

Let Leonardo da Vinci Inspire Your Next Data Presentation

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ABSTRACT

Creating useful data presentations that communicate key points and influence audiences is a mix of art and skill – much like a Leonardo da Vinci masterpiece. The task always begins with a blank canvas that many data professionals find intimidating. It's not always clear where to start or how to ensure you get the results you want. Whether you are trying to create a simple report, a dazzling dashboard, or tell an influential data story, using a standard method simplifies the process and enables your inner report artist to bloom.

In this session, you will learn the various data presentation methods, review a common approach for creating data presentations, and then review some examples and techniques. This session features examples using SAS® tools, such as SAS Visual Analytics and SAS Office Analytics.

INTRODUCTION

Leonardo da Vinci is one of the most influential artists who ever lived. While best known for the *Mona Lisa* and *The Last Supper* artwork, his influence was felt in medicine, science, architecture, and even warfare inventions. Da Vinci has been described as one of the most gifted and inventive men in history. He was born more than 500 years ago in the Tuscan town of Vinci in Italy. His birth was during the Renaissance period, a time when the Middle Ages started transitioning into the modern world. Da Vinci would go on to influence a generation of artists.

When he was 14, he became apprentice to Andrea del Verrocchio who reportedly put down his brush after seeing da Vinci paint (Morrison, 2017). During his life, da Vinci kept a journal that had sketches, ideas, and reminders. He was self-taught in anatomy, engineering, and other scientific fields.

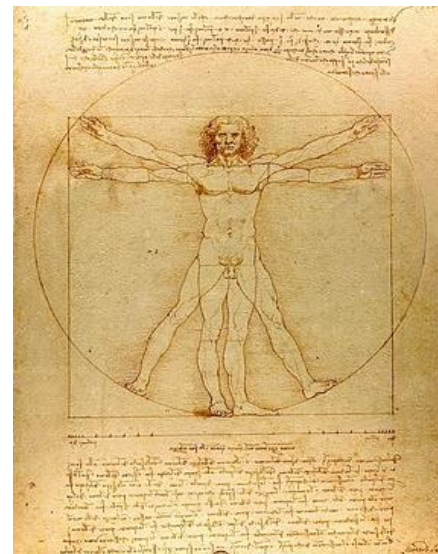


Figure 1 Vitruvian Man

His Vitruvian Man drawing (shown in Figure 1) is a man standing inside a circle and a square that shows his understanding of proportions. This drawing is thought to be a self-portrait.

“A good painter has two chief objects to paint — man and the intention of his soul,” da Vinci wrote. “The former is easy, the latter hard, for it must be expressed by gestures and the movement of the limbs.”

To keep his art exact, da Vinci dissected human and animal bodies. While he was working to have more exact artwork, his drawings for the internal organs and the body’s muscular structures are some of the first known. (Biography.com Editors, 2014)

Da Vinci died in 1519 in France at the age of 72, while in service to the King of France. He will be remembered for his vast influence on art and science. Today, you can apply his love of details, curiosity about the world, and inspired beauty to your data presentations for a true masterpiece.

DA VINCI APPLICATIONS TO DATA COMMUNICATIONS

Da Vinci kept over 7,200 journal pages that had sketches, ideas, and even reminders. From these notebooks, we have been able to study his thinking patterns. From da Vinci, we can embrace curiosity, systems thinking, love of detail, and even risk taking.

USING SYSTEMS THINKING IN REPORT DESIGN

Systems thinking is the ability to understand how pieces influence the whole. Da Vinci saw patterns in the natural world and applied those patterns in multiple ways. From his study of anatomy, he developed ideas for how gears and levers worked. His ability to interconnect concepts and apply those ideas to other fields enhanced his ability to solve problems (Capra, 2010).

This same process of systems thinking can be applied to data communications. By thinking about business issues as applied to the entire process or organization, you can better understand how each question or insight will change the entire process.

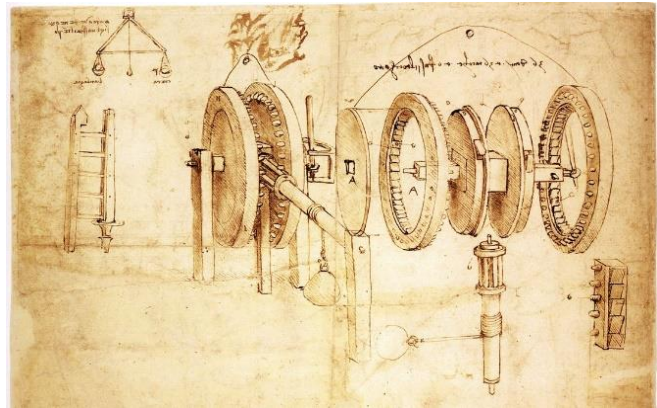


Figure 2 Da Vinci notebook excerpt

In the *Data Analytics – System Thinking* post, the author suggests how analysts can cause issues when they don't consider the impact of a single metric (Coleman, 2011). It is easy to isolate that value without considering the upstream and downstream approach, but this is dangerous! The metrics are part of a larger system and changing one can have ripple effects on others. When you think of the system, consider if your insights are valuable.

Da Vinci's observations and consideration for each element is how we should be thinking of our data communications.

THINK VISUALLY FOR IMPACT

In one of his notebooks, da Vinci noted how paintings were superior to writing because paintings could communicate in moments what a poem would take hours to say (Jones, 2011). This is exactly how we think of data visualization today!

None of this visual thinking is clearer than what we learn from the Mona Lisa. Scholars have commented on the Mona Lisa smile. Is she smiling or is she sad? If you focus on the mouth, it may appear that she is only smiling. As you pull away and notice her eyes, she is very clearly smiling and even watches you as you cross the room.

Da Vinci's *sfumato* technique, where he blurs the lines and boundaries, brought realism to his work. He didn't think people saw sharp lines but rather an unfocused smokiness. He said the technique was "without lines or borders, in the manner of smoke or beyond the focus plane". When translated, *sfumato* is derived from the Italian word for smoke (Wikipedia, 2018).



Figure 3 Mona Lisa

He analyzed everything about the human face to better understand how to paint it. For his masterpiece Mona Lisa he dissected the human face to understand the muscles related to

the lips. Da Vinci wanted impact with his artwork. He wanted to move the viewer, which is exactly what we want with our data communications.

FINDING UNEXPECTED INSIGHTS IN ANALYSIS

If you journey to Milan, Italy, you can see one of da Vinci's most famous paintings – *The Last Supper*. This artwork is painted on the wall of the Santa Maria delle Grazie. The painting depicts a story from the New Testament of Christ having what would be his last meal with his 12 followers. Da Vinci wanted to capture the moment that Christ revealed that he would be betrayed by someone at the table.

