

The Beginner's Guide to Effective Business Storytelling with Data Visualizations



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Introduction

Effective Storytelling through Data Is a Required Skill in Today's Business Landscape

Business Intelligence, data visualization and dashboards made a huge impact in 2015. In fact, 89% of business leaders believe big data will revolutionize business operations in the same way the Internet did¹. The exponential growth of business data² and the numerous choices a user has when it comes to visualization solutions available, make it hard for users to make sense of data effectively. Data visualizations are key to learning quickly and telling an impactful story in a business environment. So choosing what data to visualize and how to present it has become a vital skill in today's business world.

Indeed, to those unacquainted with the world of data and Business Intelligence, its rows of unintelligible numbers and confusing jargon can feel intimidating. Nevertheless, you do not need a statistics PhD from an Ivy League college to begin creating effective data visualizations and dashboards. This whitepaper serves as a beginner's guide to understanding the influence good data visualizations can have on your audience.

There is a substantial amount of research³ that shows that visual learning is key. It takes the brain roughly 13 milliseconds to process an image; in comparison, it takes around 60,000 times as long to process basic text. 65% of visual information gets retained in memory for more than 3 days, compared to 10-15% learning recall for spoken or written information.

¹Schmidt, Eric. 2010. TechCrunch. Every 2 days we create as much information as we did up to 2003.

<http://techcrunch.com/2010/08/04/schmidt-data/>

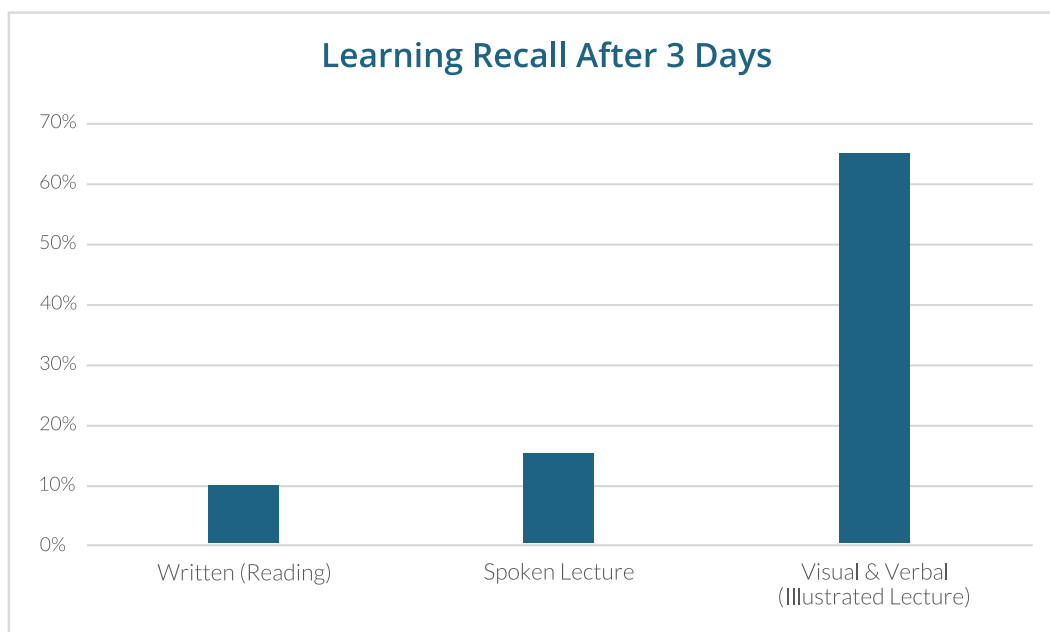
²Kouyoumdijan, Haig Ph.D. 2012. Psychology Today. Learning Through Visuals. Available online: <https://www.psychologytoday.com/blog/get-psyched/201207/learning-through-visuals>

³Dale. 1969. Active Learning. Available online:

http://changingminds.org/explanations/learning/active_learning.htm

Type of presentation	After 3 days
Written (Reading)	10%
Spoken Lecture	15%
Visual & Verbal (Illustrated Lecture)	65%

As the above table demonstrates, the brain is able to preserve information much more effectively when provided with visuals compared to written and spoken information. This can be proven by simply comparing the table with its visualization shown with the chart below:



(Dale, 1969⁴)

Of course, most people are already very aware of the benefits that data visualizations can offer; the problem is actually creating them. Given the sheer quantity of available data and methods of visualizing it, it can seem rather intimidating. This need not be the case, however, as in this whitepaper we will discuss the knowledge required to get you started with visualizing your data, and unlocking its large-scale potential.

Know your story

The explosion of data now makes it easier than ever to back your business story with proof points. Being able to effectively justify your idea has always been emphasized in businesses – whether it’s showing a new concept to your boss or presenting a project in front of your team. With new data visualization solutions available, like ReportPlus, you can now connect, explore and turn your data into a powerful visual story to drive influence in your organization.

It's easy to get lost in this ever-expanding ocean of data – so it is vital that you understand where your data sits and what the purpose of your data visualization is from the beginning. The role of visualization solutions like ReportPlus is to simplify connecting data streams, help you uncover your strongest proof points and expedite visual story telling. A valuable approach is also to take on a storytelling mindset. Giving your visualization a narrative offers it a spine, and makes it far less likely to end up trailing off (along with your audience's attention).

