Data Storytelling

The Art of Communicating Business Insights with Data

BY JOE HILLEARY

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About the Author

Joe Hilleary is a writer and a data enthusiast. He believes that we are living through a pivotal moment in the evolution of data technology and is dedicated to helping organizations find the best ways to leverage their information. With a background in both analytics and the liberal arts, he crafts clear, articulate narratives on technical topics that empower stakeholders to make informed decisions. Hilleary is a Research Analyst at Eckerson Group.

About Eckerson Group

Eckerson Group is a global research and consulting firm that helps organizations get more value from data. Our experts think critically, write clearly, and present persuasively about data analytics. They specialize in data strategy, data architecture, self-service analytics, master data management, data governance, and data science. Organizations rely on us to demystify data and analytics and develop business-driven strategies that harness the power of data. **Learn what Eckerson Group can do for you!**

About This Report

To conduct research for this report, Eckerson Group interviewed numerous industry experts and practitioners. This report is sponsored by Toucan Toco, who has exclusive permission to syndicate its content.

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Executive Summary

Data storytelling promises to close the last mile of business intelligence (BI) delivery—connecting data insights to business actions by providing a clear, guided, and contextualized experience. The ability to tell stories with data has long separated top-notch analysts from run-of-the-mill ones. It's not enough to generate analyses and complex models; data professionals must explain them in terms decision makers can understand. A good story cuts away the complexity, offering a simple narrative that communicates a concrete takeaway. This approach helps organizations become data-driven by lowering the bar on data literacy, freeing up executives, putting the focus on business questions, and proposing tangible courses of action based on the data.

Crafting a compelling data story requires a specific skill set. Data storytellers must combine visual design best practices with clear narrative structure to guide data consumers through their insights. Unfortunately, many analysts lack these talents. Now, modern storytelling-oriented BI vendors promise to turn every report and dashboard author into a top-notch data storyteller by building best practices directly into their platforms. They aim to reduce the time data analysts must spend on design, enabling them to focus more on the data itself.

Modern tools provide authors with a more guided way to create and deliver data stories that doesn't depend on their existing design, coding, or communication skills. No more presentations with static charts copy-and-pasted onto slides—new tools leverage the cloud to provide interactive data stories in a range of formats at the point of decision making, while natural language generation algorithms create human-readable narratives from tabular data. These new technologies make data more accessible and digestible than ever, helping connect the analytics workflow to the business workflow.

Humanizing Data

To tell a story is to tap into a primal element of our humanity. From the earliest times, we have told one another stories to make sense of our world—legends and myths to explain rain, earthquakes, famine, and disease. Even today, stories help form our identities. At the community level, we define ourselves through histories, the collective narratives we tell about our societies. As individuals, we construct personal narratives that provide direction and purpose to our lives.

Nevertheless, we often relegate stories to the "soft" disciplines of the humanities. In the data world, we pride ourselves on our reliance on numbers, on strict computation and logic, but in doing so we fail to recognize the need to translate those numbers into the human realm. Despite spending millions of dollars on data and analytics, most enterprises still struggle to be truly data-driven. Although talented analysts churn out reports and dashboards, a disconnect between data and business teams prevents their insights from driving decisions. Data storytelling helps bridge that gap. It turns data into stories that clearly and powerfully communicate insights to decision makers, laying out options and recommending actions. (See figure 1.)

Figure 1. Connecting Data to Business
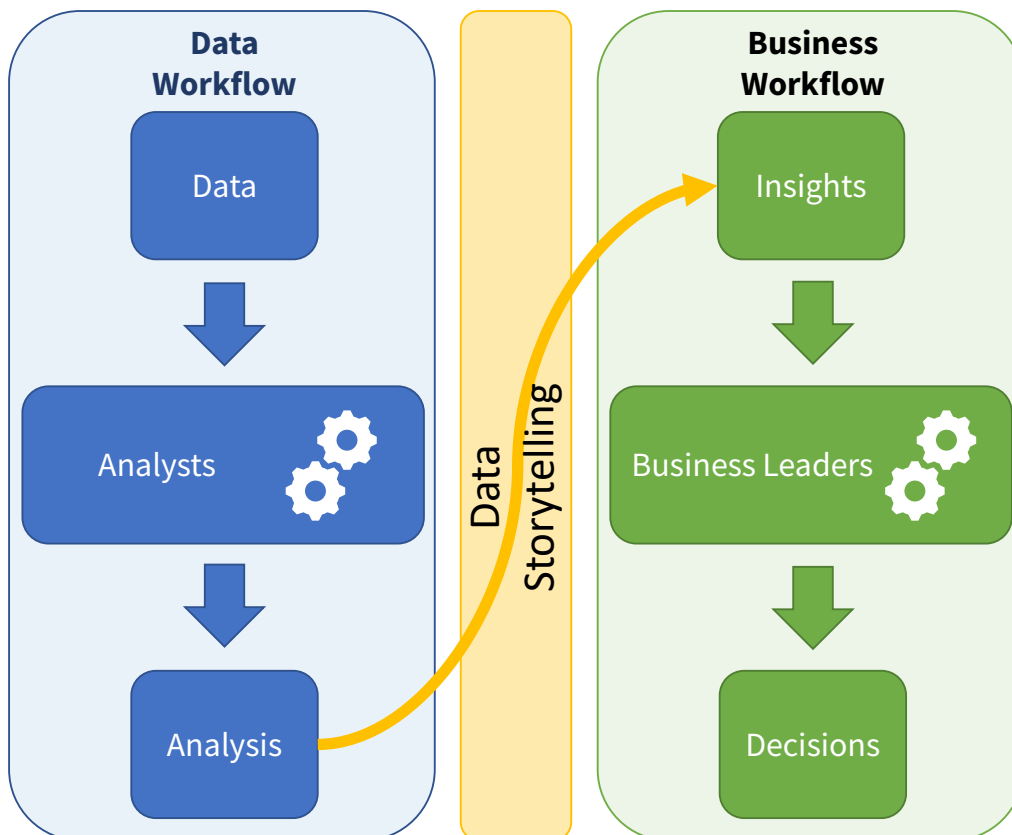
Data Storytelling vs. Data Analysis

