Online Project Monitoring System (OPMS) - Technical Documentation

Introduction

This Sway covers the technical details of how the Online Project Monitoring System (OPMS) was developed. It is expected that the reader is familiar with CommCare (particularly case management and organizational hierarchy aspects) and Power BI, as well as having familiarized themselves with how the OPMS functions. Below are a number of links to resources if this is not yet the case.

- GOAL's Digitalization Strategy
  - Management Information Systems Video Tutorial
- Online Project Monitoring System Documentation
- General CommCare Documentation
CommCare Application

CommCare Application Structure

In order to understand the CommCare application structure of the OPMS you need a good grasp of the case management functionality, which is described on Dimagi's help site and which I discuss in-depth in a tutorial. It is highly recommended you do the tutorial, even if you are already familiar with CommCare’s case management functionality.

There are two types of data export in CommCare: forms and cases. Form data automatically maps 1-to-1 from the forms created in applications, with questions as columns and form submissions as rows. In order to generate case data, the user needs to specify which questions map to which user-specified case properties. Case properties can take input from more than one question across forms and even applications. A case type can be defined in CommCare by creating a ‘Case List’ menu in the application with at a minimum a registration form. Registration forms allow for initial writing to the case property, and by default it writes the first question in the form to the case property 'name'. You cannot change the label of this case property, so each case has this 'name' property. In case exports, case properties become columns and each form submission from a registration form becomes a row. Followup forms allow you to define new case properties or overwrite existing case properties defined in the registration form. In a simple application setup, registration and followup forms are all located in the same menu, and therefore write to case properties of that menu's case type.

CommCare allows you to link cases using 1-to-many relationships through 'Child Cases'. In this setup the registration form for the child case, must be in the same menu as the parent case. As this would make the structure of the OPMS application messy, the registration forms of child (and grand-child) cases are hidden and the functionality to register a case from the case list is turned on.

The OPMS CommCare application is located in the goal-global project space and consists of 5 menus with corresponding case types. The image below shows how these case types are related to each other. Notice that the case types begin with 'PITR_'. This prefix refers to the predecessor of the OPMS, the Project Indicator Tracking Report. The purpose of the prefix is to group case types and make it easier to manage them. It is not possible to change the name of the case, as it would lead to a new case type being created. The highest level at which to access data in the application is at the country level (giving access to all projects, data sources and associated results). This is defined in the organizational structure of the GOAL Global project, which is discussed in the next section. You can explore the case structure more by navigating to the application summary in CommCare.
The screenshot and table below shows where each of the 12 forms that comprise the OPMS are located within the application and which case types they contribute to. You can explore the form structure more by navigating to the application summary in CommCare. An in-depth form by form review of technical issues is discussed in the section after next.

### 2 - Forms and Menus

<table>
<thead>
<tr>
<th>Form Name</th>
<th>Menu</th>
<th>Case Type</th>
<th>Form Type</th>
</tr>
</thead>
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<tr>
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<td>Project</td>
<td>Project Registration &amp; Disaggregation Levels</td>
<td>PITE_Project</td>
</tr>
<tr>
<td>Project Details</td>
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<tr>
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<tr>
<td>Indicators Registration</td>
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</tr>
<tr>
<td>Reporting Schedule and Target Registration*</td>
<td>Indicators</td>
<td>PITE_Indicator, Target and Result</td>
<td>Registration</td>
</tr>
<tr>
<td>Indicator Targets and Results</td>
<td>Indicator Targets &amp; Results</td>
<td>PITE_Indicator, Target and Result</td>
<td>Follow-Up</td>
</tr>
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<td>Data Source Registration</td>
<td>Data Sources</td>
<td>PITE_Data_Source</td>
<td>Registration</td>
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<tr>
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<td>Data Collection Schedule Details</td>
<td>Data Collection Schedule</td>
<td>PITE_Data_Collection Schedule</td>
<td>Follow-Up</td>
</tr>
</tbody>
</table>

### 3 - Form Locations
**Users and Organizational Structure**

**Adding New Users.** In order to enter data into the OPMS, end users need to be given a mobile worker account. A list of existing users with passwords can be found [here](#) (currently only Louise Kelly has access). When adding new users there are a number of fields that need to be completed as in the image below.