Once you think you have the basis for your data visualization, ask yourself the following questions:

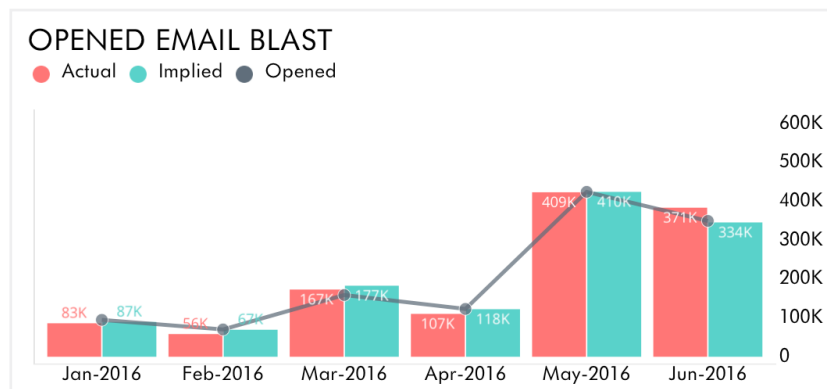
- Who is your audience?
- What are the key messages you want to convey?
- What questions might your visualization spur?
- Do you have the answers to those questions?
- What conversations may result?

The notion of questions and conversations is very important, as that should be one of your main aims for your visualization. You want your viewers to come away with something after they've spent time with it, so that they're more likely to remember the information you've shown them.

Find the right pattern

When analyzing data, searching for patterns or interesting insights is a great starting place for creating the base of your story. The three common patterns conveyed through data are trends, correlations, and outliers.

Trends You can use data to express a variety of different things, but one of (if not the) most common theme for data visualizations is displaying trends. Tracking trends over time is a frequent favorite, used for its simplicity and clarity. These are most often displayed in the form of bar, area and line charts.



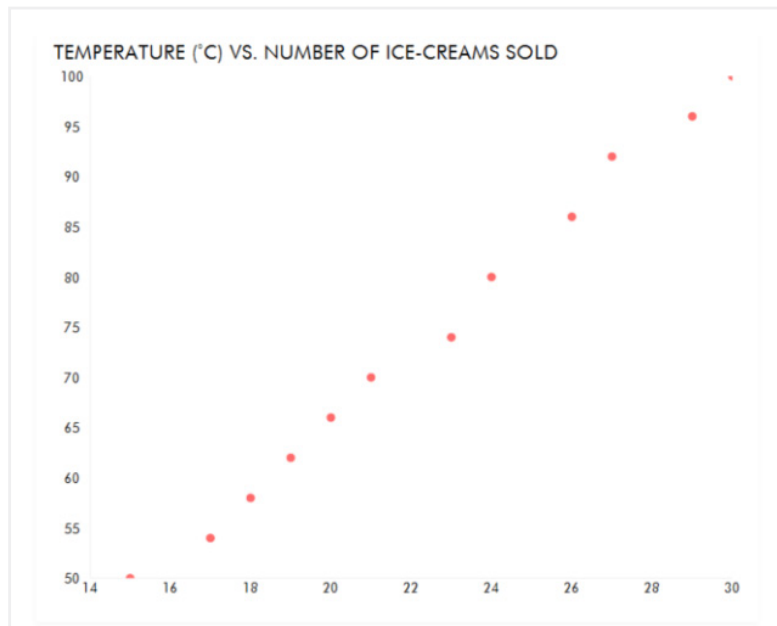
⁴Hubspot. 2015. Data Visualization 101: How to Design Charts and Graphs. Available online:

<http://offers.hubspot.com/data-visualization-guide>

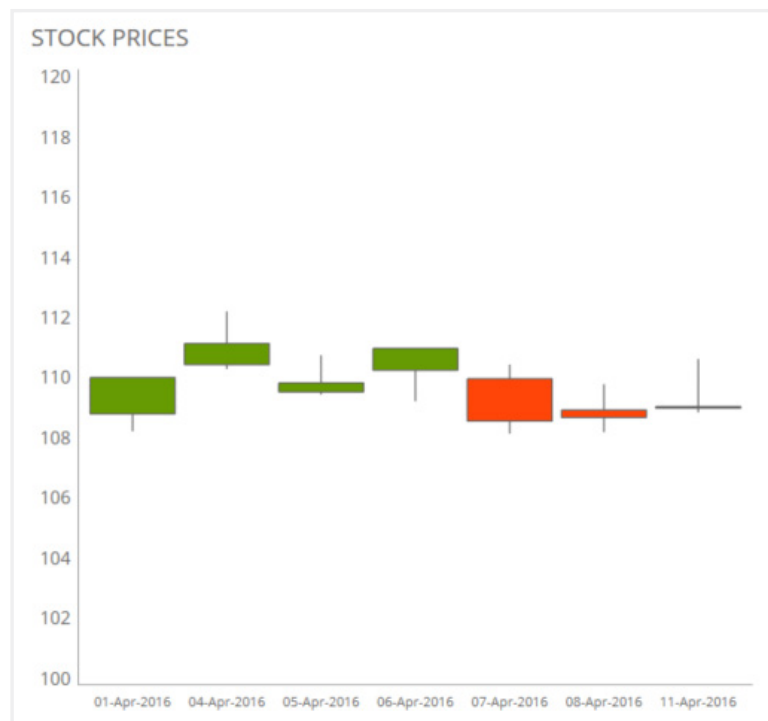
⁵TechTarget. 2005. Dashboard development and data visualization tools for effective BI. Available online:

<http://searchbusinessanalytics.techtarget.com/essentialguide/Dashboard-development-and-data-visualization-tools-for-effective-BI>

Correlations The perfect pattern for comparing and contrasting, correlations help put your data into perspective. You may have found an interesting parallel between two data sets, or an alarming difference between two others. There is a certain attraction to seeing two elements juxtaposed, and correlation patterns are extremely popular. By highlighting the two side-by-side, your results become far clearer and more striking..



Outliers Outliers may seem like a burden when analyzing data, and are recognized by some as 'faulty data'. While this is sometimes the case, they can actually form the starting point for creating your data story. Outliers are defined as data that lies a considerable distance away from the mean or median average, and so are good ways of identifying any dissimilarities or unusual instances in your findings.





The beginner's guide

Whether you are creating a dashboard to demonstrate quarterly sales figures, charts to display customer interaction with your brand or to show how energy is consumed across the country, this guide will teach you the fundamentals of data visualization.

1

Work out your story As mentioned above, this is your first and potentially most important step. If you already have a plan of where you want your story to go, then that's great. If not, it's time to get brainstorming. With the amount of data out there, the good news is you're not going to struggle to find a source of inspiration.

Once your plan is in place, check it thoroughly to make sure there aren't any glaring holes that may end up toppling your visualization further down the line. The more complete your initial plan is, the easier the process of creating your visualization will be.

2

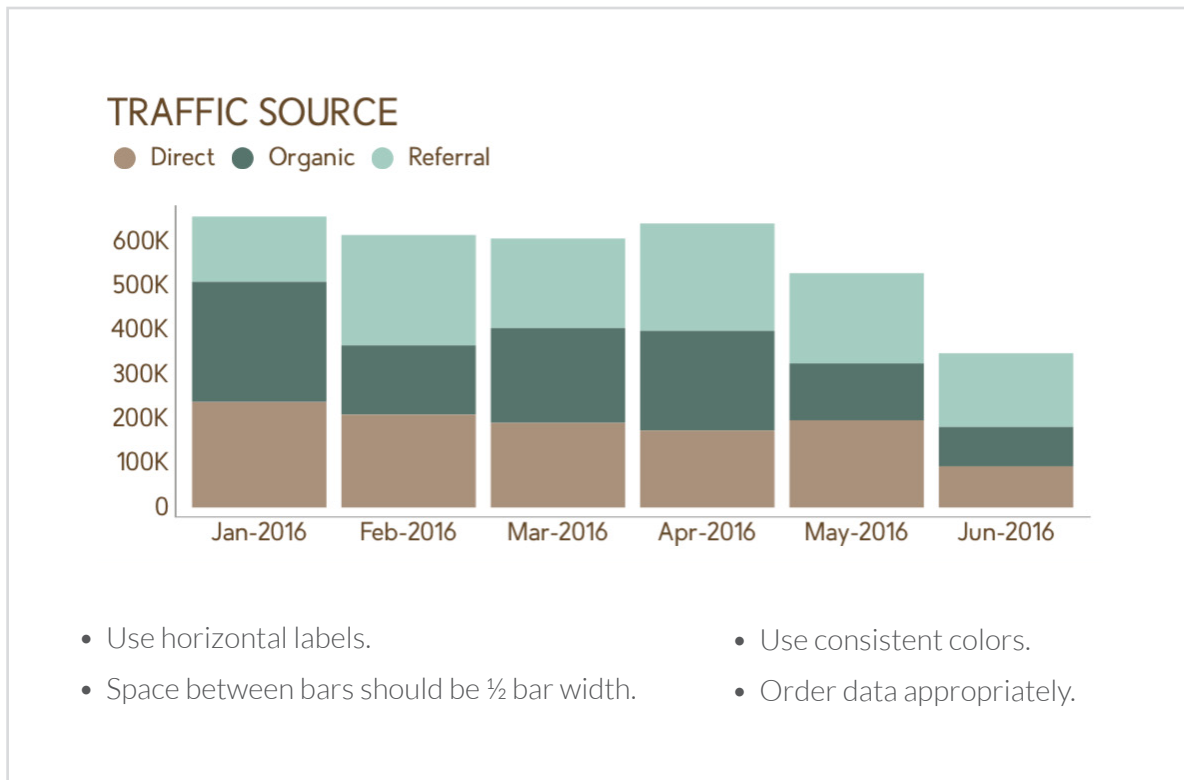
Know your data Once you know your story, it's time to match the data to it. Assess the data at your disposal and look for any trends, similarities or differences that jump out at you. It's important not to rush this stage: make sure the data you're analyzing is relevant and can mesh with other sources. Try not to mix together too many different types of data if possible, as this will likely make the process more complicated.

