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Create Impactful Data Journeys for "Informavores" with SAS® Visual Analytics on SAS® Viya®

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ABSTRACT

Have you ever thought about what makes one dashboard or infographic more impactful than another? This paper provides all you need to take your current information products from "huh?" to "aha!" Creating data applications with SAS® Visual Analytics is important to ensure that the audience gets immediate and long-term value from your output. Competing for audience attention today is harder than ever, and the term informavore refers to the insatiable need for information today—we are all informavores. Humans need answers or we start filling the answers in without the correct context or data. Our job as data and business analysts is to create data applications that provide a journey from one infofragment to another. This paper steps you through creating impactful output that resonates with your audience, no matter how data literate they are. SAS Visual Analytics on SAS® Viya® provides so many options to craft the precise journey for all users in an organization. You will gain insight about how to leverage these features in SAS Visual Analytics and how to modernize the way you communicate data stories to your audience. The journey you design for your audience is important for how long they stay and whether they keep coming back to your dashboards and reports in the future. This paper provides you with the ideas and skills needed to create and refine your information products to keep Informavores hooked and keep them wanting more tomorrow.

INTRODUCTION

Grabbing the attention of the modern-day data audience is tougher than ever before. The rise of information volume and velocity has changed our lives in almost every way. We are in the information age and we are Informavores.

INFORMAVORE

Information + -vore (from Latin vorare – to devour)

Originally used as a way of describing humans in the Information Age, the concept of informavore has quickly become our new normal. In the same vein as herbivores or carnivores, the informavore consumes information as the primary source of their diet. Today with social media and our digital life, information analysis is much harder than ever before. Using of the simple comparison to carnivore or omnivore, informavore is simply a consumer of information. You have to question whether your information is cutting through the stream at all. With so many options today for information, if your data projects are not being consumed, people fill the gap with other sources.

"Just as the body survives by ingesting negative entropy, so the mind survives by ingesting information. In a very general sense, all higher organisms are informavores.**"** George Miller, 1983

This statement by Miller is the origin of the term. However, since then, both 'infovore' and 'informavore' have been used to talk about our voracity for information and our modern social media lives. The modern evolution of the term informavore has placed it in the context of education. A notable example is the theory of connectivism, developed by George Siemens and Stephen Downes, which states that humans create trusted *personal learning networks* to provide the information that each individual believes will assist their learning and personal development. In short, as analysts, our information products are competing with a massive amount of information today, such as social media, niche websites, Reddit, news (**including "fake news"**), microblogs, video blogs, and other ever-changing sources that we rely on to live our modern lives. To deliver the value to our audience, we need to create impactful data journeys with our data projects.

This is important for the data analyst today because we are crafting the interaction with data for our audience to consume. The audience is overwhelmed with information, but it still needs information to survive and function. This dichotomy is the challenge of our time, and it has led to infographics rising in record numbers to try and bridge this gap and make information more consumable. To break into **the audience's** trusted network of information, analysts need to create impact with their information products.

TWO PERSPECTIVES: AUDIENCE AND ANALYST

It is worth thinking about the data journey from two perspectives: the audience and the analyst. The audience is overwhelmed, but it is still made up of informavores, so the analyst thinks they have the full attention of the audience. Times have changed. Analysts often expect the audience to change their behavior to fit them, which is a naïve assumption. This kind of assumption is seen in the traditional behavior of the analyst. If a business audience asks for a dashboard, the analyst building the dashboard hears that they want an "ad hoc reporting application". This kind of slice-and-dice masterpiece is great, but it requires a commitment in time and learning from the audience, which we will not get from them in the age of the informavore. Understanding these core roles is key.

Each of us can fill both roles - as a member of an audience for some information sources and as an analyst who supplies information to an audience for other information sources. These roles require different skills.

The modern informavore can play different roles in a data journey. Sometimes they are the subject matter expert and might have skills in statistics or in powerful drag-and-drop tools such as SAS Visual Analytics. At other times, they are acting as a member of an audience and are trying to make sense of **someone's** data output. This means we are either the analyst or the audience. The audience for information is becoming experts in consumption without necessarily becoming experts in analyzing. This is not a new concept in technology, and it mirrors the use of technology in the modern era. We are often expert users of technology, but we could not all develop or code an app. We could tell you how the app should work without being able to build an app to work that way. There are unicorns out there that can fill both roles, but more often than not, we just get by and live within the bounds of our limitations. The same hold true for information roles. We often state how, when, and in what format we need information, but then we sigh and make do despite the

limitations **of what we're actually given**. The dynamic of the analyst and the audience is really a matter of skills and impact. If you lack the skills as an analyst you might miss the mark with your audience, and if you lack skills as an audience you are at the mercy of the analyst and what they provide you. We dive into this in more detail in this paper and discuss some of the ways to increase impact for your audience.

EVOLVE YOUR ANALYTICS PLATFORM

A modern enterprise needs to have a robust analytics platform to ensure they can meet both the demands of today and the ever-changing requirements of tomorrow. SAS provides powerful analytical capabilities for end users across the enterprise, from data scientists to business analysts to information consumers. Having all users participate in the same platform has many benefits, and it allows development of skills across the enterprise as people change roles or as they continue to require analytics to support their decisions. Your analytics platform needs to provide your users and audience with choices while keeping your enterprise under control at the same time. Choice and control are both important benefits of the SAS platform. All roles are covered for the analytics lifecycle through data, discovery, deployment, and orchestration. Figure 1 Shows how the completeness of the platform covers all stages of the analytics lifecycle.
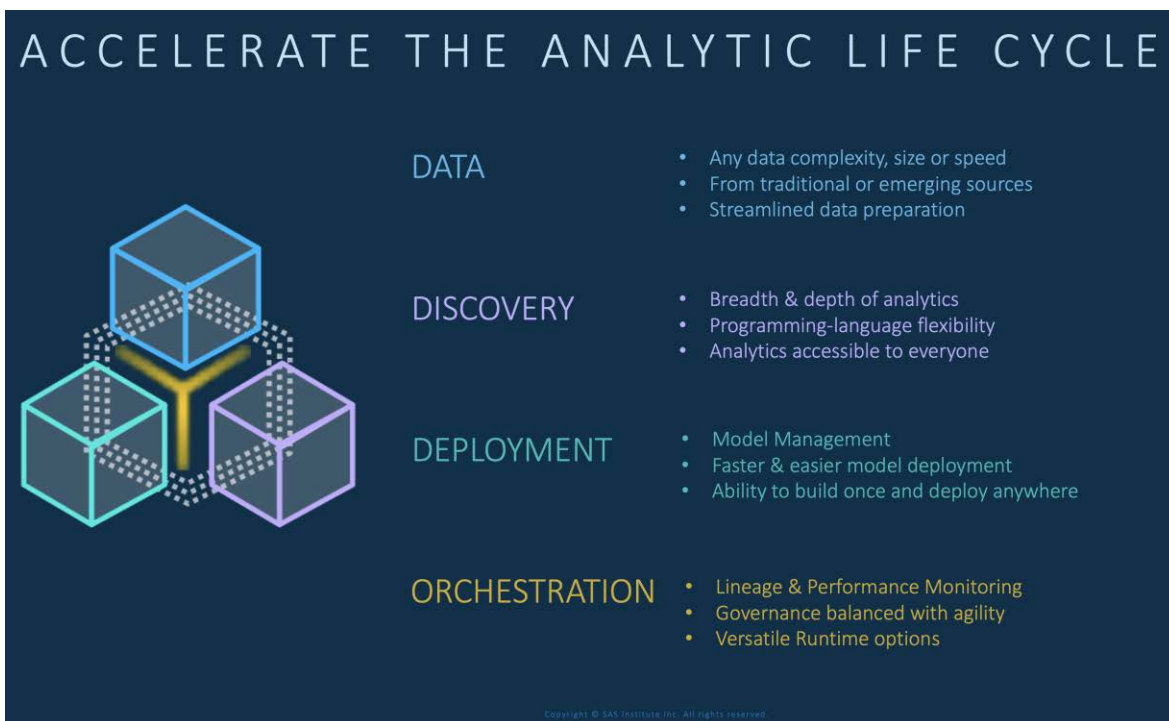
Figure 1: Accelerate the Analytics Lifecycle with SAS Viya