Data analysis comes in two forms, exploratory and explanatory. The first occurs when an analyst digs into the data without a particular agenda. They seek to understand the data more thoroughly and conduct analyses to that end. The second is more directed. An analyst creates a report, dashboard, or graphic with the intention of delivering it to a business leader who will use it to inform a decision. Data storytelling builds on the latter.

So, what makes data storytelling different from good, old-fashioned data analysis? Two traits:

1. A focus on a specific business insight

2. The addition of narrative

A data story differs from a basic analysis because it has an agenda. It communicates a concrete finding and suggests a takeaway. It adds business context to the analysis and delivers a "so what?" statement. In contrast, a dashboard or report often presents a slew of data without context or direction. The *reader* must decide what's important. A data story takes that burden off the data consumer. Rather than cramming as many insights as possible into a single graphic or display, a data story highlights just the aspects relevant to the narrative it's telling. This could be a singular discovery in the data or a set of targeted KPIs to which an executive regularly refers. The key is that, like a traditional story with characters, a plot, and a climax, it focuses the reader's attention.

A data story differs from a basic analysis because it has an agenda.

Because of the singular focus of a data story, it's important to make sure you're delivering an *accurate* story. As the saying popularized by Mark Twain goes, "There are three kinds of lies: lies, damned lies, and statistics." It's far too easy to mislead using data. We see these sorts of deceitful data stories all the time in advertisements that distort axes or proportions to exaggerate benefits, but it's just as easy to do so unintentionally. In particular, a data storyteller must be careful when choosing which facts to include in their narrative. What you choose not to say can be just as potent as what you choose to say, and although simplicity is vital, over-simplicity can lead to poor outcomes.

Historically, analysts have turned data analyses into data stories in two ways—annotation and presentation. Some storytellers communicate narrative insights in comments to the visualizations in a dashboard or report. Others might paste their chart into a slide show and then deliver the narrative orally. Either way, the goal has always been to deliver a guided walkthrough of the data. When a storyteller has finished, the stakeholders should understand the key message in the data and how the business ought to respond. This insight can then inform the decisions they make.

Consider the following data story about sales at an imaginary company.
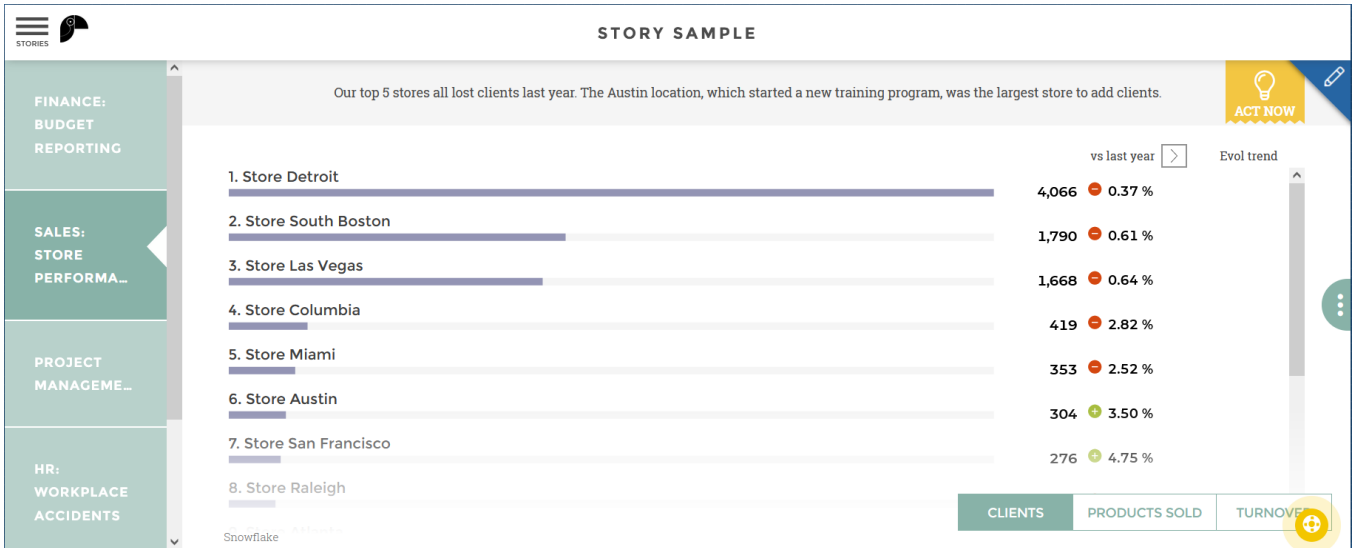
Figure 2. Sample Data Story

