Requests](#) **4**[Concepts](#)[Data](#)[Resources](#)[CA](#) [Stephany Duda](#) ▾

## Upload Data

The following leDEA Concepts have active Data Requests. Please select the request for which you wish to upload data. Data files should be in the [leDEA Data Exchange Standard \(leDEA DES\) format](#). If you are transferring non-DES, non-data files, please use the [File Transfer Tool](#) instead.

Due Date	Concept	Title	Contact Person	Data Request	CN	Actions
2017-10-27 <b>-2 days</b>	MR014	Duration of first-line antiretroviral regimens in children: a global perspective (CIPHER)	Harmonist TestPerson (CN)		No uploads	<a href="#">Upload Data</a>
2017-11-20 <b>+22 days</b>	MR077	Outcomes of children and adolescents treated with raltegravir in the leDEA consortium	Gem Patten (SA)		Uploaded 2017-10-26	<a href="#">Upload Data</a> <a href="#">View Upload</a>
2017-11-27 <b>+29 days</b>	MR108	leDEA-WHO collaboration: global analysis of the pre-ART cascade and delay from diagnosis to start of antiretroviral therapy in HIV-infected children aged 0-19 years	Cam Ha Ostinelli (SA)		Uploaded 2017-10-26	<a href="#">Upload Data</a> <a href="#">View Upload</a>

# HARMONIST DATA FLOW



leDEA  
regional data  
Submission



Data pass through the  
Harmonist Data Toolkit  
to check data quality,  
standards compliance,  
and generate reports.

Data managers are  
prompted to correct  
errors and reupload.



Standards-  
compliant  
regional data



Data files are stored  
in the secure cloud  
(encrypted) for  
retrieval by study  
investigator

# leDE DATA QUALITY CHECKING AND REPORTING

INITIAL: DATA QUALITY  
ALGORITHMS IN R

SOLUTION:  
HARMONIST DATA TOOLKIT

- Users must install and run R → Web interface (Shiny)
- Files to be checked must be .csv → Shiny UI
- Cryptic reporting → Rmarkdown = reproducible reports
- Difficult to maintain (hard-coded) → REDCap (API → R)
- No mechanism for file exchange → AWS (API → R) File storage/retrieval

Snippet of previous code

```
## CHECK FOR UNEXPECTED CODING
badcodes(gender,c(1,2,9),basic)
# Mode of Infection
# 1 = homo/bisexual
# 2 = injecting drug user
# 3 = (1+2)
# 4 = haemophiliac
# 5 = transfusion, non-haemophilia related
# 6 = heterosexual contact
# 7 = (6+2)
# 8 = Perinatal
# 9 = Sexual contact (homo/hetero not specified)
# 10 = Sexual abuse
# 90 = other
# 99 = unknown
badcodes(mode,c(1:8,90,99),basic)
# ART naive upon enrollment
# 0 = No
# 1 = Yes
# 9 = Unknown
badcodes(naive_y,c(0,1,9),basic)
# Prior to enrollment, has the patient been exposed to antiretroviral therapy for p
# 0 = No
# 1 = Yes
# 9 = Unknown
badcodes(proph_y,c(0,1,9),basic)
#Has the patient ever received antiretroviral treatment? (excludes antiretroviral d
# 0 = No
# 1 = Yes
# 9 = Unknown
badcodes(recart_y,c(0,1,9),basic)
# Has patient ever been given an AIDS diagnosis? (clinical)
# 0 = No
# 1 = Yes
# 9 = Unknown
badcodes(aids_y,c(0,1,9),basic)
badcodes(birth_d_a,c("<",">","D","M","Y","U"),basic)
badcodes(enrol_d_a,c("<",">","D","M","Y","U"),basic)
badcodes(recart_d_a,c("<",">","D","M","Y","U"),basic)
badcodes(aids_d_a,c("<",">","D","M","Y","U"),basic)
```