At the heart of this lifecycle are core capabilities as a user moves through the platform at different times. Many roles need to be covered, from casual user to citizen data scientist. See the SAS website for information about the SAS Platform. (See References.)

SAS VISUAL ANALYTICS

A core solution for the analytics platform is SAS Visual Analytics on SAS Viya, which provides a single application for reporting, data exploration, and analysis. SAS Visual Analytics provides almost endless ways to explore and visualize data. This paper focuses on using SAS Visual Analytics to create an impactful data journey for your audience. With SAS Visual Analytics, you can streamline both the discovery and creation process for the analyst, while providing many options for your audience to be able to consume and understand the information being shared. SAS Visual Analytics provides many benefits and capabilities, including these key capabilities:

- Reports and dashboards: You can design reports once and distribute and publish them anywhere – web, mobile, API or even Microsoft Office.
- Interactive charts and visualization: You can deliver insights from any size and type of data in a simple visual element from bar graphs, geographic maps, or even a single highlighted number.
- Visual data preparation and transformation: You can import data from anywhere and transform the data to match your needs without leaving your report.
- Powerful, easy-to-use analytics: Many embedded self-service artificial intelligence (AI) and machine learning (ML) functions are available to enhance the traditional business analysis, including forecasting, text analytics, network analysis, and much more.
- Open and extensible – New API options allow you to embed external visualizations and also embed SAS Visual Analytics into any application not from SAS, which provides almost endless entry and exit points for your projects. You can get inspired or share your creations on https://developer.sas.com.
- Custom visuals – More out of the box visuals than ever before are provided, including a built-in graph builder and custom visuals that use third-party data-driven content. These visuals will bring your data journey to life for your audience.
- Advanced location analytics – SAS Visual Analytics leverages ESRI and SAS to provide visualization and data enrichment using geospatial objects.

SAS Visual Analytics provides a single solution for many use cases, and it also allows an analyst to grow their skills and their understanding of analytics without leaving a consistent and visual user interface. There are many more capabilities included in SAS Visual Analytics. See the SAS website for information about SAS Visual Analytics. (See References.)

IMPACTFUL DATA JOURNEY - APPROACH

Just like designing good software, we need to design our data journey with our user experience in mind, and we need to understand how they intend to use the information. If you keep the audience in your mind from the outset, you will ensure that the output has some value to your audience.

The main principle of creating impactful data journeys is to first get into a creative mindset. Figure 2 shows the process outlined in "Infographics Powered by SAS: Data Visualization Techniques for Business Reporting." Although this figure shows the process from the perspective of creating infographics, it is just as relevant when you approach a data project. Although the book talks through each step in more detail, these are the main takeaways:
- Start with a pen and paper
- Go through agile iterations through collaboration
- Be prepared to fail along the way
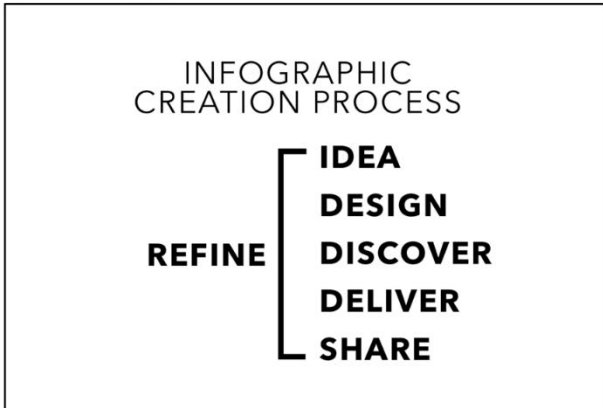
Figure 2: Infographic Creation Process (Murphy, 2018)

The way you approach your data project is important, but it is more important to highlight the audience journey. You should consider the journey in order to maximize impact and increase the trust of your next information project. Figure 3 shows an example of experience flow example you could be providing the audience. I have used this process over many years to create impact for the audience. It is designed to create approachable and
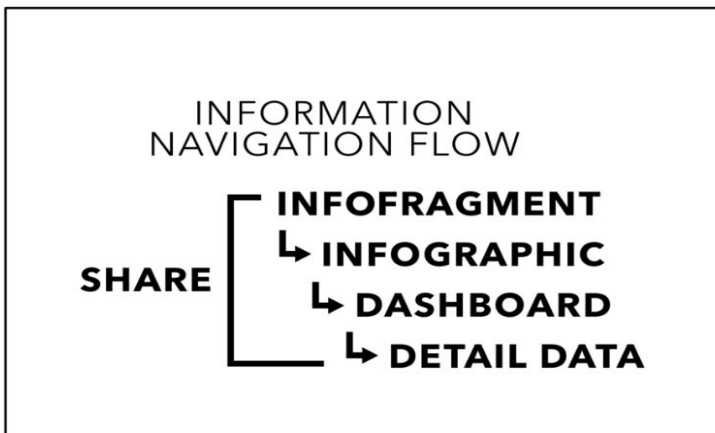
Figure 3: Information Navigation Flow (Murphy, 2018)

engaging journeys and to connect information in order to allow additional detail and context as the audience moves through the data.

The key highlight to take away from this approach is keeping the audience at the center of the information products that you create as an analyst. If you jump directly to sharing detailed data with the audience, you have forced a tough journey that demands a high skill level to quickly make sense of the data. Alternatively, if you give the audience just a fragment of the information (such as providing them a single number in an email), then you are limiting them from asking more questions.

Keep the audience at the center of the design process and be mindful of a complete journey rather than a single data output. Remember to consider all of the available information products and outputs you could use as well as the best tool to use to create these products (such as a dashboard, a report, a spreadsheet, raw data, an infographic, or a combination). The modern data journey needs to be agile and iterative, to be linked together with multiple

outputs, to contain engaging infographic styling, and to require little to no learning curve for the audience. The next section steps through a case study example of creating an impactful data journey for your audience using SAS Visual Analytics.

# IMPACTFUL DATA JOURNEY – CASE STUDY: RETAIL SALES DATA

INTRODUCTION

The following case study steps through example data projects using SAS Visual Analytics and provides an overview of some considerations and ideas to apply in your next data project. The data covers a fictitious toy retailer called Insight Toy Co, which has retail operations across the globe, with the largest being in the USA. The dataset used for this example includes some cost and revenue metrics, order details over time, and sales rep performance over many years.