Image courtesy of Toucan Toco

This example displays the total number of customers at various store locations. Unlike a general-purpose dashboard, it does not crowd the screen with competing KPIs. It focuses exclusively on the number of clients. It orders the stores by popularity and shows the change in clients over the last year. Rather than forcing the data consumer to figure out what's important about this chart, the data story makes a clear statement at the top. This annotation adds business context and highlights the key insight. Clicking the "Act Now" button tells the data consumer how they should respond to this information (see figure 3.)
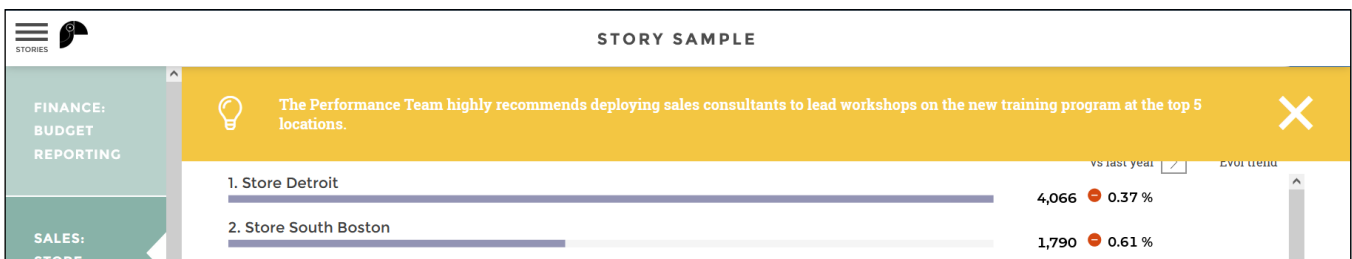
Figure 3. Action Bar

Image courtesy of Toucan Toco

Through the banner, this story goes beyond analysis to connect the insight to a specific action, completing the narrative. As a reader, we learn what happened and what we should do as a result. Though not every BI vendor builds this concept into their platform, the action statement is a critical component of every data story.

Data Storytelling as an Organizational Competency

Taking a data storytelling-oriented approach to business intelligence addresses several challenges:

> **Low data literacy.** Not all data consumers are created equal. Business leaders typically have little background in statistics or numerical analysis. Although increasing data literacy levels across the organization creates a strategic advantage, it also takes time and energy to educate the entire workforce. Data storytelling helps predigest complex data and statistics for non-data literate data consumers.

> **Time as a premium.** Even when data literacy rates are high, business leaders don't have the time to spend digging around in the data to identify insights. It's just not their job. Even if an executive was formerly a statistician and more than capable of doing so, their time is better spent on other executive tasks. Competent data storytellers can direct these business leaders' attention to the relevant aspects of the data, allowing them to focus on using the insights to drive decisions.

> **Need for specific answers.** Business leaders don't need data. They need answers to business questions. With our focus on data, we sometimes lose sight of the reason we value it at all. In the analytics world, data is only valuable insofar as it informs a business decision. Data storytelling recenters analytics on this basic premise. Rather than a buffet of data, data storytelling presents data like a fixed-plate multi-course meal. In the former scenario, the answer may well be somewhere in the display, but it's up to the consumer to find it amidst a range of distracting options. In the latter, the answer is presented through progressive steps that guide the consumer to the ultimate understanding, allowing them to better digest the significance of the insight.

> **Too much data.** Big data provides value, but it can also lead to an informational overload. With so much to draw from, sorting the wheat from the chaff becomes non-trivial. Data storytelling with its emphasis on communicating one insight at a time helps refocus business intelligence on what's important.

Building a data storytelling strategy. Unfortunately, creating a culture of data storytelling doesn't happen overnight. Most data professionals have a deep understanding of their models or analyses, but few know how to communicate that understanding to businesspeople. Nearly every one of the dozens of data and analytics professionals I spoke with identified data storytelling as a rare skill that distinguished great data analysts from run-of-the-mill ones. As it turns out, being good with numbers and being able to talk about them in a way non-experts can understand are two different abilities. But, even having a single data storytelling expert can cause a ripple effect throughout the business.

Being good with numbers and being able to talk about them in a way non-experts can understand are two different abilities.

Begin by identifying the best data storytellers already on your team. If no one fits the bill, consider hiring someone who specializes in the discipline or sending a few of your analysts to a workshop to pick up the basics. Once you have an internal storytelling expert, position them to act as a kind of consultant, advising and editing the analyses and dashboards produced by other analysts. In the short term, they can translate analyses into stories, so that your initiative can have an immediate impact on the business. Over the long run, they will also be able to impart best practices to other data professionals, enabling them to tell their own stories. Technology can also help in this endeavor. New BI platforms increasingly automate data storytelling, reducing the burden of skill on individual analysts. I will explore these tools—and their role in scaling and industrializing data storytelling—in greater depth later in this report.

Data storytelling in action. A great example of the power of data storytelling comes from a conversation I had with a data storyteller who works for a construction company. Within that industry, building and sticking to a schedule is a big deal. His firm had sophisticated software for building out and predicting schedules, but the folks actually on site weren't engaging with the schedule analyses it produced. Like executives, the construction crews weren't data professionals. The detail provided by the schedulers just made their eyes glaze over. They needed a more human-oriented data story.

In response, the data storyteller started bringing data from the scheduling tool into a BI platform. He pared down the data the software provided to the essentials—the impact of time, materials, and labor—and began delivering data stories directly to workers' tablets in the field. Because he simplified the narrative and made a concrete connection between data and action, this new approach made sense to the construction workers. Instead of feeling like an analyst imposed the schedule on them, they felt as though they had more agency. They could clearly see the link between the schedule and their actions.

