unicef

GeoSight User Guide

RAPS/DAPM

January 2024

Table of Contents

INTRODUCTION

GeoSight is UNICEF's open-source **geospatial** web-based data visualization and analysis platform that aims to make geospatial data easily accessible and sharable in support of risk informed programming.

GeoSight is linked to **GeoRepo** which is a geospatial data repository that helps to store, manage, and share commonly agreed, versions and official set of administrative boundaries which are used for displaying maps and performing analysis in GeoSight.

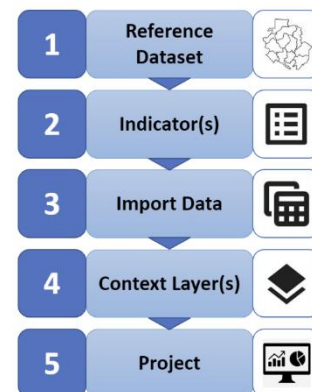The development of a dashboard involves 5 main steps show in Figure 1

Figure 1: Steps in the development of dashboard

REFERENCE DATASETS

Reference datasets refers to the vector shapefiles that illustrate various national boundaries are used to plot the maps that are visualized on the dashboard. UNICEF utilizes the WFP published version of administrative files. Theses reference datasets are managed in GeoRepo, a partner system to GeoSight.

Features of GeoRepo

- Manage, access and upload admin boundary data via a **reference dataset** (figure 2).
    - o Users can upload **reference boundaries** that represent the national and/or sub-national borders of a country or region of interest.
- Data must be uploaded as a zipped shapefile.
- Each administrative polygon can be identified by **WFP Code** or **PCODE**.
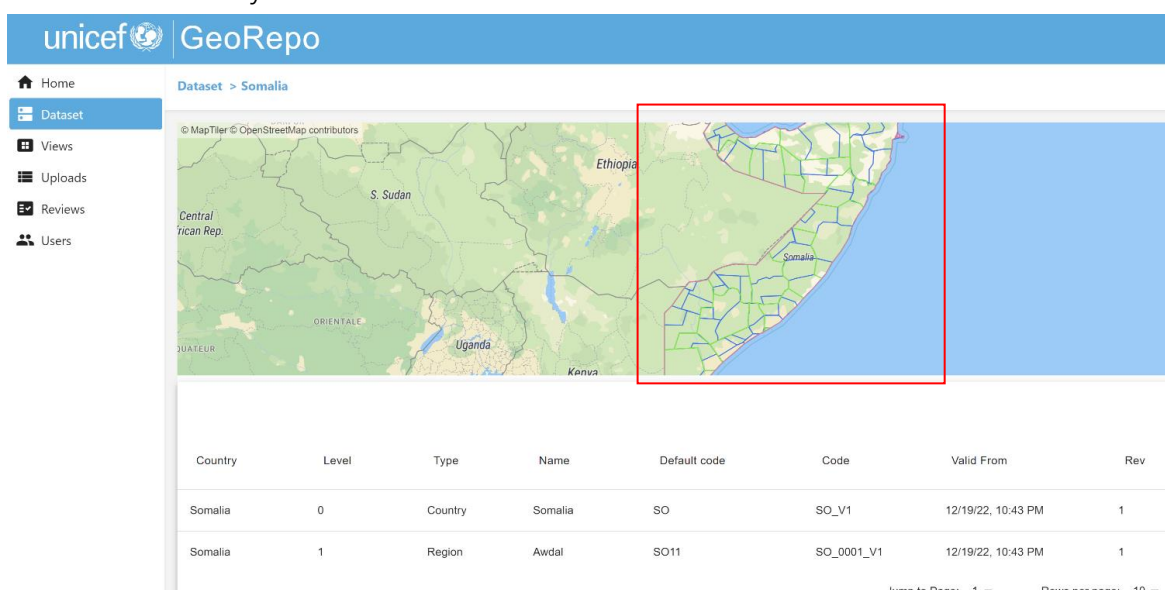   - o This ensures datasets and values can be applied to the correct country/district.

Figure 2: Main interface of GeoRepo

Detailed information on the creation of reference layers is available in the [GeoRepo manual](#)
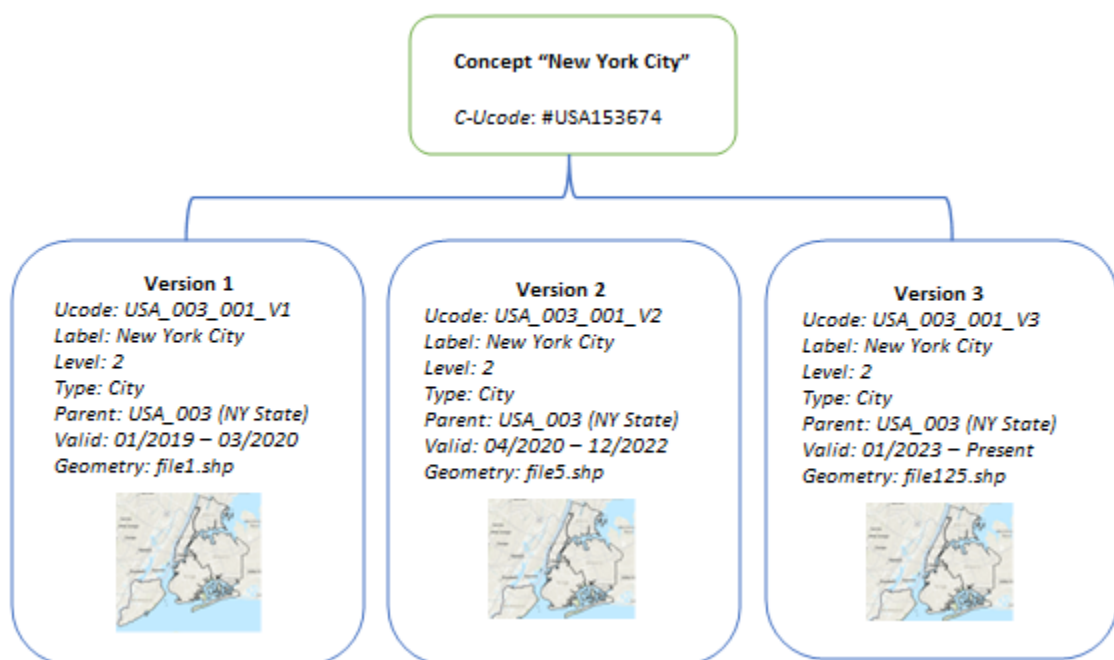
4

Geography Codes

For given geographical entities, GeoRepo provides two kinds of identifiers that can be seen in GeoSight:

Concept identifiers (**C-Ucodes**) at the level of a **geographical concept**.
- A **geographical concept** represents a geographical entity, regardless of the shapefiles attached or the versioning in the system.
    - o For example, "New York City". The **C-Ucode** is more readable than a UUID and includes the information about the level 0 entity (ISO3) code and then a progressive number to make the code unique. For example, #USA153674.

Versioned identifiers (**Ucodes**) for each **version of a concept**.
- *GeoRepo is a versioning system*, so any time there is an upload, new boundaries are compared with the existing ones and if the level of similarity is high enough, a new version of boundaries is created for a concept.
    - o For example, after three uploads, "New York City" will have three versions of boundaries, V1, V2, and V3, where V3 is the latest version. The geometries may also be the same for all the versions because it's an upload that causes an increment of the version and so the adoption of a new **Ucode**, even though the upload contains a different geometry. The **Ucode** is a unique identifier that represents a specific version. A version has a time range of validity, so given the **C-Ucode** of a concept, we can always access the version of boundaries that was valid at a specific date.

Concept "New York City"

C-Ucode: #USA153674

Version 1
Ucode: USA_003_001_V1
Label: New York City
Level: 2
Type: City
Parent: USA_003 (NY State)
Valid: 01/2019 – 03/2020
Geometry: file1.shp

Version 2
Ucode: USA_003_001_V2
Label: New York City
Level: 2
Type: City
Parent: USA_003 (NY State)
Valid: 04/2020 – 12/2022
Geometry: file5.shp

Version 3
Ucode: USA_003_001_V3
Label: New York City
Level: 2
Type: City
Parent: USA_003 (NY State)
Valid: 01/2023 – Present
Geometry: file125.shp

INDICATORS

Indicators are a central part of GeoSight, individual pieces of relevant data are uploaded to the platform and in turn are visualized based on location to communicate that information to users. This applies for each dataset, values for the indicator are assigned to the given reference boundaries within the reference dataset.

