

A Process of automating research administration data of the Ministry of Health by using a customized software: RedCap

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Outline

- Background and introduction to the domain
- Objectives
- Methodology
- Results
- Discussion
- Conclusion and recommendations



Introduction

- The government of Sri Lanka is geared to improve the research culture among state officials
- As per the 2011 budget proposals and subsequent circulars, government officials can obtain research allowance
- Eligible officers in the Ministry of Health
 - Senior level administrators
 - Medical officers
- Vigorous administrative process
- Research committee chaired by the Secretary- Health
- Operationalized by the Education, Training and Research Unit of the Ministry of Health



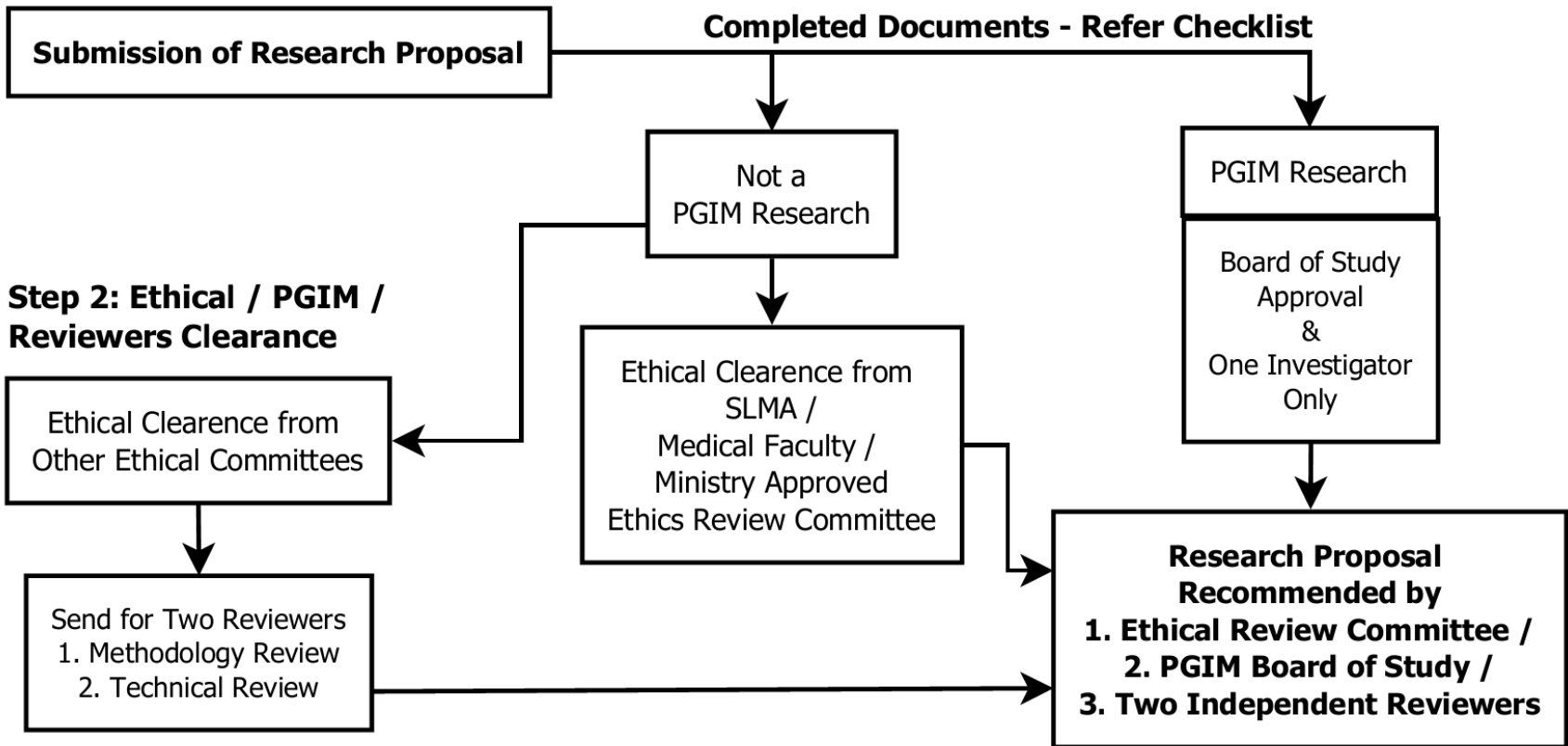
Introduction

- Number of research files reaching 1100
- Difficulty in handling paper based data for administrative and analysis purposes
- Type of primary data: Case based non aggregated
- Difficulty in proper storage and analysis of the collected data on papers
 - Does not facilitate searching and updating
 - Physical space
 - Difficulty in tracking existing research
 - Difficult analysis



Process of management

Step 1: Submission of the Reserach Proposal





Process of management

Step 3: Payment for 1st 6 Months



Step 4: Payment for 2nd 6 Months



Depending on the nature of the research, the research committee can decide to approve payment to carry out the research up to a maximum of 3 years



Process of management

Step 5: Payment for 2nd Year



Step 6: Payment for 3rd Year





Objectives

1. To capture the administrative data of the research allowance process electronically
2. To generate technical and audit related reports on time



Methodology

- Governing principles
 - Participatory approach
 - Iterative development
 - Free and Open Source solution with adequate support
 - More focus on quality of case based research administrative data capturing than aggregation of data
 - Mandatory 3 tier architecture
 - Only to be deployed in the LAN
- Steps
 - Requirement analysis
 - Customization of the software solution
 - Implementation
 - Testing
 - Maintenance



Customizable solution

REDCap

- **Research Electronic Data Capture software**
- Secure, web-based application used to build and manage research based primary and administrative data
- REDCap was developed by Vanderbilt University
- Used extensively by clinical and translational science researchers and research administrators
- Free and open source
- PHP based
- Built in to 3 tier architecture
