Visual Analytics

Presented by:

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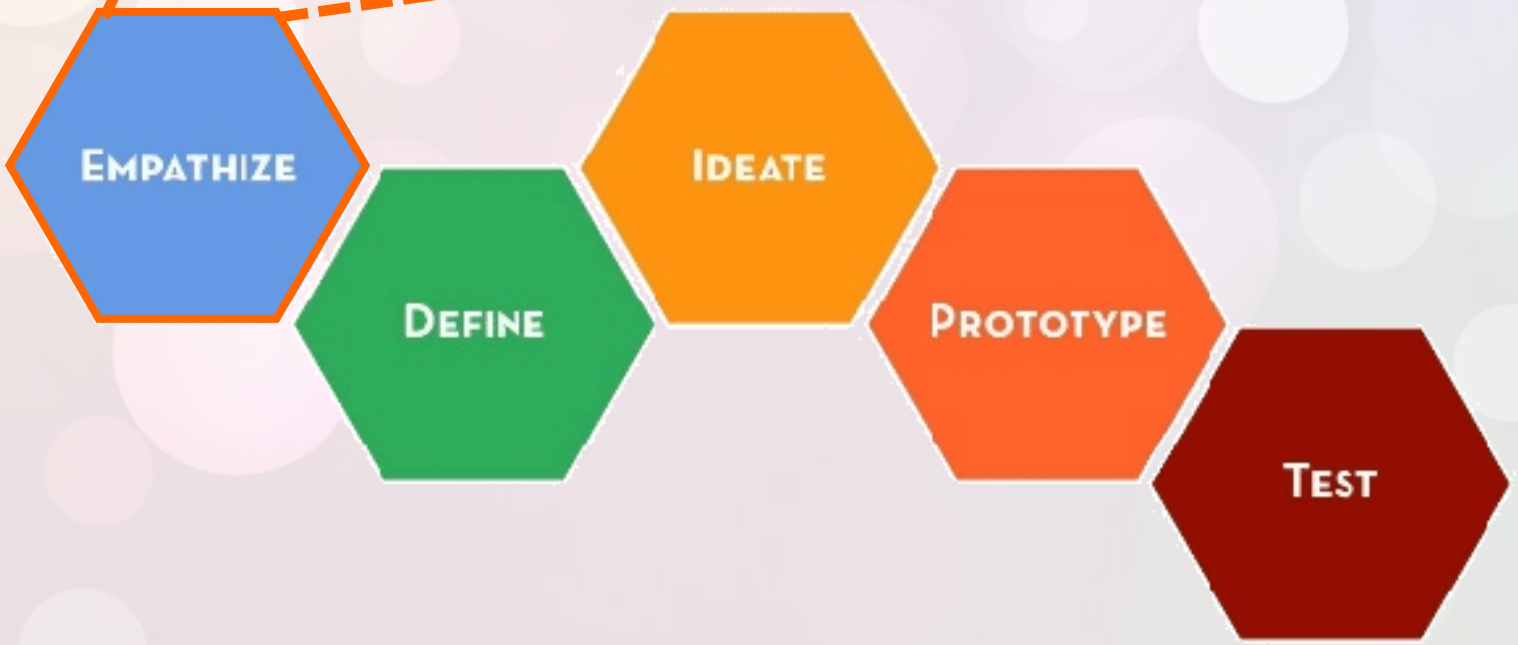
Visual Analytics Framework

- Users
- Contents
- Presentation
- Navigation

1 Users → Know your client (KYC) & understand user requirement



“User Empathy Map Template”

Name:
Position:
Main Screen:

DOING	decide	monitor	control	alert	plan	order	execute
THINKING	calculate	compare	classify	forecast	identify	understand	
SEEING	measures	time	locations	dimensions			

E.g.:

Name: XXX
Position: Marketing Strategic Department
Main Screen: Powerpoint (1600×900)

DOING

decide
- The ship mode that should be inspected

monitor
- Growth rate of business
- The category having least sales
- The month having seasonal effect for sales

control alert plan order execute

THINKING

calculate
- Total Sale by month of each yr
- Total Profit by month, market
- Sales growth of 2015 to 2014
- Profit growth of 2015 to 2014
- Control Limits of lead time
- shipping cost per unit

compare
- Proportion of sales by categories in each year
- Total sales of product categories by markets

classify

forecast
- Forecasted profit of company in 2016

identify
- Abnormality in Leadtime(LT) based on ship Mode
- The significant trend for sales in each month

understand

SEEING

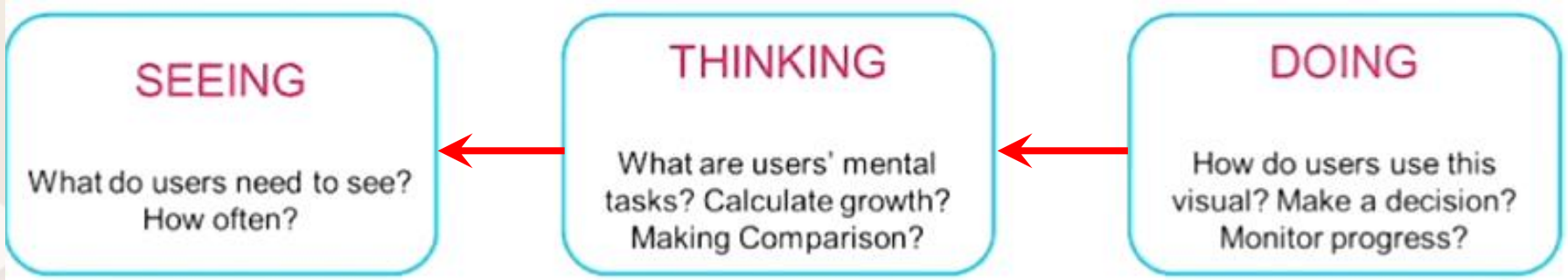
measures
- Profit
- Sales
- Shipping cost
- Quantity

time
- ship date
- Order date

locations

dimensions
- Ship mode
- Product category
- Market

User Empathy Map



Dashboard

Problems → Reasons → Actions

Define problem	Define cause	Take action
Key results	KPI drivers	Show data at the level where you can take actions
Lag indicators	Lead indicators	Highlight business opportunities
Desired outcomes	Breakdown key problems into sub-problems	Identify a root cause of a problem

5W1H Analysis ⟹ **Questioning technique that provides the full story of problem**

"A problem well state is a problem half solved."

Initial Problem Statement		Answer Question	Is / Is Not
What	> What does the issue look like? > What product, machine, material was being used? > What size? > What are the boundaries of the problem? Examples to consider: organizational, workflow, geographic, customer segments, etc. > What is the issue causing? > What will happen when it is fixed? > What will happen if we don't solve the problem?	Info about problem	
When	> When did the issue occur? > When in the sequence of operation; startup, continuous running, intermittent problem, shutdown, changeover? > When does it need to be fixed?	Problem timing	
Where	> Where did you see the issue or where does it occur? > Is it only in certain locations, processes, products, etc.? > Where on the equipment or material did you see the issue?	Problem location	
Who	> Who does it effect? > Everyone? Or Specific groups, organizations, customers, etc.? > If it is it less of a problem for some individuals or teams, what info can they offer? > Is it specific to a certain shift? > Is it skill related?	Leader/observer (observe pb; Lead to sol")	
Which (or Why → Why this is a problem?)	> Which trend or pattern does the abnormality have? e.g. Is the abnormality more frequent on Monday mornings? After a change-over? Or is it random in nature? Which direction does the abnormality happen in? (Note: Not many abnormality are truly random!)	Abnormality signal (3 Plu, 4 ZERO, 6 Big Loss, 7 Wastes)	
How	> How is the state of the equipment changed from the optimal? > How many times does the problem occur? > How many parts are involved? > How are you going to solve the problem? Using what method or techniques?	Problem Severity	
Revised Problem Statement		Rewrite problem statement that can take action	

Initial Problem Statement	Statement
What	• Low profit and sales growth rate which is the KPIs for evaluating budget allocation of marketing departments • Costly shipping expense
When	• Compare all indicator of the current year (2015) to the previous year
Where	• Each global markets' cash flow and the flow of product inventory • Shipping mode for each exported product
Who	• Marketing & Sales department • Shipping department
Which (trend of abnormality)	• Sales seasonal effect in some month
How	• The current growth rates of profit and sales decrease about 8.48% and 0.95% from the previous year. • The customers sometimes complained about unexpected long duration of waiting for the shipping products.
Revised Problem Statement	• **In 2015, the unexpected growth rate of profit and sales occurred.** • **There was some complain from customer about slow shipping operation.**

Why-why Analysis ⟹ **Problem solving tool to reach the solution treating root cause**

Problem

Why?

