

Five Secrets for Building Fierce Dashboards

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ABSTRACT

Are your dashboard or web reports lifeless, unappealing, or ignored? A fierce dashboard is not an accident – it is the result of careful planning, design knowledge, and the right data. In this paper, you will learn the techniques professionals use for creating dashboards that are engaging, beautiful, and functional. This paper uses SAS® Visual Analytics as the example, but the tasks shown could be accomplished with other SAS tools.

INTRODUCTION

If you are a fan of the television show *Project Runway*, then you may have heard the designers talking about a fierce outfit or a fierce design. This meant something that had all the right elements – it was functional, it was attractive, and probably the envy of the other designers. Your dashboards can be the same way but you must understand the secrets of a fierce performance dashboard.

In this paper, you will learn how to craft meaningful measurements, select effective visualizations, create workable layouts, add amazing style and work with users. All of these elements together are what make a fierce dashboard. So as Project Runway host Tim Gunn would say, "Make it work!"

SECRET 1: CRAFT YOUR MEASUREMENTS

Your dashboard is useless if users do not need the data shown, cannot trust the data shown, or don't understand how to get more information. Some users confuse dashboards with web reports. Dashboards have a more specific purpose because they are used to drive performance in an organization. As a result, dashboards contain KPIs or other goals the organization is trying to measure. [1]

Generating Useful Measurements

Each performance dashboard should start with planning what the end user (aka customer) would like to understand and improve. Performance dashboards are closely linked with gauges. Gauges imply a performance measurement, but how do get these measurements? You define key performance indicators (KPIs).

In many organizations, there are a set of yearly objectives the management team uses to maintain process control. These objectives can be used to create KPIs. These KPIs show how successfully an organization is meeting their goals. A KPI contains an objective and a time frame. You can find many sources online for KPIs if you are not sure how to state the KPIs. Check the References section for some suggestions.[6]

Adding Supporting Measurements

For each KPI, a user needs supporting information to understand the measurement. Let's consider these KPIs chosen by a technical support organization and explore the supporting information.

KPI	Purpose	Supporting Data
Resolve 90% of tickets within 30 days	The organization has to meet service level agreements (SLA) of 30 days to resolve a customer issue. Resolving a ticket depends on several things, such as properly trained staff and overall arrival rate. The organization has a trained staff, so they want to focus on the arrival rate.	The manager needs to understand the ticket arrival rate and the resolution time.
Resolve 25% of tickets during first contact	This is a technical support organization. Many tickets require follow-up. Analysis discovered 30% of tickets could have been resolved within one phone conversation by a first-level agent. The management wants to understand severity level and how often tickets are sent to second level support.	The manager needs to understand if the ticket severity and current status.
Maintain customer satisfaction score of 4.5	A chief part of a service organization is keeping the customers satisfied. The organization knows there is a relationship between count of tickets and satisfaction. The more tickets a customer opens the lower quality the product appears, thus causing dissatisfied.	It would be helpful to see customers ranked by most issues and least satisfaction.

Using Actionable Data

Once you know the requirement measurements, you can work on creating actionable data for your dashboard. Actionable data has three characteristics: appropriate, correct, and timely.

You have to ensure that the required data for the above KPIs exists. Many organizations reach a barrier when they realize they do not have the appropriate data for their measurements. At this point, the organization may need to implement more serious tools. It is also possible that much of the data is available but some is not automated. For some measurements on your dashboard, you might need to get creative with how the data is accessed. There's nothing wrong with having a spreadsheet manually updated monthly to include in the dashboard.

The data has to be correct. The counting rules should be defined and understood within the organization. Management has to agree on what constitutes the success of the measurement. The data must be accurate particularly if you consider someone's job performance may be based on what you present.

A worse situation occurs when the data is not refreshed often or it is so inaccurate that no one looks at the dashboard. This may be the number 1 killer of a fierce dashboard – essentially the dashboard is not useable. If the data is frequently inaccurate, then it can cause some political issues in the organization. If employees have their performance reviews based on this data, they will get testy if it's wrong. If the data sets are refreshed yearly for a monthly dashboard, then no one really needs it after January.