![Adding Users](image1.png)

The username is usually comprised of the first letter of the first name, followed by a full stop (.) and then the surname. The password is comprised of four random digits. There are two levels of users: country and project. Project level users don't have access to the 'Data Sources' and 'Data Collection Schedule' menu and related forms. Also, project users can only see data about their project, whereas country users can see data for all projects within a country. The user level can be set using the 'Organizational Hierarchy' dropdown shown in the image above. If 'Country' is selected the location field should only include a country. If 'Project' is selected the location field should include the country followed by a forward slash and the Grant Management System (GMS) number. The correct location will appear if you simply type in the GMS number.

**Adding New Projects.** To add a new project to the system, an administrator needs to add the project's GMS number under the correct country in the organization structure section of CommCare HQ, as in the image below.

![Adding New Projects](image2.png)

An organization structure allows you to control users' access to data in a hierarchical fashion when case sharing for an application is enabled. When case sharing is disabled users can only access cases that they themselves own. When case sharing is enabled users need to belong to either a case sharing group (not applicable for the OPMS setup) or a location within the organization hierarchy.
Users assigned to the same location can view each others' data and (if enabled) the data from child locations. CommCare allows you to define the levels of your organization structure. As you can see from the image below, the goal-global project space only has two levels defined: country and project. The country level can view and edit data owned by the users at the project level, but not the other way around. In the OPMS; projects, indicators and results are owned by project locations, and data sources and data collection schedules are owned by country locations.

Once a project has been added by an administrator, users can register the project from within the application itself.

6 - Organization Levels

In-Depth Form and Menu Review

**Menu: Project Registration & Disaggregation Levels**

- **Settings**
  - *Case Type: PITR_Project*

- **Case List**
  - Contains a calculated property that checks the owner id, which is equal to the GMS number: `instance('locations')/locations/location[@id = current()/@owner_id]/name`

**Form: Project Registration**

- **Form Editor**
  - *country*: A hidden value that takes the user's location id and returns the site code (i.e. the name of the country). See [this page](#) for more documentation.

  - *Assign to GMS Number*: **Lookup table** with a list of GMS numbers for that country. These are taken from the GMS numbers registered as locations (see previous section). The way to display these in a lookup table is discussed [here](#), which is similar to displaying cases as multiple choice values. The question has a validation condition that ensures that a project can only be registered once, using the following logic: `count(instance('casedb')/casedb/case[@case_type = 'PITR_Project'][@owner_id = /data/owner_id][@status = 'open']) = 0`

- **Settings**
- **Form Type**: Registration Form

- **Case Properties**: Assign to GMS is saved both to the name and owner_id properties. By assigning the GMS number to the owner_id property, it ensures that projects are owned by the project level, rather than the country level. See [this page](#) for more documentation.

- **Display Condition**: The form's display condition is set so that only users with the 'organizational_hierarchy' user field set to 'Country' can see it: 
  \#user/organizational_hierarchy = "Country"

**Form: Project Details**

- **Form Editor**

  - **Project Status**: This question is used in the form settings to close the case. This means the project will no longer show up in the case list.

  - **GMS Number (please re-type)**: Currently only the project/owner id has been saved in the system, but there is no record of the actual GMS number. Finding a workaround for this.

- **Settings**

  - **Form Type**: Followup Form

  - **Close Condition**: Case is closed when 'Project Status' question has selected value 'Closed'

**Form: Levels of Disaggregation**

- **Form Editor**

  - Levels of disaggregation are defined at the project level rather than the indicator level, as it is assumed that multiple indicators within the same project, will have the same disaggregations. The first question list 'Disaggregation Types by Name', contains the different types of disaggregation, e.g. gender, age group, etc. What follows are question lists for each of the 6 disaggregation types, containing the levels of disaggregation, e.g., male, female, etc. Each question list has a display condition that hides the question list if the disaggregation type has been left empty. Each level, past level 2 has a display condition that hides the levels if the previous levels have been left blank.

