Supercharge Your Dashboards with Infographic Concepts Using SAS® Visual Analytics

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ABSTRACT

A human's attention span is shorter than that of a gold fish—about eight seconds is all you have to capture their attention and create a reason for a viewer to stay on your dashboard. Therefore, a dashboard's visual appeal is even more important today than ever before, and this is where infographic concepts make a difference. Infographics deliver information with clarity and simplicity. Data is everywhere, and more report designers are using infographic elements to better communicate insight from the data. The boardroom can now benefit from what has become mainstream on popular news sites and social networks online. This paper shows you how to create infographic-inspired dashboards and reports that can be shared and dynamically explored by your teams using SAS® Visual Analytics on SAS® Viya®. Supercharge your existing dashboards and reports with easy drag-and-drop wizards, while still providing the performance, repeatability, and scalability on massive data that your enterprise demands. This session looks at how the latest enhancements in SAS Visual Analytics enable users to design and create infographic-style dashboards and reports like never before. You learn tips and techniques to get the most from your SAS Visual Analytics software that you can apply back at the office. You will leave this session with the perfect balance of creative ideas and practical examples to better engage your entire organization with high-impact data visualizations.

INTENDED AUDIENCE

This paper is aimed at SAS® Visual Analytics users who create and design reports and dashboards for their users. Managers can also use this paper to get an idea of what their teams can create and design with SAS Visual Analytics.

TOOLS

SAS Visual Analytics 8.2

SAMPLE FILES AND DATA

All files that are permitted to be shared from this paper will be made available here: https://communities.sas.com/infographics

This page is provided to allow you to ask questions and discuss your own approach and examples.

INTRODUCTION

Travis Murphy spent the last year working on a side project that was related to this paper. Travis wrote a book on infographics powered by SAS, which covers how to use different tools in SAS to create infographics for business. This is based on the work he completed for a SAS Global Forum paper he authored in 2016, and is an area he is passionate about. (Murphy, 2016) He has always found a way with SAS to achieve the visuals needed from data. Sometimes this was simple drag and drop, and other times this involved some code. However, the result was positive.

In the book *Infographics Powered by SAS®: Data Visualization Techniques for Business Reporting*, Travis outlines how to use personal productivity tools like Microsoft Excel and PowerPoint with SAS as well as how to use SAS code to create the infographic. This book also uses SAS Visual Analytics to create infographic style dashboards. So, this paper is focused on some specific infographic approaches and how

to apply these to your SAS Visual Analytics dashboards. It steps through some examples, which gets you ready for doing this back in the office. This paper discusses some ways to use infographic concepts to supercharge your SAS Visual Analytics dashboards and make them more engaging to your users.

DASHBOARD VERSUS INFOGRAPHIC

A dashboard is more than an infographic: it can be dramatically different, or remarkably similar.

There are many interpretations about what a dashboard is versus what an infographic is, and we have come to the following distinction: an infographic is an entry point in data, a perspective, sometimes rich and sometimes fleeting. A dashboard is more of a comprehensive view of one or more data perspectives, and includes user driven context and line of thought interactivity. As we unite these two data driven information products, we can combine benefits of each in one information product. Taking the techniques that work well for infographics and combining these into the ever-popular dashboards, there are many benefits in doing this.

The infographic is an engaging and modern combination of data and art, at its best, and at worst a presentation slide of shapes and numbers. The Oxford dictionary states that an infographic is the combination of the words "information" and "graphic," which is a very simple and literal view of the term, and this covers many formats in the modern world. People today have an attention span shorter than ever before, which means we must design information in a more compelling way. (McSpadden, 2015) Our world sees infographics used in all social media, and the boardroom has figured out that a more engaging display of information is winning over executives also.

Wikipedia defines an infographic as "graphic visual representations of information, data, or knowledge intended to present information quickly and clearly." (Wikipedia, 2018)

The modern dashboard is more like an information application, which often does not require specialist knowledge to use, and should provide the user a rich and complete data experience. Traditionally the dashboard was creating functional slice and dice options for users. However, the aesthetics or visual appeal were not as important. User expectations have changed in recent years, and users want it all – appealing *and* functional dashboards.

Whatis.com defines a dashboard as "a user interface that, somewhat resembling an automobile's dashboard, organizes and presents information in a way that is easy to read. However, a computer dashboard is more likely to be interactive than an automobile dashboard." (Whatis.com, 2018)

The tools to achieve dashboards have evolved over time to become more visually appealing and simpler to use for more people to create high quality outputs. SAS Visual Analytics is an example of these tools and we can now use SAS to quickly create and share engaging and intelligent dashboards to our audience.

WHICH OUTPUT IS RIGHT FOR YOUR AUDIENCE?

There are so many options when you are considering how to communicate insight from data. Travis digs into the options more in his book. However, a simple list is as follows: infographic, dashboard, spreadsheet, email, report, presentation, and document. And there are of course many more options out there. However, these are all available for you as a data analyst to use when you are deciding on how to share your data. If you decide to use an infographic or a dashboard, then the examples provided in the paper might assist you in your project.

WHAT MAKES A GREAT DASHBOARD?

As mentioned above a great dashboard has some simple characteristics. Here are some ideas about what works for users of dashboards and why they work.

A dashboard is an information application, and like many of the best apps, the best dashboards don't require any additional training or special skills to use. The user can simply open the dashboard and start to navigate by clicking and moving on areas that matter or are interesting to the question the audience has. Today, all insight from data is competing for a user's attention, and we have only seconds to provide a reason for the audience to stay. A great dashboard needs to grab the attention of the audience, in a similar way that an infographic does. This can be achieved by applying a makeover to existing dashboards, and taking some of the characteristics of the infographic and applying these in the build phase of your next dashboarding project.

The best dashboards are layered, and these layers are often built into multiple tabs or pages of your dashboard and linked together to move between these layers with context from each question the audience has. The infographic does this also. However, the layers are often achieved using scale of objects on the same infographic. Both the traditional dashboard layered approach and the infographic layered approach can be used to drive more engagement in your dashboard designs.

Intuitive and simple pathways for how the audience will navigate the dashboard need to be analyzed (for example, will they click the tabs, or each object and what path they take). Is there a single line of thought navigation built in, or are there multiple pathways to take for the user at a time? Actionable insight is key for a dashboard user, and each click of the mouse or tap of the screen should provide more detail, or a different perspective, while still maintaining context. The dashboard moves from highlights to detail with ease and simplicity.

It is important to consider how interactive or static the dashboard needs to be, and sometimes this is not for the designer to decide, but rather consider how the users will interact with the final design. Static is often all you have to work with when using an infographic as it will end up on a wall as a poster, or as a social media tile shared on the internet and consumed via a mobile phone.

A great dashboard is designed once and used by many users in many contexts. This means that there need to be hooks and entry points into the dashboard. Each user gets a custom experience even though the look and feel is never different, so the context is the only thing that changes. Creating a context-sensitive landing page for the dashboard allows for many entry points to the same content and increasing the use cases and audience, without limiting the value for each group.

INFOGRAPHIC DESIGN CONSIDERATIONS THAT ADD VALUE TO DASHBOARDS

Story is the key – the topic of your infographic provides the central element that all other things are based on. What is being answered by the infographic, and what value can be gained about the story are key. Audience-first design is a key principle of infographics.

Data driven elements versus non-data driven elements – data driven elements are very important, and this is where dashboards are at their best. However, infographics also use subjective data to add more context and develop the story further. Some graphs work well for infographics over others. Elements like word clouds, ranked bar charts, single key values, and dynamic text elements are perfect to add to an infographic.

Scale – layers of objects provide a range of scale to unveil information at different rates to allow attention grabbing and then more information as the audience processes the initial views and headlines.

Style - Styling of the dashboard does many things, from being pleasing to the eye of the audience, to being the reason the audience consumes elements in a particular order. You need to be careful of too much formatting, where your dashboard becomes style over substance.

WHERE TO START?

When starting out, it is important to keep in mind the following elements when designing and building dashboards. Each element is important and can affect the success of the final product.

The design – What question are you answering? When designing a dashboard with infographic inspirations, it is recommended to you to start with a whiteboard or piece of paper. This element takes the

report designer out of a tools frame of mind and places no constraints on your design. Sketch out a design that tells the story that you want to tell, and not what the tools allow you to tell. That will come next.

The tools – the tools you choose will have an impact on what you can achieve, and if your design is possible at all. We have great goals in our original design steps, which cannot always be fully achieved in tools we use at the time. Now with this release of SAS Visual Analytics we can achieve the design planned on paper. We also can go a step further and use analytical-driven visuals versus traditional dashboard objects to raise the insight for users.

The output – The display of the dashboard or infographic is very important, and will affect the way you build and implement your design. If you are planning to use this once and then share a static version of the report, then you don't have to think too hard about the live or real-time interactions that are on offer. If you know your audience will use this as their analytics application to slice and dice, then you must design for usability also.

SAS VISUAL ANALYTICS OVERVIEW: MORE THAN A PRETTY PICTURE

We all want to use data anywhere, on any device, at any time, so we can collaborate and keep aligned to the goals of our organizations. A modern data visualization toolset needs to satisfy these requirements:

- Cover all users.
- Span all requirements.
- Be consumable anywhere and at any time.
- Be flexible, simple, and powerful.

As you might be aware already, SAS Visual Analytics provides almost unlimited ways to explore and visualize data. It's used by many organizations for big data exploration as well as self-service analytics and dashboards. Before we get into the examples, we wanted to share some features of the recent updates to SAS Visual Analytics 8.2 that can assist with achieving the infographic dashboards.

- **Location Analytics** – Brings your data to life with demographic enrichment, automatic clusters, custom polygons, and more.
- **Custom Graphs** – Extends your content by using third-party graphs as if they were native graphs. Graph libraries like D3 or C3 are now able to be used in SAS Visual Analytics.
- **Ambient Analytics** – SAS Visual Analytics includes so much self-service analysis that it delivers ambient analytics – allowing business teams to grow their skills and create dashboards that are powered by advanced analytics.
- **More visuals to tell your story** – out of the box, there are many more visualizations to use to represent the data just the way you want.
- **Open and Extensible** – provides new APIs to allow you to call the elements of the VA dashboard and share it on the site https://developer.sas.com. This now means you can create endless entry points into SAS Visual Analytics 8.2.

