

# Provide Context to Indicators

ArcGIS Dashboards enables you to use a variety of visual elements to see the status of people, services, assets, and events in real-time. Indicators in dashboards can provide essential information at a glance. With a few basic configurations, you can have a title and number on your indicator that communicate meaningful information to your audience. Sometimes, however, additional context is needed to aid in its effectiveness.

This article provides three techniques to add context to your indicators through reference values and conditional formatting.

1. Apply situation-based styling
2. Compare your metric to a baseline
3. Normalize your metric

Each technique will be illustrated by taking an indicator and enhancing it.

## 1. Apply Situation-Based Styling

Let's say we have an indicator on a dashboard showing information about recently reported crimes. The dashboard is used by a police chief and staff, and it is mounted on a wall in the department office. The purpose of the indicator is to inform them of recent violent crimes.

## Provide Context to Indicators



This indicator uses effective, attention-grabbing color and simple, informative text. However, over periods with no violent crimes, the indicator is unnecessarily prominent. Let's use a reference and conditional formatting to change this.

In this case, a reference value can be thought of as a threshold. When combined with conditional formatting, you can style the indicator differently depending on whether your value is above or below the threshold.

Step 1: Add a Reference

## Provide Context to Indicators

For the reference type, choose Fixed Value. Set the reference value equal to 1. We have, in a sense, defined a threshold of one violent crime. Next we'll see what we can do with this "threshold".

The screenshot shows the 'Indicator' configuration window. On the left, the 'Data Options' panel is visible, with the 'General' tab selected. The 'Filter' section shows a filter for 'DISPATCH\_DATE\_TIME' (date) 'is within the last' '3' 'hours'. Below this, the 'AND' section shows a filter for 'UCR\_CATEGORY' (string) 'equal' to 'Violent Crime'. The 'Value Type' section shows 'Statistic' selected, with 'Count' as the statistic. The 'Reference' section shows 'Reference Type' set to 'Fixed Value' and 'Reference' set to '1'. On the right, a preview of the indicator is shown, displaying 'Violent Crimes' with a large '10' and a small '1' below it, indicating the count for the last 3 hours.

### Step 2: Turn on Conditional Formatting

Conditional formatting allows us to render the indicator differently depending whether we are above or below the threshold we defined. In the Indicator tab, turn on conditional formatting.

# Provide Context to Indicators

Indicator

Data

Indicator

General

Indicator Options

Conditional Formatting ☒

Style for value at or above reference

Top Text

Fields: {} ☐ ☐ A

Violent Crimes

Middle Text

Fields: {} ☐ ☐ A

{value}

Bottom Text

Fields: {} ☐ ☐ A

{reference}

Icon

None Left Right ☐ ☐ ☐

Change

Style for value below reference

Top Text

Fields: {} ☐ ☐ A

Violent Crimes

Middle Text

Fields: {} ☐ ☐ A

{value}

Bottom Text

Fields: {} ☐ ☐ A

{reference}

Style for value at or above reference

Violent Crimes

11

1

Last 3 Hours

Style for value below reference

Violent Crimes

11

1

Last 3 Hours

Done

Cancel

## Step 3: Update Text and Color for "No Crime" Scenario

Now we have two previews that represent our two scenarios: 1) when there has been one or more violent crimes and 2) when there has been no violent crimes. We can now configure the indicator differently for each scenario. Change the Middle Text in the Indicator tab for the second scenario to a simple message saying "No violent crimes in last 3 hours".

