



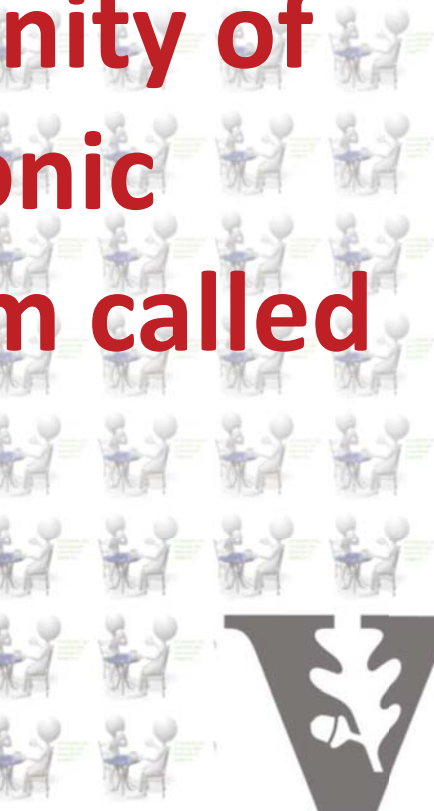
# **Innovation through Implementation: *Lessons and New Operational Models Based on Use of REDCap's FHIR Module In Single- and Multi-Center Trials***

Paul A. Harris, PhD  
Director, Office of Research Informatics  
Professor of Biomedical Informatics, Biostatistics, and  
Biomedical Engineering  
Vanderbilt University Medical Center

**DIFUTURE**  
Data Integration for Future Medicine



**We have a very large and very active community of users for an electronic data capture system called REDCap**





**Visual Status**

**Data Validation**

**Numerous Field Types**

**Human Readable Labels**

**Auto-Variable Coding**

**Branching Logic**

**+ Text (Free) (Number) (Phone) (Zip) (Date) +TextArea +Select +Radio +File**

Study ID: 9898

Demographic Characteristics

Date subject signed consent: 2008-01-30

First Name: Paul

Last Name: Harris

Contact Information

Street, City, State, ZIP: 123 Wilson Road

Phone number: (388) 388-3888

Second phone number: (388) 299-2888

E-mail: paul.harris@vanderbilt.edu

Gender: Female

Has the subject given birth before?: Yes

How many times has the subject given birth?: 8

## Benefits

Secure

Disease Neutral

Intent Neutral

Intuitive Project Setup

Free to Users

(no programmer needed)

Easy Capture

Export to all Stats Packages

Randomization

CRFS + Surveys + SMS + Voice

Patient Reported Outcomes

Role-Based User Management

RESTful API (setup, users

... and more



**Data Export Tool**

**Embedded De-Identification Tools**

**Exports Raw Data + Stats Script Files (Labels, Coding)**

Protocol 1453 Nutritional Status of Malnourished in Tennessee - Mozilla Firefox

Protocol 1453 Nutritional Status of Malnourished in Tennessee

Form Status: Complete? (month\_0\_complete)

Study Completion Information: Has patient completed study? (complete\_study)

Reason patient withdrew from study (withdraw\_reason)

General Comments: Comments (study\_comments)

Form Status: Complete? (study\_completion\_complete)

De-Identification Options (Optional)

Known Identifiers: Remove all known identifier fields (tagged in Data Dictionary)

Free-form text: Remove unvalidated text fields (i.e. Text fields other than dates, numbers)

Date fields: Remove all date fields

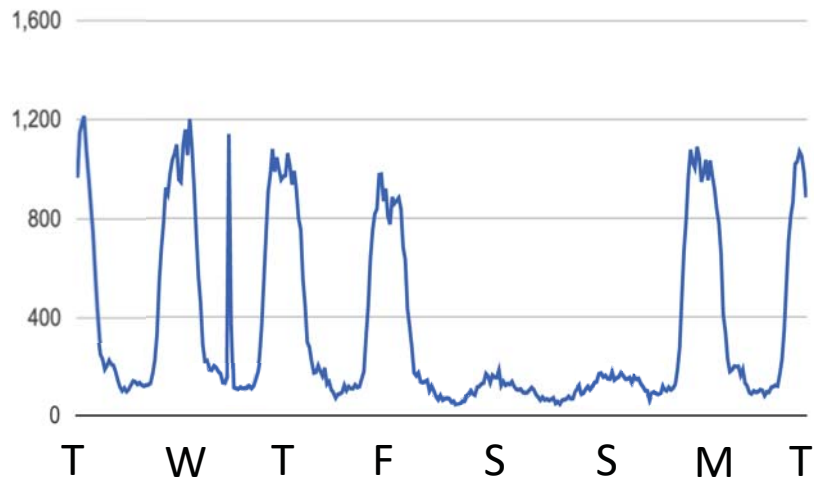
Shift all dates by value between 0 and 364 days (shifted amount determined by what is data shifted)