1st cause

Why?

2nd cause

Why?

3rd cause

Why?

4th cause

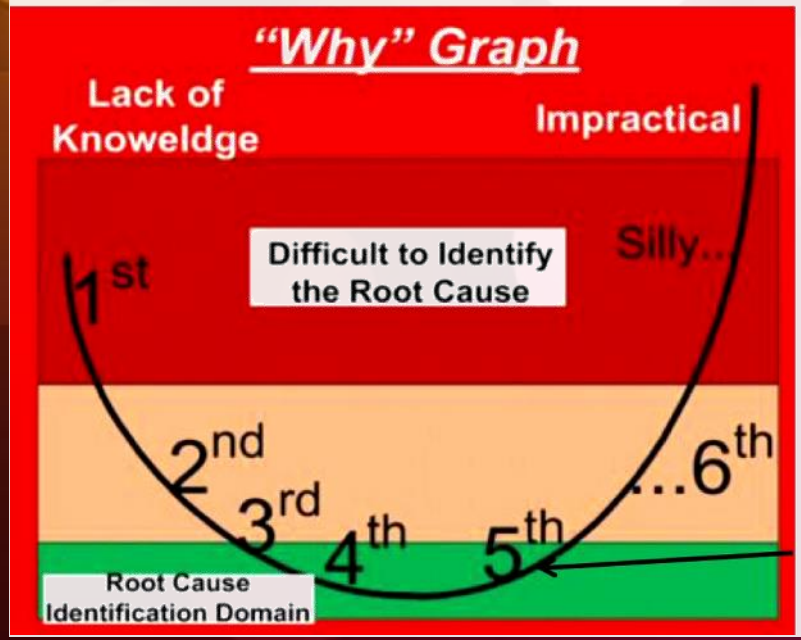
Why?

5th cause

Make a Solution

(Countermeasure)

Real Root Cause



Stop at last why where you can do something.

Effect	1-Why	2-Why	3-Why	4-Why	5-Why	Action
In 2015, the unexpected growth rate of profit and sales occurred.	Most markets have low profit growth.	The sales of some product category in most market is too low.	Some product category has been lowest proportion of total sales since 2012, and has too small increasing amount of proportion among another product category	There might be some seasonality effect behind the sales of that product category.		Use the marketing strategy to increase the customer awareness of some product which has low sales amount to increase that product purchase.
There was some complain from customer about slow shipping operation.	Some product in a month of year has its lead time exceeded its control limit based on ship mode.	The cost of ship mode is required to be controlled.	The quality of shipping operation of some shipping mode is required to be improved.			The additional payment varying to the priority of ship modes should be included in the bill of customer.

2 Contents → Choose the right information

- Derive **key measures** and **dimensions** from user requirements
- Choose an **effective aggregation** method
- **Develop calculation methods** that guide users thinking
- **Pre-process information** to reduce cognitive load

Actual ↔ Target

$$actual - target$$

$$\left(\frac{actual - target}{target}\right) \times 100\%$$

Growth Rate

$$\left(\frac{actual_t - actual_{t-1}}{actual_{t-1}}\right) \times 100\%$$

Contents

- Derive **key measures** and **dimensions** from user requirements
- Choose an **effective aggregation** method
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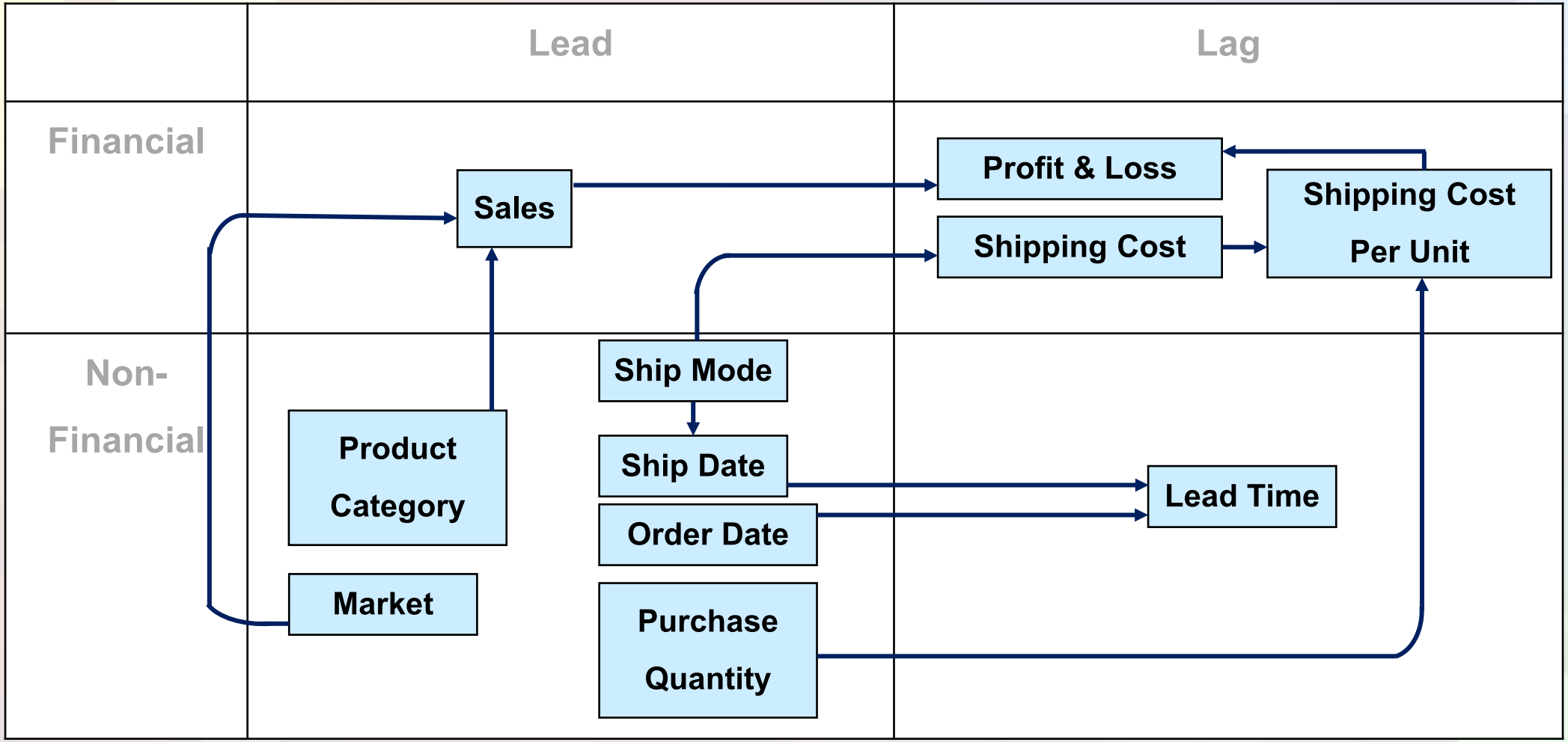
The Balanced View of Measures