# Provide Context to Indicators

Indicator ✕

**Indicator Options**

Style for value at or above reference

Top Text Fields: {} ☐ ☒ A

Violent Crimes

Middle Text Fields: {} ☐ ☒ A

{value}

Bottom Text Fields: {} ☐ ☒ A

Icon None Left Right ☐ ☐ ☒ Change

Style for value below reference

Top Text Fields: {} ☐ ☒ A

Middle Text Fields: {} ☐ ☒ A

No violent crimes in last 3 hours

Bottom Text Fields: {} ☐ ☒ A

Icon None Left Right ☐ ☐ ☒

Style for value at or above reference

Violent Crimes

11

Last 3 Hours

Style for value below reference

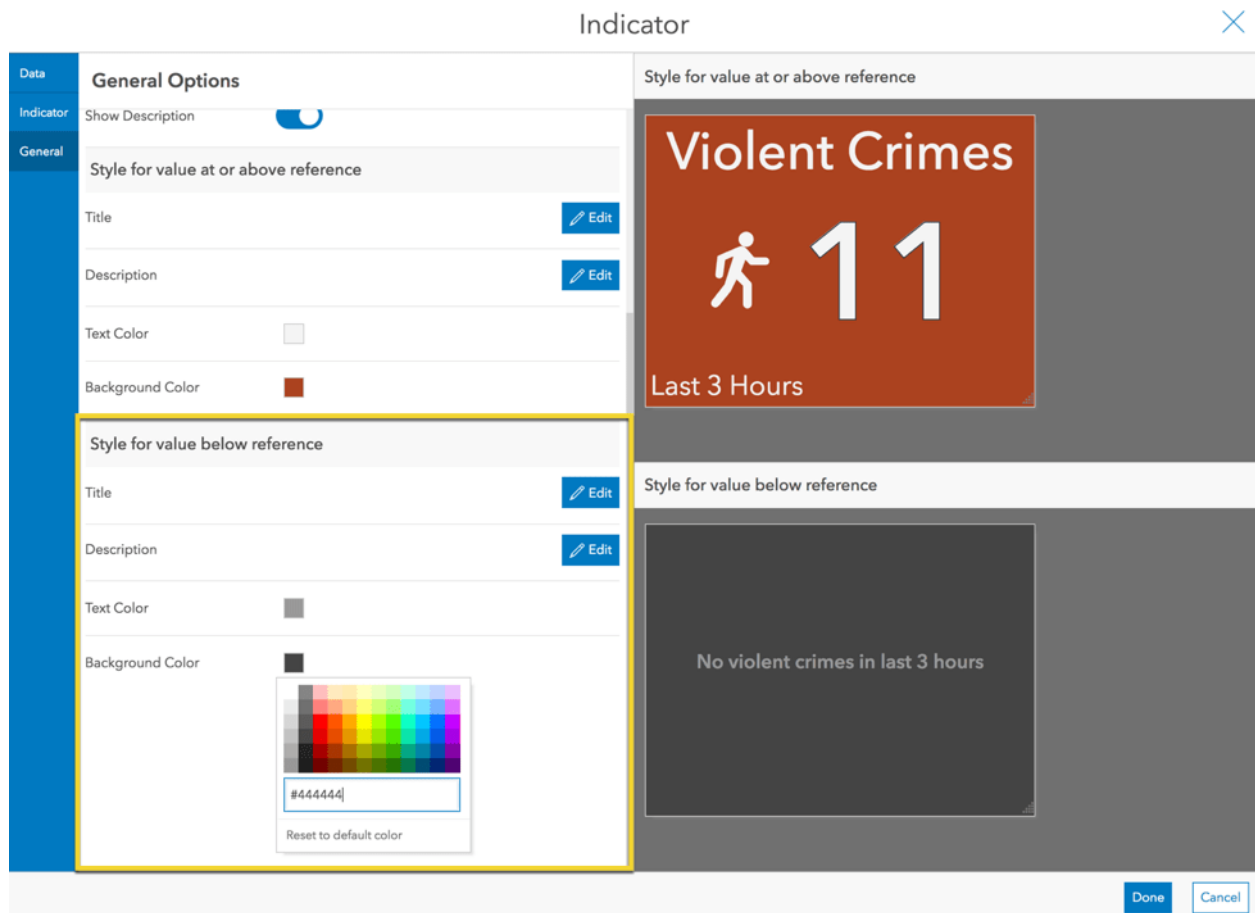
No violent crimes in last 3 hours

Last 3 Hours

Done Cancel

In the General tab, change the text color to #f4f4f4, the background color to #444444, and delete the description text.

# Provide Context to Indicators



The indicator is now more effective at informing the chief and staff—it will only be the eye-catching bright red when there has been one or more recent violent crimes.

## 2. Compare Your Metric to a Baseline

Let's look at another way to use a reference and conditional formatting. Say we have an indicator showing the number of crimes recorded in the last 28 days. It will be displayed on the same wall-mounted dashboard for the police chief and staff.

## Provide Context to Indicators



The indicator shows the 28-day crime count. The indicator would be more effective if we provided context to this number. Crimes fluctuate by time of year, and so it can be helpful to compare it to the same timespan last year.

### Step 1: Add a Reference

For the reference type, choose statistic. We will query the same layer, but with a different time window defined in the filter—the previous 28 days from last year on this date. By default, the same layer is selected—keep this unchanged. Also keep the default statistic type Count. Add a filter and define a constraint for DISPATCH\_DATE\_TIME is before the last 365 days. Click “AND” to

# Provide Context to Indicators

add another constraint for DISPATCH\_DATE\_TIME is before the last 393 days.