SECRET 2 – INDICATORS AMP YOUR DATA

When showing data, you have to determine the best way to deliver your message. Here's some suggestions on how to show KPIs, trends, and breakouts. You have to choose the right indicators or your message may be lost. There are sometimes several methods available to show the data – your job is to pick the best one.

Understanding the Dashboard Gauge Elements

There are several gauges available from SAS in their various applications and using the KPI procedure. There are five gauges: bullet, thermometer, slider, dial, and speedometer. You can make them horizontal or vertical. In the following figure customer satisfaction is shown using some of the different gauges.



Figure 1 SAS Dashboard Gauges

Each gauge has three main elements: measurement, target value, and display rules.

The gauge in the following figure measures customer satisfaction where a score of 1 to 5 is possible. The target is 4.25. The display rules control the section numbers and their color. The color gives you a guideline – the pink is poor, yellow is getting by, and blue is within range. Figure 2 shows the steps for creating a dashboard gauge in SAS Visual Analytics. Refer to the SAS documentation for instructions using the KPI procedure.

Recipe for Bullet Gauge

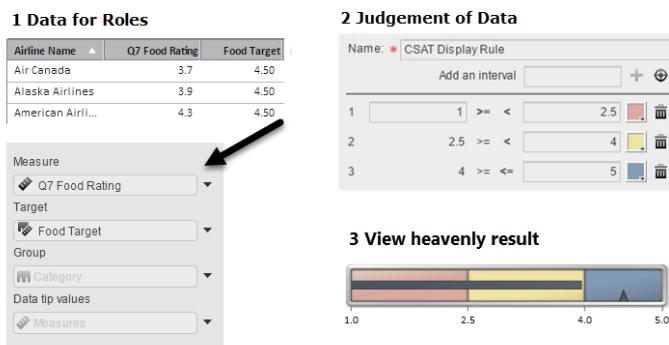


Figure 2 Gauge Ingredients

Complaints about Gauges

When selecting a gauge, you consider how much space you have in your layout. A round gauge uses more space than the rectangular ones. When used in a grouping, it does seem overwhelming. Here's two examples where I display the same data with round and square gauges. When there are so many gauges, notice how much space each uses.

While space usage is an issue, the larger issue is that it is confusing when there are so many. It is hard to know where to focus your attention. The user might get overwhelmed and feel like more time is spent studying the gauges than taking any action!

Maybe this data needs to be presented in a different way? For instance, what if you convert the data into a table and added a thermometer for each measurement? It more clearly shows performance and in less space. The user can

see quickly that only three airlines meet the criteria. Now there is a new issue – is the target too high? But now we are focused on the data instead of the layout.



Figure 3 Gauge Layout Considerations

Showing Trends in the Data

Dashboards can be used to reveal trends. For KPI 1, the managers want to know how often the team falls below the line. They can understand if this trend just started occurring or is a continuing trend. A line chart allows you to show trends because it measures the value at regular intervals. You want the intervals to make sense for your dashboard. If the dashboard is intended to show daily progress it wouldn't make sense to show the trend at yearly level.