There are many features included with SAS Visual Analytics that have been covered in previous papers for SAS Global Forum and in recent publications. Therefore, they are not covered in detail in this paper, other than to include an overview of functionality that can be seen in Figure 1. This overview of capability

in SAS Visual Analytics is a great way to see the breadth of the SAS offering in this data visualization market segment. SAS is much more than just data visualization and is used to power many critical analytic processes across the globe by some of the biggest organizations in the world.
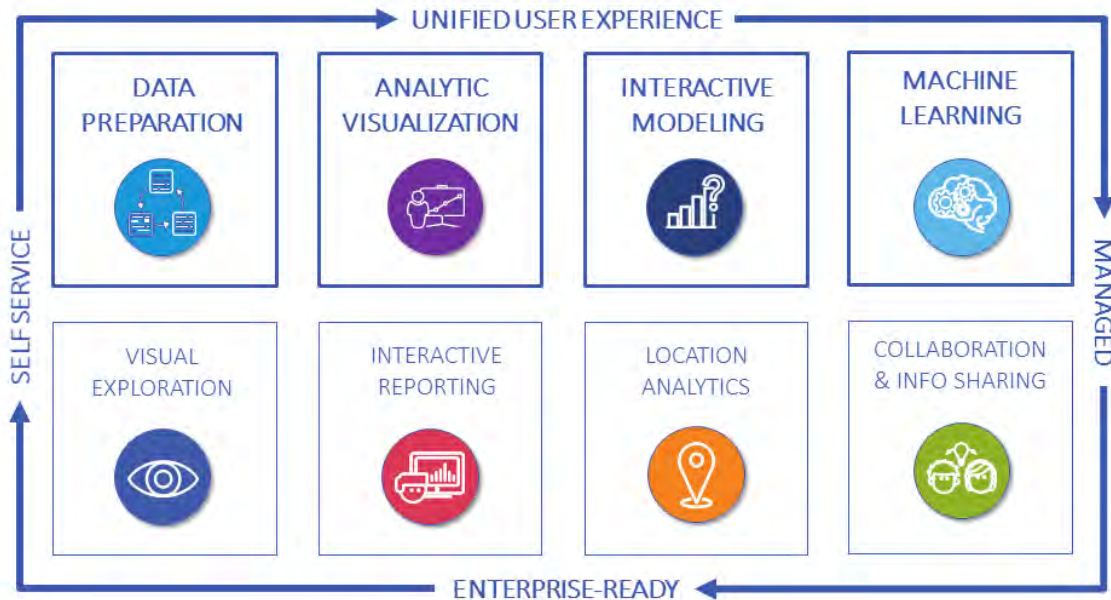

Figure 1. SAS Visual Analytics Capability Overview – This covers the breadth of capability in SAS drag and drop data visualization with SAS Visual Analytics.

WORKFLOW FOR BUILDING YOUR INFOGRAPHIC-INSPIRED DASHBOARD WITH SAS VISUAL ANALYTICS

Topic

Question to answer, or topic to explore – data preparation might be needed here to load or transform the data and even do some analysis at this point to understand what insight is available to share. This step is where you can take an initial look at the data, start to explore, and discover what might be useful.
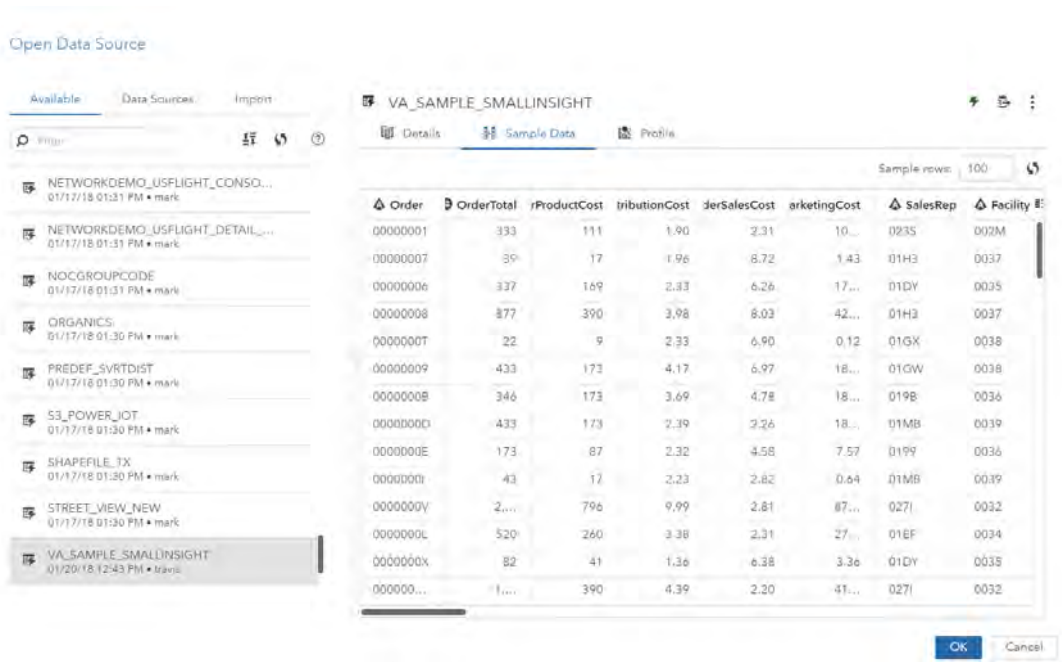
Figure 2. SAS Visual Analytics Data Prep – Data uncovers a story or a point of view. If you don't know the topic well, research it. Do this with the data you have, and other sources as needed.

Design

We always need to think about the general design – use pen and paper or a whiteboard to start to lay out the design. You can bring the ideas out a bit more easily than you can when sitting at the keyboard trying to make magic happen with mouse clicks. Give yourself some space to think about how this might look and place yourself in your audience's position. An example of this whiteboard design can be seen in Figure 3.
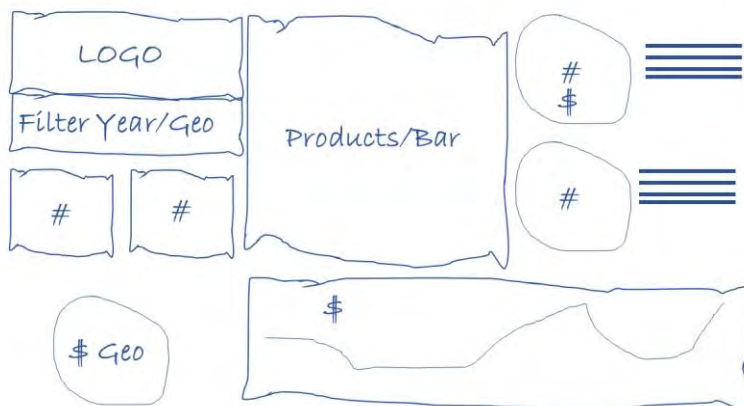
Figure 3. Example Mockup of a Dashboard Design – Always start with a mockup of the design. This helps you understand how many tabs are needed to tell the complete story on the topic you have decided to cover.

Build

Using the tools, in this case SAS Visual Analytics, we will build out the dashboard and refine the design throughout the build. Formatting reports to the point where they are looking like infographics goes against the principle of simple and automatic layouts for use across any device or platform. This is not dissimilar to desktop publishing where you have the output in mind and a clear vision of the way this will be consumed. When building your dashboard with highly formatted design, you need to consider how you plan to consume or deploy the final output. An example of an infographic style dashboard can be seen in Figure 4.
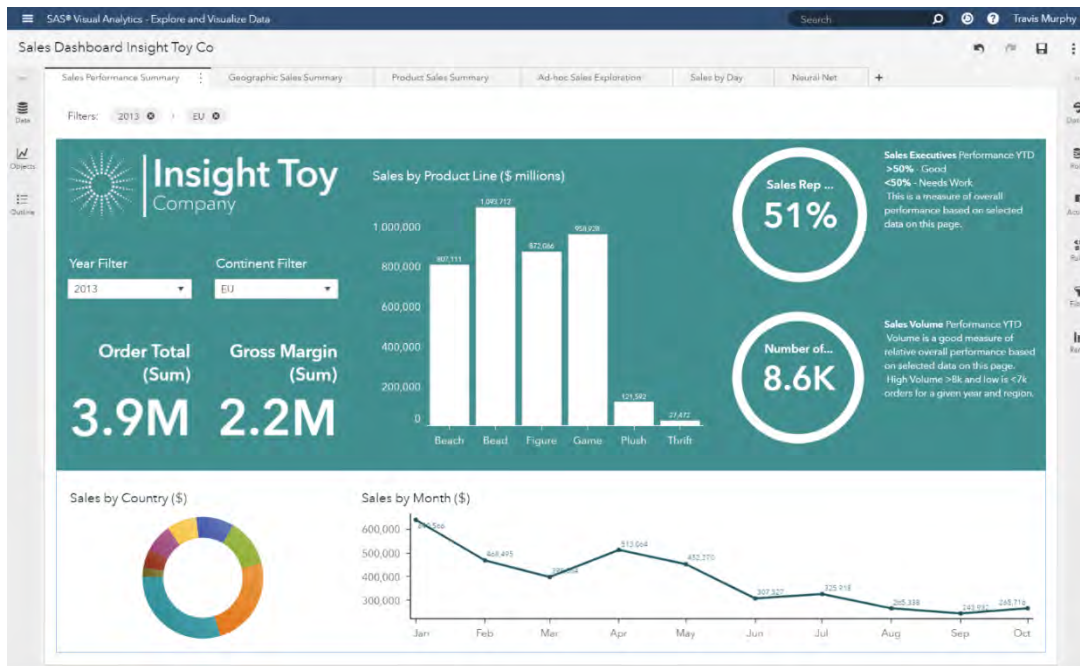
Figure 4. SAS Visual Analytics – SAS Visual Analytics is a powerful toolset to design visually rich dashboards. It caters to all levels of user skills and introduces analytics into regular dashboard options. (Murphy, 2018)

Some general tips when building your infographic styled dashboards with SAS Visual Analytics:

- **Drop zones and Containers** – You can achieve a whole lot of formatting by just drag and drop in SAS Visual Analytics today using intelligent drop zones without the need for containers. We can use the container object in SAS Visual Analytics to group objects together. There are benefits in using both. However, when doing precise designs, one or more container objects will provide many options to format and control layout.

- **Object Overlay** – a key feature to take advantage of in SAS Visual Analytics when designing infographic dashboards is the use of object overlay in precision containers. The container facilitates this concept. However, the design effect it allows is impressive. We use this feature in the examples, where we place images over graphs, or a graph on another graph. This allows for very creative designs with SAS Visual Analytics dashboards and can be the difference between a good dashboard and a great dashboard.

- **Interactivity versus Static** – understanding how your dashboard will be used is going to improve your build process. The dashboard can often be the only tool a user must use to slice and dice data, so interactivity needs to be embedded in the design. If the dashboard is built only for a

single view of the data, then a static view will suffice. SAS Visual Analytics allows flexible interactive options and includes an option for everything in the dashboard to interact with just one option selected.

- **One report, many users** – understanding if you are designing a dashboard for more than one user group can affect the design, and might require some additional features to be used. For example, data driven content objects or parameters assist with rendering for a particular group at the run time of the dashboard.

- **New graphs to tell better stories** – SAS Visual Analytics has many more out-of-the-box visualizations to use in your design like the key value object, which has an infographic setting to create quick and simple infographic styled elements in your dashboard. Even with the addition of many more out-of-the-box SAS visualizations, there are many great visualizations made by others around the globe, and they can also be used in SAS now with the Data Driven Content object.

