

WHITEPAPER

# Using Business Logic

November 2020

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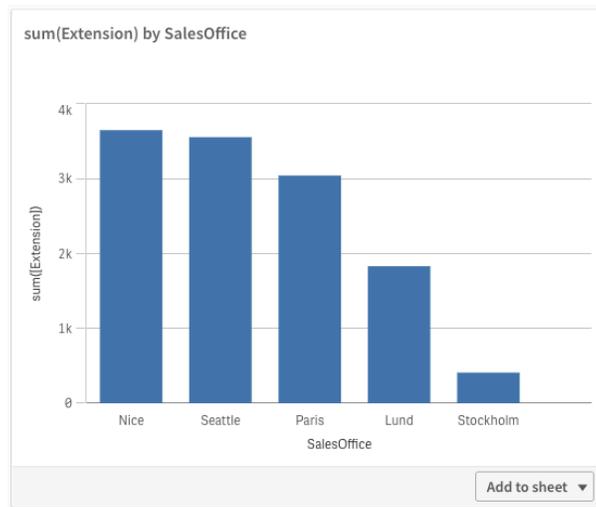
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## INTRODUCTION

When you use Insight Advisor or Insight Advisor Chat, the Qlik Cognitive Engine analyzes your data to determine which fields are of interest, which should be treated as dimensions and measures, which should be analyzed together, etc. In some cases, the Cognitive Engine may not make the right decision for your app or use case. Business Logic allows application authors to see what the Cognitive Engine has proposed and alter those determinations so that Insight Advisor (and Chat) produces better results.

In this example, Insight Advisor recommended a chart showing the field “Extension” as summed because the Cognitive Engine incorrectly classified Extension number as a measure.



We can see this error by looking in the Business Logic UI. On the Fields and Groups tab, we see the Extension and Reports To fields are marked as visible and categorized as measures.

Employees(Fields: 2, Master items: 0, Group type: Measure)					
<input type="checkbox"/>	Extension	visible	measure	No	sum
<input type="checkbox"/>	Reports To	visible	measure	No	sum

We can use Business Logic to correct these errors by changing the classification or setting the visibility to hidden. Once a field is hidden, it no longer appears in the Insight Advisor field list, and charts showing sum of extension number will no longer be shown.

## Setting field properties

Above we have used the visibility property to exclude a field from Insight Advisor. There are 4 properties in total that you can set for a field or master item:

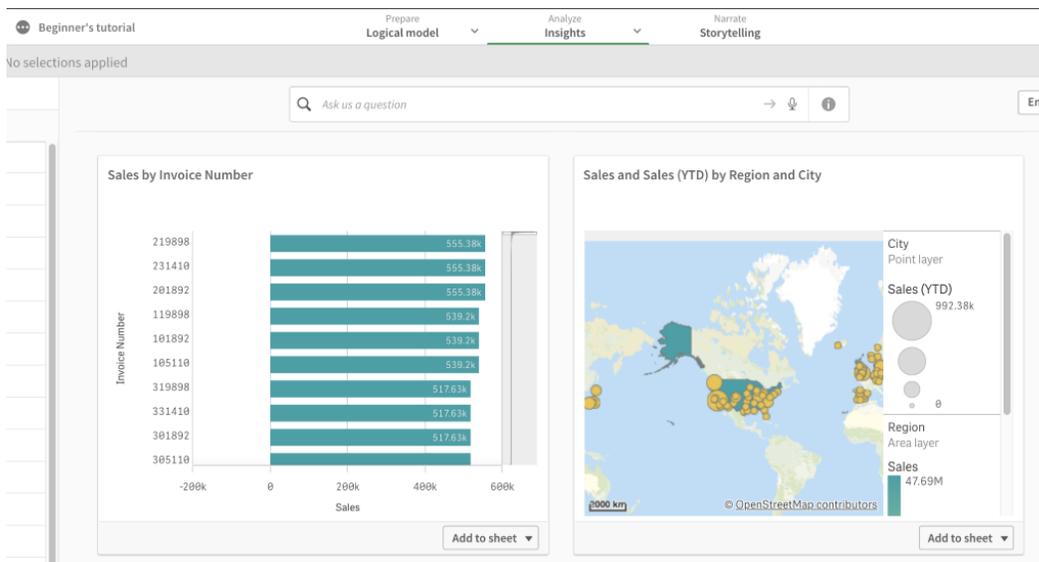
- Visibility
- Classification
- Data Value Lookup
- Default Aggregation