Indicators are first created as empty shells. A name, color rule and basic information is applied before any data is imported. In pursuit of open data sharing and ease of access, indicators are formatted so data can exist across multiple dimensions (time and geographical location/reference dataset) within one common indicator as opposed to repeating indicators for separate countries.
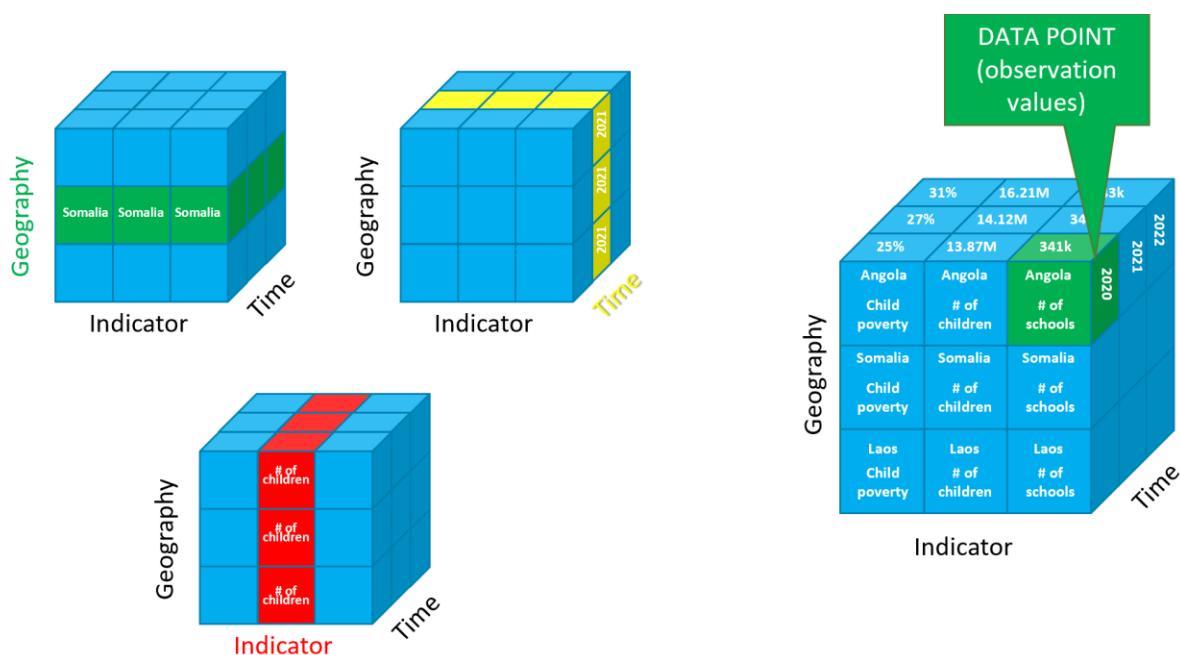
Similarly, this prevents the repetition of similar or the same indicators that may be created for different time periods, by users from different Country/Regional Offices. As such **users are encouraged to use existing indicators and** *not create country specific ones*.

Creating Indicators

1. Navigate to the **Indicators** tab (figure 3) via the **Admin Panel**.
    a. Users can see all existing indicators to search for and manage them.

2. Select the **Add New Indicator** button on the top right.

Figure 3: The indicator tab

3. Complete the **General** tab (figure 4)
   a. Enter background on the indicator, including:
   b. Name
   c. Description
   d. Technical information about the data type.
   e. **Shortcode**
      i. A shortcode is an abbreviated name that allows for the easy computer-to-computer management of datasets.
      ii. Ensure this aligns with pre-existing indicators
   f. Category
   g. **Indicator type**
      i. **Integers** are for whole numbers without decimals
      ii. **Float** allows for different types of numerical data, such as decimals or percentages.
   i. A description, data source, unit as well as min and max values are optional.

A unit e.g. 'cases', 'people', 'children', that will be shown alongside the number in reports.

Indicator type*

Float

Min value

Max value

Figure 4: Create an Indicator "Form" tab

4. Complete the **Aggregations** tab (figure 5) which allows for the summarization of high level sub-national data into larger administrative districts. (optional)

Enabling all aggregation is recommended

  a. Check the box "Allow aggregation upper level".
  b. Select an option from the **Aggregation upper level**
     i. COUNT is the number of datapoints (or sub-districts)
     ii. SUM is the total of the indicator within the sub-districts
     iii. MAX and MIN are the highest and lowest values
     iv. AVG is the average of the data within the appropriate sub-districts.
  c. **Aggregation multiple values** is for the management of different instances of the dataset over a period of time.

General
Aggregation
Style
Label
Share

☑ Allow aggregation upper level

Aggregation upper level

SUM | value

Aggregation data per geometry that will be used to determine the value of the geometry. | Select field to be aggregated.

Aggregation multiple values

AVG | value

Aggregation data per geometry that will be used to determine the value of the geometry. | Select field to be aggregated.

Figure 5: Create an Indicator "Aggregations" tab

5. Complete the Style tab to decide how your data is visualized (see **Styles** for details).
  a. Either create a custom style, use a pre-made one from the library *OR* a dynamic style

6. Complete the **Label** (figure 6) to create labels for the administrative polygons. (optional with default)
  a. Complete the textbox to decide the contents of the label

Text

Put any text in here. To put the value of indicator, you can put markup {<Field Name>}.Th
"code" = geography code
"date" = date of data
"label" = Label of data based on legend
"name" = Geography name
"value" = Value of data

Labels

	Visible Zoom:	0	~	24	
Preview	Font Family:	Rubik			
	Font Size:	14			px
	Font Weight:	300			px
	Font Color:	#000000			
	Halo Color:	#FFFFFF			
	Halo Weight:	0			px

Figure 6: Label creation tab

> i. The key below (figure 7) shows options to read the data
> ii. Enter the row in {}.
>
> b. Complete the above section to change the display of the label
> > i. The zoom level at which it is visible
> > ii. Font
> > iii. Font size
> > iv. Color
> > v. Boldness
> > vi. Halo.

7. Select **Save** in the top right.
     a. This will confirm and save your indicator settings.
8. To make changes to an indicator, select the blue name on the main indicator page and the same tabs will appear. (optional)
9. **Batch Editing** allows for users to make the same feature changes to multiple indicators at once.
     a. Select desired indicators
     b. Select **Edit** ✏ Edit
     c. Determine desired shared changes
     d. Save

Indicator Layers

An important and project specific feature is that GeoSight *individually* considers the indicator itself from its given representation and display as a global layer. This difference can be noted by the inclusion of both the Indicator panel and Indicator Layer panel.

- The **Indicator** panel allows indicators to be connected to the project for the data. Users can connect and create widgets and filters, as well as perform any data analysis.
- **Indicator Layers** are for the visualization of layers within the project. Users can manually create specific changes to the individual instance that do not impact the indicator site wide.

The eye symbol ◉ represents the chosen indicator layer that will first visualize when the project is opened.

Types of Indicator Layers include:

- **Single Layers** are for visualizing single and simple indicators. They are the base type of Indicator Layer, and simply display one dataset and within the chosen reference dataset.
- **Multi-Indicator Layers** are analysis tools that visualize multiple layer values in proportion to one another via **pie** or **bar** charts.

- o When defining this style, users will be prompted to *select the desired indicators* as well as determine **one** appropriate color for that indicator.
- **Dynamic Layers** are customizable layers that can be created by using a custom expression tailored by user feedback.
    - o Users will be prompted to define SQL expressions that allow for data to be filtered and selected from other datasets for visualization.
- **Related Tables** are layers that allow for **Splicing** and the manipulation of previously uploaded related tables. See **Related Tables** for more details.

Configuring Indicator Layers

Users can access and view indicator layers within the Indicator Layer panel of projects.

By selecting the **Configuration** ✿ Config option, users can control General Information (Name, Administrative Levels), Styles and Labels

General

1. Users can change the **name** as well as the **description**
    a. For example, if the indicator description indicates one source, but the given layer is from a different context.
2. Select **Override admin level configuration** which will allow users to override the project admin level configuration and dictate it on a layer specific basis.
    a. **Default level** determines the level the layer first visualizes at.
    b. **Available levels** determine which levels the layer can be switched to.

Styles

1. Users can change a style by selecting **Override style from indicator**

2. Select the **Style Type**
    a. **Style Library** allows you to select a defined style/color rules.
    b. **Predefined style/color rules** allow users to create their own color rules specific to that layer.

Labels

Users are able to set layer specific labels that are unique to this individual instance. See **Creating Indicators** for more details.

Pop-Ups

Pop-Ups are useful tools that appear when a specific polygon/administrative area is selected. They display all aspects of the appropriate dataset and provide metadata information that is not available by the visualization of an indicator.

To configure Pop-Ups

1. Select the **Pop-Ups** tab

2. Users can change the **Alias** or name of the field in the Pop-Up

3. They can **Turn OFF** the field by clicking the check box

4. They can control the data type

5. To customize the Pop-Up, users can click **Customize** and adjust the code of the display if desired.

Expression (Dynamic Indicator Layers ONLY)

Dynamic indicators require a bit of skill, as they necessitate that users develop custom expressions by using the coding language **Jinja**, similar to Python. These layers can mathematically compare layers and/or provide customizable weighting for end-users. A complex guide is provided to users and can be found [here](#).

1. Select the **Expression** tab

2. Enter a valid expression.

An example expression that compares two indicators (A & B) while allowing for an exposed variable to adjust the weight, resulting in customizable values:

{% set a = (context.values['SOM_TEST2_IND_A']) %} -> A = Indicator A

{% set b = (context.values['SOM_TEST2_IND_B']) %} -> B = Indicator B

{% set i = (context.values['Increase']) %} -> Exposed Variable

{% set result = (a + b) + ((a + b) * i / 100) %} -> Mathematical Expression

{{ result }} -> Display Result

3. Decide on a (if any) **exposed variable**.
    a. A front-end customizable value that users can use to adjust the outputs of your chosen expression.
    b. This can be used as an example of an independent indicator, or weight that users can use to measure severity, and see how results may change.

