Data Visualization Framework

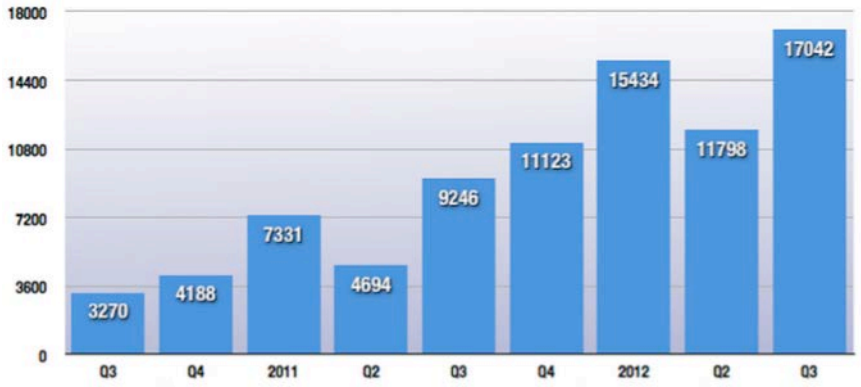
Stages of Data Analysis

Some questions can be answered using queries and generating numbers, but are better answered using visualizations

For example: *What is the growth of my sales quarter on quarter?*

Answer A: **25% CAGR**

Answer B:



Stages of Data Analysis

Data visualization techniques are used extensively in data analysis and data science teams to both identify problems / issues / interesting patterns, to convey information and to help with decision making

According to IDC “Visual data discovery tools will be growing 2.5x times faster than the rest of the BI market”*

And according to SAP “On average, those using data visualization tools report that it would take an average of nine hours longer to see patterns, trends, and correlations in their company’s data without data visualization” **

Many companies want to provide the power of data driven decision making to all their employees, and data visualization tools allow people without specialist analytics knowledge to also generate insights from data easily

*http://www.idc.com/getdoc.jsp?containerId=prUS25329114
**http://www.news-sap.com/sap-sponsored-survey-finds-business-decision-makers-struggle-unlock-power-big-data/

Stages of Data Analysis

Data visualization techniques are used extensively in data analysis and data science teams to both identify problems / issues / interesting patterns, to convey information and to help with decision making

Worldwide Big Data and Analytics Predictions for 2015 – IDC

Visual data discovery tools to grow 2.5x faster than rest of BI market, investing in this enabler of end-user self service to become requirement for all enterprises by 2018.

SAP

On average, those using data visualization tools report it would take an average of nine hours longer to see patterns, trends, and correlations in their company's data without data visualization

Many companies want to provide the power of data driven decision making to all their employees, and data visualization tools allow people without specialist analytics knowledge to also generate insights from data easily

*http://www.idc.com/getdoc.jsp?containerId=prUS25329114
**http://www.news-sap.com/sap-sponsored-survey-finds-business-decision-makers-struggle-unlock-power-big-data/

Data Visualization Framework

Visualization generates insights only when done properly, it is very easy to draw the wrong conclusions when data is not visualized or presented properly

A good framework when trying to create data visualizations is:

1. Frame the problem statement correctly
2. Extract / collect / combine relevant data
3. Process and analyse data to get answer in number/table format
4. Choose the most appropriate visualization
5. Label and format the visualization clearly

Data Visualization Framework

Most of the times, we start by directly trying to build a visualization

Instead, it is better to use the framework to find the answer in numeric format first, and then create the most appropriate visualization

Business Problem: I want to understand how sales of MP3 players are doing across my stores

How would you create a visualization to answer this question?

Data Visualization Framework – Step 1

STEP 1: Frame the problem correctly

“Understand how sales of MP3 players are doing in across stores”

What are the monthly total sales figures for the category “MP3 Players” across all stores for the last 12 months?

What is the difference in these two problem statements?

Data Visualization Framework – Step 2

STEP 2 : Extract / collect / combine relevant data

Many times, data may need to be extracted or queried from a database

Data may also be in multiple source files, so data may need to be combined to get a final *datafile* that will be used to answer this specific question

What would be the data source you would look at to answer this question?

Transactions databases

Data Visualization Framework – Step 2

For this example, we have two csv files that we have extracted from a database:

Transactions.csv:

Transaction ID	Card_ID	Payment Method	Timestamp	Product Code	Items Number	Items Amount
10561	104656909	CreditCard	11-01-2001 15:48	1	1	24
101048	102084120	Cash	08-04-2001 11:25	1	1	24
191266	100881058	CreditCard	01-07-2001 16:13	1	1	24
287112	103140520	CreditCard	24-10-2001 10:10	1	1	24
39688	102602585	Cash	09-02-2001 11:02	1	1	24
124001	104593687	DebitCard	29-04-2001 15:46	1	1	24
297322	102610396	Cash	04-11-2001 13:26	1	1	24
164006	102231115	Cash	06-06-2001 13:33	1	1	24
71462	100588277	CreditCard	10-03-2001 16:24	1	2	48
250948	103371803	CreditCard	12-09-2001 15:45	1	1	24
294489	103746762	CreditCard	01-11-2001 11:47	1	1	24
338834	105074329	Cash	18-12-2001 14:17	1	1	24
215825	100128865	CreditCard	01-08-2001 17:41	1	1	24

Data Visualization Framework – Step 2

We will need to add the product category name to the transactions file via the Product Code

Product Code	Product Category	Unit Price
196	MP3Players	209
197	MP3Players	16
198	MP3Players	59
199	GameConsoles	799
200	GameConsoles	899
201	GameConsoles	799
202	GameConsoles	699
203	GameConsoles	899
204	GameConsoles	1299
205	GameConsoles	1399
206	GameConsoles	1299
207	GameConsoles	1499
208	GameConsoles	1199
209	GameConsoles	299
210	GameConsoles	399
211	GameConsoles	199
212	HiFi	699
213	HiFi	799
214	HiFi	899

Transaction ID	Card_ID	Payment Method	Timestamp	Product Code	Items Number	Items Amount
10561	104656909	CreditCard	11-01-2001 15:48	1	1	24
101048	102084120	Cash	08-04-2001 11:25	1	1	24
191266	100881058	CreditCard	01-07-2001 16:13	1	1	24
287112	103140520	CreditCard	24-10-2001 10:10	1	1	24
39688	102602585	Cash	09-02-2001 11:02	1	1	24
124001	104593687	DebitCard	29-04-2001 15:46	1	1	24
297322	102610396	Cash	04-11-2001 13:26	1	1	24
164006	102231115	Cash	06-06-2001 13:33	1	1	24
71462	100588277	CreditCard	10-03-2001 16:24	1	2	48
250948	103371803	CreditCard	12-09-2001 15:45	1	1	24
294489	103746762	CreditCard	01-11-2001 11:47	1	1	24
338834	105074329	Cash	18-12-2001 14:17	1	1	24
215825	100128865	CreditCard	01-08-2001 17:41	1	1	24

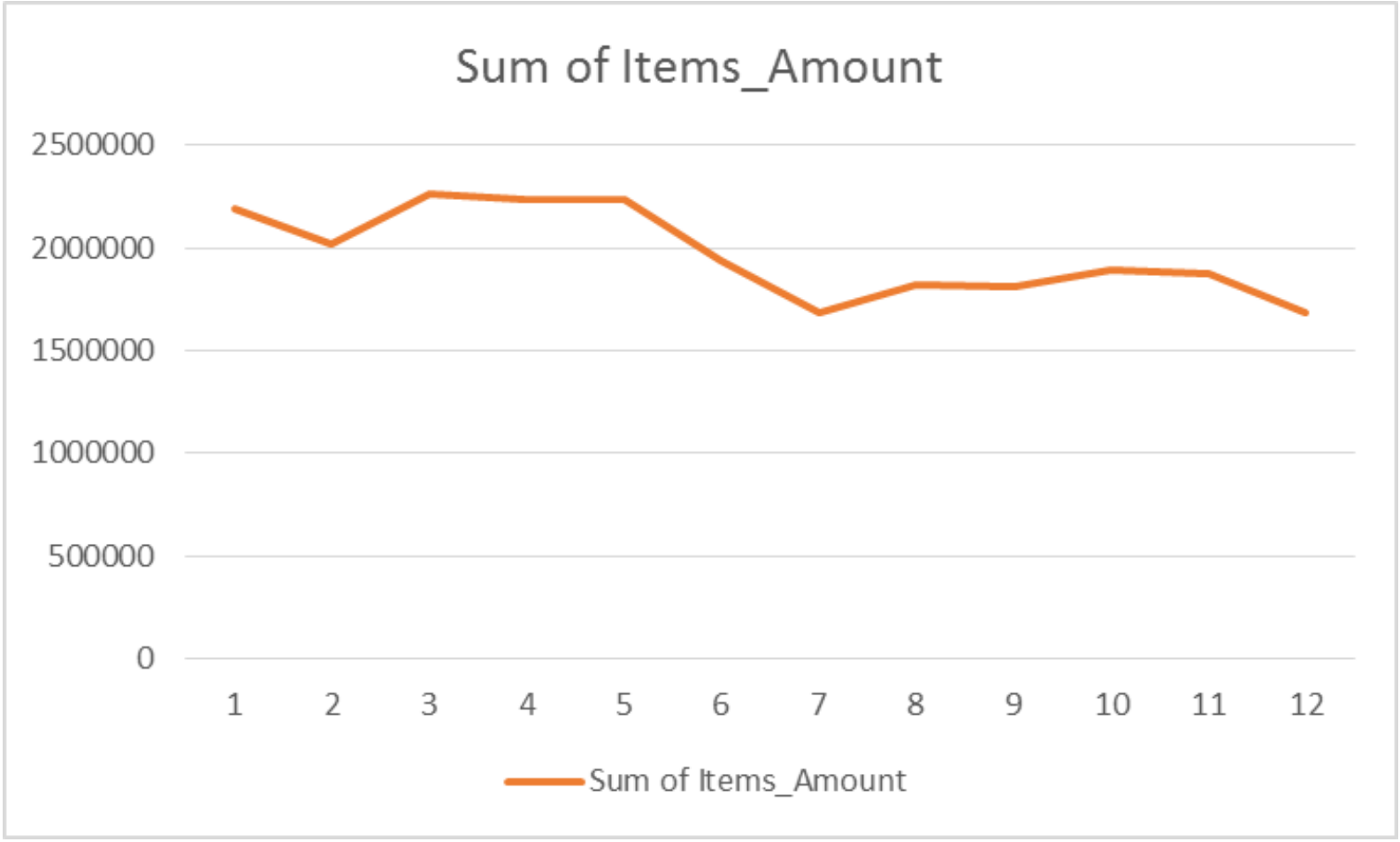
Data Visualization Framework – Step 2

Using Excel: Open the files in Excel, and use **VLOOKUP function** to add the product category name to the transactions file using the Product Code for **VLOOKUP**

=VLOOKUP(E2,Products_File.txt!$A$2:$C$812,2,FALSE)

A	B	C	D	E	F	G	H
Transaction ID	Card_ID	Payment Method	Timestamp	Product Code	Items Number	Items Amount	Product
10561	104656909	CreditCard	11-01-2001 15:48	1	1	24	MP3Players
101048	102084120	Cash	08-04-2001 11:25	1	1	24	MP3Players
191266	100881058	CreditCard	01-07-2001 16:13	1	1	24	MP3Players
287112	103140520	CreditCard	24-10-2001 10:10	1	1	24	MP3Players
39688	102602585	Cash	09-02-2001 11:02	1	1	24	MP3Players
124001	104593687	DebitCard	29-04-2001 15:46	1	1	24	MP3Players
297322	102610396	Cash	04-11-2001 13:26	1	1	24	MP3Players
164006	102231115	Cash	06-06-2001 13:33	1	1	24	MP3Players
71462	100588277	CreditCard	10-03-2001 16:24	1	2	48	MP3Players
250948	103371803	CreditCard	12-09-2001 15:45	1	1	24	MP3Players

Data Visualization Framework – Step 4

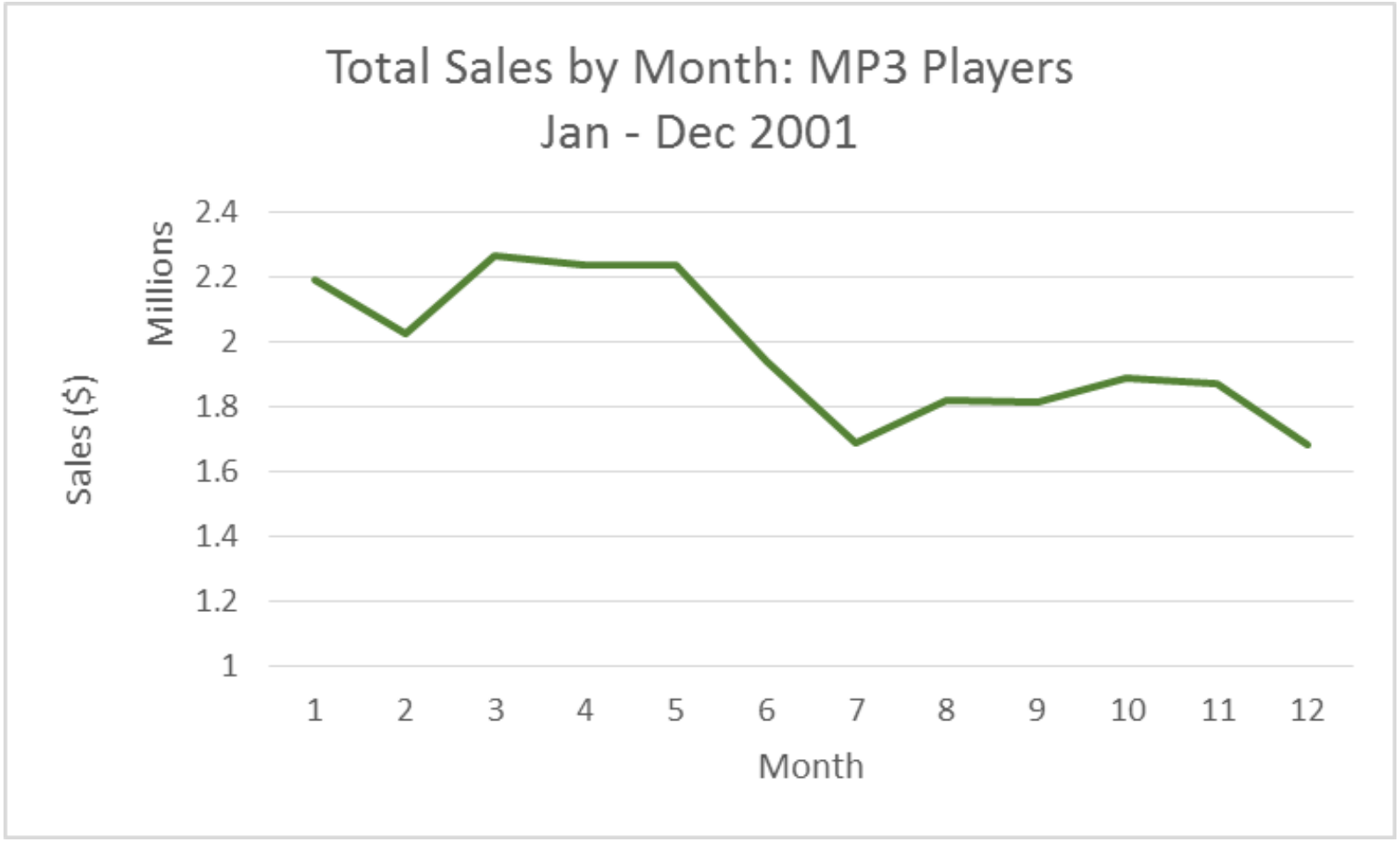


Data Visualization Framework – Step 5

STEP 4: Format and label the visualization

- Change the titles to reflect what we are capturing
- Add axes labels
- Change axes scale if required
- Format numbers as appropriate
- Choose appropriate colors

Data Visualization Framework – Step 5



Data Visualization

- Data visualization techniques are an effective way of data analysis and presentation
- However, it is important to choose the right set of visualizations given the problem statement and the available data
- How to choose the right visualizations?

Next: Types of Data Visualization

Data Visualization in Excel (Part 1)

Data Visualization in Excel

Data visualization techniques are an effective way of data analysis and presentation

However, it is important to choose the right set of visualizations given the problem statement and the available data

How do you choose the right visualizations?

Excel Charts

Very powerful way of summarizing and visualizing patterns in data

Excel has a wide variety of charts and graphs options

Things to remember when creating charts:

- Choose the right type of chart
- Labeling
- Formatting
- Ease of understanding
- Less is More!

