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AFP® GUIDE TO

Data Visualization: How to Tell Number Stories with Pictures

FP&A Guide Series

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Contents

Financial planning and analysis (FP&A) teams are increasingly being challenged to produce and organize financial data, and also convey it through intuitive images.

Without the ability to organize and present data efficiently, decision-making takes longer. Information can also become lost or outdated. Moreover, understanding the story may become difficult for not only FP&A teams, but more importantly, for management and key decision makers.

FP&A teams need a reliable, efficient, and interconnected method of organizing and presenting their financial data. Telling a story simply and effectively through intuitive images makes it easy to communicate and collaborate throughout all levels of the company—giving management more time to interpret and make critical decisions.

With this in mind, Workiva is pleased to partner with the Association for Financial Professionals (AFP) to produce this *AFP Guide to Data Visualization: How to Tell Number Stories with Pictures.*

This guide explores how finance professionals look at data visualization as a way to solve problems, identify patterns, and understand what's driving organizational performance. The guide also provides real-world examples of how FP&A teams are implementing visualization today.

As FP&A teams explore ways to provide better visual representations of their data, they also should look for reporting solutions that enable them to:

- Create intuitive and compelling stories easily using graphs and charts, with the ability to drill down or show high-level trends on strategic measures showing business performance to multiple audiences within their organization

- Ensure one central source of truth for information that can be linked into financial reports, dynamic, at-a-glance dashboards to management, and presentations that enable readers to digest key messages rapidly

- Encourage collaborative and productive conversations to identify and find answers to key business questions that will improve the quality of analysis, so insights are communicated to executive management and the board more efficiently

Companies are pushing hard for better graphical representation of data. FP&A teams are expected to visualize what's important without distracting from the key message at hand. Interacting and reporting data from one central data set will play an integral role in telling a story with accurate and consistent information across charts, graphs, and dashboards.

Joseph Howell
Managing Director and Co-Founder
Workiva

Executive Summary

"Graphical excellence is the well-designed presentation of interesting data — a matter of substance, of statistics, and of design. Graphical excellence consists of complex ideas communicated with clarity, precision and efficiency. Graphical excellence is that which gives to the viewer the greatest number of ideas in the shortest time with the least ink in the smallest amount space." – Edward R. Tufte

Financial planning and analysis professionals are increasingly using charts and graphs to visualize data, interact with information, and present it to senior management and the board to tell stories and drive important conversations.

Graphical information is more intuitively absorbed in our minds and can capture large amounts of data in a much more succinct format, allowing FP&A to spot and show trends, patterns and anomalies more effectively. Using graphics, finance professionals can tell better stories, pinpoint action items, and create effective dashboards that allow management to see the business at a glance. These dashboards need to be tailored to audiences — more high-level for the board, more detailed for operations. However, they should all draw on the same set of data, or version of the truth.

FP&A professionals are only beginning to use high-level visualization to interact more effectively with their data, perform their own analyses, validate hypotheses, ask deeper questions, and prepare presentations for senior management. They can do so at increasing rates of speed, which means more time to think and analyze, more dynamic, real-time analysis and reporting, and less time spent collecting data and struggling with creating charts.

New tools are emerging that allow analysts to use data visualization to dig into patterns and identify problem areas quickly, often tied directly to the company's performance database. Going forward, interactive data tools will allow finance professionals to not only confirm hypotheses, but ask additional questions and continue to interact with the data to explore new areas, thus providing continuous feedback to management.

As the use of data visualization becomes more widely used by finance, which many say is lagging compared to areas like marketing and sales, it will unleash a greater power of analytics and enable professionals to deal with an increasing amount of data.

Introduction: The Trend

Survey shows more finance professionals are looking to data visualization to help solve problems, identify patterns and anomalies, and understand what's driving their organizational performance.

The trend toward greater use of visualization among FP&A professionals is still growing. "A lot of them are still focused on numbers," said Craig Schiff, president and CEO of BPM Partners, a vendor-neutral advisory services firm specializing in business performance management (BPM) and business intelligence solutions. However, the data from the 2014 BPM Pulse Survey of finance professionals shows the desire for change is strong. Asked if they require data visualization beyond typical charts or graphs offered in Excel, 40 percent of the finance professionals surveyed responded that they do. "That's a large and growing number," Schiff noted.
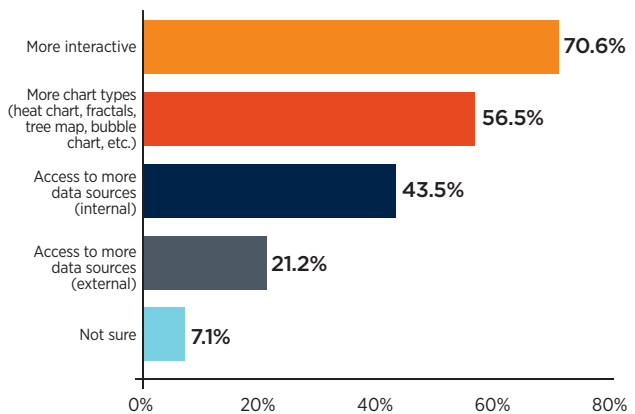
More interactive features scored highest (71 percent) when asked what kind of data visualization capability respondents would like to have. "They really want to understand what's going on behind the scenes. Graphics are great. The important thing is that not all the visualization tools provide the ability to drill back into the detail to broaden your own understanding of the graph that brought the issue to your attention." Fifty percent of respondents also wanted more chart types and tools in order to present the data with specialized graphics.

The last question the survey asked about data visualization is from what source respondents would prefer to acquire these tools. The choices were: *third-party providers, included in their performance management solution, or doesn't matter.* According to the results, 71 percent preferred that the data visualization capabilities be integrated into the core product. "One of the challenges of the third-party tools is how to connect them to the source data," Schiff said. That integration is already built into the budgeting tools. Those systems also speak the financial language and are designed for business end-user self-sufficiency. Many of the standalone tools require more IT knowledge to connect them to the data sources. "We believe that data visualization is a growing trend, and there is still a lot of opportunity for the vendors to add value."
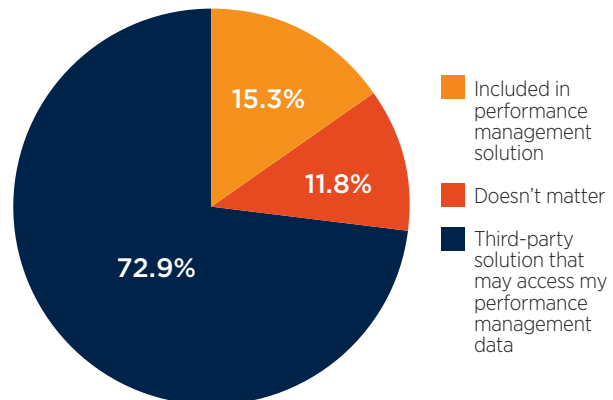
Do you require data visualization capabilities beyond standard charts and graphs?

- Yes — 24.0%
- No — 40.9%
- Not sure — 35.1%
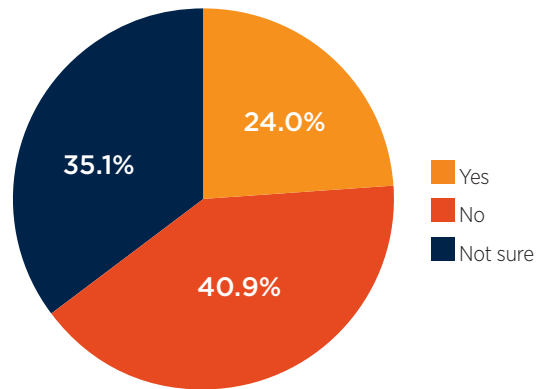
What data visualization capabilities do you need that you are not getting today? (select all that apply)

- More interactive — 70.6%
- More chart types (heat chart, fractals, tree map, bubble chart, etc.) — 56.5%
- Access to more data sources (internal) — 43.5%
- Access to more data sources (external) — 21.2%
- Not sure — 7.1%

Where would you prefer to get these data visualization capabilities from?

- Included in performance management solution — 15.3%
- Doesn't matter — 11.8%
- Third-party solution that may access my performance management data — 72.9%

Source: BPM Partners 2014 BPM Pulse Survey

"Most humans are wired for visual learning and understanding," said Gary Cokins of Analytics-Based Performance Management and co-author of "Predictive Analytics: Forward Looking Capabilities to Improve Business Performance." "Very few people can examine data tables and pick out trends or grasp big-picture issues," he continued. "Even statisticians and data scientists who are better equipped than most to deal with data in all its forms benefit from graphical interpretations."

Data scientists and business analysts need to be able to communicate in straightforward, visual ways with broad and diverse audiences. "FP&A professionals consistently seek better ways to support decision-makers," said Madison Laird, CFO of Funding Profiles, a visualization software provider that brings together finance executives from companies such as HP, Microsoft, Citigroup, Cisco and IBM. "There's increasing pressure from the CEO and COO to view finance as a keeper of the facts and provider of key insights. They don't want a series of data points or another 'fact pact.' They want the analysis that helps them decide on a strategic direction for the organization."