## Visibility

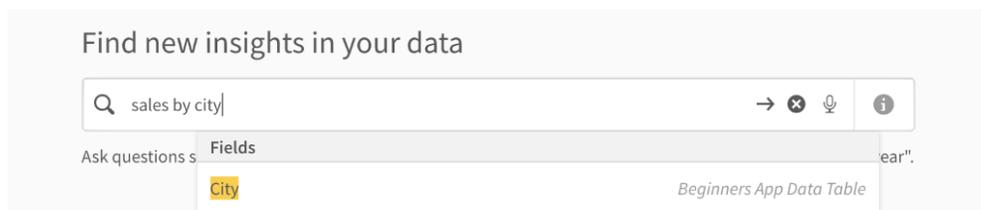
Visibility determines whether or not a field is included in the field list in Insight Advisor. Note however that you can still ask for a hidden field in the search box or chat window and get a response. Hidden fields should not typically be enabled for Data Value Lookup.

### *Behavior in Insight Advisor*

In this example, the field “City” is visible by default in Insight Advisor. Here you can see a chart showing sales by region and city is recommended.



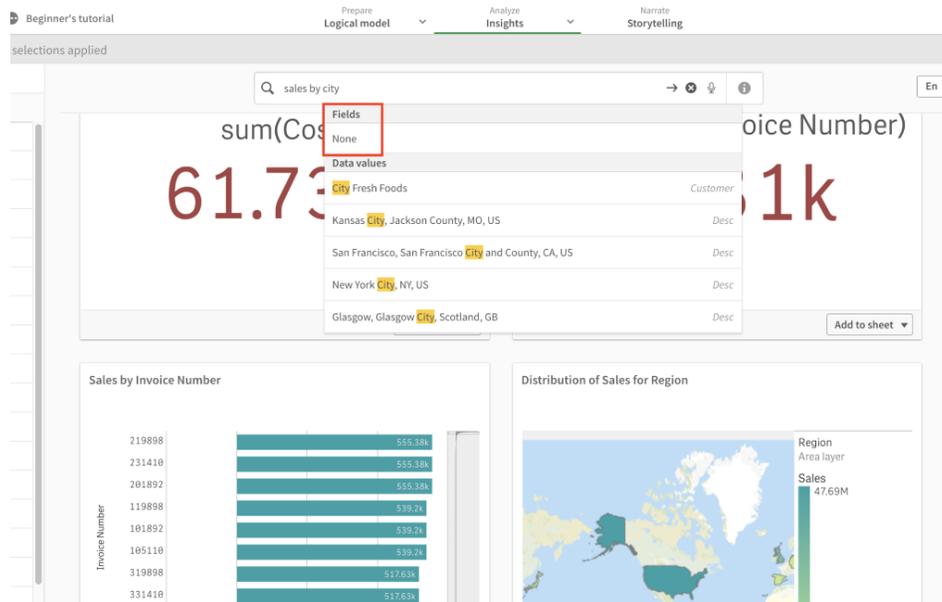
You will also notice that City is recognized as you type it into Insight Advisor, and that it is displayed in the field list.



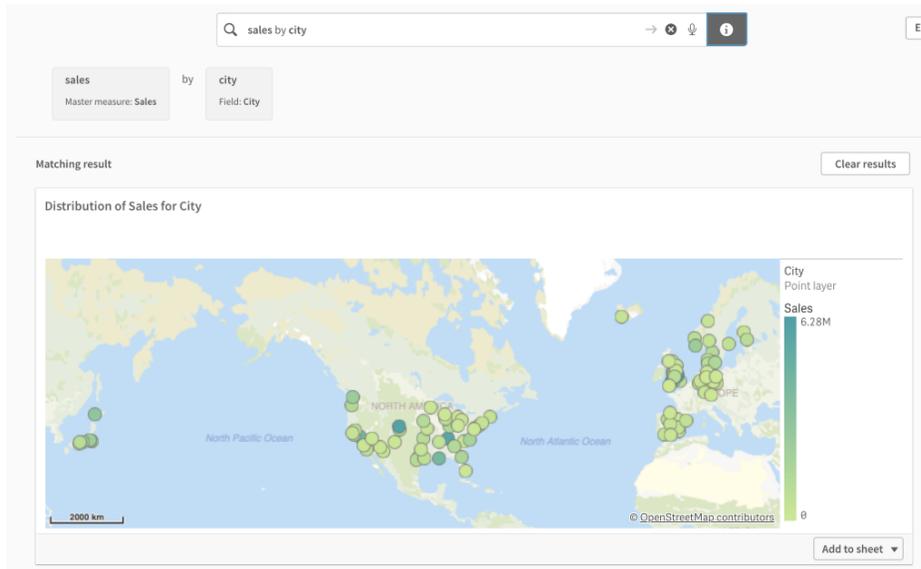
In Business Logic, you can change the visibility of “City” to hidden.