THE CHALLENGE

The challenge we have in this example is one I have seen many times at customers over many years. We have a robust data set for our retail sales performance, and we now need to build engaging reports and dashboards with this data for use by the business teams who are responsible for retail operations. This sales report needs to be interactive, engaging, and functional for many users with varied skill levels across the global enterprise. As part of the report analyst team, we are familiar with the data and we want to provide an impactful data journey for our audience.

THE APPROACH

The approach is to load the data we have been given from the data team and create a report that highlights company performance across the regions, looks into the best performing stores, provides insight into the best performing products, adds some self-service analysis features to predict performance. We then present some new ways to share these insights and take the impact to where the audience lives – on the web and in their email inbox.
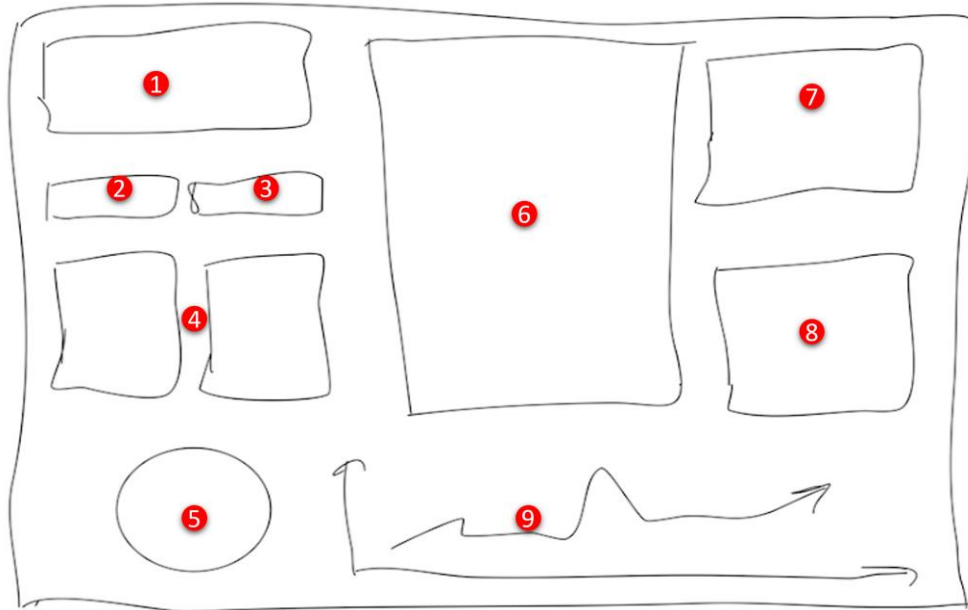
Figure 4: Mock-up of Main Dashboard Main Sales Page Design – Using Pen and Paper First is Important!

Using pen and paper or a whiteboard first, we mock-up the designs and play around with different metrics to collate for the data journey. Studies have shown that humans use different parts of the brain when drawing than when sitting at their computer. As seen in Figure 4. the following elements would be included to support the design.

1. logo

2. filters for time and region

3. KPI for sales revenue

4. KPI for total gross margin

5. pie graph for country breakdown

6. bar chart for product line revenue

7. KPI for customer satisfaction

8. KPI for total orders

9. time series of sales by month

We also want to add interactivity to allow users to slice and dice across the elements. We next repeat this pen-and-paper or whiteboard process for all the pages in the design. Instead of showing these examples here, here is a list of elements:

All included report pages in this dashboard should cover the following data elements:
- geographic sales – a geo map with year filter layered over top
- product analysis - time series plot showing sales and costs, a product table, and regional performance with hierarchy navigation
- sales by day – data for each day of the year, over many years, with filters for self-service data selection
- ad hoc sales analysis – forecast sales performance with some additional filters and interactions

- detail data **–** text showing the filters applied and a table of key details from the sales data

THE SOLUTION

Using SAS Visual Analytics, we upload the sales data into our report, we apply some dashboard pages, and we create an impactful data journey for our internal audience. This process provides a custom dashboard with multiple pages to group our insights. The following topics step through the creation of this dashboard and the sharing of our solution with our intended audience.

To achieve our solution, we need to prepare the data, build our data journey, and share this data journey with our audience. **Let's get started!**

DATA PREPARATION

In this example, we are using a SAS dataset that is mostly complete as provided from our data team. It contains 50 columns and one million rows and is about 450MB in size. To load this table into SAS Visual Analytics, we can either use the Import tab within the report or simply drag and drop the dataset into the SAS Visual Analytics window, as shown in Figure 5.
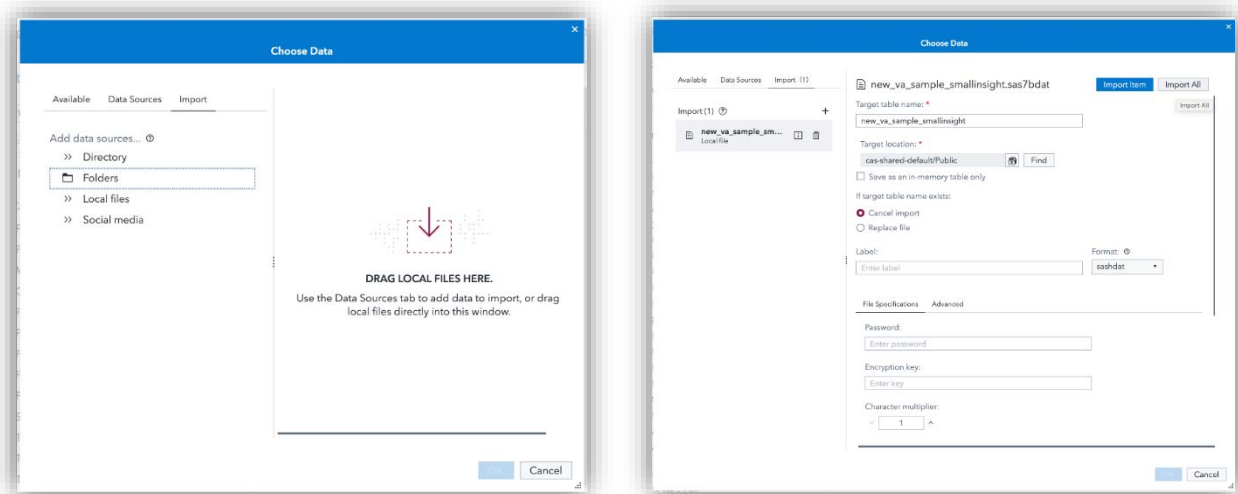
Figure 5: Simple Import of Data Using SAS Visual Analytics

After the data is loaded into SAS Visual Analytics, we have many options to create new calculations or groupings for shaping the data for use in our analysis. We can quickly and simply add a group and use a custom category to compare the North American operations to all others across the globe. We also use this stage to assign our geographic latitude and longitude data for our store locations and other geospatial elements. We can add many more calculations and elements to shape the data for further analysis. We have many options for reshaping the dataset for use in SAS Visual Analytics. However, in this example the data is in good shape for reporting purposes.
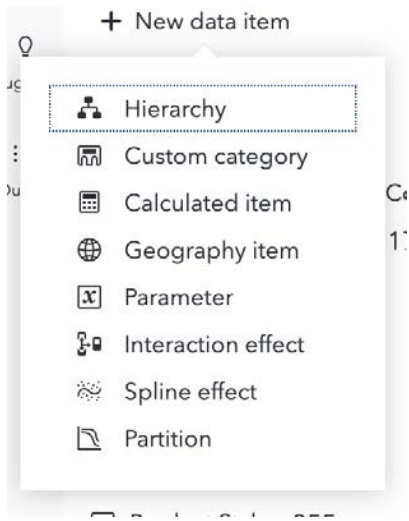
Figure 6: Adding and Shaping your Data for Reporting is simple in SAS Visual Analytics

BUILD THE DATA JOURNEY

In our role as the analyst, we can step through the tasks needed to create our main dashboard with SAS Visual Analytics. Using the mock-up, we can start to create our report zones using our container objects to group and control common elements. The following changes are recommended:

1. Specify the Options for the entire report:
   - Set the report size to 1700 x 800.
   - Set the default colors for use in report data, which this ensures all data objects use this color.
   - Set the Viewer Customization option for your report user, which provides some great self-service features for your audience. However, our plan is to control their data journey, we restrict this customization to Simple edits.