IMPORTING DATA

Within GeoSight, information uploading, and harvesting are essential features that can intake a variety of data formats in a single instance or repeatedly at established intervals. A variety of formats are accepted, such as:

- APIs
- Excel files
- SharePoint sites
- SDMX files

Data imports can be scheduled, changes in data on these sites will be incorporated into GeoSight on a regular basis.

Importantly, due to the construction of indicators, data is imported around indicators (and indicators are *not* constructed around datasets). As such, before importing data, ensure that an indicator has been created.

*Practice using this GeoSight test file (wide) *do not edit**

Importing Data

Data imports are available in the **data management** tab

1. Prepare data for intake to conform to how the program reads data.
    a. There are two formats (figure 8):
        i. **Long format** can import multiple indicators, geographies, and dates at once.
            1. Geography Code to connect it to administrative datasets.
                a. Often a PCODE but may be a UCODE.
            2. Indicator code
                a. The shortcode and connects the data to an indicator.
            3. Date
                a. This is used to identify the timeline of the data incase of multiple uploads.
            4. Value.
        ii. **Wide format** allows for a larger number of datasets to be uploaded at once for a single date only.
            1. Geography code
            2. Value column
        iii. For all formats there are two essential columns, a geography code and a value that *must* be included.

Long

	A	B	C	D
1	GeographyCode	IndicatorCode	DateTime	Value
2	PK_0001_V1	TEST_IND_INT	01/01/2022	12
3	PK_0002_V1	TEST_IND_INT	01/01/2022	3
4	PK_0003_V1	TEST_IND_INT	01/01/2022	44
5	PK_0001_V1	TEST_IND_FLOAT	01/01/2022	22.432
6	PK_0002_V1	TEST_IND_FLOAT	01/01/2022	6.43

Figure 8: Data Formats Long & Wide

Wide

	A	B
1	GeographyCode	TEST_IND_INT
2	PK_0001_V1	12
3	PK_0002_V1	3
4	PK_0003_V1	44
5		

2. Complete **General** (figure 9)
    a. Select the "Import type",
        i. Indicator value
        ii. Related table
    b. Select the input format
        i. API
        ii. Excel
        iii. SharePoint
        iv. **Vector context layers**- Allows users to summarize context layers
        v. SDMX files
        vi. **Formula Based on Other Indicators**- Allows users to combine indicator values into new *permanent* indicators

Figure 9: Data Importing Form Tab

If uploading a related table to an indicator the 'Import type' *must* be the related table.

-   Once the table has been uploaded, the user can return and reuse the related table to upload to the indicator.
-   You must connect with a pre-existing related table and, creating it before you upload to an indicator **is the only way to create one.**

3. Complete the **Attributes** tab (figure 10)
    a. Connect to the origin of the data.
        i. Excel file: identify it on your computer
        ii. API/SDMX/SharePoint: paste the link or path.
        iii. Vector Context Layer: pick the context layer
    b. Identify the column that contains your geography code.
    c. Select the indicator.
        i. Click the "Select an Indicator" button
        ii. Or the "Data-Driven Indicator Column". T
            1. Codes *must* match indicator shortcodes.
        iii. Identify the column that contains the value for the indicator (ie; the short code).

Figure 10: Data Importing Attributes tab

There are a variety of ways users can upload datasets. Although much of the process is identical, the **Attributes** page is directly responsible for communicating with GeoSight, how/what the data source is. As such, for this area will be different as different formats require various ways to identify the data source.

i. Importing SharePoint Data

Importing SharePoint data allows users to connect to excel tables and datasets stored on the cloud. This can be useful because users can share and collaborate on datasets, without having to download a local file that would be removed from the cloud.

1. All datasets must be in the *proper* SharePoint folder, owned by DAPM. At this time, any other location on SharePoint is not available.

1. Paste the link on the Attributes page. This will allow GeoSight to connect to the data source.

2. Utilize the button to connect columns with indicators

ii. Importing API Data

API data is quite simple, as it is regularly updated and maintained data from an outside organization.

2. Identify the API link from the REST service.

3. Paste the link on the Attributes page. This will allow GeoSight to connect to the data source.

4. Click the **key list**, this will bring up the GeoJSON where users can identify the proper lines that contain the data.

5. Identify the geocode column.

6. Utilize the button to connect columns with indicators.

iii. Importing SDMX Data

SDMX stands for *Statistical Data and Metadata eXchange* is a unique data sharing format developed and coordinated by the United Nations. Data for UNICEF can be accessed from the [data warehouse](#) in this format.

1. Locate the SDMX link from the proper source such as the UNICEF Data Warehouse and paste it. This will allow GeoSight to access the data.

2. Identify the proper columns for data and geocodes, and pick an indicator.

3. Verify the data through the **Retrieved Data** viewer.

iv. Importing Formula from Other Indicators

GeoSight is a unique platform that allows users to utilize different datasets in order to combine them for further analysis. This can be useful to users who want to use other, shared, data in order to enhance their own dataset.

Users can only define pre-existing indicators *with* uploaded data and upload this new analysis into another pre-existing indicator.

1. Users can select the indicator which is the *destination* for the aggregated dataset.

2. *"Indicators that will be used"* allows for users to select the indicators they would like to analyze.

3. A **reference layer** from the "*Reference Layer & Time*" page.

4. The **Generate get_value** allows users to select an indicator, time series and data format in order to generate the proper code to identify the dataset.

5. A formula can be defined using coding language in the expression box.

v. Importing Vector Context Layers

The Vector Context Layer option allows for users to summarize vector (point, line, polygon) GIS data that is stored as context layers. This can be useful to turn infrastructure or survey data into an aggregate indicator so it can be combined with and used to enhance other indicators. It can also

be used to extract some form of data from a context layer stored by another organization that cannot be accessed otherwise.

NOTE: Users can only summarize string (numeric) data stored in context layers. Any text values will be lost and it is recommended you continue with context layers or prepare the data differently if you would like to aggregate these values.

1. Select the context layer you would like to summarize and the destination indicator.

2. Determine the **Geometry Type**
    a. Point
    b. Line
    c. Polygon

3. Create an SQL filter that isolates desired data points (optional).

4. Define the **spatial operator** which clarifies how to summarize incongruent shapes that may not fit within administrative boundaries.
    a. **Intersect**- The data overlaps with an administrative area.
    b. **Within**- The data is near the administrative areas, within X meters.
    c. **Completely Within**- The data is entirely encapsulated by an administrative area.
    d. **Centroid Within**- Only if the interior center of the shape is within the administrative area.

5. Determine how you want the data to be aggregated.

vi. **Importing Related Table Format**

Importing Related Table data *is not* the same as importing a Related Table. Related tables are large, multi-column datasets that can be filtered a variety of ways. Once these are uploaded, they can be filtered and summarized to be added as a single value per administrative area to an indicator.

1. Select your desired indicator and related table.

2. Identify the geocode column.

3. Determine an SQL filter to select specific values from the related table (optional).

4. Determine an aggregation for values.

4. Complete the **Reference Layer & Time** tab (figure 11)
   a. Choose the **reference layer**
      i. To connects the dataset to the reference dataset within GeoRepo.
   b. Select a **Admin Level.**
      i. Can choose a specific level
      ii. Can choose a data driven option which allows GeoSight to read the codes and choose.
   c. Select the type of Geographic code (this will usually be a PCODE).
   d. Select the date (any data type)
      i. Data driven
      ii. Select own date
      iii. Select current date

Figure 11: Data Importing Reference Layer & Time tab

5. The **Schedule** tab to automate importing data. (optional)
   a. Not available for excel files.
   b. Select "Scheduled Import"
      i. Will users to name the scheduled job.
   c. Click "Job Schedule"
      i. A pop-up (figure 12) will allow users to set when data is uploaded from the source API or SharePoint.
      ii. This can be done every minute, day, week, or month, etc.
   d. Finally, you can add alerts to notify you when jobs are successful or fail via "Add new alert".

17

Figure 12: Scheduling Pop-Up and Alerts

6. Complete the **Aggregations** tab (optional)
(figure 13)
   a. If selecting "handling multiple values" option, use multiple data uploads over different time periods.
   b. "Last value" will use the most available data
   c. "Aggregate" option will combine all versions of the data.
   d. You can use the aggregation rules from the indicator or redefine your own aggregation style.
   e. The "aggregate admin level" allow you to decide what levels you want aggregated. Similarly, you can utilize pre-defined aggregation rules, or create your own.

Figure 13: Data Importing Aggregations tab

Scheduled jobs can be monitored under the data importer in the left-hand column.

7. Select submit in the upper right-hand corner.
8. Validate the data to adjust errors in their data that they might have missed.
   a. Access the **Logs** (figure 14)
   b. Select the "Data" button for the most recent upload under your name.
   c. This will bring you to a table of the data.
      i. Adjust values if needed.
      ii. Select the box that allows you to select all the values.
      iii. Click "**Validate**". This will finally complete the data upload.
9. Scheduled jobs can be **Paused** or **Deleted** at any time.

Any failed runs can be run again using the **Rerun** tool. This preserves the information of your run and allows for easy changes to any mistakes that may have been made.