"FP&A spends a large amount of time managing large amounts of information, to craft a lot of insight. A lot of time is spent taking numbers and presenting them in a compelling way," said Joe Howell, managing director and co-founder of Workiva. Visualization gives data credibility. "It gives credence to what they've done," he said.

Tell a story in an intuitive way

Finance professionals are increasingly turning to images, such as graphs and charts, to find out what's going on behind the scenes, and to create more compelling stories that drive decisions and spotlight action items for management, the board, and operational leaders.

The ultimate goal of data visualization is to present a story and highlight what's important. "Data visualization begins with telling a story, but its power is in enabling the next question to be answered," said Mike Saliter, vice president of global market development at Qlik, a provider of data visualization software.

Historically, visualization has been more focused on empowering people to confirm their intuition and to validate a hypothesis as part of the underlying data through analysis. "However, the market is shifting," said Saliter. "There's a current trend to better communicate and share findings with others. The concept of 'data story telling' enables you to wrap the interactive visualization and data with a narrative."

"The challenge has always been to present a story and to communicate it in a more operational, practical way," said Sherri Liao, EPM advisory U.S. practice leader of The Hackett Group. "The idea is to understand the outcome and the action items that management needs to pursue. People are more visual. Using data visualization allows FP&A professionals to more effectively say what they're seeing in terms of financial results."

That's why heat maps have such an immediate and intuitive impact: red is negative, green is positive. When there's a lot of red on the map, people are visually motivated to ask the important questions. "It's more intuitive," said Liao.

"I think speed of insight is the key," added Jim O'Connor, principal with The Hackett Group. "For the last 20 years, FP&A got out of the transactional side and more into analytical. With visualization, they have the capacity to do that. The reality is that executives are busy. To tell an effective story, you need a concise dashboard with insightful graphs."

Stephen Few, author of "Show Me the Numbers: Designing Tables and Graphs to Enlighten," takes it one step further. "Because of their visual nature, graphs tap into the incredible power of visual perception to communicate quantitative information. When the story that you wish to tell is contained in the data's patterns, trends and exceptions; or when it depends on your audience's ability to compare entire series of values to one another… a graph will do the job best but only if you avoid all too common design flaws."

Different vendors and consultants have developed a number of effective visual components to aid their customers. However, according to Karuna Mukherjea, senior director of Product Marketing at SAP, this has created a problem. "The issue we're running in to is that there are too many visual components that are not standardized," she said. "Different consultants do it in different ways. We need to work with an organization whose mission is to standardize the visualized components. The idea is to view the visual components like musical notes — there are so many different types of music, but the notes used to create them are the same."

Senior management needs to see, in one glance, the five metrics that best illustrate the health of the business. "It comes down to not only breaking it down to visualized components but to how and where the business is going, which is more important from an engagement and interaction standpoint," said Mukherjea. "Getting those visual elements that can tell the story behind the data is taking that big data component that we have in finance today and telling the story for the data."

"The trick is to visualize what's important," said Howell. "People sometime visualize what's easy versus what matters, or what looks good rather than what's important. That can be distracting from the point and from the message. You have to tell a story prior to even getting into the room with them."

Wdesk by Workiva builds a single source network of an organization's most valuable data, helping to create consistency of information across all departments. "That's central to our product," Howell explained. "You use the same data set. It's not about fancy artwork. It's about how you tie it all together."

Practitioner perspective

When explaining financial results to executives whose first language isn't numbers, finance professionals should start by educating them at a macro level and defining key metrics. As a general rule, the simpler the graphics used to convey the information, the better.

According to Jim Robertson, vice president of FP&A at Emeritus, one should always start by asking: What's the best way to communicate the story to the audience? "The story needs to be a standalone document," he said. "You never know where a presentation is going to end up. You can't assume that any of your key points will be highlighted unless they're in the document. Build a presentation that someone who is smart, but not necessarily knowledgeable about the topic, can pick up and get the point you're trying to make."

"Graphics can be very a very powerful tool when telling a story with quantitative data, especially if you are trying to draw particular attention to a salient topic, or if you are trying to summarize large quantities of data in a meaningful way," said Irena Barisic, deputy CFO of the Brookings Institution. However, she cautioned, "Graphics always have to be presented in context, or introduced as part of a larger context, in order to tell the full story."

Data visualization can also help promote clearer understanding by turning big data into small data. For example, "You can use a simple line graph to show a 5- to 15-year trend on profitability," said Barisic. "Clearly a significant amount of data goes into generating profitability figures, especially when we are trying to look at results over multiple years. All of this data can be presented with a clear message of trend and potentially — even forward forecasting — in one line graph."

However, it's important to use graphics that are not intimidating or difficult to assimilate. "In some instances it may be appealing to use graphs over tables," said Barisic, "but if individual values need to be identified, then tables are a more appropriate medium to use even if they might be slightly less visually appealing."

For all their positives, there are times when graphics are not the appropriate medium to convey a message. Sometimes a simple summary in a Word document or a PowerPoint slide with bullet-points suffices. "You've got to be selective and match the display medium to the story," said Barisic.

"The trend is toward more visualization," said Bruce Hunt, vice president of FP&A for a technology company. "It doesn't matter whether it's a table or a graph, what matters is that the person using it can grasp the underlying meaning of what's being presented."

Ask the right questions

The power of data visualization lies in its ability to drive strategic decisions by helping management find the answers to key business questions.

According to Graham Wills, RAVE chief architect and statistician with IBM SPSS, any successful data visualization project starts with clearly identifying your goals, which starts by asking the right questions. Is the goal is to assist in managing global risk and governance, to increase sales, or something else? "Assuming it's about risk, you'd probably want to know which areas are most risky, or where do things go unreported? Visualization will answer those questions," said Wills.

A successful image asks and answers multiple questions. "Visualization almost always asks better questions," said Wills. For example, where do problems occur that are not handled rapidly, how long does it take for

them to be handled, and what is their geographical location? "You have to be able to answer the broader questions so people can discover more about the problem," he said. "It's a sort of partnership with the user."

"It's also important to try to tie in predictive analytics," continued Wills. "If something happens, what is the total amount of money you're predicted to lose, and should you be concerned about the average amount or the big amounts that are the outliers? That's the data you choose to highlight and the context for the analytics. The measure of value or success of a visualization project is whether it helped answer the questions."

In order to be able to tailor the image to the audience, "You have to be asking the right questions," said Amanda Pype, user researcher at Tableau Software, a leading visualization software provider. "What do they want to know? The most important thing is to understand the audience and what they're trying to get out of the data." Also, use charts that they can easily understand, she advised. "You don't want to spend 10 minutes explaining the chart."

One key concern is the reliability of the forecast, according to Andrew Mosely, director at Metapraxis, a London-based visualization vendor. "Across all indus-

tries, the most common business question is: how credible are the forecasts of our business units?" said Mosely. "And when a forecast appears either too optimistic or overly pessimistic, how can our FP&A team present the data visually to support their dialogue with the business? Every business needs to be on top of its numbers. The challenge is finding out as soon as possible if you're not going to make that forecast rather than being presented with an impossible last-minute challenge. Having time to take action puts you back in control."

Metapraxis' software contains a calculation engine that creates statistical scenarios, which are then presented visually to show trends and variances. Alternative scenarios are automatically created, against which you can test the management forecast, according to Mosely. "We call this visualization the 'Windsock' chart (see below).

The "Windsock" chart tracks the evolution of the subsidiary's updated year-end forecasts throughout the financial year, comparing them against the annual budget, prior year performance and a statistical risk range. The chart shows that the current management forecast for Net Sales is at the very top of the current risk range and may be too optimistic.

Western Europe Net Sales Windsock
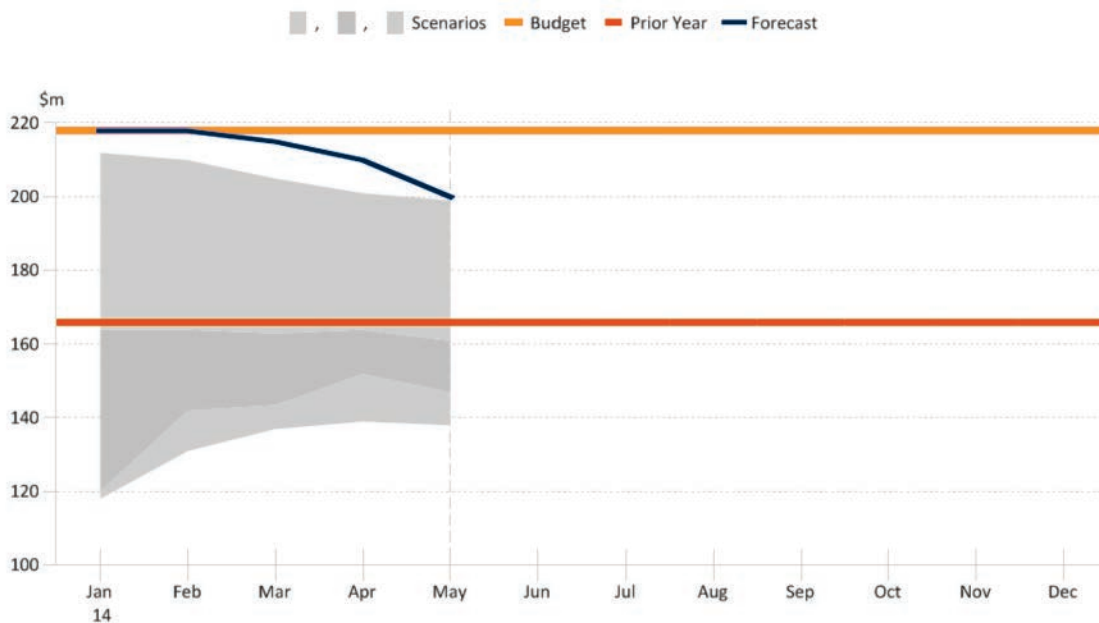
To provide context, an accepted practice by analysts is to first establish a hypothesis in the learning stage of analysis, said Cokins, "and then to validate or refute the hypothesis in the confirmation stage. The key is to establish a high-gain hypothesis, which, if confirmed, can lead to substantial favorable actions with results. An example of a hypothesis is: 'Which type of consumer segment is most likely to respond to deal, discount, or offer?' An effective way for analysts to communicate the hypothesis they intend to test is to initially involve those who will be making decisions based on the outcome of the test. Revisions from their inputs can then be made."