These options are illustrated in Figure 7.
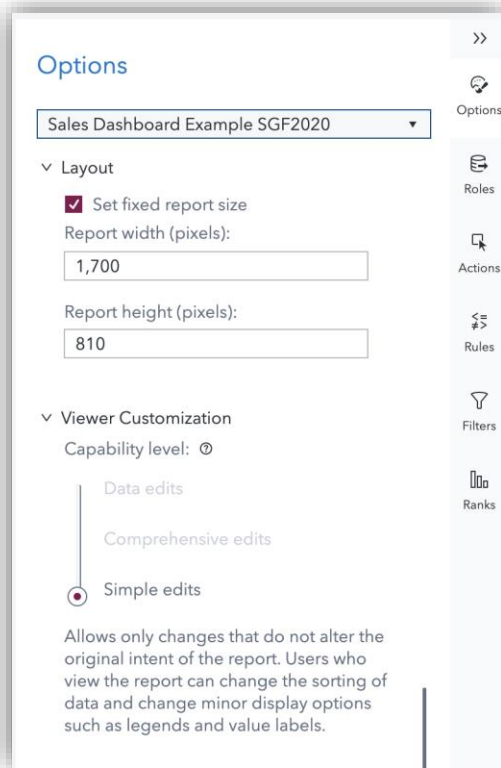
Figure 7: Report Level Options – Setting Report Size Allows for more Control Over Your Final Design in Any Viewing Resolution
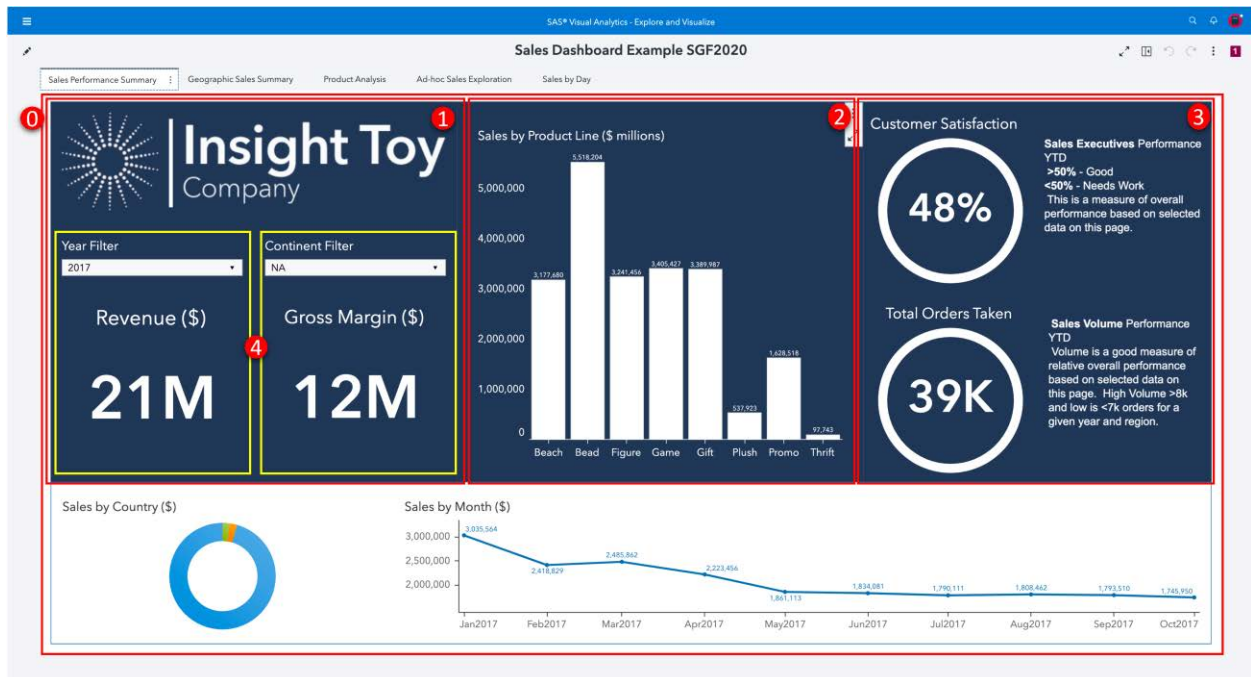
Figure 8: Sales Performance Summary Page – Highlight Container Objects Used to Layout Design

2. Create a new page called Sales Performance.
3. Add a precision container to the page. This is the parent object for this layout (container in Figure 4).
4. Add some nested additional precision containers to assist with greater control over the design:
    a. Add top left container, top middle container, and top right container (objects 1, 2, 3 in Figure 4)
    b. Set properties such as position percent for width, height, and so on.
5. Add some graphs and objects as placeholders and use standard containers to arrange objects together (object 4 – Figure 4).
6. Add the data to the objects.
7. Format the page for consistency and user experience, using background colors and text and graph colors. Adding images and logos can help connect the story to your audience.

NOTE – Precision Container Object

The object overlay is a very powerful capability within SAS Visual Analytics. It allows very creative designs that are unlocked when we use the precision container object. Think of the precision container like a PowerPoint slide. Remember that you only need to use this if you are trying to create a complex design. If you just drag and drop, SAS Visual Analytics will automatically use automatic drop zones and responsive layouts for displaying your objects. For more control over creative designs, we use the precision container object and the object overlay feature that the object provides.