Excel Charts

Choosing the right type of chart:

- **Line Charts :** Trends over time
  - Stock price changes
  - 3 year trend of quarterly revenues
- **Bar Charts:** Comparisons or changes at a fixed period in time
  - Sales by Geography
  - % of R&D to total Revenues by Product
- **Column Charts:** Comparisons or changes, over time
  - Sales by Geography across quarters
- **Pie Charts :** Proportion to 100%
  - Disposable income spend allocation

Excel Charts

- **Scatter Plots:** Relationships between X and Y
  - Mobile subscriber attrition by Plan Type
  - Income and years of education

- **Area Charts:** Relative importance of values over time
  - Profit by product over time

Other (advanced) charts

- Bubble Charts
- Doughnut Charts
- Stock Charts

Excel Charts

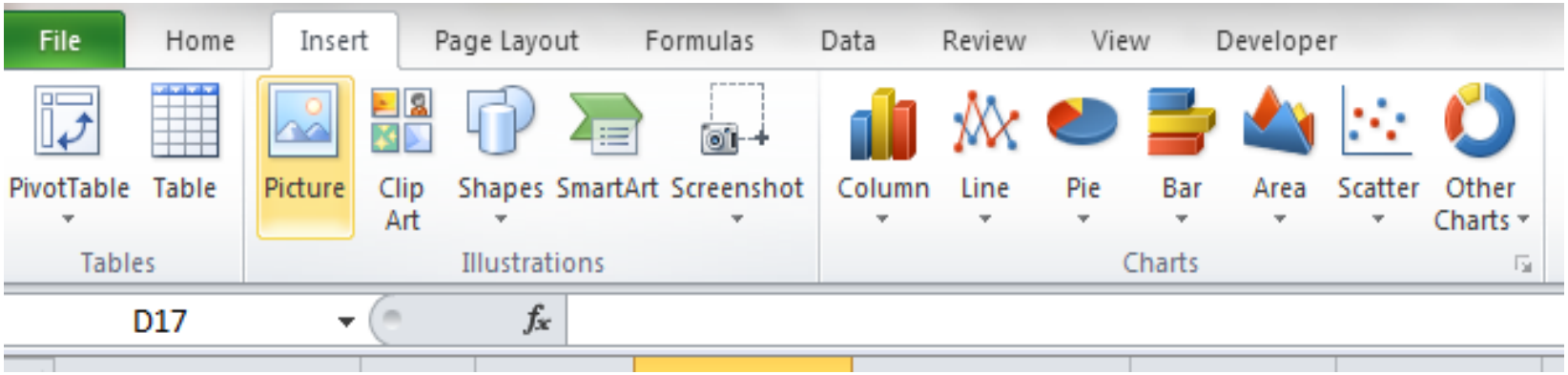
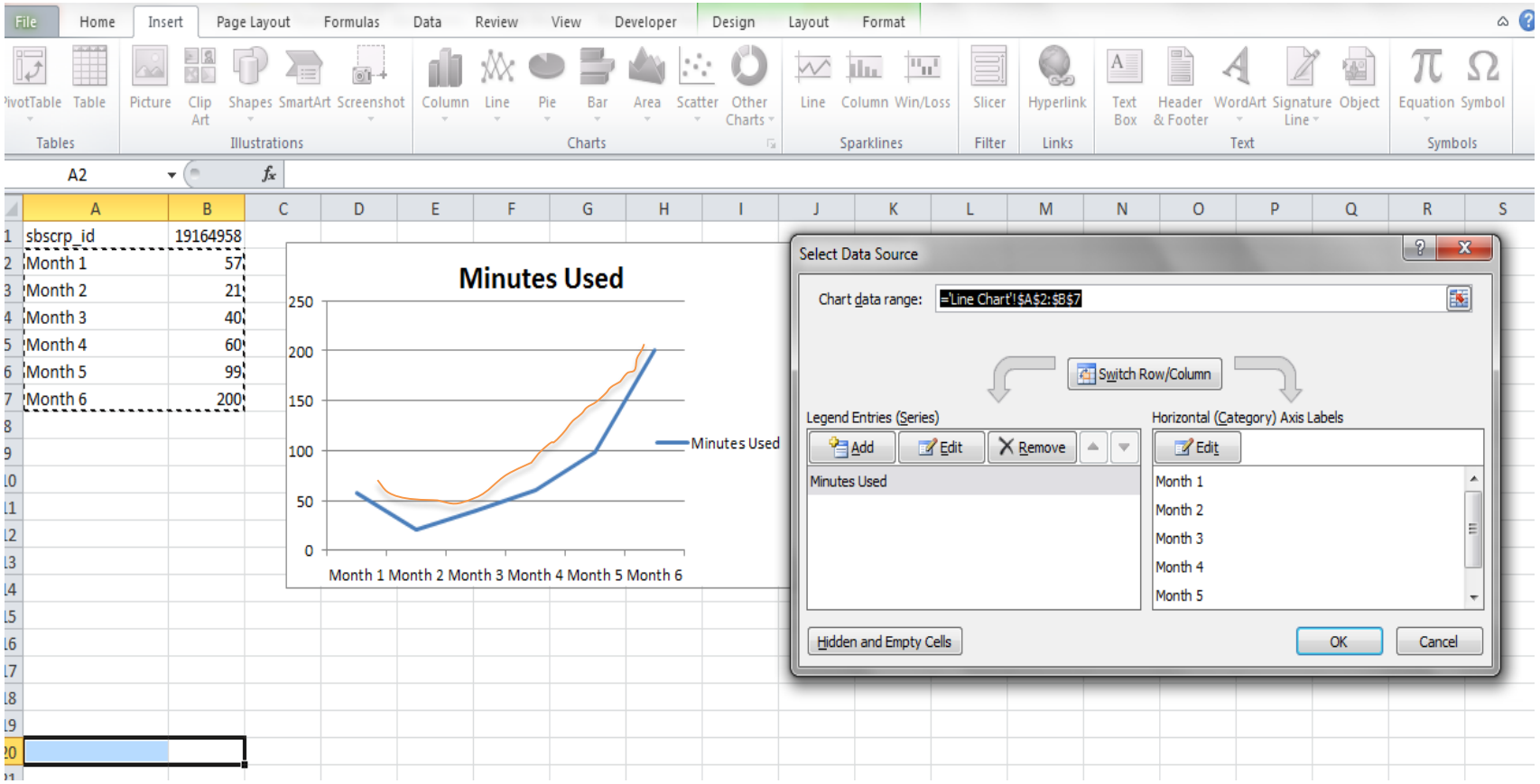


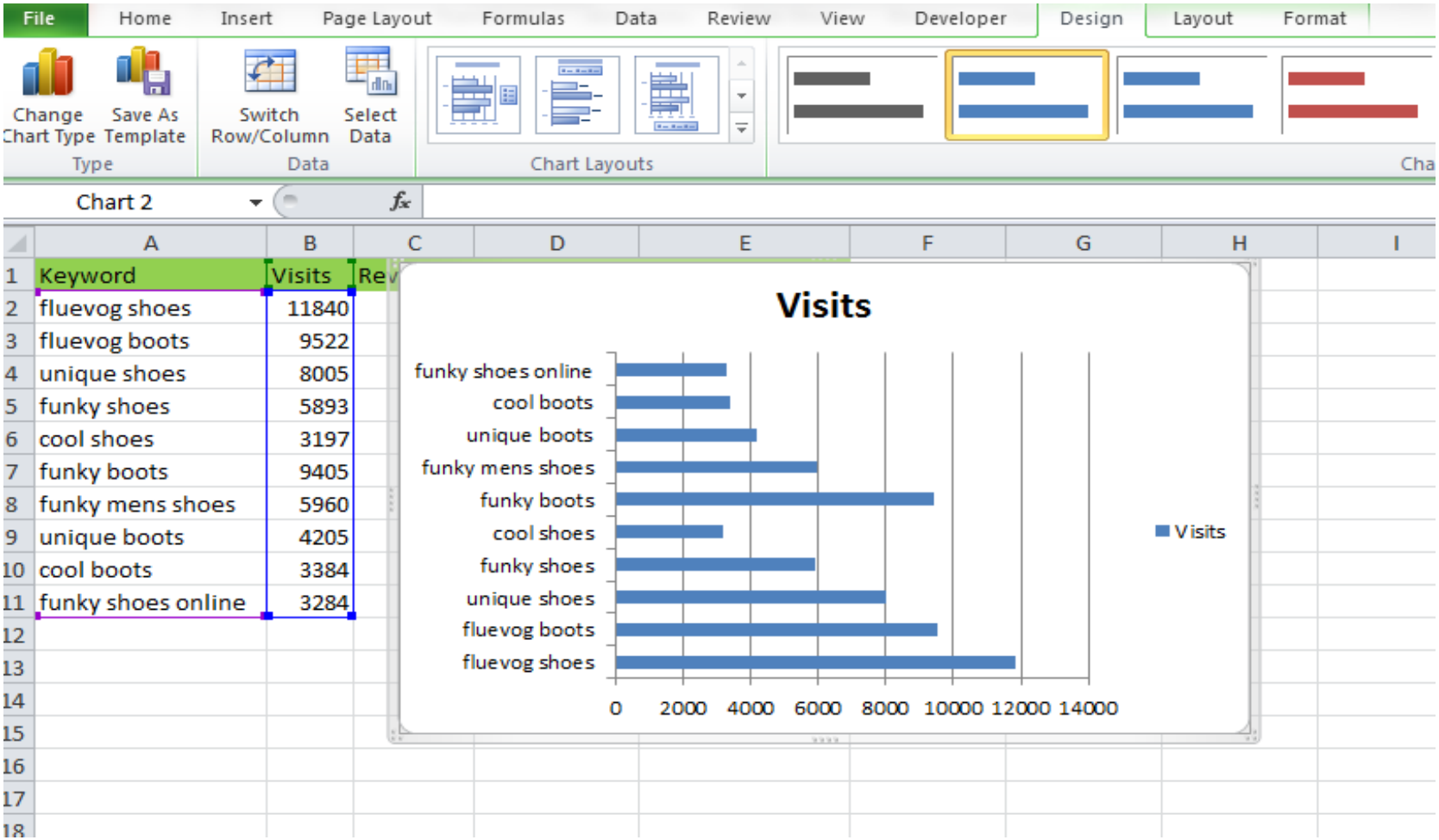
Chart creation steps:

1. Decide what you want to show (what you want to convey)
2. Pick the right chart type
3. Format the underlying data appropriately
4. Create chart in Excel using the Insert Chart options

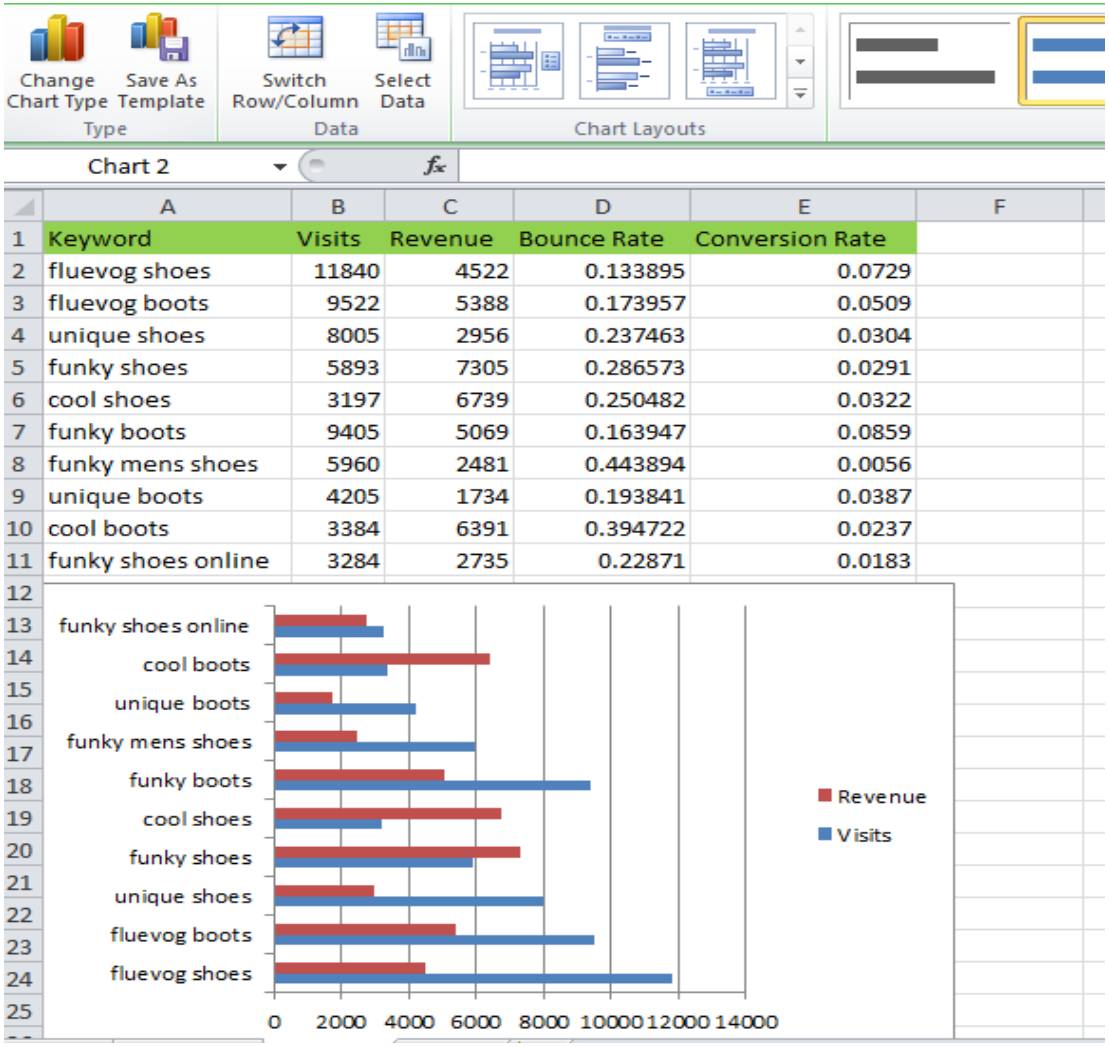
Excel Charts – Line Charts



Excel Charts – Bar Charts

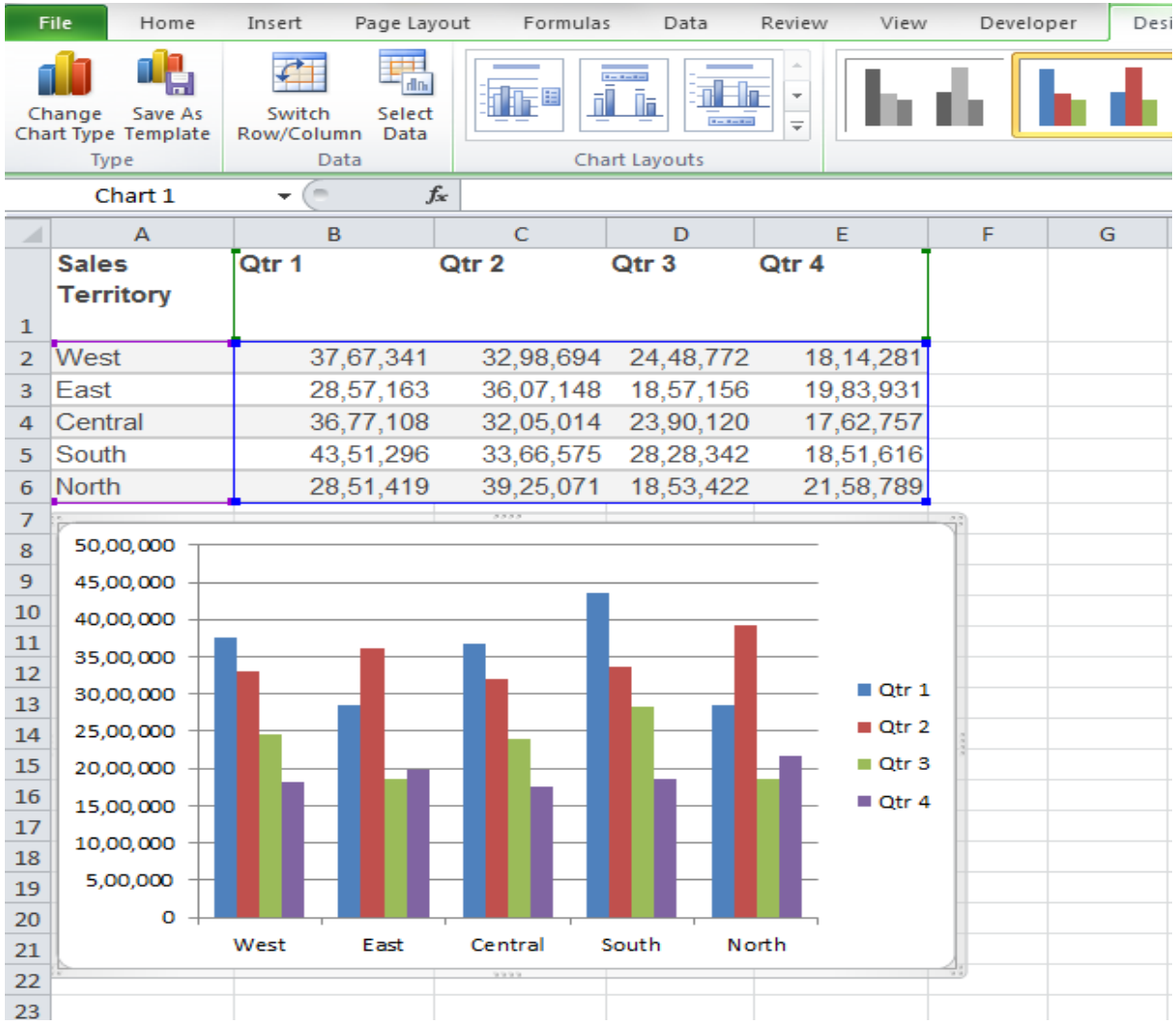


Excel Charts – Bar Charts

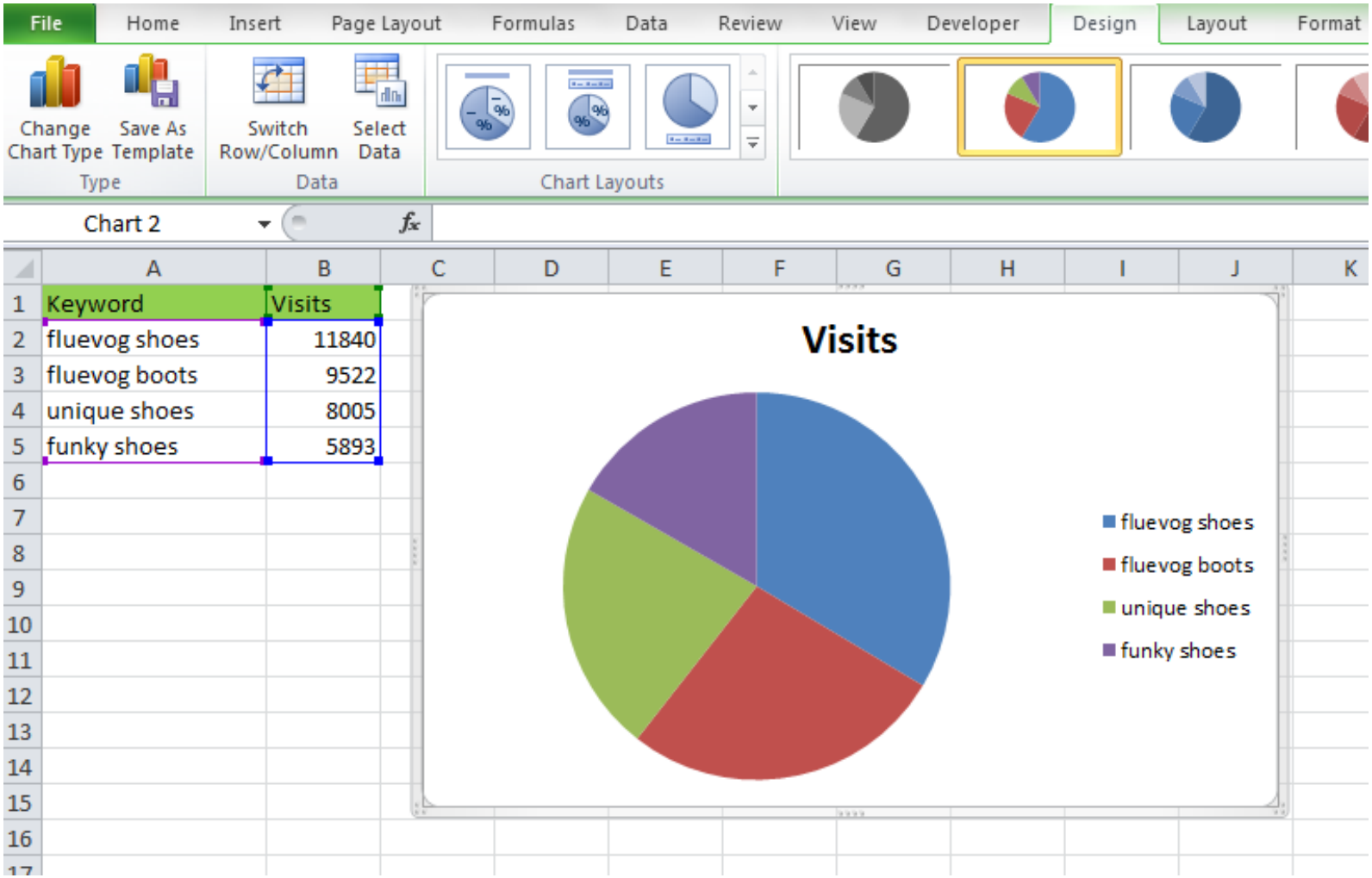


	A	B	C	D	E	F
1	Keyword	Visits	Revenue	Bounce Rate	Conversion Rate	
2	fluevog shoes	11840	4522	0.133895	0.0729	
3	fluevog boots	9522	5388	0.173957	0.0509	
4	unique shoes	8005	2956	0.237463	0.0304	
5	funky shoes	5893	7305	0.286573	0.0291	
6	cool shoes	3197	6739	0.250482	0.0322	
7	funky boots	9405	5069	0.163947	0.0859	
8	funky mens shoes	5960	2481	0.443894	0.0056	
9	unique boots	4205	1734	0.193841	0.0387	
10	cool boots	3384	6391	0.394722	0.0237	
11	funky shoes online	3284	2735	0.22871	0.0183	
12						

