

Designing for the Mobile Workforce

Peter J. Ina, SAS Institute Inc.; Khaliah H. Cothran, SAS Institute Inc.

ABSTRACT

The evolution of the mobile landscape has created a shift in the workforce that now favors mobile devices over traditional desktops. Considering that today's workforce is not always in the office or at their desks, new opportunities have been created to deliver report content through innovative mobile experiences. SAS® Mobile BI for both iOS and Android tablets compliments the SAS® Visual Analytics offering by providing anytime, anywhere access to reports containing information that consumers need. This paper presents best practices and tips on how to optimize reports for mobile users, taking into consideration the constraints of limited screen real estate and connectivity, as well as answers a few frequently asked questions. Discover how SAS Mobile BI captures the power of mobile reporting to prepare for the vast growth that is predicted in the future.

INTRODUCTION

In today's information economy, many individuals are traveling longer and farther than ever before. According to the U.S. Census Bureau (2013), nearly 600,000 full-time United States workers commute 90 minutes or longer. Since timely and accurate business knowledge is the key to being successful, work is increasingly being done on mobile devices to maximize commute and travel time. With 32% of workers relying on mobile devices in a given workday, access to relevant and accurate business information while on the go is critical (Agarwal 2013). SAS Visual Analytics with SAS Mobile BI can bridge the gap between Angry-bird-tossing time loss and career-propelling productivity on daily commutes. With the appropriate Android or iOS tablet, business users now have access to the power of SAS® anytime and anywhere they are.

In the following paper, we will introduce you to the world of mobile reporting, explain some of SAS Mobile BI's key features, guide you through its design, and finally share some of our experiences with the suite and how to get the most out of SAS Mobile BI.

SAS MOBILE BI, AN ORIGIN STORY

Workers must meet the demands of today's fast-paced business environment whether in the office, in meetings, or on the road. The SAS Visual Analytics suite enables users to quickly analyze and explore big data as well as discover insights through analytic visualizations on the web and mobile devices. SAS Mobile BI, a critical component of the SAS Visual Analytics suite, was born to bring big analytics data to the hands of business users wherever they are whenever they need it.

Taking into consideration business users' constant need to access information, SAS Mobile BI was designed with the goal of providing a rich and compelling mobile experience that is delivered through native yet predictable user interfaces across mobile platforms. As the application was designed, inspiration was drawn from applications that take advantage of multi-touch, manage podcasts, and allow for in-app subscriptions or purchases. The application embraces multi-touch in swipe-able reports, which enable users to traverse sections easily. Visual report objects such as graphs, tables, KPIs, and data grids make it easy for users to understand their organization's most important information at a glance. Charts and graphs are pinch-able to enable users to get a closer look at the data and touchable so users can see the data under their finger. Interactions between report objects provide an array of options for exploring reports and for consuming information within seconds.

SAS Mobile BI enables users to connect to one or more SAS® Visual Analytics Servers, find reports via server-based metadata searching, access suite wide favorites, browse the server's file system, and subscribe to them. Once subscribed, the SAS Mobile BI application checks the server for any report updates. Those updates include changes to the report's design as well as the data that drives it. A few of the application's key features include:

- interactive report viewing that utilizes native gestures
- visually rich reports that support multiple chart types, tables, and KPIs
- detailed exploration of report data via drilling, highlighting, filtering, or linking
- customizable themes and report styles for corporate branding
- collaboration capabilities via e-mail, commenting, and annotation
- Offline connectivity for anytime and anywhere access to mobile reports

These features and more help companies prepare for and meet the demands of an increasingly mobile workforce by allowing users to quickly view and interact with their organization's reports and information from their iPad or Android tablet. The mobile application gives executives and business users alike the ability to make decisions faster based on immediate access to the most up-to-date information available inside or outside of the workplace.

NATIVE CAPABILITIES, INFINITE POSSIBILITIES

SAS Mobile BI was designed and developed as a native mobile application for a variety of tablets on the Apple iOS and Google Android platforms. Because the application was written specifically for these platforms and a variety of devices (as opposed to being a web-based application), it can take advantage of device-specific hardware or software and integrate with many operating system (OS) features and technologies that are directly tied to the user's device.

SAS Mobile BI can integrate with the mobile device hardware. For example, SAS Mobile BI's commenting feature enables users to collaborate and comment on reports as well as visual objects. The application can integrate with device's built-in camera to enable users to attach video and images to reports.