In this section of the build process, we add interactivity and links in order to allow some drill through to the detailed data. Many of the following steps **don't use the precision container** and therefore require less formatting than our summary page. Create the following pages and make suggested property changes per below:

Geographic Sales – Add a page, add a precision container to enable object overlay, add a Geo Map with Coordinates, and select the geo hierarchy. Add a year filter layered over the geo map. Add the automatic actions on all objects action.
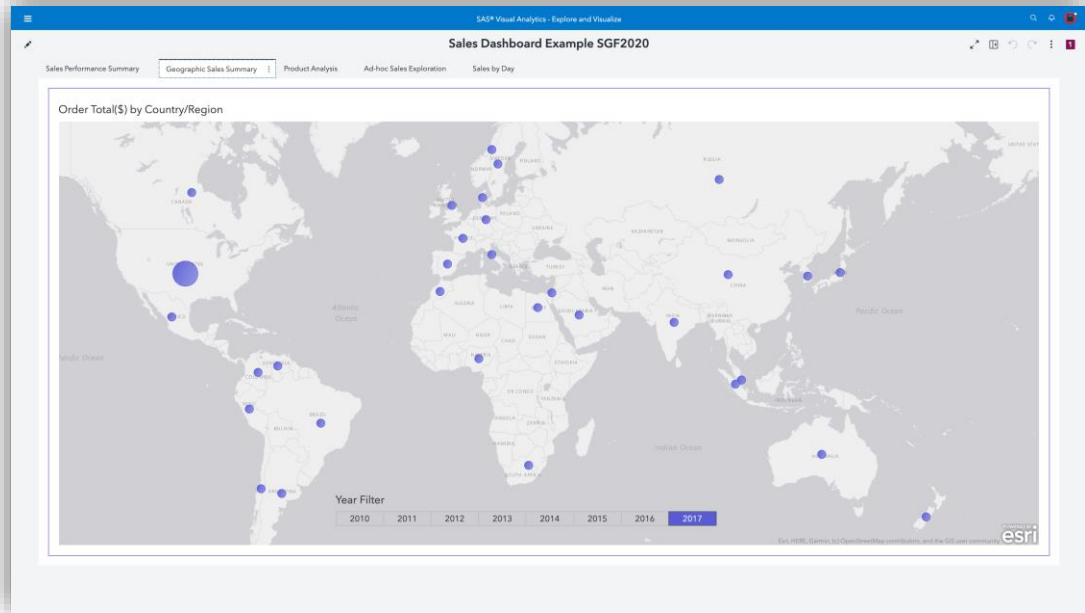
Figure 9: Geographic Sales Summary – Dashboard Page

Product Analysis - Select and hold the + page icon to display a popup with a page template. Select the page template and add the data to the objects as shown in Figure 10. Change the original Geo Map object to a Treemap object. On the actions tab, select the automatic actions on all objects.
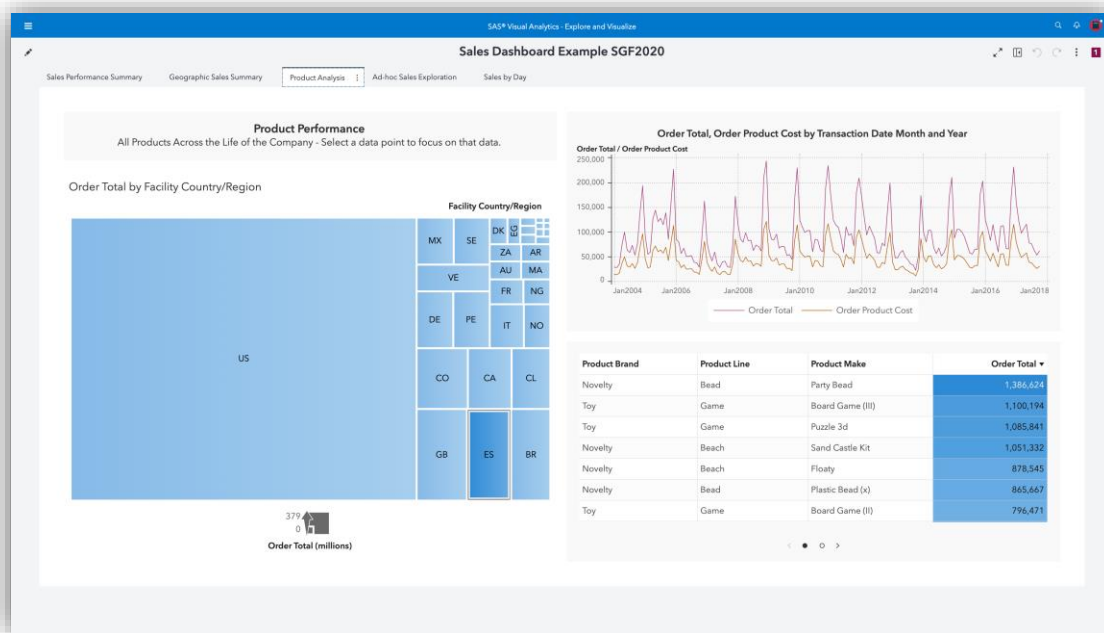

Figure 10: Product Analysis – Using a Page Template to Provide a Quick Start Layout

Sales by Day – Add a Data Driven Content object, add the URL where the custom visualization is located, and link to the custom calendar to show each day of the year (Google Calendar Chart). Add a Transaction Year filter. On the Actions tab, select the automatic actions on all objects.
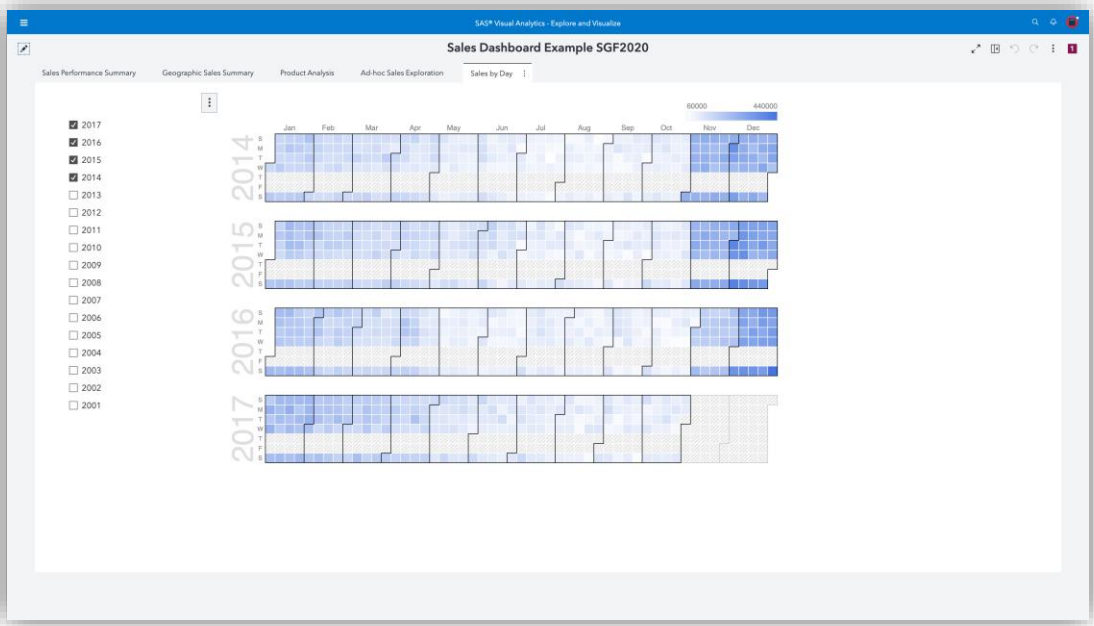
Figure 11: Sales by Day – A Page Leveraging 3rd Party Visuals – Data Driven Content