The screenshot shows the 'Indicator' configuration window. On the left, the 'Data Options' panel is visible with tabs for 'Data', 'Indicator', and 'General'. The 'General' tab is active, showing 'Value Type' set to 'Statistic', 'Statistic' set to 'Count', and 'Value Conversion' turned off. Below this, the 'Reference' section is highlighted with a yellow box. It shows 'Reference Type' set to 'Statistic' and 'Using 'Philadelphia Crime v1' layer'. The 'Filter' section contains two date-based filters connected by an 'AND' operator. The first filter is 'DISPATCH\_DATE\_TIME' with the condition 'is before the last 365 days'. The second filter is 'DISPATCH\_DATE\_TIME' with the condition 'is within the last 393 days'. At the bottom of the filter section, there are 'AND' and 'OR' buttons. The main area on the right displays a large indicator for 'Crimes' with the value '5,931' and a reference value '6,018' below it. The text 'Last 28 days' is visible above the main value. At the bottom right of the window are 'Done' and 'Cancel' buttons.

## Step 2: Update Indicator Text to Include Comparison Metrics

In the Indicator tab, add in text to convey how it has changed. In the Bottom Text, inject the difference between the value and reference as well as the percent change.

```
{difference} from last year ({percentChange}%)
```



# Provide Context to Indicators

Indicator

Crimes  
Last 28 days

5,931

-87 from last year (-1.4%)

Indicator Options

Conditional Formatting ☒

Top Text Fields: {}  A

Middle Text Fields: {}  A

Bottom Text Fields: {}  A

{difference} from last year ({percentChange}%)

Icon None Left Right

Formatting

Value Prefix Pattern

Percentage Pattern #,0

Ratio Pattern #,###.0

Done Cancel

## Step 3: Turn on Conditional Formatting

To further enhance the indicator, turn on conditional formatting. A preview is shown for each condition: 1) when the crime has increased/remained the same and 2) when the crime has decreased.

Style the text red for when the crime rate has increased and green when it has increased. We can even add small up and down arrows via [Unicode characters](#). Also, since we have the arrows, we don't want to show the "-" sign when the rate has decreased (i.e., the difference is less than zero). So, use the absolute value of the difference. Insert the following text.

```
▲ {absoluteDifference} from last year ({percentChange}%)
```

# Provide Context to Indicators

▼ {absoluteDifference} from last year ({percentChange}%)

The screenshot shows the 'Indicator' configuration window with a sidebar on the left containing 'Data', 'Indicator', and 'General' tabs. The 'Indicator' tab is active, showing 'Indicator Options' and 'General' sections. The 'General' section has a 'Conditional Formatting' toggle that is turned on. Below this, there are two sections for styling the indicator: 'Style for value at or above reference' and 'Style for value below reference'. Each section has fields for 'Top Text', 'Middle Text', and 'Bottom Text', along with 'Fields' and 'A' color pickers. The 'Bottom Text' field in both sections is highlighted with a yellow box and contains the formula '▼ {absoluteDifference} from last year ({percentChange}%)'. The 'Style for value at or above reference' section also has an 'Icon' dropdown set to 'None'. To the right of the configuration fields, two preview cards are shown. The top card, titled 'Crimes Last 28 days', displays a large blue number '5,931' and a red text '▲ 87 from last year (-1.4%)'. The bottom card, also titled 'Crimes Last 28 days', displays the same large blue number '5,931' and a green text '▼ 87 from last year (-1.4%)'. At the bottom right of the window are 'Done' and 'Cancel' buttons.

Now that the indicator provides context to the last 28-day crime count, viewers can easily interpret whether crime has improved or gotten worse compared to this time last year.