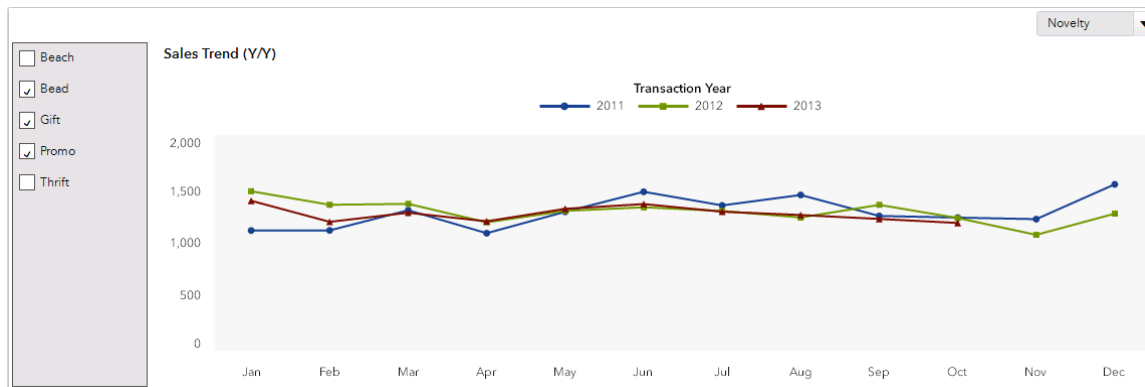


Figure 4 Show trending with line charts

Showing the Breakdown

Bar charts allow you to show how the category breaks out. For a technical support organization, it is important to know the severity of the trouble tickets since you react differently to each. The manager could understand why responsiveness was lower if she saw that most of the tickets from the previous day were a critical severity. Likewise, if the manager sees an increase in unresolved minor tickets, she may understand there is a new tech support agent who is having training issues or cannot keep up.

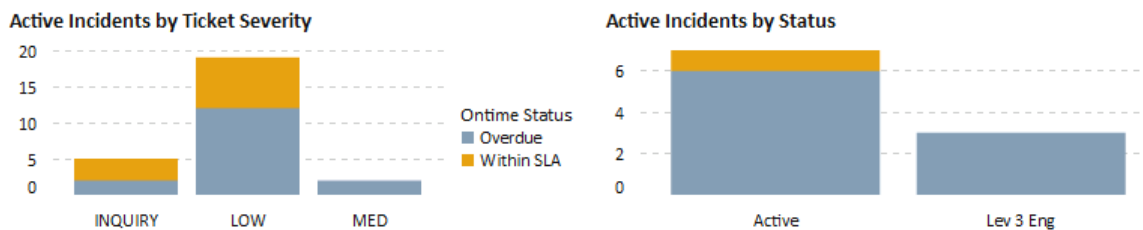


Figure 5 Using Bar Charts

Bar charts can also allow you to rank elements so the manager can see what is driving an issue. In the following figure, it is relevant that customer CX_0044 has the most open tickets and the lowest level of satisfaction. This gives the manager a signal to investigate this customer. Both of these charts used ranking – one counts the top 5 while the other ranks the bottom 5.

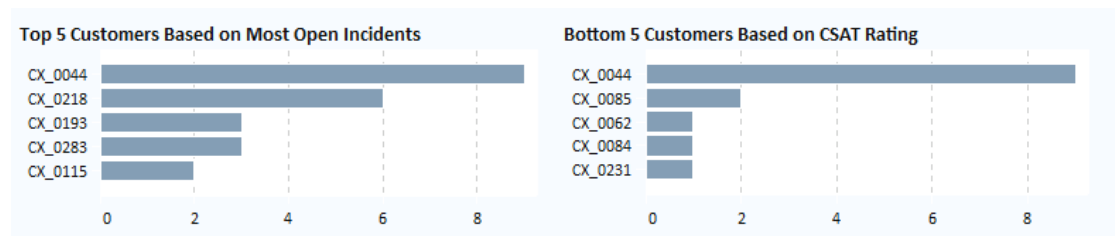


Figure 6 Using Ranking with Horizontal Bar Charts

Combining Data Objects

In some cases, it may make sense to combine data objects. The dual bar-line chart shows a trend with the category count. You can see in the following figure there is a relationship with the on-time resolution and the ticket arrival rate. When arrival rises, responsiveness lowers.