Importing Related Tables

Importing related tables is quite simple. Follow the steps below to understand the process:

1. Navigate to the **Data Importer** in the **Admin Panel** under **Data Management**.
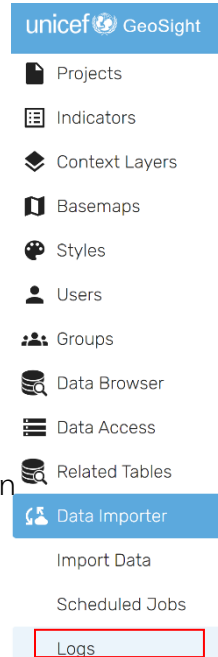

Figure 14: Location of the Logs

2. Under **General** select the **Import Type** as *Related Table*.

3. Select the input format (API, SharePoint, Excel, SDMX).

4. Complete the **Attribute tab** to connect to the data.
   a. Via either a local file or pasting the appropriate link

5. **Submit** and view your table by navigating to **Related Tables**, finding the table and clicking **Data.**

CONTEXT LAYERS

Context layers are an important part of GeoSight that provides an extra dimension of understanding to indicator data on dashboards. They are global layers that display information hosted through an API e.g. via ArcGIS Enterprise. These layers are any geographic data (Vector; Point, Line, Polygon and Raster data that **is not connected to administrative reference datasets**). Examples include:

- Armed conflict events
- The location of local or UNICEF infrastructure
- Areas of control
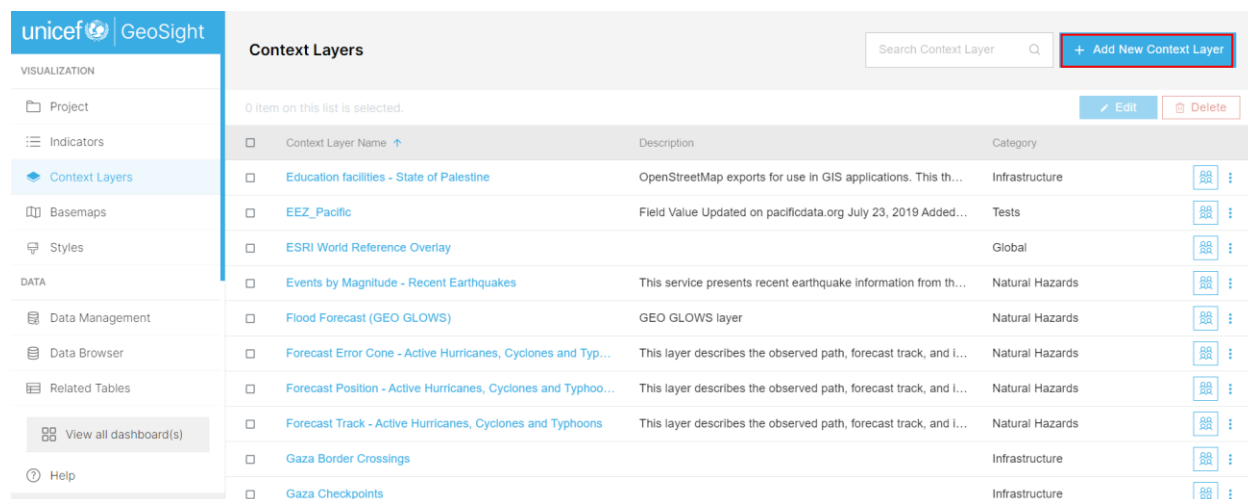- Natural hazards

Figure 15: Context Layers tab

Creating Context Layers

1. Navigate to **context layer** (figure 15 & 16)

2. Select "Add context Layer"

3. Enter a name for the layer

4. Select a category.

5. Paste the API's URL

6. Identify the type of API
   a. ARCGIS: Hosted on ArcGIS Online or Enterprise.
   b. GeoJSON
   c. Raster tile

Figure 16: Context Layers creation page

7. **IF** using ArcGIS Online, select the type
    a. ArcGIS Enterprise
    b. ArcGIS Online

8. Enter permission information (optional).
    a. Token
    b. Username
    c. Password

9. Check the validity of the context layer below.
    a. "Map" option displays the visualization of the layer.
    b. "Fields and labels" allow you to configure the information displayed
    c. "Styles" allows you to dictate how the layer appears.

10. Click submit to save the layer.

11. **Style**, **Label** and **Display** options are available in the following tabs. See indicators for more details

Like Indicators, Context layers can be managed by navigating to the context layer section and clicking on the name of the desired layer.

Adding Context Layers to ArcGIS Enterprise

An advantage of GeoSight is its ability to add data from multiple sources from geospatial software such as **ArcGIS Online/Enterprise**. By publishing this data as hosted feature layers, users are able to visualize geographic data using ESRI software and connect it to GeoSight.

Details for adding these layers can be found above. Below, find the steps to access the URL and token information required to enable the layer on GeoSight.

1. Log on to ArcGIS Online/Enterprise.

2. Navigate to the **Content tab**.

3. Click **Add New Item,** select your data/shapefile and create a hosted feature layer.

4. Once it has uploaded, click the layer for **Item Summary.**

5. Navigate to **Layers** and click the layer.

6. Copy the hosted layer URL (Figure 17).

URL   ⬈ View

https://gis.unicef.org/server/rest/s

Figure 17: Hosted feature layer URL

7. Navigate to your pages URL, add **#overview** to the end and *refresh* (Figure 18).

🌐 SyriaEQ_adm3 - Overview ✕

0df3f23c6&sublayer=0#overview

8. Navigate to where you copied the URL and select view (Figure 17).

🌐 SyriaEQ_adm3 - Ov ✕   🌐 Layer: SyriaEQ_adm ✕

dm3/FeatureServer/0?token=Mi2Ldu8zDBAWlKul44WSJ

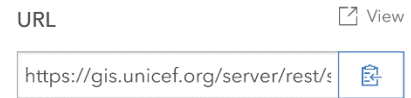9. Once on the **Rest Services Directory** page, a token will be added to the end of your URL. Copy it *IN FULL*.
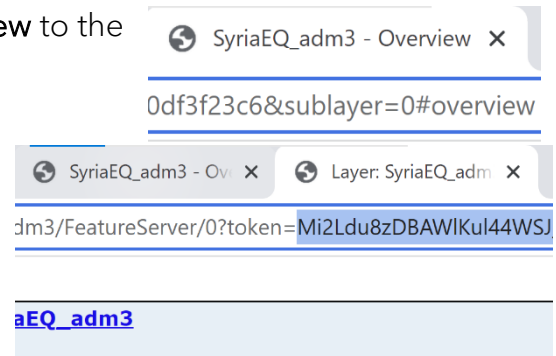
aEQ_adm3

Figure 18: A token.

22

PROJECTS

A project (dashboard) is the most important part of GeoSight, their combines different elements (Reference datasets, indicators, and context layers) and enable data visualization/analysis for all end users.

Dashboards & the Front End of GeoSight

Dashboards and the front end of GeoSight are the user experience where developers can aim to display data, create a story and provide a place for monitoring. Every action in GeoSight is toward this end. These projects can cover an array of contexts from country office programs, to natural hazard analysis, to conflict monitoring.
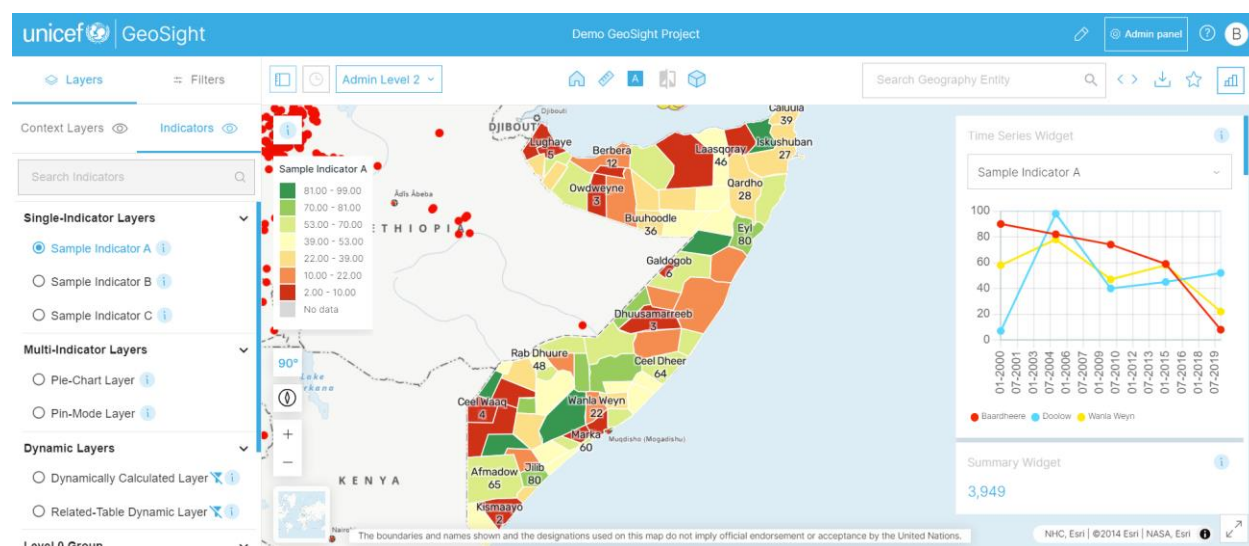
Creating & Managing Projects

The project helps to display context and indicators layers have tools and widgets for performing data analysis on country/regional levels.