- Customizable
- Needs bilateral agreement between the Vanderbilt University and the implementing institution and obtain consortium partnership



Customizable solution

REDCap

- Super users can define the data to be captured, including how it will be displayed and stored
- Can make changes to the program at any time, even after data capturing has begun
- Can control access to the project and use the audit trail to monitor activity
- Validation of data types (e.g. number, date, time, email, phone number)
- Range checks for numbers and dates
- Branching logic to hide fields until appropriate, based on values in other fields (e.g. hide questions about ethical approval board until ethical clearance number field is entered)
- Calculated fields (e.g. enter job class, the total allowance could be calculated)

Results

Customized solution: User profiles

× +

Search

Edit Your User Profile

If you wish, you may edit your User Profile information below. This information will not be given out to anyone but will be used to help us better keep track of who is using REDCap and also in case you need to be contacted regarding your access to REDCap.

[Return to previous page](#)

Basic Information

First name:

Last name:

Primary email:

[Save Basic Info](#)

Password-related Options:

[Reset password](#) [Reset password recovery question](#)

Additional Options

While your primary email address is used for receiving emails and notifications from REDCap, your secondary and tertiary email addresses can only be used when sending out emails from REDCap (e.g., sending survey invitations), in which they appear as the 'From' address in the email.

Secondary email: [Add email](#)

Tertiary email: [Add email](#)

User Preferences

Set your preferences for how dates, timestamps, and numbers appear to you in REDCap.



Date and time format:
(e.g., 12/31/2004 22:57 or 31/12/2004 10:57pm)

Number format - decimal character:
(e.g., 3.14 or 3,14)

Number format - thousands separator:
(e.g., 1,000,000 or 1.000.000 or 1 000 000)


[Save Preferences](#)

[Return to previous page](#)

Results

Customized solution: User rights



Logged in as admin | Log out

- My Projects
- Project Home
- Project Setup
 - Project status: Production

Data Collection

- Record Status Dashboard
- Add / Edit Records

Data Collection Instruments:

- Research Allowance Data
- Details of the co-researchers
- Payment And Progress

Applications

- Calendar
- Data Exports, Reports, and Stats
- Data Import Tool
- Data Comparison Tool
- Logging
- File Repository
- User Rights and DAGs
- Record Locking Customization
- E-signature and Locking Mgmt
- Data Quality
- API