To make your chart is an act of what Randall Bolten, a former Silicon Valley CFO and author of "Painting with Numbers: Presenting Financials and Other Numbers So People Will Understand You," calls "quantation." Quantation is the act of presenting numbers, e.g., financial results presented electronically or in a written form, for the purpose of informing the audience.

"To make data valuable and meaningful to your audience you need to have a sense of what decisions the people in your audience are facing, what problems they are facing, how they think about those decisions and problems, and your own ultimate goal in preparing your report," said Bolten.

Practitioner perspective

According to Barisic, when sharing financial information, the focus is to keep the executive team informed, as well as to facilitate decision-making and performance measurement. In order to accomplish these goals:

- Use simplified terminology to convey financial results, assumptions, and conclusions.
- Focus on the most salient points and provide sufficient but concise information without being overly technical and detailed.
- The financial discussion needs to be high level and tied to business strategy. Executives are generally action-oriented with a forward focus; therefore, you should always answer the following questions:
  - Why does this data matter?
  - What impact does the financial result/conclusion have on us today and in the future?
    Be audience-specific.
- Always be prepared to discuss any financial information in more detail should it become necessary.

Identifying patterns

Graphs are at their most powerful when helping finance professionals, and by extension, management, identify patterns and anomalies. Visualization, particularly of large amount of data, can reveal trends and deviation from trends that can compel management to ask the important questions and take corrective action where necessary.

Visualization can help you see and understand patterns in your own data and help you communicate those pattern to others. "The visual nature of graphs endows them with their unique power to reveal patterns of various types, including changes, differences, similarities and exceptions," writes Few. "Graphs can communicate quantitative relationships that are much more complex than the simple associations between individual quantitative values that tables can express."

According to Pype, "Visualization allows you to understand data holistically," she said. "Once you start looking at graphs, it's easier to spot the outliers. It's incredibly powerful as a complement to statistical information." If you need to show more than one number, there's no better tool for communicating with others. "For example, how do I compare one region to another? A visual representation is almost always better when it comes to comparing patterns. It's highly efficient. A well-crafted visualization allows the audience to see the important information immediately."

Visualization is not adding tremendous value when it's in the hand of an analyst who's doing basic profit and loss (P&L) or balance sheet analytics. According to Schiff, it starts gaining power when finance professionals are examining high volumes of data in order to spot trends.

"Graphics can clearly highlight the trends, particularly things like activities by certain types of customers, where manually looking through large amounts of data would be simply impossible," he said. "Putting graphics on top of analysis intended for a wider audience is important. The main benefit is the opportunity to clearly communicate your findings to others, especially when you go outside of finance."

Another place where graphics can be helpful is in looking at variances, from forecast or budget. You can chart actual versus the forecast or budget and explain the trend. Using simple tools like stop lights or gauges

can make it clear even to the most casual user where you stand in terms of achieving targets. "A key point to appreciate for the CFO's finance and accounting function is that columns-and-rows tables, typically from spreadsheets, cannot reveal trends, outliers, or key items for attention," said Cokins.

Pie charts, graphs, and histograms are arguably the most popular ways to display table data. Advanced methods can use three-dimensional views (e.g., sales by product type, region, and customer segment). Even more advanced features have real-time interactive features where one can slide the cursor on an independent variable in the graph (e.g., sales volume), and the dependent variables (e.g., profits) will instantly reflect the change.

"In terms of live data visualization, that's still in an innovative stage and has improved the quality of the conversation where it's available," Liao said. "You can understand what's going on faster. You can better understand performance, gross margins, product margin and market share."

Heat maps are one of the most popular mediums for live data visualization. Another is geographical area maps, which are helpful in answering questions such as: are we doing better in Asia or Europe? You can look at each shipping location, its collections delays, and its number of customer complaints due to delays, and link the three data points to find the common root. "Charts make it easier to understand," said Liao. "It helps complete the story."

"Visualization can improve the quality of analysis so that insight gets generated more efficiently. This enables FP&A to communicate more effectively with the executive managers and directors of the business," said Mosely. "Visualization facilitates this dialogue. It also harnesses the power of the human visual system to digest key messages rapidly. Visualizations can be more engaging than tables, particularly when they are designed to answer a well-thought-out business question."

Tailor the image to your audience

Most FP&A professionals and experts agree that data visualization should be matched to the audience, with simpler images for boards and senior management. The idea is to quickly communicate key business indicators, pinpoint areas of action, and raise key questions. That's not always an easy balance to achieve.

"If you don't think carefully about the balance between complete, accurate and useful for your particular audience, they might not get what they need to get out of your reports, and then all of your work, collecting and presenting your information, may be for naught," said Bolten.

The visualization design and layout has to fit the audience. "It's definitely not one-size-fits-all," said Saliter. "It's a best practice to tailor the interface to meet the expected level of interactivity and analysis."

CEOs and executives need to see very high-level trends and indicators, according to Saliter. They need to see if things are trending up or down, but they often don't need the same level of interactivity and drill down that management and business analysts need.

Analysts need to be able to dissect the numbers and ask the next question. "You need a lot more self-service and the ability to investigate," he said. "I've seen situations where companies tried to offer the same level of analytical self-service to the board and senior executives, and adoption was low. It actually creates a negative effect since senior executives can get turned off or intimidated by too many bells and whistles."

According to Bolten, "The most important thing you can do is keep their [audience] needs in mind when you design your reports if you want to inform, enlighten, advise, guide, warn or even entertain, the most important thing you must do is reach your audience. No matter what your objectives are, if you can't reach the audience, you won't be able to communicate with them."

"When you present to the board or senior executives, present your information in trend lines. Don't give them just one or two spots," said Ivan Koon, a former FP&A professional who now works as an adviser to start-up companies. "Be consistent in how you present information. Your executive team and the board must be able to instantly tell how the business is trending over time. Show exceptions through the same set of graphs. Those

graphs should illustrate where/when the lines have changed and why the exception happened. Make it really quick and easy to explain business trends. If you do that, you can save so much time by anticipating their questions, and help decision-making to move forward faster."

Practitioner perspective

The biggest challenge in communicating financial information really depends on the audience, according to the vice president of finance at a multinational technology corporation. "When you have a broad, mixed bag of audiences, with some who understand numbers and some who don't, you have to strike the right balance between detail and conceptual information," he said.

Finance is often about very precise messages, for example, revenue is reported with precision. "The challenge is to keep it broad enough for the audience to understand what you're trying to say versus trying to deep dive," said the vice president of finance. "In my work, I've learned that graphics that are simple work more effectively," he said. "They have to be connected to the story you've got to tell and the top-level message you're trying to communicate."

That's true of both senior level executives and broader audiences. "It doesn't mean you don't have to be armed with the details behind it. Keeping it simple and well-structured is the most important thing."

To tailor the presentation, think about the nuance you need to include and the degree of detail you need to provide, he said. With broader audiences, you may use a detailed view of next year's budget, but your presentation to senior executives would be different. It's an adjustment that takes time. "That's the biggest challenge," he said. "Most finance folks have the data but also have many presentations to do. It's time consuming to actively keep tailoring those messages."

David Mann is director of financial planning and performance of Tufts Health Plan, a health management company with $4 billion in revenue. According to Mann, the biggest challenge in communicating data is in ensuring executives feel ownership of the numbers so they actually care. The second biggest challenge is including the right level of details.

"The question is what material things they need to know to manage their business," he said. "As a result, every deck is different and in a digestible format. It goes to the key information that they need to see, and the frequency with which they need to see it."

From a graphics perspective, every executive and every company is different. A lot depends on culture. "In my previous company, most of the communication was through graphics," said Mann. "This company is more numbers oriented. They see graphics as potentially hiding the truth. Culture is huge in the role graphics play. There's a clear executive preference in how they like to view things."

According to Hunt, the message has to be tailored to the board and executive committee. "These are very smart people who see multiple presentations each day. It's very important to include the key takeaway from each graph in the actual image. As you go down the chain, you provide more detail and need not highlight the key takeaway because the audience is close enough to the story to get it instantly."

