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BI at Your Fingertips: Creating Immersive Mobile Reports with SAS® Visual Analytics

Scott McQuiggan, David Coyle, Greg Thorne, and Philippe Sabourin,
SAS Institute Inc., Cary, NC

ABSTRACT

The pervasiveness of mobile computing has created a paradigm shift in how information is consumed. It has become increasingly evident that report consumers expect business intelligence to be readily available, timely, and easily accessible wherever they are located. The new BI pipeline from SAS facilitates the distribution of information to the fingertips of decision makers anywhere. In this paper, we offer best practices, tips, and tricks for creating compelling, immersive reports for mobile BI users. Learn how to transform a Web report into a mobile report using the SAS® Visual Analytics designer interface and how to take advantage of features in the SAS® Mobile BI app to delight and empower decision makers anywhere.

INTRODUCTION

Mobile is here. It is getting bigger and more widespread from the kindergartner in the classroom to the traveling CEO thousands of miles from an office. Information consumption is no longer a task primarily reserved for the desktop or laptop computer, but a ubiquitous task that can be performed anywhere, anytime. With the addition of tablets to mobile lineups, mobile BI has ignited to take advantage of the real estate and storage capacity these devices offer to provide critical information in the form of reports and dashboards at the fingertips of decision makers.

SAS Mobile BI consists of native apps designed for the Apple iPad and Android tablets. The apps are built to work with the new SAS Visual Analytics product, specifically the designer interface and the explorer interface. These new, powerful tools afford the development of reports and dashboards designed to take advantage of mobile BI.

While the native apps can display any report produced or exploration exported from SAS Visual Analytics, we offer several principles to enable the creation of compelling mobile reports. The principles we discuss here are the same principles that we used in the design and development of the application itself. In other words, these principles are guidelines for creating reports that act like an extension of the app and deliver a seamless experience to report consumers. In this paper, we consider the following principles for constructing reports:

- highlight the primary task
- suitable chart size for touch
- navigation
- user control
- terminology
- color coordination
- simplicity

We explain each principle and how it was applied to the implementation of the app and how the principle can be extended into report design.

HIGHLIGHT THE PRIMARY TASK

When creating visualizations, following Few's regions of visual emphasis encourages the placement of emphasized visuals to be central or upper left (2006). Figure 1 overlays Few's regions of visual emphasis on an iPad. In the app itself visual emphasis is used to support main workflow. This is demonstrated in the placement of buttons, such as the Library button (Figure 2a) or the My Portfolio button and Connections button (Figure 2b), in a primary emphasis region. When reports are added to My Portfolio, they are added to the top of the list in the primary emphasis region. Previously added reports are pushed down into regions of less emphasis.