## 3. Normalize Your Metric

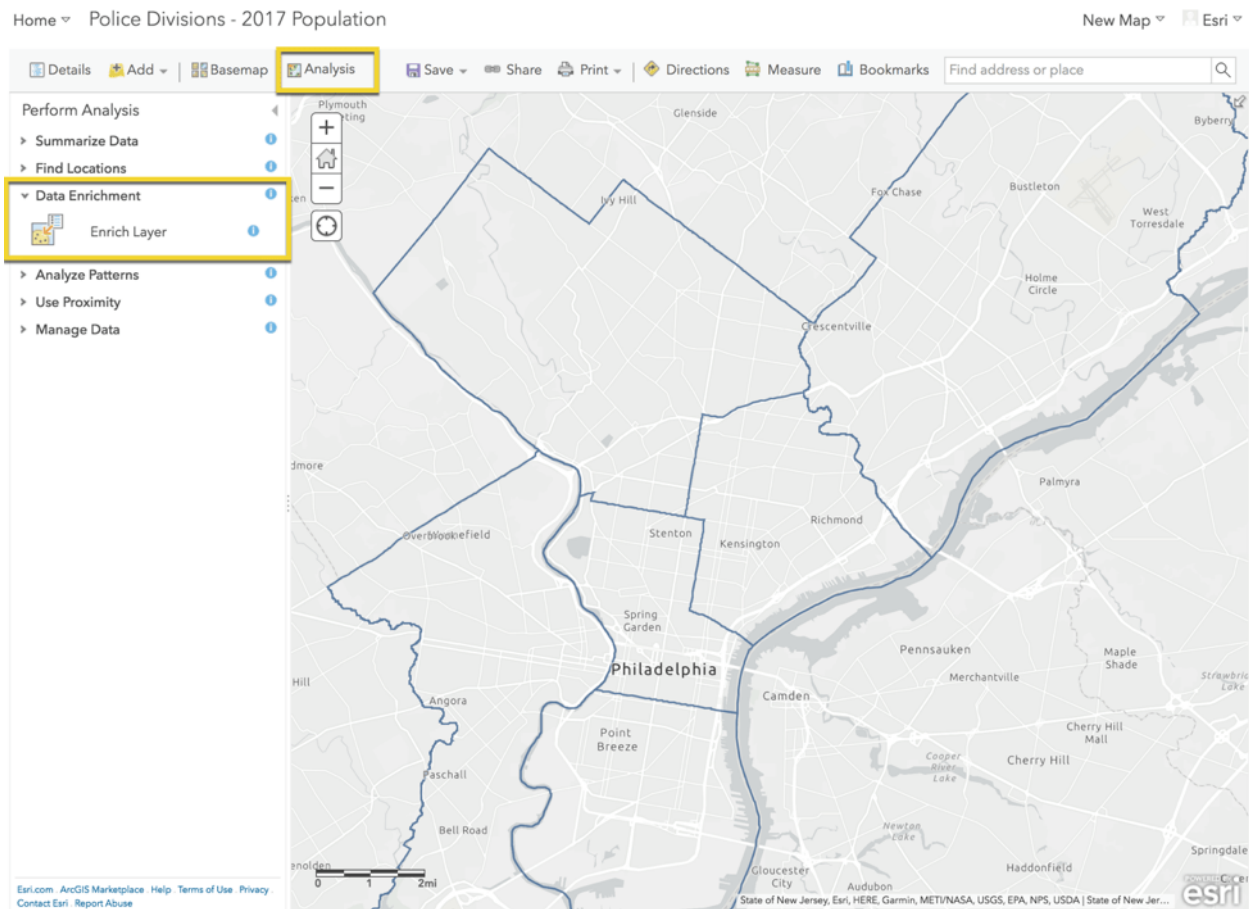
In addition to the 28-day crime counts, the police chief might also want to see crime “rate” (crimes per 1,000 inhabitants). Let’s enhance our indicator to include the rate. This time we will create a statistic-based reference that is based on a different layer—one with population data.

# Provide Context to Indicators

As part of the data set, we have a polygon layer of the [police divisions](#). If we knew the population for each police division, we could sum them to get the total for the city (or even do a breakdown per division). We can do this with ArcGIS Online by [enriching layers](#).

## Step 1: Enrich Your Data

Let's open the layer in Map Viewer. Click the Analysis button. Under Data Enrichment choose Enrich Layer. Click Select Variables and choose the Total Population variable for the current year. Uncheck "Use current map extent" to include data for our whole layer, then click Run Analysis.



# Provide Context to Indicators

## Step 2: Add a Reference

After the population data has been added to our layer, we go back to Operations Dashboard. We'll start with the same 28-day indicator as before.

The screenshot shows the 'Indicator' configuration window. On the left, the 'Data Options' tab is active, showing the following settings:

- Value:** Using 'Philadelphia Crime v1' layer (with a 'Change' button).
- Filter:**
  - Field: DISPATCH\_DATE\_TIME (date type)
  - Operator: is within the last
  - Value: 28 days
- AND** (separator)
- Field:** DISPATCH\_DATE\_TIME (date type)
- Operator:** is not
- Period:** Value Field
- Value:** Today