Crafting a Good Data Story

Now that we've established the value of data stories, how do we tell a good one? There are essentially two components to good data storytelling: visual design and narrative. (See figure 4.)

Figure 4. The Components of a Good Data Story
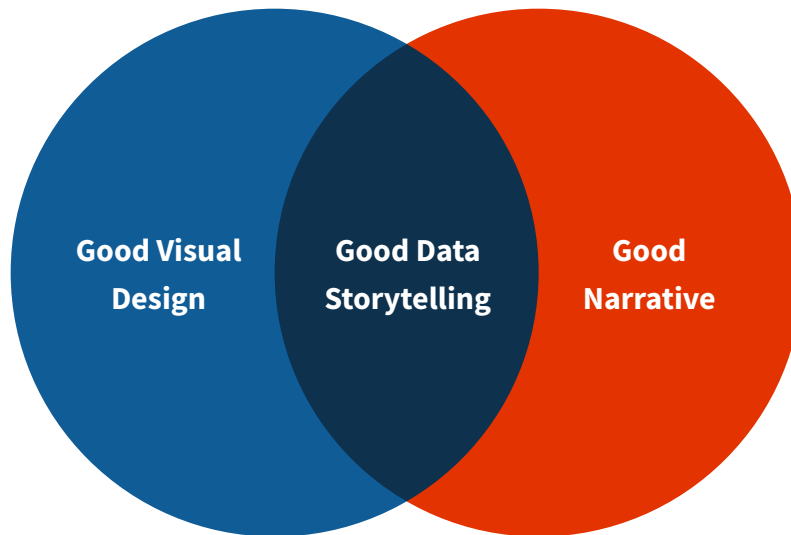
Visual Design

Think of visual design as rhetoric. However strong the underlying argument, if you cannot deliver it in a clear and compelling way, you will persuade no one. With data storytelling, this rhetoric tends to be more visual than verbal. In fact, some practitioners equate data storytelling with good dashboard design, although I believe there's more to it.

Many data storytelling guides and workshops revolve around visual design. They communicate best practices for data-centric graphic design. Although there are many standards and methodologies, they all come down to one thing: clarity through simplicity. Modern business intelligence and visualization tools give us a dazzling array of options to customize charts and dashboards—they may give us too much choice. Data stories flounder when analysts spend too much time showing off all the neat features of the tool and not enough time articulating their insight. Instead, they should focus on reducing distraction.

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This process starts by ensuring clarity of presentation. Analysts should limit the amount of information on a single page—psychology tells us most people can only absorb about seven new pieces of information

at a time. They should consider the order of visualizations and how relative sizes and positions impact the interpretation of those visuals. They need to make sure that they provide readily accessible business context for the information they display. Colors and fonts ought to be communicative, not decorative. All of these aspects reduce the time a data consumer spends processing the page before arriving at the "Ah-ha!" moment when they understand the insight.

The other key element of visual design is the clarity of each data visualization. The philosophies espoused by Edward Tufte in ***The Visual Display of Quantitative Information*** continue to form the academic backbone of most best practice guides. Dave Wells and Wayne Eckerson of the Eckerson Group have also written on this subject (See ***"The Other Side of Data Visualization"*** and ***See, Know, Act: How Visual Design Standards Improve Analytical Literacy***). ***The International Business Communication Standards***, based on the work of Rolf Hischert, further codify good visual design for charts. Although many of these resources go into much greater depth and provide numerous examples, I will lay out a few general rules here:

DO:

> Remove any elements that can be removed without loss of information.

> Emphasize elements that represent data.

> Use simple shapes, especially rectangles.

> Mark and standardize axes.

> Give colors standard meanings across visualizations.

DON'T:

> Use patterned fills.

> Use three dimensions unless absolutely necessary.

> Use pie charts with more than two sections.

> Use irregular shapes or images.

> Clutter the background.

> Plot multiple insights in one graphic.

You can observe many of these rules in action in our example from before. (See figure 5.)
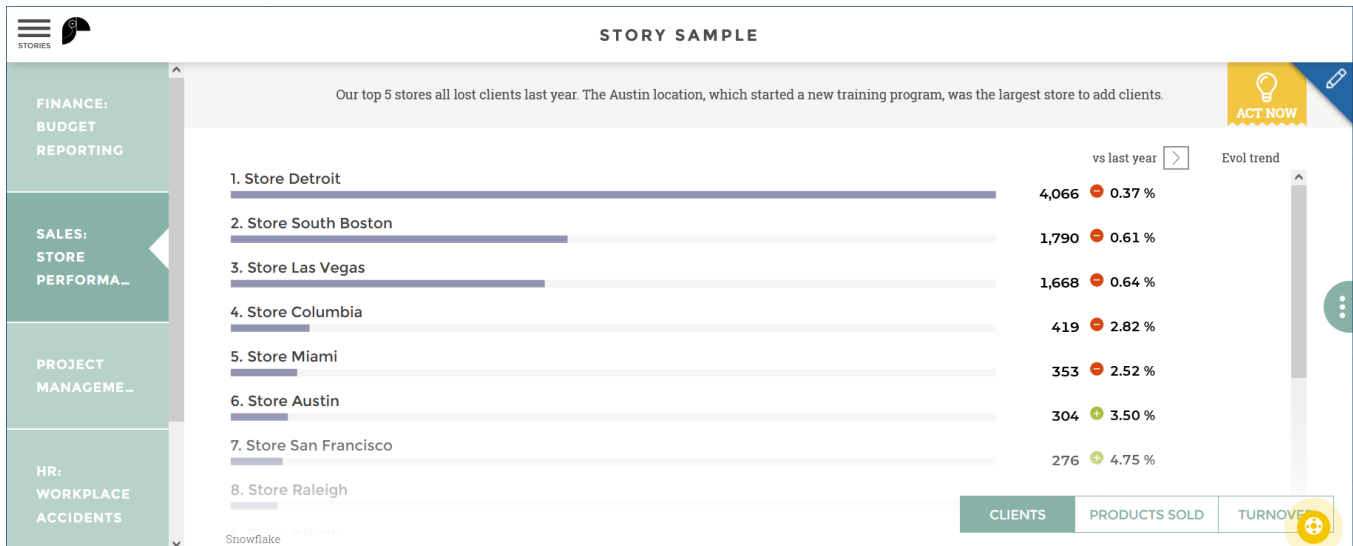
Figure 5. Sample Data Story