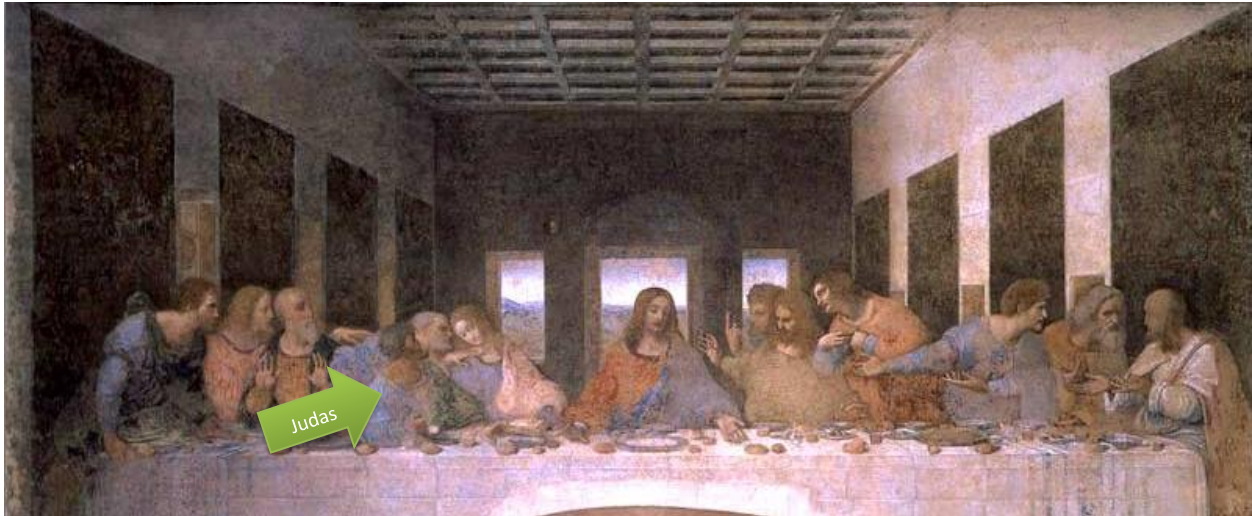


Figure 4 The Last Supper

The attention to detail is where you can find the insights. Notice that Christ is at the center of the table with open body language. The entire image centers around him and the window arch even appears to crown his head. Da Vinci ensured that each disciple had a different reaction to Christ's statement – many asking, "is it me?" There is concern, shock, anger, and bewilderment.

Judas, who was the betrayer, is leaning away from Christ. In front of Judas there is a spilled vessel of salt. Spilling salt on the table has often been associated with a bad omen. These were some of the details he included to add depth of meaning to his painting.

Da Vinci was known to spend hours watching people to capture expressions in his notebooks. He would study the subject in detail and create numerous sketches. In Figure 5 you can see one of his notebook drawings of *The Last Supper*. In this sketch he considers placing Judas on the opposite side of the table. He drew the figures multiple times to ensure his message was communicated. In our world, we would call this iteration.



Figure 5 Da Vinci Notebook Sketches

The same diligence is what makes data communications stand out. Da Vinci focused on the details of the expressions, the table setting, as well as the room. Your details will come from the data as you search through it to find the most impactful results.

USING THE DATA COMMUNICATIONS PROCESS

Creating data communications is a combination of considering what you want to say, why you are saying it, and to whom you are speaking. While this seems like a simple concept – it can be as daunting as an empty canvas to a beginning artist.

In this topic, we will consider each element of a data communication, as illustrated in the following figure.

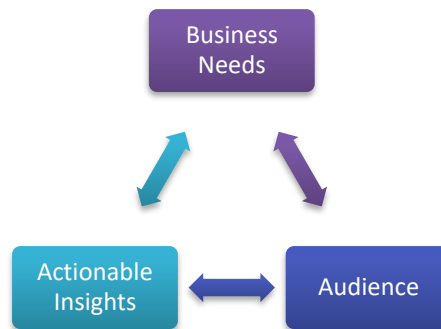


Figure 6 Elements of Data Communications

UNDERSTANDING THE BUSINESS NEEDS

Before any data communication begins, you must understand what question needs to be answered and why it is being asked. Often the business question may not be presented as an actual question but as a problem. Few business people will ask you to do a linear regression! They will instead voice concerns about what they fear, what they don't know, or what they want to improve about their business.

Sometimes, you may not speak to a business user at all. If you understand the business domain, it will not be an issue because you are able to consider the question from the business user's perspective.

Know the Business Domain

It's your job to translate the questions and concerns of the business into something meaningful to guide the data communication. This means you must also have domain knowledge about the subject at hand. Domain knowledge refers to understanding key terms, common metrics, and standard workflows for that specific business. Common domains are banking, finance, healthcare, and government. Domain knowledge allows you to understand why the question is important as well as to weed out irrelevant information.

Dr. Uwe Hohgrawe, Northeastern College of Professional Studies, said, "By being thoroughly versed in the language of analytics, an analyst is able to perform his or her job effectively. But by also being versed in the language of your organization's domain, you can communicate effectively with team members who aren't fluent in analytics, allowing you to translate your data into actionable advice that can be used in business decisions." (Stobierski, 2018)

Domain knowledge is gained in multiple ways. You can read journals or magazines from the field to understand common issues. Talking to industry professionals, such as your

colleagues, can help you gain insights about what they experience and view as issues. Even attending conferences where you can absorb a huge amount of issues about industry issues.

With domain knowledge, you can empathize more with the business users and consider how they see the world. Your answers and insights are more valuable to them because it solves *their* problem.

State the Problem from the User’s Perspective

With understanding of the concern or question, you can think of it as a business problem and state it in a measurable way. It’s possible the business users will say what concerns they have about a process or how they want to improve the business in a recognizable way. Usually, the business users do not talk about statistical terms, they only state their concerns. In the following table, the first column has what the business users say, and the other columns show the interpretation.

What They Say	The Real Question	The Need
Customer service manager states customers are complaining about responsiveness.	<ul style="list-style-type: none"> Are any priority 1 tickets not being serviced? Are any team members not resolving issues? 	<ul style="list-style-type: none"> Understand the day-to-day business needs.
Sales manager says the vice president wants sales growth of 20% for the coming year.	<ul style="list-style-type: none"> What percentage of the goal is being met weekly/monthly? Are we on track to meet the goal? 	<ul style="list-style-type: none"> Manage the team toward the business goals.
Police force wants to make best use of staff.	<ul style="list-style-type: none"> Can we predict which areas of the city a crime is more likely to occur? And what types of crime. Can we convince others of this plan? 	<ul style="list-style-type: none"> Predict where resources are needed most. Gain agreement from the community.
Bank is concerned that their resources are being used for fraudulent activities.	<ul style="list-style-type: none"> Which account holders are more likely to be laundering money? Or committing fraud? 	<ul style="list-style-type: none"> Analysis of the accounts and their behavior to protect the business

While these questions and problem statements seem clear, there are many who skip this step. For the preceding examples, the questions and path seem clear. As the questions get more complex, you (and the business user) need to evaluate if the questions can be answered with the current data.