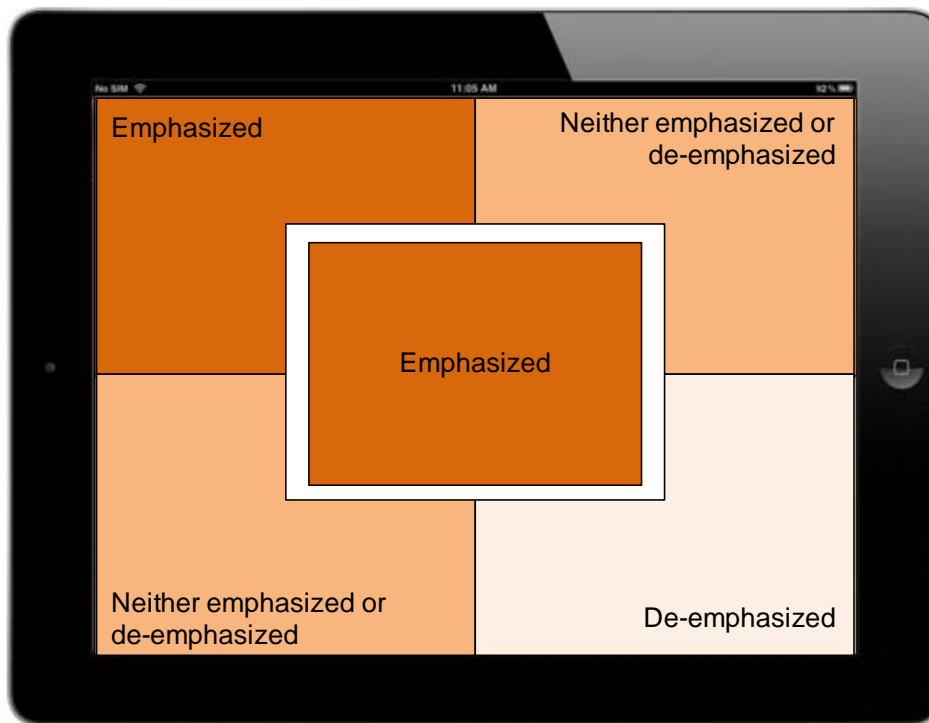


Figure 1. Few's Regions of Visual Emphasis on an iPad (Few, 2006).



Figure 2. Regions of Emphasis over the Portfolio (left) and Library (right) Screens

When laying out indicators in a report, identify and place the most important or most useful indicators, tables, or graphs in the primary emphasis regions. This layout helps users quickly find the most useful information because it highlights the primary task of the report. For example, consider a sales report with four indicators: daily sales, two historical graphs, and a detail table. If the report is updated daily, the daily sales indicator is best placed in the top left and the table in the bottom right (Figure 3).



Figure 3. Regions of Emphasis over a Sample Report

SUITABLE CHART SIZE FOR TOUCH

Apple provides the iOS Human Interface Guidelines (2011), which are a must-read for app developers. This document details principles of quality app design in an extreme level of detail in 184 pages (at last reading). One particular point that is reiterated is the standard of reserving a minimum of 44 x 44 points to handle touch events from a user (Figure 4). Note that 1 point is equivalent to 1 pixel on the iPad 1 and iPad 2. On the new iPad, 1 point is equivalent to 4 pixels (2 x 2). Thus, buttons should be at least 44 x 44 points to make it easy for users to interact with the button (Figure 4).

Similarly, all graphs are interactive in the SAS Mobile BI app. The primary touch event known to all users, the tap, is capable of performing selection to display a tooltip and, if the report is so designed, to filter or brush data in other indicators. Therefore, to support this type of interaction, bar charts with fewer bars and more real estate are easier to interact with (Figure 4). Fortunately, a secondary gesture is available for selection in charts where it is not possible, or perhaps not desirable, to provide broad tall graphs easy to touch. By using the touch+hold gesture a magnifier appears that enables users to drag and discover desired selections (Figure 4).

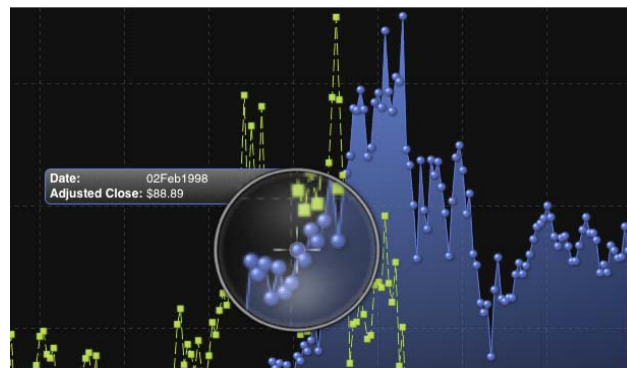
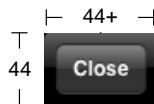
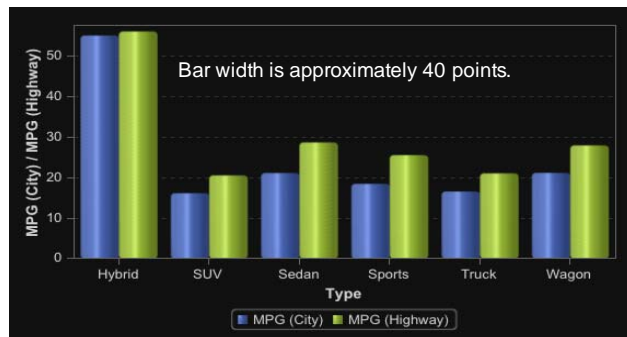
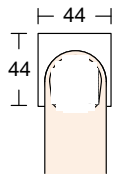