Connect all outputs

### Map of VUMC Users (Last Week)



### Concurrent VUMC Users (Last Week)



### System Statistics

<b>Total projects</b> (excludes 'practice' projects)	68,672
• Project status	
- Production <a href="#">view types</a>	25,145
- Development <a href="#">view types</a>	29,768
- Inactive <a href="#">view types</a>	3,028
- Archived <a href="#">view types</a>	10,731
• Project types	
- Projects not containing surveys	16,422
- Projects containing surveys	52,250
• Project purpose	
- Research <a href="#">view subcategories</a>	17,777
- Basic or bench research	2635
- Clinical research study or trial	6742
- Translational research 1 (applying discoveries to the development	865
- Translational research 2 (enhancing adoption of research findings	758
- Behavioral or psychosocial research study	4499
- Epidemiology	1168
- Repository (developing a data or specimen repository for future u	810
- Other	1674
- [Subcategory not selected]	930
- Operational Support	21,204
- Quality Improvement	21,141
- Other	7,883
<b>User Statistics</b>	
• Users currently logged in	
- Project users	481
- Survey participants	491

Available at no cost to Academic, Nonprofit, Government Organizations

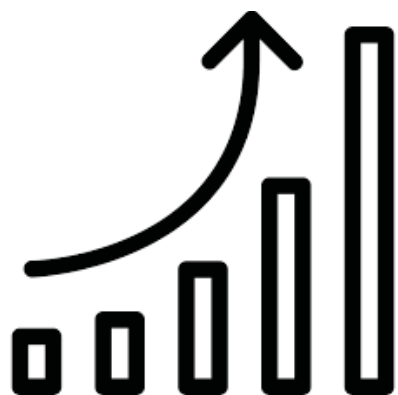


Institutions	Countries	Projects
3719	131	778k

## Map of REDCap Consortium Partners

[View fullscreen map](#)