Once you can state the problem in a measurable way, you will know what data or analysis is needed and have better ideas about what information should be presented.

CONSIDERING YOUR AUDIENCE

Your audience is who is receiving your data communication. Your audience determines the depth of your data communication and the presentation method.

Understanding Audience Types

In the *How to Tell a Story with Data* article, Jim Strikeleather defines five audiences for communications. (Strikeleather, 2013) He separates each audience based on the way they will consume the data. These audience types are listed in the following figure.



Figure 7 Audience Types

Don't take these audience titles literal. For instance, an *expert* refers to someone familiar with the topic. Your work colleagues more likely fit this category since they would understand why the company is interested in the data plus, they are domain experts. A *managerial* audience could be line managers, vice presidents, or even project managers. The key word for that group is "actionable results."

An *executive* audience could be anyone from senior leadership to the C-level folks. These are the decision makers who want to understand why you are suggesting a course of action. They want to assure themselves that you have done the homework and the data supports your conclusions.

Whether you are presenting to a novice or generalist – each of these audiences expects to see your insights. They just won't be able to consume those insights in the same way. Hans Rosling did an excellent job presenting data to an audience of generalists in his [Let My Dataset Change Your Mindset](#) Ted talk (Rosling, 2009). When you watch the video, you'll notice that Rosling never talks down to his audience. Instead, he explains the data set, the parts of the chart, and lastly interprets how it has changed over time.



Figure 8 Rosling with his bubble plot during Ted Talk

Even someone with low data literacy was able to understand his message. With the new understanding, the audience can make decisions about what action they want to take.

When working with an audience, put yourself in their place. For each audience listed in the preceding figure, generate the questions you think they would have about your data and your insights.

Getting to the Right Detail

When you review the audience types, you may notice your goal is to get to the right level of detail. Experts need less about specific details but may need more convincing, while generalists need more explanation of the issues around the data and may not challenge your data as much.

You want your work to present the correct amount of detail. Consider how different you would structure a paper called "Best Programming Tips" if it was aimed at beginner programmers versus senior-level programmers. Tips for beginners would have more details about structuring the code, basics of the DATA step, and the importance of comments. Senior programmers would be more interested in advanced DATA step techniques, ways to gain more performance, and comparisons between approaches.

While both topics have the same subject, the starting point for each talk would be at a different place. You could present the same information to both groups, but the more experienced programmers would be bored listening to the value of commenting code and programming basics. Likewise, new programmers would be glassy-eyed and even discouraged reviewing advanced techniques. In either case, you will lose your audience.

The same holds true with your terminology or jargon. Think of how different a discussion of a medical condition would be when presented to a medical professional versus the general public. The explanation of what was happening to the body would be simplified for the public who would be a little dumbfounded by the specific details. Someone more familiar with the body would already understand the jargon and the talk could be at a more technical level.

Tip! Think of Da Vinci's attention to detail when he painted *The Last Supper*. He had to understand the entire event and then think of it as his patron, the church, would have viewed the moment. Which disciple wanted to be the one who betrayed Christ?

Your audience's level of understanding influences how to present the information. The audience is the single most essential element of communicating your data.

PRESENTING YOUR INSIGHTS

Your insights into the data are what you need to communicate. It is your message. Based on the questions or your problem statement, you should have some ideas about the method to communicate the data as well as the data sets needed to form the message that you want to communicate.

Determine Your Message

Once you understand the audience and their questions, you can review the data for insights. Some questions are easier to answer, and the message may even be expected. It is easy to show how many trouble tickets were opened the previous week. To get value from the data, you need to reveal surprising insights.

When we think about the Technical Service manager's job, she needs to be armed with what causes tickets, team's response time, and so on. After reviewing the data, your message is that three team members are more likely to send tickets to second-level support. These team members have less time on the job, so you suspect a knowledge gap.

Your message is – training produces better outcomes. However, that tired message is repeated often and doesn't really have any teeth. What if you said, "You can reduce ticket resolution time by 30% if you better train your new employees?" This message has a stated benefit and an actionable message for your audience.

Your job is to create data messages that your audience can understand and use.

Using the Right Data Visualizations

When presenting data, the most important thing to remember is that you have a message. The message holds your insights about the data. The data visualization techniques help the audience see the data.

A good data visualization communicates your message quickly, only presents the needed information, and engages the audience. Based on your audience, you will have better ideas of what techniques you can use. A general audience may do better with simple bar, geographical and line charts. Experts can handle decision trees or more advanced ways of looking at the data.

Dr. Andrew Abela created a diagram that helps you think about the correct visualization technique. He asks you to first think about the message in your data and then provides some pathways to help clarify your thinking. Possible methods to visualize the data include relationship, comparison, distribution, and composition.