Reports [Edit reports](#)

- 1) custom year
- 2) test 2
- 3) Audit Query
- 4) Audit Query 2
- 5) Audit Query 3
- 6) null records
- 7) Audit Query 4-1
- 8) Audit Query 4-2
- 9) Audit Query 4-3
- 10) Audit Query 4-4
- 11) Audit Query 4-5
- 12) Audit Query 4-6
- 13) Audit Query 4-7

Help & Information

- Help & FAQ
- Video Tutorials

Research Allowance data (ETR Unit) Main

Project Setup
User Rights
Data Access Groups

This page may be used for granting users access to this project and for managing the user privileges of those users. You may also create roles to which you may assign users (optional). User roles are useful when you will have several users with the same privileges because they allow you to easily add many users to a role in a much faster manner than setting their user privileges individually. Roles are also a nice way to categorize users within a project. In the box below you may add/assign users or create new roles, and the table at the bottom allows you to make modifications to any existing user or role in the project, as well as view a glimpse of their user privileges.

Add new users: Give them custom user rights or assign them to a role.

— OR —

Create new roles: Add new user roles to which users may be assigned.

(e.g., Project Manager, Data Entry Person)

Role name <small>(click role name to edit role)</small>	Username or users assigned to a role <small>(click username to edit or assign to role)</small>	Expiration <small>(click expiration to edit)</small>	Project Design and Setup	User Rights	Data Access Groups	Data Export Tool	Reports & Report Builder	Graphical Data View & Stats	Calendar	Data Import Tool	Data Comparison Tool	Logging	File Repository	Record Locking Customization	Lock/Unlock Records
—	admin (MOHI MOHI)	never	✓	✓	✓	Full Data Set	✓	✓	✓	✓	✓	✓	✓	✗	✗
—	bhagya (Bhagya Samanmalie)	never	✗	✗	✗	✗	✓	✓	✓	✗	✗	✗	✗	✗	✗
—	chamara (chamara chathuranga)	never	✓	✓	✓	De-Identified	✓	✓	✓	✓	✓	✓	✓	✓	✗
—	dag (Kannangara D.A.G)	never	✗	✗	✗	✗	✗	✓	✓	✗	✗	✗	✓	✗	✗
—	eranga (Eranga GMOA)	never	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗
—	ijaz (Ijaz Mohammed)	never	✗	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗
—	imesha (Imesha P)	never	✗	✗	✗	Full Data Set	✓	✓	✓	✗	✗	✗	✓	✗	✗
—	shanaka (Shanka Patirana)	never	✗	✗	✗	✗	✓	✓	✓	✓	✗	✗	✓	✗	✗
—	sudeera (Sudeera Wann)	never	✗	✗	✗	✗	✓	✓	✓	✗	✗	✗	✓	✗	✗
—	thava (Thava Yogarasa)	never	✗	✗	✗	✗	✓	✓	✓	✗	✗	✗	✓	✗	✗



Results

Customized solution:

Data entry

Research Allowance data (ETR Unit) Main

Actions: [Download PDF of instrument\(s\)](#) [Share instrument](#)

[VIDEO: Basic data entry](#)

Save Record
Save and Continue
Save and go to Next Form

Logged in as admin | Log out

My Projects
Project Home
Project Setup
Project status: Production

Data Collection

- Record Status Dashboard
- Add / Edit Records

Record ID 450 [Select other record](#)

Data Collection Instruments:

- Research Allowance Data**
- Details of the co-researchers
- Payment And Progress

[Lock all forms](#)

Applications

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Reports [Edit reports](#)

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- Audit Query 3
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- Audit Query 4-2
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- Audit Query 4-5
- Audit Query 4-6
- Audit Query 4-7

[Help & Information](#)

- Help & FAQ

Editing existing Record ID 450

Record ID 450
(To rename this record, modify the value immediately below.)