Financial	VS.	Non Financial
- ROE - Debt-to-Equity Ratio		- No. of customers - Churn Rate

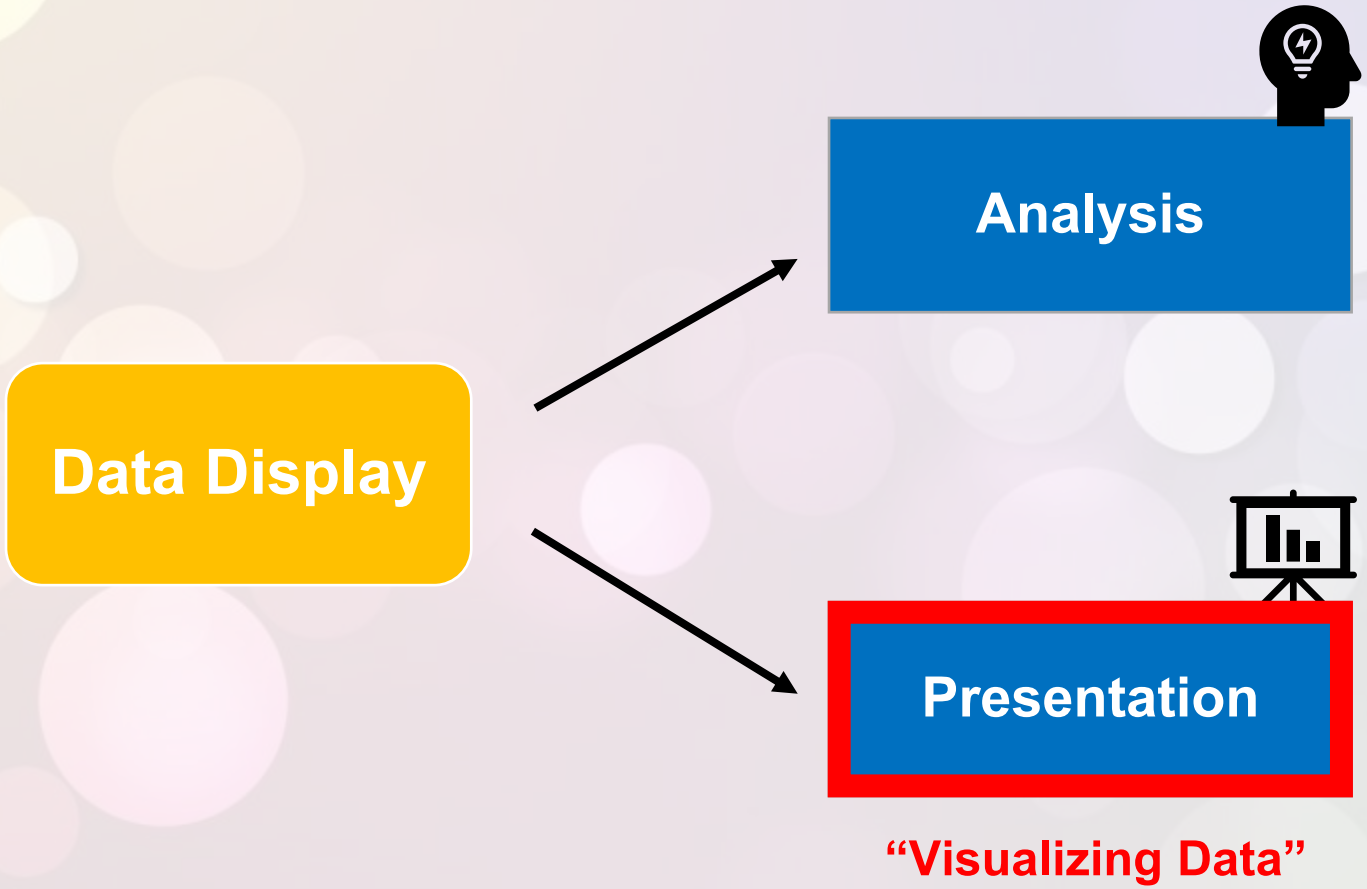
Lead	VS.	Lag
- No. of sales visits - No. of website visitors		- No. of complaints - Net Income

Internal	VS.	External
- New Product Development Cycle - No. of incidents		- % Market share - Net Promoter Scores

E.g.:


Lead
Lag
Financial
Non-
Financial
Sales
Profit & Loss
Shipping Cost
Shipping Cost
Per Unit
Ship Mode
Product
Category
Ship Date
Order Date
Market
Purchase
Quantity
Lead Time

3 Presentation



"Visualizing Data"

3 Presentation

Use the appropriate chart type and its visual best practice corresponding to visualizing objectives

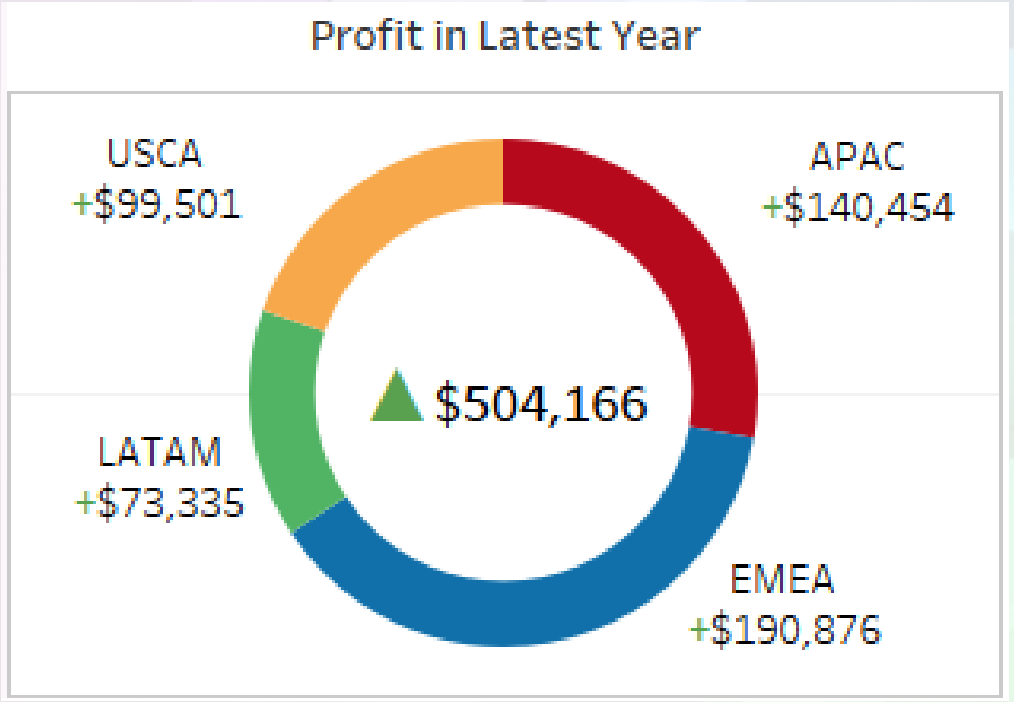
Objectives of “Visualizing Data”