Ad hoc Sales Analysis – Add a forecast object to the page to compare past performance and look at possible future predictions and add a filter for the facility region. On the Actions tab, turn on the automatic actions on all objects.
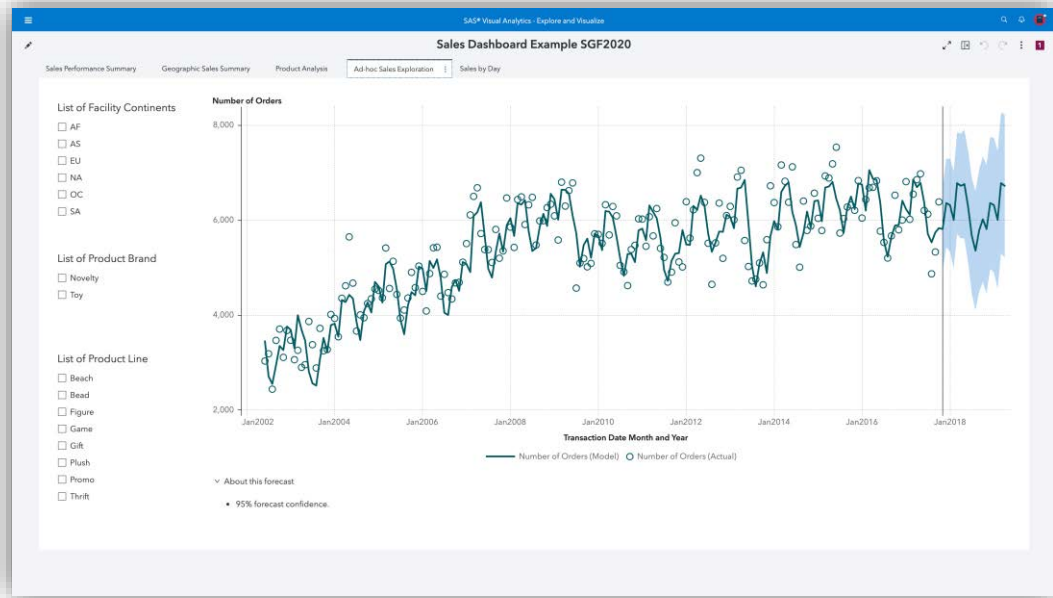
Figure 12: Ad-Hoc Sales Analysis – Keep Looking Ahead and Add a Forecast to Your Dashboard.

Detail Data – Add a page, hide this page, add a text object to the page, edit the text object and select the show active filters, add a list table object, add data elements you need, add a heat map as a cell graph (to highlight variance). Return to the geographic analysis page, right-click on the geo map, add a link to the report page, and select the Detail Data page.

Figure 13: Detailed Data – Adding a Hidden Page for Use as Drill-Through Target

These are all the changes we need to make to create our data journey in SAS Visual Analytics. We now look to share this journey with our intended audience.

NOTE: Writer's Block

Starting is often the hardest part, so if you are suffering from report **writer's block when you** are creating your data project, two new features in SAS Visual Analytics provide great benefits for analysts.
- Page Templates **–** These provide a nicely formatted report page. Just click and hold the + page icon to see the latest templates from SAS.
- Suggestions Tab **–** Built-in AI can help you create engaging elements for your next project.
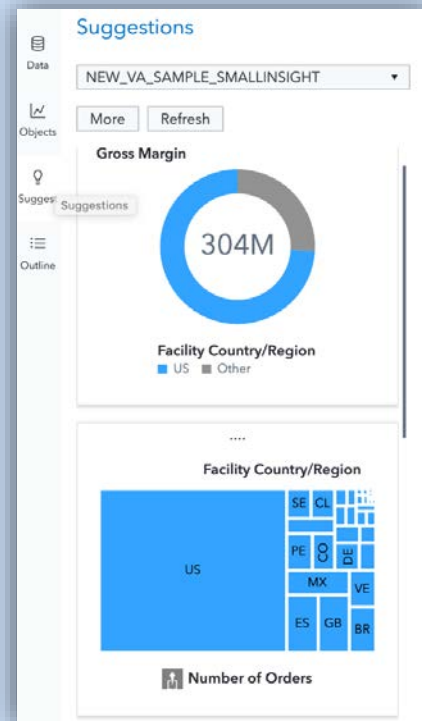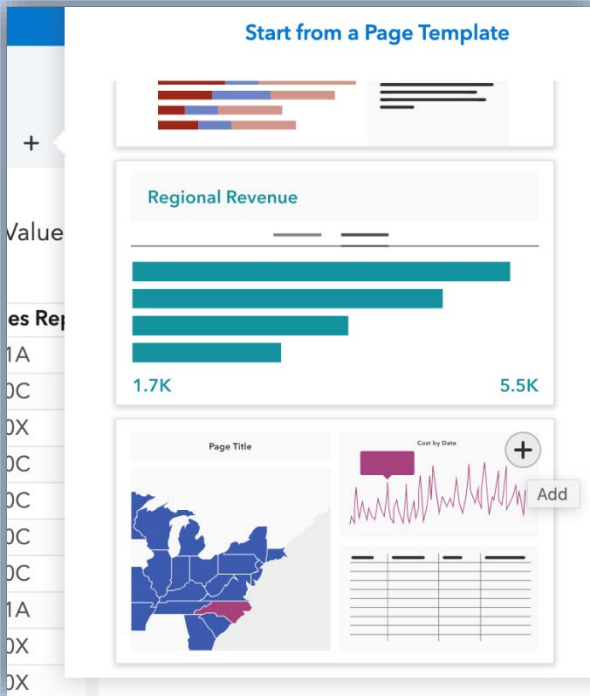
SHARE THE DATA JOURNEY

Let's use the Information Navigation Flow we outlined earlier in the paper - infofragment, infographic, dashboard, and detailed data to show the final audience experience. In this stage we also use some of the extensibility of the SAS Visual Analytics by using the API and SVG integration. Our aim is to take the insight to many users, rather than requiring the user to come to us.