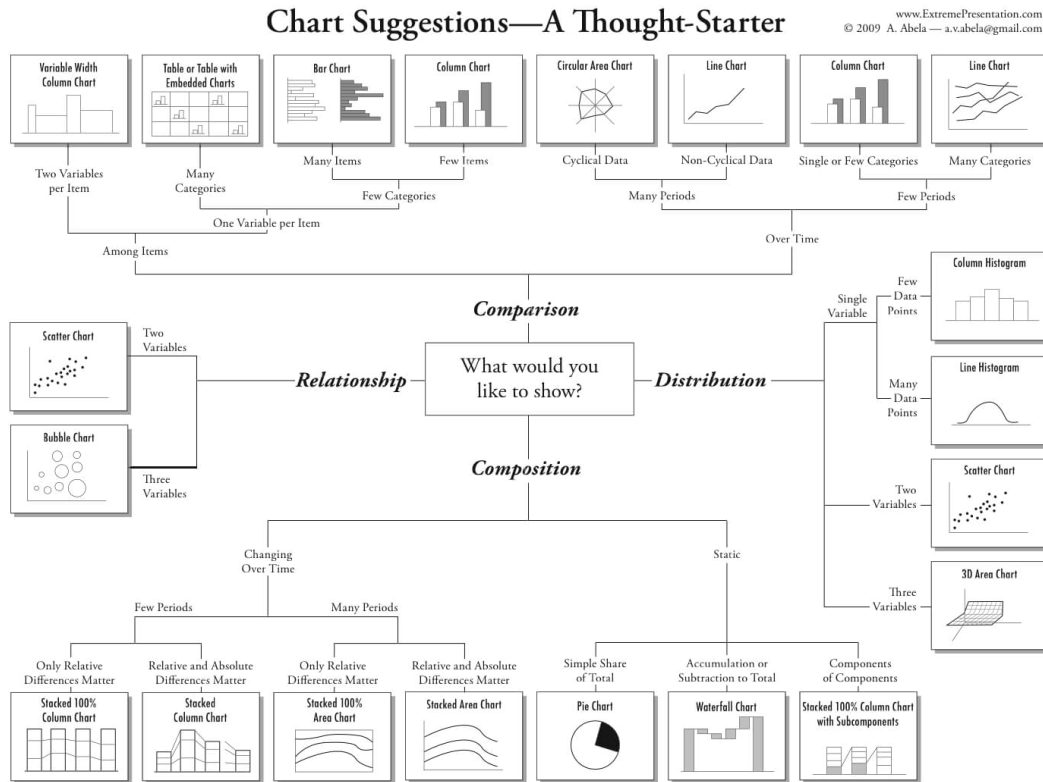


Figure 9 Thought Starter Visualization (Credit: www.extremepresentation.com)

For our message above, a comparison of seasoned versus new support specialists would work well. You could show how each agent responds to the same situation. Is the agent more likely to defer the ticket, pass the ticket to level 2 support, or resolve the ticket at once?

When a customer must contact technical support, if the issue is resolved quickly – surely that is a better outcome. Your message could be expanded to talk about customer satisfaction scores. Your visualization choices need to highlight and convince the manager quickly of the action to be taken.

When a data visualization fails, there can be multiple reasons. The most common reason is that the author didn't understand the message. Thus, the meaning in the data is unclear or even hidden. The author didn't consider what question the audience was asking. You can spot these visualizations because you need to spend a long time studying them to try to understand what they mean instead of gleaning insights.

METHODS FOR PRESENTING DATA

Understanding the various methods for presenting data helps you define your approach. This section defines the common presentation methods used by most data professionals along with some preparation guidelines.

Based on the audience question, you will have an idea of which communication method to use. The following table contains the business needs listed in

State *the Problem from the User's Perspective* section along with suggested communication methods.

Requested Information	Possible Methods
<ul style="list-style-type: none"> Trouble ticket management 	<ul style="list-style-type: none"> Operational reports updated hourly Infographic as a fun way to review information during a quarterly meeting
<ul style="list-style-type: none"> Sales progress toward goals 	<ul style="list-style-type: none"> Dashboards updated weekly
<ul style="list-style-type: none"> Predictions for new course of action 	<ul style="list-style-type: none"> Data analysis presented as a data story
<ul style="list-style-type: none"> Which account holders are more likely to be laundering money? Or committing fraud? 	<ul style="list-style-type: none"> Analysis reporting to look for patterns and trending Operational reports to monitor individual account holders

The remainder of this topic reviews each method, reviews examples, and provides tips for employing each method.

OPERATIONAL REPORTING

Many managers start their work day by reviewing data from the previous day or week. Operational (or enterprise) reporting means the organization has prepared data that the management staff can use to make decisions in a timely manner. This data presentation method may be the most common method used within organizations.

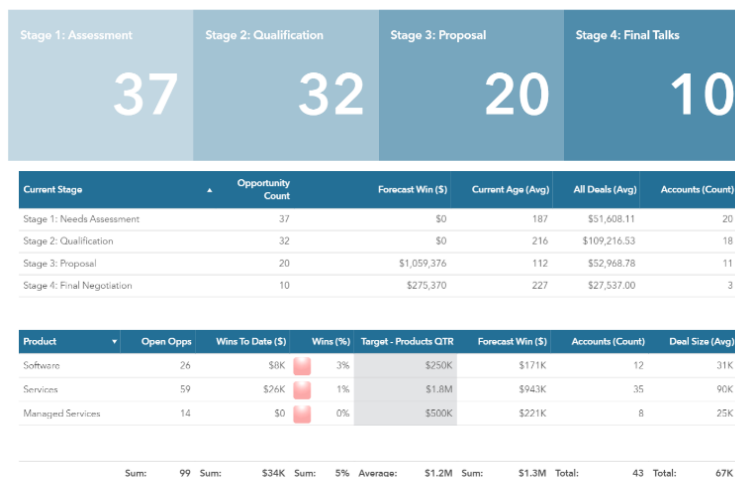


Figure 10 Example Operational Sales Report

Operational reports are tactical in nature. These reports are aimed at solving day-to-day

issues within the business. They are generated at regular intervals (hourly, weekly, monthly, and so on). They contain summarized data that leads the viewer down an information path where they can get more data.

For instance, the summary report may show the sales manager a chart of potential sales for the organization. The manager can then drill-down to a detailed list of what each employee is working on.

This allows the manager to direct the team's activities for the day. These reports usually present information that the manager interprets. There may be traffic lighting techniques used to assist with alerting the manager to undesirable situations.

More Effective Operational Reporting

The target audience for operational reports is the managerial level. The keys to effective operational reports are being able to see how the organization is tracking against organizational goals as well as automated generation, central availability, and standardization of the reports. It is becoming more popular to show real time data, but the need for this is usually dependent on the size of the organization and the customer's expectations of a process.

- Limit the drill-downs

When designing the reports, have a summarized report lead to detailed information within three clicks. The user shouldn't have to click endlessly to find actionable information. The report should focus the manager's attention to important details right away by allowing a drill-down.

- Include Counting Rules

Users should understand how the report data is summarized. Most reporting is available from a web page, so ensure you add a link to the counting rules. The counting rules explain how the data is collected and how any of the metrics are calculated. It also details what information is not considered. This helps new managers understand what the organization considers important.

- Traffic lighting is an effective way to highlight processes with issues.

Traffic lighting is when traffic signal colors (red/yellow/green) are applied to tables or graphs. In recent years, this method has been criticized because some have gone overboard and created a circus-look. The preferred method is to use *performance signals*, where table cells are highlighted with gray and low performance has red borders. This method draws the user's eye without obscuring the information (VanBuskirk & J., 2012).