3

Choose the correct chart Which visualization type is best going to represent your ideas? There's plenty to choose from; be it a bar, pie, area or bubble chart, a scatter plot or a heat map. Once you've decided on the chart that's right for you, it's time to get your data in there and start creating an appealing and compelling data visualization. To help you make the right decision, the following are examples that are both familiar to your audience and versatile options for accentuating your data, as well as some best practice tips worth remembering.

Bar Chart

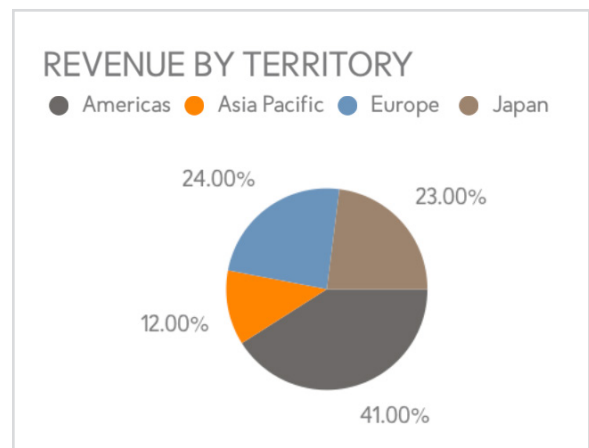
With a vertical or horizontal orientation, as well as ‘stacked’ and ‘100% stacked’ variations, Bar Charts are one of the most versatile and popular visualization types. They are most often used to display change over time, the comparison of different categories or parts of a whole (percentage).



Pie Chart

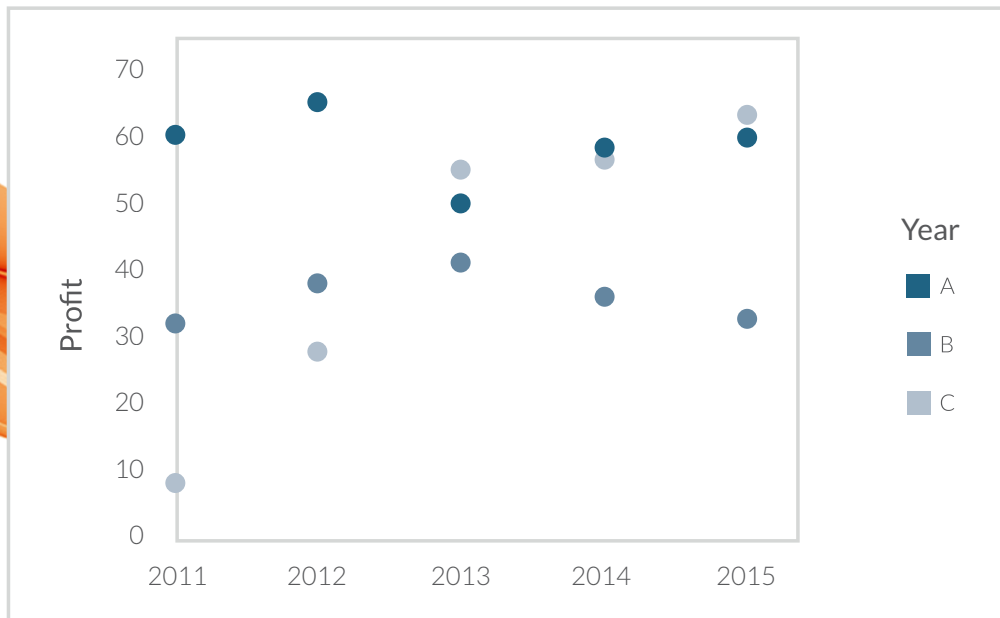
Another common favorite, Pie Charts are used for making part-to-whole comparisons. They are best used with small data sets, as having too many categories causes the chart ‘slices’ to be challenging to differentiate between.

- Don’t use too many categories.
- Make sure all data adds up to 100%.
- Consider placing the largest section at the top, and work clockwise around via order of size.



Scatter Plot

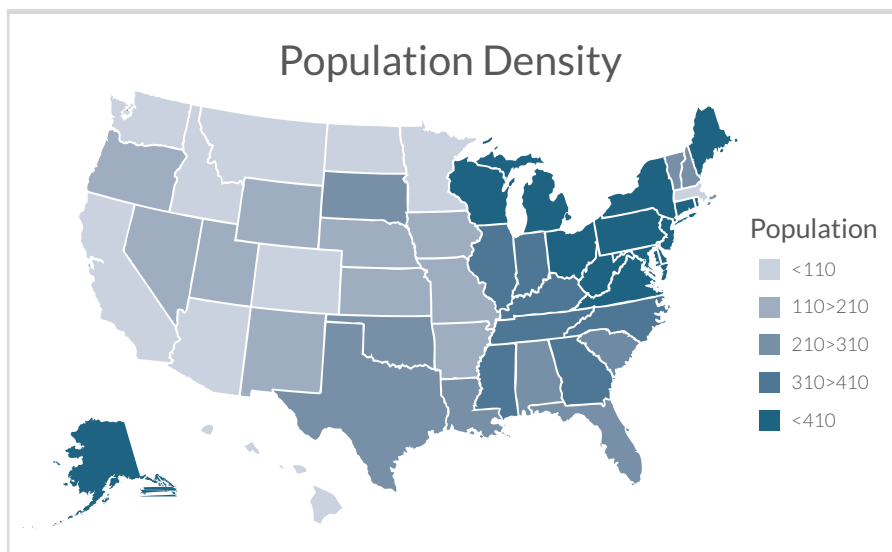
Scatter plots are a great method of showing a correlation in large amounts of data. As such, scatter plots benefit greatly from the inclusion of trend lines – a clear indicator of a positive or negative correlation.