City (Fields: 2, Master items: 0, Group type: Dimension)		
City	hidden	▼
City Code	hidden	Visibility
Customer (Fields: 2, Master items: 0, Group type: Dimension)		
Customer	visible	visible

After this change, visualizations that include “city” will not be recommended in Insight Advisor, “city” will no longer appear in the field list nor be recognized by auto-complete.



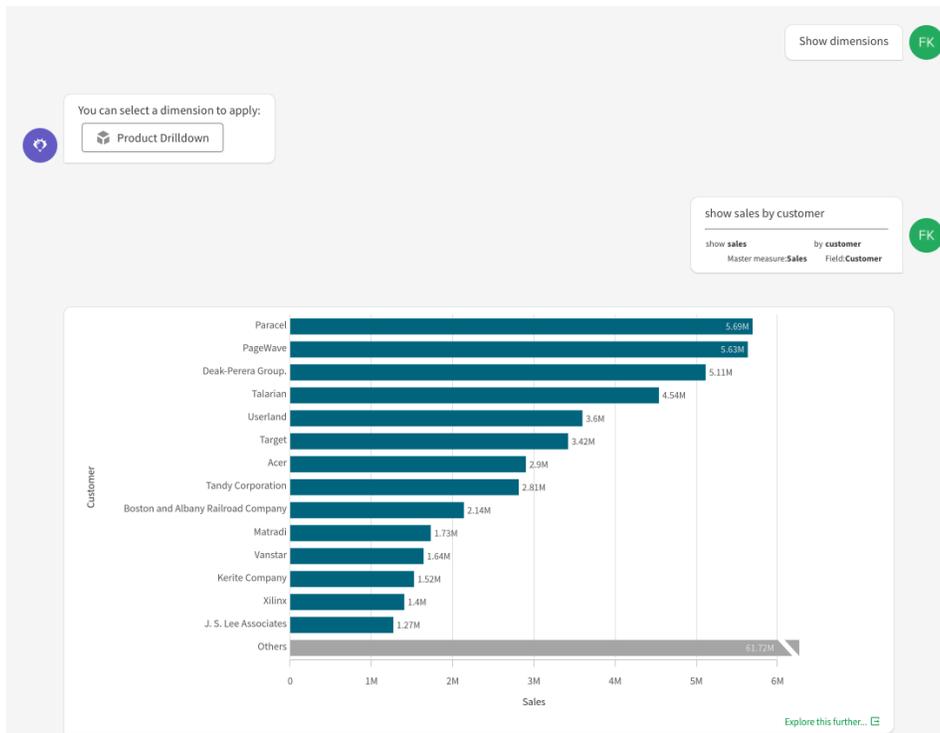
Note however that you can still explicitly search for city and get results.



### Behavior in Insight Advisor chat

When you set a measure or dimension to hidden in Business Logic, and reload the application, “Ask Insight Advisor” will not include that measure or dimension when you ask “show dimensions” or “show measures”. However, if you ask a question explicitly referencing that dimension or measure, “Ask Insight Advisor” will respond.

For example, if the dimension “Product” is hidden in Business Logic, it will not be shown when you “show dimensions”. However, you can still ask “Show me sales by Product” and get the desired result.



## Classification

Fields are classified by the Cognitive Engine into one of these classifications: **dimension, measure, country, city, geographical, geoPoint, geoPolygon, year, date, timestamp, and boolean.**

From time to time, you may encounter a field that might be considered a dimension in one question and a measure in another. For example, the number of cylinders in cars might be considered a dimension in most cases (“show horsepower by number of cylinders”), but occasionally as a measure (“show average cylinders by year”). To address this situation, create a second field or master item describing the alternate use.