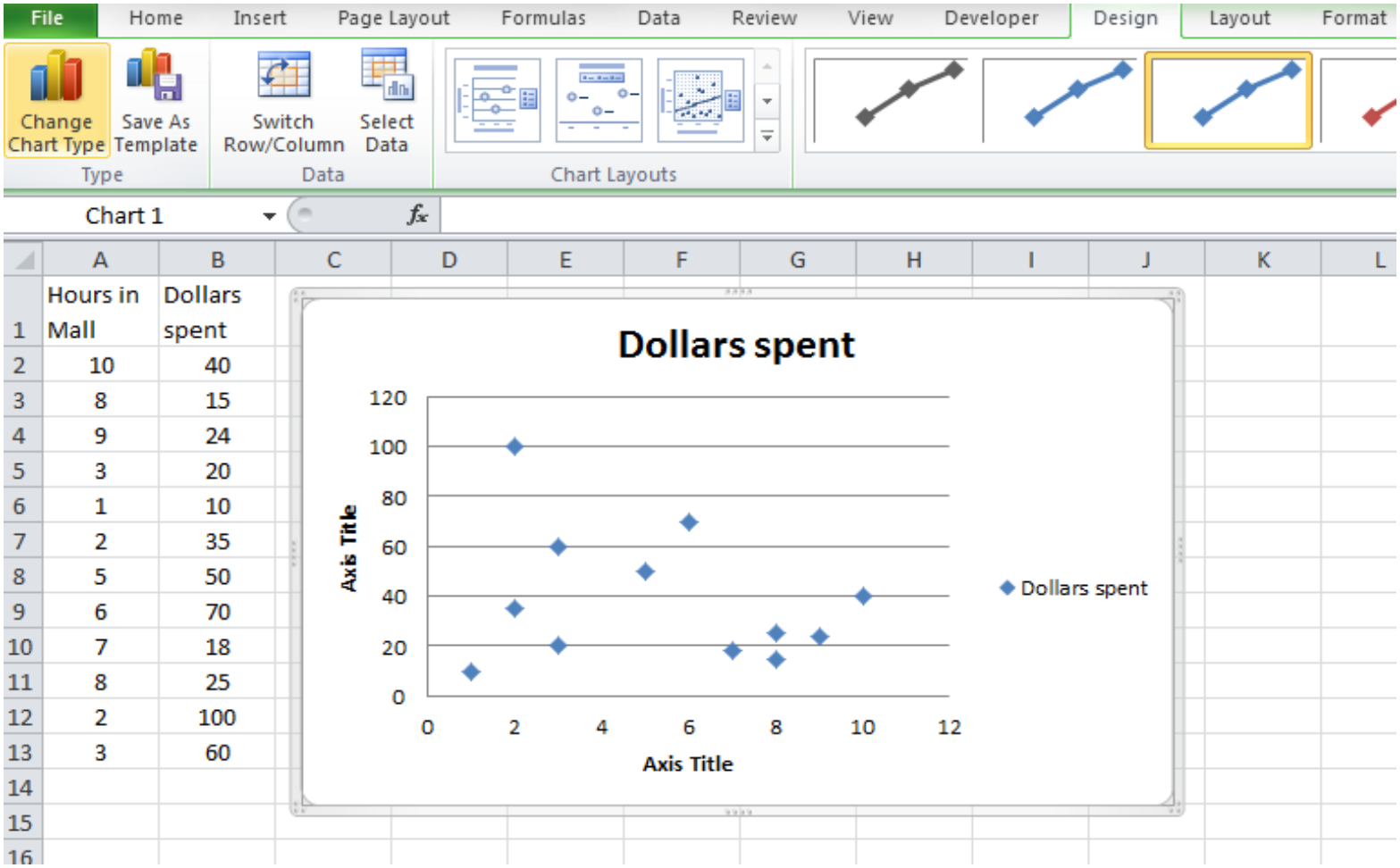
Excel Charts – Column Charts



Excel Charts – Pie Charts



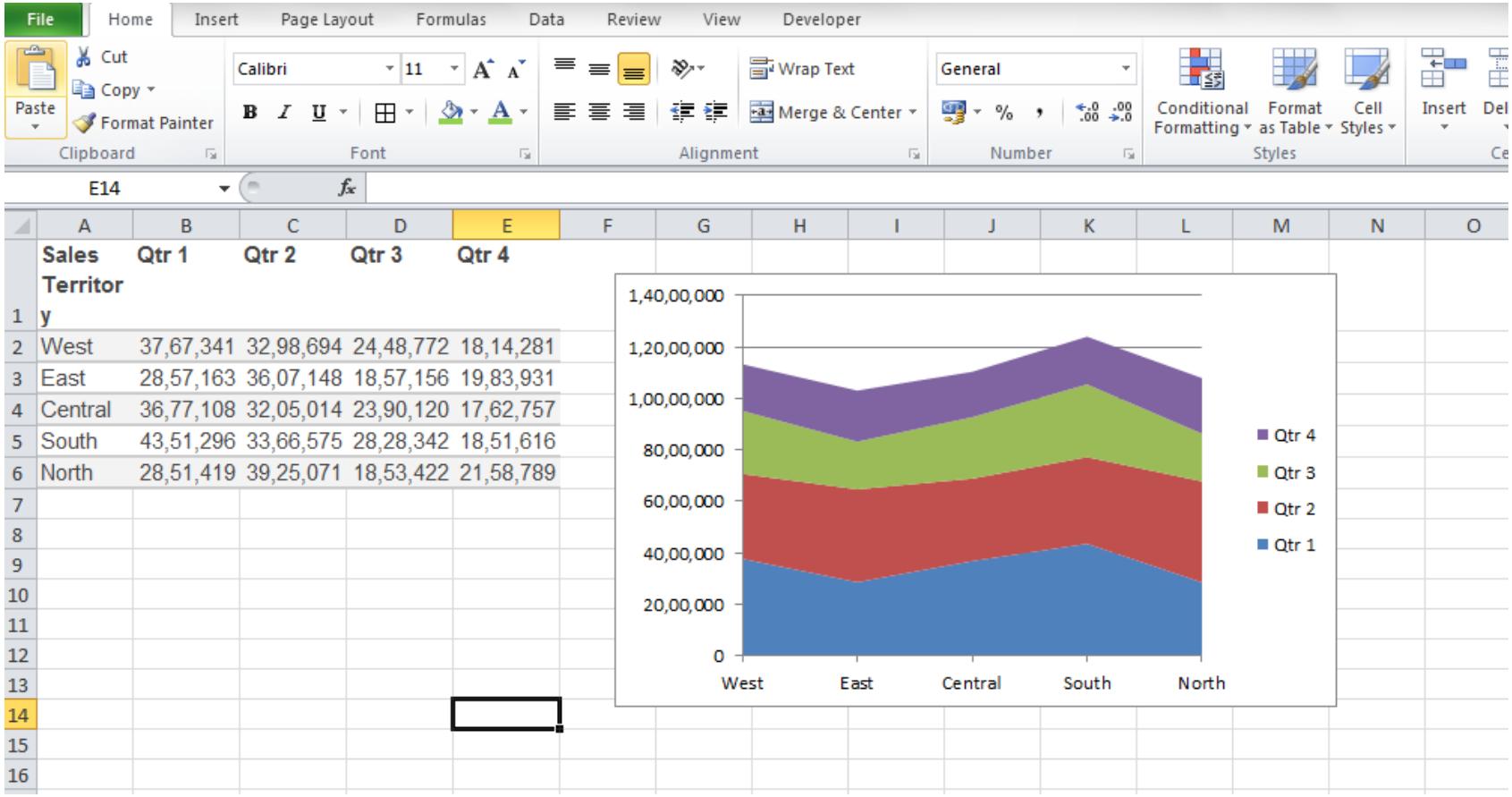
Excel Charts – Scatter Charts



Next: More Data Visualizations in Excel

Data Visualization in Excel (Part 2)

Excel Charts – Area Charts



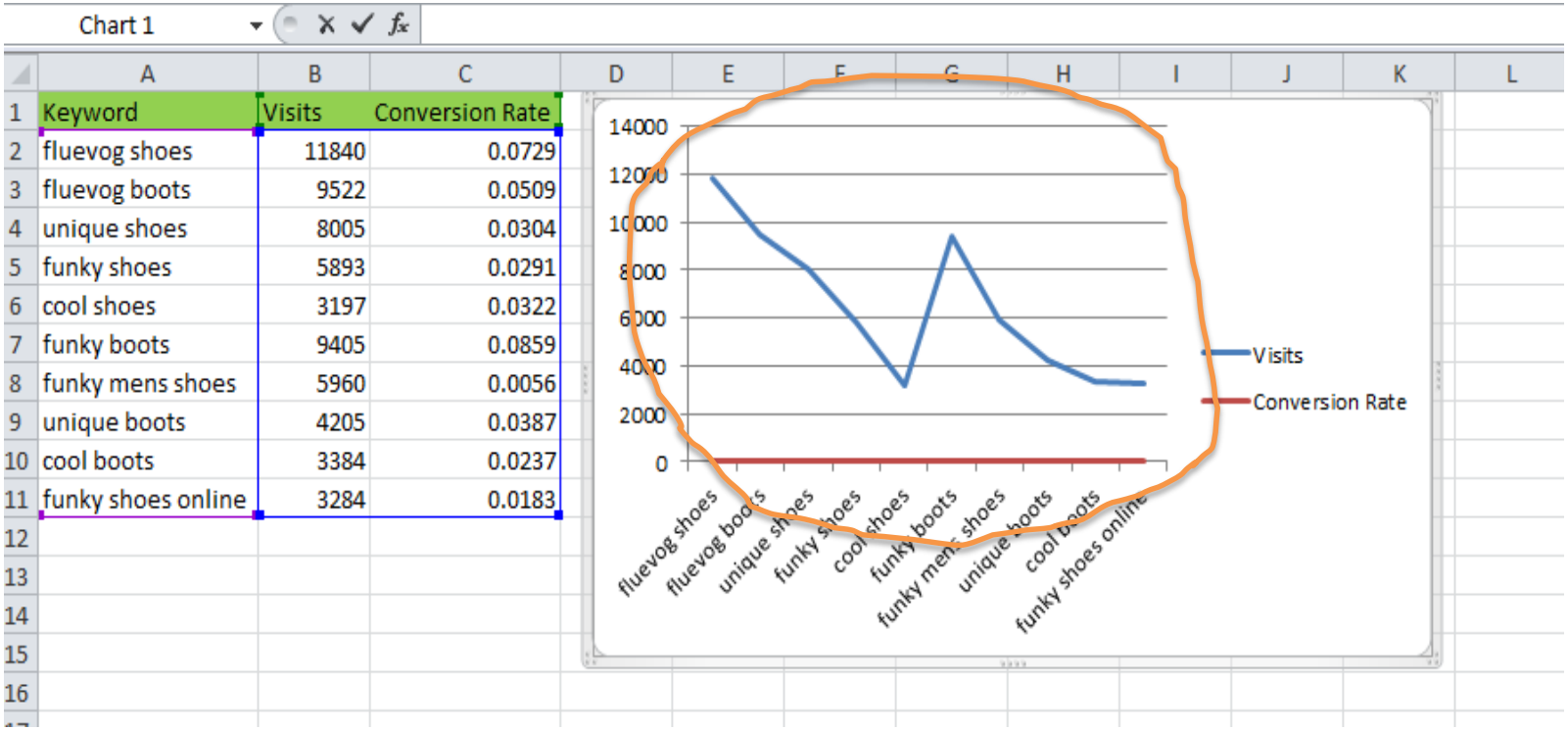
Advanced Excel Charts – Secondary Axis

Sometimes, you may want to show two series that have very different values (magnitude) on the same chart

Keyword	Visits	Conversion Rate
fluevog shoes	11840	0.0729
fluevog boots	9522	0.0509
unique shoes	8005	0.0304
funky shoes	5893	0.0291
cool shoes	3197	0.0322
funky boots	9405	0.0859
funky mens shoes	5960	0.0056
unique boots	4205	0.0387
cool boots	3384	0.0237
funky shoes online	3284	0.0183

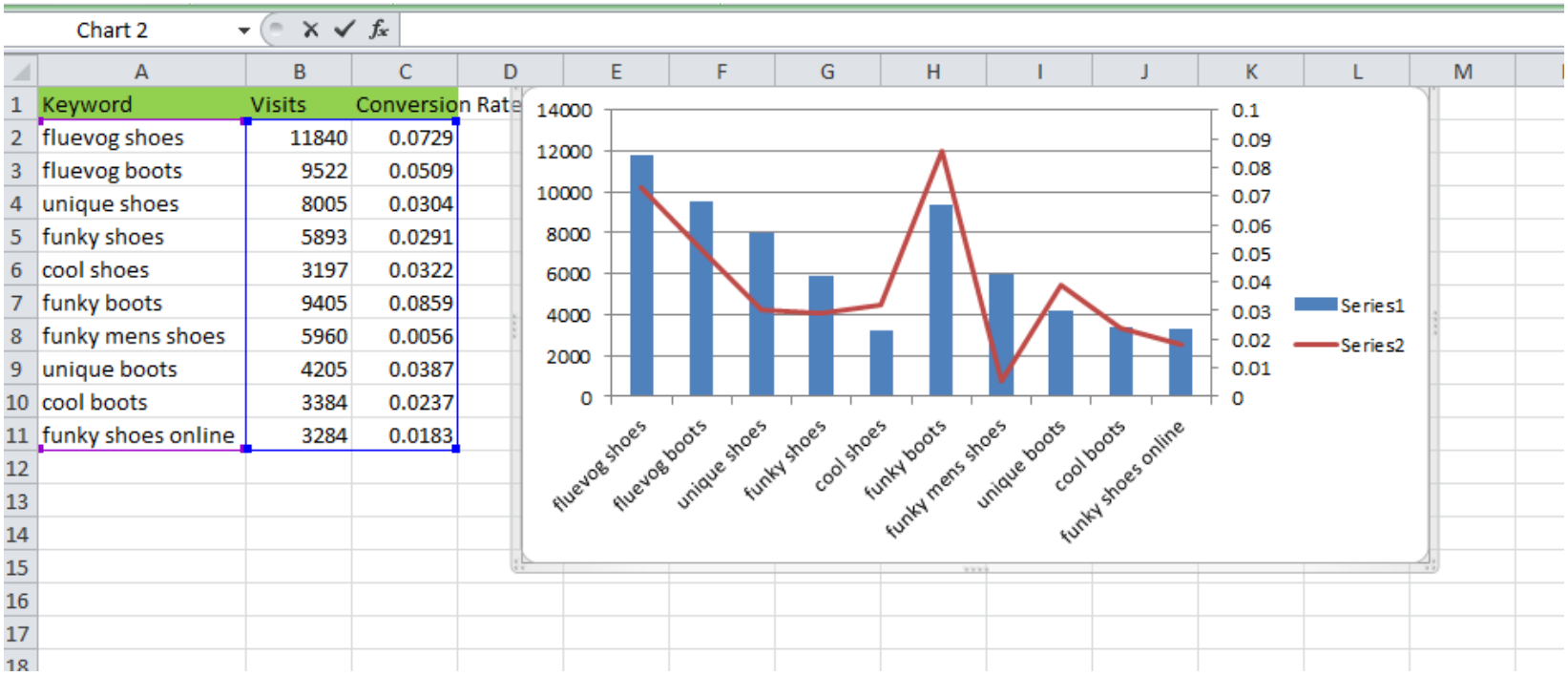
Advanced Excel Charts – Secondary Axis

If you try to put both series in the same chart, you will have trouble seeing the second series



Advanced Excel Charts – Combination Charts

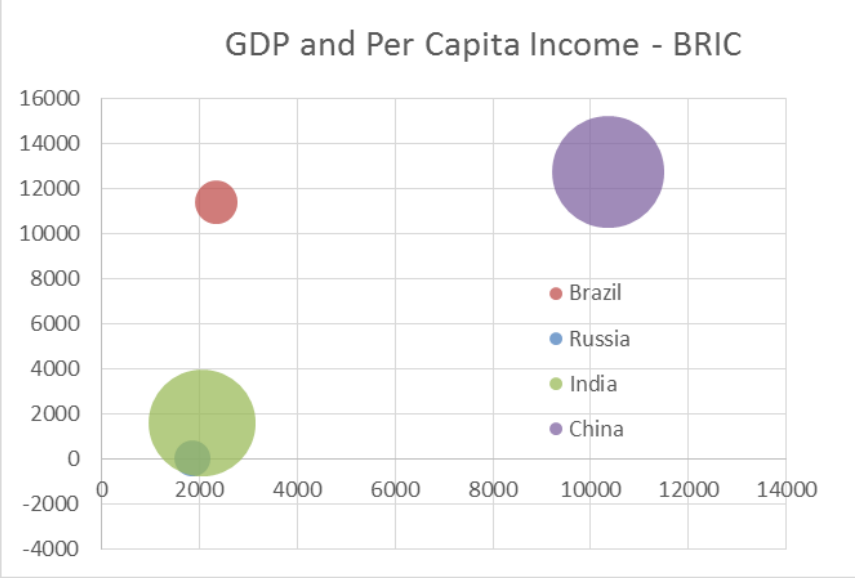
So you could use two types of visualizations on the same chart



