

Paper 038-2012

## Modernize with SAS® Dashboards: Go beyond a Collection of Gauges

Anand Chitale, SAS Institute Inc., Cary, NC

### ABSTRACT

A modern dashboard's ability to present data and information at both summary and detailed levels makes it one of the most powerful tools in a business user's kit, going beyond a collection of dials and gauges and meeting business needs in a practical and actionable way. The SAS BI Dashboard® brings a powerful yet simple to use environment supporting the design characteristics of a modern dashboard.

This paper showcases the characteristics of a modern dashboard and shows how you can achieve the same with SAS BI Dashboards discussing industry-specific dashboard examples.

### INTRODUCTION

Dashboards are one of the hottest Business Intelligence tool categories, because they provide everyone, from executives to customer service representatives, an at-a-glance view of the business in an appealing interface.

Dashboards as a concept are not new, but with new technologies and maturing user demands, the scope of dashboards has widened from just a static state of information to a highly interactive and dynamic source of both strategic and operational information that is fully integrated as a BI solution. It covers all aspects of BI from summarized views to the ability to dig into details for root cause analysis, thereby helping organizations improve their performance and ensuring that the right people are making the right decisions at the right time.

Different users have a different perspective of what a dashboard means, or how it should be designed, and how it should function. This varies not only with the collection of graphic types but also the aesthetics of layout, color, size and shape. Some users would look at dashboards just as collection of key business metrics, and some can say that it is a complete reporting solution or a BI application. It can be difficult to decipher the differences between dashboards and get a proper understanding of which solution best fits the needs of the organization.

In this paper, we will highlight some of the design aspects related to dashboards, the different types of dashboards and its application. We also give examples on how SAS BI Dashboards can help you to produce a powerful yet simple to use modern dashboard.

### CHARACTERISTICS OF A MODERN DASHBOARD

The measure of a dashboard's success is its "stickiness" – do users return to it? Users must believe it can help them complete their work more efficiently and effectively. It must be highly personalized, relevant, customizable, and adaptable. The ability to make a screen full of information instantly understandable is a skill that requires a good understanding of the target audience, and the support from technology to make it happen.

The purpose of a dashboard is to communicate a rich and often dense assortment of information in an instant. Thus, it becomes important to select appropriate graphics to communicate information that is reflecting the actual data with minimum visual fluff. To achieve this, what people see on a dashboard must be the result of thoughtful and skillful design, using display widgets that were specifically designed to work well on a dashboard. These display widgets must be capable of communicating a rich set of information in a small amount of space with exceptional clarity. It is now a requirement that the delivery mechanism of information provides an easy-to-use interface for navigating and consuming information; at the same time, it must have a robust enterprise class security to access the information.

Some of the key characteristics of a modern dashboard include:

1. **Easy to build:** Creating a dashboard should be as easy as creating power point slides, if not simpler than that and it should need minimal IT intervention.
2. **Access to multiple data sources:** Dashboards are all about the message they convey using the data they can access. For the most rightful information to be presented, it is critical that dashboards have the ability to access data from different sources and formats.
3. **Consumable visualization:** The life span of a visible metric on a dashboard is small, and in that short span it needs to convey the right message to its users in a consumable visual format. So dashboards must provide data visualization in a way that makes sense for each individual.

**Modernize with SAS Dashboards: Go beyond a Collection of Gauges**

4. **Interactive Analysis:** Interactive dashboards facilitate data exploration and trend analysis with the ability to navigate easily within and across dashboards and other sources of information (reports, external web links and applications) for more informed and more detailed information required to answers business queries at hand. The interface needs to provide this interactivity, again, in an easy to use way.
5. **Personalization:** Users require that they have the ability to personalize their analysis environment to make the best use of it. With dashboards, this comes with the ability to be able to set personal alerts, define your own visuals, and to some extent, control what needs more focus and add your most used metrics or dashboards as favorites and define personal alerts.
6. **Extendable:** Dashboards may not provide out-of-the-box features that address every requirement for every industry or the needs of every business user. With a strong technology foundation and flexibility to the design, the next generation dashboards should allow developers to easily extend or integrate new features, controls, or data sources into the dashboard technology.