## Data Value Lookup

When entering a Natural Language query in Insight Advisor, a search for each term is conducted across all dimensions to see if a filter can be constructed.

Example: What are sales for bananas?

To avoid unnecessary searches (which may be time consuming), and to reduce the number of false positive results, you can disable Data Value Lookup for specified fields.

Example: Suppose there are three fields in your model – First Name, Last Name and Full Name. By allowing Data Value Lookup on all 3 fields, the user might get confusing results if they search for “Karen”.

Data Value Lookup is disabled by default for measures, and hidden fields.

## Default Aggregation

You can specify the aggregation (sum, **avg**, **min**, **max**, **count**, or **countDistinct**) to be used for fields classified as measures (aggregations are already defined for master items and can't be overwritten). For example, the default aggregation for inventory might be MAX, while the default aggregation for sales should be SUM.

## Groups

Groups allow you to organize fields and master items into related conceptual groupings. For example, you can group all of the attributes of a Customer together in one group (regardless of which tables in the underlying model they are sourced from). This is an example of a “Dimension Group”, which will influence what attributes are shown on recommended charts

Groups influence which fields and master items Insight Advisor shows on a visualization. For example, if a group “Employee” is defined to include First Name, Last Name and Full Name, Insight Advisor will typically pick just one of these attributes to put on a visualization. You can also use Groups as a convenient way to create packages and hierarchies. (described later)

There are three types of groups:

- Dimension Groups
- Measure Groups
- Calendar Groups

### Dimension Groups

Dimension groups are used to organize together fields and master items that comprise attributes of a given dimensional concept.

Note that you need to create a separate Dimension Group for each category that you would want to organize into a hierarchy. For example, although Country and City are attributes of customer, you may want to put them in their own groups such that you can create a hierarchy.

### Measure Groups

Measure groups allow you to organize together related measures. A Sales Group might consist of Sales, Cost, Margin and Discount measures.

Don't include measures of completely other domains in the same measure group. For example, warehouse square footage, or total gas consumption of delivery trucks does not belong in the same group as Sales.

### Calendar Groups

Calendar groups allow you to organize together calendar related attributes – used for a single purpose. If your calendar is a simple date (e.g. Order Date), just add it to a Group called “Order Date”.

Calendar Groups become more valuable when there are a number of fields defining your calendar. For example, if year, month and day are provided as separate fields, or if there are other date related fields such as Fiscal Quarter, Fiscal Year etc.

## Packages

Packages are a way to tell Insight Advisor which Groups to analyze together. If you include Product, Order Date and Customer in a package that contains a sales measure group, Insight Advisor will know to use those dimensions when analyzing sales, and to avoid other excluded dimensions such as Suppliers.

## Hierarchies

You can define hierarchies between groups. Suppose you have groups for Product Line, Product Category and Product. You can indicate that these comprise a hierarchy in a specific order. Insight Advisor will then avoid putting two of these dimensions on the same chart, except in the case of breakdowns – where they might be used to correctly populate a tree map.

## Behaviors

Behaviors can be defined for Measure Groups (only). There are four types of Behaviors:

- Required selection
- Prefer relationship
- Deny relationship
- Default calendar period

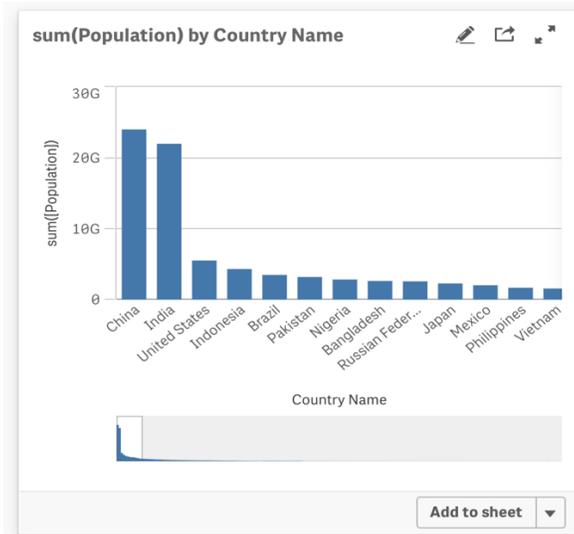
## Required Selection

Some applications / data models are design such that it would be incorrect to aggregate data for a given measure without making a selection on a dimension. In the example below, we have world population data by country and year. Summing population across years is incorrect.