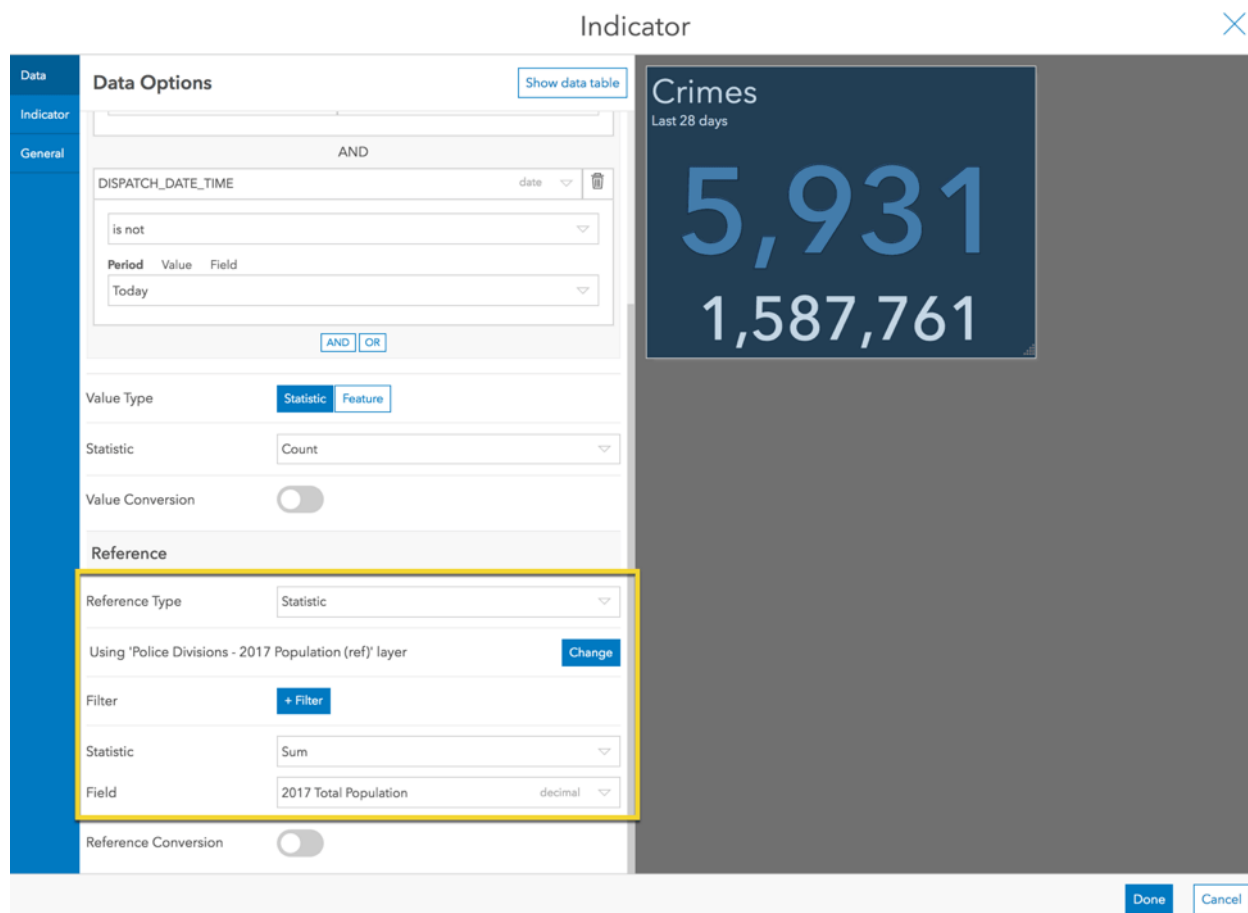
Below the filter, the 'Value Type' is set to 'Statistic' (with a 'Feature' button). The 'Statistic' is set to 'Count'. The 'Value Conversion' toggle is off. The 'Reference' section shows 'Reference Type' set to 'None'.

On the right, a preview of the 'Crimes' indicator is shown, displaying the value '5,931' for the 'Last 28 days' period. The preview is titled 'Crimes' and 'Last 28 days'.

At the bottom right, there are 'Done' and 'Cancel' buttons.

For the Reference Type, choose Statistic. Click the Change button to change the source layer. In the upper right, click the Select Layer button and then choose the layer we just created. Choose a Sum statistic on the population field.

# Provide Context to Indicators



## Step 3: Update the Description Text to Include the Ratio

In the Indicator tab, erase the Bottom Text that was added. This time we will add our text in the element's Description. In the General tab, edit the Description and inject the ratio of the crime count (value) to the population (reference).

```
{ratio} crimes per inhabitant
```