Figure 4. Supporting Touch

NAVIGATION

Navigation is a key design principle for app developers, making it easy for users to find content and pertinent information quickly is critical to user experience. In the app, this principle is evident in the navigation from My Portfolio where a single tap selects a report, and a tap on a bar reveals a tooltip with specific data (Figure 5). The guideline here is to make navigation easy and predictable by drilling down in the level of detail revealed to the user (Apple, Inc., 2011).

One area where users control the navigation in the app is in the folder structure of the Library. This common desktop paradigm can often suffer from under and over-organization. The organization that makes it easy for users to quickly find content is the most delightful.

Reports can also be designed to account for easy, predictable navigation. By displaying general to specific information while highlighting the primary task, report views can provide a flow of information that is easy for users to parse. Furthermore, report sections (Figure 6) can also help users find pertinent information. Report sections should also display general information to specific information, coupled with good section titles (see Terminology below).



Figure 5. Single Tap Navigation: Select a Report and Display Tooltips



Figure 6. Swipe Down to Reveal Section Navigation

USER CONTROL

Instead of creating multiple reports to serve a number of user populations, you can simplify report creation and empower users by using filters and prompts. For example, instead of creating four sales reports for each sales region (East, North, South, and West), one report can be created with a prompt (Figure 7) that enables users to easily change regions. Also, report designers can further empower report consumers by providing an option that visually

filters the data in an indicator based on the selection made in another indicator (Figure 8). Creating such reports often requires more design time for the report designer, but enables a more interactive experience for report consumers, helping them quickly and easily focus on the pertinent data.

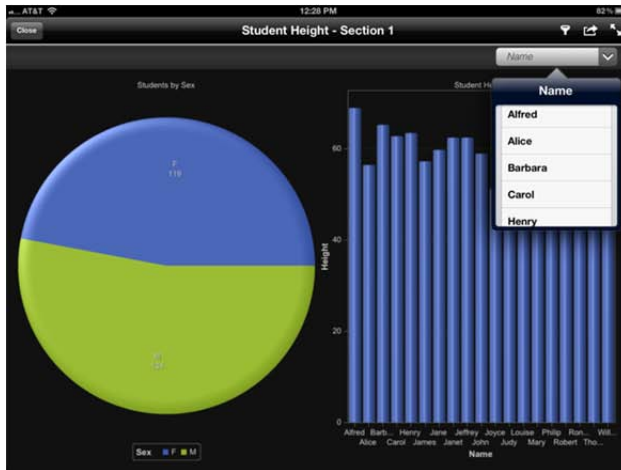


Figure 7. Prompt to (Globally) Filter Data by Student Name

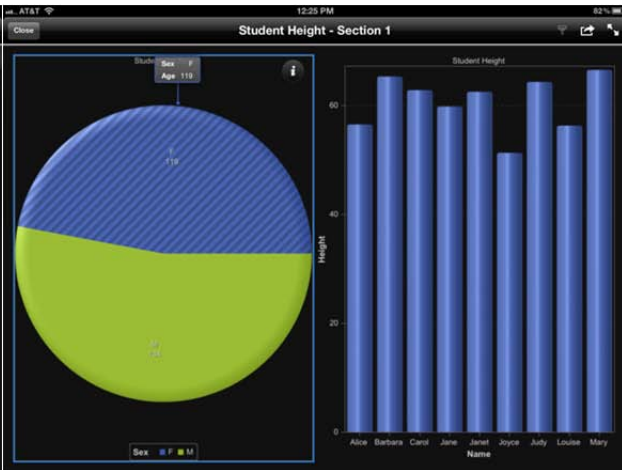


Figure 8. Interactive Filtering. Selection on the Pie Chart Filters the Data in the Bar Chart.