EXAMPLES OF INFOGRAPHIC-INSPIRED DASHBOARDS WITH SAS

To demonstrate some of the elements we mentioned so far in this paper, it is worth spending some time on looking at examples of dashboards with infographic elements. This section looks at some examples of using SAS Visual Analytics and applying the above ideas and workflow to achieve these designs. This section of the paper will step through three examples using SAS Visual Analytics: a novelty dashboard, a geospatial infographic style dashboard, and a standard dashboard with multiple pages.

EXAMPLE 1 – NOVELTY DASHBOARD

Overview

At Christmas time 2017, you might have read Travis's post on communities.sas.com, and might have seen the Santa-themed infographic-style dashboard created using SAS Visual Analytics and some data sourced from previous SAS posts by Falko Schulz and Robert Allison in earlier years. As we were preparing this paper, we decided to share some of the steps taken in creating this SAS Visual Analytics dashboard.

Topic

Santa, like all CEOs, needs access to analytics to understand what has happened, what could happen, and how to take action. The initial view of Santa's dashboard should provide at-a-glance highlights for immediate insights on toy production, delivery routes, and overall performance. Some key performance indicators are provided to help explain team performance like reindeer performance, naughty and nice, toy production versus targets, and much more. The dashboard also shows geographic routes for all deliveries, optimized using SAS to ensure deliveries happen on time.

The data set we are working with came from previous blog posts by colleagues Falko Schulz (Schulz, 2013) and Robert Allison (Allison, 2012 and 2014). We will reuse this data and load that into SAS Visual Analytics to create Santa's dashboard: The DasherBoard. Some of the questions that should be answered from Santa-related data are reindeers' luminosity, speed, and agility; toy production and quotas; and the delivery route.

Design

We always need to think about the general design – use pen and paper or a whiteboard to start to lay out the design. We always do this at this point to understand how many elements we are trying to fit on each

page of the dashboard, and whether more than one page is needed to tell the story and provide the functionality in the dashboard for the audience. The audience for this dashboard is Santa, Helpers, and interested parties in the Christmas business. Santa and his helpers need to be on the same page so that they can use the same data, whether out of the office on deliveries or at the production facility in the North Pole. The mockup for this dashboard can be seen in Figure 5.
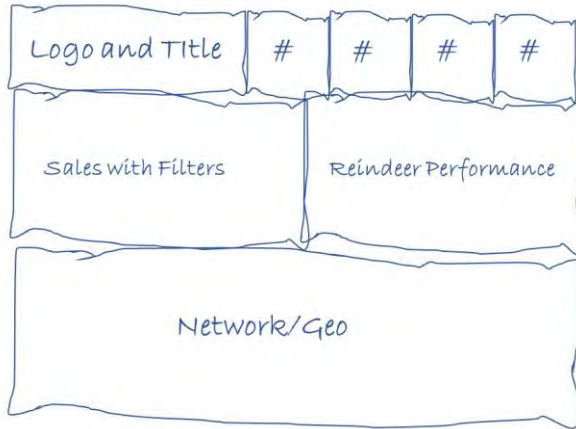

Figure 5. Mockup of the DasherBoard – A whiteboard design of the infographic.

Build

Using SAS Visual Analytics, we will build out the dashboard and refine the design throughout the build.

We use containers quite extensively in this build process, as we really get some formatting benefits by using containers and ultimate control in achieving the precise design we have in mind. This build process can be seen in Figure 6.
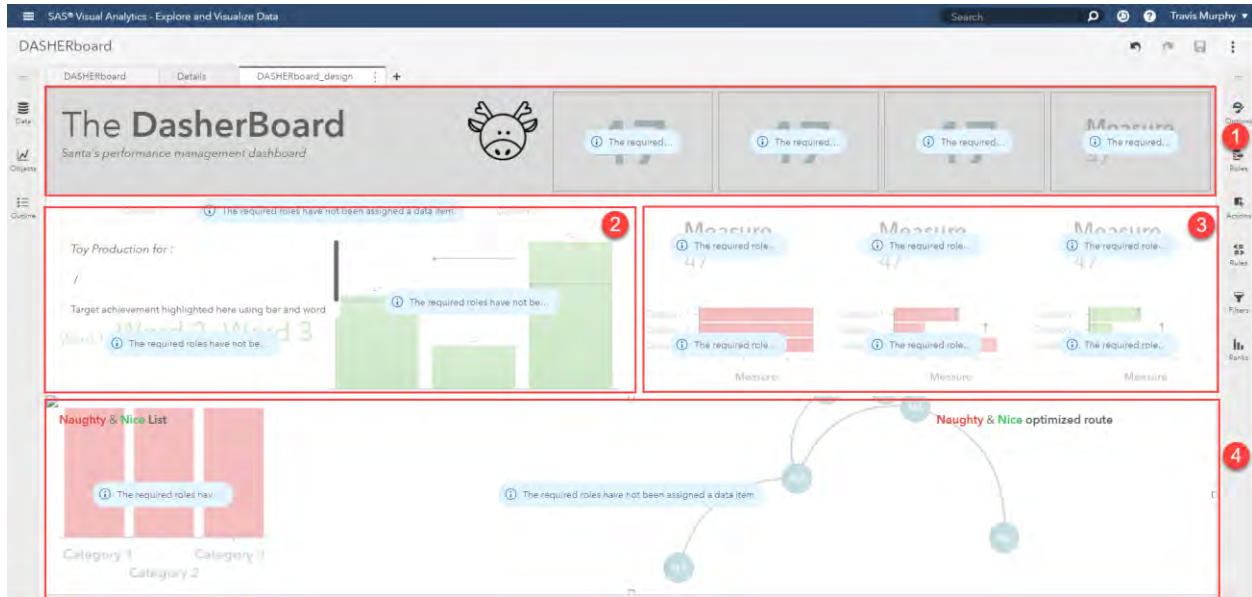
Figure 6. SAS Visual Analytics Build Process – Placeholders within each container provides the structure and using containers, we can control how each section of the report behaves. Each container is marked in this image with a number: 1, 2, 3, and 4.

Header Container – Using the standard container, we can add the other objects with simple drag and drop. The objects we use in this example are the Text object for the heading and sub heading, an image object for the reindeer icon. We can then use nested containers where each contains a single key value object. This is repeated by using the duplicate option on the first container with the key value. This is a quick way to repeat settings changes and formatting you did on an object already, and can save significant time in your build phase.

Middle Left Section Container – Using a precision container, we are going to control each object we use inside this container. We do this because we use some layering of objects in this section of the dashboard. The objects we include are a button bar object, which allows us to add some interactive filters/highlights within this section of the report. We add a text object and use the roles to add dynamic data driven text to this element, which is a great way to add a data paragraph to any dashboard (some static and some data driven text). We use a targeted bar chart and a word cloud object to complete the elements we are after in this section of the dashboard. The data we assign here is mostly around production of toys and the types of toys being produced.

Middle Left Section Container – Using a standard container, we drag and drop some objects to create some ranked performance measure for the reindeers. We do this by using 3 key value objects and 3 targeted bar charts. We assign data to these and use the rank option on the key value objects to ensure we get the data we want to display: the top performer.

Bottom Container – Using a precision container, we will add the following objects: a network analysis object (with geographical map background enabled) and a bar chart object. This container is precision, once again allowing for a layered design. We also include an image object (the Christmas decorations) and add this as a background image for all elements in this container. We then use opacity/transparency settings to blend them all together seamlessly.

We are using many different data sources in this example, some spreadsheet data, some data managed by SAS, and some SAS analytics output data for the network route map. Once all of this is assembled, we do some formatting to create the look and feel to match the design we planned at the beginning.

Formatting - We use some of the panels in SAS Visual Analytics to adjust and format the objects in particular ways. In this example, we use formatting options like change padding of objects, background color, transparency, border, data color, and some other options to tell the correct story. We also need to look at how to report exceptions rather than forcing the user to understand what is important and not. This is where conditional formatting is applied and the audience can see the data that matters at a glance, and without having to process all the data first. Formatting is important when creating a compelling dashboard for your team.

Adding Interactivity – We mentioned some of what makes a great dashboard earlier in this paper. In this example we achieved a more engaging dashboard by adding some actions between objects in SAS Visual Analytics. We add some links and filters to ensure that elements will dance around the screen as the user clicks and moves around the dashboard. Lastly, we add a second hidden dashboard page, which links to the map to allow for detailed data view, which in turn will move the user to a pop-up page with context of the mouse click they made, showing only the selected data. This matches the last point of reference. This will allow Santa and team to drill through to the address and status of each stop on their journey. This interaction can be seen in Figure 7.

All finished, we present: The DasherBoard. The final output can be seen in Figure 7.

Figure 7: The DasherBoard – Santa's Performance Management – Interactive dashboard to get insight from data.
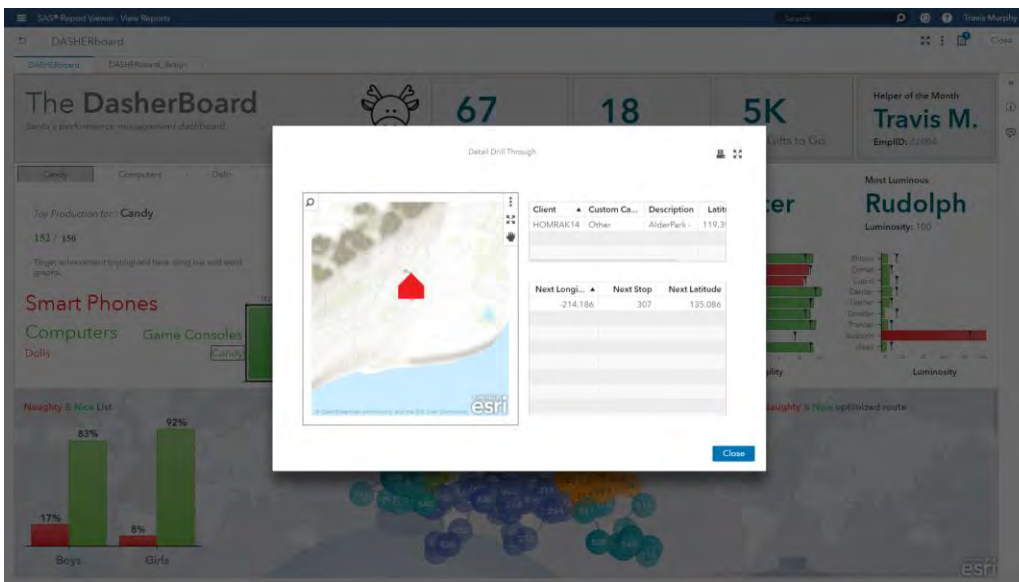

Figure 8. SAS Visual Analytics Drill Through – This is an example of drill through on a map, which then shows then a quick screen with details about the stop on the route for Santa and team. Context is passed to make navigation easier.

If Santa has any further questions he can easily navigate to detail with context of his initial question as seen in Figure 8. Drill through is provided and integrates other core systems with his everyday DasherBoard.