1. Navigate to the project section under the admin panel.

2. Select "Add New Project"

3. Complete the **General** tab.
    a. Select a reference dataset
        i. This *must* align with the reference dataset for your indicators (this is the vector layer from GeoRepo).
    b. Enter a name
    c. Define **available levels**

> i. This allows users to control what administrative levels can be used. This can limit the display of empty datasets and allow the management of datasets across different scales.

d. Define the **extent** (figure 17)

> i. **Extent**- T view you would like the dashboard to open on.
>
> ii. Enter the latitude and longitude for the corners of the extent OR
>
> > 1. Draw a polygon by selecting the pentagon in the top right corner.

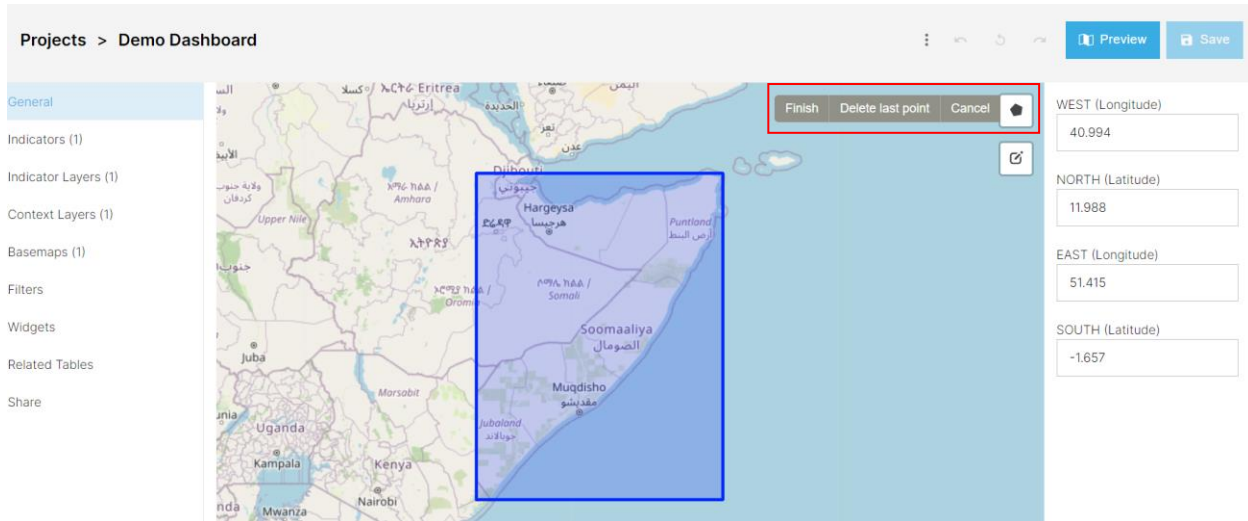*Figure 17: Define an extent*

4. Complete the **Indicator** tab.

> a. This does *not* display these indicators.
>
> b. Select "Add Indicator"
>
> > i. Search for the appropriate indicators
> >
> > ii. Click the check box
> >
> > iii. Click "Apply selections".
> >
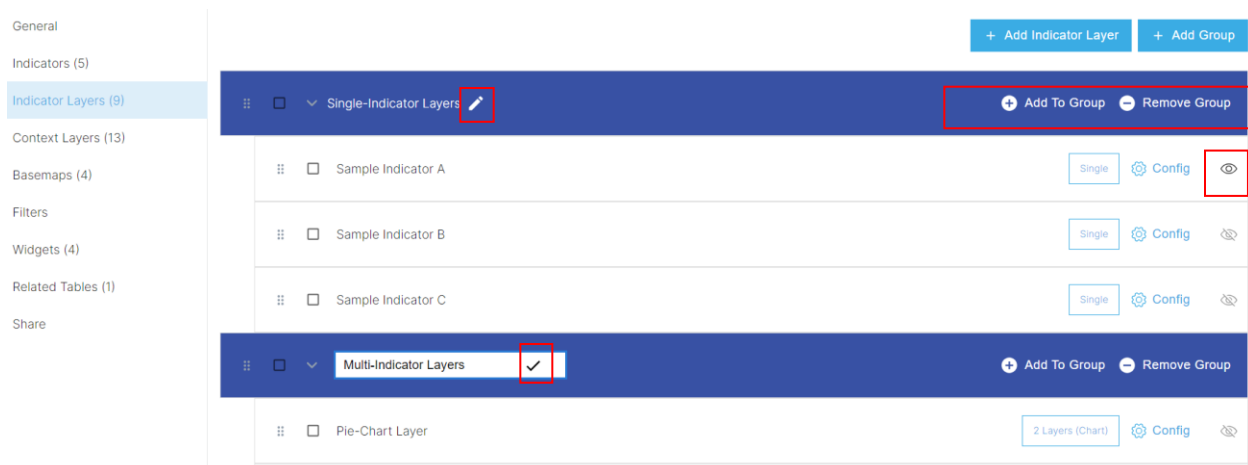> > iv. The number in parentheses shows the number of indicators you've selected.

Figure 17: Managing indicator layer groups

5. Complete the **Indicator Layers** tab (figure 17)
    a. Add individual indicators using the "Add Indicators" button.
    b. To group indicators, select "Add Group".
        i.   You can name the group by selecting the pencil icon and entering the name in the text box.
        ii. You can add indicators to the group by selecting "Add to group" or adding a single indicator and dragging it into the group. Similarly, groups can be nested within one another, but an indicator must be present within a group as well for the group to save.

    c. The **Configure** option allows for *project specific* visualization adjustments. This can be useful when the indicator default does not fit your needs.
        i.   **General** allows users to adjust metadata and available administrative levels.
        ii. **Style** allows for adjustments to data classifications for the given reference dataset.
        iii. **Label** allows for the customization of administrative polygon labels.
        iv. **Pop-Up** allows users to customize the text box (including data) when a given administrative polygon is selected.

6. Complete the **context layers** tab.
    a. Add individual context layer using the "Add Context Layers" button.
    b. To group context layers, select "Add Group".
        i.   You can name the group by selecting the pencil icon and entering the name in the text box.
        ii. You can add context layers to the group by selecting "Add to group" or adding a single context layer and dragging it into the group.
        iii. Similarly, groups can be nested within one another, but a context layer must be present within a group as well for the group to save.

7. Complete the **basemap** tab.
    a. Basemaps are neither indicators or context layers, but the bottom map that both are imposed over.

      i. These maps show the shapes of landmass and depending on the details, country borders, roads or general information that is not available via an indicator or context layer

b. Add individual basemaps using the "Add Basemap" button.

c. To group basemap, select "Add Group".

      i. You can name the group by selecting the pencil icon and entering the name in the text box.

      ii. You can add basemap to the group by selecting "Add to group" or adding a single basemap and dragging it into the group.

      iii. Similarly, groups can be nested within one another, but a basemap must be present within a group as well for the group to save.

      iv. Use the Open Street Map basemap (OSM) as it shows country borders and when zoomed, local roads.

            1. Other options include:

                a. Satellite images

                b. Topographic map

8. Complete the **Share Tab** to control the sharing and control of access to the project.

a. Allows for permission control for specific users, groups or the general public.

b. The permissions are as follows:

      i. **List** allows for users to see the presence of a project.

      ii. **Read** allows them to view it.

      iii. **Write** allows them to edit the project and make changes.

      iv. **Share** allows them to control access to the project.

      v. **Owner** allows complete control, including the ability to delete the project.

BASEMAPS

Basemaps are layers of geographic information that serve as a *background* for maps and provide additional context that often is static, and may not be captured in a layer.

Examples of basemaps include satellite data, road maps, and country/land features. In GeoSight it is the background that the indicator layers and reference datasets are super imposed onto.

Adding Basemaps

Adding basemaps are quite simple and only require a URL link to the source. However, it is only on rare occasion should users expect to add a basemap. Almost are basemaps are global and all main basemaps (including Satellite and OSM) have already been added.

1. Navigate to the **Basemap** tab in the Admin Panel and select + Add New Basemap .

2. Complete the **General** tab including the **Name** and **Category** tab.
    a. Insert the **source URL** and determine the **layer type** (which be available on the source).

3. Complete the **description** and **icon** (optional).

4. Complete the **share tab** (optional).

5. Save when complete

ANALYSIS TOOLS

Since GeoSight is a geospatial analysis and visualization, it provides a wide range of tools for users to enable to highlight different dimensions of data, enable spatial analysis and allow for multi-variate analysis.

Widgets & Filters

Widgets & filters are some of the most powerful tools on GeoSight as they allow for the multi-variate analysis of humanitarian indicators across time and space. They can highlight areas with specific needs, as well as provide various graphs that help to improve the users understanding and comprehension of the data.

Filters

Filters are a valuable tool that administrators can enable to allow front-end users to only display districts that meet a certain threshold or criteria of an indicator's values.

Creating Filters

1. Optionally complete the **Filters** tab (figure 19) to allow users to identify and isolate specific administrative areas based on the desired values of an indicator.
   a. You can create filters by selecting the plus button on the right.
   b. Define the operation for the filter (figure 18)
   c. Connect filters (optional)
      i. The AND/OR operation allows you to design filters to identify areas that meet multiple conditions at once, or one or the other.