- Distribution
- Relationship
- Comparison
- Connection
- Composition
- Location

Visualization

Donut Chart

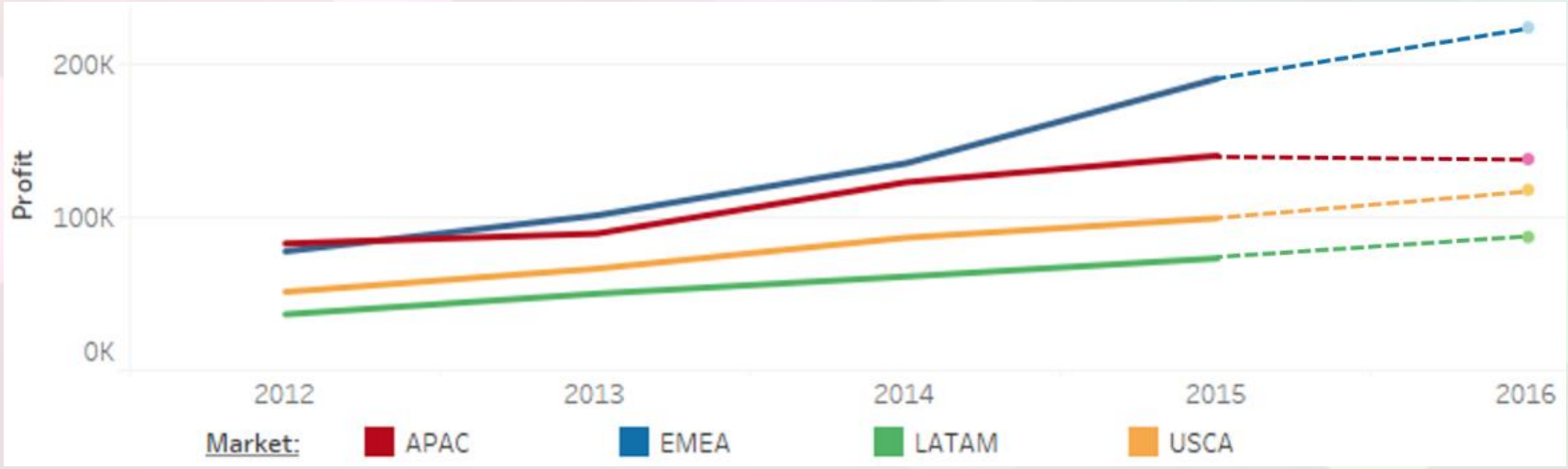
- **Show Profit proportion** of the organization in latest year (2015) by market
- **Show total Profit** in the middle of chart



Line Chart & Expo Smoothing Forecasting

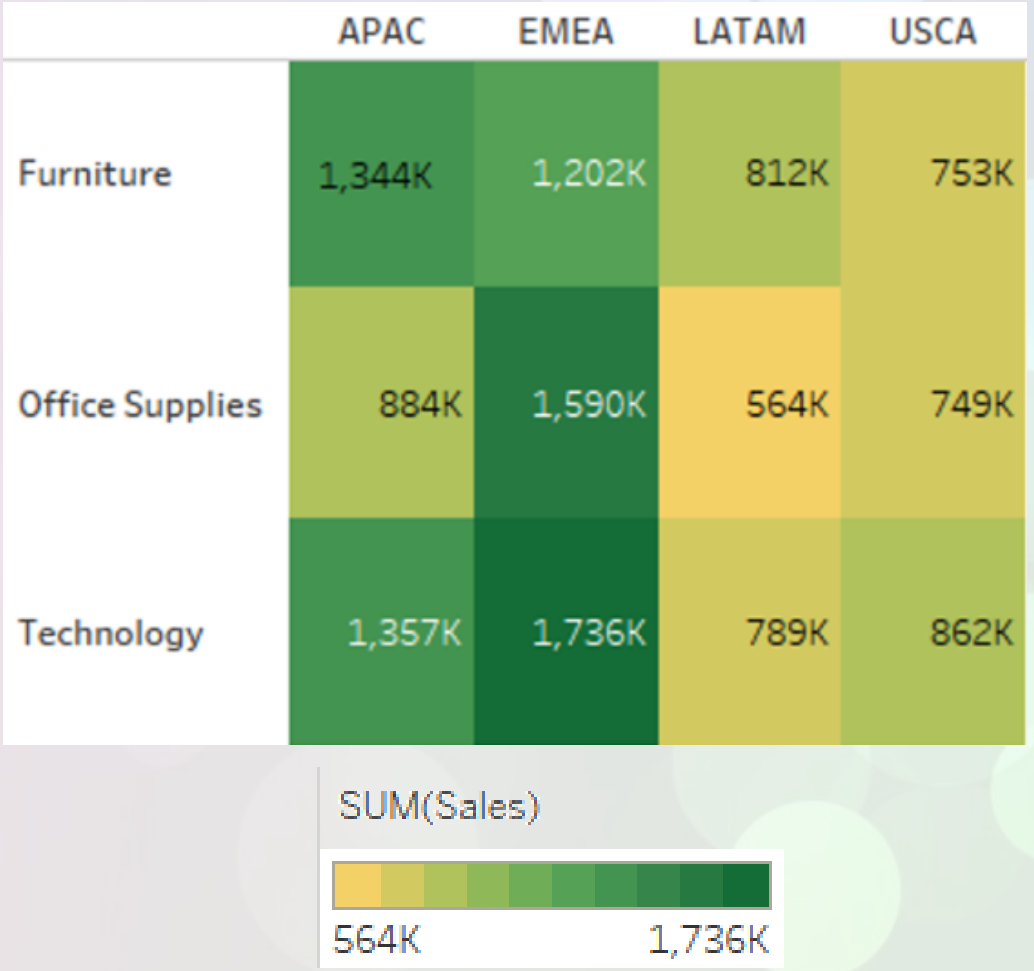
- **Show trend** of Profit changing over year classified by each Market
- **Forecast Profit** of the next year (2016) with exponential smoothing

Market	Smoothing Coefficients		
	Alpha	Beta	Gamma
USCA	0.01	0.177	0
LATAM	0	0.449	0.156
EMEA	0.145	0	0
APAC	0.269	0	0



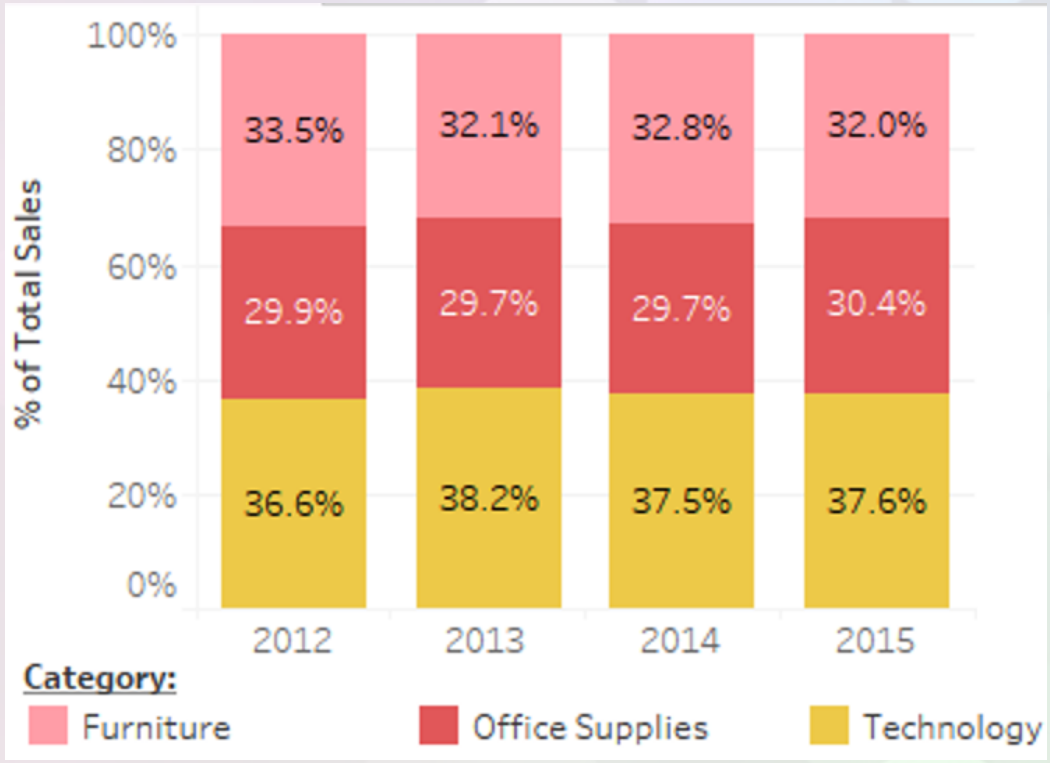
Highlight Table

- **Show** Sales amount **(numeric field)** of which level distinguished by color intensity when it was **segmented by each class of 2 categorical fields**: Market and Product