A required selection applied to a measure group ensures that Insight Advisor does not present population data without a selected year. You can also choose a default value to use if the user has not specified one.

Country	Year	Population
Aruba	2015	104,341
Afghanistan	2015	33,736,494
Angola	2015	27,859,305
Aruba	2016	104,822
Afghanistan	2016	34,656,032
Angola	2016	28,813,463
Aruba	2017	105,264
Afghanistan	2017	35,530,081
Angola	2017	29,784,193

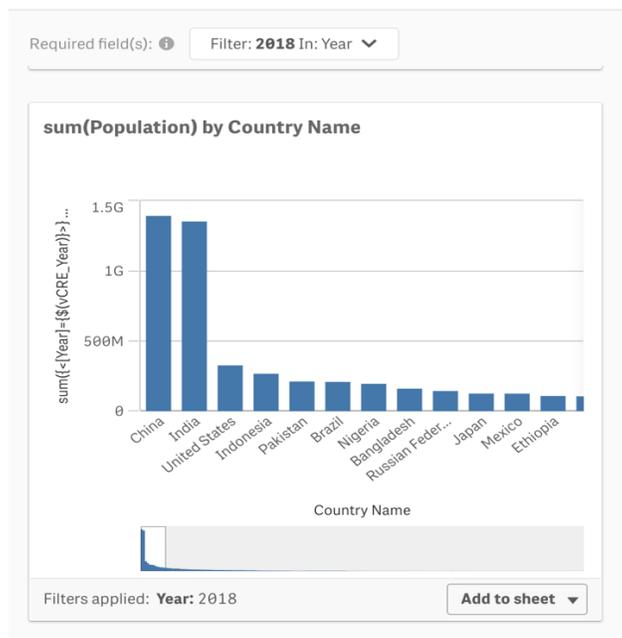
In the absence of a required selection, Insight Advisor might present a chart like this:



Clearly the population values shown are incorrect. This is because population in this dataset is recorded for various years, making it a semi-additive measure.

You can correct this by creating a required selection on Year for the Measure Group that contains population and setting the default to 2018.

Insight Advisor will now display the set of required fields, which allow users to select other years (those changes will be applied globally to all affected recommended analyses as well). Similarly, answers provided in “Ask Insight Advisor” will apply the default year unless the question specifies a different year. (e.g. What was the population of China in 2015).

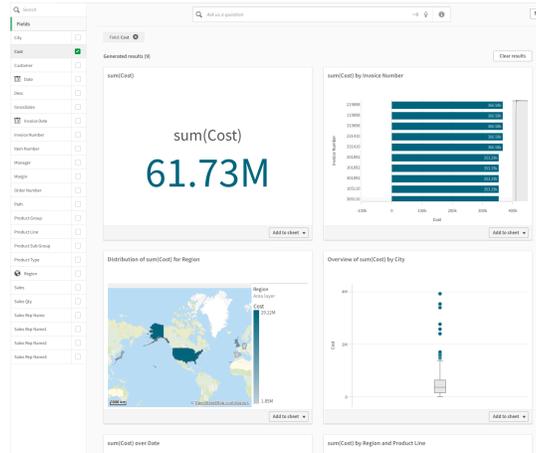


Notes:

- A session variable, `vCRE_{required field name}`, is used to manage selection of values across recommended analyses. Its value is initially set based on specified default values and updated accordingly when other values are selected.
- In case the app already contains a global selection for any of the required fields, these values will be used as default values for the macro - not the ones specified in the model. More importantly, making a selection from the required field selector in Insight Advisor won't have any bearing on the global selections.
- If a NL question already contains a condition for one of the required fields, the condition in the question is used as a filter, as before, which makes the use of a session variable unnecessary. However, the condition becomes mandatory and cannot be dropped when editing the analysis.
- Any change to the required selection (filter) value made while editing a specific analysis is applied only to that analysis and does not change the value of the session variable.