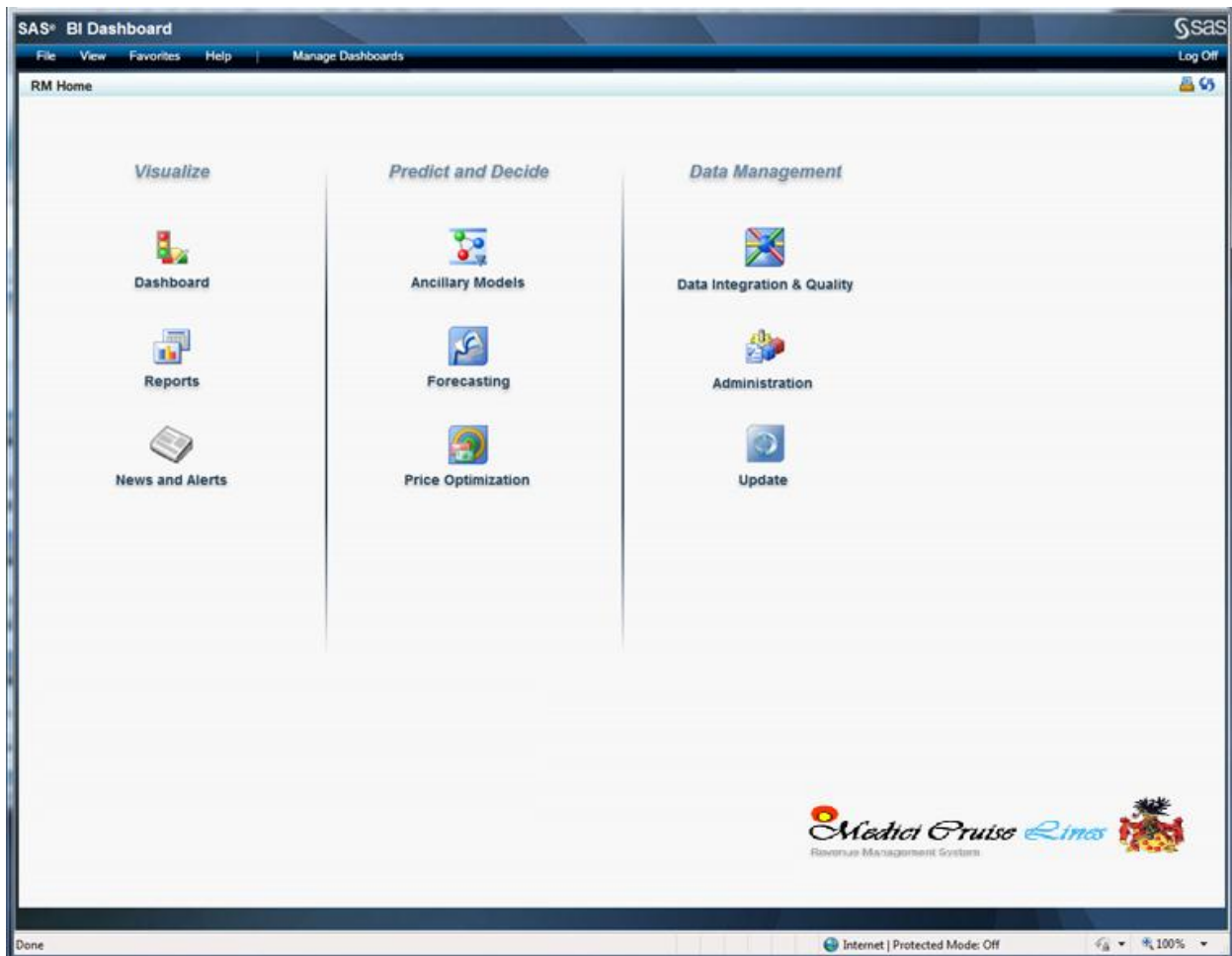
A dashboard at a glance should help a user identify what requires further attention and provide an easy path to this. Thus, Dashboards can offer an excellent form of alternative menu type system that is wholly data driven to drill down into detailed more granular reporting. A well designed data driven dashboard alerts you to focus on the relevant areas.