In all the examples the best way to understand the report layout and build elements is to use the outline panel and view all the dashboard objects in one location, as seen in Figure 9. The outline view is interactive and allows the report designer many options to select and work with objects in the dashboard.

Figure 9. Example of the Outline of the Dashboard (right) – Many features are available from the outline panel within a dashboard. Note the highlights around the containers, which are used to control the elements in the design.
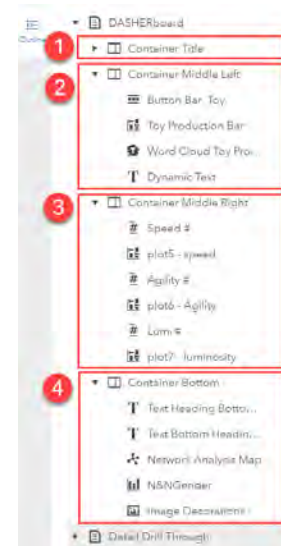
EXAMPLE 2 – GEOSPATIAL DASHBOARD

Overview

This example is based around a single geospatial object, combined with some formatting and other infographic style elements.

This example has some elements that are similar to infographic designs, and similar to the example 1. These include style, color, and imagery. This example also uses some SAS Visual Analytics objects that help highlight data and allow interactivity for the audience. These objects include key value, word cloud, and geospatial elements. This example also uses data from the internet that is different from example 1. The first thing to do is import the data from the Smithsonian Institution website. (Global Volcanism Program, 2013) Some of the data preparation is already done here. However, SAS Visual Analytics can add some enrichment to the data. This is outlined in Falko's blog post on this topic. (Schulz, 2017) Falko enhances the data for display and use in the latter parts of the dashboard build process. We can explore the data with SAS Visual Analytics to understand the topic better and to see if any insights around a topic are interesting and worth sharing. This is a perfect way to understand what the data might provide and what topics are worth building a repeatable dashboard around.

SAS Visual Analytics provides simple access to data. If you need to add the data into SAS via a file like a spreadsheet then you can import this within a simple user interface as seen in Figure 10.
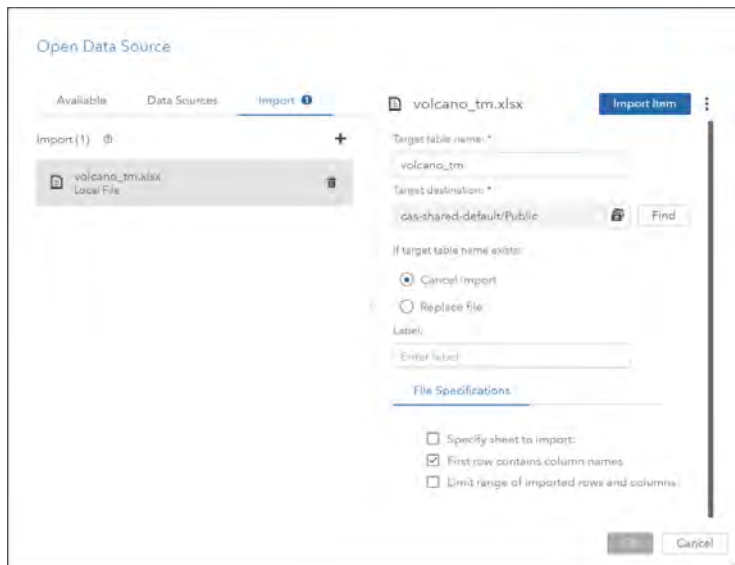
Figure 10. SAS Visual Analytics Data Import Options – Simple spreadsheet import is as easy as a few mouse clicks.

Topic

Open data is everywhere today and this raises a plethora of options for starting a dashboard project for fun and to demonstrate capability in a toolset. Your organization has data across many areas, for example, internal functions and external services and products that could benefit from an infographic dashboard. This example's topic is based on some open data about volcanos and shows how explosive the world around us can be. This data is provided from the Smithsonian Institution's Global Volcanism Program (GVP) and shows details of the Earth's volcano activity for the past 10,000 years. The GVP database includes many attributes like names, types, and features of volcano activity, and provides a whole lot to explore and discuss around the topic. Let's look closer into volcanic eruptions across the globe and find out what is the most active volcano, most common volcano type, and most active regions. We can also add some facts about volcanos to our dashboard to round out the story the data is telling and the value delivered to the audience.

Design

We always need to think about the general design – use pen and paper or a whiteboard to start to lay out the design before trying to build the dashboard yourself with software. Understanding what you want to say and how you want to say it allows you to think about the right visual story, and not what the software can achieve with your present skills or knowledge in how to build with the software. You don't have to be a designer or professional artist and you don't have to share this rough design with anyone. We often do multiple designs and, when designing dashboards, we create multiple pages of a design using this technique. In this example, it includes only a single page of the dashboard, and combines the data elements from the spreadsheet, and some additional factoids that we want to share. Falko designed this with the core element being a map, with all the volcanos displayed. He wanted some additional information like a word cloud to show a text representation of the continents and a bar chart to highlight the types of volcanos and their activity. The design needs some additional data driven measures added,

like most common volcano type and highest volcano. The mockup of this design can be seen in Figure 11.
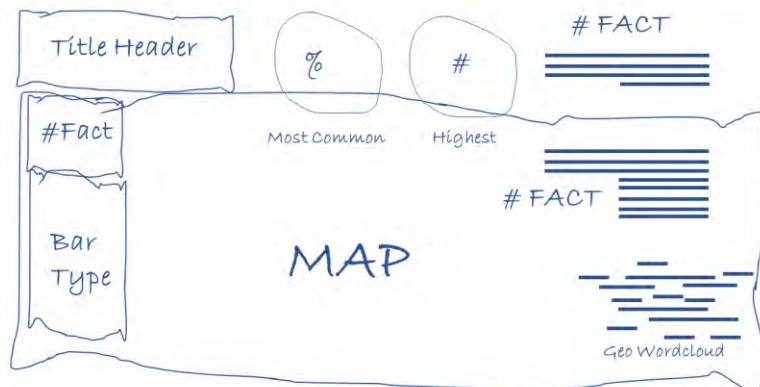
Figure 11. Mockup of the Design for Our Volcano Dashboard – Using pen and paper (or whiteboard) first saves so much time down the track. This provides a target state to keep comparing back to as you move into the build phase.

Build

Using SAS Visual Analytics, we will build out the dashboard and refine the design throughout the build.

When building this example with SAS Visual Analytics we can think about some of the key features shown in this dashboard example:

Containers – a single container (precision) allows for a flexible design; this example uses a single container to provide the structured dashboard and some formatting options like borders and padding used to create the exact story.

Key Value object – add ranks or use the options like maximum or minimum value to show the desired options

Background – change the background of either the report page, or use a report theme, or even use the container settings to show this dashboard as a poster rather than a traditional dashboard.

Given the data structure and provided volcano locations, we are making a geo map object the centerpiece of the report. In order to overlay the objects on top of the main map, we are going to use a precision container with the map taking up almost the entire report canvas. We leave some space (about 10%) at the top for the banner to be added later and provide some space at the top for headings and text.

Firstly, we can add the object to the report page and start to add to the design as we need to. So, inside the precision container, we are going to add the geo map object. Then we will add the word cloud object as well and the bar chart object also. These objects will be displayed as placeholders as seen in Figure 12.
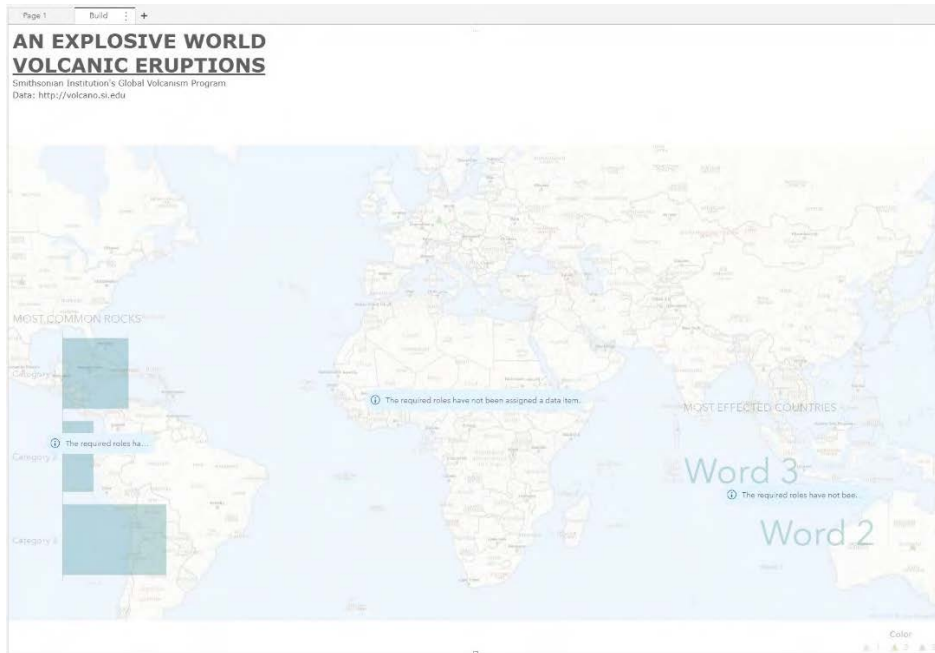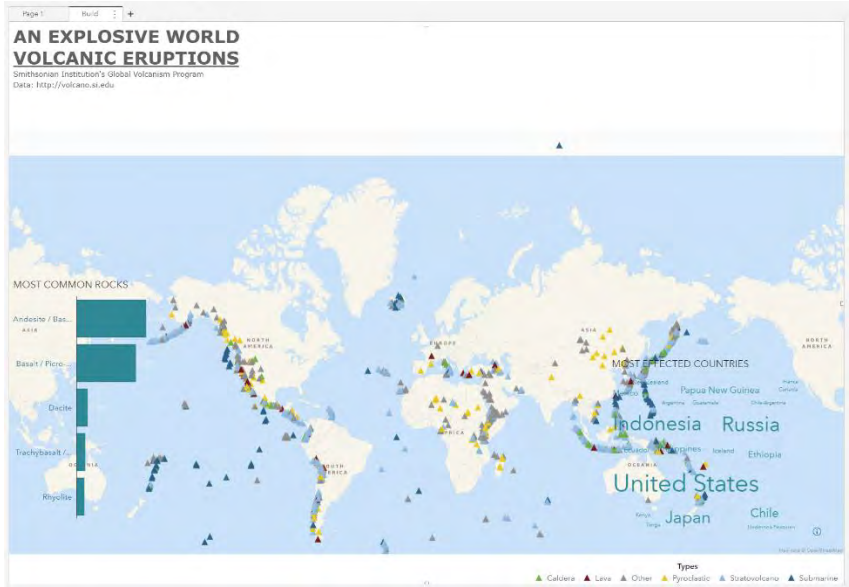
Figure 12. SAS Visual Analytics – A screen shot of placeholder objects before data has been assigned. The objects are overlaid onto each other. In this case, the bar chart and word cloud objects are over the map. All objects are placed within a single precision container.