In addition to integrating with device hardware, SAS Mobile BI can also communicate with other apps on the device. Its sharing feature enables users to capture an image of a report section or annotation and send it along with an editable message and link to the report via the device's native e-mail client or other e-mail applications installed on the user's device. Compatible e-mail applications can be identified and displayed to the user as shown in Figures 1 and 2. This enables users to share reports quickly and easily by sending and receiving content within SAS Mobile BI, using their favorite applications such as Mail, Gmail, Yahoo! Mail, or Outlook.



Figure 1. iOS Report Sharing Options



Figure 2. Android Report Sharing Options

SAS Mobile BI can also utilize host OS features and technologies. The application can receive automatic updates from the Apple App Store or the Google Play Store. In most cases, the application will update in the background, migrating users to the latest versions and features smoothly and quickly. On the Android platform in particular, the application also uses the device's notification system to inform the user on the status of report downloads and updates as shown in Figure 3. Such capabilities enable users to stay informed about events without being in the application.



Figure 3. Android Report Notifications

Some of the less apparent examples of integration, however, are in the application's usage of the native platform's built-in accessibility technologies. For visually impaired users, navigating and interacting with mobile applications can be challenging. SAS Mobile BI utilizes the OS's accessibility features available in device settings to enable visually impaired users to better interact with the application. The Invert Colors setting on iOS or the Negative Colors setting available on some Android versions and devices applies a higher contrast and inverts the colors on the device to help visually impaired users better see what is on the screen. Figures 4 and 5 illustrate high-contrast report colors on iOS and Android platforms.



Figure 4. iOS Normal and Inverted Report Colors



Figure 5. Android Normal and Inverted Report Colors

The Large Text option on Android will increase the font size on the user's device so that it is larger and easier for the user to read. As shown in Figure 6, applying such setting will enlarge text, titles, axes, and labels of report objects in the mobile viewer.

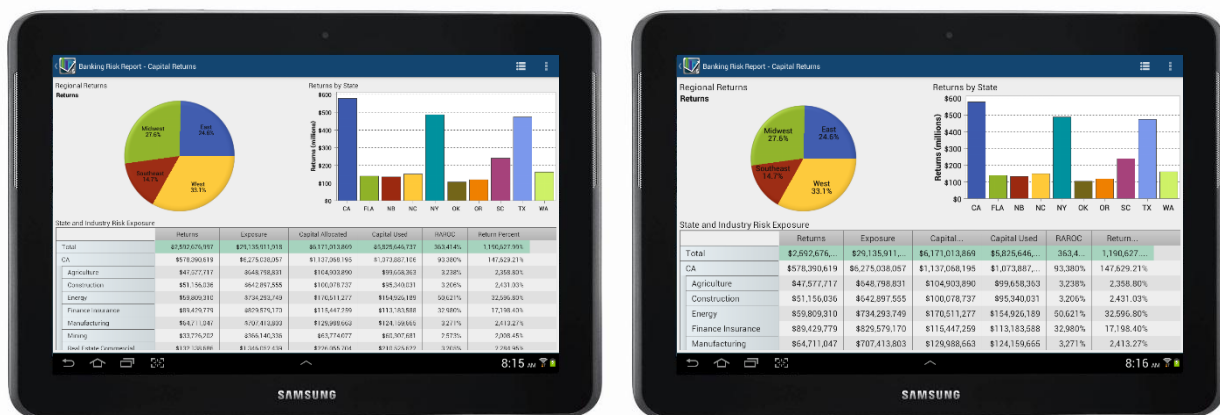


Figure 6. Android Normal and Large Text Report

Apple and Google also provide VoiceOver and TalkBack, native screen reader technologies, which add spoken, audible feedback to describe the results of actions and events when the user touches elements on the screen. Because these technologies are integrated into the OS, they work with various elements such as buttons and labels in SAS Mobile BI to help blind or visually impaired users interact with reports and navigate the application more easily. Although mobile graphics are not currently supported, with every release they are the focus of continual efforts to further enhance the experience for visually impaired users who are using these technologies.

Using the built-in functionality of mobile devices benefits mobile reporting. Each of these native capabilities are enhanced by SAS Mobile BI and create opportunities to provide a customized user experience that make the application more personal, engaging, and interactive.