SAS provides a powerful BI offering, SAS Enterprise BI Server with full breadth and depth of reporting capabilities that includes all the capabilities required by the modern dashboard. SAS Dashboards, in combination with other forms of SAS content such as SAS Web Report Studio Reports and SAS Stored Processes, make SAS BI Dashboards an ideal tool.

To get more details on the complete set of capabilities provided by SAS BI Dashboard and other SAS reporting capabilities, please look at the links provided under References.

Figure 1 below shows an example of SAS BI Dashboard as an application providing a single entry point for the users of an organization. As you would notice, it allows organizations to personalize and standardize the environment with their graphical standards (colors, fonts, company logo, etc.) allows a smooth navigation to relevant information accessible to its users.

## Modernize with SAS Dashboards: Go beyond a Collection of Gauges



**Figure 1. An example of a Launch Page with Navigation Options Created Using SAS BI Dashboard**

A common mistake when dashboards are employed is to make them visually intense, i.e. using very vivid colors, a multiple variety of visuals and adding a lot of non-data visual “noise”. This design approach is possibly driven primarily by the desire of the creator to entertain and leave a strong first impression with the end users. However, this has the opposite effect on the effectiveness of a dashboard, the more visually intense a dashboard, the less the truly important part, the data, actually stands out. This doesn’t mean to say that a dashboard should be designed to be dull and lifeless, but the dashboard canvas aesthetics should be derived from the simplicity of the design and its ability to communicate and highlight the data on it. Vivid colors for example should be exclusively used when there is a need to alert the user or place emphasis on a particular part of the dashboard.

Another pitfall is not paying careful attention on the placement of metrics within the dashboard design. Often, the primary part of a dashboard, the top left (for left to right reading countries) is taken up by navigation aids, logos or secondary importance metrics when they should contain the single most important values in the dashboard screen. Another example of design placement is when comparing two similar line graphs with related metrics, it is usually best to arrange them in a top-down configuration as opposed to side by side to make the comparison easier.

Figure 2 below shows a dashboard that is created in way that does not follow a proper design approach.

## Modernize with SAS Dashboards: Go beyond a Collection of Gauges



**Figure 2. A typical dashboard example created in SAS without application of design best practices**

The image (Figure 2) looks at a dashboard that someone could have put together using the SAS BI Dashboard product, but not applying many of the data visualization best practices covered earlier in this paper. While it is not a fundamentally bad dashboard, there are a few areas it could be improved. First, strong vivid colors and effects such as the gradient on the bar graph are in use, thereby distracting the end user from being able to decipher where they should be focusing their attention. Additionally, circular form dials and other singular KPIs are present. They take up valuable space that could have been used to add a spark line for the trend to the Accidents table. Moreover, the top left has been used up to display employee distribution, while this might be relevant, it probably isn't one of the most important pieces of information on this dashboard and should be relegated to a less prominent location. Finally, direct comparison between the two possibly related metrics of absence is difficult in a side-by-side configuration.

One aspect relating to dashboard usability (when building multiple dashboards) is being able to tie them together through some form of navigation. In this case, the initial entry point into the dashboards should be a starting page dashboard with links. This will serve as a central hub from which access into the built dashboards can easily be gained by the business users, and also keep them within the same dashboard frame. The starting page dashboard could just host links into the other dashboards, or in addition to the links, some high-level metric indicators that could aid an end user in deciding where to focus their attention. Each destination dashboard in this setup would need a way back to the main hub. Because dashboard canvas real estate comes at a premium, it is good practice to minimize how much of a dashboard forms the navigation aid.

For example, some organizations might want a company logo to be visible on their dashboards. The best place for this would be a small image at the bottom right of the canvas, because this is the position on a dashboard that gets the least visual attention on initial view. This logo can be made into a clickable link that takes the end user back to the starting page dashboard.

## Modernize with SAS Dashboards: Go beyond a Collection of Gauges

### TYPES OF DASHBOARDS

With all the possible capabilities available at hand with the dashboards, if the dashboards are not designed to cater to the needs of the target audience, they run a high risk of losing the attention from its users. Hence, it is important to understand the link between the types of users and the types of dashboards.