Let's bring the visualization to life by assigning data items and color the volcanic eruption locations by the type of volcano. This is done by assigning the data roles on each object: the geo map, the bar chart, and the word cloud. We start with the main geographical map in the center of the canvas and the common rock type bar chart to the left, and assign geographic data to the word cloud as a summary of the map itself.

As we do this step we notice that we can probably improve a few things here. Given the distinct count of volcano types (33 in total as shown in the data panel), we get too many colors, making our map rather confusing and less readable. We can fix this by merging some of the volcano types by creating a custom category in SAS Visual Analytics. We also want to filter out eruptions in Antarctica to move the focus to the main continents with human populations. We are getting too many of the dominant rock types (bar chart) and too many countries (word cloud), so let's apply a top 5 and top 10 rank each, respectively. These dynamic ranks are a great way to keep the information controlled and highlight the data that we think the audience needs, rather than showing all the data and forcing the audience to process what matters. Ranks are a great way to achieve this.

Figure 13. SAS Visual Analytics Volcano Dashboard Build Process – This screen shows the objects with data assigned.

We will add some more objects in this next stage of the design, and this is where we add some infographic elements like static text, and dynamic key value objects. This adds some more headline elements to catch the eye, while adding some depth of information to add more context as the audience moves to complete their understanding further. To make things more interesting we searched the web for a few facts about volcanoes (largest eruption, most active volcano, and so on). We added these to the side of the report. This can be seen in Figure 14.

Figure 14. SAS Visual Analytics Volcano Dashboard Build Process– This screen shows all the elements of the infographic taking shape.

This design requires for a more dramatic darker color scheme than the default report is displaying at this point. We will add some styling and images to finish this design off. With a slightly darker map background we get to show this more as a poster, more than a dashboard. At this stage we are also adding some images to the design to associate the theme of volcano at-a-glance. One is at the top, spanning the entire report width (we used an imaging tool to match the map background color) and another is at the bottom left, overlaid on top of the map. We want to make sure the image is aligned correctly and doesn't leave a gap. This will give the illusion of the map and image being one large visualization. This works in this design. However, adding images can create noise and distract from the data elements, especially if they compete for attention. Let's add a title and use formatting tools to make this bold and match the color code (x414044) of the map background. These changes in style can be seen in Figure 15.
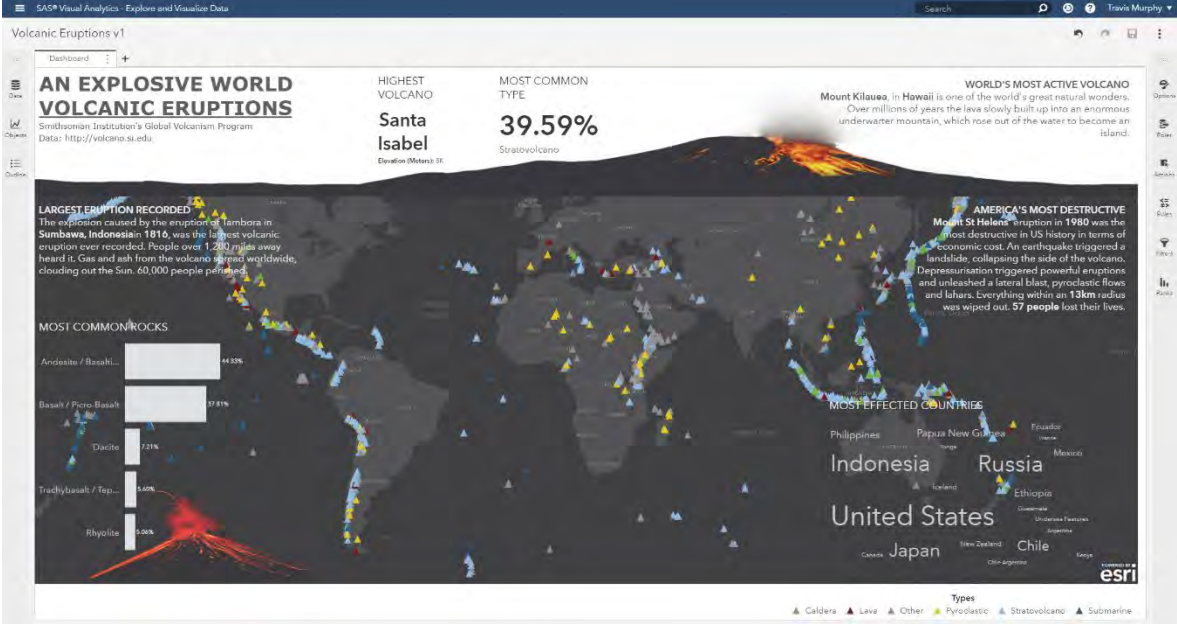

Figure 15. SAS Visual Analytics Final Output – This is the final design for this example and shows the optimized design for the volcano infographic.

There are some key features that are shown in this dashboard example:

Geospatial – ESRI integration – allows many additional features without any additional configuration: interactive search for locations, clustering high volume data for clear visualization interactive zoom.

Styling – use images and color to unite the visual effect and create the poster styling, change the background of either the report page, or use a report theme, or even use the container settings to show this dashboard as a poster rather than a traditional dashboard.

Containers – a single container (precision setting enabled) allows for a flexible design.

Interactive – all elements can be exported as data or image, and used outside of SAS.

Key Value object – add ranks or use the options like maximum or minimum value to show the desired options.

EXAMPLE 3 – INFOGRAPHIC POSTER FROM YOUR STANDARD DASHBOARDS

Overview

We have looked at the way to create some infographic dashboards in the first two examples, and these are showing how to add more of an infographic out of your dashboard tools. We thought it would be interesting to see if you could just pick up some of your existing dashboards, give them a makeover, and then create a poster-sized infographic directly from them. The example here is a larger display that is more like a poster size and scale that can be shared, interacted with, and displayed as the report designer intended. This is more like your business infographic poster, and less like a dashboard. The example discusses different approaches to achieve this, but focuses on showing how an example API call can be used to display the graphic in a precise way, even though it is still designed by the dashboard creator using SAS Visual Analytics.

Topic

Sales Dashboard Example (Pages 1, 2, and 3)

The other examples in this paper are precise layouts that might look best in a set situation on a particular device. Example 3 is a little different, and we are going to create simple multi-tabbed dashboard using SAS Visual Analytics. This dashboard can be used just like any existing dashboard, no precise layouts, and so on. The special take on this example is how you can extend the traditional view options of a report in SAS and, in doing so, you can create an infographic style poster from the simple dashboard.

Our process does not change in this example. We repeat our approach once more.

The data used in this example is similar to dashboard data in any services or product company, and would be similar to your data you use to build sales dashboards today in your daily tasks. This data has been made available from our fictitious corporate data team and is loaded into SAS Visual Analytics by our data services team already. The data is our company sales data. In this case it is a fictitious Toy Company: Insight Toy Co. The topic for this is our sales performance for the global teams and is needing to include some metrics about sales, customer engagement, and customer satisfaction.
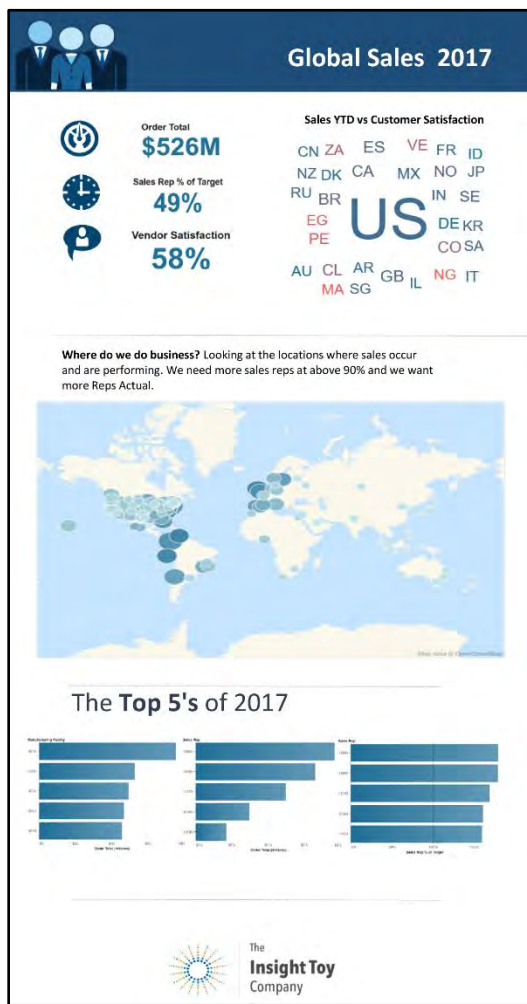
Design

The mockup for this design is simple. However, we do have an image in mind for how we want the final design to be consumed, as a poster. We have a desired output, and we are trying to emulate it in this example. This can be seen in Figure 16. We have seen this often when dealing with customers and their projects, where they have a legacy report design and they want you to build it in SAS and automate everything.

Figure 16. Infographic Design Idea (left) - This is the design we want to try to emulate in this example – Example of a poster style infographic. We will try to emulate this using multiple pages from the dashboard. (Murphy, 2018)

In his book, Travis uses this infographic built using Microsoft PowerPoint and SAS Visual Analytics objects inserted using the SAS Add-In for Microsoft Office as an example to show a simple integration between SAS and MS PowerPoint.

We thought that, as a link to his book, and yet offering something brand new for this paper, we would approach creating something similar. However, use SAS Visual Analytics only to achieve this. If you look at the example in Figure 16, it has three distinct sections that are then stacked on top of one another to create a cohesive infographic.

Build

This is probably the easiest build in this paper. We will use only a small number of options that are not default settings. There are no containers needed to achieve what we are doing here, just simple drag and drop of objects in SAS Visual Analytics.

Page 1 of the Dashboard

Simple objects are placed on a page, including an image object and a text object for a heading and subheading. The next part of this page is using three key value objects, three icons, and a word cloud object to show data on sales amounts, sales rep performance, and customer satisfaction. These elements can be seen in Figure 17.
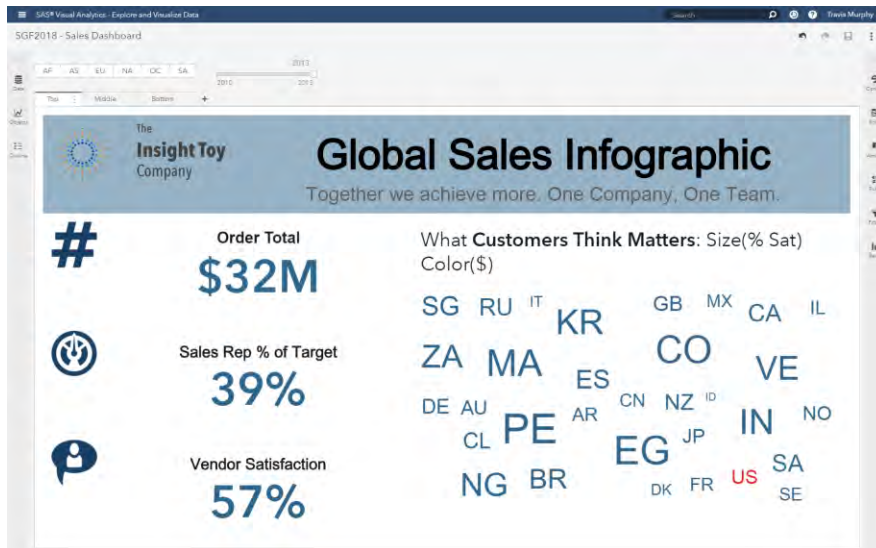
Figure 17. SAS Visual Analytics Dashboard Example 3 – Page 1 of this dashboard completed with data assigned.