Advanced Excel Charts – Bubble Charts

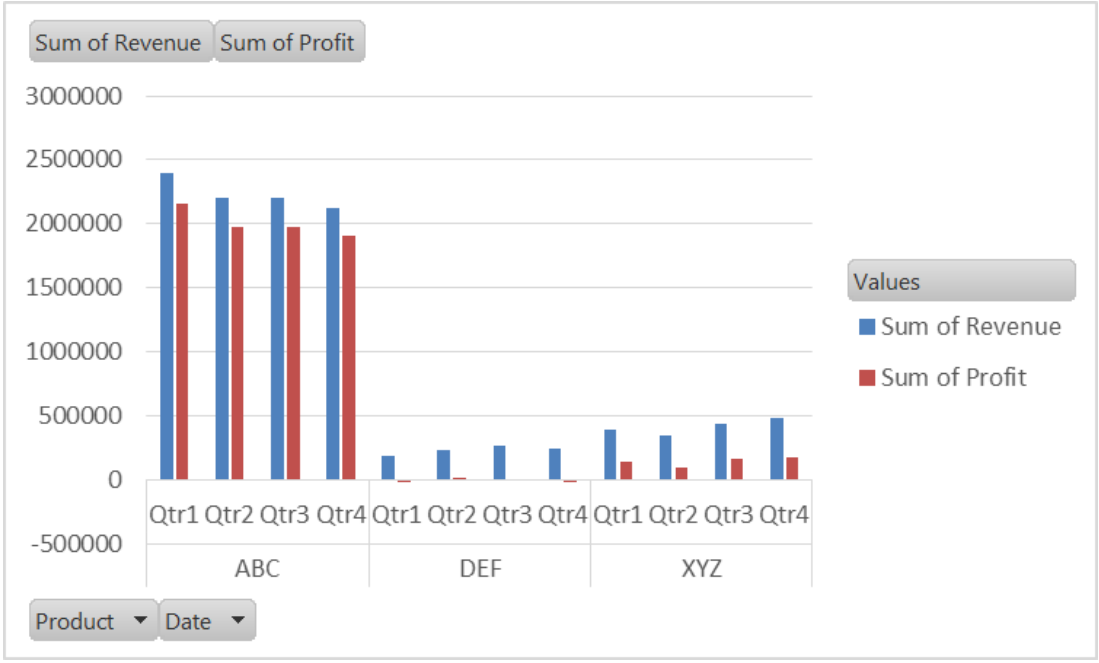
Used to add a third dimension to charts

Country	GDP	Per Capita Inc	Population
Brazil	2346	11384.4	204
Russia	1860	0.6	146
India	2051	1581	1251
China	10356	12735	1361



Advanced Excel Charts – Pivot Charts

Row Labels	Sum of Revenue	Sum of Profit
ABC	**8939085.35**	**8007385.35**
Qtr1	2399760.42	2155824.42
Qtr2	2206957.79	1978267.79
Qtr3	2206526.97	1971907.97
Qtr4	2125840.17	1901385.17
DEF	**933887.67**	**-28464.33**
Qtr1	188044.22	-13675.78
Qtr2	234885.71	3645.71
Qtr3	268790.48	-825.52
Qtr4	242167.26	-17608.74
XYZ	**1657499.92**	**573157.92**
Qtr1	394846.43	140368.43
Qtr2	345980.5	95590.5
Qtr3	431400.42	158526.42
Qtr4	485272.57	178672.57
Grand Total	**11530472.94**	**8552078.94**



Next: Formatting Excel Charts

Formatting Excel Charts

Formatting Excel Charts

It is important to both:

- Choose the appropriate type of chart
- Label and format the chart correctly

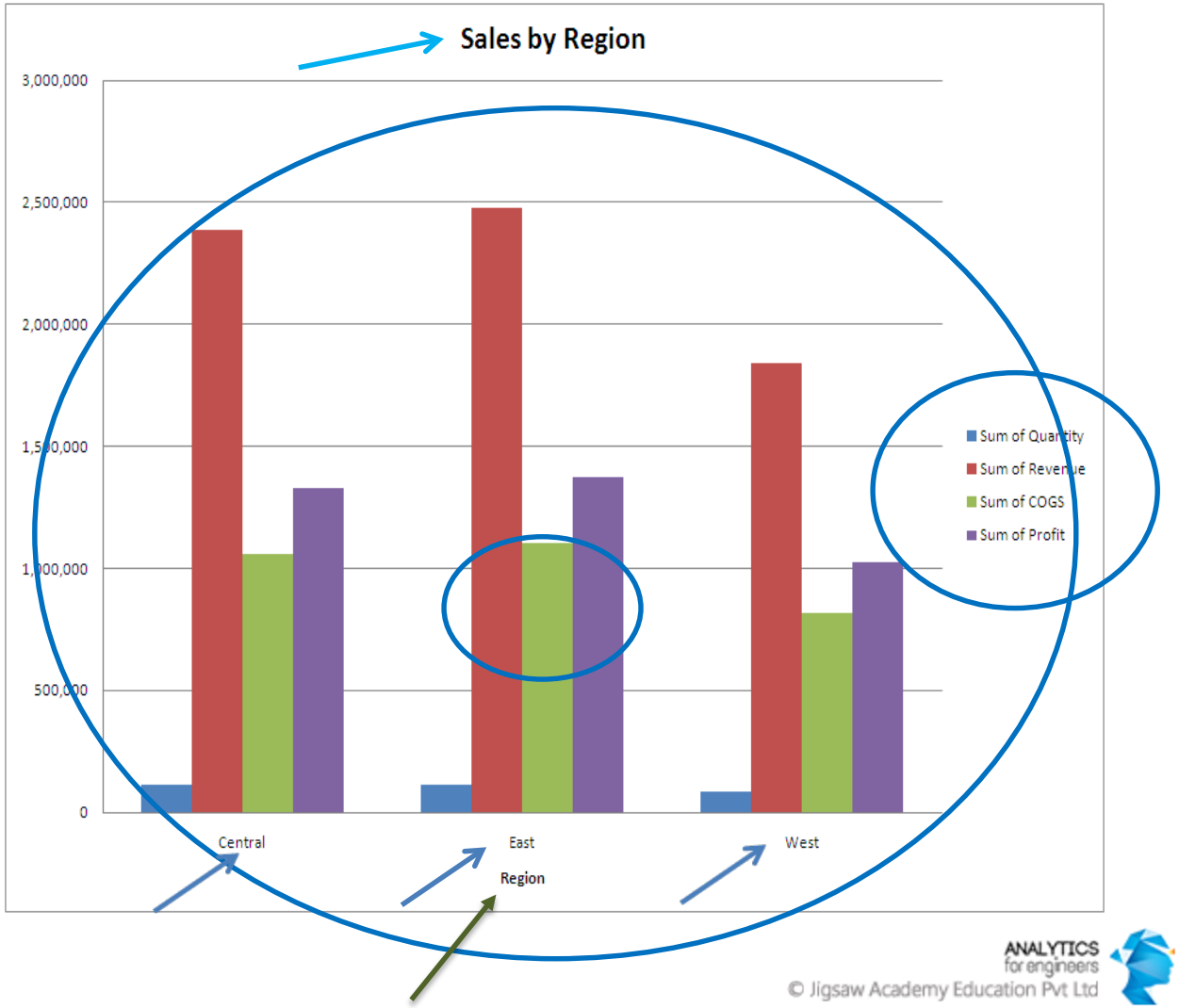
Formatting charts includes

- Chart Titles
- Axis Labeling
- Legend Labels
- Number/Values Formatting
- Grid Lines
- Plot Area Formatting
- Chart Area

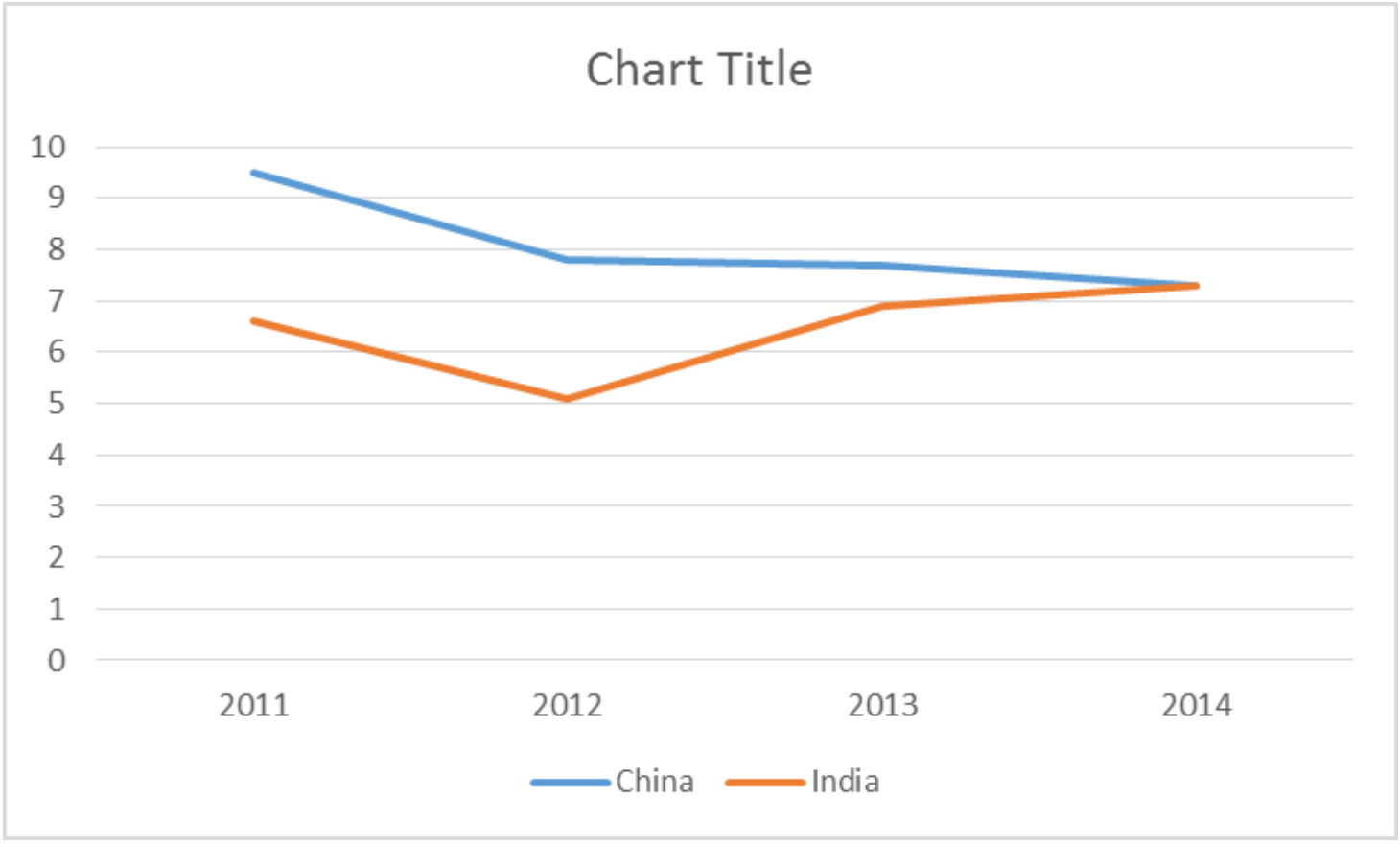
Formatting Excel Charts

Chart Elements

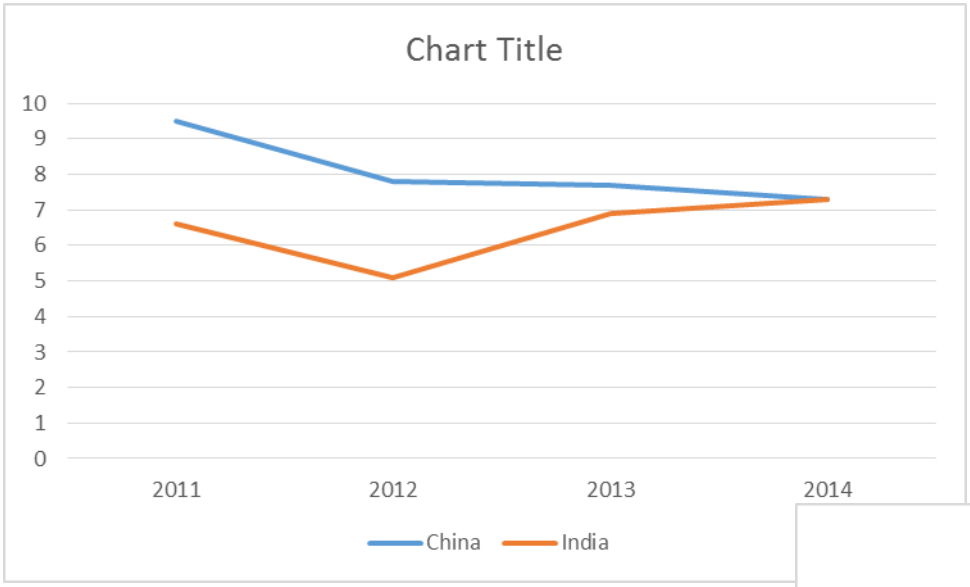
- Chart Area
- Plot Area
- Legends
- Labels
- Chart Title
- Axis Titles
- Colors

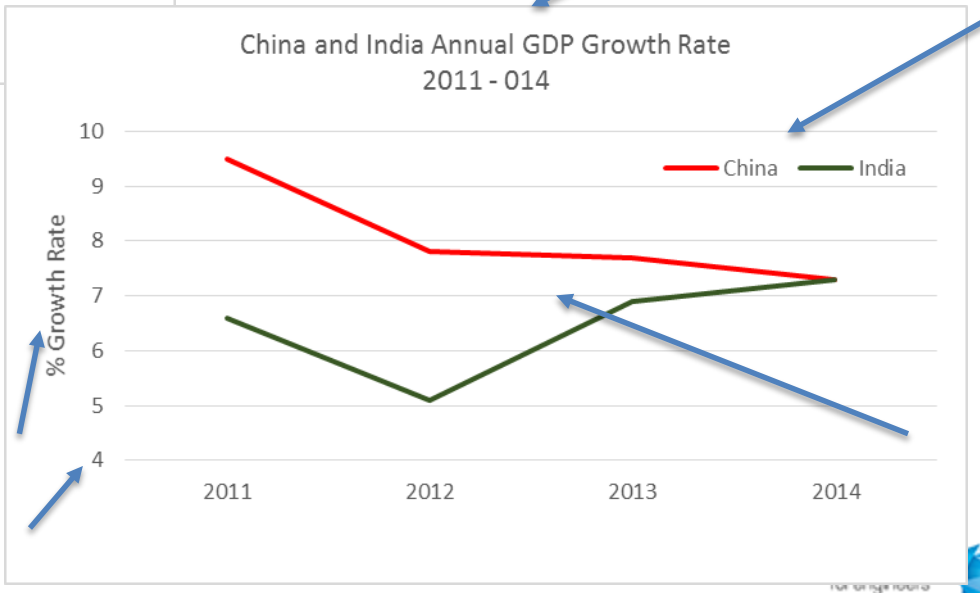


Formatting Excel Charts



Formatting Excel Charts





Formatting changes:

- Added title
- Changed colors
- Moved legend
- Changed axis start value
- Added vertical axis title

Formatting Excel Charts

How to make sure you have effective charts

1. Ensure readability (font sizes, numbers, consistency)

2. Easy identification of labels and legends - placement

3. Point to be made with data – Summary line or Title

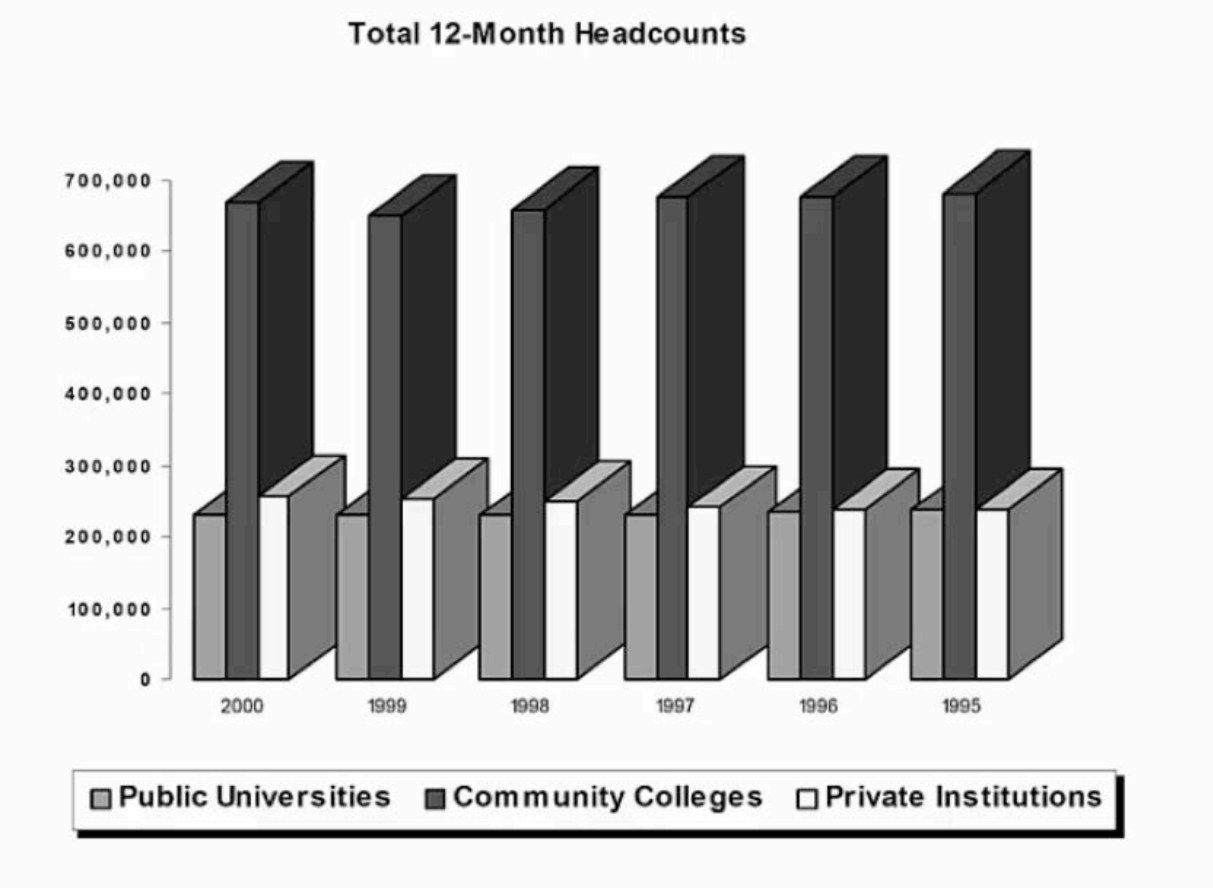
4. Scale is important

5. Choose appropriate colors (e.g. green = growth, red = decline)

<u>Remember:</u>
Do not create junk charts – too much information or not enough information