Record ID

Basic data

File Number (ETR/E/MC/RP)
* must provide value

Date Received by the ETR Today D-M-Y
* must provide value

Basic details of the research

Research Topic
* must provide value [Expand](#)

Type of the research Basic research
 Applied research
 Evaluation research
 Research and Development
 Action research
 Clinical trial [reset](#)

Details of the Principle Investigator (PI)

Name of the PI
* must provide value

NIC of the PI
* must provide value Please enter only the number

SLMC Reg. Number

Mobile number of the PI

Designation of the PI

Address of the working station (PI) [Expand](#)

Results

Customized solution:
Searching records

Research Allowance data (ETR Unit) Main

VIDEO: Basic data entry

Actions: [Download PDF of instrument\(s\)](#) [Share instrument](#)

Research Allowance Data

You may view an existing record/response by selecting it from one of the drop-down lists below. The records are separated into each drop-down list according to their status for this particular data collection instrument. To create a new record/response, type a new value in the text box below and hit Tab or Enter. To quickly find a record without using the drop-downs, the text box will auto-populate with existing record names as you begin to type in it, allowing you to select it.

Total records: 1,054

Incomplete Records (0)	-- select record --
Unverified Records (0)	-- select record --
Complete Records (1054)	-- select record --

Enter a new or existing Record ID

[Hide Unverified Records drop-down](#)

Data Search

Choose a field to search
(excludes multiple choice fields) -- select search field --

Search query
Begin typing to search the project data, then click an item in the list to navigate to that record.

Logged in as admin | Log out

My Projects
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- 12) Audit Query 4-6
- 13) Audit Query 4-7

Help & Information

- Help & FAQ
- Video Tutorials
- Suggest a New Feature

Results

Customized solution:
Scheduling
and the
calendar

Research Allowance data (ETR Unit) Main

Calendar [VIDEO: How to use the calendar \(7 min\)](#)

The Calendar application can be used as a project calendar within this project to help organize your schedule and keep track of any upcoming events. It will allow you to add or modify calendar events and then view them either in a daily, weekly, or monthly format below. To add a new note or calendar event to any day, click **+New** at the top of that day's box to begin entering the information.

Day Week Month Agenda

October 2015 [Print Calendar](#)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
+ New	+ New	+ New	+ New	+ New 1	+ New 2	+ New 3
+ New 4	+ New 5	+ New 6	+ New 7	+ New 8	+ New 9	+ New 10
+ New 11	+ New 12	+ New 13	+ New 14	+ New 15	+ New 16	+ New 17
+ New 18	+ New 19	+ New 20	+ New 21	+ New 22	+ New 23	+ New 24
+ New 25	+ New 26	+ New 27	+ New 28	+ New 29	+ New 30	+ New 31

Data Collection

- Record Status Dashboard
- Add / Edit Records

Data Collection Instruments:

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Results

Customized solution: Data quality

The screenshot shows the REDCap Data Quality interface. The left sidebar contains navigation options like 'My Projects', 'Data Collection', 'Applications', 'Reports', and 'Help & Information'. The main content area is titled 'Research Allowance data (ETR Unit) Main' and features a 'Data Quality' section. A table lists eight data quality rules (A-H) with columns for Rule #, Rule Name, Rule Logic, Real-time execution, Total Discrepancies, and Delete rule?. Rules A, B, and G show discrepancies of 114, 0, and 1 respectively. Below the table is an 'Add' button and a form to create a new rule.

Research Allowance data (ETR Unit) Main

Data Quality

This module will allow you to execute data quality rules upon your project data to check for discrepancies in your data. Listed below are some pre-defined data rules that you may utilize and run. You may also create your own rules or edit, delete, or reorder the rules you have already created. To find discrepancies for a given rule, simply click the Execute button next to it, or click the Execute All Rules button to fire all the rules at once. It will provide you with a total number of discrepancies found for each rule and will allow you to view the details of those discrepancies by clicking the View link next to each. [Read more detailed instructions.](#)

Data Quality Rules ✔ Processing Complete! Execute rules: Apply to: -- All records --