## Prefer Relationship

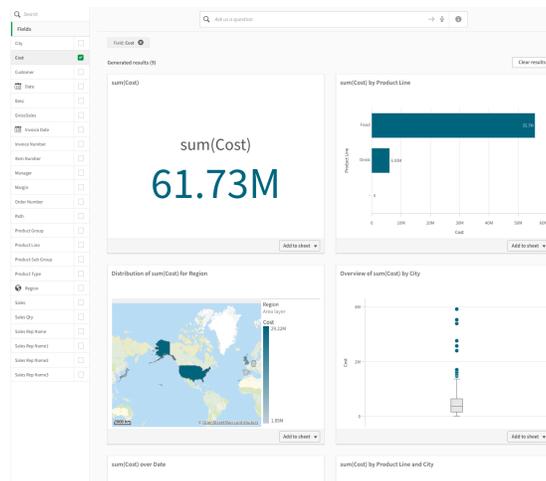
A prefer relationship has a similar role of guiding the Cognitive Engine on what to do when there is ambiguity. For example, if sales by product line is the most common answer to a question about sales in your organization, you can create a prefer relationship. In this way the Cognitive Engine will favor sales by product line when it is asked about sales. In this example, Insight Advisor prioritizes sum of Cost by Invoice Number.



We can add a “Prefer relationship” between Cost and Product Line.

The 'Create behavior' dialog box is shown. It has a title bar 'Create behavior'. Below it, there are two dropdown menus: 'Applies to:' set to 'Cost' and 'Behavior type:' set to 'Prefer relationship'. Below these is a text box with the instruction: 'When you use Prefer relationship, you will guide insights on how best to pair Fields with Groups in the analysis for recommendations.' Below that is another dropdown menu 'Prefer for:' set to 'Product Line'. At the bottom right are 'Cancel' and 'Create' buttons.

After this change, Insight Advisor shows cost by Product Line as the second analysis returned.



## Deny Relationship

A deny relationship allows you to tell the Cognitive Engine that unless specifically asked for, it should not show measures from a measure group with a particular dimension group. In the example above, we could add a Deny relationship between Cost and Invoice Number instead of the prefer relationship.

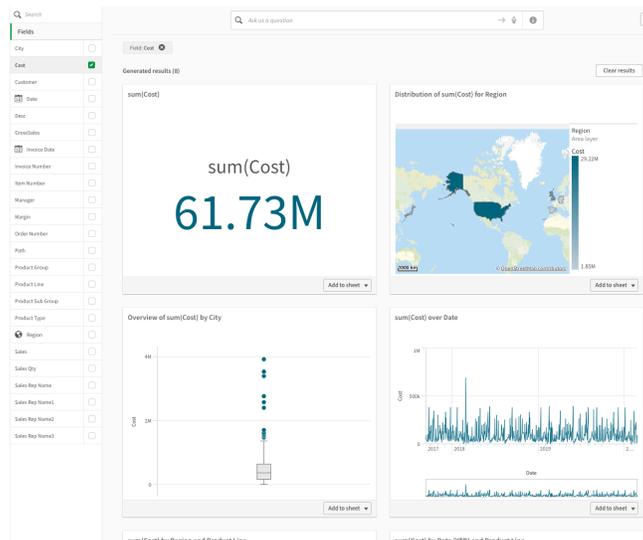
**Edit behaviors**

Applies to:  Behavior type:

When you use Deny relationship, you instruct Insights about possible measure/dimension scoping traps that can cause incorrect results.

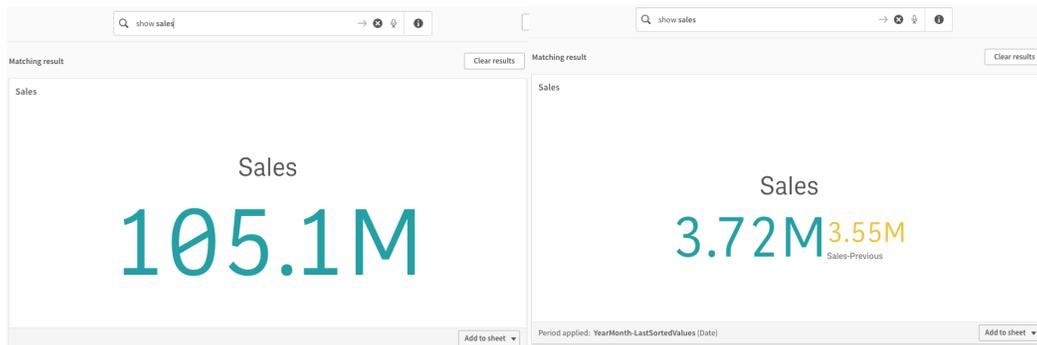
Deny for:

Insight Advisor will still respond to the specific question “Show cost by Invoice Number”, but will not return an analysis including cost and Invoice Number any other query such as “show me cost”.