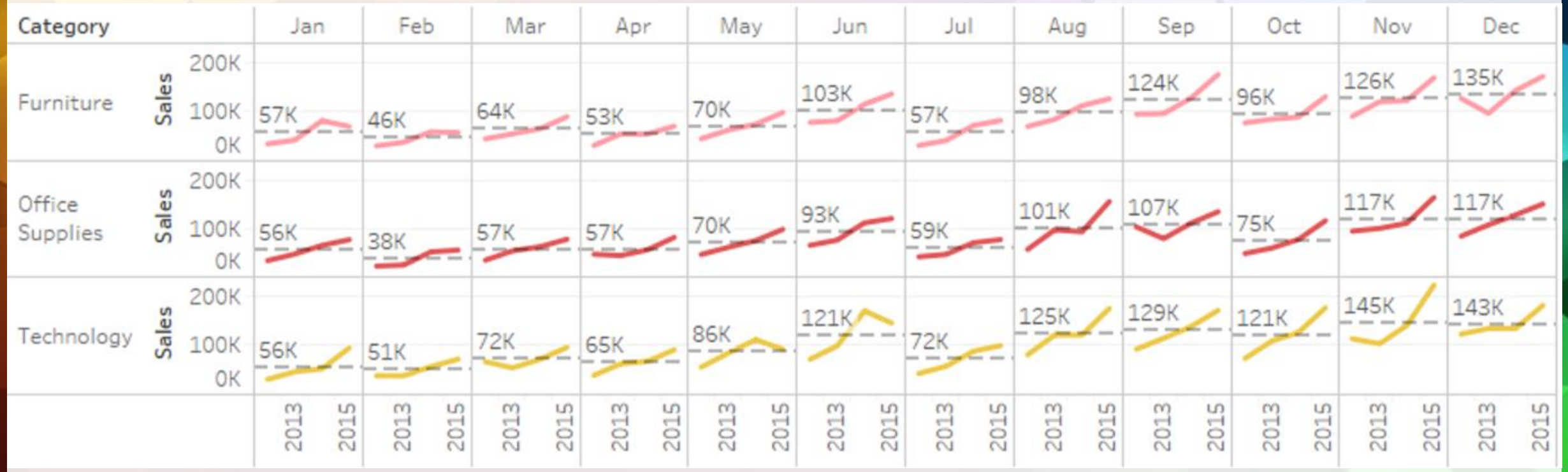
100% Stacked Bar

- **Compare proportion** of Sales (Numeric Field) from each product Category (Categorical Field) **over year**



Cycle plot

- **Show trend of** Sales (numeric field) significantly increased from seasonal effect observed from dash line as the average of each month (Order Date)



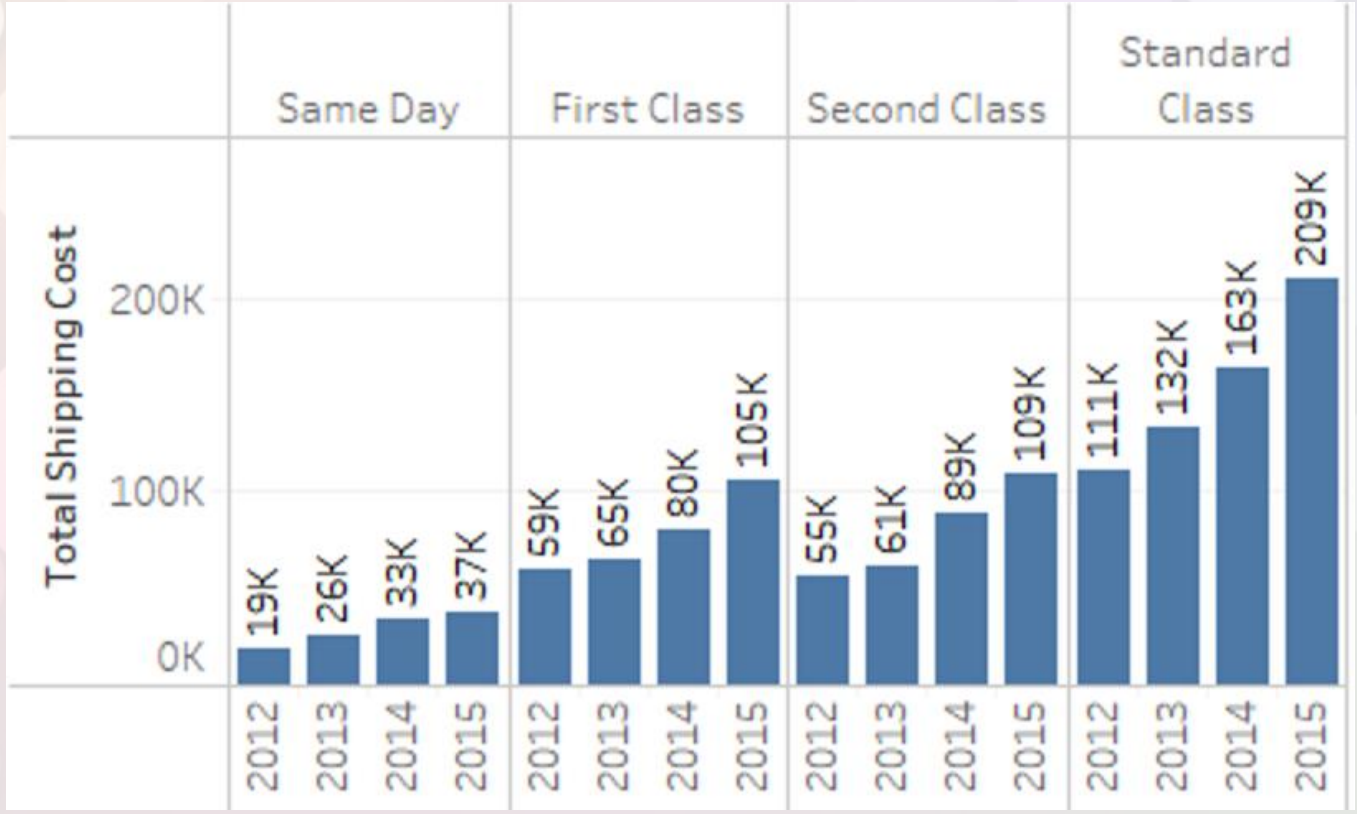
Cross Tab

- Show Cost per unit of each Ship Mode

Ship Mode	
Same Day	$12.92/piece
First Class	$12.42/piece
Second Class	$8.87/piece
Standard Class	$5.83/piece