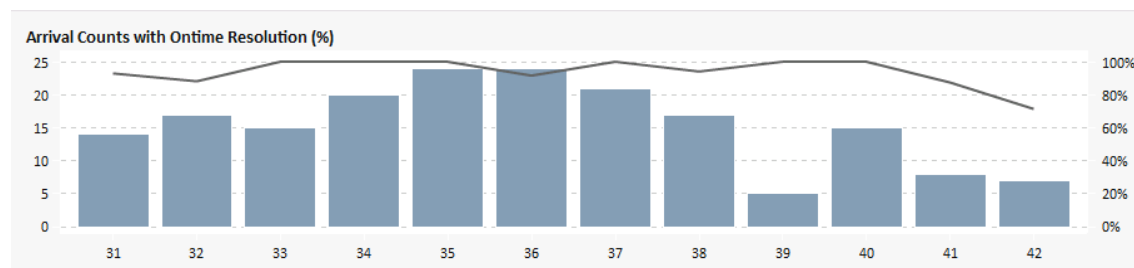


Figure 7 Using a Bar Line Chart

There are other data objects that combine measurements, such as a targeted bar chart. This chart shows the sales rep actual sales to target. This object is similar to a gauge but it allows you to see more data at once.

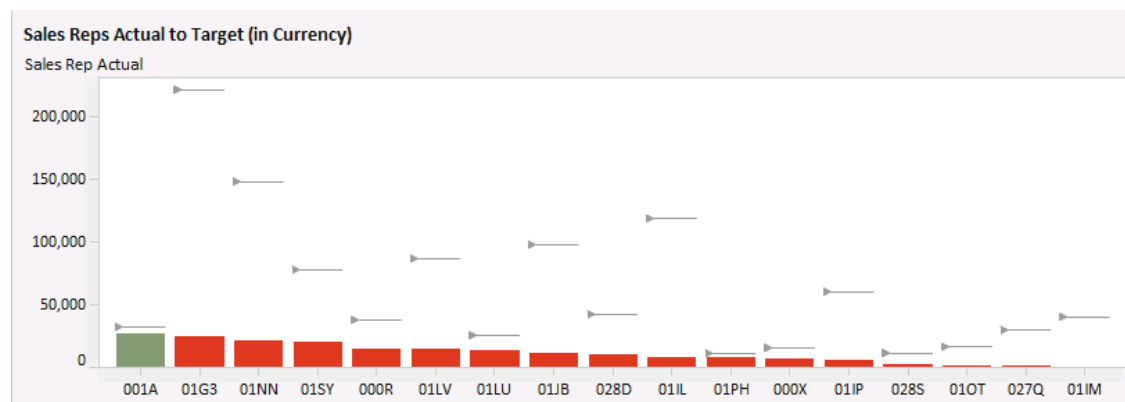


Figure 8 Targeted Bar Chart

SECRET 3 – YES, LAYOUT MATTERS

Once you know the measurements you want to use and the objects you want to display, you can place these items on a page. Most dashboards are displayed on a web page. Use webpage design principals when creating your dashboard.

Key layout principals

The layout must emphasize what is important about the information. There are two layout design ideas frequently mentioned when you study web design: Gestalt and F-Pattern layout. Web design is a deep field of study and this paper is addressing the topic at a high level.

Your Brain Likes to Understand Data Objects as Group

Many designers refer to Gestalt Principals when discussing layout. During the 1920s German psychologists described how humans organize visual information. These findings are referred to as the Gestalt Principals. These principals discuss how the mind tries to make sense of a group of objects – such as graphs on a page. [2]

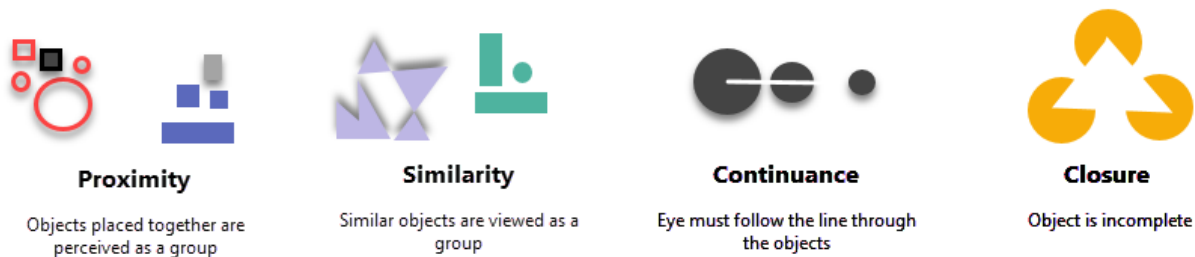


Figure 9 Your eyes are trained

When you violate these principals, your user is confused and doesn't want to interact with your dashboard. When designing the layout, think about how the user groups items just based on how they look or in some cases – add things that are not there.