## Default Calendar Period

The final type of behavior lets you define what happens by default when a user asks “what are my sales”. For each measure group, you can select a calendar period to show the data for. In this example, where the default behavior is to show sales for all time, creating a default Calendar period for the Sales measure group answers by showing sales for the most recent month, and the comparison with the previous month.



Creating a Default calendar period behavior requires that Calendar periods be defined in advance. This will be discussed in the next section. However, if your app is constructed using Data Manager, Calendar periods will be automatically created based on the autoCalendar definition, and you can use those to create a default calendar period behavior.

These are the settings to get the result above.

The 'Create behavior' dialog box has the following settings:

- Applies to: Sales
- Behavior type: Default calendar period
- Calendar group: Date
- Period: YearMonth-LastSortedValues

Buttons: Cancel, Create

## Calendar Periods

As mentioned above, users in different organizations may expect a different answer to the question “what are my sales”. Some organizations think of sales by quarter, others by month, others by day.

Organizations also have standard practices when it comes to comparing measures against previous periods. For example, one organization may tend to talk about sales compared with last quarter, while others compare against same quarter last year.

Calendar Periods are a way to explain these organizational norms to the Cognitive engine. You can:

- Create a calendar for each important date in your application
- Define the “Calendar period grain” your organization uses (e.g. month, quarter or year)
- Define the period to use by default (e.g. last available month)
- Define the default comparison you want to use (last month, same month last quarter, or same month last year)

## Automatically Generated Calendar Periods

If your app is created by Data Manager, an autoCalendar is automatically derived from the date fields in your data model, and Calendar Periods are created by default from that. Here is an example of the generated script.

```
[autoCalendar]:
  DECLARE FIELD DEFINITION Tagged ('$date')
FIELDS
  Dual(Year($1), YearStart($1)) AS [Year] Tagged ('$axis', '$year'),
  Dual('Q'&Num(Ceil(Num(Month($1))/3)),Num(Ceil(NUM(Month($1))/3),00)) AS [Quarter] Tagged ('$quarter', '$cyclic'),
  Dual(Year($1)&'-Q'&Num(Ceil(Num(Month($1))/3)),QuarterStart($1)) AS [YearQuarter] Tagged ('$yearquarter', '$qualified'),
  Dual('Q'&Num(Ceil(Num(Month($1))/3)),QuarterStart($1)) AS [_YearQuarter] Tagged ('$yearquarter', '$hidden', '$simplified'),
  Month($1) AS [Month] Tagged ('$month', '$cyclic'),
  Dual(Year($1)&'-'&Month($1), monthstart($1)) AS [YearMonth] Tagged ('$axis', '$yearmonth', '$qualified'),
  Dual(Month($1), monthstart($1)) AS [_YearMonth] Tagged ('$axis', '$yearmonth', '$simplified', '$hidden'),
  Dual('W'&Num(Week($1),00), Num(Week($1),00)) AS [Week] Tagged ('$weeknumber', '$cyclic'),
  Date(Floor($1)) AS [Date] Tagged ('$axis', '$date', '$qualified'),
  Date(Floor($1), 'D') AS [_Date] Tagged ('$axis', '$date', '$hidden', '$simplified'),
  If (DayNumberOfYear($1) <= DayNumberOfYear(Today()), 1, 0) AS [InYTD] ,
  Year(Today())-Year($1) AS [YearsAgo] ,
  If (DayNumberOfQuarter($1) <= DayNumberOfQuarter(Today()),1,0) AS [InQTD] ,
  4*Year(Today())+Ceil(Month(Today())/3)-4*Year($1)-Ceil(Month($1)/3) AS [QuartersAgo] ,
  Ceil(Month(Today())/3)-Ceil(Month($1)/3) AS [QuarterRelNo] ,
  If(Day($1)<=Day(Today()),1,0) AS [InMTD] ,
  12*Year(Today())+Month(Today())-12*Year($1)-Month($1) AS [MonthsAgo] ,
  Month(Today())-Month($1) AS [MonthRelNo] ,
  If(WeekDay($1)<=WeekDay(Today()),1,0) AS [InWTD] ,
  (WeekStart(Today())-WeekStart($1))/7 AS [WeeksAgo] ,
  Week(Today())-Week($1) AS [WeekRelNo] ;

DERIVE FIELDS FROM FIELDS [Date], [Invoice Date] USING [autoCalendar] ;
```