Student Grades	Student 1	Student 2	Student 3
Assignment 1	28	98	56
Assignment 2	58	76	0
Assignment 3	62	86	92
Final Grade	49	87	49

Student Grades	Student 1	Student 2	Student 3
Final Grade	49.3	86.7	49.3
Assignment 1	28	98	56
Assignment 2	58	76	0
Assignment 3	62	86	92

Figure 11 Example Performance Indicators

PERFORMANCE DASHBOARDS AND SCORECARDS

In the early 1990s, when the terms *performance dashboard* and *balanced scorecard* were introduced, there were few vendors able to support either method. Scorecards are tabular in nature, whereas dashboards tend to contain graphical elements, such as gauges or line charts. Since their introduction, the terms have become synonymous. Both terms generically refer to presenting actionable data on a web-page.

This is certainly an area to apply system thinking. Each KPI impacts the behavior of those being measured. Consider all of the measurements together before adding to your final product.

Using a Scorecard

A scorecard can be a weighting or ranking system created for specific organizational metrics. It typically features several domains with a scoring system (for instance, 1-5 with 1 being the lowest and 5 being the highest). The allows the organization to compare entities based on strengths and weaknesses. The following figure contains an example scorecard recreated from a website. The use of traffic lighting is a little overdone.

Objective	Owner	Target	QTR 1	QTR 2	QTR 3	QTR 4	YTD
Sales							
Increase this measure from x to y	Michael Scott	4.8	4.2	4.5	4.8		4.5
Reduce process from x days to y days	Jim Halpert	3	2.9	3.1	2.9		3.0
Reduce this measure from x% to y%	Jim Halpert	85%	86%	85%	70%		80%
Human Resources							
Increase this measure from x to y	Toby Flenderson	4.8	4.2	4.5	4.8		4.5
Reduce process from x days to y days	Toby Flenderson	3	2.9	3.1	2.9		3.0
Customer Support							

Figure 12. Scorecard Example

A *balanced scorecard* is a management system framework popularized in the book, *The Balanced Scorecard* by Drs. Robert Kaplan and David Norton. This method encourages organizations to monitor performance against financial and non-financial strategic goals. This method tends to focus on progress instead of performance. What is important to note is that the technique has a specific management practice that goes along with it. (Kaplan & Norton, 1996)

Using a Performance Dashboard

In his book, *Information Dashboard Design*, the author Stephen Few defines a dashboard as a “visual display of the most important information needed to achieve one or more objectives.” The word objective is crucial in this definition because it implies a performance measurement or key performance indicators (KPIs). There are no set rules for what a performance dashboard must contain other than focusing on visualizing organizational objectives. (Few, 2006)

Each performance dashboard should start with planning what the organization would like to understand and improve. In many organizations, there are a set of yearly goals that the management team uses to keep process control. These goals can be used to create KPIs because they show how successfully an organization is meeting their goals. A KPI contains an objective and a time frame, such as the ones shown in Figure 13.

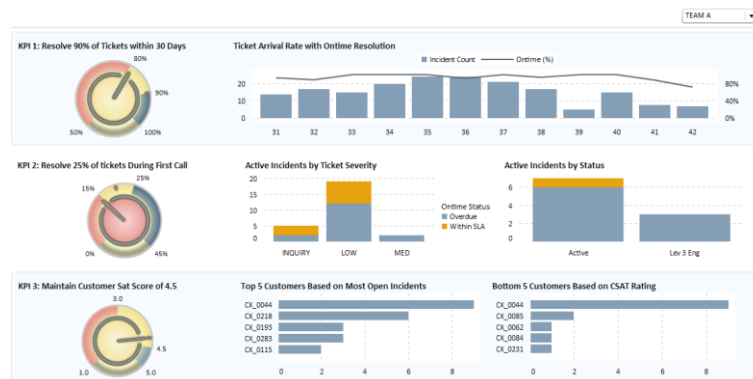


Figure 13 Customer Service Dashboard with KPIs

Unlike some of the other data communication methods, this method requires significant interaction with the end user to ensure it meets their needs.

Hint! This is a place where you can take a best practice from Leonardo da Vinci and sketch your ideas before creating a design. Your sketches can help you determine how much space is needed and if the ideas flow together properly.

Improving Dashboards and Scorecards

Any changes to dashboard or scorecard should be reviewed with the team using the information.

- You must ensure that the required data for the KPIs being displayed does exist
Many organizations reach a barrier when they realize they do not have the appropriate data for their measurements. This issue may be solved in creative ways, such as using a spreadsheet that is updated weekly and ingested into the dashboard process.
- When using interactivity in dashboards, determine the user's viewing path
How will users identify pathways or understand that more information is available. In some case it is obvious. You might have controls on the page like a drop-down list, buttons, or a slider. The user understands these objects control other objects. Consider carefully where these items are placed on the page.
- The most successful dashboards use a clean, minimal look
As Edward Tufte would direct us, "*Let the data talk*". You must be careful that your design choices do not upstage the data or distract your user from understanding the main messages. Some tips for keeping your design clean:
 - Avoid using logos or other decorative elements on your page. If your dashboard is internal to the organization, there is little reason to have the logo on it. If it's required to be there, keep it small and near the top right.
 - Add a title section as the first page of your dashboard that contains any supporting information the users need to access the dashboard or handle any housekeeping topics. This is useful for inexperienced users or people questioning when the data is updated or how the charts are prepared.
 - Style is what makes users want to look at your dashboard. You want the dashboard to be functional and attractive so avoid gimmicky tricks or outlandish color schemes and font choices.

USING ANALYTIC REPORTING

Analytic reporting allows organizations to delve deeper into the causes of issues and improve operational performance. While operational reports are usually based upon a single database, analytical reporting combines data from across the organization, includes trends, and provides recommendations. (Data Sync Tech, 2016)

Once the analysis is complete, the analyst communicates the results to the interested parties. This analysis is presented in a document, as a presentation, or both. In general, data analysis is a one-off technique that may not have any prescribed method. It relies on the data to communicate the message. The following examples are from the US government and the Pew Research organization.

