

# DASHBOARD a National Sales Performance Analysis

## EXECUTIVE SUMMARY

The dashboard focuses on five separate questions that address the overarching theme; a **National Sales Performance Analysis** for the organization.

### Target Audience

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A National Sales Performance Analysis is required in order to support informed, strategic decision making for an executive (Target Audience). The executive's role within the organization is National Sales Director for the USA. The objectives for the Target Audience are to identify strengths, weaknesses, opportunities and threats in national Sales performance, and also to develop insights for future performance of Products so as to decide on where resources should be allocated, and which Products should be sold where for maximum Sales and Profit. The Target Audience will report findings produced by the dashboard to the C.E.O of the organization (medium to large size company) in the form of a S.W.O.T analysis.

### The Design

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In terms of overall design, the dashboard answers the targeted questions through visualization design methods and principles. The structure of the answers support a S.W.O.T analysis for the organization. Tableau's (Tableau Team, 2018) 'Interactivity Actions' drive the dashboard using interactive design techniques such as selection, filters, highlights and tooltips to create connections between the domain tasks. The functionality of the dashboard also enables the target audience to drill down into the underlying specifics of the data. Measures of performance that support strategic decision making for the Target Audience are the main focus in what needs to be communicated. Patterns, trends and outliers in the data are the key components to achieving the dashboard objectives.

### Objectives

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The overall objective is to strategically align with the target audience, and to answer the targeted questions through effective dashboard design, while also connecting to the scenario in a way that lends itself to telling a story with the data. As a visual design objective, the dashboard should aim to reduce visual complexity in design while maintaining a focus on the domain tasks.

## DATA ANALYSIS

The Data Source in this Dashboard (store.xlsx), includes three sheets that are joined using a 'Left Join' on the data sets, although the dashboard's design focuses predominantly on the 'Orders' sheet.

Once connected to the data source, Tableau's Data Interpreter (Tableau Team, 2018) was used to interpret the column headers as field names, and to interpret the field values. It was not necessary to pivot any of the fields for this dashboard. Field titles were also left unchanged.

Table 2. below, provides meta-data on attributes that were used in the dashboard:

Table 2. Attribute - Meta Data			
<i>Variable</i>	<i>General Type</i>	<i>Description</i>	<i>Data Type</i>
Sales	Numeric	Dollar Value of Sum of Sales	Continuous
Profit	Numeric	Dollar Value of Sum of Sales	Continuous
Region	Nominal - Categorical	Geographic	String
State	Spatial	Geographic	Geographic
Ordered Quantity	Numeric	Sum of Units Ordered	Continuous
Product Category	Nominal – Categorical	Item Category	String
Product Sub-Category	Nominal – Categorical	Item Sub-Category	String

In certain circumstances, Parameters and Calculated fields were created in order to transform the data so that we may answer the questions more effectively.

Table 3. details meta-data for Calculated Fields:

Table 3. Calculated Field - Meta Data			
<i>Calculated Field</i>	<i>Field Type</i>	<i>Description</i>	<i>Data Type</i>
Profit Ratio	Numeric	Calculated on Sum of Profit/ Sum of Sales	Continuous
Clusters	Nominal Categorical	Categorizes Sales Orders based on Profit as Clusters	String

How the Calculated Fields are utilized in the design of the Dashboard visualizations, is detailed further in the Answers to the Targeted Questions.

## EXPLORATION & ANALYSIS

The Exploration and Analysis process used in Tableau to create the Dashboard is outlined below in (Table1):