TOUCHABLE DATA, TANGABLE INSPIRATION

Although mobile devices and their native capabilities provide a host of opportunities for SAS Mobile BI to meet the needs of users in the mobile workforce, they also present the challenge of finding new ways for users to discover, explore, and interact with reports. Gestures are a powerful mode of interaction due to their potential to enhance the application and engage the user (Norman 2010). SAS Mobile BI embraces the challenge of interacting with reports by integrating native OS gestures into its core design. Its gesture-driven interface takes advantage of the

expectations of users as well as their device, providing an interactive mobile reporting experience that is both pleasing and engaging. Figure 7 illustrates actions for common gestures in SAS Mobile BI.

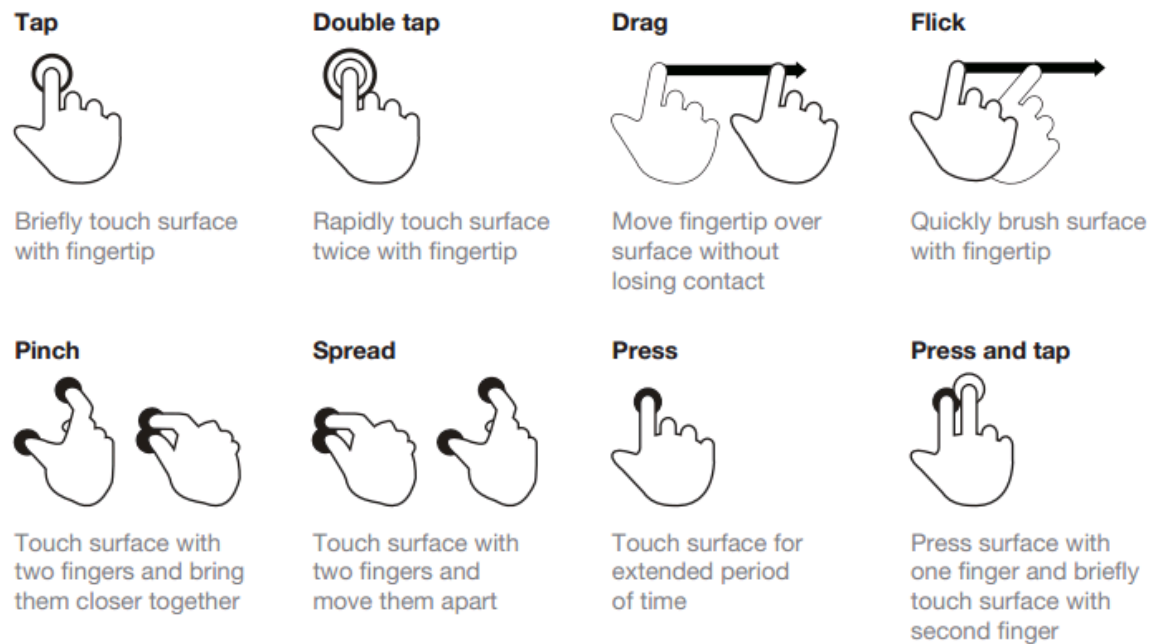


Figure 7. Mobile Touch Gestures (Villamore, Willis, and Wroblewski 2010)

Mobile gestures drive interaction, adding a “feeling of activity” to the report and value to the user experience (Norman and Nielsen, 2010). Since directly touching report objects indicates a point of interest, gestures are used to trigger important interactions that enable the user to explore data via touch.

One of the simplest yet most powerful gestures in SAS Mobile BI is the tap. Performing the tap gesture on a report object, displays a tooltip revealing details about the underlying data. When supported by the report object, the tap gesture within the tooltip itself facilitates other important interactions such as drilling down, which enables the user to further explore data and linking, which enables the user to access the data in other reports, sections, or external content. The tap gesture also enables the user to filter and highlight across other report objects and provides access to the Heads-Up Display (HUD), which displays the filters applied to the object. The HUD enables users to better understand the relationships between visual representations and view relevant information with respect to the object in focus.

Tap and hold, another relevant gesture, displays the jeweler’s loupe, producing a magnified view of the data beneath the user’s fingertip. This gesture is highly advantageous in dense data since it enables the user to focus on a point of interest. Limited screen real estate on mobile devices in many cases can cause report objects to scale down significantly in order to fit on the screen. In cases where this occurs, users can perform the double-tap or pinch open gesture to zoom in or increase the size of the object. Performing the double-tap gesture again or pinching close will zoom out.