- Begin the Y-axis value at zero to make sure the spacing of the graph accurately reflects the data.
- Include additional data variables through the color or size of the chart values.
- Use trend lines if applicable.
- Don't compare more than 2 trend lines. Multiple lines will overcrowd the chart and make the data harder to interpret.

Heat Map

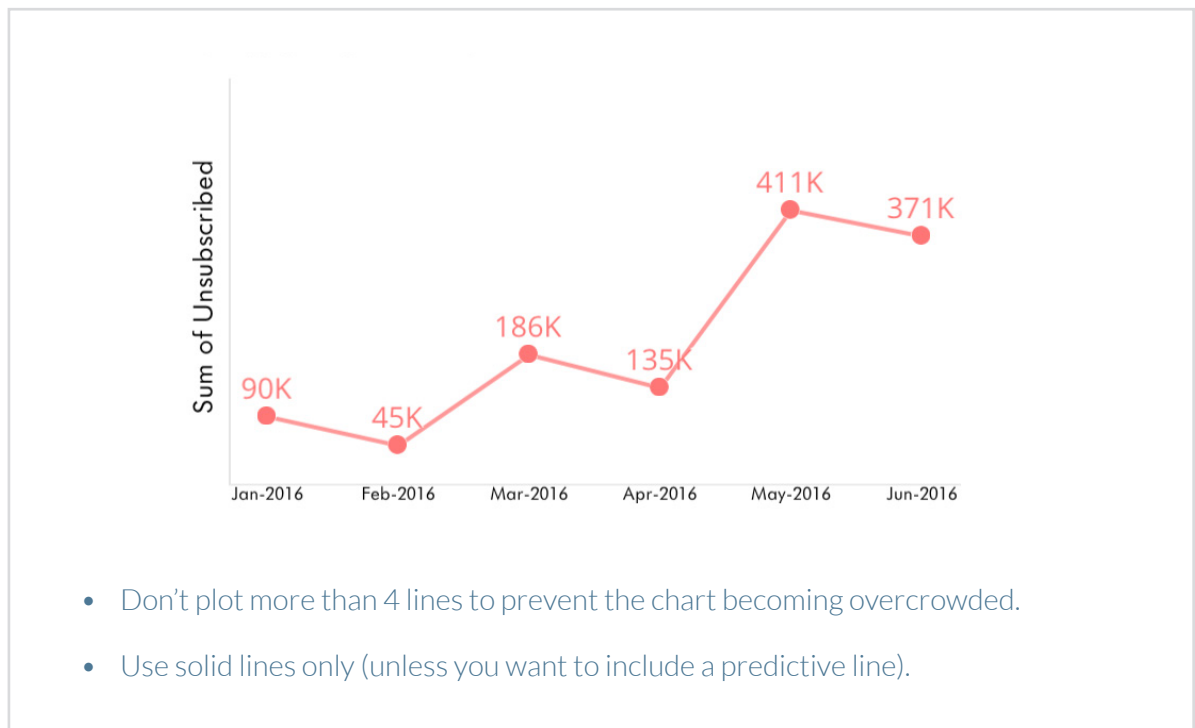
Heat Maps are becoming increasingly popular, and are great for displaying categorical data. These are often used to show data intensity, category or density in a geographical location.



- Use a simple map outline.
- Select a base color and use varying shades to depict differences. Using different colors can imply unnecessary weight to data, and result in a misconstrued message.
- Choose appropriate data ranges to enable even distribution.

Line Chart

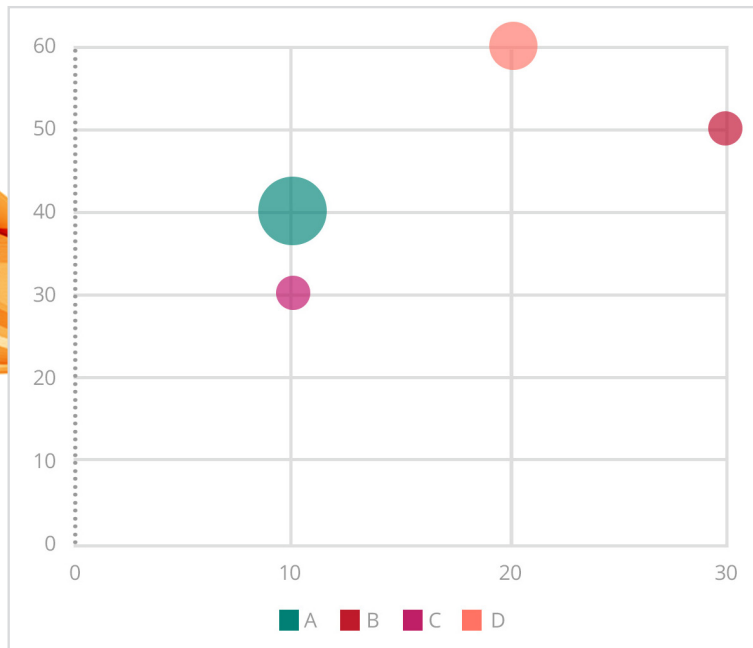
Most often used to display time-series relationships with continuous data, such as stocks. They are perfect for showing acceleration or deceleration and with enough data can effectively give future projections.