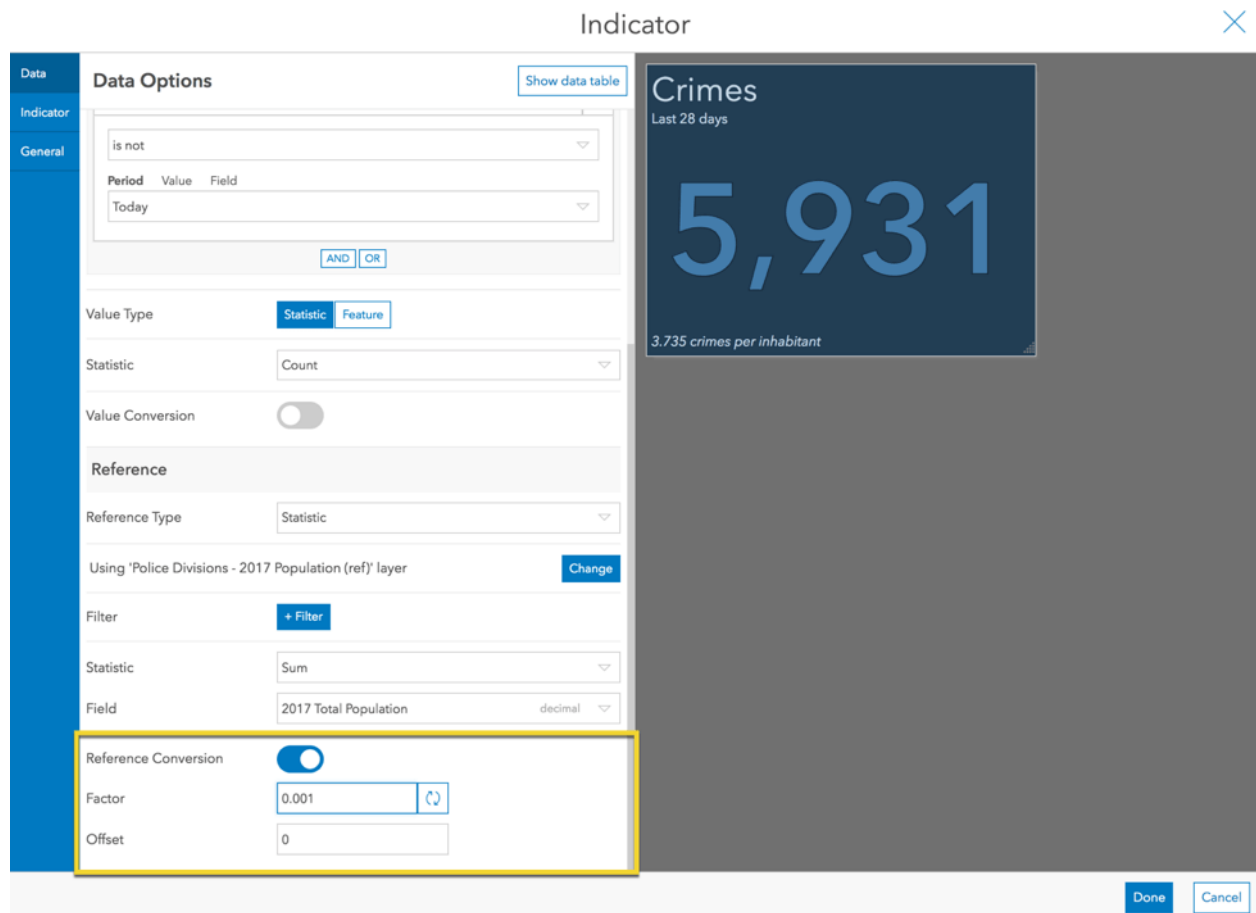
# Provide Context to Indicators

The screenshot shows the 'Indicator' configuration dialog box in QGIS. The 'General' tab is selected, showing the 'Crimes' indicator. The 'Description' field is highlighted with a yellow box, containing the text '(ratio) crimes per inhabitant'. The 'Text Color' is set to light blue, and the 'Background Color' is set to dark blue. The 'Last Update Text' is disabled. The 'No Data' section is visible. The 'Label' is set to 'Default'. The 'Show Title' and 'Show Description' options are both checked. The preview on the right shows the indicator's visual representation with the title 'Crimes', the subtitle 'Last 28 days', the large number '5,931', and the text '0.004 crimes per inhabitant'. The 'Done' and 'Cancel' buttons are at the bottom right.

## Step 4: Apply a Conversion Factor

Crime rate is often expressed as the number of crimes per 1,000 inhabitants. Thus, we need to divide the population by 1,000. We could create another field in the layer and use a calculation to do this. Or, we can simply apply a conversion factor to the reference statistic. To divide by 1,000, apply a multiplication factor of 0.001.

# Provide Context to Indicators



Step 5: Update the Description Text to Include the Crime Rate

Go back and update the text in the description to include the crime rate per 1,000 inhabitants.

`{ratio} crimes per 1,000 inhabitants`

# Provide Context to Indicators

The screenshot shows the 'Indicator' configuration window with the 'General Options' tab selected. The indicator is named 'Crimes' and has a title 'Crimes' and a subtitle 'Last 28 days'. The description field is highlighted with a yellow box and contains the text '(ratio) crimes per 1,000 inhabitants'. The indicator's value is displayed as '5,931' with a subtitle '3.735 crimes per 1,000 inhabitants'. The configuration options include Text Color, Background Color, Last Update Text, No Data, Label, Show Title, and Show Description.