NOTE - Copy Link
A powerful feature of SAS Visual Analytics is the copy link option at many object levels in the report. This can be invoked at the report level, the page level, or the object level. When you use containers, this means a single container can be shared through a link. This feature quickly generates URL links, which creates API calls that can be used to share and embed content from SAS in many locations.
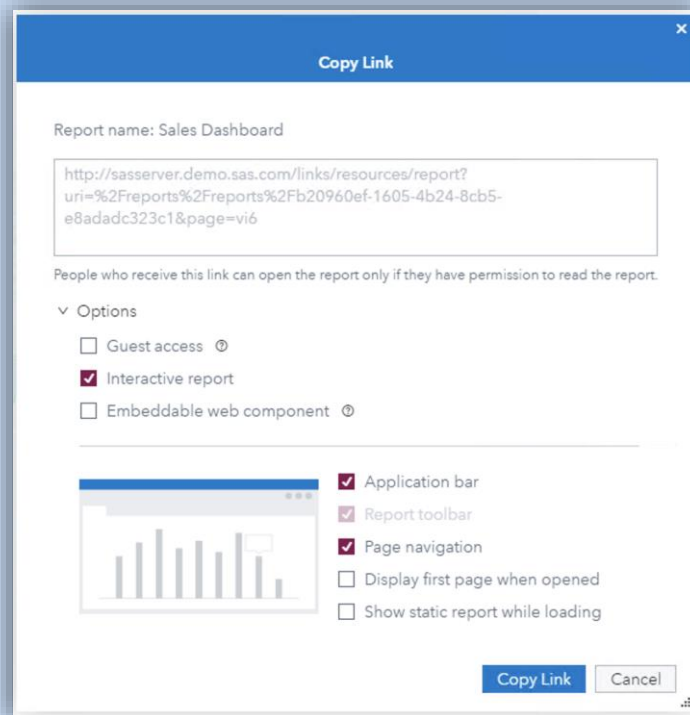
Infofragment - Sharing small focused snippets of the dashboard is a great way to get people started on their data journey. Use the Copy link option to show a simple report page of this report. This page could be sent via email or embedded into an intranet page or application in order to keep people focused on the sales performance. You can add a link to the main dashboard to provide a clear pathway for their data journey. For easier maintenance, you can use hidden prompts and parameters, and pass parameter values to filter this infofragment for different regions.
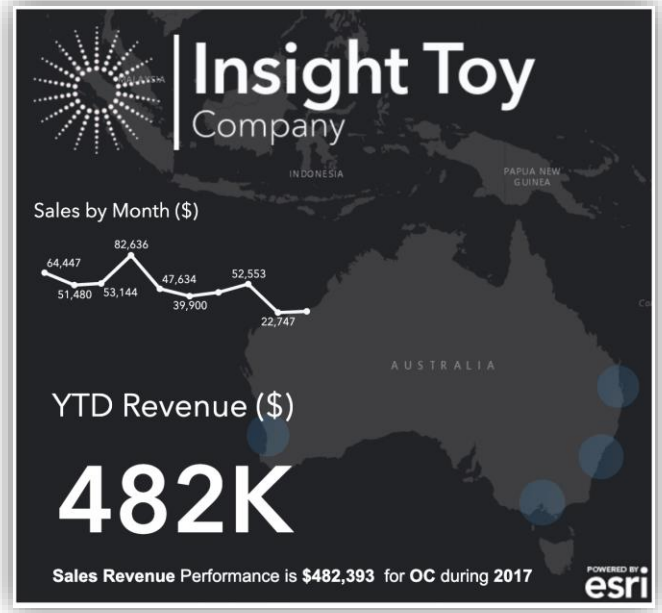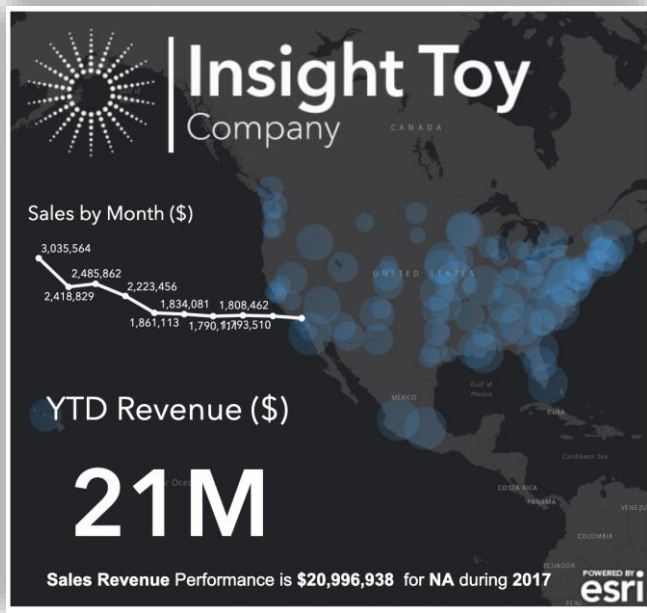
Figure 14: Share Bite-Sized Infofragments to Keep the Audience Engaged and Wanting More

Infographic – We could have built a poster version of the dashboard with all the features we just used to build this example. However, we can use the report image SVG API included in SAS Visual Analytics and an open-source custom SVG Viewer to display the first N pages of a report as an infographic poster – just like magic! This example creates a live SVG image of each of the report pages and displays them in an alternative viewer – the SVG Viewer custom app. This app allows the user to navigate and zoom in and out of crystal clear SVG images. This is an example of how open the SAS Viya platform is.
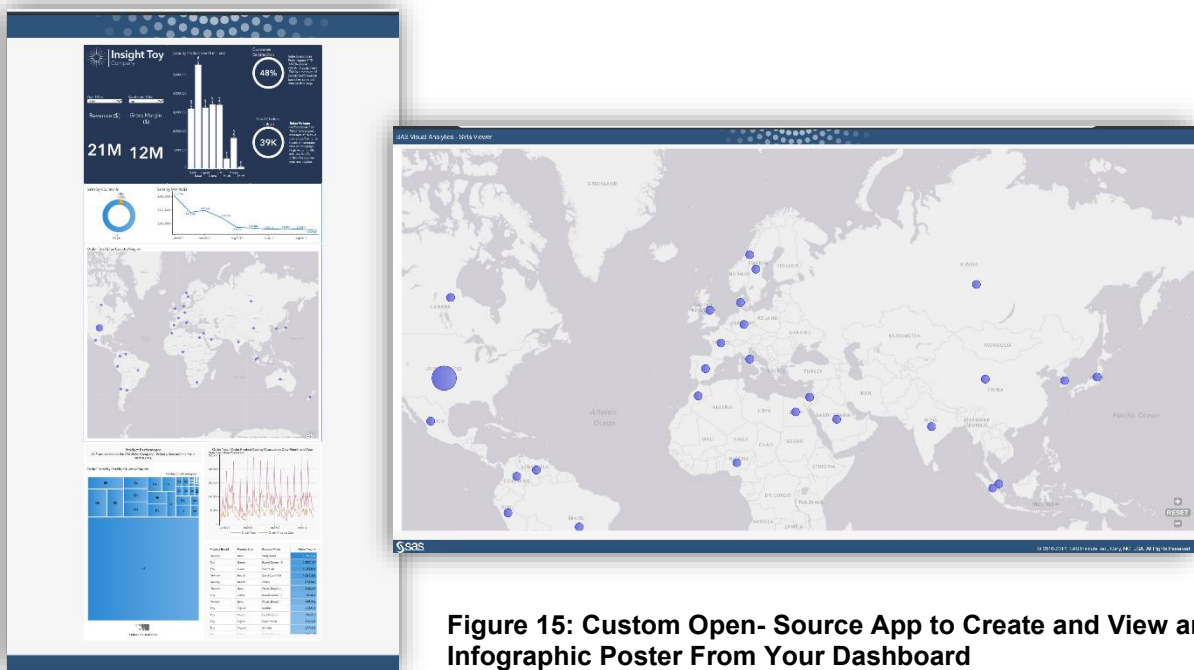
Figure 15: Custom Open- Source App to Create and View an Infographic Poster From Your Dashboard