Constructing dashboards

Dashboards are perhaps the most common use of visual displays, particularly those used by finance professionals to communicate key financial metrics to senior management. Creating an effective dashboard is no easy task: most struggle with selecting the right charts and striking the right balance between high-level visualization and detail.

According to BPM's Schiff, it's important to keep the content of your visual dashboard simple and specifically relevant to your audience. "A dashboard is an opportunity to think about what's important to this business, include only a handful of strategic key measures and how the business is performing against them, so you really focus on what's important," he said.

Laird found that as soon as you develop a dashboard, it's relevant for a quarter. "Then management says, what we really need to see is this. They want a different format. It becomes a moving target," he said.

"What we're seeing is a trend to seek out advisors who can provide more agile analysis to explain the implications of the data. Executives, in my experience, are very short-sighted. They want someone to tell them what the right decisions are. They want trusted advisors who can be agile enough to answer the tough questions. That's not something any application can provide."

"Creating dashboards is ultimately a presentation exercise, not an analytics effort, said Joseph D'Ascoli managing director, Office of CFO Solutions at FTI Consulting. "Effective dashboards utilize a variety of techniques, from spark-lines to color variations, but the key is the relation of the technique to the data and insight being shared. We strive for clarity and preservation of white space in our dashboards to avoid information overload and focus on the key takeaways from the data."

One of the main reasons that dashboards work is that they "flatten" multiple data displays into a single space. This allows the viewer to draw connections between several analyses and understand the data as much more than the sum of its charts. "Dashboards should be designed to maximize this effect, allowing the user to understand the interrelations of the data displayed," he said.

Additionally, D'Ascoli said, "providing context is essential to dashboard creation. Data visualization tools enable data summarization with averages, standard deviations, upper and lower quartiles allowing viewers to easily understand the data's context. Avoiding the "snapshot tendency" and blindness to trends is critical; effective dashboards also provide derivative or 'change over time' information."

According to SAP's Pype, to design an effective dashboard, you've got to know your audience. "Things can get really cluttered really fast," she said. If it's in an interactive dashboard, give a good overview first and allow users to filter and drill down to relevant details. And be sure to create different dashboards for different audiences. "The interaction should lead them to ask the questions they need to ask. Anticipating the question will support the user's analytical flow."

When creating a dashboard, simplicity is key. "Don't just build it and throw it over the wall," said Saliter. "It needs to be an iterative creation process. Show it to the users. Get feedback and adjust by incorporating that feedback into the next iteration." (See examples next page.)

Tips on dashboards

Following are some tips from D'Ascoli to help you design an effective dashboard.

- Include only the information that is relevant to the decisions senior managers will be making. There is a propensity to include all available data and metrics. This defeats the purpose of the dashboard and will make it difficult to identify key pieces of information that will drive better business decisions.

- Keep the metrics strategic, objective and measurable. Example: In finance, it's not important to measure the number of projects implemented; we want to know what impact those projects had on company performance.

- Provide a clean, consistent dashboard that conveys insight. Many dashboards include a plethora of colors, graphs, and fonts. Competing or inconsistent use of color will draw the eye in a variety of directions and confuse the audience as to what the colors mean. A variety of graphs require the reader to continually decipher the meaning, slowing them down as they work to interpret the meaning of each type of visual.

- It is essential to design effective, actionable dashboards. It is often the case that a report suggests something counter-intuitive to corporate thinking or tradition, so the information included must be defensible and accurate. The design must demonstrate knowledge of business processes in order to inspire confidence.
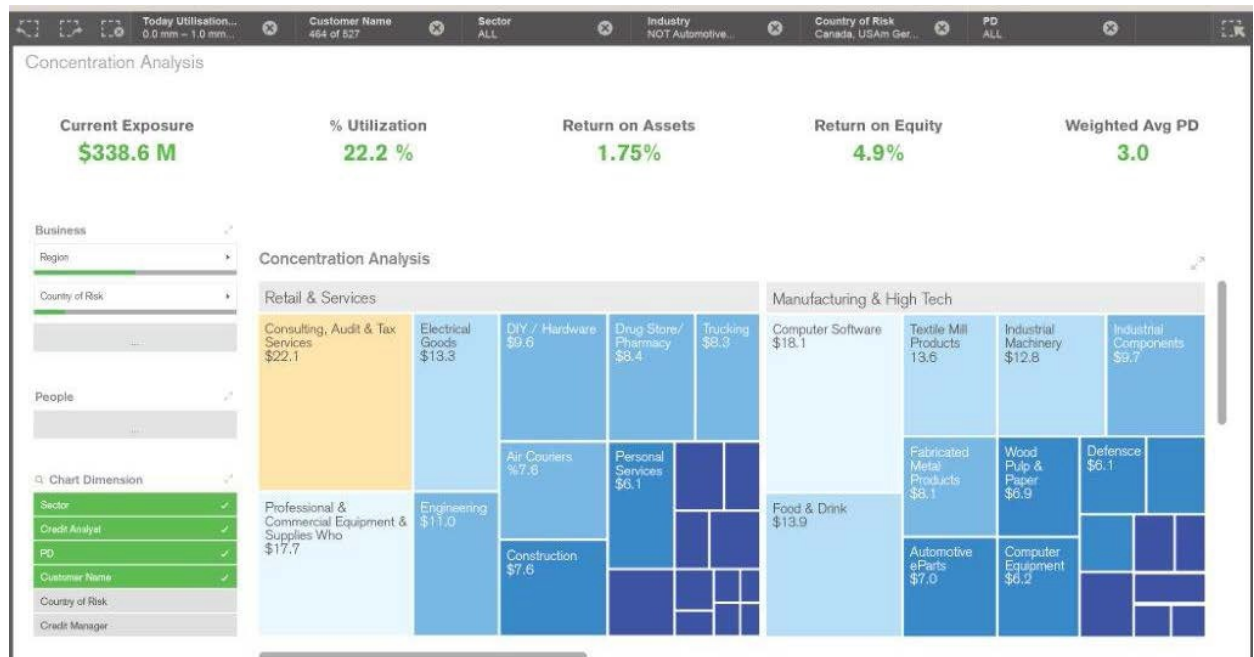
Dashboard Examples: Qlik

Finance KPIs: Executive CFO dashboard combining key performance indicators from multiple data sources, including unstructured commentary data.
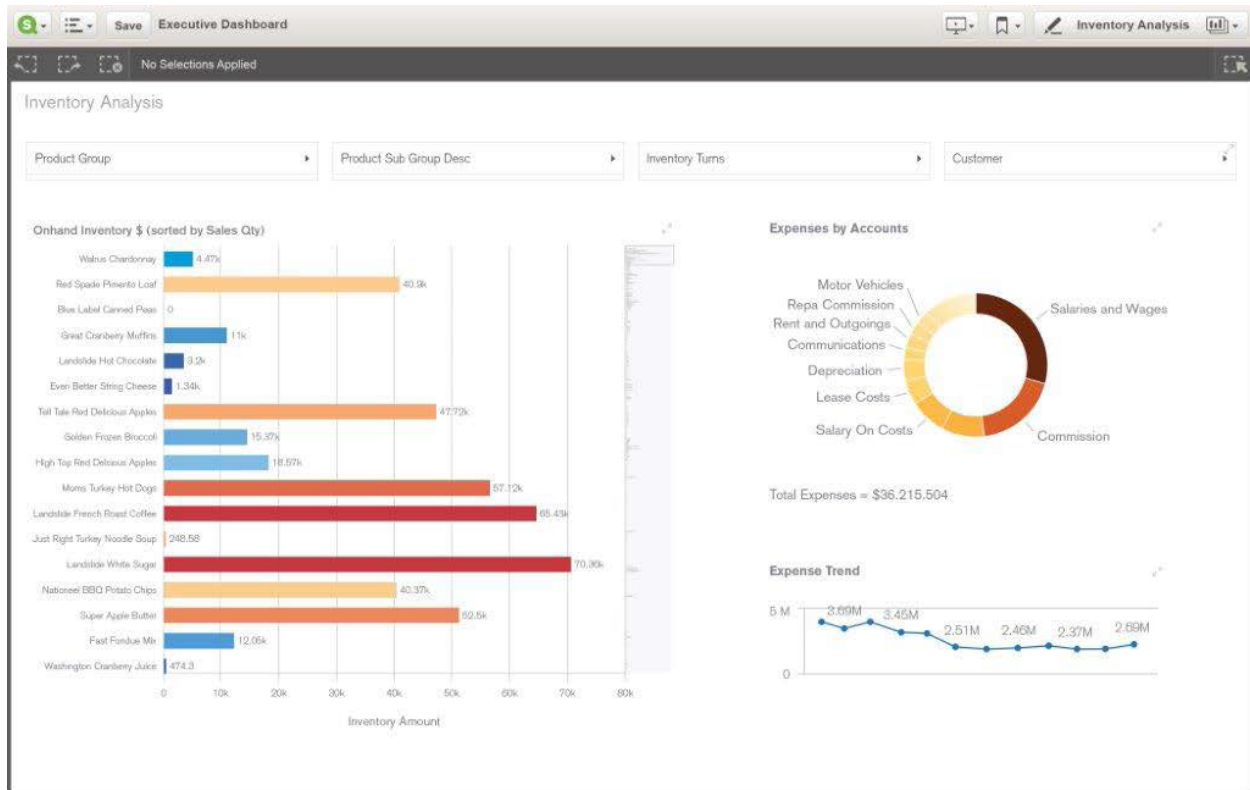

Credit Risk: Financial risk KPIs and heat map showing concentrations of risk across different dimensions (e.g., industry, customer, country, credit manager).