Bubble Chart

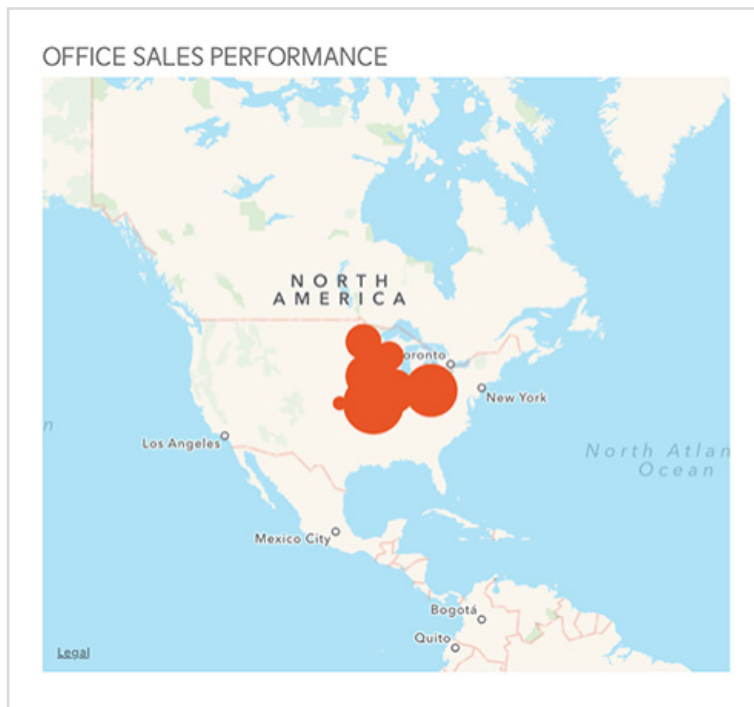
Bubble Charts are great for displaying nominal comparisons or ranking certain relationships. They are also a good tool for showing additional variables, and so are commonly used in conjunction with Heat Maps.

- Don't allow labels to get lost between overlapping bubbles. Make sure each and all are clearly visible.
- Bubbles should be scaled according to their area, not diameter or circumference.
- Although using an image or shape can be a good way of addressing the topic, generally try to avoid using obscure shapes as this can lead to inaccuracies and confusion.



4

Avoid data overload Data overload is the number one mistake people make in data visualization. If there are too many measures and dimensions on one screen, your overarching message can get lost in an instant. Don't become guilty of stacking variables together. Instead, break them down into smaller multiples to understand the relevant information without having to search for it.

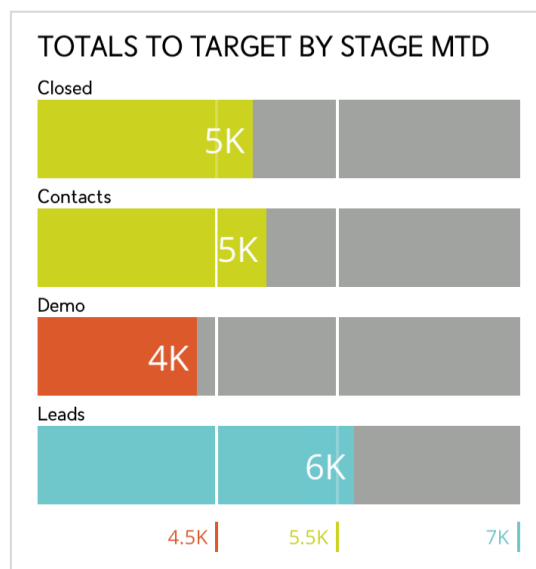


5

Make it shine It may not seem overly important, but perfecting your visualization is extremely important when it comes to clearly conveying your message. This often involves a fair bit of trial and error and may seem like a drag considering your visualization is so close to the finish line.

Use color over black and white

A colorful visualization is always going to be more appealing than a monochrome one, but don't indulge too much. As a suggestion, try not to use more than two color palettes per visualization, and don't choose ones that overlap as this will add unwanted confusion. When possible, select semantically meaningful colors that viewers will be able to relate to your data. If, for example, you are doing a visualization about fish in the Pacific Ocean, use a series of blues and pair it with some metallic silvers.