Figure 18: Filter creation pop-up

Figure 19: Filter construction

Widgets

When adding widgets in the project management page, users have quite a few capabilities available to enhance spatial analysis and reasoning. Widgets allow users to create summary apps that display the data in a non-geospatial way.

Creating Widgets

Optionally, complete the **Widgets** tab to create data visualization tools that allow for summary information for different indicators.

1. Add individual widgets using the "Add Widgets" button (figure 20).
   d. Select an indicator and operation to summarize the

2. To group widgets, select "Add Group".

Figure 20: Widget creation pop-up

28

a. You can name the group by selecting the pencil icon and entering the name in the text box.
b. You can add widgets to the group by selecting "Add to group" or adding a single widget and dragging it into the group.

Similarly, groups can be nested within one another, but a widget must be present within a group as well for the group to save.

Summary Group Widget

The summary group widget is quite similar to a standard widget for a single indicator. However, it enables the analysis of multiple indicators instead of just one.

1. Add individual widgets using the "Add Widgets" button (figure 20).
    a. Select an indicator and operation to summarize the

2. To group widgets, select "Add Group".
    a. You can name the group by selecting the pencil icon and entering the name in the text box.
    b. You can add widgets to the group by selecting "Add to group" or adding a single widget and dragging it into the group

Time Series Widgets

Users can create widgets that display the time series of an indicator to understand how a given value has changed overtime. Importantly, not only can users display this data in a graph, but they can also display the different values on the map as well. By navigating to the **time pop-up** on the bottom of the dashboard, you can change the date of the data displayed.
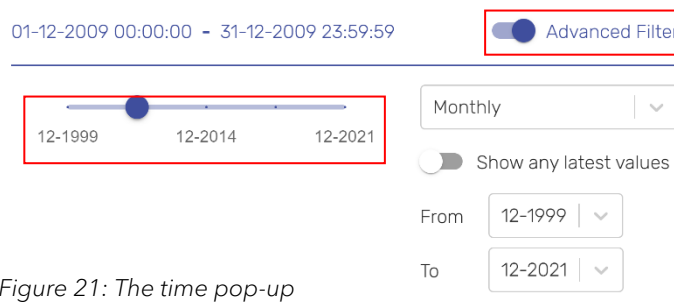

Figure 21: The time pop-up

To manage time series widgets, it is important to have multiple instances of data uploaded for a single indicator and reference dataset. This can be completed by **importing data**. By navigating to project management and then the **Widgets** tab, users can find, add and create these widgets.

Creating Time Series Widgets

When creating these widgets users have a range of capabilities and can filter a variety of aspects for indicators to create either a
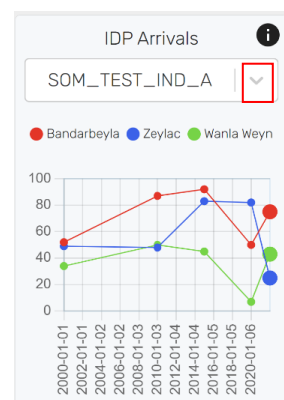

Figure 22: A time series widget of a line graph displaying an indicator over time.

generalized or highly specific time series. Similarly, they can dictate the display of administrative units and target areas of interest for enhanced analysis.

1. When adding a widget, select "Time Series Widget"

2. The **Series** option allows you to decide if you would like to display and compare either indicators, or specific geographical areas

The following options allow for you to filter the data and choose what aspects to highlight during the display of your widget.

3. By selecting the values and then clicking the arrow within the filter (figure 23), users can determine what indicators, geographical units or time periods to display within the time series widget.

   a. Users can control the color via the **color selector** on the right.

   b. Syncing "with the current map/dashboard" allows for users to include all indicators, geographical units, or time periods within the map

4. Click apply to verify the creation of the widget and save the project to complete the creation for end users.
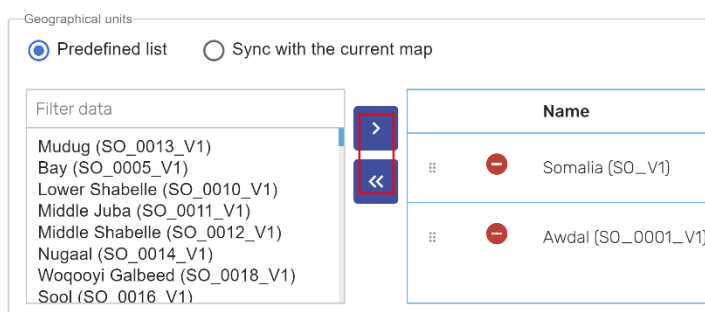

Figure 23: Geographical Units filter during Time Series Widget Creation

Compare Layers

The **Compare Layers** tool is a unique data visualization tool that allows for the direct display of two indicators, within their respective classes, on the one map that occupies the dashboard. The tool can be activated on a project by selecting the compare layers button ⧉ which is located at the top of the project.

This enables the unique data visualization feature where one indicator becomes an outline, reflecting the same class and a secondary indicator fills in the polygon. This allows users to assess the difference in classes between indicators by district. At the same time, the legends of both indicators are provided which allows users to understand precisely what the color differences indicate.
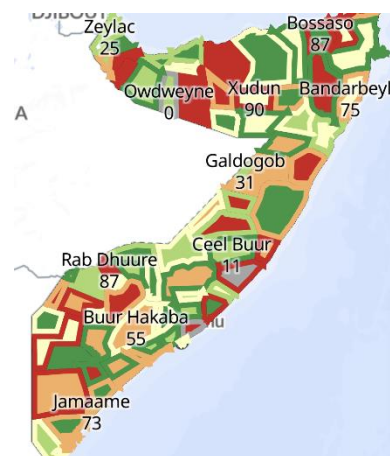

Figure 24: The display of the activated "Compare Layers" tool

3D Layers

The 3D layers tool is an important tool that enables for the analysis and comprehension of different values across different administrative polygons. In a 2D model, indicators are split into different classifications, but all values within the same class are the same color and so the values appear the same. By enabling a 3D view, GeoSight allows users to consider values *within* the same class and understand how these administrative areas differ to one another.

Users can enable this view by clicking the **3D Layers button** which is located at the top of the project.

This adjusts the users viewing angle from 90° to 30°. Users can adjust their viewing angle and orientation by right clicking or clicking the **Reset Tilt** button 90°⌞.
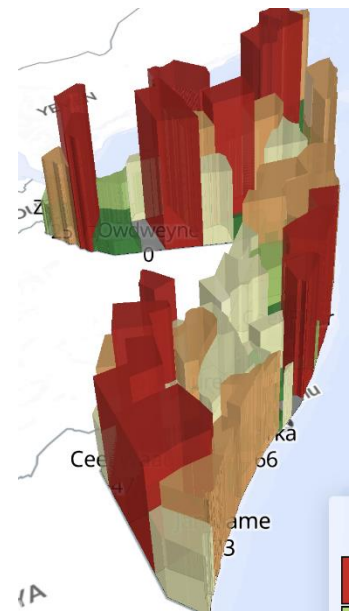
Figure 25: The display of the activated "3D Layers" tool

Multi-Indicator Layers

Multi-Indicator layers are a dynamic form of symbology that allows users to compare the numeric values of a range of indicators. Within this layer type analysts are able to compare multiple indicators (not just two) in a variety of graph formats, a **pie char** or a **bar chart**. In doing so, the values will appear is as these charts in the centroid of their appropriate administrative district.

To create multi-Indicator layers, navigate to the **Indicator Layer** tab under project managemnt (See **Projects** for more details)

1. Select **Add Indicator Layer** and then **Multi Indicators Layer** in the pop-up

Figure 26: The display of a multi-Indicator layer pie chart.

2. Complete the filter to select your indicators, it is identical to other layer filters such as time series widgets (see **Widgets** for more details)
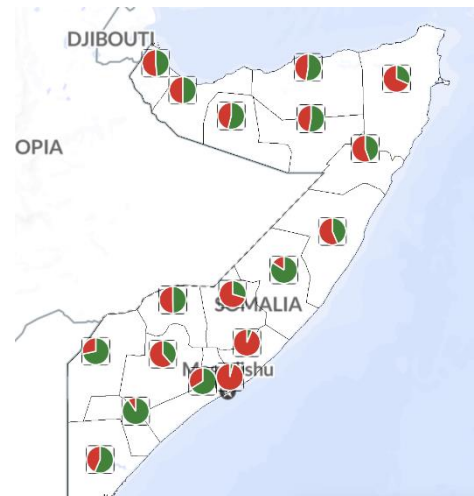   a. Determine the color by using the color selection tool (see **Styles** for more details).

3. Determine the chart type and size
   a. Users can display a pie chart or bar chart
   b. Size can be standardized or flexible.

Related Tables

Related tables are a powerful tool that allows users to upload and manipulate large, disaggregated datasets in an efficient way. Many instances of data are found in large datasets, with multiple time periods, categories and indicator types. This can require significant data cleaning (probably via a pivot table) to format it to your desired format and isolate the specific instance of data required.

Men	Date	Girls	Pcode	Sector
71	2022-01-01T00:00:00.000Z	65	PK1	WASH
57	2022-01-01T00:00:00.000Z	39	PK2	WASH
27	2022-01-01T00:00:00.000Z	93	PK2	EDU
17	2023-01-01T00:00:00.000Z	37	PK1	WASH

Related tables allow users to bypass this, by uploading the raw table GeoSight allows users to aggregate and filter tables, displaying only specific values within specified geographic areas. In the same vein, users can enable end users to manipulate the data as well, displaying multiple indicators on a whim.