Table 1. Exploration & Analysis Process	
<i>a. Analyse Questions</i>	We have identified that the target audience is an executive in a medium to large size organization within the United States. It has also been established that a dashboard is required in order to provide a Breakdown of Sales data, and the significant features of the dashboard will have to answer the targeted questions within the context of the theme. Each question will have specific individual objectives in terms of meeting the needs of the Target Audience.
<i>b. Prepare the data</i>	Once connected to the data source in Tableau, and the data had been interpreted, Left Joins were created with the separate data sheets and applied to the 'Orders' sheet. No missing data was identified, however if it were required, the missing measured values would be imputed by the mean of its total values within the respective field.
<i>c. Analyse the data</i>	Identifying what data is required in order to answer a targeted question most effectively, was the third step in the process. After analysing each question and recognizing their individual requirements, the most appropriate fields were selected based on their suitability and relevance in terms of formulating an answer. Where necessary, calculated fields were created depending on whether the original data satisfied the requirements of the answer.
<i>d. Visualize the insights</i>	Once the data fields were selected, visualization and encoding methods were determined. Specifically, the most appropriate and effective chart, marks and channels for reaching the objectives for the question.
<i>e. Present the findings</i>	Through effective dashboard design and interactive techniques, the visualizations are presented as components to a single dashboard that allows the user to navigate through the data story. Interactivity is driven by Tableau's 'actions' feature. The interactive controls aimed at providing more detail, identifying relationships and driving the dashboard.
<i>f. Limitations</i>	Ability to fit more information into visualizations without increasing visual complexity.

## DASHBOARD DESIGN

As a result of the Exploration & Analysis process previously described (Table 1.), the following dashboard design was implemented:

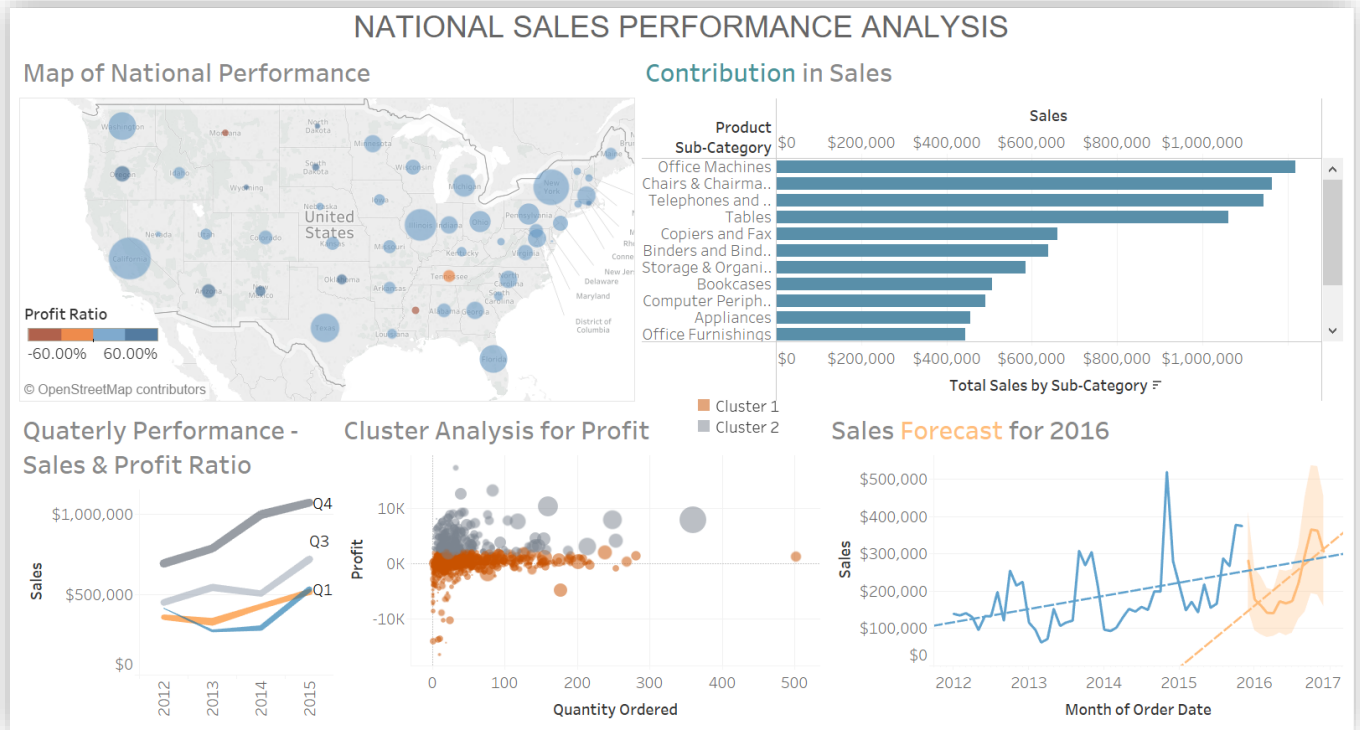


Image1. Dashboard Landing Page

### Structure

Reading in a natural 'Z' pattern (Munzer, Tamara, Maguire, & Eamon, 2015), the Map launches the dashboard and acts as the starting point for the actions that will drive it. A Bar, Line, Scatter and Forecast follow thereafter.