TERMINOLOGY: TITLES, LABELS, AND DESCRIPTIONS

In the app and associated documentation, we try to remain consistent with the labels assigned to various views of the app (that is, My Portfolio, Library, and so on). The app makes use of numerous buttons and labels to identify the task, view, or operation that exists behind the object. In-app help is provided to offer clear descriptions of steps that accomplish identified tasks. This information is particularly useful to novice users while designed to not distract the power user.

Similarly, reports should be designed to include titles, labels, and descriptions. The design tools available in SAS Visual Analytics inherently prevent what Tufte calls “chart junk” (2001) while providing ample opportunity to decorate charts and graphs with useful information. One of Tufte’s principles of graphical integrity is to provide clear, detailed descriptions of the data being displayed (2001). Titles and labels are easily added to charts and graphs (Figure 9) through settings in SAS Visual Designer. Report descriptions (Figure 10) and indicator-level descriptions (Figure 11) are also easily added by report designers to provide useful, descriptive information to report consumers. Figures 10 and 11 demonstrate how these descriptions appear in the app.

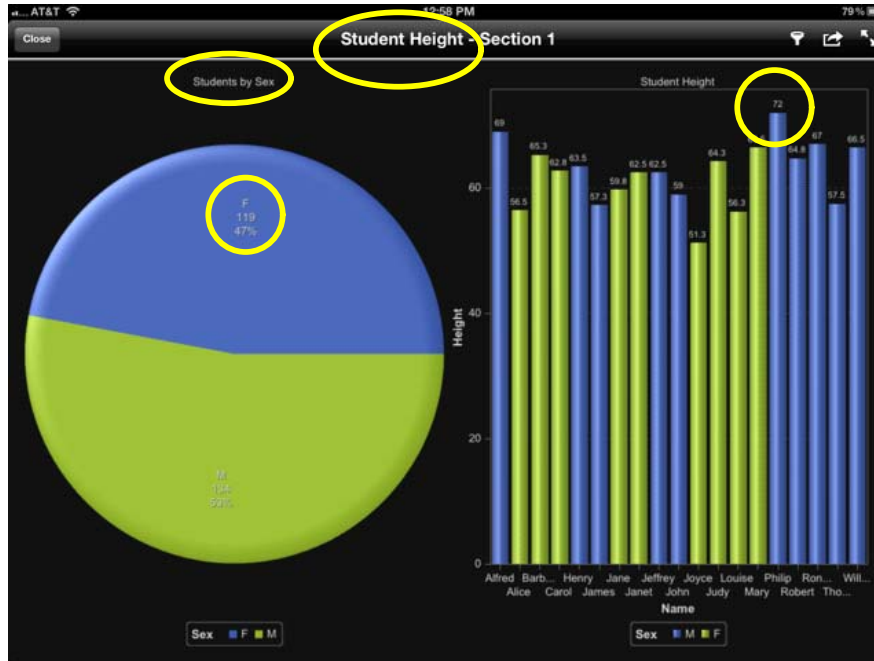


Figure 9. Titles and Labels

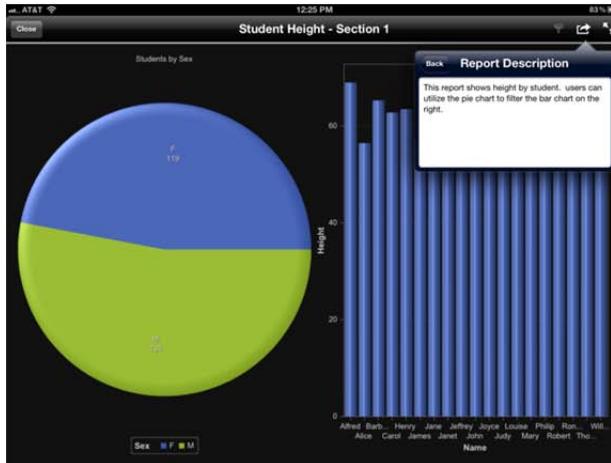


Figure 10. Report-Level Description

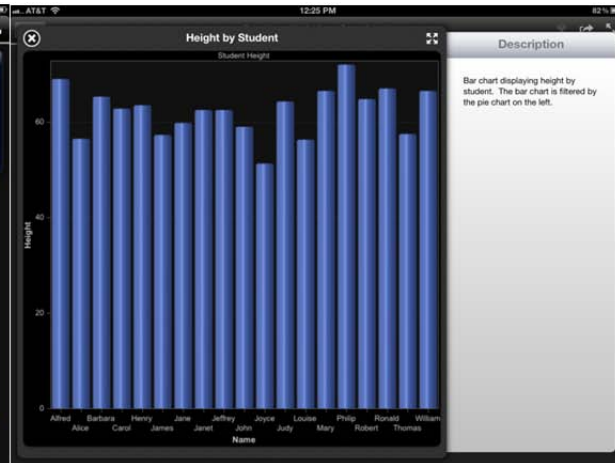


Figure 11. Indicator-Level Description

COLOR COORDINATION

Our default color palette was selected to allow the work of report designers to shine. The content of reports should be front and center, so there is very little color used throughout the app. When color is used, it is meaningful and with purpose. For example, red is used for deletion consistently in the app (Figure 12).