Exec Dashboard: Inventory analysis from a supply chain provider that correlates inventory against sales and expenses.

Practitioner perspective

The message needs to be tailored to the audience. How that's done depends on the objective of the message, according to Barisic. "For the board and for senior management, I prepare materials with a high-level focus, including only the most salient points necessary for decision-making, over the horizon risk management, or as support in strategic objectives development," she said. "For operational leaders, the focus is on more detailed, specific and technical information. Operational leaders need information to enable their day-to-day decision-making, so messaging needs to be focused and more frequent.

"Before even beginning the dashboard design, I think very carefully about the objectives of the dashboard, the messages that it should convey, the audience who will utilize the dashboard, as well as the frequency of data updating and dashboard dissemination," Barisic continued.

Once she has that information, Barisic decides what data she needs to collect. She then sketches the graphs on paper and moves them around so that the real estate of the one-page dashboard is utilized most efficiently and effectively. "I also ensure that related data is not fragmented," she said. When she's satisfied with the design, Barisic moves the graphs into Excel "where I make further iterations based on how well the graphs I have chosen actually convey the story I wish to tell."

As for the level of detail, dashboards should portray information in a clear, concise, meaningful and efficient way, according to Barisic. "Dashboards are meant to provide an at-a-glance monitoring, which can only be achieved if the level of detail is minimized based on the audience," she said. Summarized information that requires additional detail once initially reviewed should be provided as a supplement to the dashboard.

Ultimately, Barisic said, "dashboard design and development is an iterative process. Even when the initial draft is completed and presented to the audience, we should be receiving and welcoming additional feedback on the dashboard itself and how well it is communicating to the audience. This feedback is then incorporated into future iterations of the dashboard."

Barisic sticks to one page or a single screen for at-a-glance review. "Measures that are related and need to be reviewed together should be on the same page (basic visual perception and data visualization studies)." Fragmenting data is not recommended when data shown is linked and needs to be viewed together. This is not only important for dashboards, but for the design of other financial management tools as well (e.g., financial system design, particularly data entry screens).

"The goal of a dashboard is to communicate information to an audience in a simple, clear and effective way," Barisic said. "This means that we need to fully understand the objectives of the audience before designing the dashboard. Once we have a good understanding of their objectives, we have to decide on an appropriate display media to use: graph types or well-designed tables. We need to know how to organize dashboard information so that data is meaningfully and effectively organized and not fragmented."

Consistency is also important. "Choose a display media or two and stick to them," said Barisic. "If you have multiple display media, such as bar charts, line charts, tables, etc. in one dashboard, the viewer will need to adjust their view and perception to absorb the layout and message of each display/. "This adjustment takes time that most executives have very little of, especially if they are trying to very quickly make a decision."

To assess whether a chart is good or not, "I look to see if the graph enables me to process all of the data quickly," Barisic said. The question she asks is: "Can I easily interpret the graph, and is my focus drawn to data or some other aspect of the graph?" She also looks to see if the information is presented via an appropriate media/graph type. "Then I continue to evaluate the scaling and labeling and the use of color. Has everything that needs to be eliminated from the graph been done so that the focus is on data only?"

According to the high-tech company finance director, the company uses multiple dashboards with numerical information for the finance folks who want to see the numbers behind the image. The dashboards are almost always daily and include some graphics. While he says that there are no hard-and-fast rules on how to design good dashboards, "We try to design them to fit the broadest set of users and make them highly legible and consistent," he said.

Øyvind Strand, business domain responsible for finance, HR and CRM for the Business Intelligence Competency Centre at Norwegian risk management firm DNV GL, has been working with maritime, technology and energy performance management and business intelligence his entire career. The objective of DNV GL, he said, is to make itself and its core customer smarter, safer and greener. "We use performance management and fact-based analytics to differentiate ourselves," he said. The dashboards are thus not only used internally but also in customer interface**.**"

"The whole objective with KPIs is to support everybody in the organization to make better decisions and to contribute to developing the company," he said. "And the main challenge is to ensure the measurement generates action. The problem is often that employees cannot see how their actions fit into the overall goal. So visualization is for top management as well as for providing line-of-sight to employees so they can see how they contribute to the goals on a daily basis. Customer service managers or key account managers must be able to see how to work toward the customer, improving the services provided and business processes in order to contribute to the strategy and growth.

"We were challenged to trigger engagement and introduce celebration of good results — not just red flags. Over the past 3-4 years, we have tried to wrap this information into a good story, because good stories always have a compelling advantage," said Strand. "When we started to work with a strategic KPI dashboard, it was mainly meant for senior management, but then it became about getting everyone in the organization to understand our main objectives and strategy and to see beyond their daily work."

DNV GL Dashboard
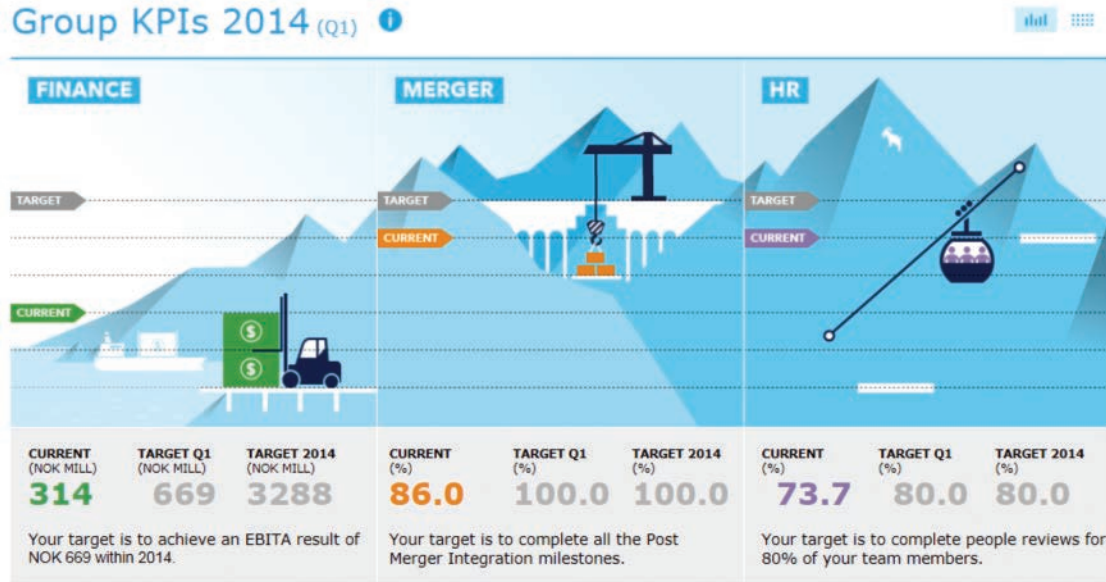
Source: DNV GL. Data shown is for illustration purposes only and does not reflect DNV's real status.

According to Fleishman, the most effective dashboards are one-pagers that are not too dense and use all the information on the slide to tell a story in a unique way. He's a fan of switching out the graphs so people don't get used to seeing the same thing every week and are instead drawn to the new image. "It gets people attention because it's new," he said. "Adding a little text to explain the visual is also very helpful."

Mann disagrees. "When I think about what graphics to show, I think about two things: information that's recurring on a monthly or weekly basis that should have a consistent format and consistent graphics, for example P&L; and expenses on a monthly basis versus budget, performance metrics. You need to establish a common format. That makes it easy for executives to scan the report and instantly get a sense for how the business is performing."

Taking dashboards to the next level

According to Strand, "The best way to become smarter and differentiate yourself is to give the customer something that's not offered by others. In the maritime area, for example, our customers must ensure that their vessels comply with a number of quality standards. For instance, the port authorities control the vessels coming to port. If they do not comply with the requirements, they will get deficiencies and, in the worst cases, be detained and not allowed to leave port. This is a big threat to the ship owners.

"Port authority controls mean higher costs and loss of income for the ship owner," he said. "We have systems in which we track a lot of data related to a customers' vessels and the segments that are natural to benchmark them against. We are able to assist them in identifying the problems, analyzing possible causes, and recommending improvement activities — all based on the available information our customer service managers possesses through this performance dashboard. It's not about the data only. It sparks dialogue with customers and builds trust between us."

