



Changing Your Analysis Mindset: Visualizing the Data

By Helen Wall

In today's world, the lines between technology and business areas are blurring into a less segmented and more integrated structure. Less than 10 years ago, IT would manage databases and produce business reports on this data through processes like SQL queries. The business would then consume these reports to analyze why they are encountering variances through their own tools like Microsoft Excel.

Today, however, we're beginning to see how businesses are leveraging applications that enable them to do much of the advanced analysis themselves and even dive into new analytics frontiers such as machine learning and AI. These new areas of explorations, in part, come from the increased volume and speed of today's data and a demand by the business to understand more about this data and make decisions with it. The newest applications enable a more efficient and flexible way to approach the process. Widely used platforms like Microsoft's Power BI and Tableau sit at the forefront of letting business users take control of how they interact and learn about the data on their own.

DIVING INTO THE PROCESS

While many people associate data tools with the beautiful visualization outputs illustrating the data trends, visualization represents just one segment of the entire data analytics process. Much like an iceberg where you only see about an eighth of it above the water, these data visualization applications require a lot of hard work and thinking on the backend to get them set up correctly.

The process for creating a final data visualization dashboard goes like this:

1. Determine data sources and set up connections to them,

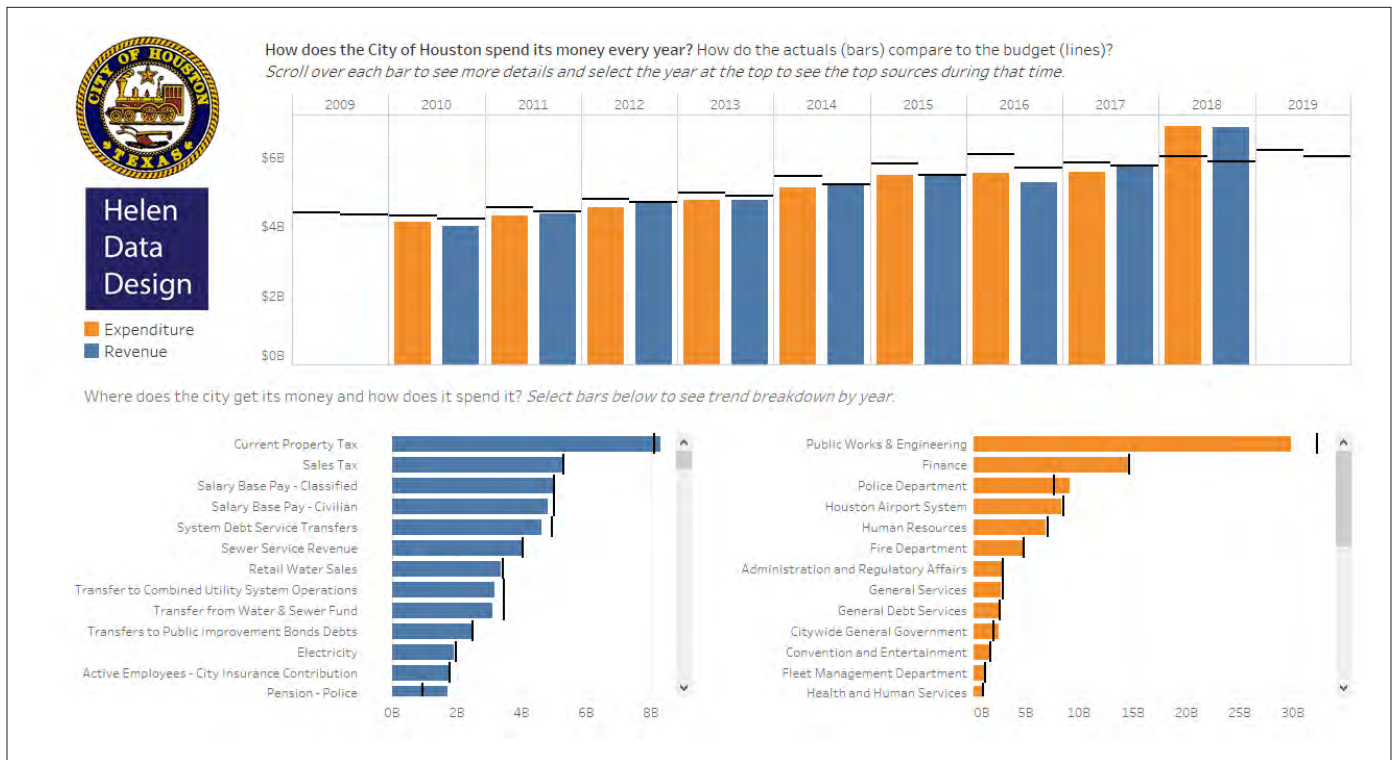


2. transform the connections into useful data tables,
3. join up tables to create a consolidated model,
4. create advanced calculations to measure and analyze the data trends,
5. design visualizations to communicate key trends and metrics, and
6. upload and share these scalable dashboards with the larger audience of business users.