- **Settings**

  - **Form Type**: Followup Form

  - **Case Properties**: The case properties are all prefixed with 'da-' which stands for disaggregation. The disaggregation types are all named 'type_' followed by a number, e.g. 'da-type_1'. The levels are prefixed with the type they belong to and then followed by '-level_' with a number, e.g. 'da-type_1-level_1'.

**Form: Indicator Registration**

- **Form Editor**
- This form simply contains the Indicator Name and the owner_id as a hidden value. This is to ensure that when a 'Country' level user creates an indicator it is still assigned to the project location rather than the country location.

**Settings**

- **Form Type:** Child Registration Form

- **Case Properties:** Questions are saved as child case properties for the menu 'Indicators' with the case type 'PITR_Indicator'. As mentioned above, the owner_id question is saved to the owner_id case property.

- **Display Condition:** the display condition is set to false(), meaning it is not visible to users in the application (but is accessible from the Indicator menu case list).

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**Menu: Indicators**

- **Settings**
  - **Case Type:** PITR_Indicator
  - **Advanced:** The registration form 'Indicator Registration*' is accessible from the case list

- **Case List**
  - **Filtering and Sorting:** Indicators are sorted by how they were created rather than by name.
  - **Parent Child Selection:** Is enabled, ensuring that users first select a project (in the case of country users) and then are able to select an indicator.

**Form: Indicator Details**

- **Form Editor**
  - **Delete Indicator:** This question will close the case as well as indicating that the registered indicator was a mistake. This means that it will be filtered out in the Power BI report. If 'delete' is selected, none of the other questions will show up.
  
  - **Reporting - Years / Months:** These are lookup table questions, which can be edited [here](#). See the [documentation](#) for more information on lookup tables.

- **Settings**
  - **Form Type:** Followup Form
  - **Close Condition:** Case closes if 'Delete Indicator' has selected 'Delete'

**Form: Indicator Relationships**

- **Form Editor**
  - **project_id:** References the Project case id for later filtering of the 'Parent Indicator(s)' lookup table.
Parent Indicator(s): Lookup table that has the names of the indicators for the selected project as choice values. You can find more information about this approach in the documentation.

- **Settings**
  - **Form Type:** Followup Form

**Form: Reporting Schedule and Target Registration**

- **Form Editor**
  - **owner_id:** Used for saving the parent case (i.e. Project) case name (i.e. owner location id) as the owner_id. If, for example, a user at the country level were to register a reporting period, the country would be the owner rather than the project. This would mean that project level users would not be able to see the registered reporting period.
  - **result_name:** Concatenates the year and month for easier reference

- **Settings**
  - **Form Type:** Child Registration Form
  - **Case Properties:** The reporting period is registered to the PITR_Indicator case as the property latest_data_reporting_period. The questions are also saved as properties of the child case PITR_Indicator_Target_and_Result.
  - **Display Condition:** This form is hidden, but accessible from the Indicator Targets & Results case list

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**Menu: Indicator Targets & Results**

- **Settings**
  - **Case Type:** PITR_Indicator_Target_and_Result
  - **Advanced:** The registration form 'Reporting Schedule and Target Registration*' is accessible from the case list

- **Case List**
  - **Parent Child Selection:** Is enabled, ensuring that users first select an indicator and then are able to select a reporting period.

**Form: Indicator**

- **Form Editor**
  - **Delete Result:** This question does the same as in other forms and is used to close the case and hide it in Power BI
  - Two hidden values are used to calculate progress against the overall and reporting period targets. These are used by other hidden values to make them display worthy. Question labels are then used to display these results back to the user.
Disaggregation Types and Levels are displayed if the user defined these in the 'Levels of Disaggregation' form. They automatically take the label of the data entered in this form.