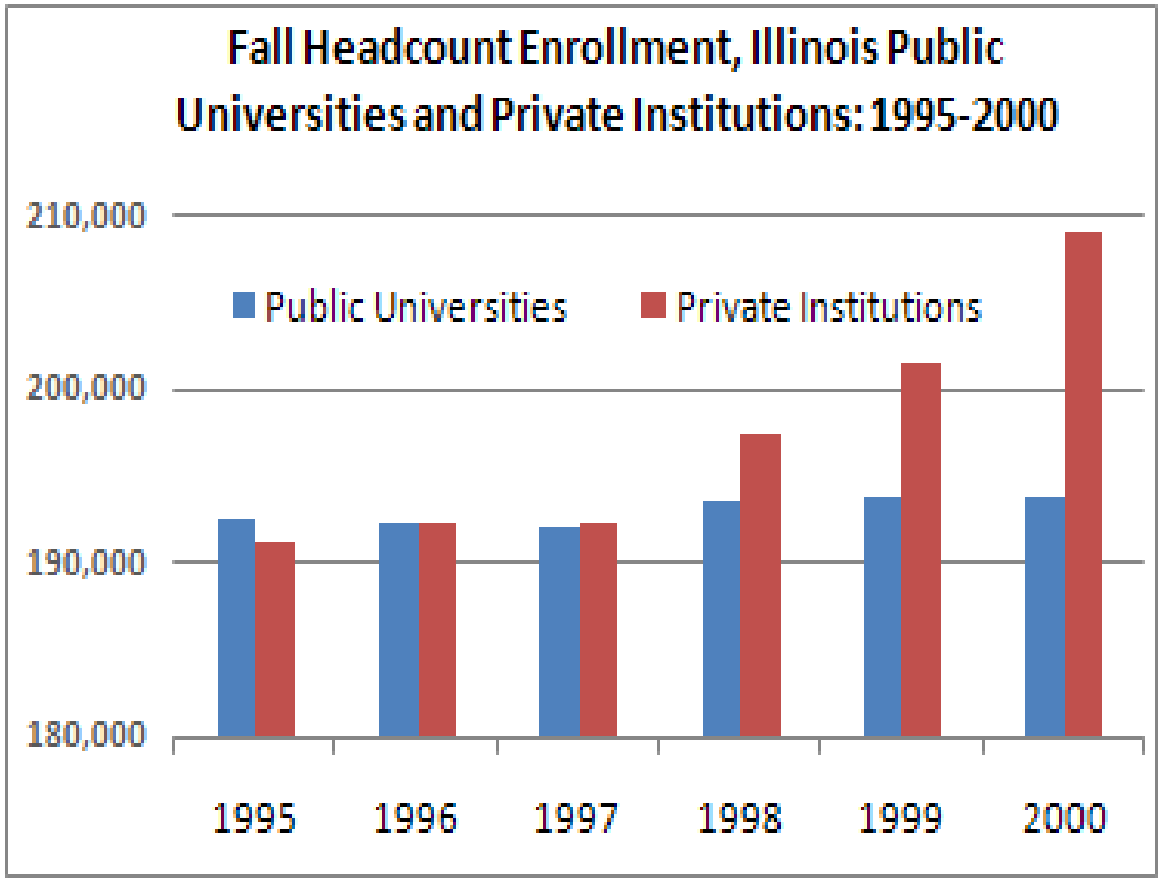
Formatting Excel Charts

How can we improve these charts?



Formatting Excel Charts

How can we improve these charts?



Formatting Excel Charts

How can we improve these charts?

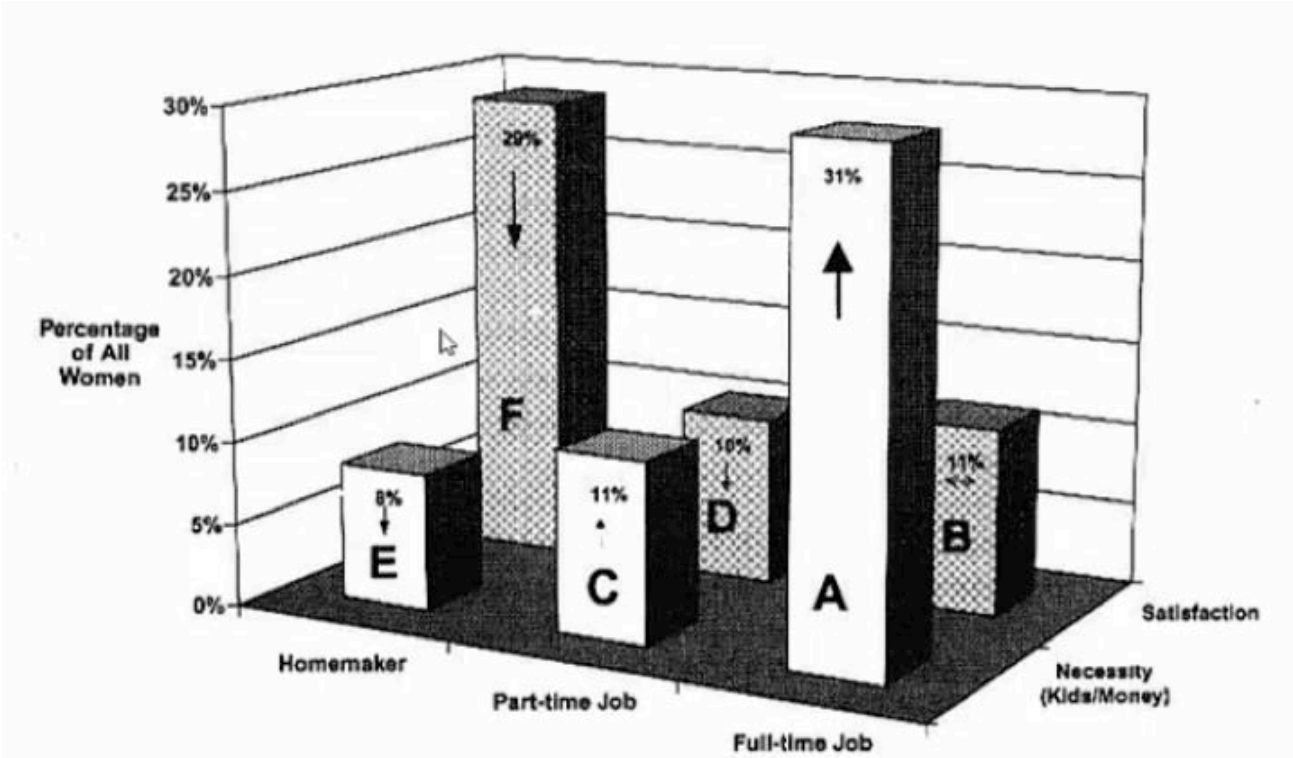
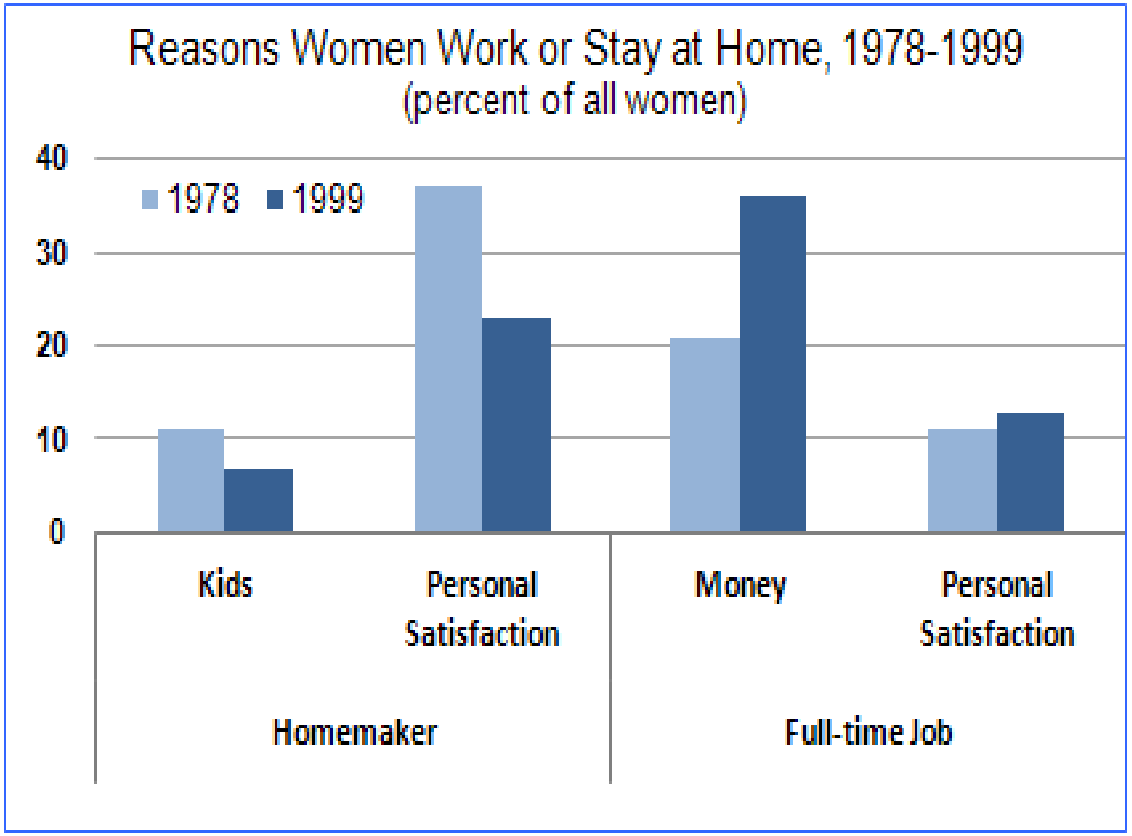


Figure 47: Working by Choice and by Necessity Among American Women, 1978–1999

Formatting Excel Charts

How can we improve these charts?

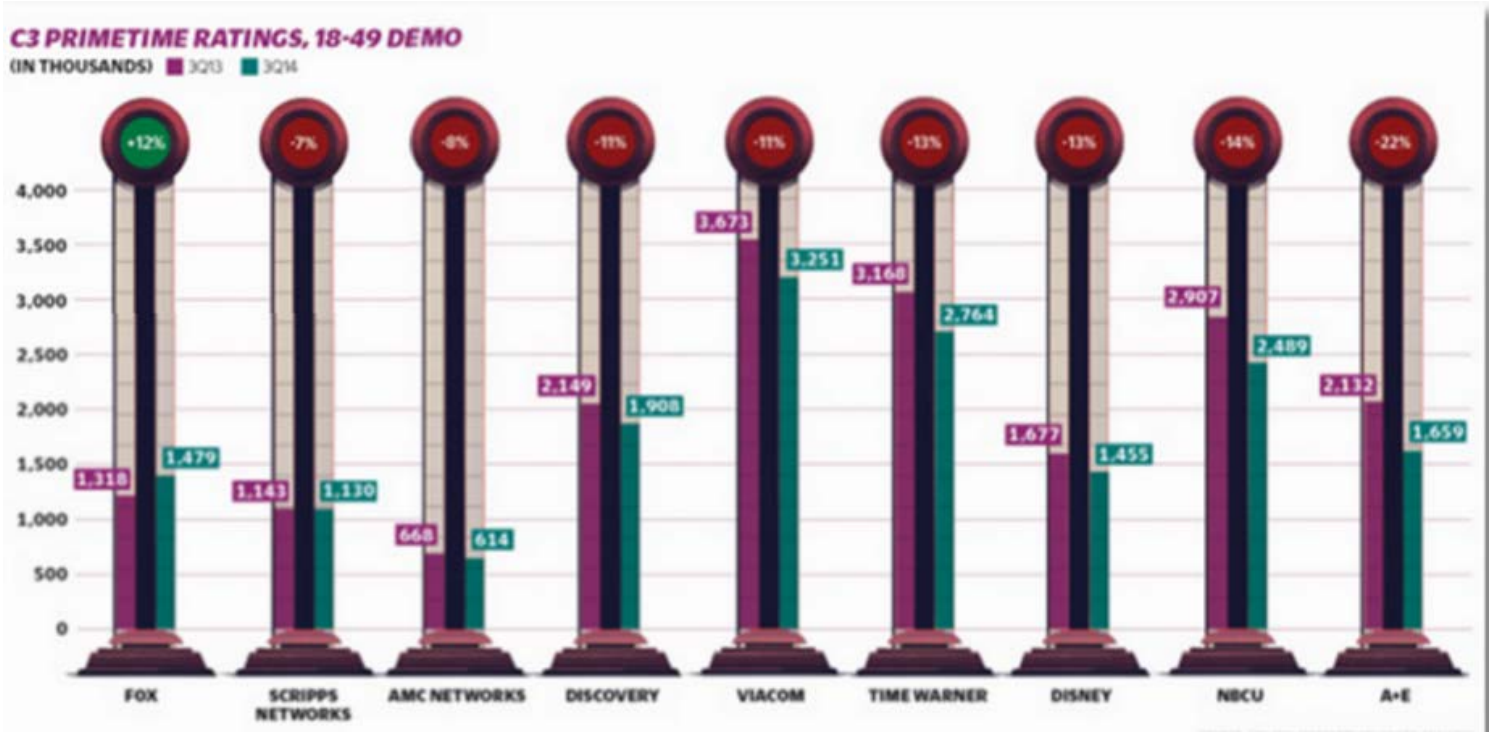


Formatting Excel Charts

How can we improve these charts?

Formatting Excel Charts

How can we improve these charts?



http://www.kaushik.net/avinash/storytelling-with-data-simplify-focus-visualize-outcomes/

Next: Generating Reports & Dashboards

Generating Reports & Dashboards

Introduction

- Objective of most business analysis is to present a report of findings and next steps
- Planning, creating and delivering a presentation or a report requires time and thought
- Presentation and reporting skills can be improved through planning, preparation and practice

Business Reporting & Dashboards

How do you build an effective business report or dashboards?

A good report requires you to build a framework

1. What is the objective of the report?
2. Who is the audience?
3. What is the most efficient way to convey the information?
4. What would you want the audience to do next?

Creating Effective Business Reports
Step 1: Objective

Why are you creating the report?

- To provide an update?
- To represent a function?
- To educate?
- To fill up the agenda?
- To sell an idea?
- To defend a position?
- To be provocative?

Points to remember

1. Be very clear on the objective
2. Keep it simple and relevant
3. Do not have more than 3-4 key points that you want to put to your audience

Creating Effective Business Reports
Step 2: Understand the Audience

- What is the expected size of the audience?
- What is the background of the audience?
- What do they already know about the subject?
- What is the appropriate level of detail for this audience?
- What are their WIIFM's? (What's In it For Me?)
- Does everyone or anyone in the audience know me**?**

Objective & Audience

When making business reports or presentations based on analysis performed by you or your team depending on the audience there are two approaches you can take:

1. **Presenting to senior executives , final presentation of results**
   - Present **executive summary first**, with key take aways or action items
   - Provide appropriate context and background data but most of it should be in the appendix
   - List all assumptions clearly upfront

2. **Presenting a WIP report, or seeking to educate an audience**
   - Provide appropriate context and background information first
   - State all assumptions and constraints clearly
   - Derive all conclusions and take-aways in a logical order

Creating Effective Business Reports
Step 3: Delivery Method & Structure

What is the most effective method of presenting your analysis?

1. Report format?
2. Dashboard format?
3. Presentation format?
4. Interactive v/s static?
5. High level v/s detail oriented?

Creating Effective Business Reports
Step 3: Delivery Method & Structure

Typical structure of a business report:

1. Executive Summary
2. Introduction and Objective Definition
3. Methodology and Data Description
4. Key Findings – Mix of tables, charts, and text
5. Summarization
6. Next steps, if applicable
7. Appendix, listing all additional relevant supporting information

Creating Effective Business Reports
Step 4: What Next?

It is very important to end with:

- Key conclusions or takeaways
- Next steps or recommendations, specified

Next: Business Reports & Dashboards

Business Reports & Dashboards

Business Reports & Dashboards

Examples of Business Reports

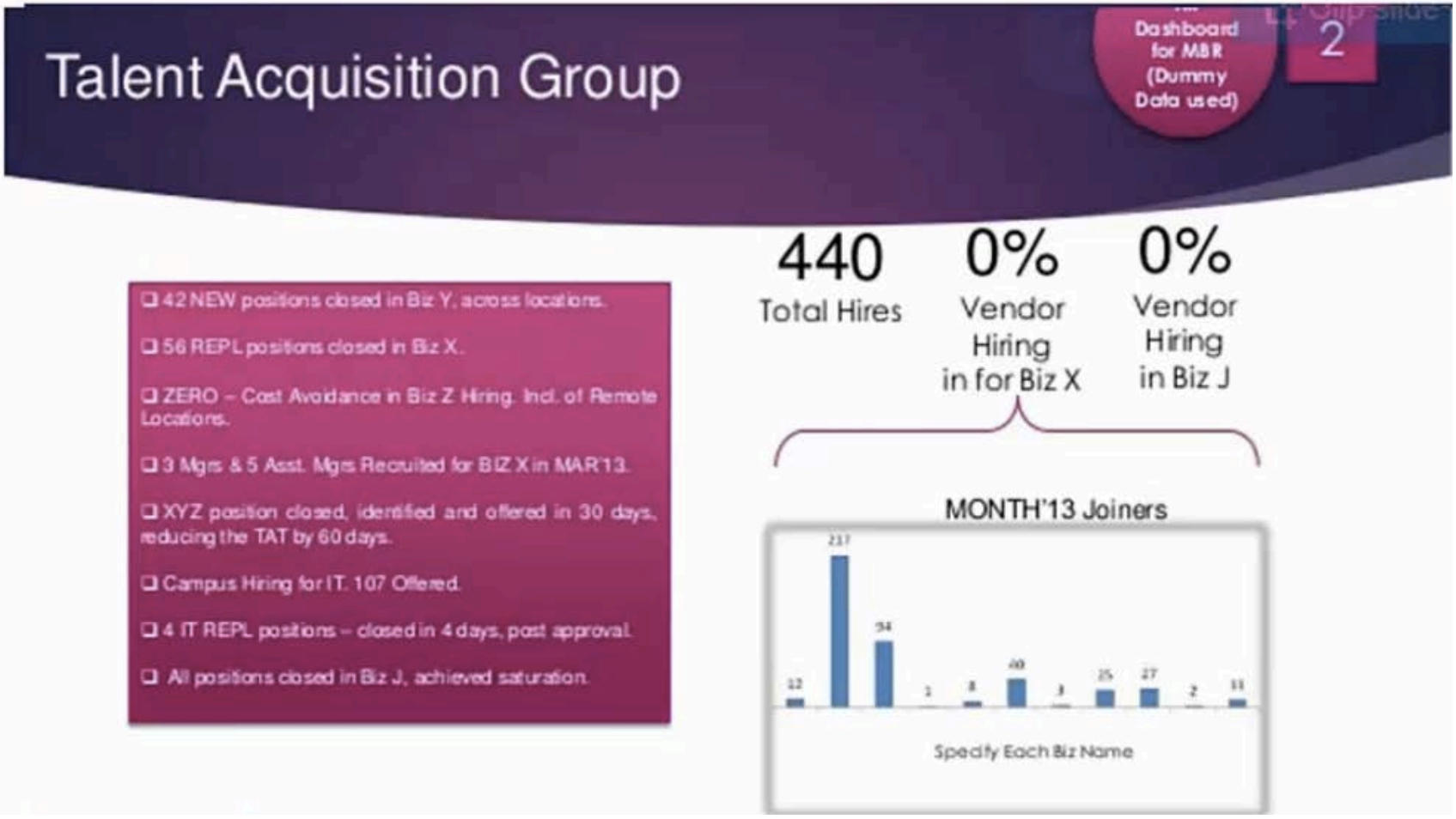
1. Annual Reports
2. Strategy Papers
3. Periodic Business Review Reports
4. Top Management Dashboards

What else?