Figure 27: An example Related Table once uploaded to GeoSight

Creating Related Tables as Indicator Layers

First, users must add related tables to a project so they can then connect to it in order to create a layer.

1. Navigate to the **Related Tables tab** under project management.

2. Select **Add Related Table** and add your table.

3. Determine the geographical administrative units.

4. In the **Related Fields** box, select which fields/columns from your dataset you would like to be enabled so you can incorporate it when adding an indicator.

Figure 28: Adding a Related Table to a project.

a. Selected fields will appear in a grey box within the Related Fields space.

Next, related table indicator layers can be created, like many other features, in the **Indicator Layer tab** of **Project Management**.

1. Select **Add Indicator Layer** and then **Related Table Layer** which will bring up the Related Table Layer Pop-up.

2. Begin completing the pop-up by naming the layer and selecting an **SQL Filter** and determining their desired expression.

   Filter for the data.

   SQL Filter

   Filter query for the data that will be put as 'where'.

   Figure 29: The empty SQL filter

   a. Users can filter by any attribute, including category, value, or geographic area.

3. Determine how you want the dataset aggregated

4. Set color rules (See **Styles**).

5. Verify the data is valid and click **Apply**.

Slicing Toolbar

When a related table is added to a project, it contains an array of data that can be manipulated and filtered to display the multiple dimensions of the dataset. This can be controlled and maintained through the use of **slicers**- data specific filters that allow end-users to control and manipulate a dataset.

Using Slicers

When using slicers on the front-end project, it's simple to manipulate the given fields and sort the data appropriately. Depending on the construction of the slicer, there will be different operations available.

- One Category- A slicer will allow users to select one grouping out of a variety of groups and display only the data for the given group.
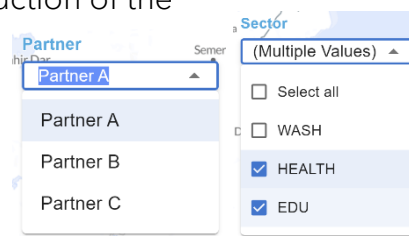
- Multiple Attributes- The slicer allows users to filter data by attributes, including selecting one, some or all of specific characteristics.

Figure 30: Slicers in a Project.

- Values- Users can select and filter specific values to display a highly complex aggregation of a specialized dataset.

Manipulating Slicers

Slicers can be adjusted in the **Indicator Layer tab** of the **Project Management Window**. To

1. Upload a **Related Table** to GeoSight (See **Importing Data**).

2. Navigate to the **Indicator Layer tab** (See **Projects**)

3. Add the related table to a project (see **Importing Data**).

Figure 31: Defining Data Slicers

4. Once it has been added, navigate to ⚙ Config and scroll to the bottom of the **General** tab.

5. Click the **Data Slicers** bar which will bring you to the **Define Data Slicers** window

6. For each slicer (from left to right):
   a. Select the **Field** to sort by
   b. Select the **Selection Type**
      i. Multi/Single Section for Categories
      ii. Above, between or below for Values
   c. Define values or categories

7. Repeat until all desired slicers are created.

8. Make sure to save any changes.

Downloading Data

Through the front-end of a project, users can download the available and currently visualized dataset. On the main toolbar, simply select the download button that is shaped like a downward facing arrow.

By downloading the dataset, further information is available to the user.

- Improved Analysis- Users can access disaggregated data to incorporate into other projects, further analysis and aggregate values, including how data changed overtime.

- Access Geospatial Codes- By downloading the dataset, users are able to access the Reference Dataset information which can provide the proper codes for further use.

Measurements

In a project, the users are able to measure the distance between one or more points. Similarly, they can draw an area to calculate both the

1. First, select the measurement tool

2. Click your starting point

3. Click the remaining desired areas, this will create either a line or a polygon

4. Double click to finish

The project will then display the measurements, including the area and perimeter if a polygon was defined.

Users can have multiple measurements at once.

Bookmarks

In order to preserve any analysis that a user may develop, they have the capability to create **Bookmarks.** These bookmarks capture the current view and returns the user to that view anytime the bookmark is selected. To create a bookmark, click the Bookmark star , click "Create New", enter a name, and save.

STYLES

When indicators are created, users must specify **Color Rules** (see **Projects**) to define the value(s) that are to be associated with a specific color on the map within the dashboard. In short, the user is determining the legend and how the data is visualized.

Users can utilize the **Style** options to create template color rules that can be applied to any indicator or any indicator layer in any project. This allows users to quickly apply pre-determined styles to numerous indicators without having to create new styles for every instance.

Styles can be understood as a dynamic tool that can exist in many different versions across GeoSight. There are three such **Individual Instances** of style configurations.

1. **Style Library**- unassigned color rules that can be applied to any project via the *Indicator Layer* tab. Can be found by selecting the **Style** tab in the Admin Panel.

2. **Override Style**- the management of style from the Indicator Layer tab, users can manually adjust color rules here.
3. **Indicator Style**- the predefined color rules from the indicator management/creation
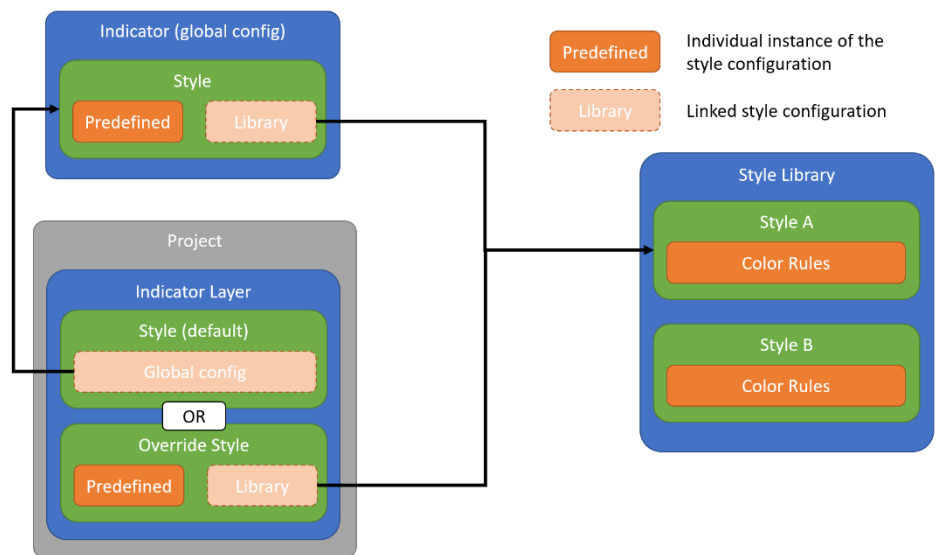
To create color rules, users simply need to follow the color matrix presented to them.

- **Name**- The name is the **Label** you wish to assign to the class of values. This can be any text or numerical values and will appear (next to the chosen color) on the legend.
- **Rule**- Determines the values/categories that are assigned the chosen color.
  - **Numbers**- Numerical values that can either be a singular value or a range of values. Users can only enter in one box, or the other.
    - Ranges are written as: <u>Greater than</u> the value on the **left** & <u>Less than</u> <mark>or Equal to</mark> the value on the **right**.

- o Categories- The **category** data type allows for string/text fields to be imported as datasets for total data visualization. If appropriate, users may set this for their color rules.
- Color- The interior color of the administrative polygon (including when using the compare layers tool). This color will also be what is next to the label/name in the legend.
  - o Users can select a color or, enter the hex code.
  - o We recommend https://colorbrewer2.org/ for useful color palettes
- Outline Color- The color of the **exterior** line features of the administrative polygon.
- No Data/Other Data- Automatic fields that are used to visualize datasets if no data within the color rules is available.

Style type *

Predefined style/color rules.	⌄

Style

		Name	Rule										Color	Outline Color	Outline Width
			The values for each rule can either be: • Text-based items that map to a number (e.g. 'Worsening' maps to value '1'). In this case, you should use the '=' box below to declare one value per rule text option. When harvesting from a datasource, that datasource can contain either numeric or text values for the indicator. • Number based items in a range that map to a rule (e.g. '1 to 5' maps to 'Worsening'). In this case, use the upper and lower range options individually or together to define the ranges (e.g. 'Worsening' <= 5, 'Better' > 5 and <= 10). When harvesting from a datasource, that datasource can contain ONLY numeric values for the indicator.									Used for filling the geometry. Put the hex color with # (e.g. #ffffff).	Used for coloring the outline of the geometry. Put the hex color with # (e.g. #ffffff).	Change width of the outline (in px)
⠿	⊖	High	Number	⌄	▶	value	is		or	2	<	value	<=	3	#00ff00	#FFFFFF	0.5
⠿	⊖	Medium	Number	⌄	▶	value	is		or	1	<	value	<=	2	#ffff00	#FFFFFF	0.5
⠿	⊖	Low	Category	⌄	▶	value	in	Select...					⌄	#ff0000	#FFFFFF	0.5
☑		No data				value	is	No data						#D8D8D8	#FFFFFF	0.5
☑		Other data				value	is	Other data						#A6A6A6	#FFFFFF	0.5

+ Add New Rule

Figure 32: Color Rules

Creating Styles

1. Users are able to create, manage and remove **styles** within the "Style" tab of the Administrative Panel or while creating/editing an indicator.