Image courtesy of Toucan Toco

Note there is only one visualization. It takes up the majority of the space so that most of the screen displays data rather than decoration. The bars are simple rectangles in a soothing but distinctive color and are ordered by size. Although there are no axes, the scale is fixed and the exact numbers are given at the end of each bar, allowing for easy comparison of the stores. Red and green indicators are used to show growth or decline corresponding to the widely understood associations of green with good and red with bad. Because many people are red/green colorblind these icons also have a plus or minus. The font is simple and readable, and all the numbers align perfectly so the eye can quickly scan through them.

One of the great pitfalls of modern visual design is the confusion of data visualizations with data art. In a business setting, the goal is communication, not beauty or cleverness. Building a chart that looks like a plane to track travel miles wastes everyone's time. Data art is well and good, but it serves a different purpose. Creative displays and complex graphics demonstrate the skill of the analyst with their tools. It puts the spotlight on the process and the designer, not the business goal and the insight. If your boss wanted to know the time, you wouldn't paint Salvador Dali's melting clocks for them.
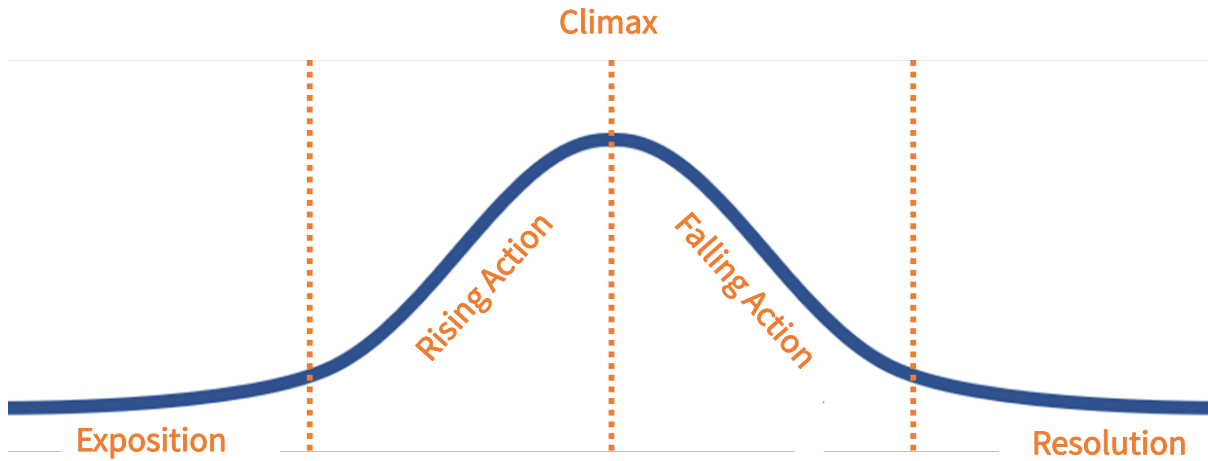
Narrative

If visual design is rhetoric, narrative is the underlying argument. The word narrative may, at first, conjure visions of something like Sky News' **Brexit by the Numb3r5.** This scrolling data story packed with sharp visuals and written analysis does represent one way to tell a data story, but it's not the only one. "Narrative" in the context of a data story means something different than in journalism or fiction.

If we think about the basic components of a traditional story, the narrative arc consists of an exposition,

a rising action, a falling action, and a resolution. In the exposition, we learn about a cast of characters. During the rising action, something happens to them that creates narrative tension. This tension comes to a head at the climax when the characters must deal with the challenge. The characters tie up the loose ends during the falling action and enter a new status quo in the resolution. (See figure 6.)

Figure 6. A Traditional Narrative Arc

Narrative in a data story consists instead of exposition, diagnosis, and recommendation. (See figure 7.)