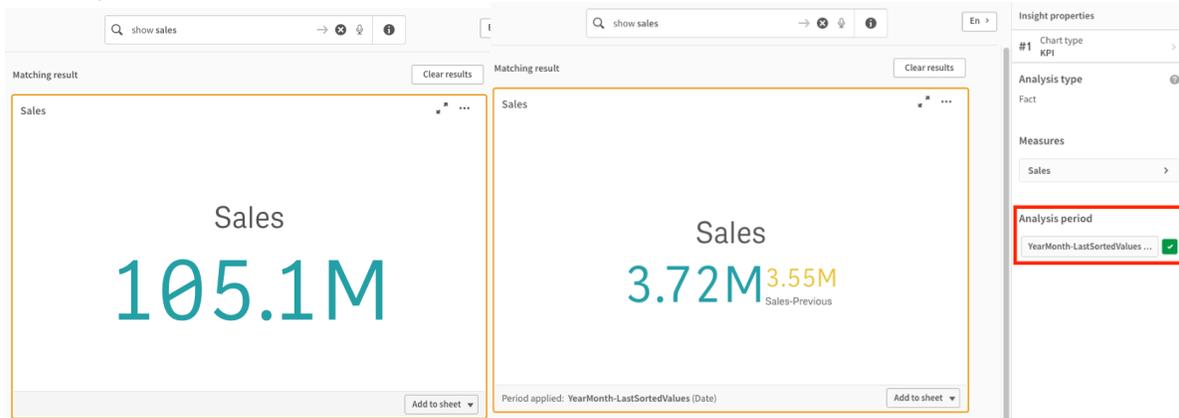
(Note apps previously created with DataManager may not have all of the fields required. You may need to recreate the data model, or copy from a newly generated app to get the necessary script.)

Here are the Calendar Periods that are automatically created.

#	Name	Calendar group	Type	Grain	Field containing	Period containing
1	Year-LastSortedValues	Date	Autocalendar	Year	Date.autoCalendarYear	Last value
2	Year-LastSortedValues	Invoice Date	Autocalendar	Year	Invoice Date.autoCalendarYear	Last value
3	Year-Month-LastSortedValues	Date	Autocalendar	Month of year	Date.autoCalendarYearMonth	Last value
4	Year-Month-LastSortedValues	Invoice Date	Autocalendar	Month of year	Invoice Date.autoCalendarYearMonth	Last value
5	Year-Quarter-LastSortedValues	Date	Autocalendar	Quarter of year	Date.autoCalendarYearQuarter	Last value
6	Year-Quarter-LastSortedValues	Invoice Date	Autocalendar	Quarter of year	Invoice Date.autoCalendarYearQuarter	Last value

## Calendar Periods Without a Behavior Defined

Unless you create a behavior that applies a particular Calendar Period to a measure group, the default answers from Insight Advisor will not be affected. However, you can adjust the insight properties to apply an Analysis Period.



## Modifying Generated Calendar Periods

You can modify these default Calendar Periods to suit your organization. Here we modify the default YearMonth-LastSortedValues to instead show that last complete month against same month last quarter.

The figure shows two side-by-side 'Edit calendar period' dialog boxes. The left dialog shows 'YearMonth-LastSortedValues' as the calendar period name and 'Month of year' as the grain. The right dialog shows 'YearMonth-vsSameMonthLastQtr' as the calendar period name and 'Month of quarter' as the grain, with 'Last complete period' checked.

With this change in place, instead of showing latest month against previous month, the last complete month will be shown against the same month in the previous quarter.



### About Qlik

Qlik is on a mission to create a data-literate world, where everyone can use data to solve their most challenging problems. Only Qlik's end-to-end data management and analytics platform brings together all of an organization's data from any source, enabling people at any skill level to use their curiosity to uncover new insights. Companies use Qlik products to see more deeply into customer behavior, reinvent business processes, discover new revenue streams, and balance risk and reward. Qlik does business in more than 100 countries and serves over 48,000 customers around the world.

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