Example Dashboard #1
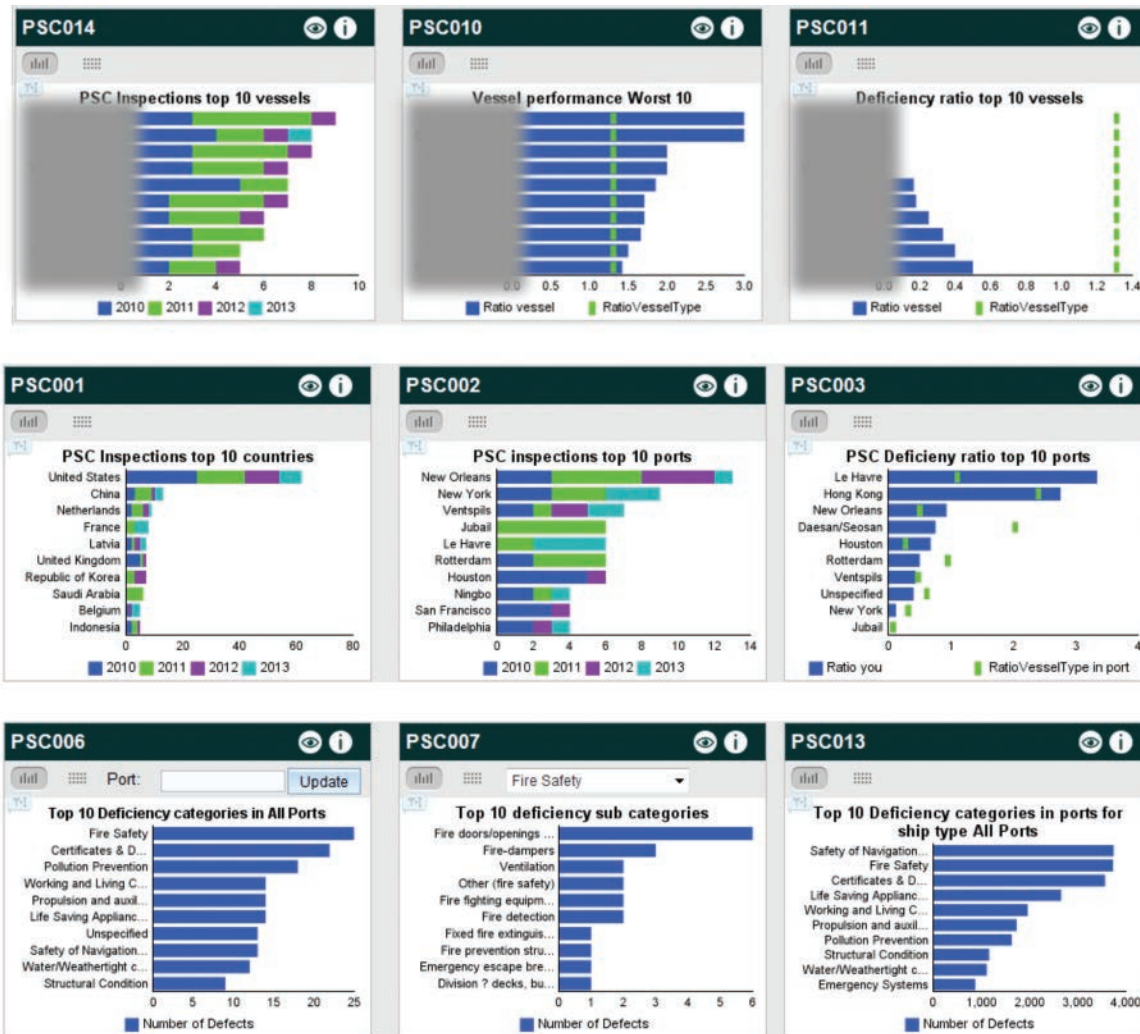
Not everyone tailors the message to specific audiences. "Interestingly, from a visual standpoint, we communicate a good bit of the same information in the same form to different audiences," said Dan McGowan, CEO of Pioneer NV Federal Credit Union. "For instance, it's not uncommon at our monthly staff meetings for employees to see some of the very same PowerPoint slides the board sees at its meeting," he said. "A big part of the reason for that is a desire to be transparent to all stakeholders." Still, he said, "We note that some of the associated verbal commentary may be modified to fit the audience."

The dashboard the credit union uses has been nationally recognized more than once as an example of best practices in the field. "Admittedly, to the casual observer's eye, it may look like a jumbled mess of tables and graphs," he said. "But to the CEO, CFO, and COO, this one-page, legal-size landscape dashboard tells us where we begin the day every day of the year and keeps us focused on the key success factors of the business."
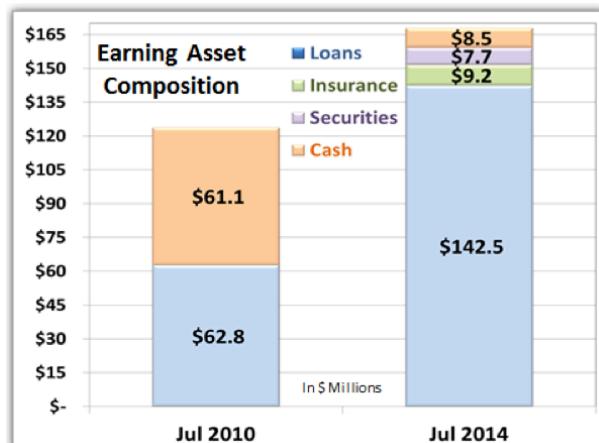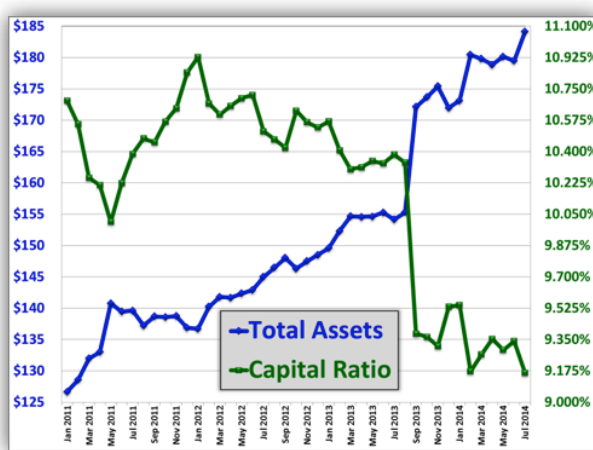
Example Dashboard #2
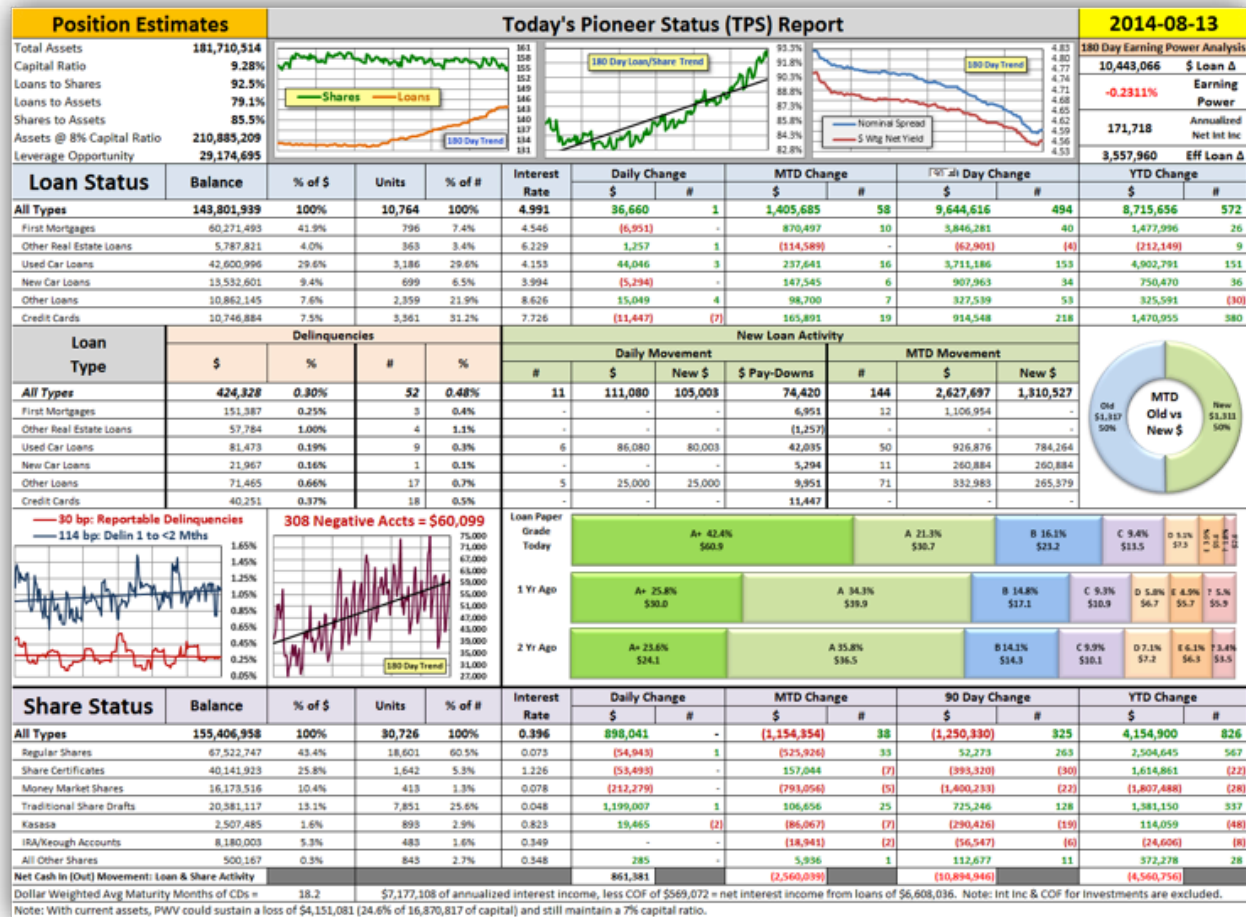
McGowan frequently uses double-axis graphs to show relationships among different items.