Active Growth

### Last Week ...

**23 Consortium Partners** added on 2019-10-04 through 2019-10-10 [Update](#)

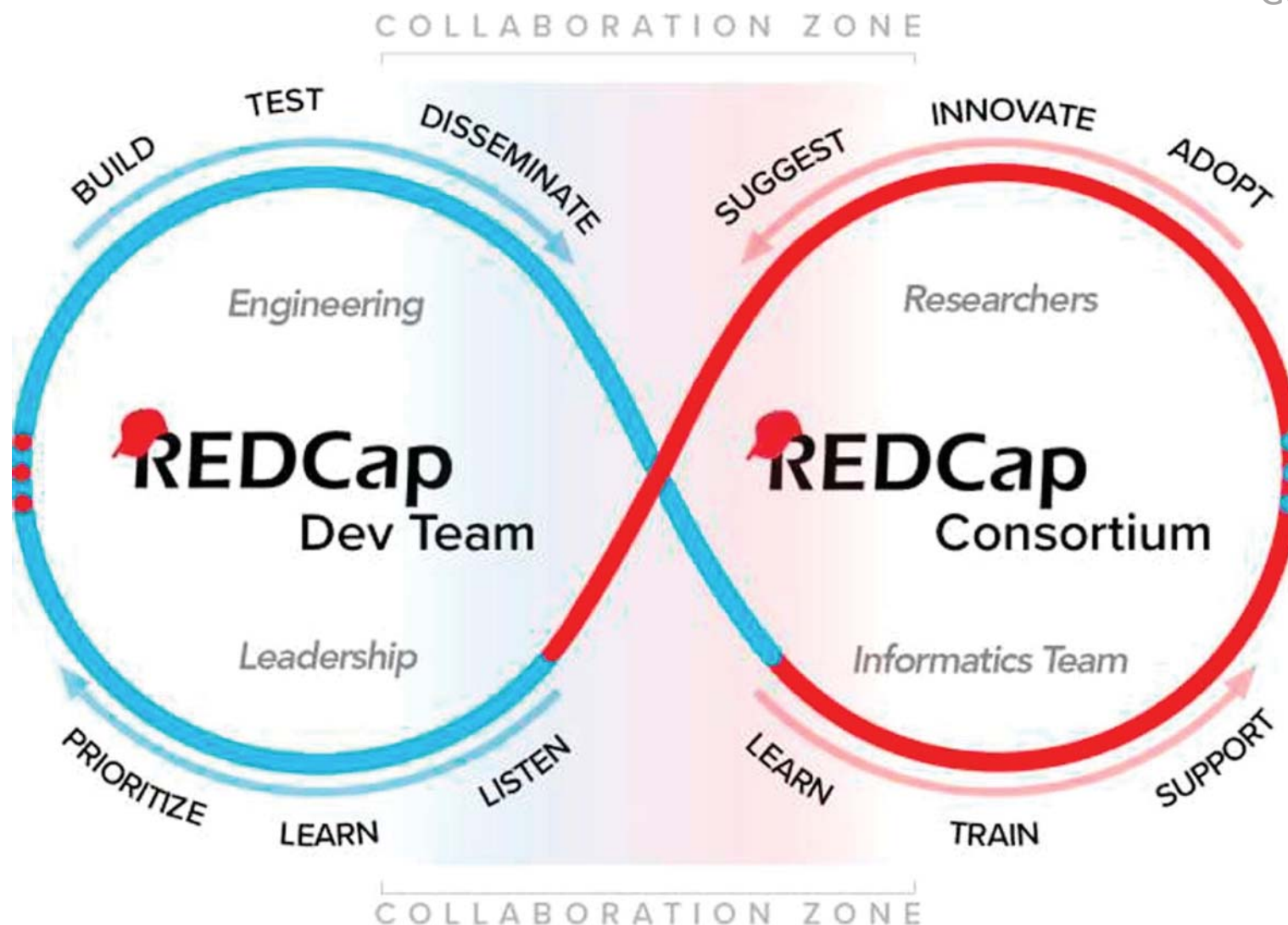
Country	Institution Name
Argentina	Corte Suprema de Justicia de la Nacion
Argentina	Fundación Natali Dafne Flexer
Brazil	Centro Universitário São Camilo
Canada	MICYRN
Canada	MICYRN
Cote d'Ivoire	Programme PAC-CI
China	Sun Yat-sen Global Health Institute of Sun Yat-sen University
Germany	UNIVERSITÄT LEIPZIG Medizinische Fakultät, Zentrum für Klinische Studien Leipzig
Spain	ASOCIACIÓN INSTITUTO DE INVESTIGACIÓN EN SERVICIOS DE SALUD-KRONIKGUNEN
India	ALL INDIA INSTITUTE OF MEDICAL SCIENCES JODHPUR
Kenya	Coast General Teaching And Referral Hospital
South Korea	Chonbuk National University Hospital
Nigeria	Public Health Research Group, Department of Epidemiology and community Health Community Health
United States	Baltimore City Health Department
United States	CAMC Health Education and Research Institute
United States	Center for Health Information and Analysis
United States	Community Building Institute Middletown, Inc.
United States	Oregon Social Learning Center
United States	Park Nicollet/ HealthPartners
United States	Somerset County and Plainfield YMCA
United States	State of Oregon / Office of Information Services
Zambia	Ministry of Health Zambia
Zimbabwe	Africa University



# It's the Bi-Directional Empowerment ...



Used Systems  
Get Better ....





**Any chance  
you could  
integrate in  
some way  
with our EHR?**  
*e.g. so we don't  
have to  
copy/paste?*



That's pretty hard to do .... EHR vendors are different and tend to hang onto their data, lack of standards, mapping is complex, permissions, regulatory requirements, privacy requirements, 'easy' at project level – but hard to scale, even harder across institutions, blah, blah, blah



Any chance you could integrate in some way with our EHR?  
*e.g. so we don't have to copy/paste?*