Creating dashboards enables you to gain scalability and eliminate duplicated work. The key questions we are trying to answer is **why** something occurs and **how** the drivers affect the numbers.

To illustrate this, I will showcase an example dashboard. One of the most prevalent business intelligence tools in the industry market is Microsoft's Power BI, which combines the features of many applications like Excel and SQL Server Analysis Services, but also allows for an incredible amount of flexibility in creating models. You can really create any kind of financial model you want to within Power BI. However, a drawback is that you can only develop models on Windows and online, and sharing your work can be cumbersome if you don't have a paid subscription account.

Another intelligence tool is Tableau, which does have a public version of the desktop application, and has a public visualization gallery that enables us to explore data analytics with public data sources. While the modeling capabilities are more limited in Tableau, it does have beautiful visuals that serve us well for illustrating the impact of effective data visualizations. For my example, I'm going to analyze the financials for the city of Houston, where I live. They have a **public portal to obtain the data** that



you can explore on your own, or you can also search for datasets from many other municipalities on the internet.

DATA VISUALIZATION BEST PRACTICES

To get the data into a workable format to create visualizations, it often takes a bit of legwork to shape and transform the data. The data field names and values within the fields differed by year, and since I wanted to use a uniform set of keys to compare the data across a 10-year time span, I had to go through the data quite thoroughly to line up the segments by year. After that, it could create the keys to identify the segmented areas to examine these data trends across the entire time span. You can see the end results below. The visual that occupies the top part of the dashboard illustrates the revenue and expenses over the 10-year period. It also compares the actual amounts to the budgeted amounts by revenue and expenses each year. On the bottom left, you can see the comparison of revenue breakdown by area, and on the bottom right, you can see the comparison of the expense breakdown over the same time period.

While I could go through the steps undertaken to create these views, I think it's more important to highlight key approaches that you can implement in your own work to make it an effective communication tool. As you'll see, simplicity is often the best approach!

1. **Color theme:** I used blue for revenue and orange for expenditures consistently throughout this dashboard. You're not limited to these colors (I often incorporate gray into the color scheme as well). I am using a blue-orange-grey col-

or scheme because it benefits colorblind users, who cannot typically differentiate between the common default red and green colors, illustrating value magnitudes on heat maps.

2. **Shape balance:** Bar shapes throughout the dashboard represent the actuals, while the floating lines hovering around the bars represent the budgets. This makes it easy to differentiate them but also eliminates too much noise going on in this view.
3. **Minimal visual count, but maximum effectiveness:** Utilizing more than three or four large visuals in a dashboard can cause it to become cluttered and difficult to read.
4. **Nudge prompts:** Right now, we see a stagnant view. How do we change what we see? Notice the prompts at the top to interact with the dashboard visuals. Think of them as subtle instructions that gently tell the user how to use the charts. I often refer to this as nudging prompts, and they're key to getting the appropriate amount of user engagement that you're aiming for when you design a dashboard.
5. **Put the elements within the chart in a sensible order:** Notice how I ranked the categories of both the revenue and expenditures, so it shows the highest numbers at the top of the visuals. This makes it easy for the dashboard consumers to identify the biggest drivers of the budgeted and actual numbers. The revenues versus expenses visual over time are in chronological order by year because this makes the most sense for time-series analysis.

6. **Remove duplicated or unnecessary labels:** Tableau initially sets up all these charts with more labels and components than what you see in the view. The key to being a good communicator through these visualization tools is to decide strategically what you need to include and what you can leave out to make your end communication of the data trends clearer and less cluttered for the viewer's eyes.
7. **Format tooltips:** One of the benefits of interactive visualizations are these third-dimensional components you can add to charts called tooltips. Don't just let the application automatically set up the tooltips and stick with its default displays. Try to experiment with creating your own views and key details about the data in these tooltips.

REFERENCES AND TUTORIALS

When the end-user interacts with the model, they can create their own view to analyze and understand the data. **Try it out on your own** in my Tableau public dashboard library! I spend most of my time exploring data analytics and creating data visualizations in Microsoft's Power BI. This City of Houston financial dashboard is a straightforward analysis of the consolidated dataset, but you can check out how to incorporate some neat models into these tools by experimenting on your own or following along with example projects. I recently wrote an article

for *CODE Magazine* that walks through **how to create an advanced financial model** for life insurance calculations in Power BI. It walks through how to set up DAX measure calculations for both term life insurance premiums and reserves where the end-user can update the numbers directly by changing the input parameters in the dashboard.

There are many tutorials online that can offer a quick start to data visualization. For example, **Power BI Data Methods** focuses on the Power Query Editor, which also works in Excel! Power Query is one of the biggest things to happen to Excel in the last 20 years. Another example can be found at, **Advanced Microsoft Power BI** which gives a walk-through on how to create an interactive loan dashboard.

Happy data visualizing! ■



Helen Wall is the owner of Helen Data Design (www.helendatadesign.com). She can be contacted on LinkedIn <https://www.linkedin.com/in/helenmwall/>.