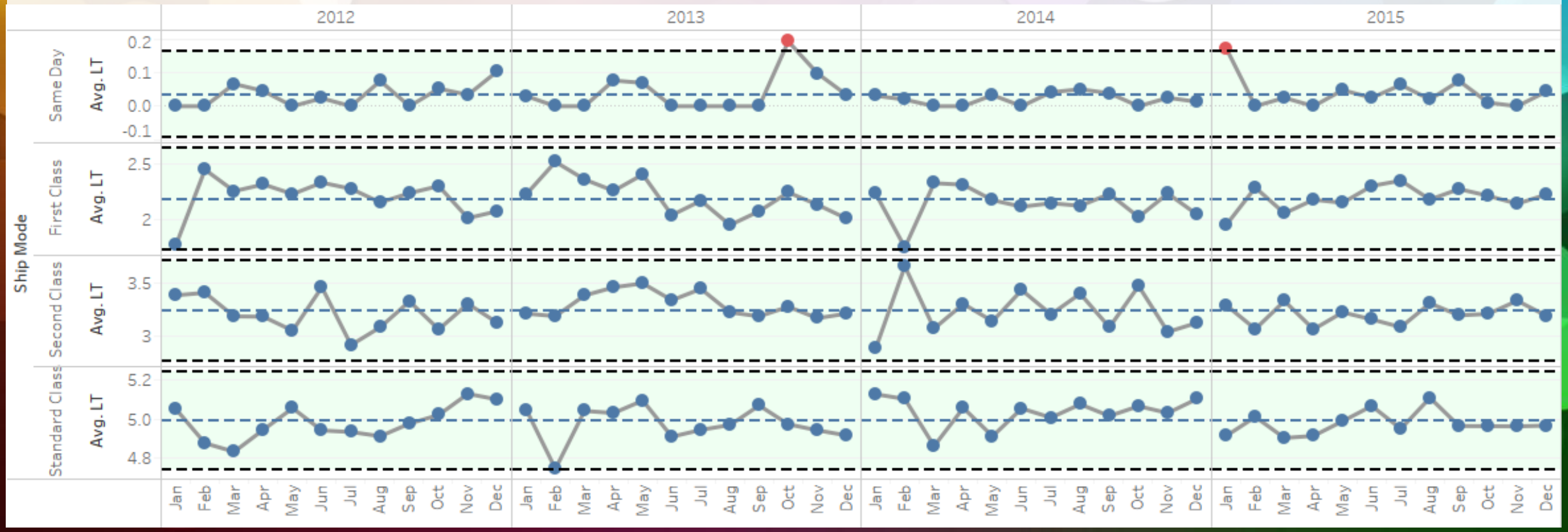
Multiple Bars

- **Compare** total Shipping Cost **(numeric) for each class of** Ship Mode **(categorical)** over years **(time series)**

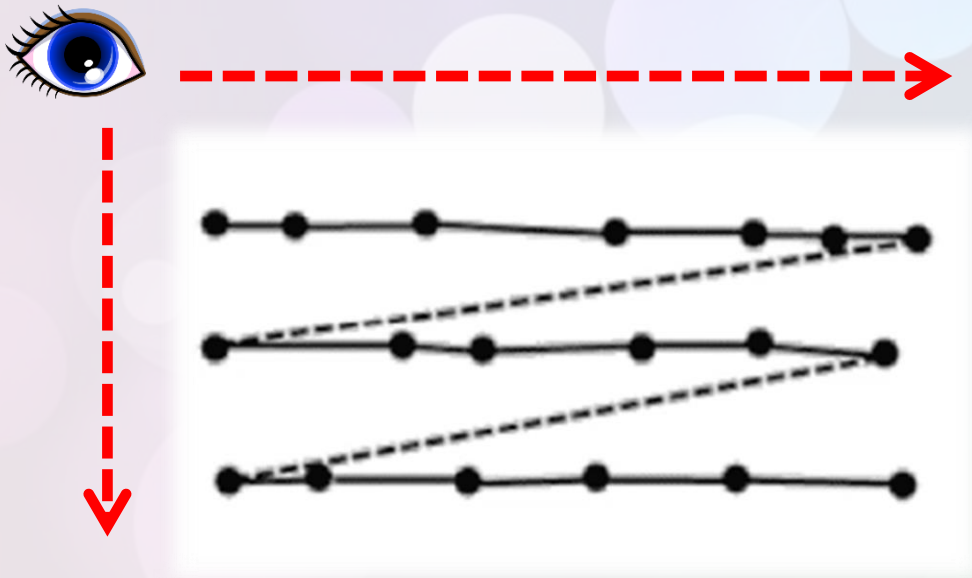


Control Chart

- **Monitor abnormality** of transportation process by using **average** Lead Time of each month over years (Order Date) by determining Control Limit with confidence interval at 99.73%
- **The abnormality** data point will be **illustrated with red point** which is out of control limit



4 Navigation → Place information into the appropriate position



"Natural Eye Movement"

- Understand user attention
- Large font size
- Colors that highly contrast the background

- Place similar content together

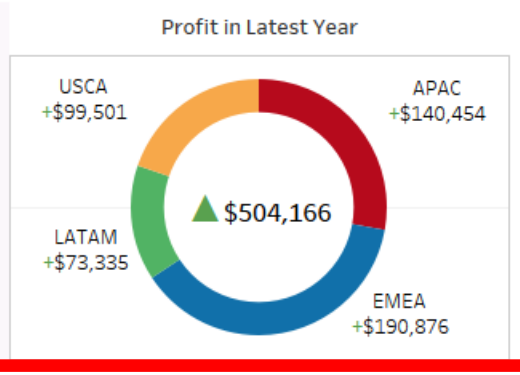
Global Superstore Growth

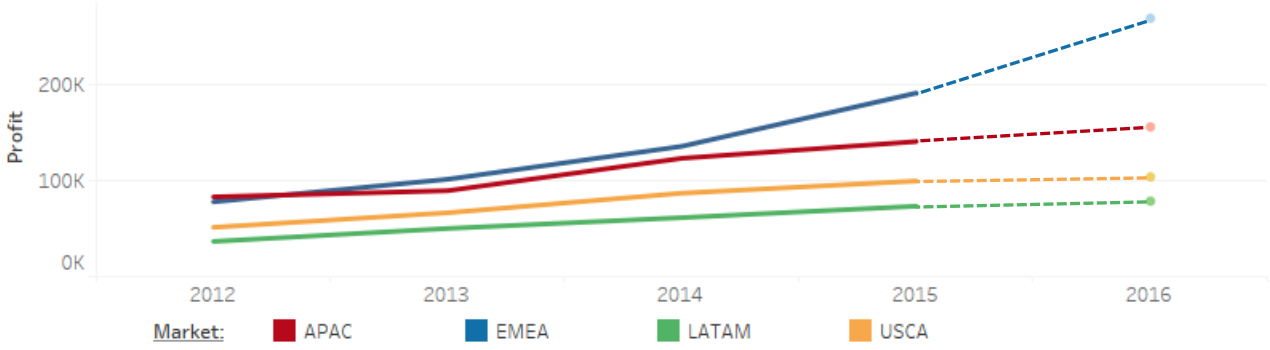
In 2015,

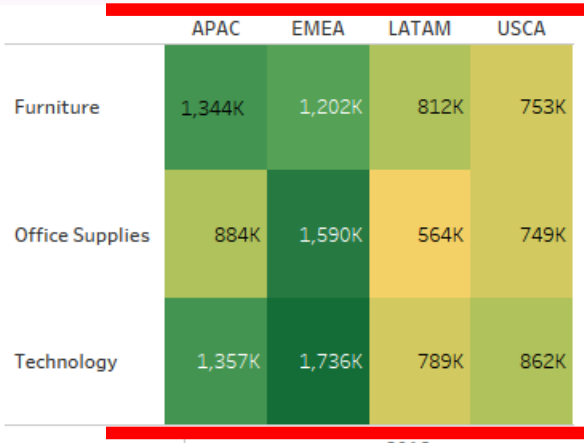
Sales: +26.25% (▼0.95%)