Example 1: Analysis with Information

The US Government Accountability Offices produces multiple reports weekly that analyze how well the government is operating. A [report from February 2017](#) detailed government wide trends with contracts. This analysis was 72-pages long, so they certainly did not skimp on detail. (US Government Accountability Office, 2017)

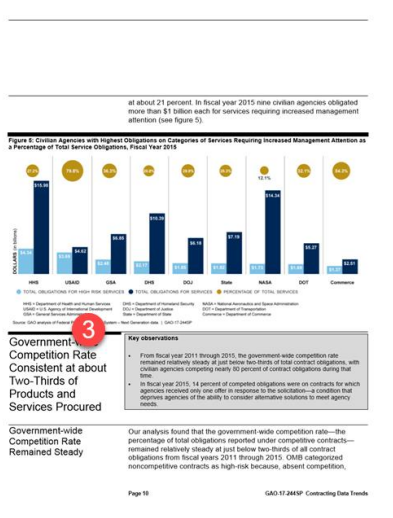
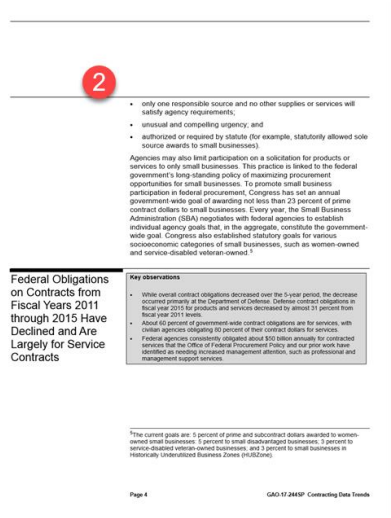
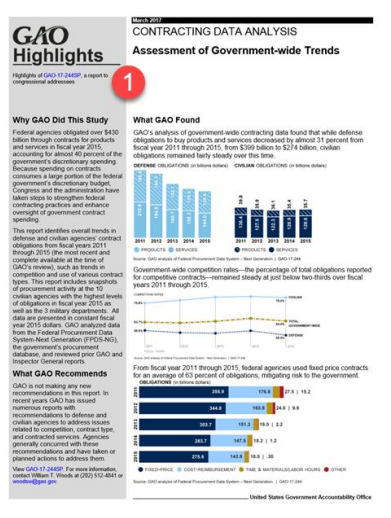


Figure 14 Analysis Reporting Example from US Government

The authors made it easy to consume by adding an executive summary that explained why the analysis was done, what they found, and what they recommended. The team used other formatting techniques to make the information easier to skim – such as descriptive headings and bulleted lists. The reader is led through the analysis but also coached about what the data says. Notice there are gray boxes with the title “Key Observations.” These observations are supported by the charts and graphs. You don’t have to be an expert on the subject, but you will have a firm grip on the subject matter at the end.

Example 2: Reaching a Wide Audience

Data journalism in an example of data analytics that reaches a general audience. In January 2018, the Pew Research group issued a [report about online harassment](#) based on data gathered in their surveys. (Smith & Duggan, 2018)

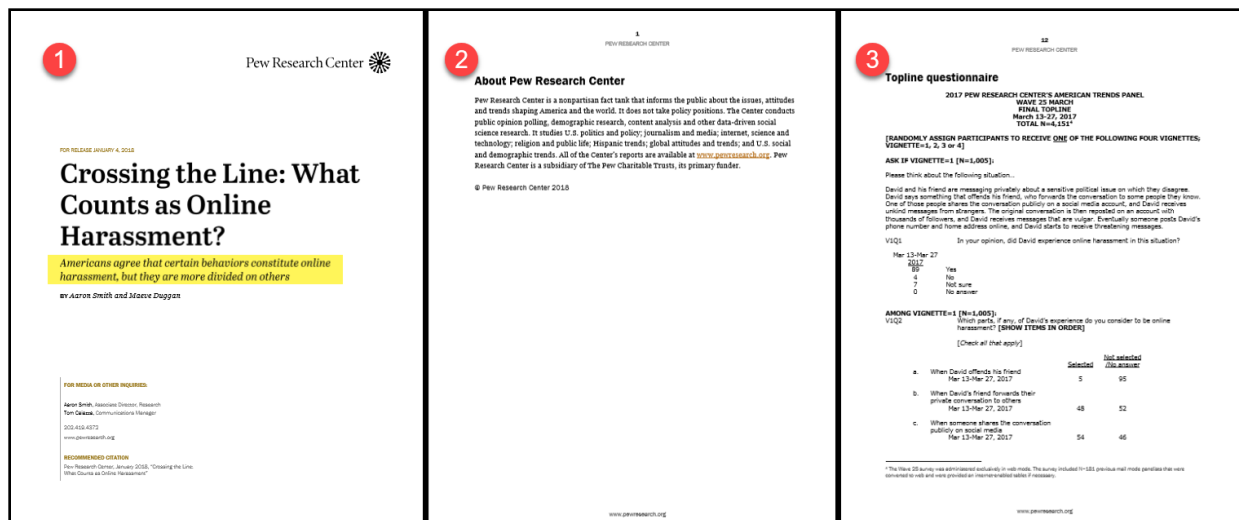


Figure 15 Analysis Reporting Example from Pew Research

This organization is targeting a novice audience. The reader may not be familiar with the organization. To build trust, the second page of the report explains who the organization is. Like the Accountability office report, there is a summary near the front. In this case it's on

the front page. The authors conclude that not everyone understands or agrees what constitutes harassment. This report doesn't provide any recommendations. It only explains what the survey reveals.

To further aid the reader, the appendix of the report has the survey questions and results. This allows the reader to find any bias or even find added insights.

Analytic reporting doesn't have any set rules. The use of data visualization techniques is going to be more important in these instances. The data needs to shine through.

Tips for More Effective Analytic Reporting

- Add an Executive Summary section

This section is for executives who are only seeking the highlights. Even your recommendations should be available for quick digestion. For those interested in understanding how you reached your conclusions they can read the report.

- Build trust with your audience

Explain the source of the data and any other details about the collection methodology. You want the audience to feel comfortable that you made the right decisions.

- Determine the focus of your analysis

Tom Davenport offered this advice about the focus of the story, "**What** stories are like reporting stories—they simply tell what happened. **Why** stories go into the underlying factors that caused the outcome. **How to address the issue** stories explore various ways to improve the situation identified in the what and the why stories. A really complete story may have all of these focus elements." (Davenport, 2014)

- Use a Sandwich Approach

When presenting your analysis, use a sandwich approach for your important insights. State your insight, provide supporting facts and figures, and then restate the insight. This technique assists the audience with understanding how the data supports your viewpoint. (SpeakerHub, 2018)

USING INFOGRAPHICS

An infographic tells a story with images, data visualizations, and text. This technique is used to grab audiences who have declining attention spans. You can think of it as an extension of a dashboard. Infographics allow you to condense huge amounts of data into bite-sized pieces. The pieces tell a quick story about a chosen subject.

Infographics can be used in advertising or shared on social media to draw attention to subjects. The visual nature of a well-designed infographic grabs a viewer's attention. This method is considered more casual. It is a fun way to open a topic for more exploration.

In his book, *Infographics Powered by SAS®: Data Visualization Techniques for Business Reporting*, Travis Murphy describes two infographics: artistic and business. (Murphy T. , 2018)

Artistic infographics contain pictures. These tend to be used in home or office décor. You may have seen the wall posters that show the many varieties of flowers, hot peppers or even how Batman changed through the years. The following figure shows these examples found on the internet. An artistic infographic is highly visual and has limited text. You use your eyes to learn and compare what is similar and what is different.

