Agenda

- Some History
  - Jargon busting: DETs, plugins, hooks, ...
  - Enter External Modules

- Finding and Deploying External Modules

- Some Cool (IMO!) Examples

- Anatomy of an External Module
  - What's under the skin
  - A simple example
A timeline of REDCap's customisation capabilities (and jargon buster!)

- **API v3.3.0**
  - Sep 2010
  - External applications can connect to REDCap via HTTP requests
  - Programmatic-ally retrieve or modify data or settings

- **Data Entry Trigger v5.0.0**
  - Dec 2012
  - Send a HTTP Post request to a URL whenever a record or survey response is created or modified (any form or survey)
  - URL can be of an external system or of a plugin page on the same REDCap server

- **Plugin Methods v5.5.0**
  - Jul 2013
  - Built-in functions for retrieving data or project settings without having to know about REDCap's back-end database structure or internal methods/classes

- **Extensions/Hooks v5.8.0**
  - Jan 2014
  - "Hooks" 5.11.0 May
  - Specific points into which custom code can be injected
  - Add additional HTML, style, JavaScript to pages or perform additional actions on the server

- **External Modules v8.0.0**
  - Nov 2017
  - Framework for packaging custom plugin/hook code
  - Control Center functionality enabling easy installation and upgrade for admins without back-end access
  - Vetting by Vanderbilt
Before External Modules

- API, DET, plugin methods, hooks provided large degree of customisability.

- Customisability became a key strength of REDCap:
  - A behaviour not to your liking? Change it!
  - A new, unusual requirement? Build it!
  - Better fitting institutions' specific needs.

- BUT!
  - Installation and maintenance requires administrator to have server access (or a responsive IT dept!)
  - Discovery and availability limited to Consortium users
  - Mechanisms for support and troubleshooting, and for release of fixes and new versions were "informal"
The "External Modules Framework" as a core component of REDCap does not actually extend the customisation potential!

But does bring major benefits to both developers and institution administrators:

- Standardising how customisations are developed (class inheritance) and configured (config.json).
- Formalising how code is packaged and released i.e. using GitHub repositories and releases. [https://github.com/topics/redcap-external-module](https://github.com/topics/redcap-external-module)
- Facilitates sharing and discovery via the REDCap Repo.
- Makes installation and upgrading easy from the REDCap Control Center - no server access required.

Spreads the benefits of consortium members' creativity and inspiration to all.
Discovering and Deploying Modules

- **Discovery**
  - Control Center → External Modules → View REDCap Repo
  - Mentions in Consortium forum

- **Deploying**
  - Download and install via REDCap Repo
  - No warranty! Dev/Test environment first, not Production!
  - Pilot in one or two projects before making discoverable

- **Production Configuration**
  - Enable on all projects by default
  - Make discoverable by users
  - Module configuration permissions
Different forms by randomised allocation

- Randomisation allocation, randalloc, is the "Control field".
- Form "Intervention group data":  
  - Show only when randalloc = '1', Intervention
- Form "Control group data":  
  - Show only when randalloc = '2', Control

- No longer need to use "arms" or in-form message for "This form is not required".
- Can still import data or access via URL edit.
- Note that event settings do not get copied when copying project with EM settings:
  - Event IDs from source project are invalid in the copy
Cool Example #2: MySQL Simple Admin

Production change with "critical" issues

- Sometimes we can see there is not likely to be any problem in approving a change containing "critical issues", e.g.
  - Affected record(s) look like test/dummy
  - Project title contains e.g. "Copy"/"Test"/"Practice"
- Module configuration enables saving a query.
  - Plug in project_id and field_name(s) and run.
  - Obtain listing of affected records and values.
  - Confirm the changes.
  - Include results in the confirmation message to the user: "here is the data you lost…"
- (Module allows read-only queries only)
Honourable Mentions

- Admin Dashboard
  - Built-in and custom SQL queries

- Survey UI Tweaks
  - Customise button wording (useful for auto-continue)
  - Hide the “question number” space!

- Instance Table
  - Descriptive text field with table of data from repeating event/form instances

- DAG Switcher
  - Enable users to switch between Data Access Groups (or to “No assignment”)
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  - Customise "Submit" wording (useful for auto-continue)
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  - Descriptive text field with table of data from repeating event/form instances

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Anatomy of an External Module

config.json

```json
{
  "name": "Demo Module",
  "description": "Demo for SLHD REDCap Day 2019",
  "namespace": "MCRI\DemoModule",
  "authors": [
    {
      "name": "Luke Stevens",
      "email": "luke.stevens@mcri.edu.au",
      "institution": "Murdoch Children's Research Institute"
    }
  ],
  "permissions": [
    "redcap_every_page_top"
  ],
  "enable_every_page_hooks_on_system_pages": true,
  "no_auth_pages": [],
  "system_settings": [
    {
      "key": "button-label",
      "name": "Button Label",
      "type": "text",
      "required": true
    },
    {
      "key": "button-url",
      "name": "Button URL",
      "type": "text",
      "required": true
    }
  ],
  "project_settings": []
}
```

DemoModule.php

```php
<?php
namespace MCRI\DemoModule;
use ExternalModules\AbstractExternalModule;

class DemoModule extends AbstractExternalModule {

  public function redcap_every_page_top($project_id) {
    if (strpos(PAGE, 'ExternalModules/manager/control_center.php') > 0) {
      $btnLbl = $this->getSystemSetting('button-label');
      $btnUrl = $this->getSystemSetting('button-url');
      
      <button id="demo-module-button" class="btn btn-info btn-sm">
        <span class="fas fa-graduation-cap" aria-hidden="true"></span>
        <?=$btnLbl?>
      </button>
      
      <style type="text/css">
        #demo-module-button { display: none; margin-left:5px; }
      </style>
      
      <script type="text/javascript">
        $(document).ready(function() {
          $('#demo-module-button').on('click', function() {
            window.open('<?=$btnUrl?>', '_blank')
          });
        });
      </script>
    }
  }
}
```
Anatomy of an External Module

- Write button HTML to page
- Write style settings to page
- Write JavaScript function to page
  - Attach click handler to button
  - Move the button to where we want it
  - Unhide it
- Click the "Learn More" button and a new tab opens with the page you specify in the module configuration.
- Full documentation by Vanderbilt available at https://github.com/vanderbilt/redcap-external-modules/blob/testing/docs/official-documentation.md
- Look at modules' GitHub repositories for patterns to use in your own.
Thank you. Any questions?

And thanks to the REDCap team at Vanderbilt University

Title: Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support

Author: Paul A. Harris, Robert Taylor, Robert Thielke, Jonathon Payne, Nathaniel Gonzalez, Jose G. Conde

Publication: Journal of Biomedical Informatics

Publisher: Elsevier

Date: April 2009

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