F-Pattern Layout Supports Your Scanning Users

When you look at a web page, your eye has a tendency to view it in a particular pattern. You scan across the page, down the page, and at some point across the page again. It is in the pattern of an F or an E. That is an interesting scientific finding but what does that really have to do with your dashboard? [4]

Note that besides telling you about the pattern I also used the word scan. When a user first visits your dashboard, most likely they are not going to read all the text first. They are going to scan to understand what goes together and learn the quickest way to use the dashboard.

You can exploit this pattern to improve the dashboard usability. Design the layout where the user expects to find things. In the following layout, the controls are across the top of the page and in the center of the page, there are more controls. It's an E-pattern or F-pattern, right?

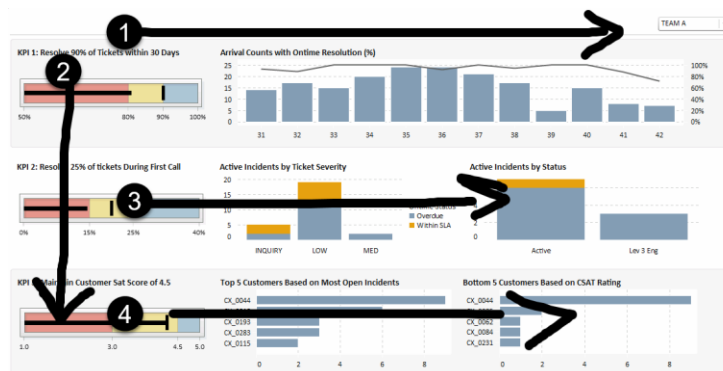


Figure 10 Exploiting a User's Laziness

Account for Interactivity within the Tool

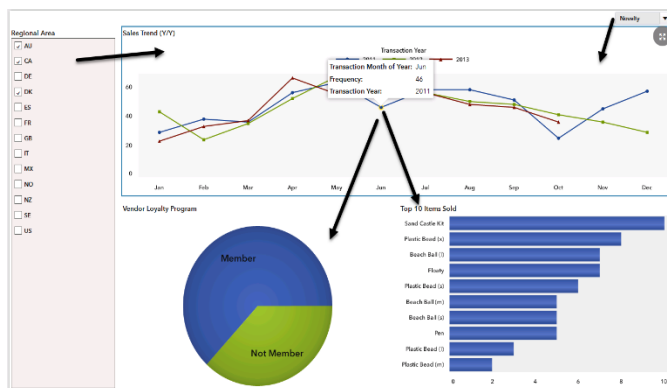


Figure 11 Interactivity creates a smaller layout, but user rich experience

If the tool is interactive or you intend to add programming to assist with interactivity, then determine how you can use it. How will users identify pathways or understand 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.

In the following example, the trend chart controls the charts beneath it. For each point on the trend chart, the user clicks to see top sales for that month. The user can also explore by regional area or product area.

Sketch, Wireframe, Boom!

You may have a lot of ideas for the layout at this point. Start sketching your ideas on paper. Force yourself to think of three or more layouts. In the end, you may like your first design the best but you will learn from each iteration. You will be tempted to skip this step – but don't. This step forces you to think of the measurements and what you are trying to communicate.

This is the time to organize the KPIs and other information you have. You want to place information in logical groupings and the measurements that support those groupings. Here's the chance to apply your Gestalt principles! It's also time to think about what each measurement is trying to express. Does a trend chart work better or does treemap help the user more? Try it out on paper.