Such gestures enable users to examine areas of interest in the report for a better understanding of the information and relationships within the data. Their use in SAS Mobile BI allows for efficient and dynamic visual exploration, inspiring users to explore data in new ways never imagined.

MOBILE REPORTING REALITIES

Effective report design is a challenge on any platform for any type of device. Getting the intended message across in the most efficient manner is critical to a report’s success within an organization. Reports that are used the most are most likely the ones that get the design right. Designing reports requires much care and planning in order to have

effective content delivery. The key to crafting a successful report is to understand your audience and their needs.

Those needs are no different when dealing with a web user or a mobile end user. The biggest difference is that mobile users are often on the go, their attention span is shorter, their time with the report is shorter, and connectivity is not guaranteed. Hence, when designing reports targeted for mobile users, think about the information density, layout, and visual design.

INFORMATION DENSITY

Users can process only so much information on a given screen. Packing more information into a given space might seem like it would improve efficiency; but the fact is that having more information crammed on a screen means that users need more time to sift through what's there, understand what it means, and understand how it is related to everything else on the screen.

Using a “less is more” approach will help simplify and organize report information as well as streamline what the user will focus on. When designing effective mobile reports, consider limiting the number of items that are shown on a screen at the same time. Leverage multiple report sections or object containers if there is a need to show more than what can fit comfortably on a screen.

LAYOUT

The two layout systems leveraged in SAS Visual Analytics reports and SAS Mobile BI are tiled and precision layouts. Both layouts are percentage-based, which means that items are positioned using coordinates that are relative to the edge of the display or to another object.

The precision layout is unique in that it is the only layout that is capable of placing items outside the visible area of the display (greater than the width or height of the display) as well as allowing items to be stacked on top of each other. Using this layout style enables users to size objects without impacting others.

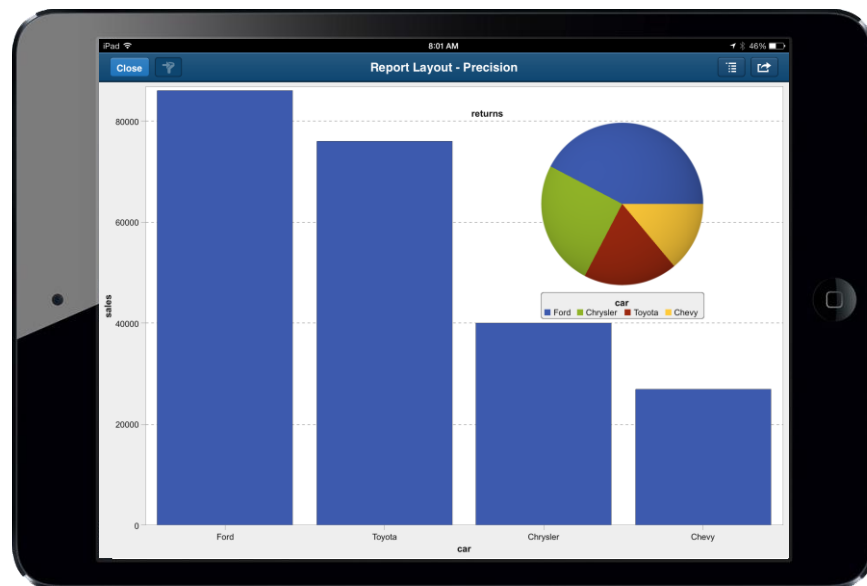


Figure 8. Precision Layout Report

Tiled layout uses a method of dividing the screen into discrete areas, with each area corresponding to a visual object. As more items are added to the report's section the tiles are further divided. In this layout, objects are resized by adjusting the size of the visual object tile. At the same time, as one tile grows, others are adjusted to accommodate.



Figure 9. Tiled Layout Report

With the range of available mobile devices, there is a wide variety of display sizes and shapes. When designing mobile reports, consider using a tiled layout as it limits the chances of objects overlapping on different displays and aspect ratios. This will build flexibility into the report. Visual objects that unintentionally overlap can create a less than compelling experience, especially when users attempt to interact with a visual object.

VISUAL DESIGN

The look and feel of a report is an important part of report design. Reports that are both functional and well-designed can have better staying power and perceived usability.

Keep a limited palette of colors when designing a report. The use of color (when done sparingly with consideration given to things like contrast between text and background colors or color-blindness) can be a great way to highlight and drive home brand identify as well as a report's key message.