Any legends for the visualizations were either integrated into the Dashboard or set as Floating and repositioned near their corresponding visualization.

### Colour & Aesthetics

As a background for the dashboard, white was selected, and also used for the background of the visualizations. The reason why white was used, is that it enables colours to be eccentuated without detracting from visualizations (Munzer, Tamara, Maguire, & Eamon, 2015).

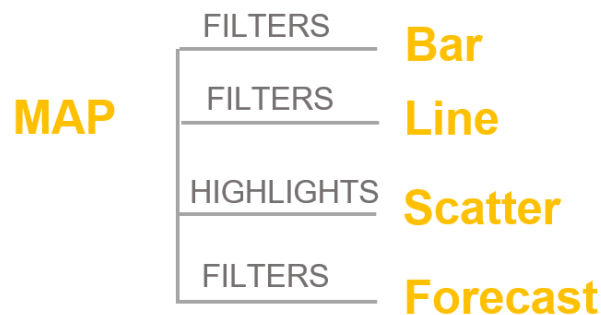
Text is set as a light grey colour to prevent drawing unnecessary attention to the title, and focus away from the visualizations. A colour blind friendly palette is used for all visualisations in the Dashboard.

## Actions

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Each Action serves a purpose for the Dashboard, and contributes to telling a story with the data. Filters and Highlights performed through Selecting and Hovering, were the key components used to drive the Dashboard. How the actions guide the audience is described in further detail within the Answers to the targeted Questions. The actions aim to enable the Target Audience to drill down into the data (Munzer, Tamara, Maguire, & Eamon, 2015), and to reveal new relevant information. The actions are implemented in a way that reduces visual complexity and supports communicating the information effectively.

For the purpose of this dashboard, Actions derived from the Map (Map.1) will be considered 'Primary Actions'. The design of the primary actions are outlined below:



The Map 'Filters' the Bar, Line, and Forecast by Selecting a State. The Map also 'Highlights' the Scatter when a State is Selected. Further interactivity is encouraged by allowing visualizations other than the Map to be set as the Filter. For the purpose of this Dashboard we will consider the actions not derived from the Map, as 'Secondary Actions'. The secondary actions are outlined below:



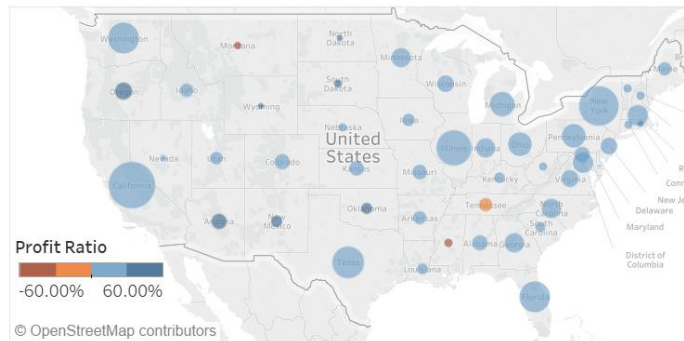
The Bar (Bar.1) 'Filters' the Map on Product Sub-Category through a Hover function. The Line (Line.1) 'Filters' the Bar and Map on Quarterly Sales through the Select function. The Cluster and Forecast do not filter any preceding visualizations. Filter and Highlight actions were not used in these cases as a form of reducing complexity for the Target Audience.

## TARGETED QUESTIONS

### Q1. **STRENGTHS** Which States had the best Sales performance?

The first visualization (Map.1) sets the tone for the data story, and launches the dashboard, guiding the target audience in the right direction:

Map of National Performance



**CHART** Map that identifies which states in the USA had a high/low sales performance and Profit Ratio. Categorized by state, measured by dollar amount and %.