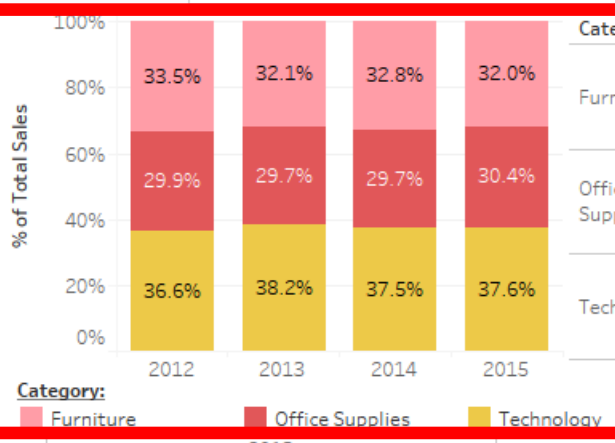
Profit: +23.89% (▼8.48%)

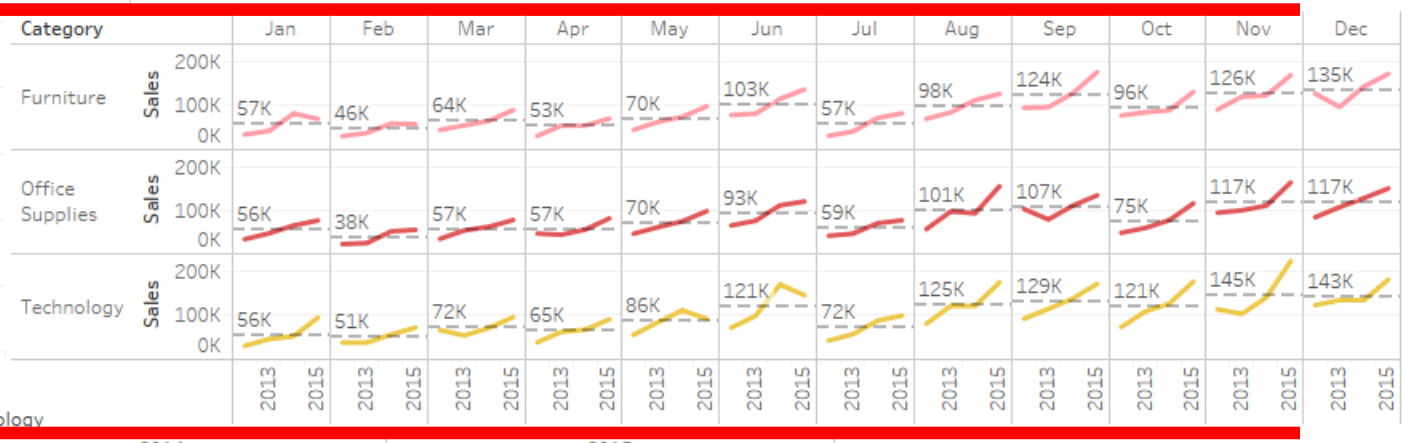
(Compared with 2014)

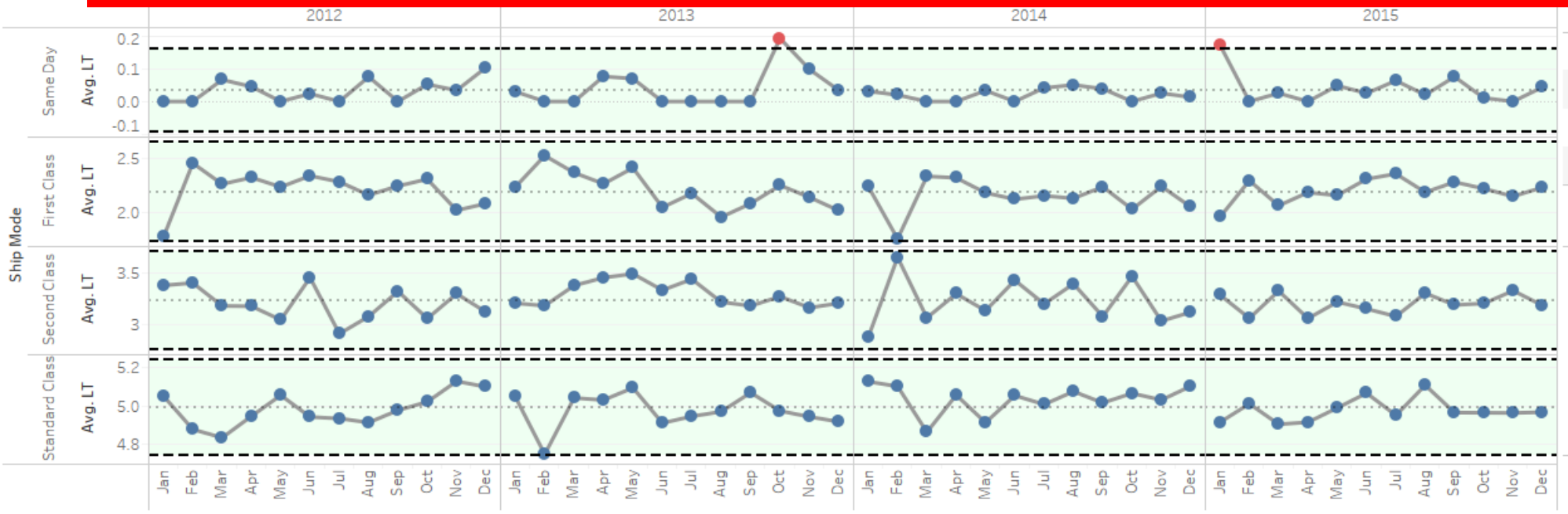












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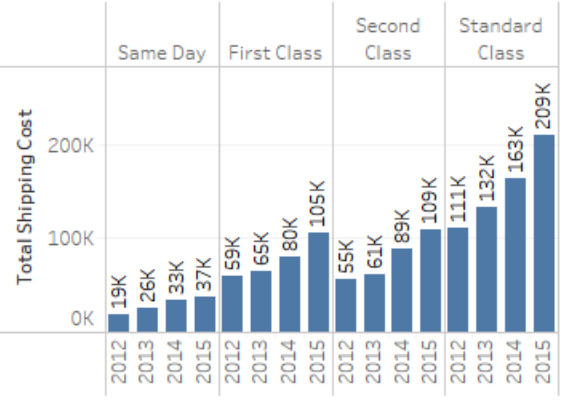
Standard Class	$5.83/piece



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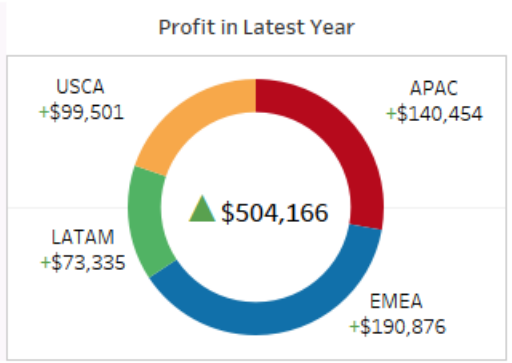