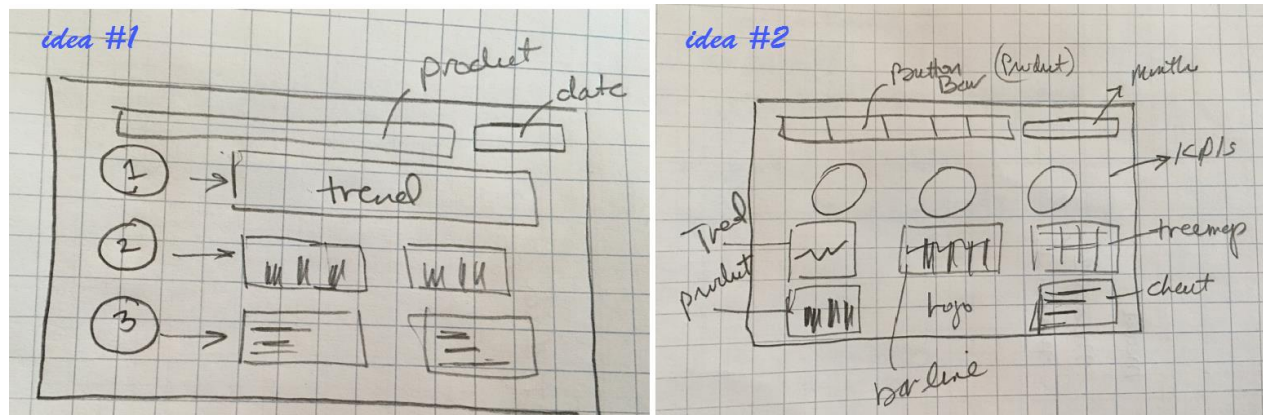


Figure 12 Sketch your ideas

After the sketching, you can use a tool like MS Visio to draw wireframes. Wireframes help your customer (or boss) understand how you plan to layout all of the information. Use arrows to show how you intend the user to move between the sections and where interactions are going to be. It's easier to untangle an ineffective design at this stage and to get feedback from your end user.