There are three common types of dashboards - strategic, tactical, and operational, where the differences between them concern the area of use. The name of these dashboard types indicates the use and thus is also a best-fit format for a particular end user.

Operational Dashboards are used by people who have the least time for analyzing, but they have the most need for a quick update on the current status of their operations to make right time decisions in a given business area.

Tactical Dashboards are used as a tool for measuring the progress of an important event or project or activity and has the target audience who are mostly the mid-level management.

Strategic Dashboards are largely used by company executives looking at the alignment of organizations' strategic goals with some predefined targets.

There is another dashboard type, Analytical Dashboards, which is largely driven by the type of information surfaced with analytical capabilities such as forecasting, optimization and what-if. With the use of analytics, there can be either a complete Analytical Dashboard or there can be analytically driven graphics / indicators as part of an existing tactical, operational or strategic dashboard. Such dashboard types can be common across all levels of users in an organization.

From a design perspective of these dashboard types, Strategic Dashboards cover a wide set of capabilities from KPIs, scorecards given aggregated views to drill through capabilities on an organization structure. Due to infrequent changes to the strategic goals and the use of aggregated views, it makes it easier to design simple and clear dashboards.

Some of the typical measures viewed in a strategic dashboard include Actuals versus Targets, trends across timeline and geographies, key measures such as Profit%, Market Position and also external or internal metrics that might influence the business, These metrics can include Customer Satisfaction index or Employee Retention Rate, and help executives get a holistic view of their business and make strategic decisions.

Tactical dashboards, unlike strategic, are prepared for more detailed purposes, usually being used for tracing the trends in relation to company's goals and initiatives. With tactical dashboards it is important to adjust the selection of graphics and their capabilities to support all tactical dashboard's functionalities. This will allow deeper insights into analyzed data, discover the problem - and trace its history, find why it had occurred, and – based on gathered information – make well-thought-out decisions which lead to improving the current situation, usually over a short to medium period of time.

Some of the typical measures for a tactical dashboard include monitoring the product quality index and looking for reasons affecting the number to define improvement plans; looking at sales of products across geographies and identifying possible new markets and campaigns to boost sales. Tactical dashboards also are handy for the organization to plan their human capital and look at measures influencing employee moral such as employee training ratio, employee satisfaction index, associated costs and timelines to fit the overall organizations strategic goals.

Unlike Strategic or Tactical Dashboards, operational dashboards are best suited to departments that require low latency data feeds and a continual view into what is happening within the business unit. Although operational dashboards may also help identify trends over time, or provide context around the KPI, the ability to drill through to current information, to get alerts, and to identify potential operational issues as they occur is what sets them apart from their counterparts.

Some of the typical measures for an operational dashboard include analysis by time, comparing the moving performance of certain KPIs such as customer complaints; numbers of support calls and monitoring operational highs and lows on performance index, faults and failures, etc in near real time and also have comparison with previous timelines of week or month for trend analysis. Alerting is a big part of operational dashboards, and is key towards helping the responsible authority to make possible operational changes to reverse the trend when the situation is not what is expected from the system.

Analytical Dashboards, as mentioned earlier, are driven by results coming from analytical systems running analytics.

Modernize with SAS Dashboards: Go beyond a Collection of Gauges

The metrics presented are beyond just the simple last month or last week comparison, but they are based on volumes of data that have been collected over time of years to understand what happened and what could potentially happen in the future. Analytical dashboards are meant to help an organization establish targets based on insights into historical data. Therefore, they are often used by business analysts and experts.

A simple illustration of making a dashboard more contextual is below (Figure 3). The example looks at an HR Dashboard for a manufacturing company and merges the out-of-the-box functionality with SAS stored processes, the rich visuals and integration available from SAS BI Dashboard and the use of a stored process to add visual context. Additionally, this has been coupled with the principles of dashboard and visual design mentioned in this paper and also inspired by domain experts such as Stephen Few (Author of the book Information Dashboard Design – <http://www.perceptualedge.com/>) to create a simple yet effective dashboard.