Sample Business Reports

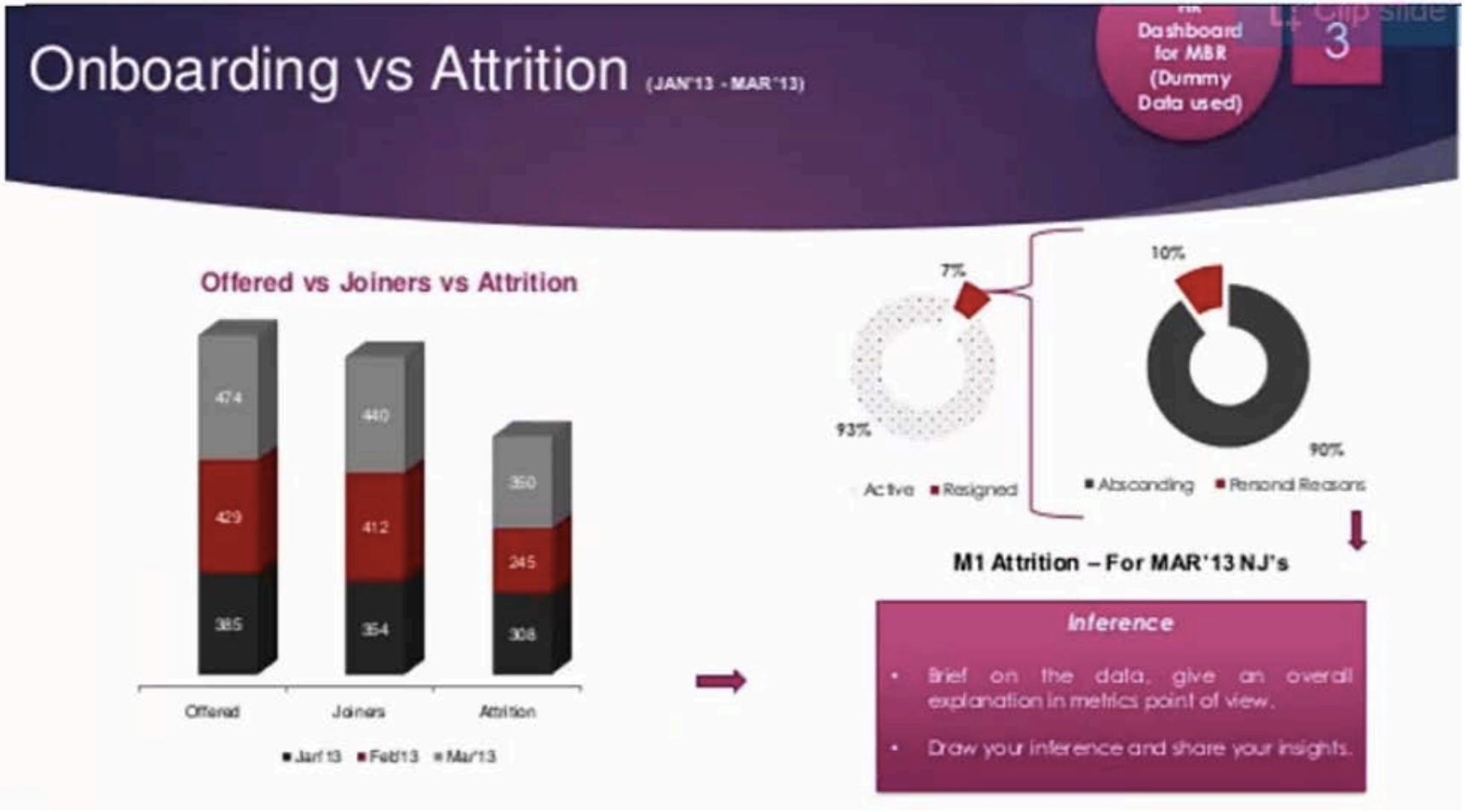
http://www.kaushik.net/avinash/digital-dashboards-strategic-tactical-best-practices-tips-examples/

Sample Business Reports



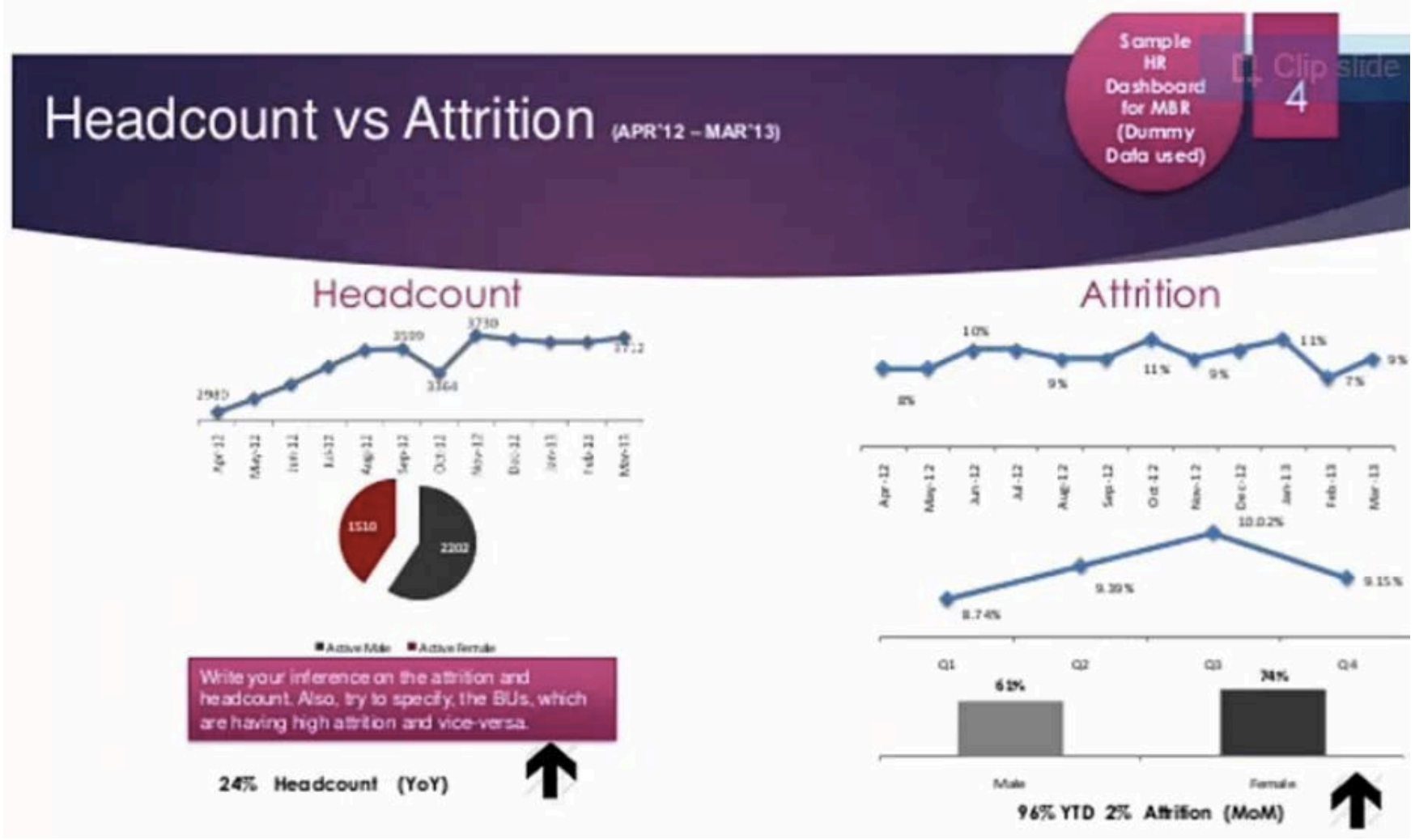
http://www.kaushik.net/avinash/digital-dashboards-strategic-tactical-best-practices-tips-examples/

Sample Business Reports



http://www.kaushik.net/avinash/digital-dashboards-strategic-tactical-best-practices-tips-examples/

Sample Business Reports



http://www.kaushik.net/avinash/digital-dashboards-strategic-tactical-best-practices-tips-examples/

Sample Business Reports

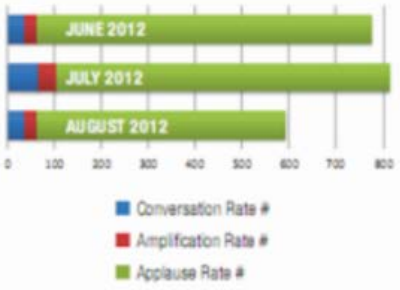
http://www.kaushik.net/avinash/digital-dashboards-strategic-tactical-best-practices-tips-examples/

Sample Business Reports

Behavior Strategy: Increase visitor engagement and loyalty

Conversation, Amplification, & Applause 3 month trend

(Source: kaushik.net, Facebook, Twitter)



Engagement 3 month trend

(Source: Google Analytics)

Key Trends & Insights:

- In Aug 2012, Conversation Rate is down by 47%, Amplification Rate is down by 27%, and Applause Rate is down 26% from the previous month.
- Frequency Rates are also down. Visitors who visited more than 9 times in the month is down 11%, and visitors who returned in less than 5 days is down 8%.
- Even though social and frequency metrics are down, Engagement Rates are up. Visitors who spent more than 3 minutes reading the post is up 26%, and those who spent more than 3 minutes and visited 3 or more pages is up 29%.

Recommended Actions:

- Implement an Email marketing program. Weekly emails will provide more regular engagement with readers, increase Economic Value.
- Set a new goal to reply to all pertinent comments in 12 hours to positively impact Conversation Rate.

Dear Avinash: Attribution Modeling, Org Culture, Deeper Analysis +++

Published: August 13, 2012

Conversation Rate #
36 Comments

Amplification Rate #
Retweets: 25
Facebook shares: 3

Applause Rate #
Stumbleupon: 1
Facebook: 78
Twitter: 329
Google+: 66
LinkedIn: 55

Visits to post: 5,955 (30 days after post)

Visits that spent 3 or more minutes on post: 737

Visits that spent 3 or more minutes on post and viewed 3 or more pages: 337

Frequency - Count of visits +9: 11,740
% of Total: 9.36% (125,484)

Frequency - < 5 days Since Last Visit: 113,520
% of Total: 90.47% (125,484)

Web Analytics Consulting: A Simple Framework For Smarter Decisions

Published: July 23, 2012

Conversation Rate #
67 Comments

Amplification Rate #
Retweets: 33
Facebook shares: 5

Applause Rate #
Stumbleupon: 1
Facebook: 82
Twitter: 497
Google+: 61
LinkedIn: 65

Visits to post: 2,404 (30 days after post)

Visits that spent 3 or more minutes on post: 551

Visits that spent 3 or more minutes on post and viewed 3 or more pages: 242

Frequency - Count of visits +9: 13,068
% of Total: 9.60% (136,073)

Frequency - < 5 days Since Last Visit: 122,117
% of Total: 89.74% (136,073)

EU Cookie / Privacy Laws: Implications On Data Collection And Analysis

Published: June 25, 2012

Conversation Rate #
36 Comments

Amplification Rate #
Retweets: 25
Facebook shares: 2

Applause Rate #
Stumbleupon: 1
Facebook: 81
Twitter: 431
Google+: 46
LinkedIn: 152

Visits to post: 4,566 (30 days after post)

Visits that spent 3 or more minutes on post: 450

Visits that spent 3 or more minutes on post and viewed 3 or more pages: 123

Frequency - Count of visits +9: 11,685
% of Total: 9.49% (123,138)

Frequency - < 5 days Since Last Visit: 111,053
% of Total: 90.19% (123,138)

http://www.kaushik.net/avinash/digital-dashboards-strategic-tactical-best-practices-tips-examples/

Business Dashboards

A business intelligence dashboard is a data visualization tool that displays the current status of metrics and key performance indicators (KPIs) for an enterprise

Dashboards consolidate and arrange numbers, metrics and sometime performance scorecards on a single screen

They may be tailored for a specific role and display metrics targeted for a single point of view

Definition from: http://searchbusinessanalytics.techtarget.com/definition/business-intelligence-dashboard

Business Dashboards

Let's take a case study : You have sales performance data by region, along with profitability. You want to present a high level summary of performance to your CEO

A1 | Region

	A	B	C	D	E	F	G	H	I
1	Region	Product	Date	Customer	Quantity	Revenue	COGS	Profit	
2	East	XYZ	1-Jan-04	Ford	1000	22810	10220	12590	
3	Central	DEF	2-Jan-04	Verizon	100	2257	984	1273	
4	East	ABC	2-Jan-04	Verizon	500	10245	4235	6010	
5	Central	XYZ	3-Jan-04	Ainsworth	500	11240	5110	6130	
6	Central	XYZ	4-Jan-04	Ainsworth	400	9204	4088	5116	
7	East	DEF	4-Jan-04	Gildan Activewear	800	18552	7872	10680	
8	East	XYZ	4-Jan-04	Texaco	400	9152	4088	5064	
9	Central	ABC	5-Jan-04	IBM	400	6860	3388	3472	
10	East	ABC	7-Jan-04	General Motors	400	8456	3388	5068	
11	East	DEF	7-Jan-04	State Farm	1000	21730	9840	11890	
12	West	XYZ	7-Jan-04	Texaco	600	13806	6132	7674	
13	Central	ABC	9-Jan-04	General Motors	800	16416	6776	9640	
14	East	XYZ	9-Jan-04	HP	900	21015	9198	11817	
15	East	XYZ	10-Jan-04	Ainsworth	900	21465	9198	12267	
16	Central	XYZ	10-Jan-04	Wal-Mart	900	21438	9198	12240	
17	West	XYZ	12-Jan-04	Ainsworth	400	9144	4088	5056	
18	Central	ABC	12-Jan-04	IBM	300	6267	2541	3726	
19	Central	ABC	14-Jan-04	Sun Life Financial	100	1740	847	893	
20	East	XYZ	14-Jan-04	Sun Life Financial	100	2401	1022	1379	
21	West	ABC	14-Jan-04	Wal-Mart	1000	19110	8470	10640	
22	East	ABC	15-Jan-04	Verizon	500	9345	4235	5110	
23	East	ABC	16-Jan-04	Molson, Inc	600	11628	5082	6546	
24	Central	XYZ	16-Jan-04	Wal-Mart	900	21888	9198	12690	
25	East	DEF	17-Jan-04	Exxon	300	5961	2952	3009	
26	West	DEF	19-Jan-04	Verizon	100	2042	984	1058	
27	Central	ABC	20-Jan-04	Molson, Inc	900	17505	7623	9882	
28	West	DEF	21-Jan-04	Exxon	300	7032	2952	4080	

Business Dashboards

One option is to create multiple charts etc. and generate a report

What are the problems with that approach?

1. Attention span of top management
2. All in one place requirement
3. Multiple comparisons
4. High level summaries

If you could figure out a way to include all relevant information, either tables or charts in one place or at one glance, the report's usefulness to the CEO could be a lot more

How could you do it?

Instead of generating multiple charts / tables on multiple Excel worksheets, you could put all of them in one place

Business Dashboards

Steps to Creating a Dashboard in Excel:

1. Understand the problem or the required outcome
2. List metrics and KPIs that will be useful given the desired outcome
3. Assess optimal ways of representing the metrics/KPIs – Tables, pivots, charts etc.
4. Design the dashboard with all the elements
5. Create individual tables, charts, pivots
6. Put all elements together with appropriate sizing
7. Re-check for consistency, readability etc.

Business Dashboards

Supposing you needed to present a high level performance report to your CEO based on the previous data

What kind of metrics or KPIs do you think the CEO would be interested in?

1. Performance by Region - Revenue
2. Performance by Product - Revenue
3. Profitability by Product - Profits
4. Profitability by Region – Profits
5. Top Customers – Revenue and Profits
6. Bottom Customers – Revenue and Profits
7. Sales Trends
8. Pricing Comparisons

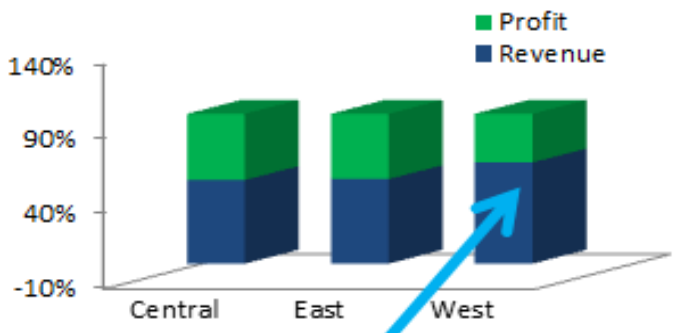
Business Dashboards

What would be the best ways to show these metrics?