Rule #	Rule Name	Rule Logic (Show discrepancy only if..)	Real-time execution <input type="checkbox"/>	Total Discrepancies	Delete rule?
A	Missing values*	-	<input type="checkbox"/>	<input type="button" value="Execute"/>	
B	Missing values* (required fields only)	-	<input type="checkbox"/>	114 view	
C	Field validation errors (incorrect data type)	-	<input type="checkbox"/>	0 view	
D	Field validation errors (out of range)	-	<input type="checkbox"/>	<input type="button" value="Execute"/>	
E	Outliers for numerical fields (numbers, integers, sliders, calc fields)	-	<input type="checkbox"/>	<input type="button" value="Execute"/>	
F	Hidden fields that contain values**	-	<input type="checkbox"/>	0 view	
G	Multiple choice fields with invalid values	-	<input type="checkbox"/>	1 view	
H	Incorrect values for calculated fields	-	<input type="checkbox"/>	<input type="button" value="Execute"/>	

Enter descriptive name for new rule (e.g., Participants below age 18) Enter logic for new rule (e.g., [age] < 18) [How do I use special functions?](#) Execute in real time on data entry forms

* The Missing Values rules above automatically exclude fields hidden by branching logic when searching for missing values. If a field is hidden by branching logic on a data entry form or survey, then it is expected that such a field would not have a value. Thus for these cases, the values for those hidden fields will not be classified as missing. Additionally, checkbox fields are also excluded since an unchecked checkbox is itself often considered to be a real value.
** The term 'hidden fields' refers to any fields on a survey or data entry form that are not being displayed because branching logic is hiding them, which assumes that the field's value should be blank/null.

Results

Customized solution: Program selection

admin | My Profile | Log out

REDCap™

Home My Projects Create New Project Training Resources Help & FAQ Send-It Control Center

Welcome to REDCap!

REDCap is a mature, secure web application for building and managing online surveys and databases. Using REDCap's stream-lined process for rapidly developing projects, you may create and design projects using 1) the online method from your web browser using the Online Designer; and/or 2) the offline method by constructing a 'data dictionary' template file in Microsoft Excel, which can be later uploaded into REDCap. Both surveys and databases (or a mixture of the two) can be built using these methods.

REDCap provides automated export procedures for seamless data downloads to Excel and common statistical packages (SPSS, SAS, Stata, R), as well as a built-in project calendar, a scheduling module, ad hoc reporting tools, and advanced features, such as branching logic, file uploading, and calculated fields.

Learn more about REDCap by watching a [brief summary video \(4 min\)](#). If you would like to view other quick video tutorials of REDCap in action and an overview of its features, please see the [Training Resources](#) page.

NOTICE: If you are collecting data for the purposes of human subjects research, review and approval of the project is required by your Institutional Review Board.

If you require assistance or have any questions about REDCap, please contact [Research data administrator](#).

REDCap Features

- Build online surveys and databases quickly and securely** - Create and design your project rapidly using secure web authentication from your browser. No extra software is required.
- Fast and flexible** - Conception to production-level survey/database in less than one day.
- Export data to common data analysis packages** - Export your data to Microsoft Excel, PDF, SAS, Stata, R, or SPSS for analysis.
- Ad Hoc Reporting** - Create custom queries for generating reports to view or download.
- Scheduling** - Utilize a built-in project calendar and scheduling module for organizing your events and appointments.
- Easily manage a contact list of survey respondents or create a simple survey link** - Build a list of email contacts, create custom email invitations, and track who responds, or you may also create a single survey link to email out or post on a website.
- Send files to others securely** - Using 'Send-It', upload and send files to multiple recipients, including existing project documents, that are too large for email attachments or that contain sensitive data.
- Save your data collection instruments as a PDF to print** - Generate a PDF version of your forms and surveys for printing to collect data offline.
- Advanced features** - Auto-validation, calculated fields, file uploading, branching/skip logic, and survey stop actions.
- REDCap API** - Have external applications connect to REDCap remotely in a programmatic or automated fashion.
- Data Queries** - Document the process of resolving data issues using the Data Resolution Workflow module.
- Piping** - Inject previously collected data values into question labels, survey invitation emails, etc. to provide a more customized experience.