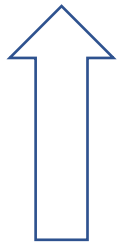


INVENT NEW METHODS

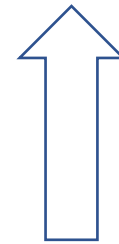


# Invention and Innovation

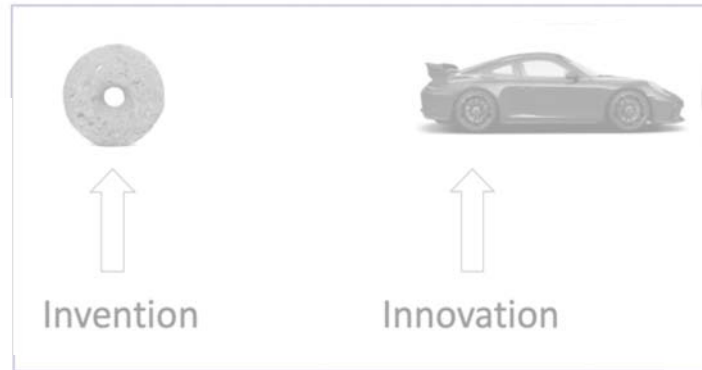
- **Invention** means having a totally original idea and showing how it can work in theory
- **Innovation** means putting a new idea into practice. This could be either bringing a new product to the market or by getting an organisation to try a new way of working



Invention



Innovation



## Invention and Innovation

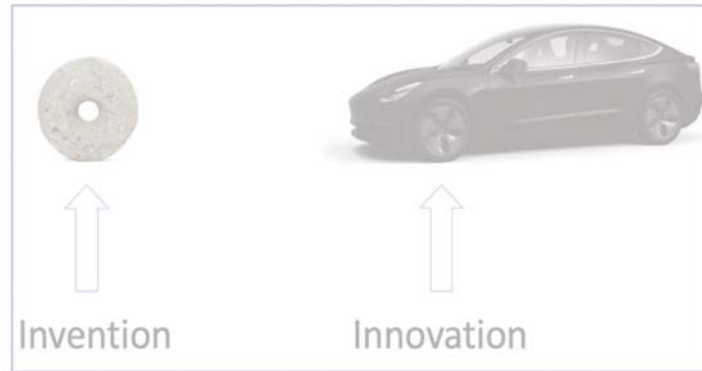
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*Too Few Words*

*Too Many Words*

## in·no·va·tion

The process of translating an idea or invention into a good or service that creates value or for which customers will pay



## Invention and Innovation

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## in·no·va·tion

The process of translating an idea or invention into a good or service that creates value ~~or for which customers will pay~~ at Vanderbilt and across the REDCap Consortium.