**MARKS** Individual States, Circles, Label

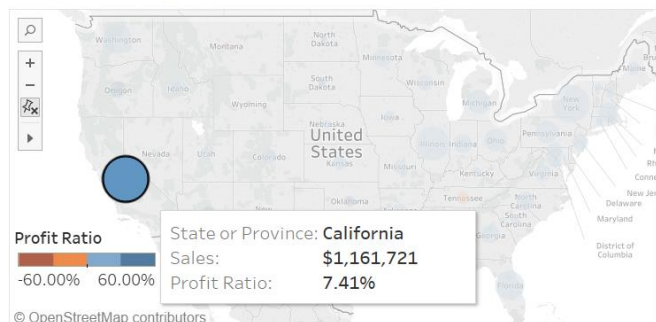
**CHANNELS** Hue to encode magnitude of Profit Ratio, Size for measure of Sales.

### Design Rationale

Without the Target Audience interacting with the Map, it represents National Sales. It is possible to determine which states had the best Sales performance by comparing the size of the Circles within each state. At first glance it answers Q1, however Sales does not equate to profitability, therefore the Calculated Field of Profit Ratio (Sum of Profit/Sum of Sales) was added as a measure. Profit Ratio is categorized by hue, Light Blue/Blue indicating a positive measure, and Orange/Red as negative.

When the Target Audience 'Hovers'/'Selects' a State, the Map reduces the non-selected States and provides a Tooltip that includes the Name, Sales for the State as a dollar value, and the Profit Ratio as a percentage value.

Map of National Performance

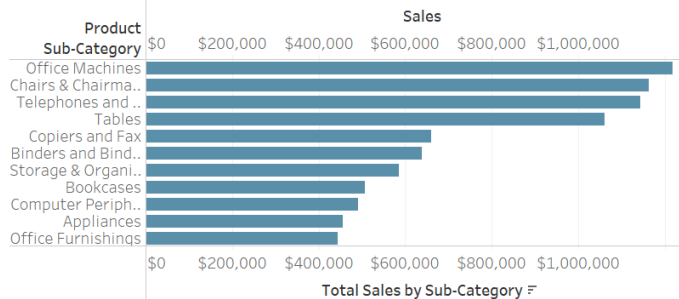


Findings for Strengths, after analysing the Map, and interacting at this point in the Dashboard's story include: California (\$1,161,721), New York (\$839,594), and Illinois (\$667,797) are the top three Sales Performers, and each have a positive Profit Ratio.

## Q2. **WEAKNESSES** How did Product Sub-Categories Perform?

The second visualization (Bar.1) is positioned to the right, adjacent to (Map.1). The Bar visualizes the Sales Contribution, and supports comparison between each of the Product Sub-Categories.

**Contribution in Sales**



**CHART** Bar Chart that compares Sales contribution between Product Sub-Categories.

**MARKS** Bars, Title, Measurements

**CHANNELS** Length, Position on a common scale for measurement. Hue to categorize Contribution and Total Sales for a Product Sub-Category. Title as legend.

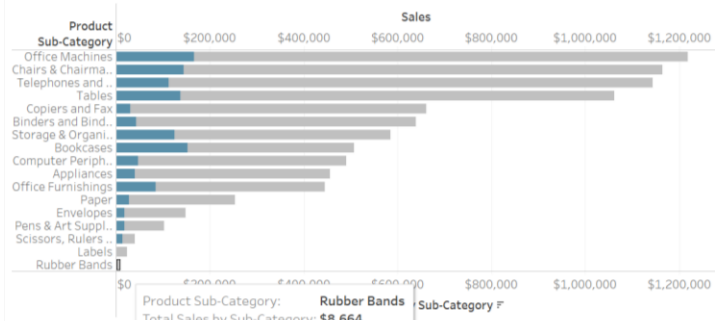
### Design Rationale

Without interacting with (Map.1), the Bar represents National Sales. The Target audience is able to determine the highest/lowest performing Product Sub-Categories.