Page 2 of the Dashboard

On this page we will add a geo map object, sales by region, and some text headings, with a pie chart for sales count by product brand, and a large text object for some additional context. We are using an option for the geo map object to cluster the points automatically as this allows a quick way to reduce the noise on the visual and provide instant context with clusters. These are all assembled and can be seen in Figure 18.
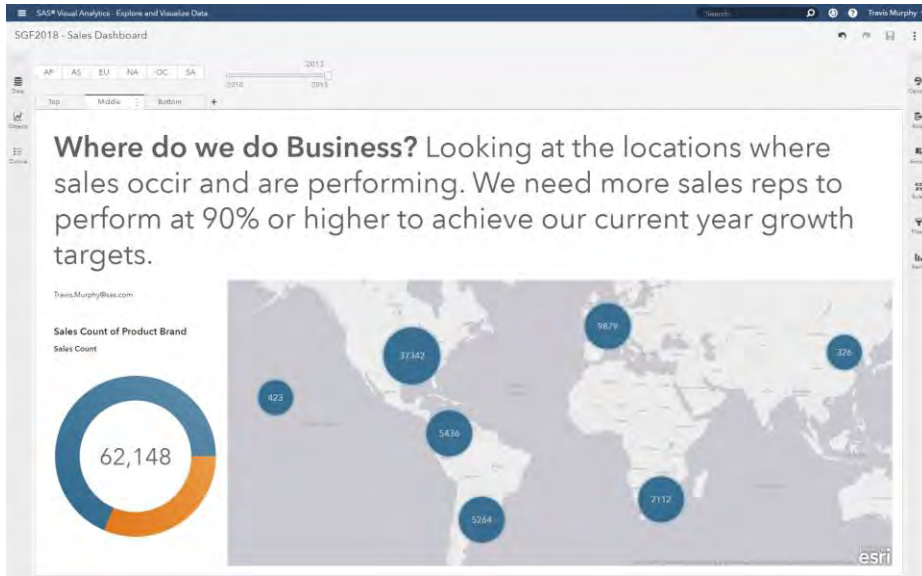
Figure 18. SAS Visual Analytics Dashboard Example 3 – Page 2 completed with a clustered map as a key feature in this page.

Page 3 of the Dashboard

Page 3 is just a group of three bar charts for the top five performers across some of the business lines. The final touch here is adding an image and some formatting as seen in Figure 19.
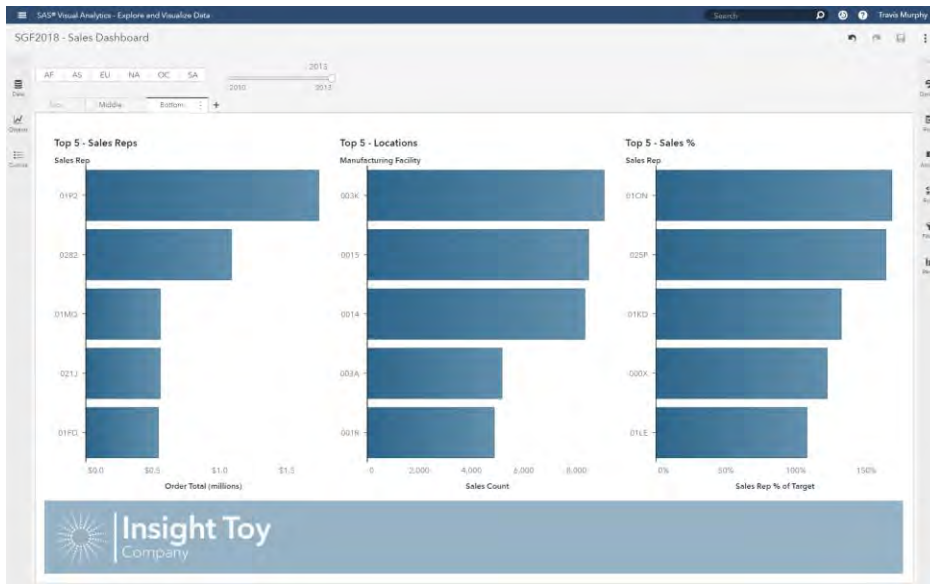

Figure 19. SAS Visual Analytics Dashboard Example 3 – Page 3 completed using three ranked bar charts to show top performers.

As you can see, this is the simplest dashboard build so far. However, it is still functional as individual pages, and it is how we share and view this dashboard that makes this build so interesting.

View the Output

In this example, we care how we view this output; as you will read in the note later in this paper, we can consume using the standard viewer in SAS using any of the supported options, mobile, web, and so on. We will take this a step further in this example and, using the APIs delivered with SAS Visual Analytics 8.2, we will use an alternate viewer, created using the SVG API and viewed using an SVG Viewer designed for this paper and built by Falko Schulz. An SVG is an image file that is a standard format for images today. An API is an application programming interface and is a common framework today for integrating software.

More information about the use of the API and links to the sample are provided with other samples in this paper.
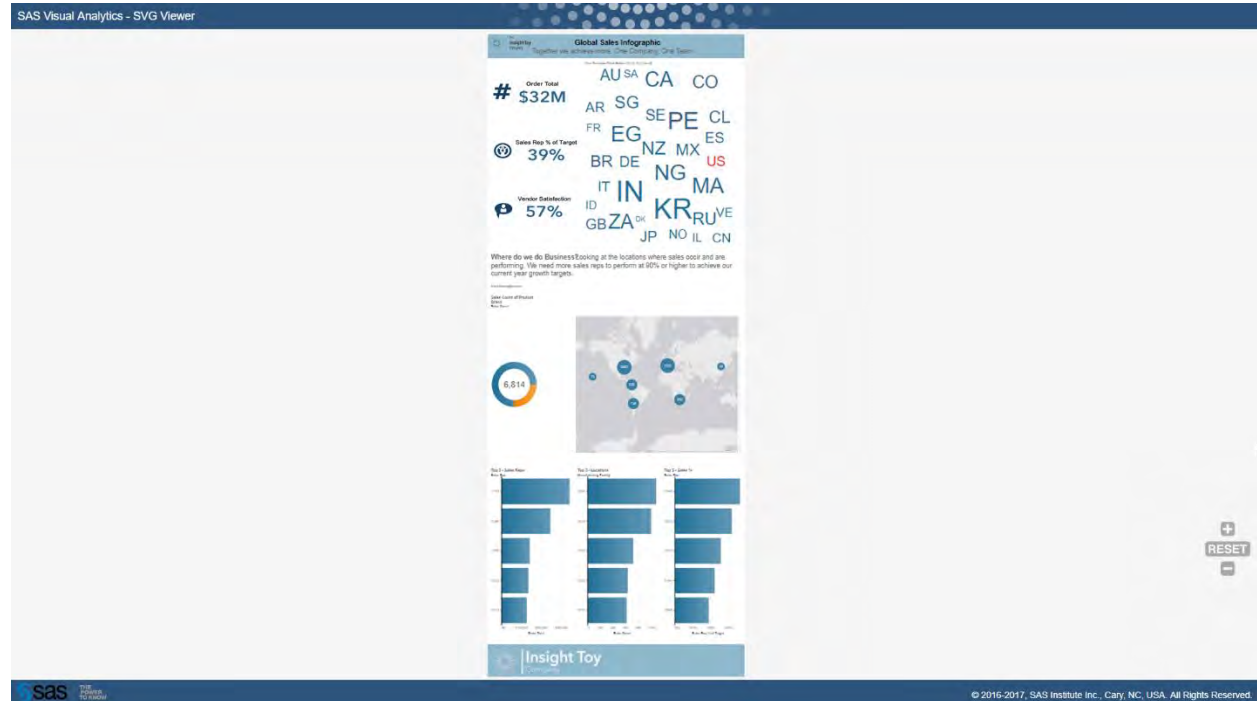
Figure 20. Custom API to View the SAS Visual Analytics Dashboard – This viewer merges each page SVG image together as a single SVG image, and provides an interactive view of the report as a single infographic poster.

The sample SVG viewer calls each page of our dashboard, and merges these into a single SVG as seen in Figure 20. The viewer then displays this as a webpage that includes features like zoom and navigation for the user to get up close and personal with any element of the infographic. In essence, this is really creating an infographic from your dashboard design.

Here are some benefits which we can take out of this example using the custom viewer:

- Use existing dashboards and stack these for an infographic effect.

- Create a fresh way to display content to your audience.

- Create once, and use across many consumers (SAS Visual Analytics viewer, API, Mobile app, and so on).

- Create your dashboards easily without advanced skills, and then display them using this viewer or design your own viewer.

TO VIEW, OR NOT TO VIEW – THAT IS THE QUESTION: CONSIDER HOW YOU ARE GOING TO RENDER YOUR DASHBOARD

In each of the examples we are designing for the audience, and the more precise the layout requirements are, the more we need to consider how we will render these examples for the audience. For example, if you are designing a onetime use infographic poster, then you are the creator and the viewer, as you are going to take a screen shot of your infographic and share the static image. This is rarely the case when talking about dashboards, so the questions always arise: will it look the same as we designed it when viewed by the users? The short answer is, that you need to consider how users will interact (primarily interact) with your dashboard design. Are you designing for mobile devices? Are you designing for a website, and so on? Often you want to design once and not lock yourself into any decision about the delivery platform for your design – as you want to design once and use many times. The good news is that SAS Visual Analytics is designed as a platform to achieve this exact scenario.

Like a modern data visualization platform should, SAS Visual Analytics is optimized to display content on mobile devices and tablets when the audience is using these modes, and adapts when on a desktop browser. This adaptive layout is great for the design-once-use-many principle. However, if you have a particular viewer in mind then you can create an optimized design for a particular viewing experience. When creating highly formatted designs, understanding how your design will render is important in knowing which options are the best for your use case.

Here are some of the render options available using SAS Visual Analytics:

SAS Visual Analytics Viewer (default) – this is the default way users will use your dashboards via a web browser, and this provides many features above just viewing a dashboard, like collaboration, sharing, printing, and much more.