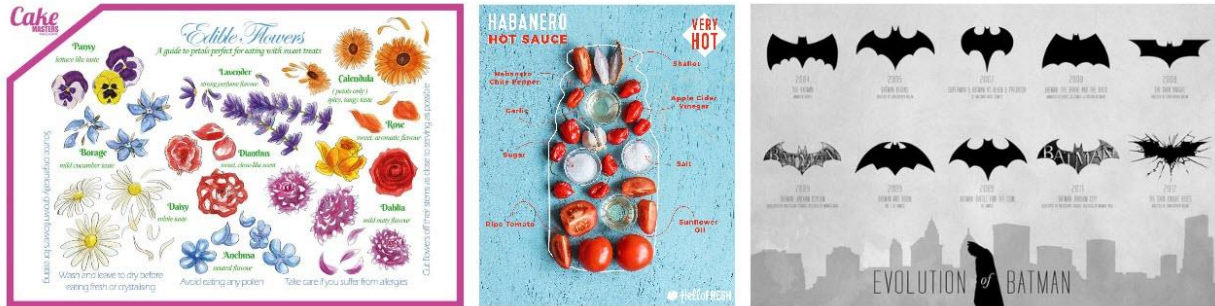


Figure 16 Artistic Infographics

Business infographics are more structured. These are more like web reports because they have statistics and pictures. These infographics tell a story.

The following figure shows a business infographic. You can see how the pictures are more prevalent than the text. The key statistics are used to enlighten the viewer with a short message.

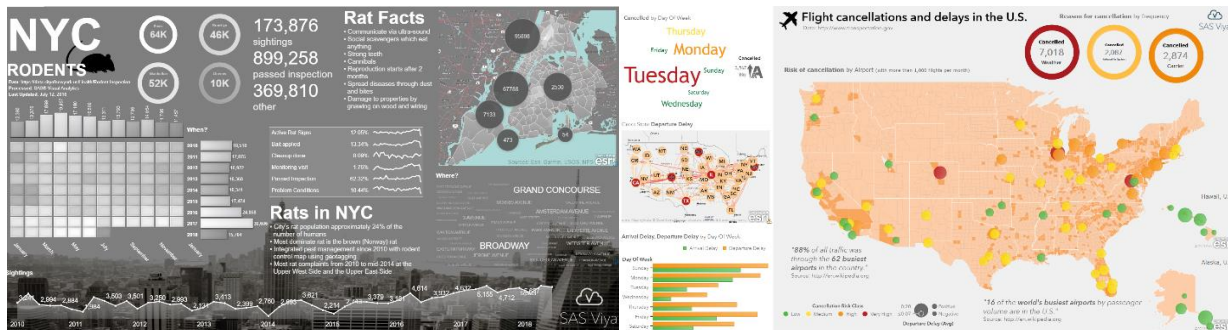


Figure 17 Business Infographic Examples (Credit: Falko Schulz, SAS Institute)

Creating More Effective Infographics

Infographics will test your design and layout skills more than other methods.

- Determine the key message and the data facts that support that message.

With limited space, each page element matters. Plus, users draw inference from how the shapes appear on the page. For instance, the larger the shape, the more important the user presumes it to be.

- Create a layout of the page elements on paper.

You can use a paper and pen just to jot down your ideas and pre-organize the data. Consider what each element adds to the story and how it leads the user through the story (Murphy & Schulz, 2018).

- Any graphic or web design skills are particularly useful in this exercise.

If you have never had any training, then consider reading up on design principals. There are free courses available on the internet from such places as Udemy, Skillshare, and other like sites.

USING DATA STORYTELLING

Data stories add a narrative to data. The most successful ones are used to persuade an audience. An effective data story sends a succinct, actionable data message to the audience. By keeping the message focused, considering the audience, and using a convincing narrative, data storytellers engage and move audiences toward their conclusions.

There're no set rules for data stories – they can be anything from one chart to a 10-minute video. What the stories have in common is a narrative that is supported by data and drives the viewer to a conclusion.

Creating Impact

Professor Ben Wellington considers creating impact to be the most important part of data storytelling. In his Ted Talk called *Making Data Mean More through Storytelling*, he told multiple data stories based on data made available by the New York City government. (Wellington, 2015)

In one data story, he showed a bubble plot over a street map that indicated revenue from parking meters. The lines showed the spot was available, but it was blocking access to the fire hydrant. Since it was next to a bike lane, residents assumed it was a valid parking spot. The NYPD disagreed and would issue a ticket. Getting a ticket at this spot was so common that Google Street view even had a picture of it. However, his data story had impact on the city – soon the spot was repainted, so citizens were not confused.