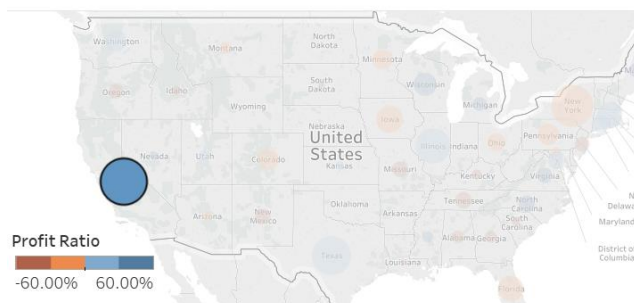
Once a State is 'Selected' (Map.1), the Bar is Filtered for that State. A comparison can then be made between the Product Sub-Categories individual contribution to the Total Sales.

When the Target Audience 'Hovers' over a Product Sub-Category, (Map.1) is filtered. The result in (Map.1) is a representation of a State's Sales and Profit Ratio for that specific Product Sub-Category.

**Contribution in Sales**



**Map of National Performance**



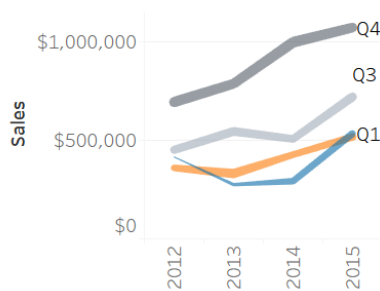
Findings for Weaknesses include: Within the State with the Highest Sales Performance (California) the lowest three Product Sub-Category contributors are Rubbers (\$1,142), Labels (\$1,845), and Scissors & Rulers (\$13,258). Interestingly, the three sub-categories have a positive Profit Ratio (Map.1), although perform poorly in terms of Sales.



### Q3. OPPORTUNITIES Seasonality, when do we perform at our best?

The third visualization (Line.1) is positioned at the left of the Dashboard, and directly below (Map.1). The Line chart presents Sales Performance & Profit Ratio, categorized by Quarter. This communicates performance seasonality to the Target Audience.

Quarterly Performance -  
Sales & Profit Ratio



**CHART** Line Chart that compares Quarters (category) by Sales and Profit Ratio

**MARKS** Lines, Labels

**CHANNELS** Position on a common scale (Sales over Time). Hue to categorize each Quarter. Size (line thickness) to represent Profit Ratio.

#### Design Rationale

Without interacting with (Map.1), the Line Chart represents National Sales. It enables the Target Audience to determine which Quarter has yielded the best Sales performance over time. In addition, the Profit Ratio is also represented by the thickness of the lines.

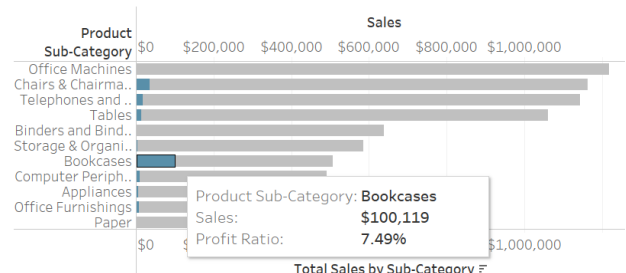
Once a State is 'Selected' (Map.1), the Line is Filtered for that State. This enables the Target Audience to compare Quarters (category) against one another in terms of Sales, Profitability, and Trend for the 'Selected' State in (Map.1).

When a point on one of the Quarter lines is 'Selected', (Bar.1) is Filtered to show the Contribution to Total Sales for the Quarter, and specifically the Year of that Quarter.

Quarterly Performance -  
Sales & Profit Ratio



Contribution in Sales

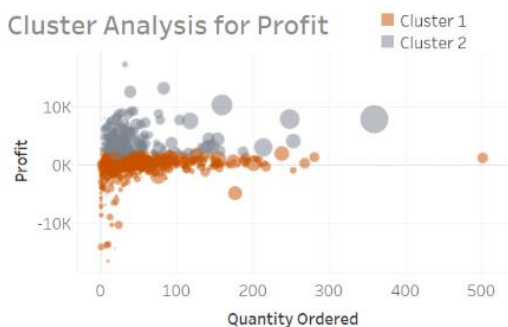


Findings for Opportunity include: Within the State with the Highest Sales Performance (California), the Quarter with the highest Sales Performance is the Fourth Quarter. When considering the Filtered (Bar.1), the best performing Product Sub-Category is Bookcases. This could be considered as an opportunity to focus on Bookcases in the Fourth Quarter to maximise Sales Performance and/or Profit Ratio.