> **TIP 1: Consider using the guest mode, or public access, settings to share directly with the public, or to the entire organization's intranet without requiring users to authenticate.**

> **TIP 2: Consider setting a fixed report size in the viewer on the report level properties, as this will fix the size of the report when viewed.**

SAS Add-In for Microsoft Office – Many users can benefit from using SAS Visual Analytics dashboards inside Microsoft Office, and there are many features and benefits above just viewing the dashboard within this popular productivity suite using Word, PowerPoint, Excel, or Outlook. This is great for embedding data driven content and data visualization into office documents.

Mobile – mobile devices are a very popular way to consume information for all users, and the professional world is no exception. SAS Visual Analytics dashboards can be used via mobile devices and can use native mobile OS applications for iOS, Android, and Windows devices. There are some great features included above and beyond just viewing the dashboards like enhanced security, accessibility, and offline data access - to name a few.

Default API – SAS has created a default API that is provided to allow fast embedding and sharing of SAS Visual Analytics reports in external applications and webpages. The default API used in the GUI allows a quick generation of an SVG of a single graph or a single page of a report. This means that a super lightweight version of the report or graph is generated on load, and can be used to place into a webpage or called by another web service, similar to our API zoom example in this paper. This can be seen in Figure 21.

Figure 21. Embedding and Sharing Reports and Report Objects – Using the share options on a report or report object, you can generate a call to the default API provided out of the box.

Public API – A documented public API for creating flexible consumption options like embedding SAS Visual Analytics objects in your ERP or custom web/mobile apps is provided to allow endless entry points into SAS. The API options are built into the GUI to show a common use case. However, applications can also be coded by a developer and will unlock endless entry points into your SAS solution. We like to think of this as a create-once-and-use-anywhere approach with SAS Visual Analytics as the data visualization engine. The possibilities are endless, and we can share and innovate together at developer.sas.com.

GALLERY OF INFOGRAPHIC DASHBOARD EXAMPLES

This section of the paper provides some additional examples of infographic style dashboards created using SAS Visual Analytics. The intention here is to show you what you can achieve with SAS that you might not have considered in the past and to provide some inspiration for your designs back at the office. These examples can be seen in Figures 22 – 28.
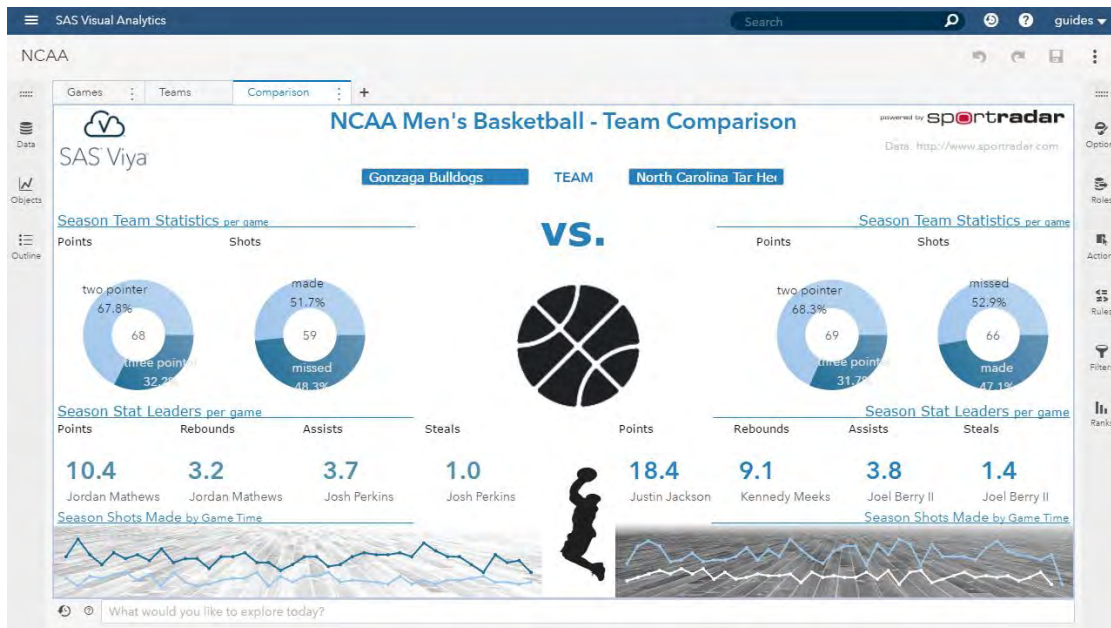
Figure 22. Dashboard Gallery Example – This example using sample player data from the NCAA basketball teams that Falko Schulz designed is a highly visual dashboard design. It adds interactivity and drill through from page to page which provides a self-service analytics application for people to find out more about NCAA basketball and each team's performance. (Schulz, 2017)
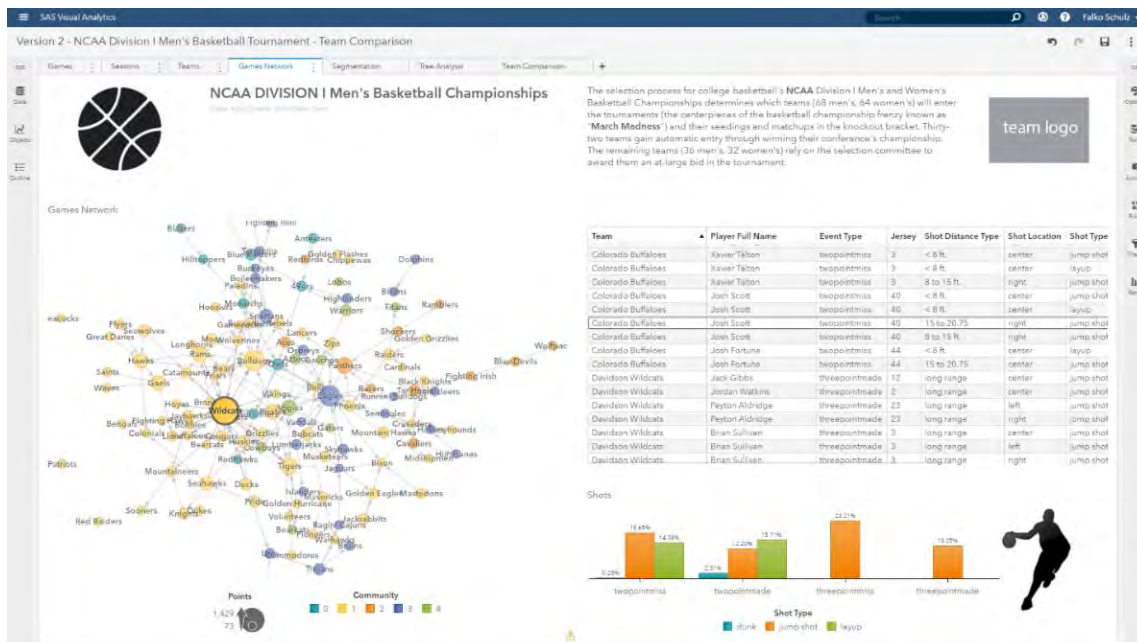

Figure 23. Dashboard Gallery Example – Another page within the basketball dashboard introduces analytic driven visualization of the network analysis and combines this with traditional graphs and tables. (Schulz, 2017)
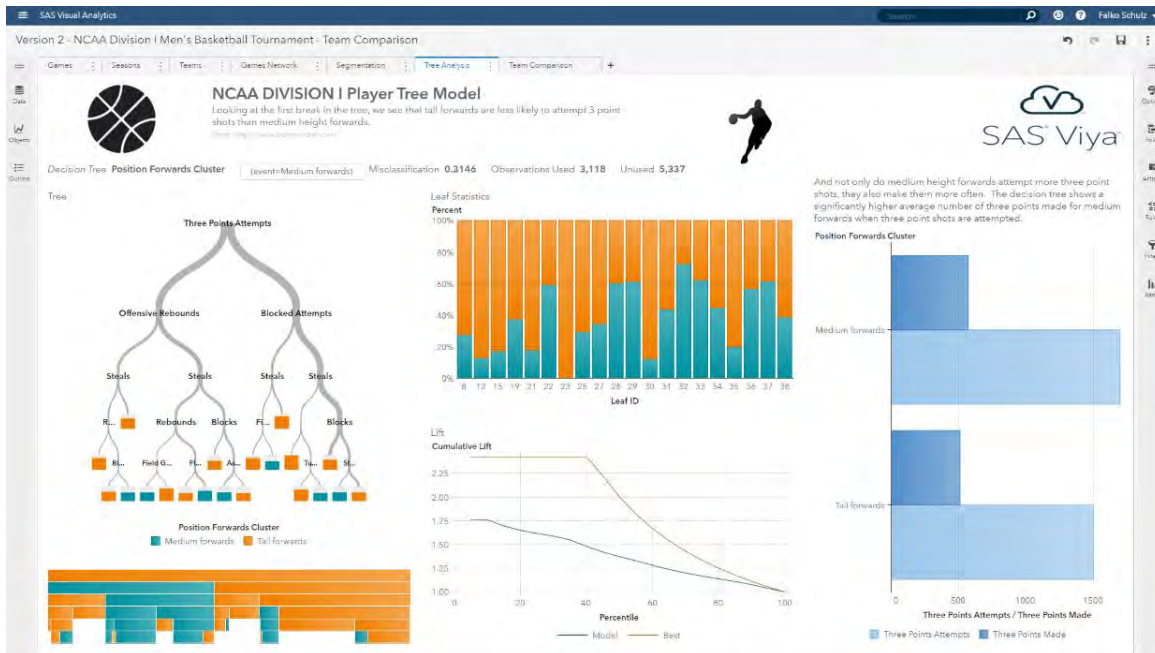
Figure 24. Title – Dashboard Gallery Example – Another page within the basketball dashboard introduces analytic driven visualization and combines this with traditional graphs. (Schulz, 2017)
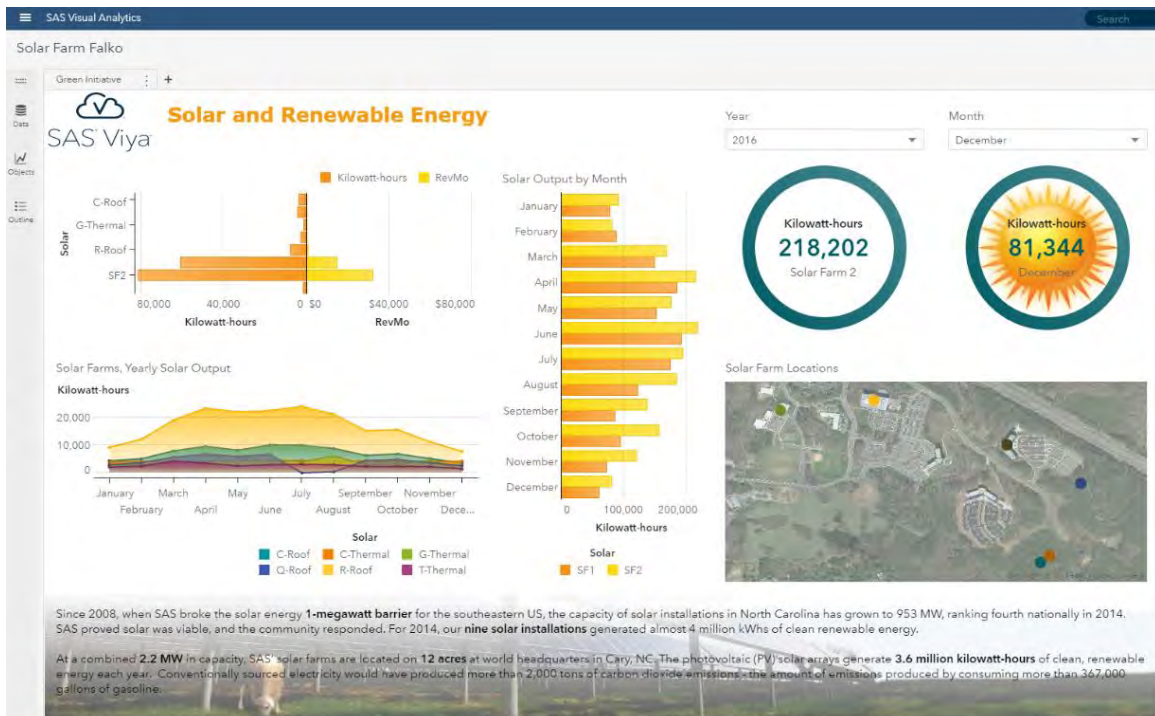