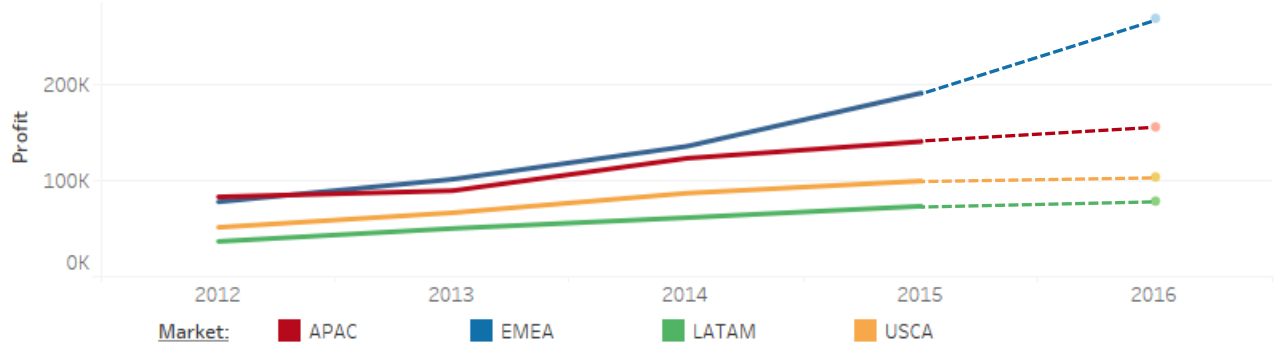

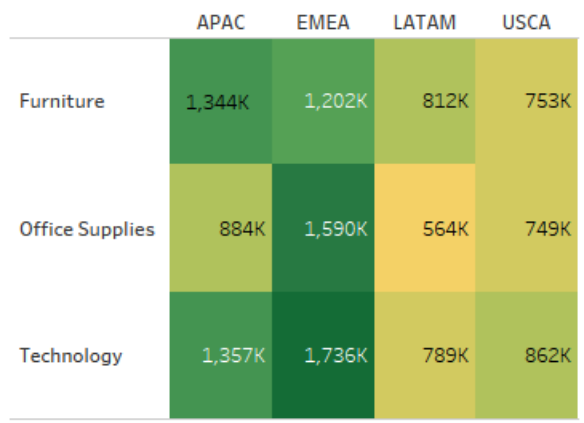

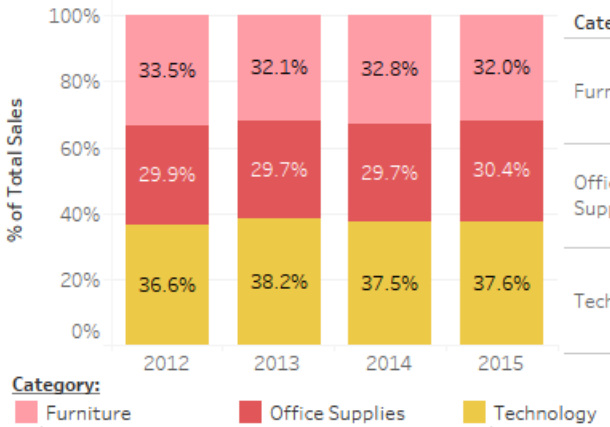

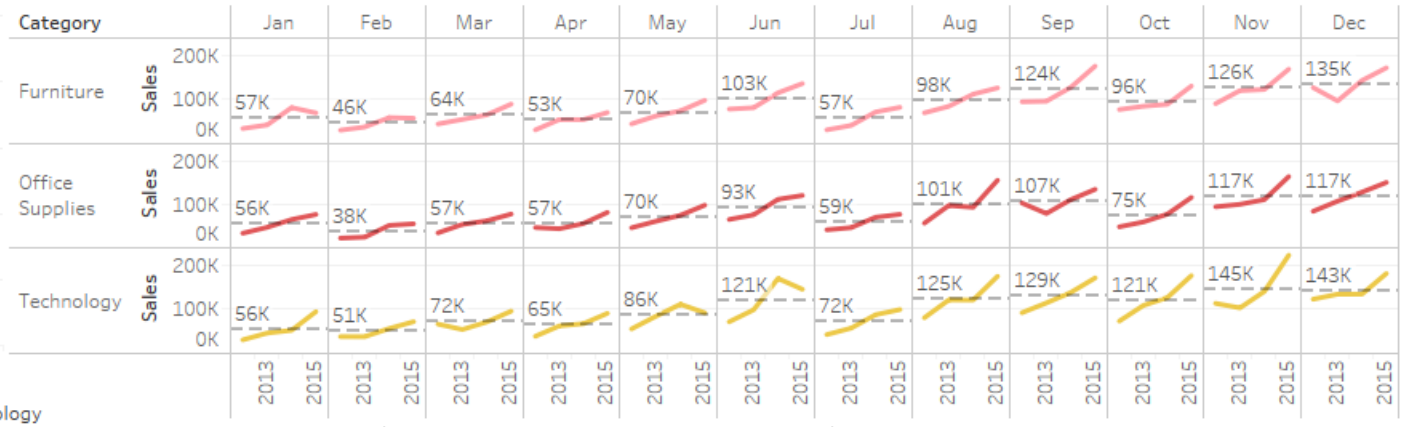

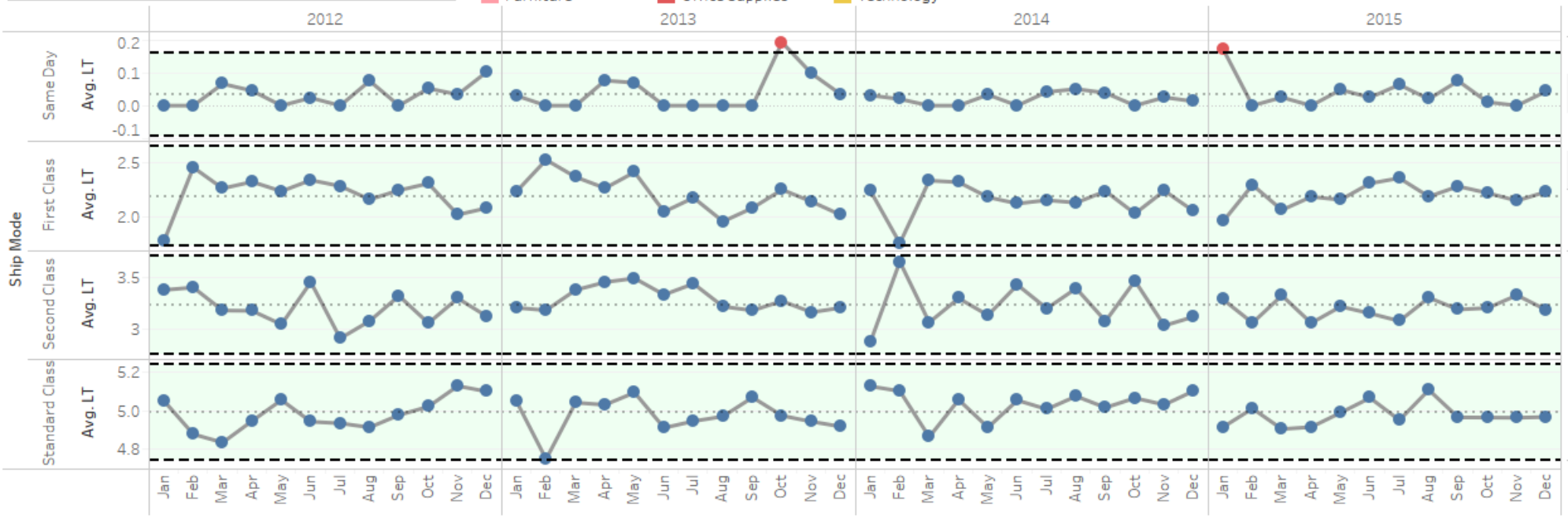

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