## Q4. **THREATS** Do outliers exist for profitability?

The fourth visualisation (Cluster. 1), is positioned to the right of (Line. 1). A Cluster Analysis is performed based on Order quantity and profitability. In addition, an indication of Sales value is also included in the analysis.



**CHART** Cluster Analysis of Order Profitability

**MARKS** Circles

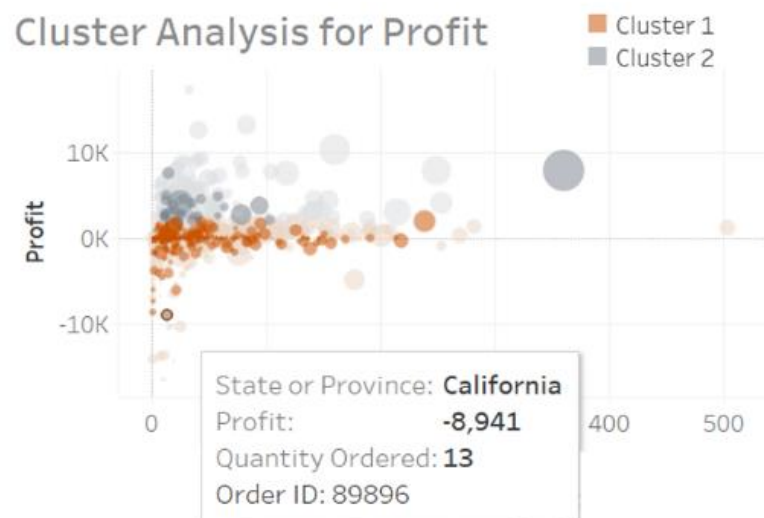
**CHANNELS** Position on a common scale (Profit over Quantity). Hue to categorize each Cluster. Size (Circles) to represent Sales value.

### Design Rationale

Whithout interacting with (Map.1), the Cluster Analysis represents all the Orders for the Nation. It enables the Target Audience to understand what portion of the Orders are responsible for Profit and Loss. It also makes any existing outliers identifiable.

Once a State is 'Selected' (Map.1), the Cluster is 'Highlighted' to represent the Marks and Clusters produced by that State.

For the purpose of reducing complexity, the Cluster does not apply any Actions to other visualizations. Rather, to enable the Target Audience to drill down further, the Order ID is included in the Tooltip so that any poor performance can be traced back to the orgional order/customer.



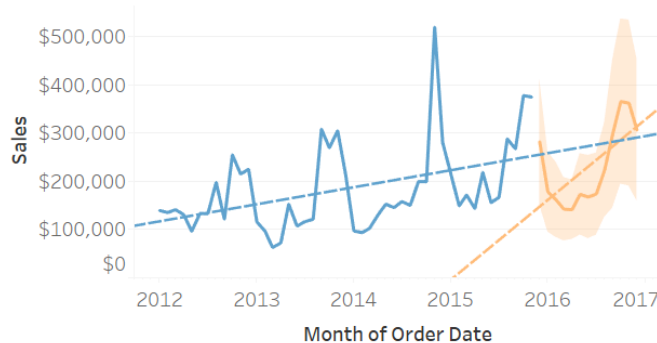
Findings for Threats include: Within the State with the Highest Sales Performance (California), there seems to be a majority of Orders that are not profitable (Cluster 1). Outliers are also discoverable, with the Lowest Profit Order (-\$8,941) for California, positioned far outside of the normal distribution.

Any outliers in the Low Profit Cluster (Cluster 1) should be noted as possible threats to Sales Performance and the overall profitability of the Organization. These outliers are what the Target Audience should pay close attention to.