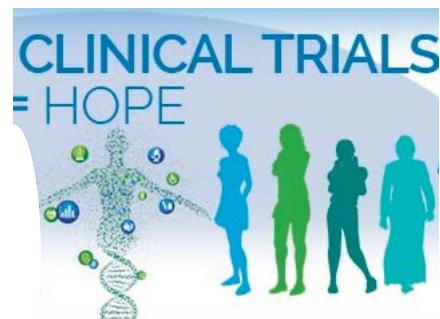


**GOAL**

Better, Cheaper, Faster



INVENT NEW METHODS



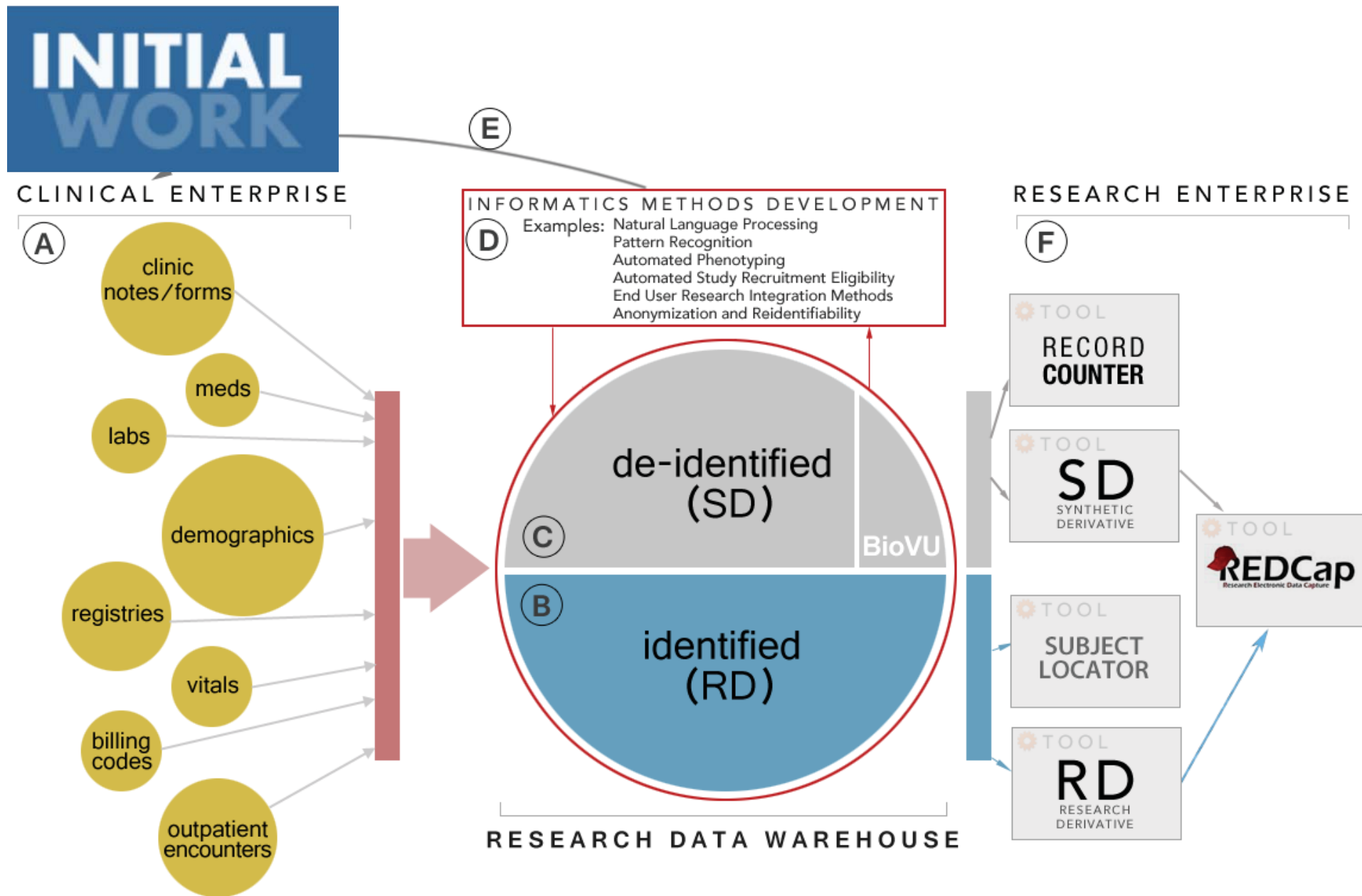
**Real  
World**



**FIRST  
THINGS FIRST**

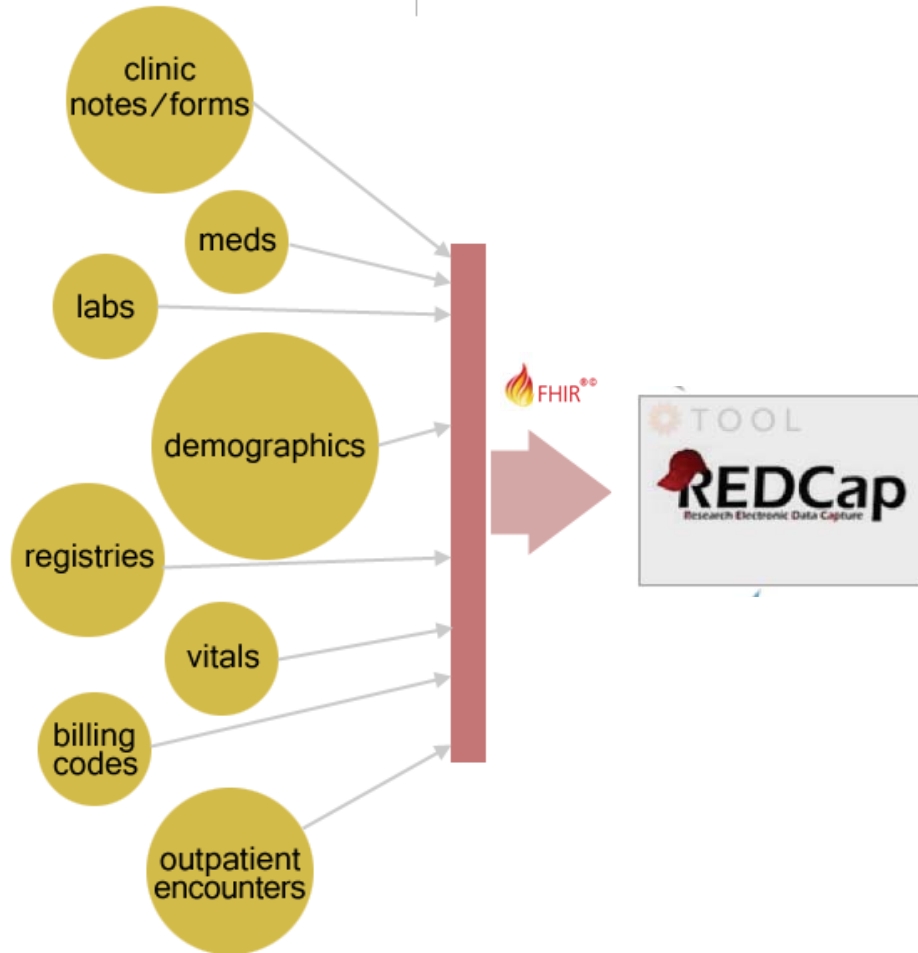


**INVENT NEW METHODS**



# INITIAL WORK

## CLINICAL ENTERPRISE



### *Value Proposition*

- *Instant Data Flow*
- *No Research Data Warehouse Dependency*



The screenshot shows a web-based EHR interface for a patient named Leight... (25 years old). The interface is titled "59-1 Heusinger, Leighton (Leight)". The top navigation bar includes icons for Attachments, Notes, Orders, Patients, Messaging, EHR, Managers, Inventory, References, and Reports. The left sidebar contains a navigation menu with sections: CLINICAL SUMMARY (Clinical Summary), INCIDENTS (New Incident, 2015 Procedures, Third Visit, Encounter, New Patient Visit, Add New Incident...), PATIENT PORTAL (Registration Forms), NOTES (Note Templates), TEMPLATE LIBRARY (Shared Templates), and TEMPLATE EDITOR (Templates, Sections). The main content area displays patient identifiers (Record ID 36) and lab values. The "Patient Identifiers" section includes fields for Bypass start date and time, Vanderbilt MRN, eCOS ID, and STS ID. The "Pre-Operative Lab Values" section includes a field for Last Pre-op Creatinine. The "Post-Operative Lab Values" section includes