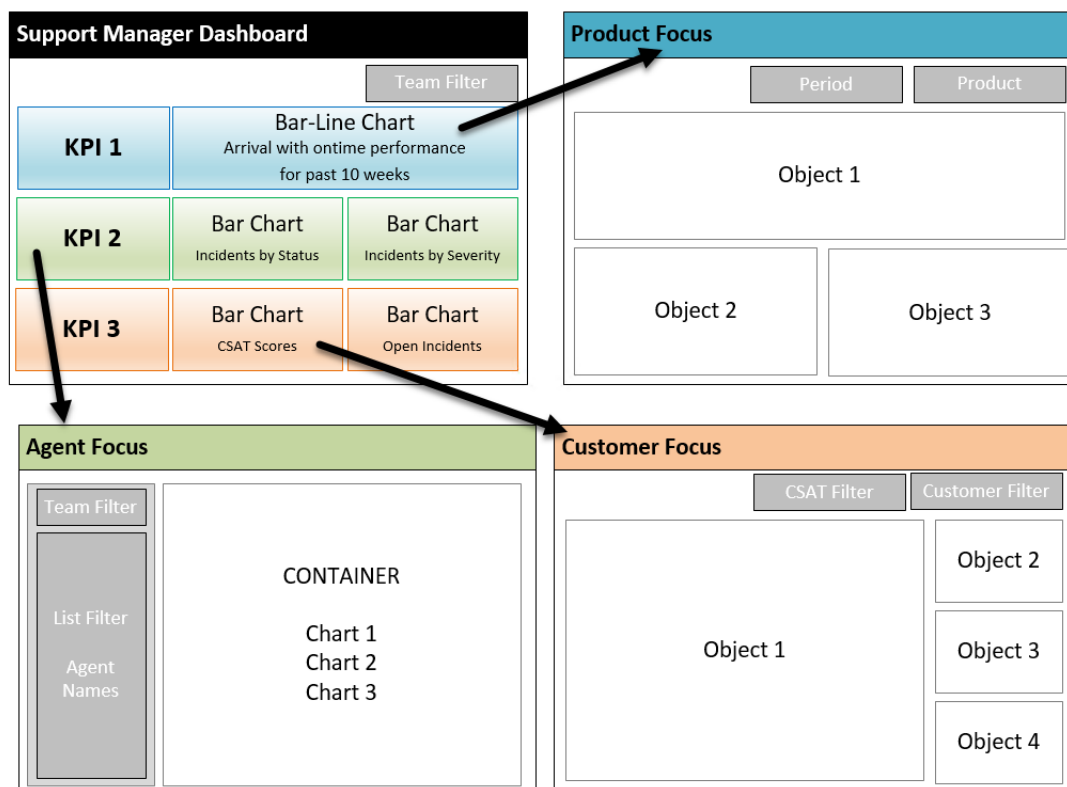


Figure 13 Wireframes show the pathways

SECRET 4: BETTER HAVE SOME STYLE

Style is what makes users want to look at your dashboard. You want the dashboard to be functional and attractive.

Don't Let Your Font Betray Your Message

There are hundreds of font choices. Fonts can be assigned to four broad categories: serif, sans serif, script, and decorative. A serif font has a small line on the ends. Sans-serif means the line is not there. Script looks like cursive handwriting. Decorative are those fonts that have a fun element.

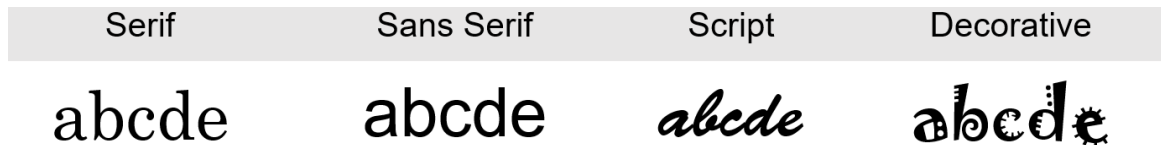


Figure 14 Font styles

Many studies have been conducted on fonts and readability. The general conclusion is serif fonts are easier to read as text because of the serifs.[5] The serif guides the eye across the page. Other considerations for readability are the font size and width. Arial Narrow is considered one of the worse fonts for readability mainly due to its narrow size and lack of serifs. Many designers use a sans-serif font for headings and serif for body type. In a dashboard, there is not a lot of space. You want your data visualizations to be the star not the headings.

Fonts communicate subtle messages about your design. Look at the following fonts and consider the subtle messages each is providing. Consider how each of these fonts would appear on a dashboard and how it might change your message. For instance, do you really want Comic Sans to show your dismal sales figures? It might give an impression of "the company is sinking and the report builder finds that comical!"

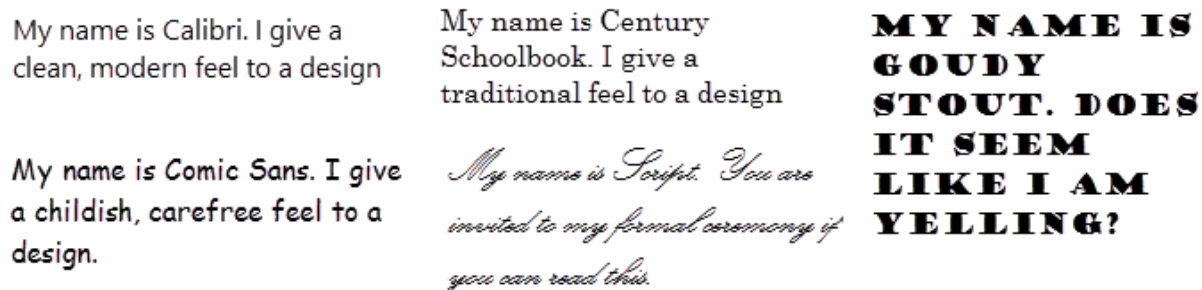


Figure 15 Fonts have hidden meanings

You'll Need a Color palette

As with fonts, color is another element of style. And just like fonts, colors communicate meaning as well. SAS offers many pre-chosen styles or palettes that work well. You may want to distinguish your dashboard from others. Color is an easy way to do that.

There are many websites that can assist with selecting a palette and others that suggest them. It is hard to select an aesthetically pleasing and effective palette. Sometimes the end user will insist on their corporate colors and if so then you are stuck. However, if the dashboard remains internal to the company they may not feel as strongly.