Figure 25. Title – Dashboard Gallery Example – Renewable energy dashboard including some geospatial and traditional infographic elements like images and icons. Also includes dashboard interactivity for slice and dice of data. (Schulz, 2017)
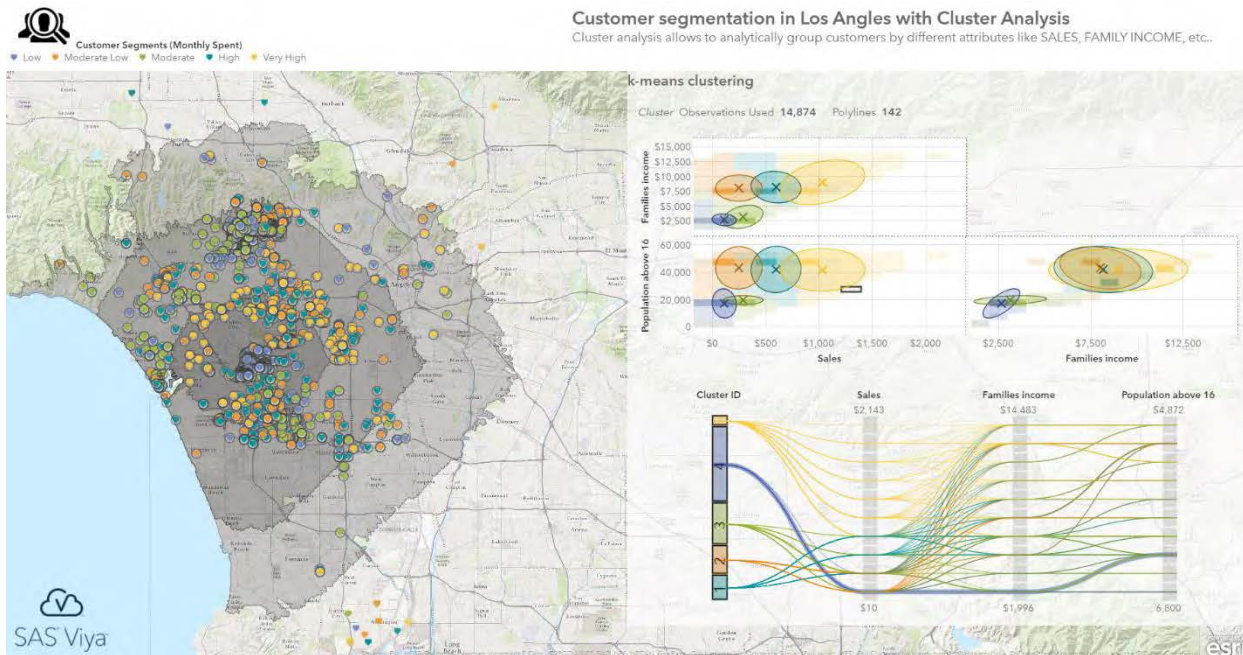
Figure 26. Title – Dashboard Gallery Example – Mockup customer analytics dashboard that combines analytic-driven visualization and geospatial filters to provide self-service analysis for the user. (Schulz, 2017)
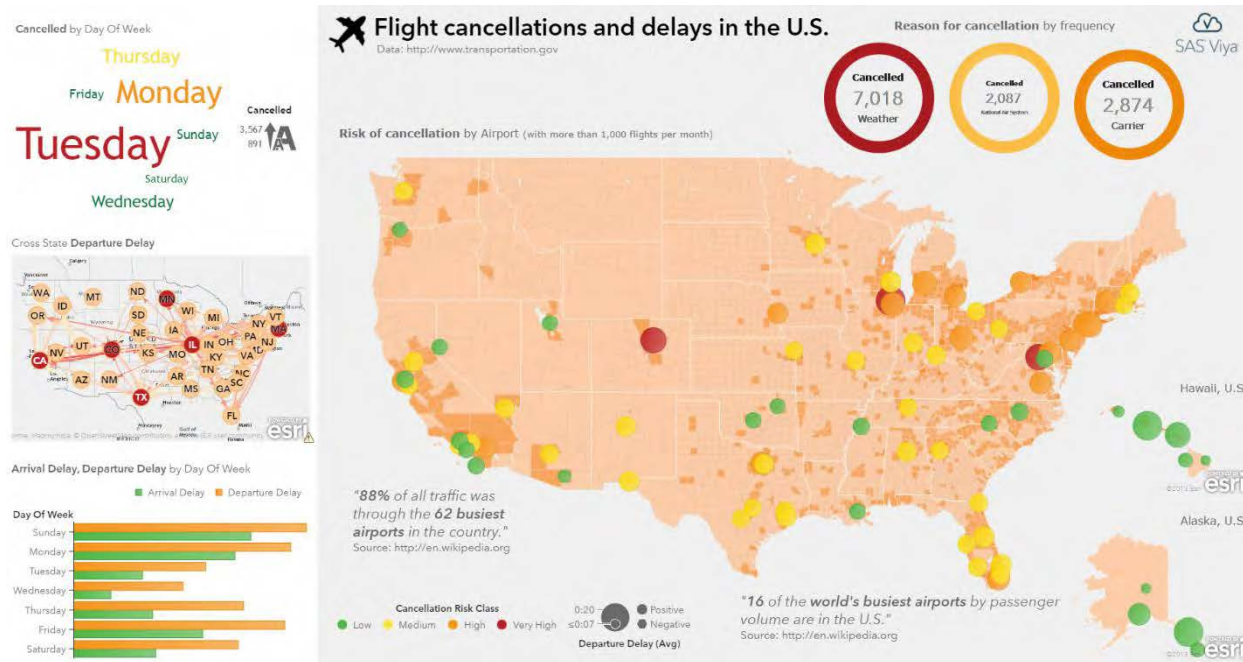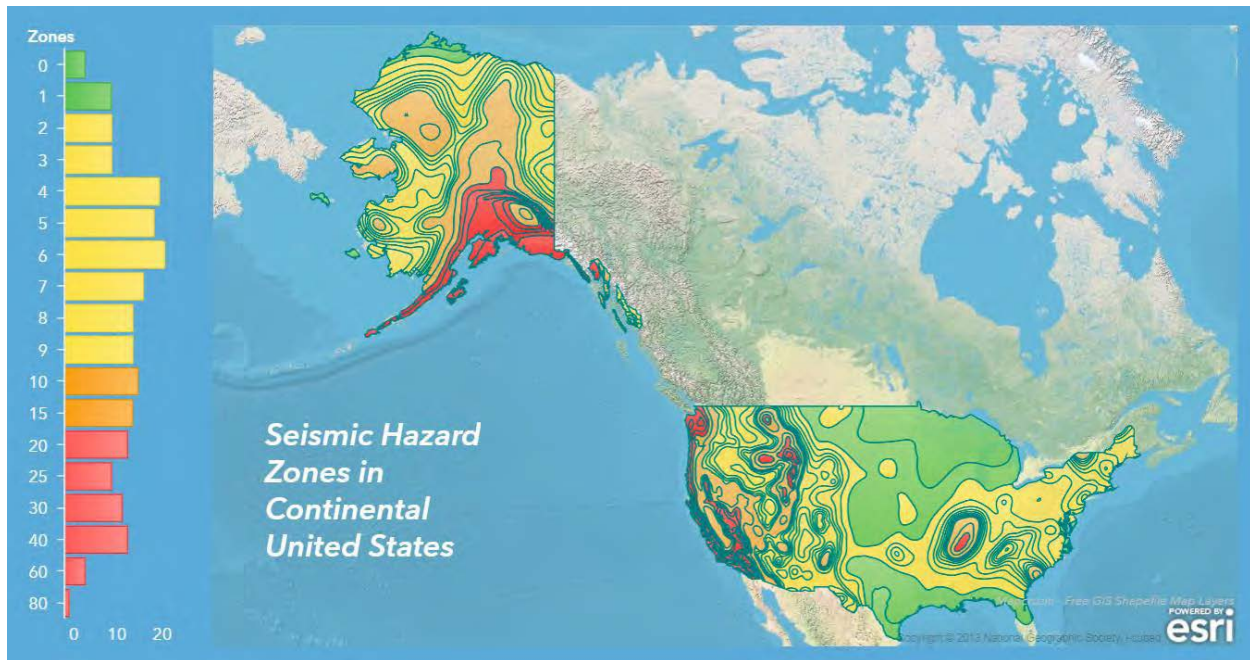

Figure 27. Title – Dashboard Gallery Example – Flight delay data is visualized in SAS Visual Analytics, and combines infographic data driven objects to provide a geospatial analytics dashboard. (Schulz, 2017)

Figure 28. Title – Dashboard Gallery Example – Geospatial dashboard talking about seismic data – "geo about geo." This dashboard shows a simple topic with a clear design. (Schulz, 2017)

CONCLUSION

When designing your dashboards, consider how principles from infographics can help you create high-impact outcomes for your audience. SAS Visual Analytics is not only a powerful and flexible toolset for the data scientist and business analyst. It also provides a range of tools to create modern data visualizations using drag and drop controls in a self-service interface. In this paper, we discussed and illustrated some ideas about how to approach designing supercharged dashboards by using infographic concepts. We provided some worked examples and a gallery of some dashboards created in this style with SAS Visual Analytics. In doing so, we have aimed to give you some ideas for use in your own dashboard designs. So, use your imagination and make your analytical reports even more appealing and interesting. If your management asks for a shiny and engaging report, give them what they are after: an infographic-inspired dashboard.

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