Avoid fonts that are overly decorative

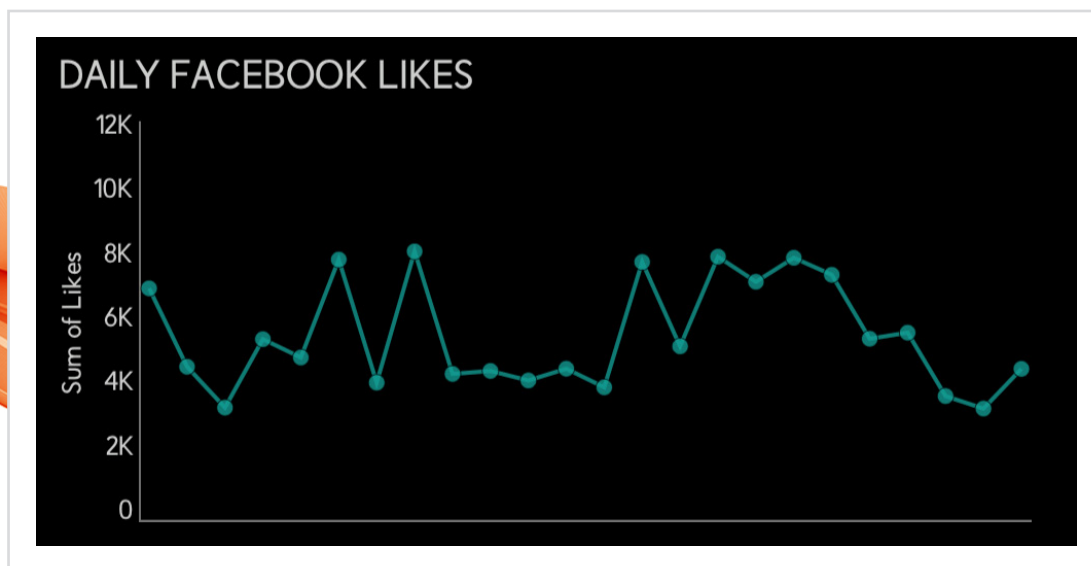
They may look pretty, but a lot of font styles will simply make your visualization harder for the viewer to read. It's best to stick to fonts that are simple, yet striking. We would suggest the following fonts for their readability and visual appeal:

- | | | |
|--|---|--|
| <ul style="list-style-type: none">• Trebuchet MS• Times New Roman• Arial | <ul style="list-style-type: none">• Georgia• Calibri | <ul style="list-style-type: none">• Tahoma• Lucida Sans |
|--|---|--|

It's also worth noting that you should never modify adjacent text by more than one attribute. For example, bold modifying is perfectly fine, but avoid modifying by a combination of bold, underlined, italics and red. Less is more.

Accessing axes

Axes are critical to your visualizations, as without them your viewers can (and almost definitely will) be left in the dark.



As pretty as the above chart may be, it's impossible to tell what it's about. Axes require some deliberate attention to make sure they're informing the viewer clearly. The following are the two best methods for granting your visualization effective axes:

Fixed axes

The range of your X and Y axes will automatically adjust based on the data in your visualization, so you don't have to worry about manually inputting the top and bottom data values.



Axis gridlines

If it isn't practical to use fixed axes – which is sometimes the case when dealing with large quantities of data – then it's possible to add gridlines to your visualization in place of the X or Y axis. Gridlines can give added structure to your axes through separating numerical values.