Studies show that users have more difficulty reading content on a mobile screen than they do reading the same content on a computer screen (Singh, Sumeeth, and Miller 2011).

Leverage font weight and size to help organize the information for users. More important items should be more visible than second- or third-tier items. This will help ensure that reports are easy to understand, and that its typeface is large and clean enough to be easily read by the end user.

By taking into consideration information density, layout, and visual design, mobile reports will be simple, clean, and easy to understand.

FREQUENTLY ASKED QUESTIONS

WHAT FACTORS CONTRIBUTE TO SAS VISUAL ANALYTICS REPORTS BEING VIEWABLE OFFLINE?

Reports generated in SAS Visual Analytics have the potential to be usable offline; however, there are several scenarios that alter this capability. When one or more the following conditions are met, the ability to use reports offline is no longer available either because it is disabled or because streaming data directly from the server to SAS Mobile BI is required.

1. Offline report viewing can be controlled via Roles and Capabilities within SAS Visual Analytics.
2. When the size of the data exceeds the default value of 250,000 cells. This setting is configurable by an administrator.
3. When geographic maps, time-series graphs, or tables with sparklines are the target of report interactions like filtering or brushing.

4. When visuals utilize SAS Visual Analytics post-aggregate calculated measures.
5. When visuals utilize SAS Visual Analytics' Ranking feature.
6. When the depth of a data hierarchy is greater than three levels or has a save default drill state.

WHAT DEVICES AND OS VERSIONS CURRENTLY SUPPORT SAS MOBILE BI?

SAS Mobile BI 6.3 supports the Apple iPad and the Apple iPad Mini running iOS 6.0 or later. SAS Mobile BI also supports the Google Nexus 7, Google Nexus 10.1, Samsung Galaxy Tab 10.1, Samsung Galaxy Tab 2 10.1, Samsung Galaxy Note 8, Samsung Galaxy Note 10.1, and the ASUS EEE Pad Transformer TF101 running Android 4.0.3 or later.

HOW AND WHERE DO YOU CREATE REPORTS FOR SAS MOBILE BI?

Reports that are viewable within the SAS Mobile BI application are created within SAS Visual Analytics. The SAS Visual Analytics suite includes a designing tool for creating a report within a WYSIWYG editor. For more information about SAS Visual Analytics and its applications, please visit SAS.com and the SAS Visual Analytics product page.

CONCLUSION

Today's workforce is redefining the concept of how work is done. Workers are always on the go and are no longer bound to the confines of the traditional office work environment. Work is instead being increasingly done on mobile devices such as laptops, tablets, and smartphones that accompany workers throughout much if not all of the workday (Argawal 2013). As the mobile landscape continues to evolve, organizations must prepare their workforce with flexible tools for the non-traditional work environment.

SAS Mobile BI for both iOS and Android tablets was created as a part of the SAS Visual Analytics Suite to enable the mobile workforce to be efficient, productive, and accountable by providing anytime, anywhere access to information that they need. Its array of features and native capabilities on the iOS and Android platforms provide many opportunities to integrate with mobile device hardware as well as other applications on the user's device to provide mobile reports with personalization capabilities, background updates, and built-in accessibility. Its gesture-driven design enables users to explore and interact with data in new and innovative ways, which leads to better insight and understanding of critical information.

In a relatively short period, mobile devices have come a long way; however, there are still limits to the content they can handle. Mobile report designers must consider the context in which the report will be consumed and ensure that it is a good fit for users in a mobile context. This challenge must be overcome to successfully deliver content on a mobile device. Best practices and considerations such as information density, layout, visual design, and offline connectivity help optimize reports in SAS Mobile BI so that they are flexible, scalable, discoverable, and can be consumed in an easy and efficient manner.

As the mobile landscape continues to evolve, SAS Mobile BI will continue to prepare for its vast growth that is predicted in the future, empowering users to work in innovative ways whenever, wherever, and however they choose. The ultimate aim is to meet the needs of a mobile workforce whether they are using the largest tablet or the smallest smartphone.

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CONTACT INFORMATION

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

Peter J. Ina
SAS Institute Inc.
SAS Campus Drive
Cary, NC 27513
Work Phone: (919) 531-2792
E-mail: Peter.Ina@sas.com

Khaliah H. Cothran, Ph.D.
SAS Institute Inc.
SAS Campus Drive
Cary, NC 27513
Work Phone: (919) 531-2706
E-mail: Khaliah.Cothran@sas.com

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