Results

Customized solution

Data import

Research Allowance data (ETR Unit) Main

Data Import Tool

This module may be used for importing data into this project from a CSV (comma delimited) file. Below are the steps you will need to follow in order to import your data successfully into this project.

Instructions:

- 1.) Click the link below to download your data import template as a CSV (comma delimited) file. Save it locally to your computer and then open it to begin filling it with the data you wish to import.
 - [Download your Data Import Template](#) (with records in rows)
 - OR
 - [Download your Data Import Template](#) (with records in columns)
- 2.) In each column of the Data Import Template file that you downloaded, place the data for each record that you wish to import. Once all your data has been added, save the file.
 - Be sure not to change the Variables/Field Names in the file or an error may occur.
 - Also, for all of the 'dropdown' or 'radio' fields in the project, you must make sure that the numerical value (rather than the text value) is entered in those cells, or else it cannot be processed.
 - Any empty rows or columns in the file can be safely deleted before importing the file. Doing this reduces the upload processing time, especially for large projects.
- 3.) Click the 'Browse' or 'Choose File' button below to select the file on your computer, and upload it by clicking the 'Upload File' button.
- 4.) Once your file has been uploaded, the data will NOT be immediately imported but will be displayed and checked for errors to ensure that all the data is in correct format before it is finally imported into the project.

Record format: The file to be uploaded has its records stored as separate

Format for date and datetime values:

Upload your CSV file:

No file selected.

1) custom year
2) test 2
3) Audit Query
4) Audit Query 2
5) Audit Query 3
6) null records
7) Audit Query 4-1
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- Suggest a New Feature

Results

Customized solution

Data export

Research Allowance data (REDCap)

192.168.1.62/redcap/redcap_v6.3.1/DataExport/index.php?pid=13

Research Allowance data (ETR Unit) Main

Data Exports, Reports, and Stats [VIDEO: How to use Data Exports, Reports, and Stats](#)

[+ Create New Report](#)
[My Reports & Exports](#)
[PDF & Other Export Options](#)

This module allows you to easily view reports of your data, inspect plots and descriptive statistics of your data, as well as export your data to Microsoft Excel, SAS, Stata, R, or SPSS for analysis (if you have such privileges). If you wish to export your *entire* data set or view it as a report, then Report A is the best and quickest way. However, if you want to view or export data from only specific instruments (or events) on the fly, then Report B is the best choice. You may also create your own custom reports below (if you have such privileges) in which you can filter the report to specific fields, records, or events using a vast array of filtering tools to make sure you get the exact data you want. Once you have created a report, you may view it as a webpage, export it out of REDCap in a specified format (Excel, SAS, Stata, SPSS, R), or view the plots and descriptive statistics for that report.

My Reports & Exports

	Report name	View/Export Options	Management Options	Report ID (auto-generated)
	A All data (all records and fields)	View Report Export Data Stats & Charts		
	B Selected instruments (all records)	Make custom selections		
1	custom year	View Report Export Data Stats & Charts	Edit Copy Delete	1
2	test 2	View Report Export Data Stats & Charts	Edit Copy Delete	2
3	Audit Query	View Report Export Data Stats & Charts	Edit Copy Delete	3
4	Audit Query 2	View Report Export Data Stats & Charts	Edit Copy Delete	5
5	Audit Query 3	View Report Export Data Stats & Charts	Edit Copy Delete	4
6	null records	View Report Export Data Stats & Charts	Edit Copy Delete	6
7	Audit Query 4-1	View Report Export Data Stats & Charts	Edit Copy Delete	7
8	Audit Query 4-2	View Report Export Data Stats & Charts	Edit Copy Delete	8
9	Audit Query 4-3	View Report Export Data Stats & Charts	Edit Copy Delete	10
10	Audit Query 4-4	View Report Export Data Stats & Charts	Edit Copy Delete	9
11	Audit Query 4-5	View Report Export Data Stats & Charts	Edit Copy Delete	11
12	Audit Query 4-6	View Report Export Data Stats & Charts	Edit Copy Delete	12
13	Audit Query 4-7	View Report Export Data Stats & Charts	Edit Copy Delete	13