Dashboard – The dashboard provides a full web experience using SAS Visual Analytics as a view and edit tool in the same way as during the creation process. Alternatively, you could use the copy link function to link directly to the dashboard and hide all the other complexities from the user. We can even share a single page as a live dashboard for a particular audience - no tabs, no SAS wrapper edges, just the dashboard page, focused and fully interactive.
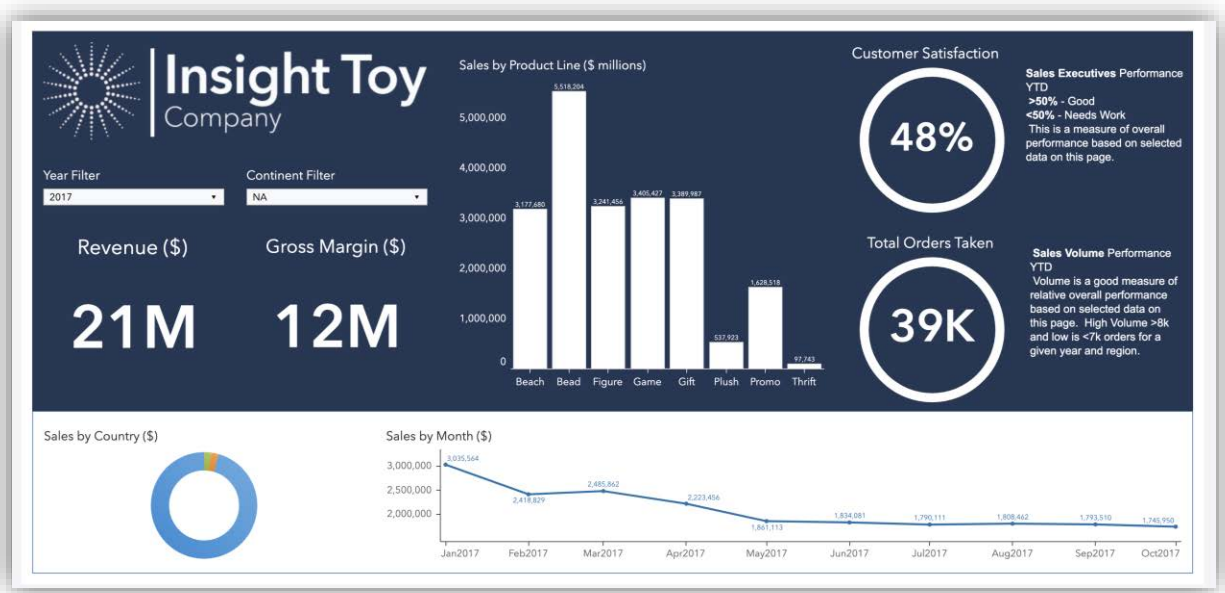
Figure 16: Dashboard Without any SAS Visual Analytics Branding

Detailed Data – This page provides drill through from the dashboard. It is not just a dump of the data, but also includes a table with a visual heatmap of data and detailed data with context of where the audience is in their data journey. You can see the number and then click to see the data.

Drill Target - Data Table

Filtered by the selection in the previous page, this table shows the details and can be exported from here. Filtered by: Facility Country/Region = 'US'; Transaction Date Year = 2017

Facility Continents	Facility Country/Region	Facility	Product Line	Product Brand	Product SKU	Product Style	Sales Rep	Transaction Date New	Gross Margin	Number of Orders	Order Total	Order Sales Cost
NA	US	0007	Beach	Novelty	00LNBS	Green	011E	10/07/2017	93.96	1	141	6.37
NA	US	0007	Beach	Novelty	00LNEF	Red/White/Blue	011E	14/08/2017	152.27	1	228	6.24
NA	US	0007	Beach	Novelty	00LNEI	Orange	011E	08/05/2017	140.77	1	211	4.33
NA	US	0007	Beach	Novelty	00LNEI	Orange	011E	01/08/2017	163.85	1	246	6.26
NA	US	0007	Beach	Novelty	00LNEK	Green	011E	04/04/2017	141.30	1	212	4.37
NA	US	0007	Beach	Novelty	00LNH5	Red/White	011E	04/07/2017	219.16	1	329	6.34
NA	US	0007	Beach	Novelty	00LNK2	Blue	011E	23/04/2017	769.90	1	1,155	4.95
NA	US	0007	Beach	Novelty	00LNK2	Blue	011E	03/07/2017	754.03	1	1,131	6.26
NA	US	0007	Bead	Novelty	00LV1E	Red 4mm	011E	11/04/2017	176.20	1	264	4.50
NA	US	0007	Bead	Novelty	00LV1J	Purple 4mm	011A	08/03/2017	132.28	1	198	6.71
NA	US	0007	Bead	Novelty	00LV46	Red 6mm	011A	04/03/2017	261.19	1	392	6.77
NA	US	0007	Bead	Novelty	00LV4C	Metalic 6mm	011E	31/07/2017	261.30	1	392	6.37
NA	US	0007	Bead	Novelty	00LV4E	Gold 6mm	011A	29/03/2017	269.61	1	404	7.06
NA	US	0007	Bead	Novelty	00LV6W	Black 8mm	011A	22/01/2017	369.38	1	554	6.99
NA	US	0007	Bead	Novelty	00LV9U	Blue 20mm	011E	09/10/2017	539.37	1	809	6.71
NA	US	0007	Bead	Novelty	00LVCH	White Mixed	011E	24/05/2017	724.52	1	1,087	4.90
NA	US	0007	Bead	Novelty	00LVCP	Silver Mixed	011E	30/10/2017	939.05	1	1,409	6.91
NA	US	0007	Figure	Toy	0172XD	Rangers	011E	29/04/2017	201.83	1	303	4.48
NA	US	0007	Figure	Toy	0172XH	Air Force	011A	18/01/2017	360.15	1	540	6.76
NA	US	0007	Figure	Toy	017306	Hulk	011E	07/05/2017	65.32	1	98	4.50
NA	US	0007	Figure	Toy	01732Z	Firefighter - Female	011E	17/04/2017	209.05	1	314	4.33
NA	US	0007	Figure	Toy	017331	Postman - Female	011A	25/02/2017	394.33	1	591	6.86
NA	US	0007	Figure	Toy	01735P	Basketball - Male	011E	29/08/2017	59.86	1	90	6.05
NA	US	0007	Figure	Toy	01735P	Basketball - Male	011E	25/10/2017	61.84	1	93	6.94
NA	US	0007	Figure	Toy	01735V	Vollyball	011E	19/06/2017	66.77	1	100	4.51
NA	US	0007	Figure	Toy	01736Q	Soccer - Male	011E	24/07/2017	56.53	1	85	4.12

Close

Figure 17: Detail Data – Sharing Row- Level Detailed Data With Visual Highlights and Context

NOTE: API & SDK

The latest software development kit (SDK) and application programming interfaces (APIs) bundled with SAS Visual Analytics allows you to easily create some great web experiences. We can now lift any report element or entire dashboards and embed SAS Visual Analytics into websites with ease. This is a great way to take the information to the audience and increase your impact. See the SAS website for information about the SAS Visual Analytics SDK. (See References.)

CONCLUSION

In the age of the informavore, analysts need to be thinking like a designer or a social media influencer. Instead of product placement, analysts need to think about data placement. Creating approachable on-ramps to the core information assets is the challenge of the modern data-driven organization. If an organization gets this right, they can leverage AI and digital transformation quickly and make real progress to becoming data-driven. The big change from the past is the need to bring a digital native mindset into traditional big data initiatives. SAS Visual Analytics provides this trusted central platform to support the organization. The SAS platform enables your teams to create and consume impactful data journeys every day in your organization. The challenge is to keep the audience and the analyst engaged and to keep them coming back again and again.

After you understand that your audience consists of informavores, you really need to step up your information journey to compete with the endless data streams today. Your information should be as engaging as a social media post, and as clear as a news flash. If you get this right, you can also find that there are endless ways to impact your audience and therefore positively impact your organization. In our upcoming SAS Press publication, Falko Schulz and I dig into using SAS Visual Analytics further and provide more use cases to practice your skills and to provide impactful outputs for the modern audience. I hope you have picked up some useful tips and ideas from this paper to help you create impactful data journeys using SAS Visual Analytics.

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