Here's the guidelines to consider as you select your palette:

- Use a neutral background that allows your data to be the star. Neutral can be gray, beige, light blue, black, or white.
- Select five colors that provide enough contrast that you can distinguish them in a bar or line chart. You will want to try them in a few charts as well.
- A softer palette works better. A sharp palette may be too shocking or hard to understand distinguish without a darker background.
- When showing treemaps or other data objects that show a difference, use a gradient value of a color. Users can better understand something going from light to dark as a scale. One end of the scale is good and the other end is bad or *vice versa*.

Here's a few suggested palettes with their palettes and fonts. These are just some examples of how you might want to use palettes. Each one has a different flavor and tone. Your main consideration should be does it hide my data.



Background: White
Product A: Fire Engine Red
Product B: Dark Teal
Product C: Bright Pink
Product D: Gold
Product E: Dark Brown
Font: Calibri

Background: Dark Gray
Product A: Light Blue
Product B: Dark Green
Product C: Dark Blue
Product D: Seafoam Green
Product E: Medium Yellow
Font: Cambria

Figure 16 Suggested Dashboard Color Palettes

Refer to *Color Speaks Louder Than Words* in the References section for another interesting discussion about color and how it is applied.

Design Thinking: Let the Data Talk

The most successful dashboards use a clean, minimal look. As Edward Tufte would direct us, “*Let the data talk*”. Avoid using logos or other decorative elements on your page. You must 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:

- 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 right top.
- Add a title section to your dashboard that contains any supporting information the users need to access the dashboard or handle any housekeeping topics. This might be useful for new users or people questioning when the data is updated or how the charts are prepared.
- Use an info window that can pop-up and contain information. In the following figure, this info window contains the counting rules for the section and some information about the data preparation.

SECRET 5: USER ADOPTION IS IMPORTANT

If you build a dashboard and no one uses it, it is frustrating. The main reason this situation occurs is because the users do not find the dashboard useful. It may be because the dashboard contains measurements that no one uses. Or the data used within the dashboard is inaccurate. It's also possible that the dashboard is too difficult to use. Many of these symptoms point to a designer who didn't work with the end user.

The only time you should build a dashboard alone is when you are prototyping an idea. Many managers do not realize the value of a dashboard until they can see a working model. After viewing the model, they begin to understand the value. You can then have a conversation with the managers about what is happening in their organizations that is going wrong. The so-called *pain points*. You want to know about the pain points because this is where the opportunity for change and process control present itself.

As you build the dashboard, you want to present layout ideas to the end user. This allows the team to become excited about what you are doing and guide you to help them get the best end result. Even after you finish the dashboard, it is a good idea to watch the users interact with it. You want to ensure they are able to understand the information pathways and how to answer the questions they have.

While some dashboards may be needed for a short time period, most dashboards are used for several years within organizations. This doesn't mean the content does change or the KPIs. Ensure you have documented your process well enough for someone else to pick it up.

CONCLUSION

One of my favorite quotes is from John Ruskin, “Quality is never an accident, it always the result of intelligent effort.” Nothing could be truer when creating a dashboard. All of the elements discussed in this paper must be given proper consideration for the end result to be useful.

An attractive, useable dashboard draws users to the data. Providing interactivity encourages them to explore and learn what the data is telling them about their organization. However, a pretty dashboard is not enough. The metrics must be of value and presented in an understandable way.

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RECOMMENDED READING

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- La Grouw, Gail. 2012. *Effective Dashboard Design: Design Secrets to Getting More Value from Performance Dashboards*. Scotts Valley, CA : CreateSpace Independent Publishing Platform
- KPI Library, Available at: <http://www.kpilibrary.com>
- SmartKPIs.com, Available at: <http://smartkpis.kpiinstitute.org/>

Blogs Related to Topic

- BI Notes for SAS Users, Available at: <http://www.bi-notes.com>
- Zencos Blog, Available at: <http://www.zencos.com/blog>

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