Figure 7. A Data Story Narrative Arc
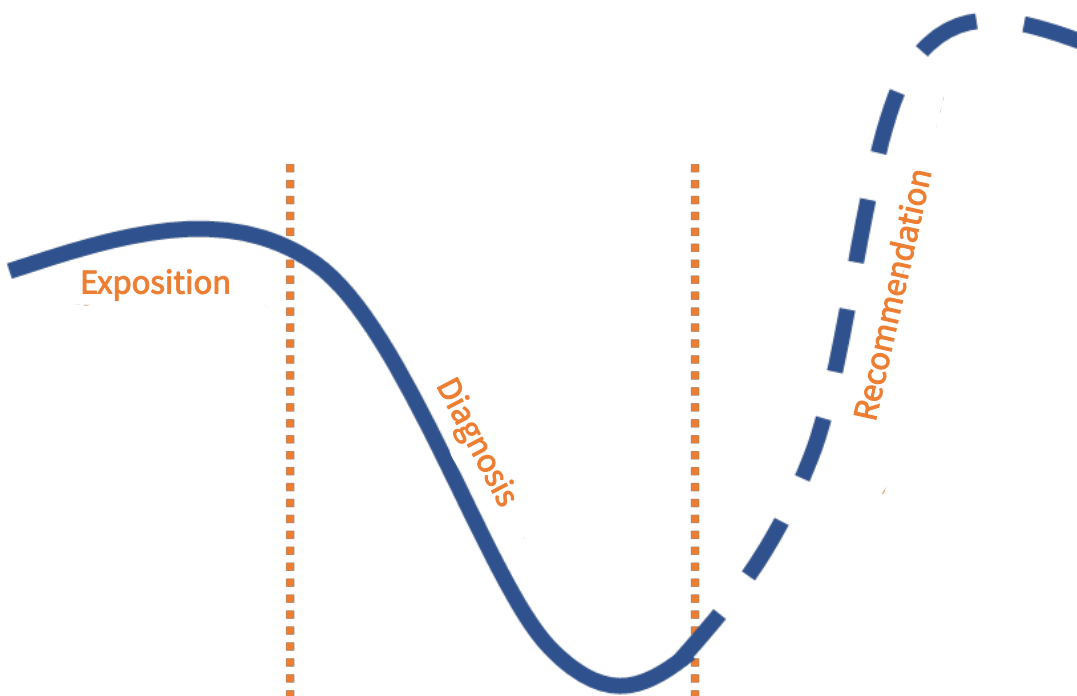
As with a traditional story, the exposition involves meeting the protagonists. In a data story, these are the metrics the narrative will focus on rather than literal characters. Unlike in a traditional story, there is no present action. When the story begins, the main event has already taken place and part of the exposition is explaining what occurred to the "protagonists." This phase focuses on the central insight the analyst uncovered in the data. Instead of a rising action and climax, the second stage of a data story—the diagnosis—attempts to explain why the event occurred. This step involves putting the data in a business context. Finally, the recommendation suggests an action that the reader should take based on the presented information to reach some new status for the protagonists. Unlike the first two phases, which are grounded in the historical record of events, the third projects into the future.

This narrative pattern has more in common with a parable than a news article or a novel. It focuses explicitly on the reader with the goal of influencing their behavior. Nothing should be implied or alluded to in a data story. It should explicitly state the takeaway. The most basic narrative for a data story reads "X happened because Y, so do Z." A data storyteller can construct a narrative over several visualizations, but they should all build to the same point. As with visual design, simplicity is king. Trying to communicate too many points at once muddles your message and leaves your audience confused. Stick to one insight at a time. Include as much context and detail as necessary but no more.

The most basic narrative for a data story reads "X happened because Y, so do Z."

Crafting an effective narrative requires knowing your audience. Remember, you aren't your audience. What you find valuable isn't what they find valuable. Often analysts and especially data scientists think the narrative consists of explaining how they arrived at their conclusion—it doesn't. The narrative of a data story isn't the methodology section of a lab report. An analyst or data scientist may answer those questions if a businessperson asks, but the emphasis should be on the action the findings suggest.

Often analysts and especially data scientists think the narrative consists of explaining how they arrived at their conclusion—it doesn't.

Keep in mind the following workflow when crafting a data story:

Figure 8. Creating a Data Story
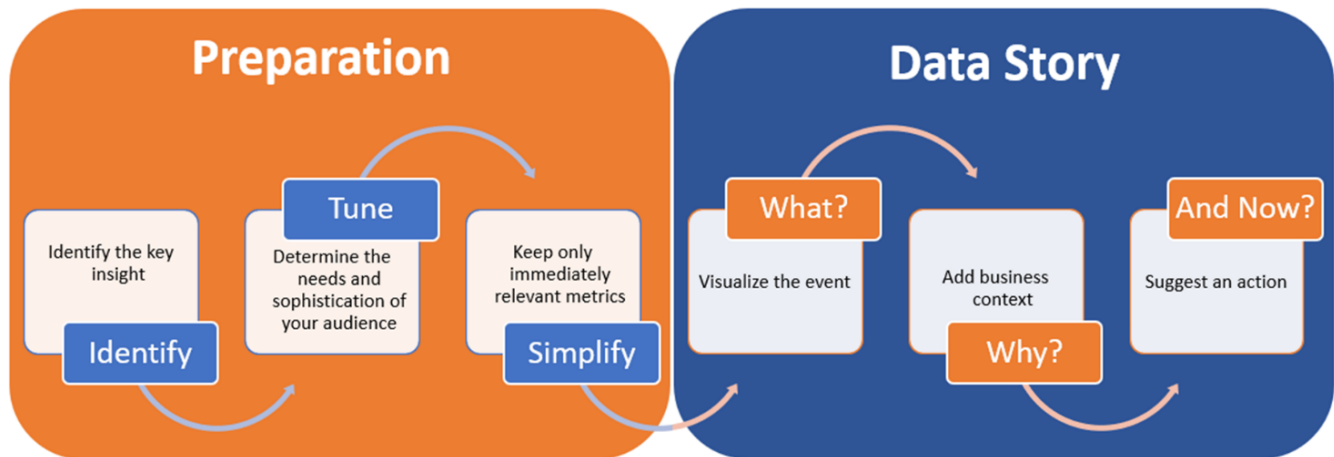
1. **Identify.** Looking at the data, what's interesting or important? Pick a single insight to focus on in your data. If there's more than one, you have more than one story to tell, but don't try to combine them into a single narrative.