**Settings**
- **Form Type:** Followup Form
- **Close Condition:** Case closes if 'Delete Indicator' has selected 'Delete'

**Menu: Data Sources**

**Settings**
- **Case Type:** PITR_Data_Source
- **Display Condition:** Only Country level users can see this module

**Form: Data Source Registration**

**Form Editor**
- **country:** References the user's location to save as the country property
- **data_source_id:** Combines country with the data source name for easier reference

**Settings**
- **Form Type:** Registration Form
- **Case Properties:** Country is assigned both to the country property and owner_id

**Form: Data Source Details**

**Form Editor**
- **Data Source Status:** This question is used to close the case, but users can choose to 'archive' or 'delete'. In the latter case, the data source disappears from the Power BI dashboard completely.
- **close_case:** Is used to verify whether the case needs to be closed and return a single answer.
- **Associated Projects:** Displays a list of project case names as choice values. You can find more documentation about this [here](#).
- **Associated Indicators:** Displays a list of indicators, filtered by the previously selected projects, as choice values. You can find more documentation about this [here](#).

**Settings**
- **Form Type:** Followup Form
- **Close Condition:** Case closes if 'close_case' equals 'close'

*Data Collection Schedule Project Assignment*
Form Editor

- **Project**: Displays a list of project case names as choice values. You can find more documentation about this [here](#).
- **grant_name**: References the name of the associated project id
- **name**: Combines the data source name with the id of the project to create an easily referenced name

Settings

- **Form Type**: Child Registration Form
- **Case Properties**: The questions are saved as properties of the child case `PITR_Data_Collection_Schedule`.
- **Display Condition**: This form is hidden, but accessible from the Data Collection Schedule case list

Menu: Data Collection Schedule

Settings

- **Case Type**: `PITR_Data_Collection_Schedule`
- **Advanced**: The registration form 'Data Collection Schedule Project Assignment*' is accessible from the case list

Case List

- **Parent-Child Selection**: Is enabled, ensuring that users first select an indicator and then are able to select a reporting period.

Form: Data Collection Schedule Details

Form Editor

- **Data Collection Schedule Status**: Allows users to delete an erroneously registered data collection schedule

Settings

- **Form Type**: Followup Form
- **Close Condition**: Case closes if 'Data Collection Schedule Status' equals 'Delete'

Making Changes to the Application

Adding Questions

In order to add questions that are editable by the user, you need to adhere to the following steps:

1. Add the question at the desired location in a form. If you're adding a question to a registration form, make sure that you add the question to a follow-up form as well.
2. In (both) the form settings, save the question to a case property.
3. Go back to the (followup) form editor and save the case property as the default value.

Try to keep the application simple by only adding questions to registration forms that are absolutely necessary.

https://sway.office.com/2ManWBjFxX99zqUQ#content=s5hV0OILGGuqNPT

**CommCare Reference Pointers**

**Case Reference**

- **Current Case ID:** instance('commcaresession')/session/data/case_id
- **Case Property (e.g. case name) from current case:** instance('casedb')/casedb/case[@case_id = instance('commcaresession')/session/data/case_id]/case_name
- **Case Property (e.g. name) from a parent case:** instance('casedb')/casedb/case[@case_id = instance('casedb')/casedb/case[@case_id = instance('commcaresession')/session/data/case_id]/index/parent]/case_name
- **Case Property (e.g. name) from a grandparent case:** instance('casedb')/casedb/case[@case_id = instance('casedb')/casedb/case[@case_id = instance('casedb')/casedb/case[@case_id = instance('commcaresession')/session/data/case_id]/index/parent]/index/parent]/case_name
- **Case Property (e.g. name) from a different case:** instance('casedb')/casedb/case [@case_type="DYNAMIC_Partner"] [@case_id = CASEID]/case_name

**Power BI Report Structure**