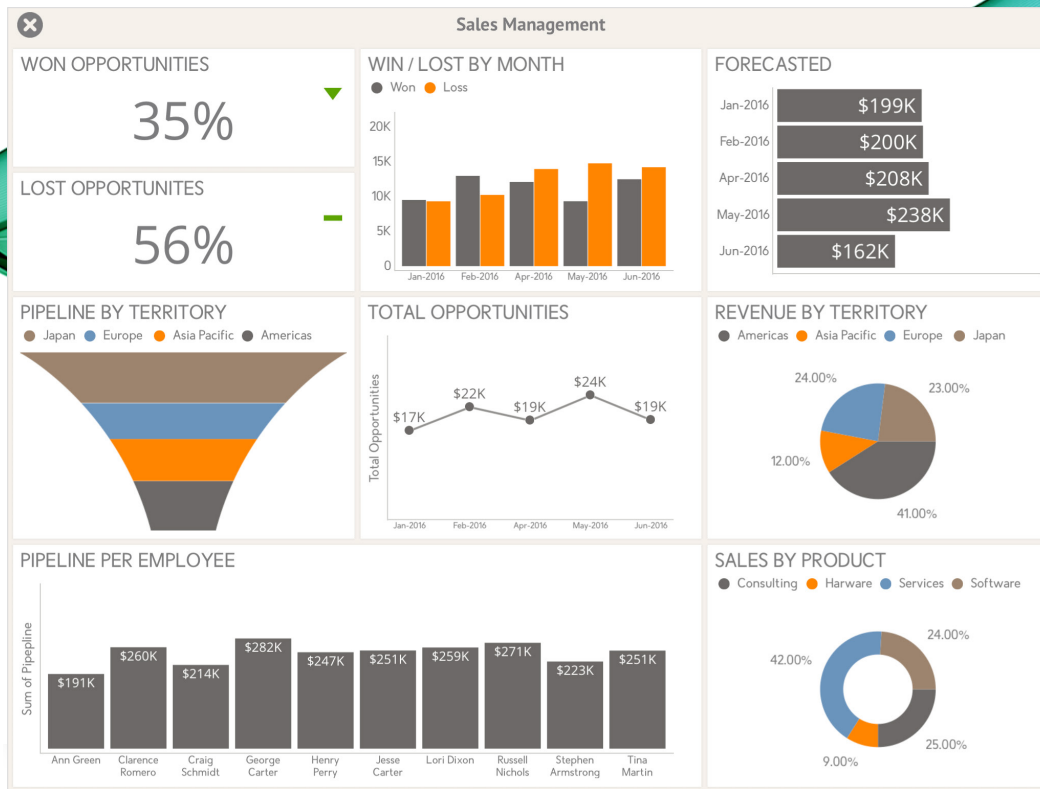
Designing a dashboard

Dashboards are able to house a collection of visualizations on a single page – often tied together through a central theme. By showing multiple perspectives in the same location, dashboards can further emphasize the message of your visualizations, and thus maximize the impact they make on your audience.

Stick together

Because all your data is being shown on an individual screen, dashboards allow for you to combine similar visualizations to provide added detail on the subject you're addressing. While this is of course beneficial, be aware that as you're showcasing more information on one screen, you run a higher risk of data overload. Make sure your dashboard visualizations are streamlined and perfectly clear; you'll be able to draw up more conclusions with multiple views without having to pack them full of data.

- Place the most important view at the top of your dashboard – preferably the top left – as that is where our eyes automatically go to begin reading.
- Unless there is an absolute need for more, limit your dashboard to four visualizations. If you add too many individual views, it can become confusing and your core message can get lost in the details.
- In the same vein as single visualizations, avoid using multiple color palettes in a dashboard.
- If you have multiple filters, try grouping them together as a subtle visual cue.
- If a legend applies to every one of your views, place them together with all of your filters. If it only applies to a select number, place the legend as close to them as possible.



Don't run before you can walk

We would suggest getting accustomed to standard data visualizations before you start exploring the world of dashboards. For those that have some experience, however, dashboards offer a whole new playing field for showcasing your data. The ability to combine multiple views on a single screen make for countless possibilities for making connections and highlighting relationships in your data.

Make your mark

Now you're aware of the best practices for creating compelling data visualizations, the only step left is finding the right solution to create them. ReportPlus is a cloud-based or on premise data visualization service that allows you to visualize the metrics that matter most to your business in one place. Monitor the most important KPI's and know the health of your business with real-time dashboards, create rich interactive reports and access data on the go with ReportPlus apps for iOS, Windows and Android, or on the Web.

Download your 30 day free trial at: <http://reportplus.com>

To schedule a ReportPlus demo or request access to ReportPlus Server and ReportPlus Embedded trials please contact us at 1-888-448-1277 or request access via our website.

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Appendix

A glossary of basic ideas and terms

The following terms will explain the core principles that make up data visualization: its variations, how it's analyzed and how it's displayed.

Business Intelligence

Business Intelligence – or BI – is something of an umbrella term. It refers to a variety of software applications that are used to analyze an organization's data. Being an umbrella term, BI encapsulates the processes of data mining, online analytical process, querying and reporting.

BI provides a means of analyzing data without having to wait for IT or statisticians to run their own complex reports, letting anyone back up their business decisions with solid data.

Data types

When we have access to so much data, it can be hard to tell it all apart. Data can be categorized into 'data types', which distinguish different types of data based on their qualities. Some of the most common data types⁵ include: It's worth noting that certain data types match well with certain 'data relationships', which we'll touch on below.

- **Quantitative.** Quantitative data can be counted or measured, and all values are numerical.
- **Discrete.** Discrete data is also numerical, but is confined to a finite number of possible values.
- **Continuous.** Continuous data is measured and has a value within a range.
- **Categorical.** Categorical data can be sorted according to a specific group or category.

It's worth noting that certain data types match well with certain 'data relationships', which we'll touch on below.

Visualizations

As mentioned above, the human brain is particularly visual, and so the ability to turn information into aesthetically pleasing images is a valuable asset. At its core, that is what's meant by data visualization: "an effort to help people understand the significance of data by placing it in a visual context"⁶

Data relationships

Understanding what type of data you have at your disposal is great, but even more important is understanding the best way to visualize it. Choosing the correct data relationship to marry with your data can take your presentation from interesting to influential.

Nominal comparison A simple comparison of the quantitative value of subcategories, such as the humble bar chart.

Deviation An examination of how data points relate to one another, and in particular how far a given data point differs from the mean. E.g. Bell Curve graph

Distribution The spread of data, often around a central value.

Correlation Data with two or more variables may demonstrate either a positive or negative correlation towards each other. This is often showcased with a 'trend line'.

Part-To-Whole Relationships Showing a subset of data compared to the larger whole. This is often found as a percentage and commonly displayed as a pie chart.

Dashboard

Just like the dashboard in a vehicle, the purpose of a data dashboard is to organize and present information in a way that's easy to read and understand. In IT, a dashboard is a user interface and is much more interactive than the dashboard of a car, for example. In Business Intelligence, a dashboard consolidates numbers and metrics on a single screen, displaying the current status of key performance indications (KPIs) for a business.