[+ Create New Report](#)

Logged in as admin | [Log out](#)

[My Projects](#)
[Project Home](#)
[Project Setup](#)
 Project status: **Production**

Data Collection

[Record Status Dashboard](#)
[Add / Edit Records](#)

Data Collection Instruments:
[Research Allowance Data](#)
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[Payment And Progress](#)

Applications

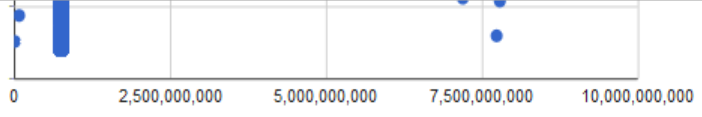
[Calendar](#)
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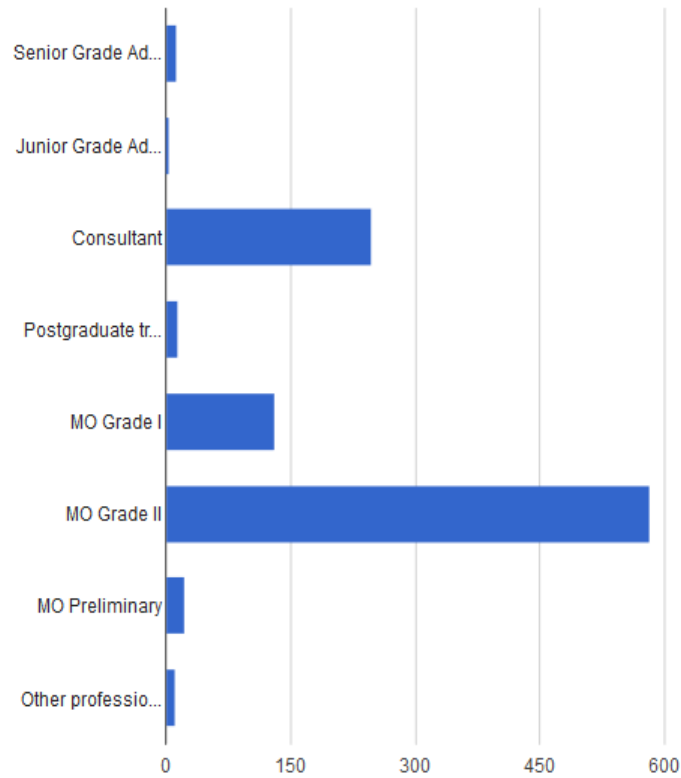
Results

Customized solution:
 Data analysis

Designation of the PI [Refresh Plot](#) | [View as Bar Chart](#) v

Total Count (N)	Missing	Unique
1,027	27 (2.6%)	8

Counts/frequency: Senior Grade Administrator (13, 1.3%), Junior Grade Administrator (4, 0.4%), Consultant (248, 24.1%), Postgraduate trainee (14, 1.4%), MO Grade I (131, 12.8%), MO Grade II (582, 56.7%), MO Preliminary (23, 2.2%), Other professional (12, 1.2%)