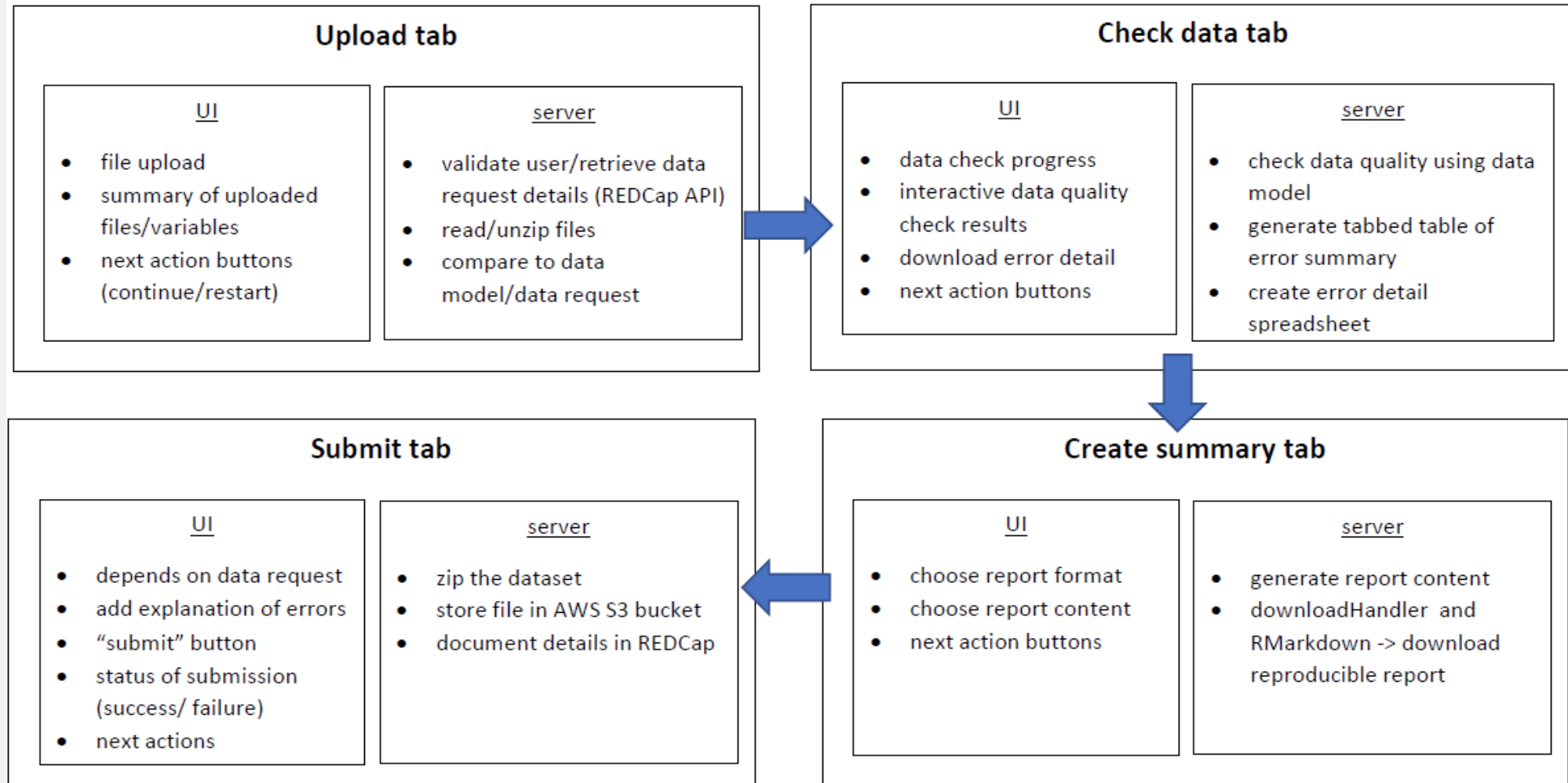


```
errorFrame <- checkCodedVariables(errorFrame)
```



DEMO

# STRUCTURE



## QUIZ: ARE THESE EQUIVALENT?

```
observe({
  action <- input$fileAction
  num <- input$favNum
  text <- input$newword

  if (action == "addText"){
    cat(text, file = "test.txt", append = TRUE, sep = "\n")
  } else {
    cat(paste0("Number chosen = ", num), file = "test.txt", append = TRUE, sep = "\n")
  }
})
```

```
observe({
  if (input$fileAction == "addText"){
    cat(input$newword, file = "test.txt", append = TRUE, sep = "\n")
  } else {
    cat(paste0("Number chosen = ", input$favNum), file = "test.txt", append = TRUE, sep = "\n")
  }
})
```

## LET'S EXPERIMENT WITH "OLD FAITHFUL" SHINY APP

- What makes a reactive variable execute?
- Let's add an input that depends on another input

## SIMPLE BUT TRUE

- `browser()` and `print()` are your best debugging friends!
- A quick `print()` can solve many reactive mysteries

# SHINY RESOURCES

- Rstudio::conf videos and other resources: <https://resources.rstudio.com/shiny-2>
- Great resources from Dean Attali, including <https://deanattali.com/blog/advanced-shiny-tips/> (Also, instructions on inexpensive Shiny app hosting: <https://deanattali.com/2015/05/09/setup-rstudio-shiny-server-digital-ocean/>)
- Nice tutorials with examples:
  - <https://ibiostat.be/seminar/uploads/introduction-r-shiny-package-20160330.pdf>
  - <https://www.zevross.com/blog/2016/04/19/r-powered-web-applications-with-shiny-a-tutorial-and-cheat-sheet-with-40-example-apps/>
- Showcase of Shiny examples: <https://www.rstudio.com/products/shiny/shiny-user-showcase/>
- Questions and answers: <https://community.rstudio.com/> and stackoverflow, of course

# MY EXAMPLE CODE ON GITHUB

- <https://github.com/judytlewis/>