2. Navigate to the [+ Add New Styles] button to begin creating a new style.

3. The **general tab** allows for users to determine the characteristics of the style including name, description and data type.

4. **Style Config** determines the color rules of the style (see above)

5. Finally, complete the **Share** tab to allow specific users or groups to access the style.

6. Click save to preserve the new style.

Dynamic Styles

Dynamic styles are an important feature to GeoSight that allows for the efficient creation and display of color rules. This can be useful, as creating individual color rules can be tedious and time consuming. Dynamic styles allow for *data-driven* palettes that cover a number of classifications and enable for the use of customary classifications, including:

- Jenks-Natural Breaks
- Standard Deviation
- Quantile
- Equidistant
- Geometric Progression
- Arithmetic Progression

Similarly, there are two types of dynamic styles:

Dynamic Quantitative Styles

Dynamic **Quantitative** styles are numerically driven styles, that based on the above classifications, display the data in four to five classes. The different dimensions of the dataset allow for users to customize their data-driven narrative and highlight statistically significant areas of interest.

NOTE: Actual statistical significance/p-value is not given.

Dynamic Qualitative Styles

Dynamic **Qualitative** Indicators are category driven styles, that allow for the ingestion and display of text values throughout the dataset. Based on data-points that share the same textual values, Dynamic Indicators can automatically apply pre-set palettes.

Creating Dynamic Styles

1. Navigate to the **Indicator Layer** of your choice.
   a. This is within the project pane.

2. *Configure* your layer of choice and navigate to the **Style** tab

3. Under **Style Type** Select Dynamic Quantitative OR Qualitative Styles

4. Select your color palette
   a. Both single and double color scales are available

5. Determine a classification and number of classes

6. **Sync fill and outline** if you wish to hide borders and decide whether to enable styles for filters.

7. Click apply changes and then save your project.

DATA BROWSER & MANAGEMENT

Data Browser

The Data Browser allows for users to look through their datasets and control/adjust values. Across the top they can filter their query to identify the specific values. Utilizing these filters, users can specify their desired **indicator**, **reference dataset**, **administrative level**, **geography**, and **date**. These hyper focused options allow users to parse all instances of data.

The page provides the date of the data, as well as the number of data points available.

To change data, navigate to the **data browser** icon and then the **value** column and select the appropriate text box. Users can enter their desired value here.

Users can delete any values.

Users can delete multiple values by **selecting all** Select all 47 filtered data. and selecting delete. 🗑 Delete

Be sure to click **Apply Changes** to save any edits.

Data Management

The **Data Management** tab allows users to see their (and maybe others if they have the proper permissions) upload logs or scheduled jobs. These logs tell users the time of the upload, the indicator, the number of data points and if the upload was successful. This can be useful in the case of mistakes on uploads, or if an upload fails.

- Selecting the Browse Data button allows for users to see individual data points from their upload so if a mistake occurred, it can be identified, diagnosed, addressed and adjusted for the next upload
- If an improper dataset was successfully uploaded, data can be deleted in the **Data Browser** (see above).

Data Imports are also initiated from this page. Select ⬆ Import Data to begin the process. See the Importing section for more details.

Reading Logs

Users can select the username to access the log under **Imported By**. A successful import is indicated by the color green and a failure is red.

By viewing this log users can view summary information of the import, as well as any errors that may have occurred. If an import failed users can select See the data to see what *specific* data are compromised, allowing for edits on the original source.

DATA ACCESS

Data Access is an essential feature of GeoSight and UNICEF operations. In pursuit of data centralization, GeoSight is supposed to serve as a repository for all geospatial information. However, although most of this data is open source, some (especially disease and conflict data) are considered sensitive and protected. Through this process, users can dictate access to indicators as well as *specific* reference datasets that contain data. For example, users can provide access to an indicator for *only* Country X by filtering by the Country X dataset.

Importantly, all data access and control are determined by the user who created the associated indicator, context layer or project. Access can be controlled in the **Data Browser** tab.

*All functions are not available for all users as access is controlled and limited.*

Data Access Tab

The **Data Access** tab allows for the control of *specific indicators **AND** their reference dataset* for individual users, groups or the public. When viewing the page, users will be able to see that indicators are listed multiple times and are available for "All Versions" and the "Latest Version" of the accompanying reference datasets.

Users can locate the desired dataset and/or reference dataset by utilizing filtering features that are found throughout the data control functions of GeoSight.

Permissions can be adjusted on the right-hand side by selecting the box, or selecting one or multiple indicators and using the [✎ Change permission] button.

- Use the **Indicator Filter** to locate your desired indicator.

- Use the scroll wheel or **Dataset Filter** to reduce selection to your desired reference dataset.
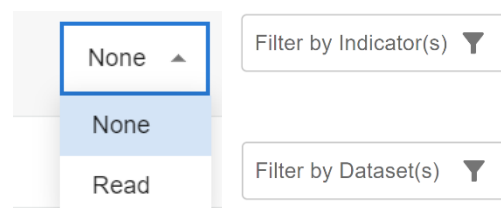
Figure 33: The data access page elements showing functions for filtering data and adjusting general access.

Adding Users

Most users, including all UNICEF staff and some consultants are able to access GeoSight with their UNCIEF email. In some cases, access may be needed for someone without a UNICEF email, including a consultant or government partner. Whatever the case may be, users can be created in the **Users and Groups** tab of the **Access** section.

1. Navigate to and select **+ Add New Users**

2. Enter the information including Name and Email

3. Select a permission level

4. Save and share details with the user

Groups

Groups are a helpful way of aggregating users based on a common characteristic or shared attribute such as a Country or Regional Office, HQ Division or Role. This can be useful when controlling data, indicator, style or project access. By selecting groups as opposed to individual users, one can efficiently apply permissions to a large number of users.

Creating Groups

1. To create a group, navigate to the **Users & Groups** tab in the admin panel

2. Navigate to **Groups** and select **+ Add New Groups**

3. Enter the name of the group

4. Select **+ Add users**

5. Use the pop-up to search for and select appropriate users

6. Update selection and click save when complete.

Editing Groups

1. To edit a group, navigate to the **Groups** tab in the admin panel

2. Select the desired group by clicking on its name

3. Adjust the name if desired

4. Select **+ Add users**

5. Use the pop-up to search for and select appropriate users
   a. Either give these users access by selecting them, or remove access by de-selecting them

6. Update selection and click save when complete.

User Access

For instances of highly sensitive data, users are able to provide access to only select users.

To control access for users, navigate to the **Data Browser** tab in the admin panel. It can be found in the same page as **Group** sharing.

1. Select **Share** to control access.

2. Select the + Share to new user(s) button. This will cause the **Update Permissions** page to appear.

3. Select your **Indicator**.

4. Filter by **Datasets**. Here users can provide access to instances of the indicator, as opposed to the full indicator.

5. Select the desired **user(s)**.

6. Decide the permission level.
   a. **Read** allows for users to view the data
   b. **Write** allows users to edit the data

7. Apply changes and make sure to click Apply in the *top right* as well

Group Access

Sharing data access by groups is quite similar to sharing access by indicator. However, in this instance users are combined via a common characteristic (such as Country/Regional Office). This function can allow for efficient data sharing with a large number of users. It can be found in the same page as **User** sharing.

1. Select **Share** to control access.

2. Select the   + Share to new group(s)   button. This will cause the **Update Permissions** page to appear.

3. Select your **Indicator**.

4. Filter by **Datasets**. Here users can provide access to instances of the indicator, as opposed to the full indicator.

5. Select the desired **group(s)**.

6. Decide the permission level.
    a. **Read** allows for users to view the data
    b. **Write** allows users to edit the data

General Access

General access allows users to control the availability of data on publicly available datasets.

1. Select **Share** to control access.

2. Select your desired level for public sharing at the top of the window, this will dictate access for anyone who has a dashboard link *(log in not required)*.
    a. **Read** allows for users to view the data.
    b. **None** prevents access.

3. Select your desired level for organizational sharing at the top of the window, this will dictate access for **all UNICEF users**/those who have a log in.
    a. **Read** allows for users to view the data
    b. **Write** allows users to edit the data
    c. **None** prevents access.

ACCESS REQUESTS

Users can submit *permission* requests for increased roles on GeoSight. This could allow them to write or create indicators, as opposed to simply being able to view them or upload data.

Submit an access request through the **Access Request** tab and an administrator will respond as soon as possible.

Contact:

Written by: Benjamin Norrito – Geospatial Analyst, RAPS/EMOPS: bnorrito@uncief.org

GeoSight is developed by: Jan Burdziej – Geospatial Lead, DAPM: jburdziej@unicef.org

Fabrizio Celli – Information Comm. Technology Specialist, DAPM: fcelli@unicef.org

Additional Contacts:

Niroj Panta - Geospatial Emergency Specialist, RAPS/EMOPS: npanta@unicef.org

Ajoke Onojeghuo – Geospatial Analyst, RAPS/EMOPS: aonojeghuo@unicef.org

Kevin Wyjad – Emergency Specialist, RAPS/EMOPS: kwyjad@unicef.org

Special Thanks to Tim, Irwan, Danang and the rest of the Kartoza team.