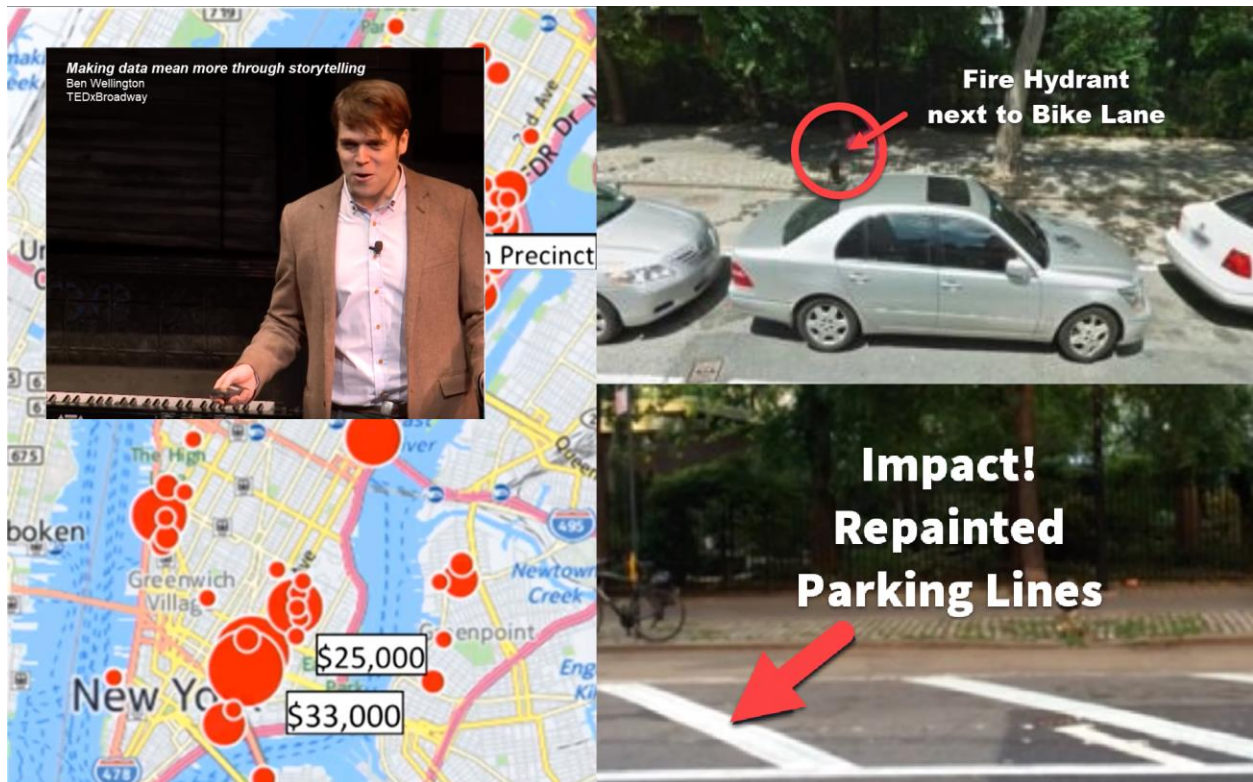


Figure 18 Data Story Example (Images from Ted Talk)

When well done, a data story can move difficult audiences to a new position. The personal narrative can have an impact that data and statistics alone do not have.

Ways to Create a Data Story

With a data story, you want to tell the story that the data reveals. The Global Shark Attack File contains all reported human/shark interactions dating back to 1899. What is the strongest point the Global Shark Attack File data set makes? Shark attacks are rare and more importantly, rarely fatal.

Hollywood has created an impression that plunging one foot in the ocean will make you the main course of a fast-food shark dinner. Most strikes are believed to be the result of a hungry or curious fish. The truth: we are more interested in them than they are in us. How do you communicate that point to a nervous beach goer?

Here are three examples of how we used this data to tell different stories based on the situation.

Example 1: Make It Personal to Pull in Your Audience

In this [Hold your Breath as We Dive into Visualizing Shark Attacks in The Bahamas](#) data story, D'Agord captures your interest using a personal story. From living in the Bahamas, her family enjoys an ocean lifestyle—including a husband who often spearfishes.

This data story starts with intrigue, danger, and adventure as she retells his encounter with a Caribbean reef shark. What a great way to open—it sends chills down my spine!

In this informative data story, she leads you through the data asking the same questions you might have—what gets a shark's interest, where do sharks fish, and which sharks are more interested in humans? She concludes that Caribbean reef sharks are more curious than harmful, but they do prefer to hang out near her home in Freeport.

Example 2: Use It as a Plot Device to Move Your Demo Along

A product demo is great way to use a data story! I wanted to talk about location analysis with SAS Visual Analytics. In this [Where Sharks Attack in Florida](#) post, I isolated the data to the past 20 years and show where sharks are fishing for their afternoon snack. Sharks are curious about surfers and do nibble at them. These attacks have not resulted in any deaths, mainly just some minor lacerations.

Taking advantage of a viewer's natural curiosity about sharks, I show that the data reveals where incidents are likely and where they seldom occur. Again, we see there is no reason to fear sharks! These attacks are more headline driven than the more deadly but common activities, such as car accidents.

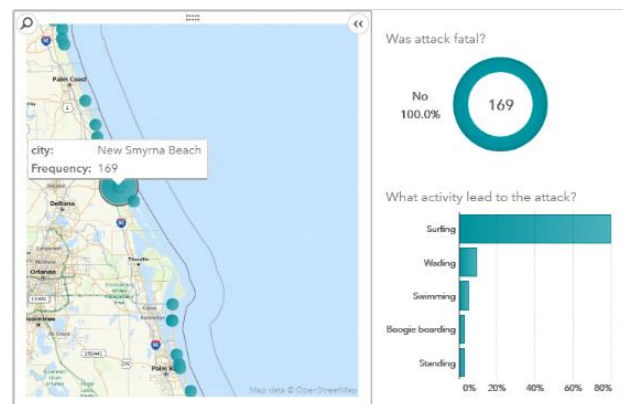


Figure 19 No fatal incidents with sharks

The media loves to talk about sensational stories to move newspapers. Problem: It drives fear of a rare threat. This data story does multiple things:

- Illustrates how beneficial location analytics can be to increasing understanding.
- Data is simple to understand. Even if the viewer had never visited Florida, the beach, sharks, and swimming are not unknown subjects.
- Showing the report viewers how useful SAS Visual Analytics is for creating visually rich and smart analysis by teaching them something about the data.

Example 3: Use an Unexpected Main Character to Grab Attention

One of the best ways to tell a story is to use a human as the basis. In [this data story](#), D'Agord switched her earlier approach. She opens with a narrative featuring a strong female lead, Mary Lee.



Figure 20 Mary Lee getting Tagged
[Credit: <http://www.ocearch.org>]

Mary Lee is a great white shark with a 100K+ Twitter following. After pinging her location for over five years, the 50-year-old shark has not registered a ping since 2017. Her Twitter fan base has tweeted concern for her and kept vigil for over 6 months. They believe her battery died.

Yes, people were worried about the fate of a 20-foot, 4,000-pound great white shark. Remember: Hollywood credits her as the ocean's deadliest predator. In her data story, Jaime shows with the data that sharks are not the threat that the horror movie *Jaws* leads us to believe. She provides

statistics to support her point, but she also captures the magic of Mary Lee as a main character with a quick narrative.

Since our first data story, our awareness of the most dangerous predator on the planet has changed from a great white shark to the more common human. It's true—humans are responsible for killing as many as 11,000 sharks per hour! Who is the real danger? (Verger, 2015)

It's easy to say shark attacks are not fatal and rattle off some statistics. It's more interesting when you add a story that unfolds as the viewer reads. In these data stories, the subject matter caught the viewers' attention, but the data pulled the viewer through the story.

Data stories are a great way to lower audience defenses about a topic. Narratives give the audience a way to empathize with the subject.

CONCLUSION

Leonardo da Vinci is one of the most significant artists who ever lived. While best known for the *Mona Lisa* and *The Last Supper* artwork, his influence was felt in medicine, science, architecture, and even warfare inventions. You can apply his love of details, curiosity about the world, and inspired beauty to your data presentations for a true masterpiece.

Creating data communications is a combination of considering what you want to say, why you are saying it, and to whom you are speaking. While this seems like a simple concept – it can be as daunting as an empty canvas to a beginning artist. By understanding the best ways to use data communications you can create more powerful messages.

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RECOMMENDED READING

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