And year-over-year composition of assets to show the trends:

Source: Pioneer NV Federal Credit Union

Don't give up on tables

"My central premise is that presenting numbers is a communication skill," Bolten said. "One of the things that you have to do is present them in a way that your key information can be easily and quickly grasped. That's especially important in a world where people aren't spending much time looking at your information. If you know that people in your audience spend five minutes, how clearly you present the information can mean the difference between their spending five minutes absorbing the content, or four minutes figuring out how to read it, and just one minute absorbing the information. Of course that's true for both graphs and tables.

"My recommendation is to consider presenting more information in tables. It's a more consistent and concise way to present all of the information. Then pick 2-3 graphs for the week. By selecting only a handful, you're more likely to make executives understand the important points," he said.

"Visual presentation is most useful when you're trying to present a trend or pattern," Bolten said. "The problem with most graphs is that they take up a lot of space to present relatively little information. Often you're just trying to communicate information and not make any specific point, and you don't know which data points the people in your audience will be most interested in. Presenting all that information in graphical form may just end up being boring, confusing, and uninformative."

"While it's true that many people insist they prefer to get graphs, the reality is that if you showed executives a bunch of graphs and then instructed them to turn off the screen and tell you what they've learned from the graphs, you'd be astonished by how little information they'd have actually absorbed," Bolten said. "I absolutely think there's a place for graphical presentation. It's just that it's too easy to make the assumption that presenting in graphs and tables is just a matter of presentation preference. It has to be about the kind of information that's being portrayed. There's really a time and a place for a graph and a table. The overlap isn't nearly as big as most people think. Even if you do the graphs correctly, the information content can be surprisingly light. Tables can be more complete and more precise. When you create a graph, have somebody else look it over and then ask them to tell you what they've learned from it. You'd be surprised what you find out."

Pie charts

There's a big debate about the utility of pie charts. Most experts advise against them, noting that they are harder to read and often the small differences between slices are easy to miss. Below is an example of a chart first created as a pie chart and then, when rules of best practices in visualization are applied, recreated as a bar.

"Our current belief is that getting rid of either completely is not productive," said Laird. "Our built-in construct library does contain pie charts for certain contexts; we believe they are especially useful when comparing the impact of two different scenarios on an annual basis when limited variables (3 or 4) are involved (usually a business unit or region). In this case, it might be any measurement: OPEX, bookings, revenue, contribution margin, etc. Many would argue that a column or bar format would be preferable even in these cases. We would say that, especially in the example provided here, simplicity is actually preferable and easier for cognitive processing."

According to Mosely, pie charts can act as a useful visualization

- When you want to affect your audience emotionally.
- When you want to quickly communicate a part-to-whole relationship.
- When approximate values are enough to have a productive discussion.

But only if …

- The parts make up a meaningful whole; if not, use a different chart.
- You can define the entire set in a way that makes sense to the viewer.
- The parts are mutually exclusive; if there is overlap between the parts, use a different chart.
- You want to compare the parts to the whole, rather than to each other.
- You have fewer than eight parts; pie charts with lots of slices (or slices of very different sizes) are hard to read.
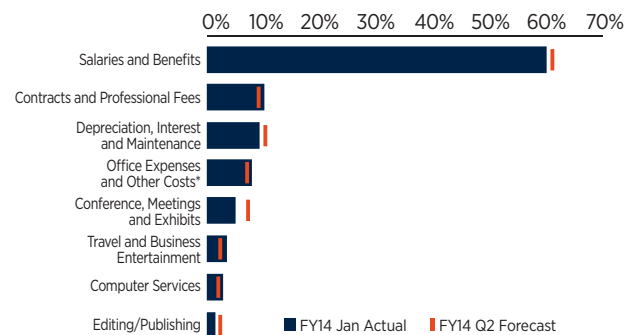
FY 14 Q2 Forecast Total: $750,000
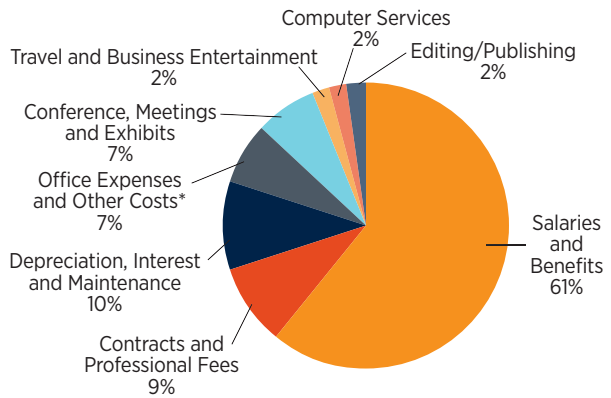
FY 14 Jan Actual Total: $387,000k
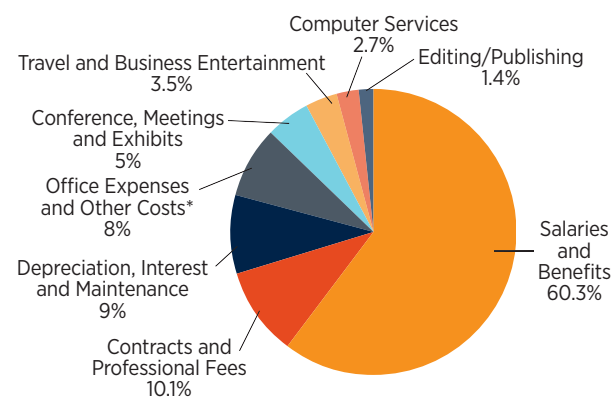
*Other costs category includes marketing and promotions costs.

Data graphed after applying data visualization rules:

*Other costs category includes marketing and promotions costs.

Multiple benefits were achieved by applying data visualization rules:
a. Two graphs have been combined into one allowing for
   a. Easy comparison between data sets (FY14 Q2 Forecast to Actual)
   b. Additional real estate on documents with limited space
b. Different type of display media was used to more clearly show the relationship between the expense types
c. Color was used sparingly to mark forecasted expense percentages drawing attention to the most important aspects of the graph
d. By using a different display media there is more data flexibility. For example, another dimension could be added to the bar graph such as FY14 budget data etc.

Conclusion: How FP&A interacts with data visualization

The ability to interact with data is growing, and data visualization is expected to become more and more utilized among finance professionals as they realize the power interacting with their data, especially as the amount of data expands exponentially — and the pressure to produce dynamic insight for management continues to rise.

"While are seeing greater adoption among FP&A professionals," said FTI's D'Ascoli, "I would characterize usage as fairly low among finance teams today. We currently see much more usage of these tools in commercial areas of the business, sales and marketing as an example. I think there are several opportunities for FP&A to better leverage data visualization within their company. For example:

- Using better graphical depiction of financial results, budgets and forecasts across the many attributes of a business can yield better insights.
- In companies where data analytics are not widely used, FP&A has an opportunity to enhance its position as a business partner and knowledge broker.

"Visualization enables the analyst to interpret data, both text and images," added colleague Vic Datta, a senior managing director and leader of FTI's Office of the CFO's Performance Management Practice. "The new business environment demands a richer, more complex understanding of trends and indicators, which cannot often be obtained by traditional analytics," he said. "Visualizations are so capable and powerful at conveying knowledge that they can be more effective than words at changing people's minds.

"One of the most important benefits of visualization is that it allows us to access huge amounts of data in ways that would not otherwise be possible," Datta said. A recent Gartner study revealed that approximately 70 percent of company analysts are still using Excel as a primary tool. However, that trend is changing given the quantum increase in data that needs to be analyzed — complex analysis outside the capabilities of Excel.

Visual tools have been steadily gaining traction for some time now as a great way to share quantitative analytics, according to Adam Berry, managing director of Financial Enterprise Data Analytics at FTI. In fact, the types of tools that are in the market today are much more advanced and attainable than in the past. "That naturally has led to more FP&A professionals looking at visualization as a more effective way to present analysis," he said. "While a good, old-fashioned table or chart is often the

standard way for FP&A professionals to measure and report, more and more we are seeing a downward push for visualization methodologies as a result of management being exposed to the concept of dashboards and data visualization."

According to Liao, it's harder for FP&A professionals to do their own data discovery using graphics because it assumes accessibility to those tools, which, in many cases, are implemented in a business intelligence center of excellence. "No matter how much visualization technology is out there, you still have to understand how data is related to explain anomalies and how things are showing up," she said. "Visualization doesn't take away from the fact that they need to understand their data models. That doesn't go away."

For finance professionals, there are certainly more tools available today that enable information visualization and make it more digestible. "Still, although they produce a shorter and more digestible version of data, a lot of the graphics are static, using a couple of key metrics for how the company is doing operationally, financially and from a customer perspective," said Liao.

"What our product does, and what other vendors are trying to do, is to offer a closed loop discovery, validation and communication process through data story-telling," explained Saliter. For example, revenue may have trended down this year, but there may be a valid reason, which can be called out with an interactive data story-telling narrative. "Furthermore, by clicking through the visual, you can find the underlying drivers of why that's happening. The BI and analytics industry analysts are recognizing this as a key capability."