Results

Customized solution:
Audit trails

Research Allowance data (... X) REDCap

192.168.1.62/redcap/redcap_v6.3.1/Logging/index.php?pid=13

Filter by record: All records
Displaying events (by most recent): 1 - 100

Time / Date	Username	Action	List of Data Changes OR Fields Exported
05/10/2015 10:25am	admin	Manage/Design	Download exported data file (CSV raw)
05/10/2015 10:25am	admin	Data Export	report_id: ALL, export_format: CSV, rawOrLabel: raw, fields: "record_id, fileno, date_recieved, res_topic, type_of_the_research, sri_lanka_clinical_trials, name_of_the_principle_inve, nic_of_the_pi, slmc_reg_number, mobile_number_of_the_p_inv, designation_of_the_p_inves, address_of_the_working_sta, salary_paying_institution, previously_obtained_allowa, pi_allow_already_file, allow_already_startdate, has_the_ethical_clearance, name_of_the_ethical_cleara, date_of_the_erc_approval, ethical_clearance_number, has_the_research_been_appr, name_of_the_board_of_study, comments_and_remarks, proceed_for_approval, research_allowance_data_complete, number_of_researchers_invo, nameco1, nicco1, slmcco1, designationco1, currently_co1, allowfileco1, reallco1, paying_officerco1, nameco2, nicco2, slmcco2, designationco2, currently_co2, allowfileco12_178, reallco2, paying_officerco12_039, nameco3, nicco3, slmcco3, designationco3, currently_co3, allowfileco3, reallco3, paying_officerco3, nameco4, nicco4, slmcco4, designationco4, currently_co4, allowfileco4, reallco4, paying_officerco4, nameco5, nicco5, slmcco5, designationco5, currently_co5, allowfileco5, reallco5, paying_officerco5, nameco6, nicco6, slmcco6, designationco6, currently_co6, allowfileco6, details_of_the_coresearchers_complete, date_of_the_comm_res, checked_and_forwaded_by_th, date_of_primary_approval, approval_by_the_research_c, date_of_primary_appr, reason_for_rejection, payment_comm_date, date_of_progress_report, proceed_for_next_6_months, reason_for_not_proceeding, year_1_progress_report, date_recieved_publi, publication_recieved, journal_conference_name, proceed_for_yr_2, dateappyr2, other_comments, year_progress_report_2, proceed_for_yr_3, other_comments2_dc8, payment_and_progress_complete"
05/10/2015 8:39am	bhagya	Updated Record 497	
05/10/2015 8:37am	bhagya	Updated Record 407	
05/10/2015 8:35am	bhagya	Updated Record 407	
05/10/2015 8:02am	bhagya	Updated Record 15	
05/10/2015 6:22am	bhaqya	Updated Record	

Record Status Dashboard
Add / Edit Records

Data Collection Instruments:
Research Allowance Data
Details of the co-researchers
Payment And Progress

Applications

- Calendar
- Data Exports, Reports, and Stats
- Data Import Tool
- Data Comparison Tool
- Logging
- File Repository
- User Rights and DAGs
- Record Locking Customization
- E-signature and Locking Mgmt
- Data Quality
- API

Reports [Edit reports](#)

- custom year
- test 2
- Audit Query
- Audit Query 2
- Audit Query 3
- null records
- Audit Query 4-1
- Audit Query 4-2
- Audit Query 4-3
- Audit Query 4-4
- Audit Query 4-5
- Audit Query 4-6
- Audit Query 4-7

Help & Information

- Help & FAQ
- Video Tutorials
- Suggest a New Feature

If you are experiencing problems, please contact your REDCap administrator.



Discussion

- Implementation issues

- Deployed in the local network, can login within the ministry premises
- Data entry to clear the back-log: Operator variability caused data quality problems
- Data security (Administrative, hardware and software levels)
- Although we can make changes to most elements after the project is in production mode, it is better and easier to do it while it is in development mode

- Sustainability

Leadership

System need driven implementation

REDCap consortium support

User participation

- Positive impact on the outcome
- Resulted in successful iterations
- Time consuming
- Not clear about the requirements resulting new data element incorporation even after data entry has completed Eg. Audit unit



Discussion and key learnings

- Balancing software and system needs
 - REDCap design and needs gap
 - Modifying the need vs the design
- Key outputs
 - Routine, daily basis file management
 - Audit report – 01/01/2014 to 30/07/2015
 - Aggregated data provision for the SLMA session on “workplace based research”
- Limitations
 - REDCap has less focus on aggregated data analysis



Conclusions and recommendations

- FOSS-HMIS as cost-effective and adoptable solutions to increase the efficiency in administrative information management
- Participatory approach in customization
 - Builds the rapport
 - Practical negotiations for the gaps between needs and the software capability
 - Be prepared to the changing or unidentified needs of the users



Thank you!