Experts have written extensively about the use of color in graphs for the goal of conveying information (Few 2004, Tufte 2001). For example, color can be used to distinguish between categories in a grouped-by chart (Figure 13) or as one of four variable assignments in a bubble plot (x, y, size, and color) (Figure 14). If a report contains multiple indicators, colors should be used consistently. That is, do not use blue to represent students aged 19-23 in one indicator and then use orange for the same group in another indicator). Color can help report consumers easily follow categorizations in your reports and understand the intended stories and flows.



Figure 12. Red Remove Reports Button

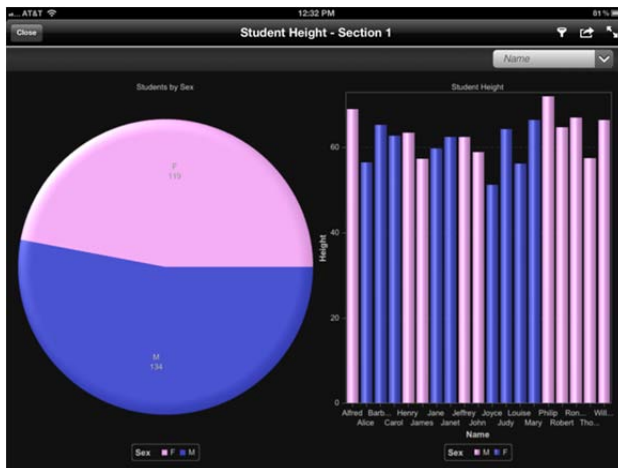


Figure 13. Color for a Sub Group Category (Female and Male)

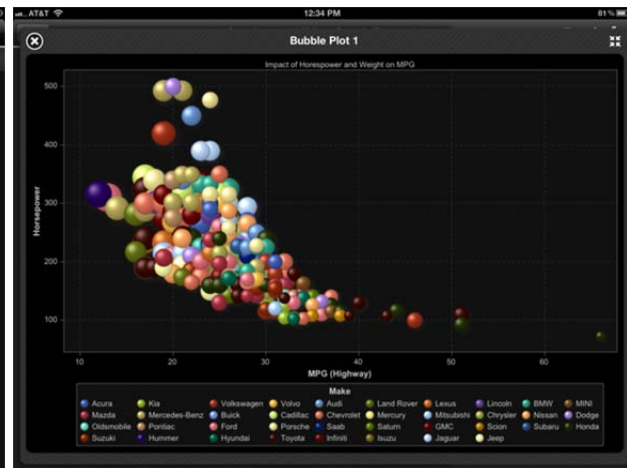


Figure 14. Color as a Variable in a Bubble Plot

SIMPLICITY

While we address simplicity last, it might in fact be the most talked about principle in report and dashboard design (Few 2006, Tufte 2001). Tufte often speaks of minimizing, or removing all, “chart junk” (2001). In the app, we implement this principle through a minimal design exposing only the most needed functions and hiding less-often used features in menus. The app also strives to minimize noise and other “frills” or “bells and whistles” so that the content of reports can be clearly read and stand out. Designing reports that are simple makes report consumption an easier task for users, enabling them to quickly find the pertinent information to make decisions.