Qlik uses its own software extensively internally. "Our entire finance team actively uses Qlik software—we have dozens of applications that help manage all aspects of the business for users from our CFO all the way down to junior analysts," Saliter said.

Saliter sees more companies use the visualization software to deal with issues like big data. Companies like MacAfee with 125 million users in 120 different coun-

Software packages

Here's a partial list of some of the software packages available for data visualization:

- Adaptive Discovery by Adaptive Insights
- Tidemark Storylines by Tidemark
- Tableau Software
- QlikView
- TIBCO
- Spotfire
- IBM Cognos Insight (ex-TM1)
- Microsoft Power View,
- MicroStrategy Visual Insight
- Oracle Exalytics appliance
- SAS Visual Analytics
- SAS for Big Data
- SAP Visual Intelligence

Packages like Tableau, QlikView and Spotfire link directly to source data. Some can also do calculations directly in the application to convert data into useful information, according to Robertson. "They are a poor man's data warehouse," he said. Instead of having to rely on IT, the packages allow a user to connect to disparate data directly and perform the necessary calculations. For example, volume may be in one dataset and pricing in another.

While large systems like COGNOS, Adaptive Planning and Hyperion have dashboard capabilities built in, "it's the interactivity of some of the standalone packages that is where the real power is," Robertson said. "My personal feeling is that the dedicated products outside these common architectures do the best job."

The value add is that many of those packages offer predesigned graphs and standard visualization tool options — something that would take a very long time to do in Excel. "It would take me too long," said Robertson. "The process of creating board presentations, cutting and pasting from various sources can dispensed with. Refreshing current data with everything formatted correctly ensures data integrity. It gives you more time to think."

tries needs to sift through big data items that include subscriptions, payments and renewals. The FP&A group previously handled all data analysis with a small team at headquarters. Before Qlik, McAfee estimated that approximately 50 percent of the finance group spent 50 percent of their time gathering reports, which left very little time to analyze the data and make the appropriate business decisions. Using Qlik, they now estimate that there has been a 30 percent reduction in employees' resources and time devoted to gathering reports, according to Saliter.

In addition, because Qlik is intuitive software, the universe of people who can use it now numbers in the thousands. "Usability is the big paradigm today," Saliter said. "The shift in data visualization and data discovery has moved from necessitating very specialized analytical skills to a common activity that people can do without much training."

"There needs to be one common business language for users to engage and interact with that information," said SAP's Mukherjea. "Depending on where you sit within the FP&A organization, the type of content you interact with may be different — from basic visualization to how to show comparisons among regions. There's a lot going on to provide best practices on how they can visualize that information."

From an FP&A perspective, five years ago, a lot of IT software providers were expected to provide an end-to-end solution. Not just the planning and modeling, but the visualization too. That's changing. "People want to do their own reporting using add-ons, often that means PowerPoint and similar plug-ins. They want the ability to create their own context for reporting and analysis," Mukherjea said.

"Organizations regularly resort to presenting data in summary tables and generating graphs and charts with spreadsheet applications," said Cokins. "As business data gives way to big data, these approaches are increasingly inadequate and fall short of producing useful, accessible views of data, which hurts the quality of the conversation with management.

"At the same time, an increasing number of users have the desire, wherewithal, and need to engage in their own exploratory data analysis projects. Further, the volume and complexity of the data are becoming too overwhelming, and many organizations struggle to see the forest for the trees — i.e., to discern patterns or insights from a mass of detail.

"What was once the sole responsibility of statisticians and data scientists has trickled down to a much broader group of business users. Although these users may lack statistical expertise, their deep understanding of the business itself can make access to the right analytical tools invaluable, especially visualization tools, for improving operational efficiencies and identifying new opportunities," said Cokins.

"The exploration and visualization of data facilitates the process of self-discovery," Robertson said. "It allows end users to be independent. They can discover the trends and the information that's really important to them. There's a basic construct that IT and/or finance produce charts and data views on a regular basis that managers find useful. It is much more powerful to provide users with the data in a structured environment and invite them to explore and discover what they think is important."

"If you think of our senses, visualization is the primary sense we use to understand the world," said Robertson.

Checklist: Best practices

- Always have a full understanding of the story that needs to be communicated and who your audience is.
- Tailor communication based on who the audience is: e.g., high-level focus versus more technical detail.
- Before starting the design of graphs and tables, carefully think about the objective of the information to be presented, what information would be relevant, how to best organize and visualize this information, and what medium to use.
- Always think of the audience when deciding what information is relevant, necessary, and how to best present it. What should the takeaway be for this particular audience?
- Sketch graphs on paper as you think about how best to organize the data.
- Are the graphs just nice to look at, or will they provide a deeper understanding, spark action, or create a demand for more information.
- A touch of subtle humor in the graphic elements (clip art, etc.), when appropriate, also assists in communicating the message.
- To keep graphs relevant, connect your presentation with and try to relate it to what people would do in those situations.
- The right things are almost always about the customer problems you're solving, why those are important problems to solve for your customers, how those problems impact your customers' businesses, and how you solve those problems better than your competitors.
- Series data lends itself to visualizations since trending can be easily depicted. The same is true of geographical data — you can show geo-special trends through mapping. Some of the best discoveries are made by combining multiple disparate sources into a single visualization.

- Have governed data that can be trusted. This is where IT has a big role in ensuring data is coming from sanctioned sources, otherwise you risk garbage in and garbage out.
- There are a lot of little decisions about how your graphs look that can have a big impact on their effectiveness. Be sure to make those decisions yourself rather than letting the software make all the decisions.
- Less is more. Too much data introduces complexity and potential confusion. If it's not relevant, don't put in on the page or include in your message.
- Anticipate questions in advance.
- Be unique but stay clear and concise.
- Tie related information together. Without putting related data together, you create a higher level of confusion.
- Keep reports to one page.
- Don't shrink font size to fit the page.
- Put hard copy in the hands of the recipient; don't send them to the server. Follow up with an email attachment.
- Attach a cover memo and table of contents if it's more than one report.
- Put numbers in context. Don't make them dig out the last report; provide all the necessary context in your report.
- Revisit the design of your reporting frequently. Routine reporting can get stale quickly.
- Highlighting only one thing can be overly simplistic. There are ways to mark more than one thing without confusing the audience.
- While different audiences matter, most people perceive things the same way. That's the science and reality of it.
- If you have a very complex chart, think about whether it's really necessary to the story. Reduce complexity and simplify the image if you can.

Checklist: Things to avoid

- Don't try to entertain the audience while losing sight of the message.
- A lot of data transparency can be lost in overcomplicated data graphing.
- Trying for impressive graphing that is perceived as intimidating doesn't accomplish the communication objective.
- Avoid having too many variables on the same chart, generally no more than three.
- People should have their "aha moment" in 10 seconds rather than having to spend time figuring out all the axis.
- Graphs can have a lot of unnecessary ink, including grid lines, borders and shading, which can distract from the data.
- There's also the potential to "lie" with the data by changing the aspect ratio or scale, such as not starting a bar graph at 0.
- Graphs can also become a distraction if they're simply eye candy: if it's not actionable, it shouldn't be there.
- There are definitely drawbacks to using the wrong charts for the wrong data. Never use a line chart if the data does not incorporate a time dimension for visualizing trends. Similarly, don't use pie charts if you are not comparing parts of a whole.
- The drawback in visualization is that even the best tools don't prevent you from building a bad chart. That's where best practices and expertise are really important.
- There are clearly opportunities to misuse graphs, such as getting caught up in the sizzle and forgetting about the data.
- Don't let your visualization initiative become an IT project, or sit within an area that doesn't understand the key business questions.
- Dashboards that don't address the key questions are irrelevant and even misleading.

- Do not allow the design of visualizations to compromise the integrity of the data. The integrity of the data is vital. Its source must be clearly stated, and it must be directionally correct.
- Don't provide excessive detail and granularity, at least with the initial overview display of the information.
- Single charts can become a distraction. Sometimes when the pictures are pretty and complex, there's a tendency to get sucked into the things that don't really matter.
- Visualization can be used to manipulate the truth or hide the real insights to fit the presenters' agenda. Data visualization allows for data framing, as the presenter picks and chooses what to share. This can create misleading analysis. For example, the range of an axis of a bar chart can skew the perception of parts of a whole.
- Stay away from 3D graphs that obscure data and pie charts that are hard to read.
- The graph needs to add value where it matters. Make sure it's not all about entertaining the audience. It should always communicate a story or support a decision.

About the Author

Nilly Essaides is Director of Practitioner Content Development at the Association for Financial Professionals. Nilly has over 20 years of experience in research, writing and meeting facilitation in the global treasury arena. She is a thought leader and the author of multiple in-depth AFP Guides on treasury topics as well as monthly articles in AFP Exchange, the AFP's flagship publication. Nilly was managing director at the NeuGroup and co-led the company's successful peer group business. Nilly also co-authored a book about knowledge management and how to transfer best practices with the American Productivity and Quality Center (APQC).

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General Inquiries	AFP@AFPonline.org
Web Site	www.AFPonline.org
Phone	301.907.2862