## Q5. **FUTURE** What can we expect for Sales in the following year?

The final visualization (Forecast.1), is position to the right of the Dashboard, adjacent to (Cluster.1). A forecast line, based on historical Sales Performance, is used to provide a Sales forecast for the 2016 period. This forecast communicates the overall Sales performance and trend by including the previous three years aswell.

Sales Forecast for 2016



**CHART** Forecast line for Sales performance, estimated for year 2016.

**MARKS** Lines, Shaded Area (Confidence Band)

**CHANNELS** Position on a common scale (Sales over Time). Hue to categorize Historical and Forecasted Data. Angle to indicate trend.

### Design Rationale

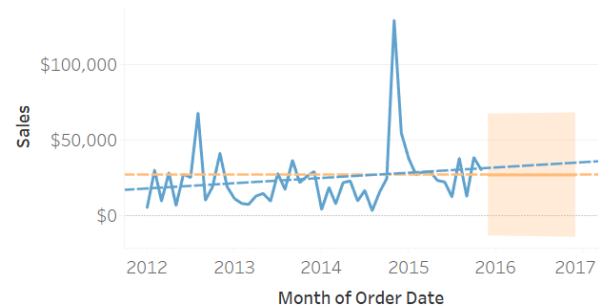
Without interacting with (Map.1), the Forecast Line represents the Sales performance for the Nation. It enables the Target Audience to gain an overview of Sales Performance. It also summarizes the Dashboard by bringing together the information from the preceding visualizations in one place. (Forecast.1) is the conclusion to the data story.

Once a State is 'Selected' (Map.1), the Forecast Line is Filtered to represent a Sales forecast for that State.

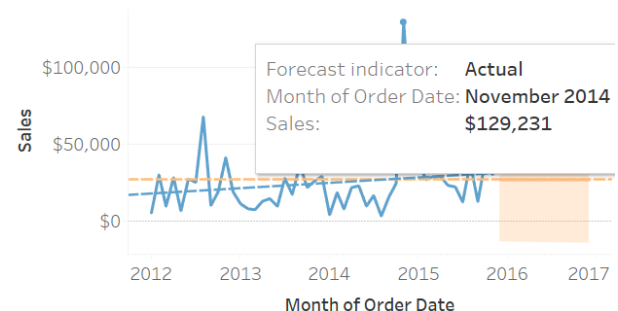
(Forecast.1) does not Filter any other visualizations. A Tooltip is rather included to communicate further detail to the Target Audience.

Findings for Future include: Within the State with the Highest Sales Performance (California), the future trend forecast is relatively flat. There was a major peak in performance in November 2014, which could indicate an event over that period, or mark the implimentation of an effective strategy. The Target Audience may want to replicate the strategy if it were the case.

Sales Forecast for 2016



Sales Forecast for 2016



## CONCLUSION

The Dashboard achieves the overall objective to strategically align with the Target Audience. The Dashboard addresses the overarching theme of **National Sales Performance Analysis**, and answers the targeted questions based on the knowledge that the Target Audience will produce a SWOT analysis from the Dashboard and its findings. Therefore the Dashboard also meets the Target Audience requirements and objectives.

The Dashboard connects to the scenario in a way that lends itself to telling a story with the data, by driving the Dashboard with Actions that encourage interactivity and engagement from the Target Audience.

The Dashboard also reduces visual complexity for the Target Audience, with a 'less is more' approach, while maintaining a focus on the domain tasks. Therefore, the visual design objectives were also achieved.

The visualizations provide a clear overview of Sales Performance, while also empowering the Target Audience with the ability to derive insights that support strategic decision making for the Organization.

In summary, the findings for the Target Audience, from an analysis of the Dashboard, include:

### Strengths

Top Performing States based on Sales and Profit Ratio

### Weaknesses

The lowest performing Product Sub-Categories

### Opportunities

The highest performing Quarters for Sales and Profit Ratio

### Threats

Outliers in low profit orders

### Future

Forecasted outlook for Sales Performance

## REFERENCES

Munzer, Tamara, Maguire, & Eamon (2015) Visualization Analysis and Design. Boca Raton, AK: Florida. Tableau Team (2018).

Tableau Public: Tableau Software., Inc. Seattle, WA, URL <http://www.tableau.com/ip>