Few encourages the display of quantitative information to be complete without distractions and for the information to say only what needs to be said (2004). To this end, charts and graphs should use reference lines, fit lines, unique markers (Figure 15) only when they are truly necessary and because these items carry important information that the user requires to understand the content.

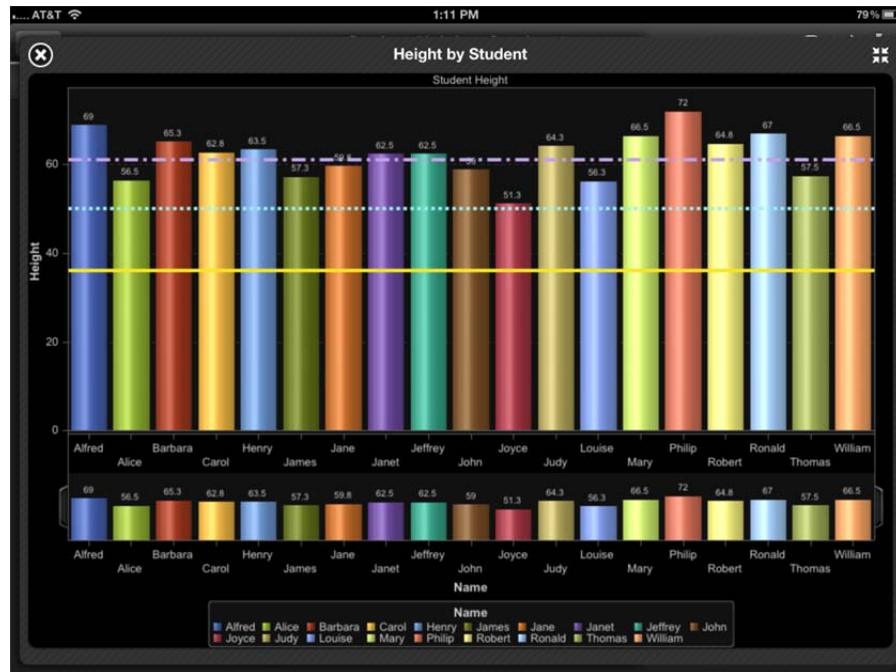


Figure 15. Overuse of Reference Lines, Labels, and Color

CONCLUSION

In this paper we identified seven principles used in the design and development of the SAS Mobile BI app. By extension, reports that incorporate these same seven principles into their design will integrate seamlessly into the app delivering a user experience that will delight report consumers. Designing reports for mobile consumers is not the same task as designing for desktop consumers. Mobile users are likely to spend less time with their reports, the devices are not likely to be as powerful as desktops (both in terms of storage capacity and memory), users are more likely to demand answers faster because they are mobile (on-site or on the move), and users are likely to expect the same results as a desktop experience. Designing good reports for mobile consumption is novel and not trivial. We hope that our presentation of these seven principles will guide report designers through this transition.

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described in this paper.

RECOMMENDED READING

Parsons, N., and S. McQuiggan. 2012. "Van Gogh Your Data: Data Visualization Methods with SAS® Business Intelligence." Paper presented at SAS Global Forum, Orlando, Florida, April 22-25, 2012.

CONTACT INFORMATION

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

Scott McQuiggan, Ph.D.
SAS Institute Inc.
SAS Campus Drive
Cary, NC 27513
Work Phone: (919) 531-1119
E-mail: Scott.McQuiggan@sas.com

David Coyle, Ph.D.
SAS Institute Inc.
SAS Campus Drive
Cary, NC 27513
Work Phone: (919) 531-4217
E-mail: David.Coyle@sas.com

Greg Thorne
SAS Institute Inc.
SAS Campus Drive
Cary, NC 27513
Work Phone: (919) 531-4375
E-mail: Greg.Thorne@sas.com

Philippe Sabourin
SAS Institute Inc.
SAS Campus Drive
Cary, NC 27513
Work Phone: (919) 531-2035
E-mail: Philippe.Sabourin@sas.com

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