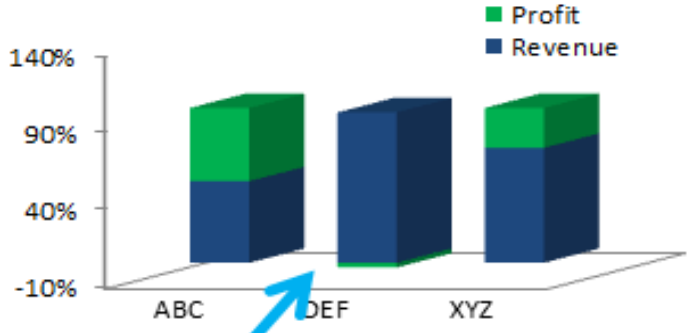
1. Performance by Region - Table, Chart, Pivot?
2. Top 5 Customers
3. Sales Trends
4. Pricing

Business Dashboards

Company XYZ Sales Performance - 2004



Lower Margin in West



DEF Unprofitable

Margin

Region	ABC	DEF	XYZ
Central	49,589	1,484	4,212
East	56,701	-1,395	-1,655
West	6,250	-274	7,601

Pricing

Product	Central	East	West
ABC	101	119	20
DEF	12	7	9
XYZ	18	8	23

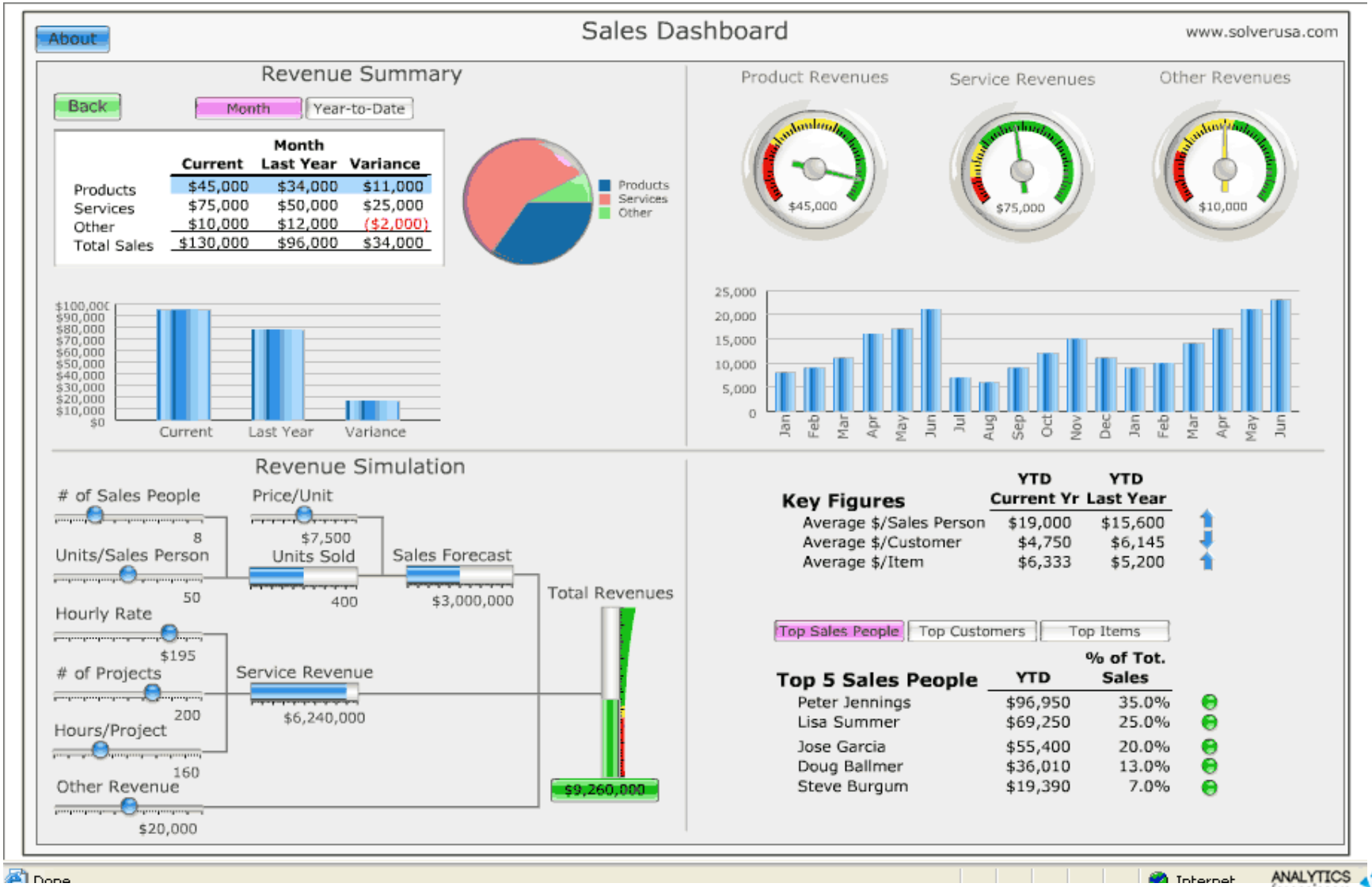
Wide variation in Pricing and Magins - potential opportunity to rationalize pricing

Business Dashboards

To reiterate, the idea is to create a report that allows the reader to get a high level understanding of key performance metrics

Because there will be a lot of information, readability and ease of instant understanding is critical

Sample Business Dashboards

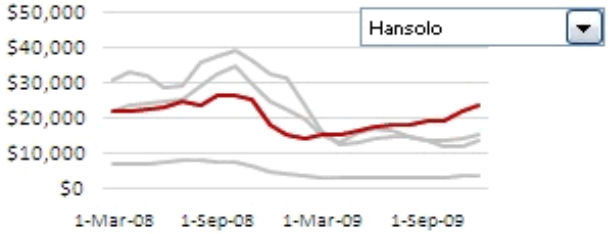


Sample Business Dashboards

Sample Business Dashboards

Sales Force Summary, Two Year 2008-2009

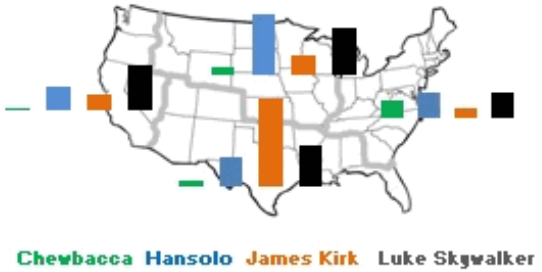
			Monthly	3-Mon Rolling	Budget/Actual	Variance to Budget
All	$	1,652,992				-2%
Chewbacca	$	116,303				-7%
Hansolo	$	489,337				22%
James Kirk	$	490,777				-6%
Luke Skywalker	$	556,575				-14%



Headlines:

Revenue is 2% less than the forecast
Hansolo exceeded forecasted sales
2009 revenue is 41% less than 2008

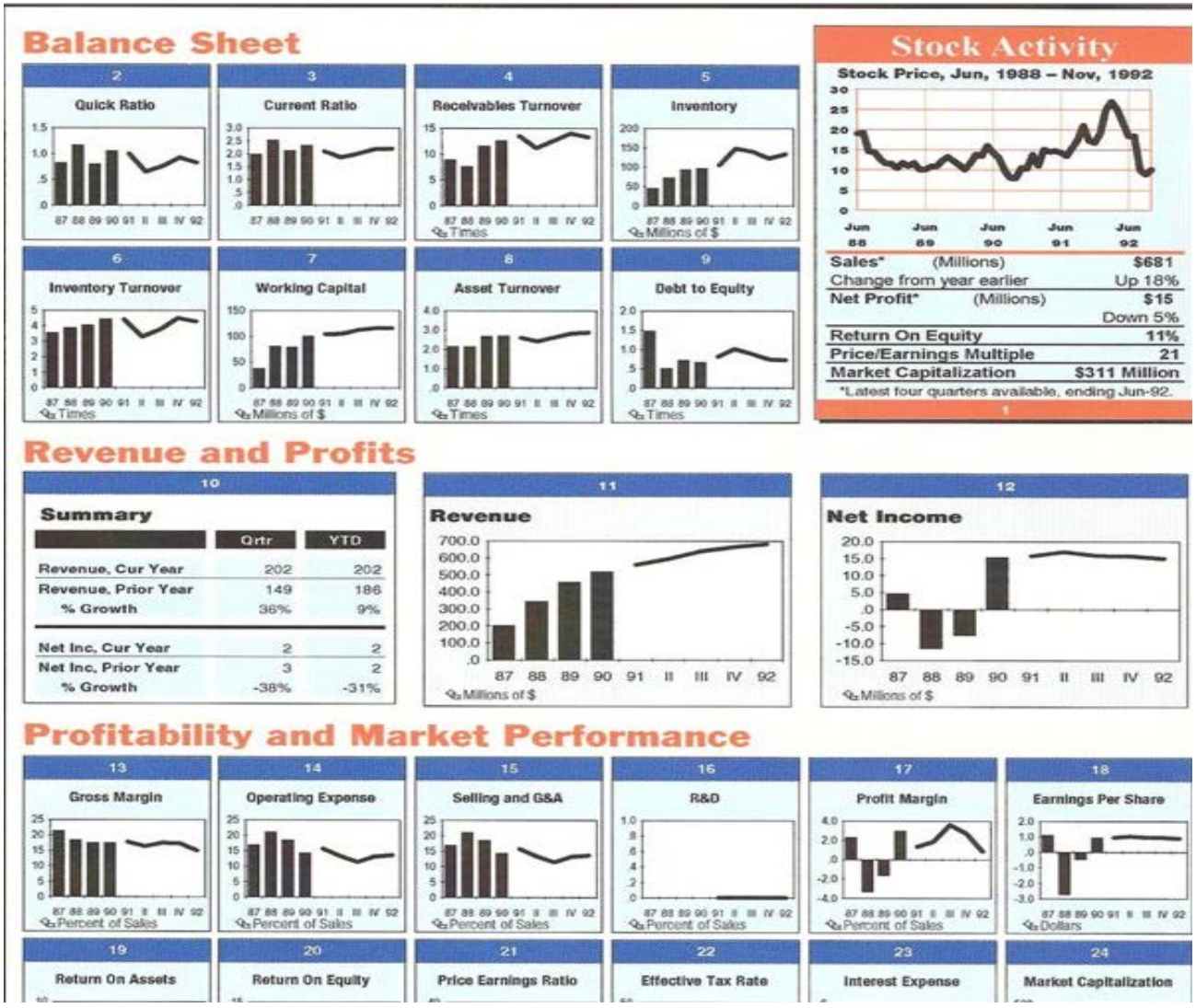
Region	East	North	South	West
Chewbacca	$ 61,225	$ 24,268	$ 22,434	$ 8,377
Hansolo	$ 87,733	$ 211,431	$ 113,371	$ 76,802
James Kirk	$ 37,178	$ 65,525	$ 332,805	$ 55,270
Luke Skywalker	$ 88,034	$ 167,432	$ 151,266	$ 149,843
Total	$ 274,170	$ 468,656	$ 619,875	$ 290,292



Product	Glue Guns	Light Sabres	Transponders	Product Mix per Salesperson
Chewbacca	$ 20,447	$ 48,403	$ 47,453	
Hansolo	$ 64,532	$ 241,756	$ 183,049	
James Kirk	$ 60,618	$ 225,320	$ 204,839	
Luke Skywalker	$ 39,112	$ 284,845	$ 232,618	
Total	$ 184,710	$ 800,324	$ 667,959	

Sample Business Dashboards

Sample Business Dashboards



Business Dashboards

How do you build good dashboards?

1.Appropriate use :

Reports v/s Dashboards

2. Audience goals

3. Design

4. Consistency and Readability

5. Summarization

Reports v/s Dashboards

Appropriate Use:

Reports:

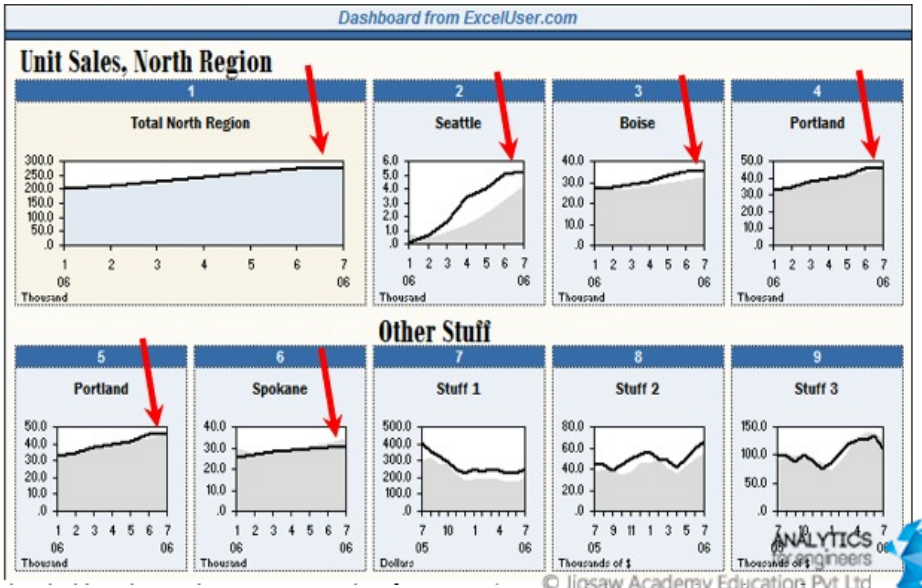
1. More detailed
2. More story oriented
3. Need more time – deep dive analysis
4. Multiple Pages

Dashboards

1. Focus on important information
2. Identify critical action areas
3. Single page views

North Region Unit Sales by City *July 2006*

	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06
	Actuals						
Seattle	111	653	1,598	3,411	3,972	5,092	5,290
Boise	26,779	27,867	29,153	30,557	33,402	35,400	35,450
Portland	33,078	34,401	37,535	39,916	41,357	45,306	46,671
Spokane	25,417	26,669	28,092	29,020	29,674	30,501	30,838
North Region	**199,841**	**211,053**	**226,789**	**242,957**	**256,605**	**273,640**	**277,777**
	Plan						
Seattle	693	468	790	1,383	2,205	3,180	4,213
Boise	29,525	26,062	27,088	28,269	29,536	30,821	32,166
Portland	32,276	34,708	36,737	38,857	41,066	43,364	45,750
Spokane	30,500	26,644	27,987	29,430	30,994	32,594	34,231
North Region	**191,783**	**203,916**	**216,524**	**230,474**	**246,390**	**263,378**	**281,228**
	Variance						
Seattle	-582	185	808	2,029	1,767	1,912	1,076
Boise	-2,746	1,805	2,064	2,288	3,866	4,578	3,285
Portland	802	-307	798	1,059	291	1,942	921
Spokane	-5,082	25	105	-410	-1,320	-2,093	-3,393
North Region	**8,057**	**7,137**	**10,265**	**12,483**	**10,215**	**10,261**	**-3,451**



Reports v/s Dashboards

Audience Goals

1. Audience need is critical to understand
2. Audience needs drive goal and layout of dashboards
3. Identify critical areas of audience interest
4. Include analysis of problem areas or summary of deep dive analysis

Sales Performance? Financial Indicators? CEO vs COO?

Dashboard Design Principles

1. **Grouping is important**
   - Since dashboards usually contain multiple charts, group similar items together
   - Use business logic to decide grouping
2. **Summarize information efficiently**
   - If you have 20 product categories with 15 contributing to < 5% of sales, you don't need to show sales of all 20 separately
3. **Use colors carefully**
   - Use colors for highlighting
   - Keep color use consistent
4. **Don't overcomplicate charts**
   - Label appropriately, but don't add too much information (secondary axes, multiple shapes)
5. **Keep it simple**

Dashboard Design Principles

Readability is Key

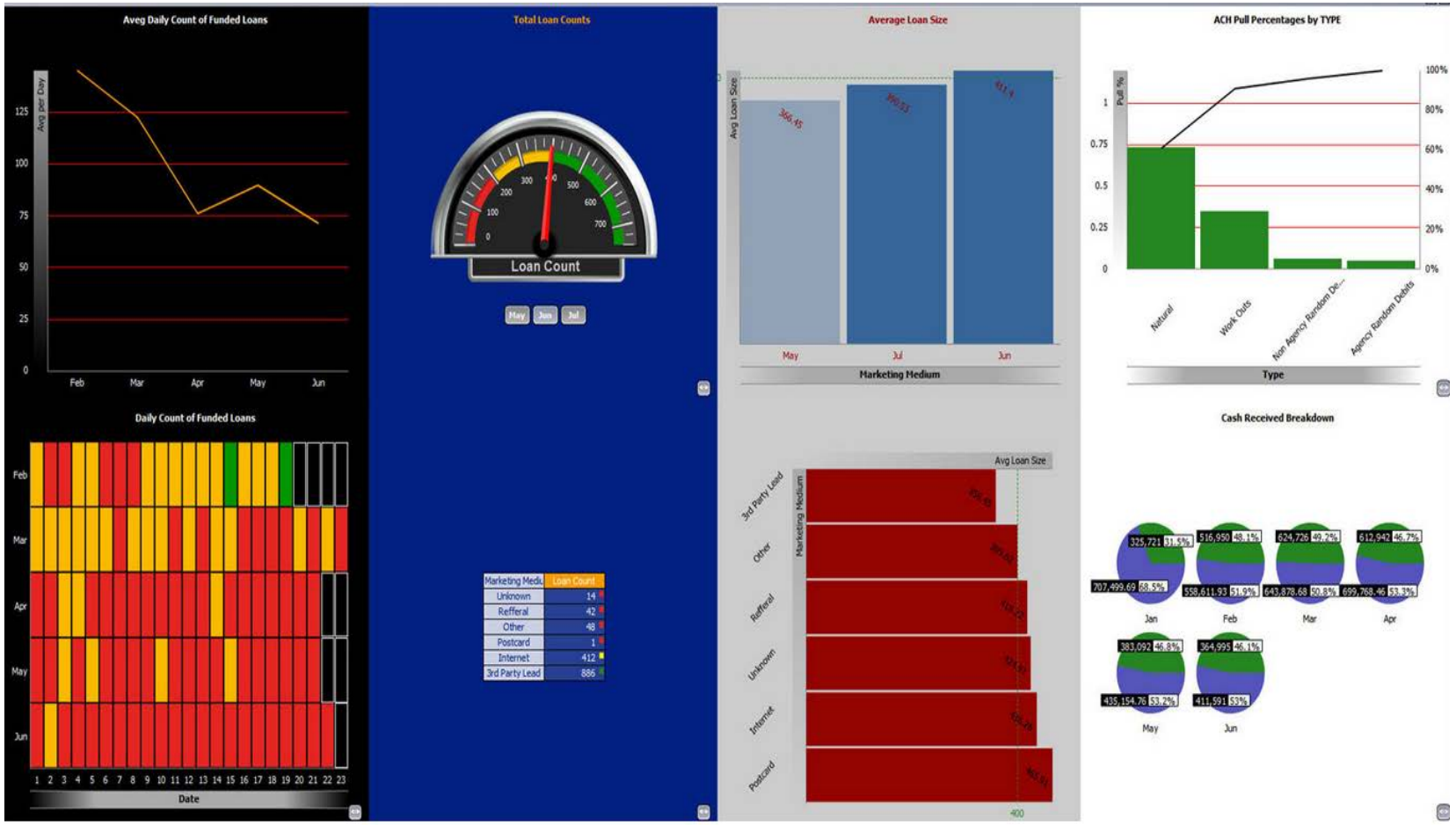
1. By design, dashboards tend to have lots of information
2. Give readers a logical flow (left to right, top to bottom)
3. Use text and tables as appropriate
4. Allow space for critical points to be highlighted
5. Allow for multiple iteration time