## Step 6: Update the Number Formatting

We don't need this many significant digits though. So, format the number. In the Indicator tab, add a [pattern](#) for the ratio to only include one decimal place: `###.0`



# Provide Context to Indicators

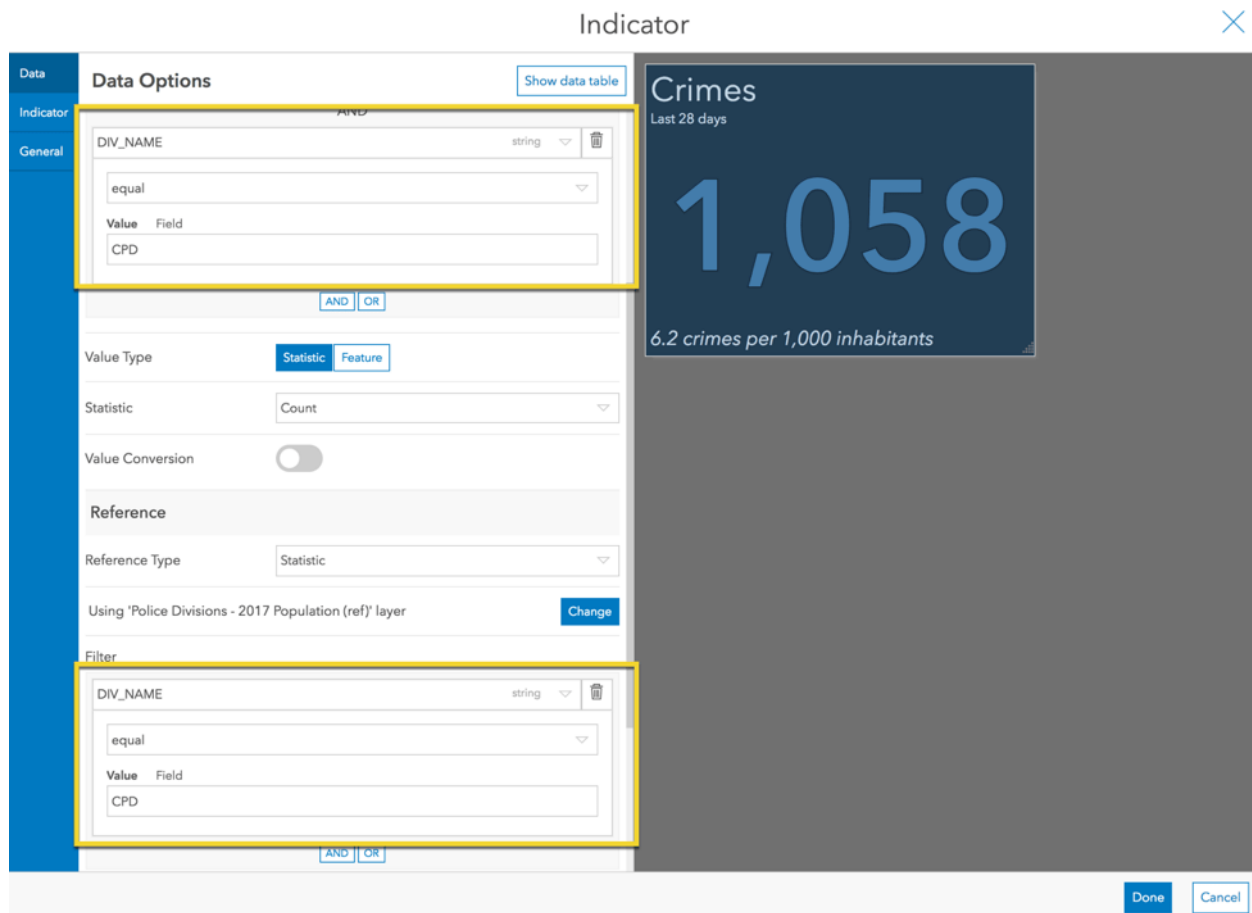
The screenshot shows the 'Indicator' configuration window. On the left is the 'Indicator Options' panel with a 'General' tab. It includes fields for 'Top Text', 'Middle Text' (containing '{value}'), and 'Bottom Text'. There are also 'Fields' selection buttons and an 'Icon' dropdown set to 'None'. The 'Formatting' section has a 'Value' toggle, a 'Pattern' dropdown set to 'Default', a 'Percentage Pattern' dropdown set to 'Default', and a 'Ratio Pattern' field containing '###.0' which is highlighted with a yellow box. On the right is a preview of the indicator titled 'Crimes' with the subtitle 'Last 28 days'. It displays a large blue number '5,931' and a smaller text '3.7 crimes per 1,000 inhabitants' at the bottom. The window has a 'Done' button and a 'Cancel' button at the bottom right.

And there you have it. Now the chief can see the crime rate relative to the population.