2. **Tune.** Make sure the story you want to tell matches the audience you're telling it to. The level of granularity you need to provide depends on who will consume your data story. A data story for a CEO requires a different level of abstraction than a data story for salespeople in the field.

3. **Simplify.** This is arguably the most important step in preparing a data story. Remove everything from the analysis that isn't explicitly connected to the insight you want to communicate.

4. **Create the Narrative.** Once you have clearly defined the insight, it's time to actually create the data story. Answer each of the three questions of the data story to map your insight onto the narrative structure.

    a. **What?** This is the exposition of the data story. Use a visual to show the data consumer exactly what happened.

    b. **Why?** This is the diagnosis. Link the data to the business context to explain why the event you're highlighting occurred.

    c. **And now?** This is the recommendation. Make a call to action. Tell your audience exactly what they should do given the insight you've communicated.
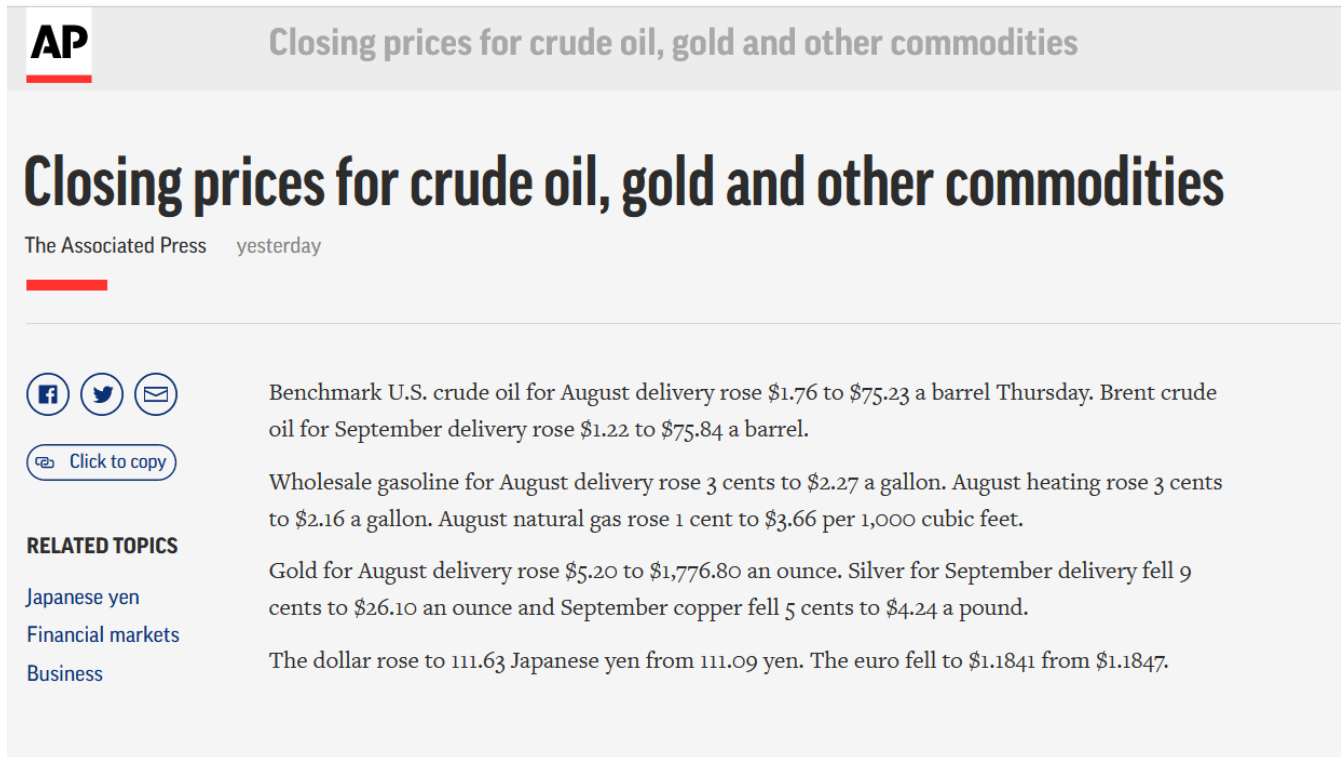
Tools of the Trade

Data stories can have an enormous impact on a business when well-constructed, but crafting strong data stories is difficult at scale. Those who tell stories well are invaluable, but the process is still labor-intensive. Until recently, data storytelling has been an artisanal craft. Uniquely skilled storytellers build data stories from scratch using visualization tools and slide presentations, but the quality of stories is inconsistent across the business. Today new approaches to BI are starting to change that, heralding a new era of industrialized data storytelling.