fields for Highest Post-op Glucose, Highest Post-op Creatinine, Highest Post-op AST, Highest Post-op ALT, and Highest Post-op Lactate. The bottom status bar shows "Welcome, Leighton H" and a clock showing "0:00/72:18".

## Value Proposition

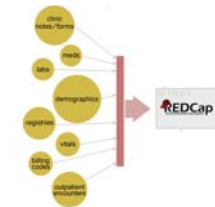
- Research-Centric Workflow



Real Estate

+

Data Flow



*Value Proposition*

- *Research-Centric Workflow*

*Value Proposition*

- *Instant Data Flow*
- *No Research Data Warehouse Dependency*

If you can **think it**,  
you can **do it**

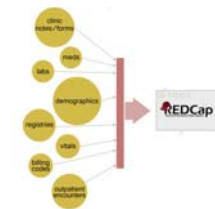
# INITIAL WORK



Real Estate

+

Data Flow



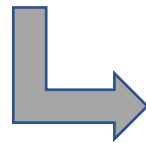
*Value Proposition*

- *Research-Centric Workflow*

*Value Proposition*

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## Setting up REDCap on FHIR





# NIH/NCATS CTSA Program

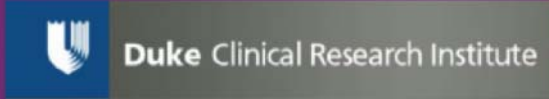


60+ Program Hubs in 31 States and DC, representing the premier translational research, training, and engagement programs in the country.

<https://ncats.nih.gov/ctsa/about>



# Trial Innovation Network



VANDERBILT  
UNIVERSITY  
MEDICAL  
CENTER



Benjamin



Dean



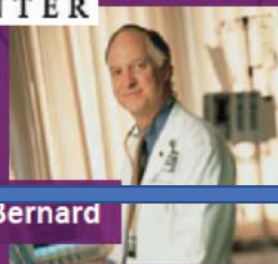
Ford



Hanley



Selker



Bernard



Harris



Wilkins



CTSA Clinical & Translational Science Awards

Thank you!

**DIFUTURE**

Data Integration for Future Medicine