## Step 7: Create an Indicator for Each Police Division

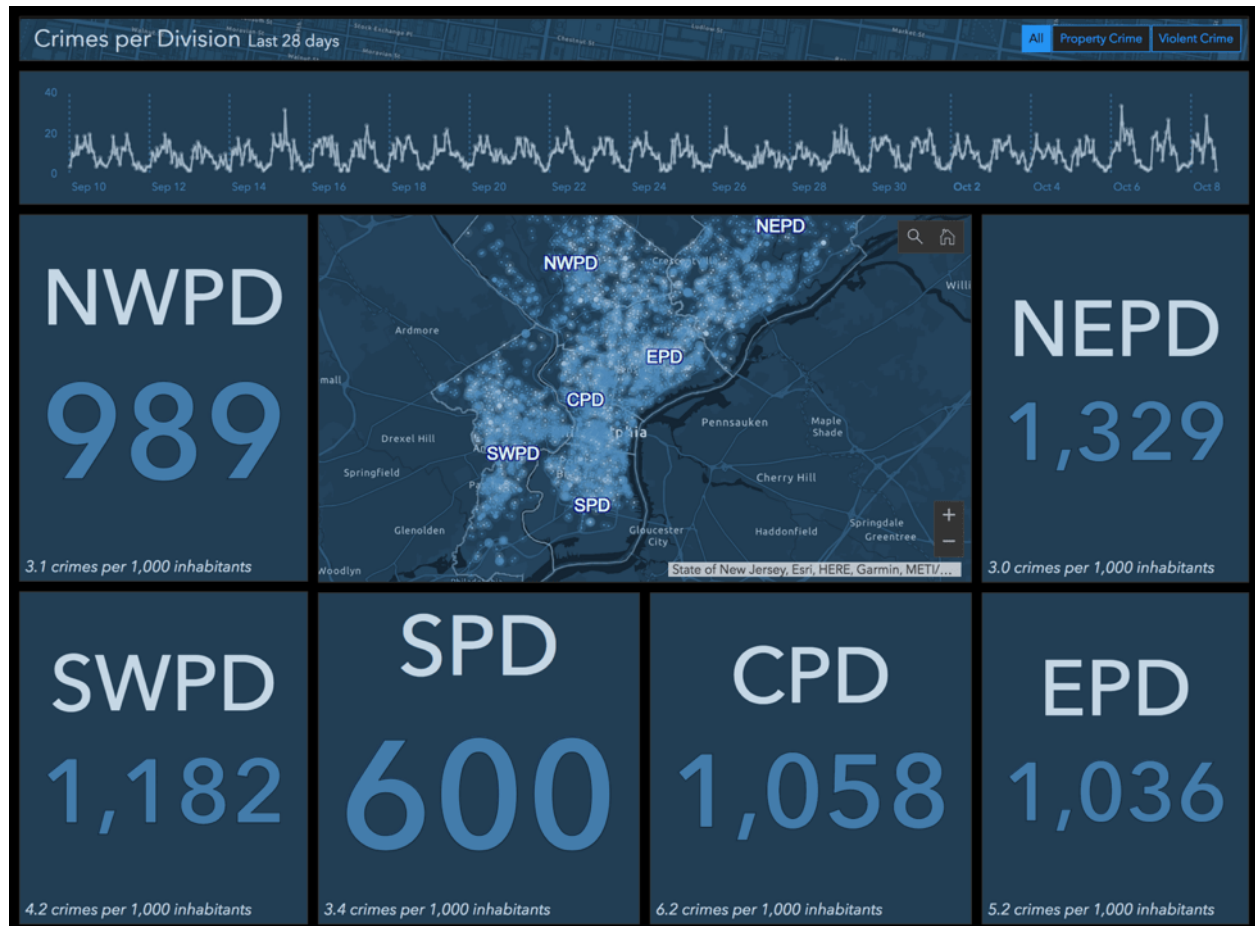
Before we wrap up, let's go one step further. Since the crime rate likely varies across police divisions, we can create an indicator for each division. Apply a filter to limit the crime layer (the indicator value) to only the one division, such as the central police division (CPD). Also apply a filter to the police division polygon layer (the indicator reference) to limit it to the same police division.

# Provide Context to Indicators



Now we have a geographic-specific crime rate. After pressing Done, we can duplicate the indicator and change the filter for each one to include a different division. With a bit more sprucing up, we can end up with the following [dashboard](#). With it, the chief can easily identify the central police division as having the highest crime rate and compare it to other divisions.

# Provide Context to Indicators



## Conclusion

Indicators are great at providing simple metrics to viewers. Sometimes, however, it is important to provide context. In this article we did this by using reference values and conditional formatting in three different ways:

1. Apply situation-based styling
2. Compare a metric to a baseline
3. Normalize a metric

[Here is a dashboard](#) with the three indicators we made. You can even [copy it](#) to see how they are configured.

## Provide Context to Indicators