Creating Effective Dashboards

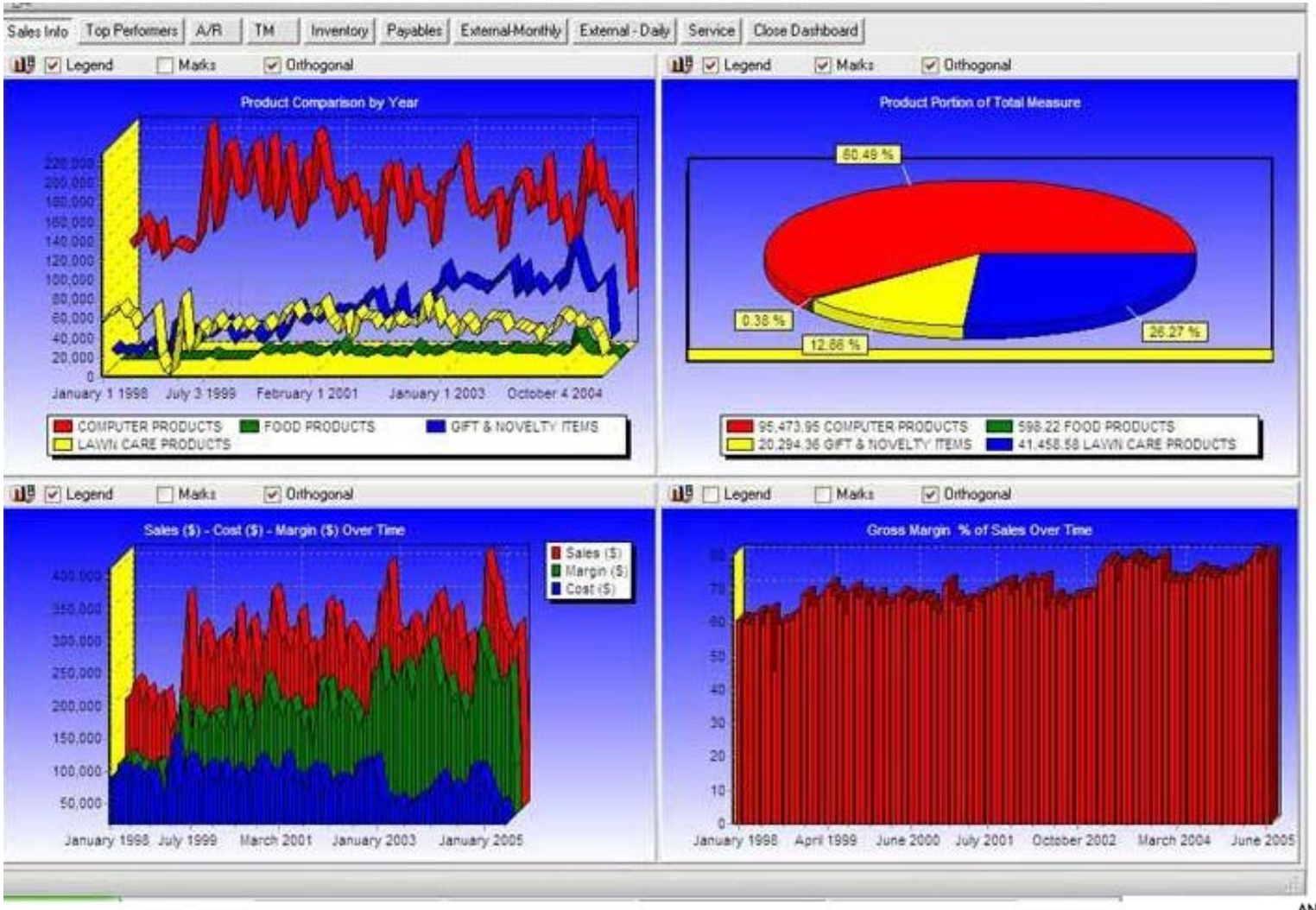
Summarization and Conclusions

1. Always include at least 1 or more lines summarizing key findings
2. Key findings should be easily deduced from the dashboard
3. Dynamic summaries are possible with advanced Excel functions

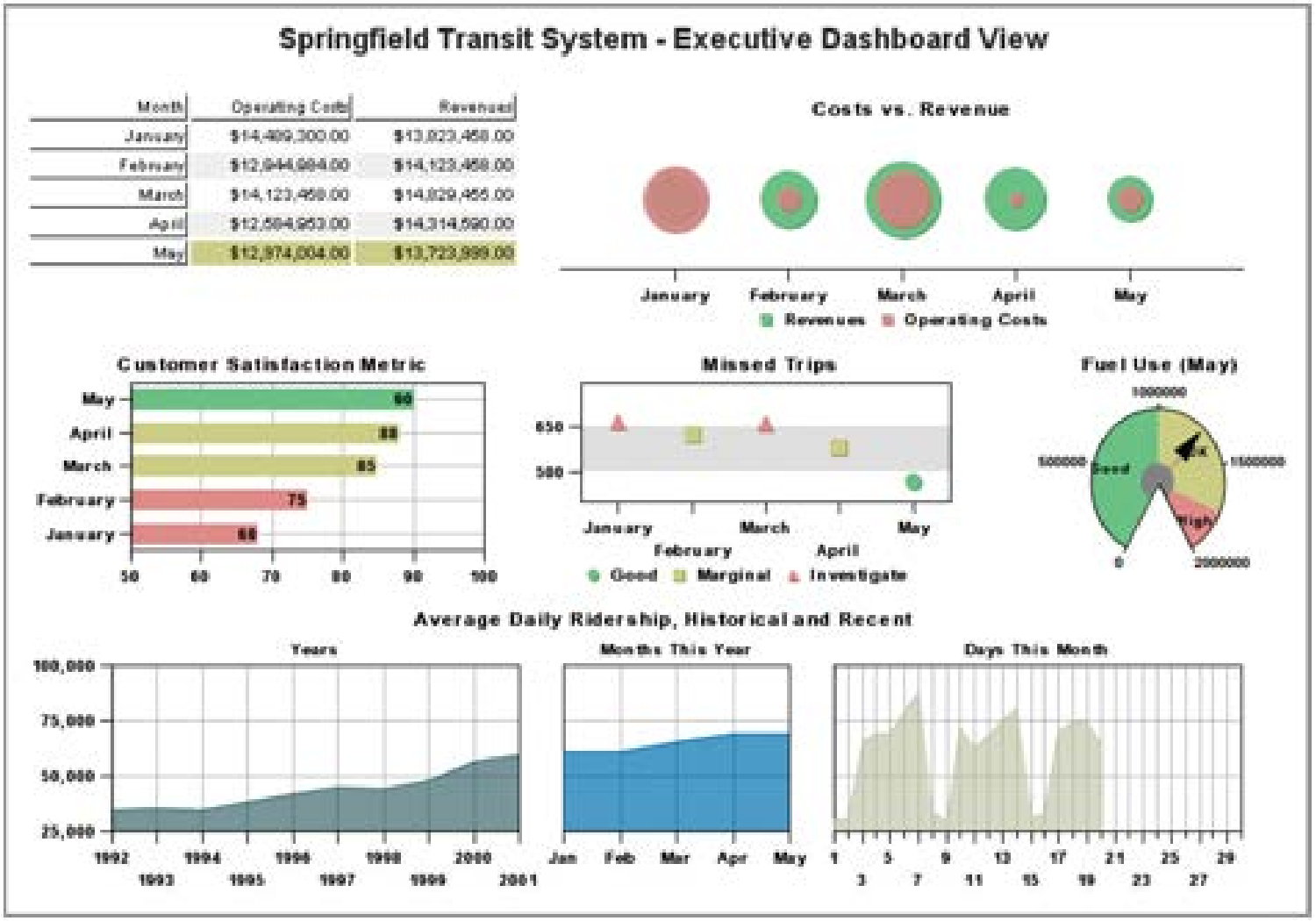
How can we improve these dashboards?



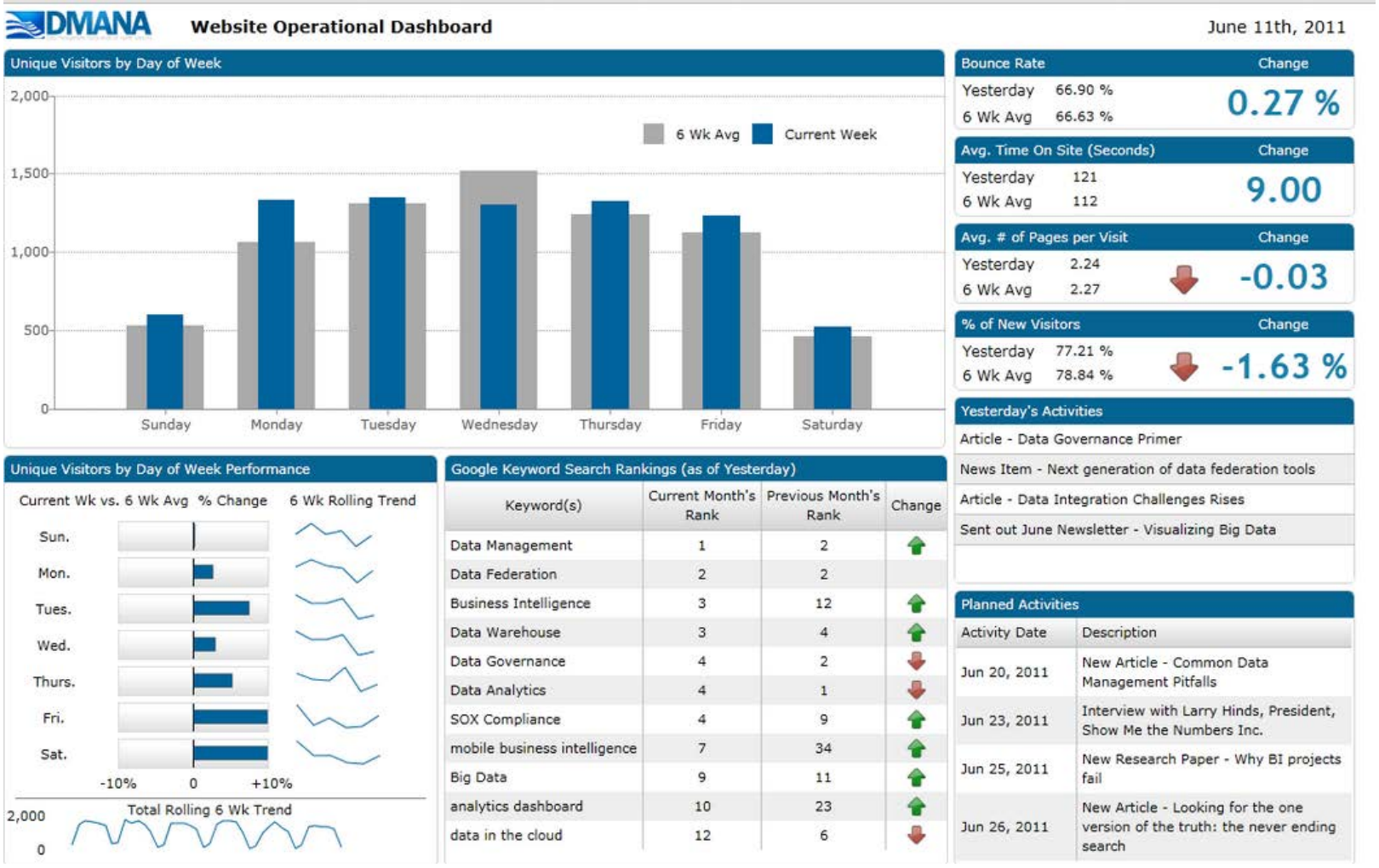
How can we improve these dashboards?



Well-Designed Dashboards



Well-Designed Dashboards



Well-Designed Dashboards

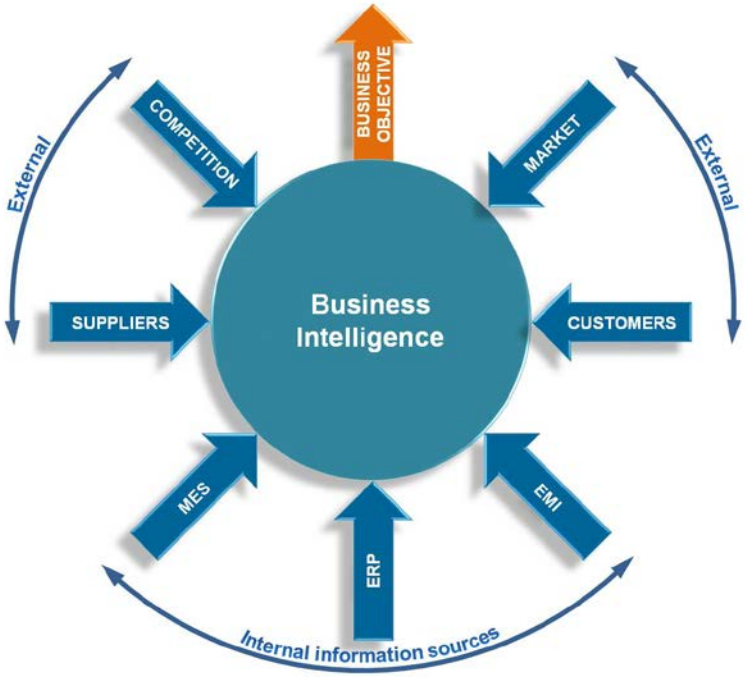
Business Reports & Dashboards

- Reports & dashboards are tools that allow us to analyze data better, and present results effectively
- Need to budget time and effort for presentation of results
- Analyses are better received when supported by effective reports and dashboards

Other Business Intelligence Tools

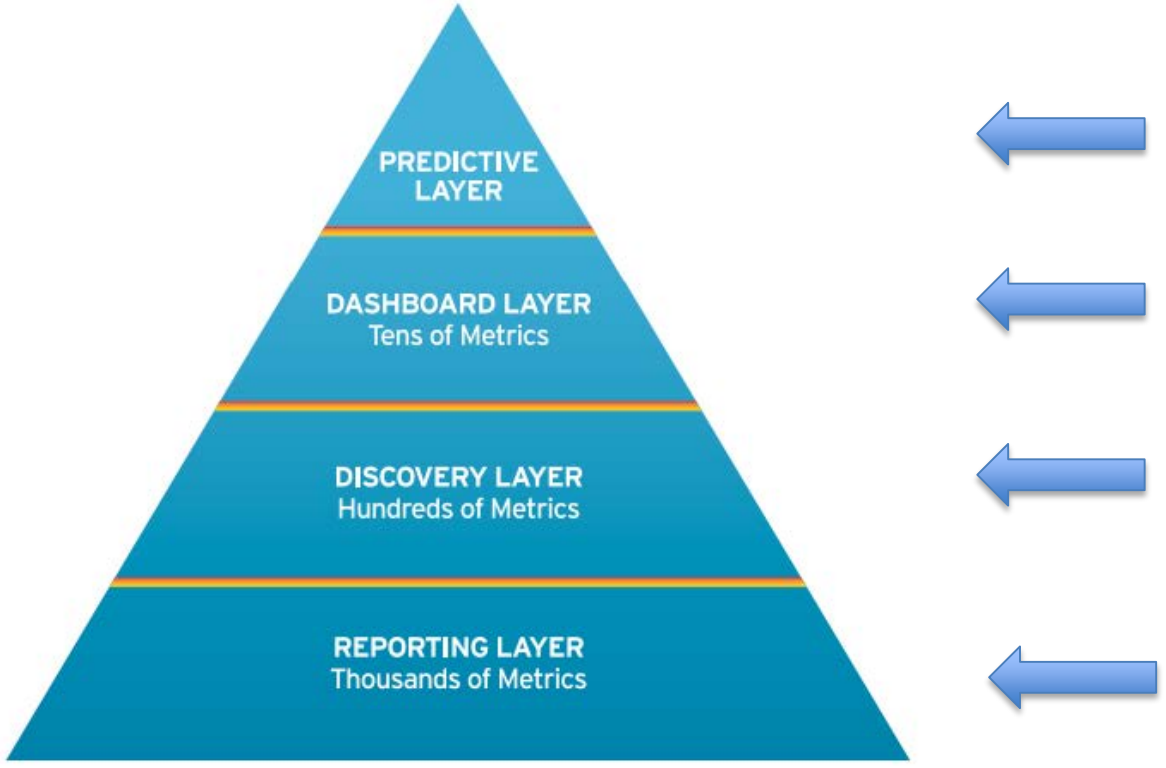
Other Business Intelligence Tools

- Excel is a great reporting, BI and visualization tool
- But Excel cannot handle large volumes of data
- Many other BI alternatives available to companies



Other Business Intelligence Tools

The BI Technology Stack



*Source: Derived from a graphic by Wayne Eckerson, BI consultant and Expert

Reporting Layer – BI Stack

Typically, reporting is of static metrics

Pre-defined where end users may not directly interact with the tools but get static reports on a periodic basis based on defined metrics / KPIs

<u>Examples of OLAP and Reporting Tools:</u>

Discovery Layer – BI Stack

Discovery layer is when users ask questions - when querying and data processing is involved

Typically these tools are used by business analysts that have the ability to identify and create the right metrics based on business requirements

Data discovery tools have a strong component of search and visualization

Examples of data discovery tools:

QlikView

tableau

Dashboard Layer – BI Stack

Dashboard layer is for users that need interactive visualizations of multiple metrics or KPIs

Typically the difference between discovery and the dashboard layers is shrinking, so a lot of discovery tools also provide dashboard functionality

Examples of dashboard tools:

MicroStrategy

SAS® VISUAL ANALYTICS
Picture hidden trends coming into plain sight.

tableau®

Predictive Layer – BI Stack

Lot of BI tools are now also offering a predictive layer, that data scientists can use to answer much more sophisticated questions that are predictive in nature

Examples of BI tools that also also offer predictive capability:

SAS

MicroStrategy

IBM COGNOS Better Decisions Every Day™

R

tableau

Next: Recap

Recap: Data Analysis Methods

Recap: Data Analysis Methods

- Simple querying, SQL
- Visualizations in Excel
- Reports and Dashboards