Built-in storytelling. Increasingly BI vendors are building data storytelling features directly into their platforms. Instead of copying-and-pasting visualizations into a presentation, analysts can add a narrative arc within the tool to build a complete data story, which is then available as a high-quality, mobile-first, web-based deliverable. One example of this approach is **Toucan Toco**, a modern cloud-native BI platform that seeks to enable any analyst, not just the unusually gifted, to tell great data stories. It does so by integrating design best practices directly into the platform, removing the need to know how to design well and making the product accessible to a larger audience. At first, the fewer choices it allows the analyst may seem limiting, given the way traditional BI tools constantly compete to add more options and customizations. However, it actually aligns perfectly with the data storytelling methodology.

Essentially, Toucan Toco removes the burden of visual design from analysts. They don't have to go to dozens of trainings and build a new skillset to tell better data stories, because the platform's user interface already guides them through those choices. The end product isn't a visualization or even a dashboard, it's a data story, complete with annotations that point out insights, business glossary integrations to provide context, and action banners that tell data consumers how to respond. In fact, the example data story I shared at the beginning was built within the Toucan Toco platform.

Natural Language Generation. Other vendors focus on using artificial intelligence and natural language generation (NLG) to automate the creation of stories entirely. These tools ingest data and write short, news-like blurbs to communicate the key insights. Already organizations including Bloomberg, Forbes, The Associated Press, and The Washington Post use NLG to write articles about data-centric topics such as finance and sports. (See figure 9.)

Figure 9. NLG-Powered Storytelling

This article from the Associated Press represents the kind of stories NLG can produce at this point. Although it manages the exposition part of the narrative arc, it lacks the diagnosis and the recommendation. Another challenge is for the model to identify which stories are worth telling. News organizations still depend on humans to feed algorithms data that other people will want to know about. Although it's still early days, as the technology advances, it's possible that one day most simple data stories won't even require a human storyteller.

Storytelling for the cloud. Finally, BI platforms are turning to the cloud to extend the impact of data stories. Once a data story might not have left the conference room where the analyst delivered it, but today it can reach data consumers wherever they may be. Bringing data stories out of the PowerPoint and into the modern data environment is a key aspect of operationalizing data storytelling. Platforms like Toucan Toco are cloud-native and mobile-oriented. They not only integrate with modern cloud data sources such as Snowflake, but they also share the same mentality that prioritizes flexibility, scalability, and accessibility. Consider the example of the construction company. A key reason that their data storytelling initiative succeeded was that the storyteller was able to put his stories directly into the hands of on-site workers who used tablets.

Conclusion

The best analysts have told data stories for years. They just didn't call them that. As the volume of data has grown and our reliance on data has increased, however, data stories have gone from a nice-to-have to a must-have. To compete in the modern economy, organizations must be data-driven. To be data-driven, you must act on your data. By linking the analytics workflow to the business workflow, data stories help you do just that. They deliver concrete insights from the data in a way business leaders can understand and help companies overcome the hurdles of data literacy by clearly articulating the key insights in the data and suggesting a course of action. Well-told data stories enable business leaders to spend their time doing their jobs rather than sifting through dashboards and reports. These stories answer specific questions and connect data to business objectives.

Well-told data stories enable business leaders to spend their time doing their jobs rather than sifting through dashboards and reports.

Unfortunately, telling a good data story is non-trivial. Not all analysts are cut out to be data storytellers. Although analysts can study design theory and improve their communication skills, the level of data storytelling will continue to be inconsistent across the business. Instead, businesses should look for ways to transition data storytelling from a boutique skillset into an industrialized capability. Tools that automate aspects of the design process or surface insights autonomously will be key to this transformation.

Industrialized data storytelling should not be confused with an analyst creating templates and simply copy-pasting them for different use cases. It requires BI platforms to make the conscious choice to integrate data storytelling and visual design best practices into their deliverables. Only then is the burden of design taken off of the analyst, allowing them to quickly create and distribute high-quality, contextualized data stories, which in turn provide data consumers with more digestible reports and dashboards that don't require high levels of data literacy.

As companies work to modernize their infrastructure and migrate to the cloud, the moment is ripe for them to make the shift to a new generation of story-focused BI tools. Many of these tools natively integrate with cloud sources and extend the advantages of a cloud service into the BI stack. Data stories are no longer confined to presentations in a conference room. Now, data consumers can digest data stories on the go from their phones, home offices, or client's offices. This architectural change makes stories more accessible, democratizing data consumption and bringing organizations one step closer to being data-driven.

About Eckerson Group

Wayne Eckerson, a globally-known author, speaker, and consultant, formed **Eckerson Group** to help organizations get more value from data and analytics. His goal is to provide organizations with expert guidance during every step of their data and analytics journey.

Eckerson Group helps organizations in three ways:

> **Our thought leaders** publish practical, compelling content that keeps data analytics leaders abreast of the latest trends, techniques, and tools in the field.

> **Our consultants** listen carefully, think deeply, and craft tailored solutions that translate business requirements into compelling strategies and solutions.

> **Our advisors** provide one-on-one coaching and mentoring to data leaders and help software vendors develop go-to-market strategies.

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Toucan Toco was founded in March 2015 by Kilian Bazin, Charles Miglietti, Baptiste Jourdan, and David Nowinsky. They noticed that only experts could have easy access to performance data in companies. Their goal was then to give easy access to data for non-specialists and add value to their decision-making.

From four partners to 115 employees within 5 years, Toucan Toco is trusted by 140 big account clients for 300 projects, including Renault Nissan, Engie, BNP Paribas, Crédit Agricole, Engie, l'Oréal, Marques Avenue, Elior, and Sodexo.