First, the out-of-the-box rich visuals and integration available are utilized by using objects such as the spark line table. This helps encode a trend within the table, and enables the maximizing of data presented versus the space required to communicate this. Additionally, other objects can be embedded in the tables to supplant the standard tabular information like the bullet bar used for Monthly Turnover. The rest of the objects are standard graph types but come with the out-of-the-box capabilities like extra information on hover, data brushing etc. From an interactivity side, the top left table acts as a form of prompt and controls the data rendered in the bar graph and line charts, so the specific data for each gender can be viewed within the same view. Finally, the Accidents table offers a detailed drill down into a detailed web report of individual accident occurrences by date, and bases the accident type as a parameter.

A great feature of SAS BI Dashboard is its support for custom graph types such as SAS Stored Process generated images. (<http://support.sas.com/documentation/cdl/en/bidbrdug/64524/HTML/default/viewer.htm#n0fmfbjylt8ren1wyoiy8rrp0na.htm>). On one hand, this allows flexibility to the designer to introduce non-out of the box visuals available in the wider SAS suite to SAS BI Dashboard. Additionally, thanks to the SAS/Graph annotate facility, it can be used to make data aware background images to a dashboard. There are plenty of code examples of using SAS/Graph Annotate to return image files that can be employed within the dashboard (<http://robslink.com/SAS/ipad/aaaindex.htm>). Using this technique, it is possible to create data aware visual context that acts as a form of alerting or drawing the users' attention to specific areas (for example the dots and red box generated in the example illustration). Thanks to the fact that the general dashboard colors and tones are quite subdued, these visual cues jump out and guide the user.



Figure 3. An illustrative example of SAS BI Dashboard that follows best practices

Modernize with SAS Dashboards: Go beyond a Collection of Gauges

## CONCLUSION

Dashboards have become the front-end and first line of access to business intelligence, and often the best way to gain insight into an organization's operations and performance.

With its business intelligence and analytics offering, SAS provides a powerful and flexible business solution for its users in the form of SAS BI Dashboard which supports all the needs required by a modern dashboard. The guidelines for dashboard types discussed in the paper should guide you toward the kind of dashboard that best suits your requirements. In many cases, businesses will require both analytical and operational dashboards in different parts of the company for long-term performance insights and day-to-day business decisions respectively.

## ACKNOWLEDGEMENTS

Special thanks to Christopher Redpath, Senior Technical Consultant at SAS for his contribution this paper. Christopher has done many implementations of SAS BI Dashboards and carries immense knowledge of how SAS BI Dashboards can be optimized for the best use under a given business scenario.

## REFERENCES

Craige, Rob. 2011. "Enrich Your SAS Reporting with SAS Predictive Analytics." *Proceedings of the SAS Global Forum 2011 Conference*. Cary, NC: SAS Institute Inc. Available at <http://support.sas.com/resources/papers/proceedings11/048-2011.pdf>

Thomas, Michael, and Gordon Hirsch. 2010. "Interactive Dashboards: Powered by Flash and the SAS® Programmer." *Proceedings of the SAS Global Forum 2010 Conference*. Cary, NC: SAS Institute Inc. Available at <http://support.sas.com/resources/papers/proceedings10/045-2010.pdf>

SAS Institute Inc. 2011. *SAS BI Dashboard 4.31 User's Guide*. Cary, NC: SAS Institute Inc.

Allison, Robert. "Robert Allison's SAS/Graph iPad Dashboards." Available at <http://robslink.com/SAS/ipad/aaaindex.htm>

Renison, Keith. 2011. "Match Made in Heaven: Predictive Analytics and the SAS BI Dashboard 4.3." *Proceedings of the SAS Global Forum 2011 Conference*. Cary, NC: SAS Institute Inc. Available at <http://support.sas.com/resources/papers/proceedings11/047-2011.pdf>

## CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author:

Anand Chitale  
SAS Campus Drive  
SAS Institute Inc.  
E-mail: Anand.Chitale@sas.com

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.

Other brand and product names are trademarks of their respective companies.