The Competitive Imperative for Good Charts


Overview

Data visualization is no longer a nice-to-have skill for a few visually minded people in organizations. Increasingly, the ability to effectively communicate through visuals is a must-have skill that helps organizations make sense of the data they collect. Data visualization helps others see the risks and opportunities in data. Prerequisites for effective data visualization are an understanding of the context needed for various charts, as well as a data visualization team composed of a design thinker, data wrangler, and subject matter expert.

Context

HBR’s Scott Berinato discussed the importance of effective data visualization, as well as what makes a good chart. He reviewed examples illustrating how to turn ordinary charts that show data into great visuals that communicate ideas.

Key Takeaways

- **Organizations that invest in visualization create a competitive edge.**

  Visualization makes complex concepts more accessible to audiences. When people must make decisions based on large volumes of data, it can be very stressful. Visualizing information can help individuals make better decisions, faster. This suggests that organizations that invest in data visualization have a competitive edge.

Berinato offered three examples:

- **Tesla.** Tesla cars contain sensors that constantly send data to the company where teams visualize it in real time. The company has embedded visualization into its operations.

  The chart below shows tire air pressure over two years. It illustrates when people refill their tires, as well as which tires tend to be flatter than others. Tesla uses visualizations like these to reengineer their cars because they can see how people actually drive. The company has used information derived from visualizations to change how they communicate with customers. They can see when people don’t refill their tires or whether tire pressures are low when they leave the factory. Data visualization is the only way to gather these insights. Looking at the raw data alone isn’t enough.

- **Houston Rockets.** This basketball team is a hotbed for data visualization. Darrell Morey, the general manager, has said the team must have visualization to compete. There’s no other way to get ahead of other teams. The team is actively investing in data visualization.

- **Carlson Wagonlit Travel.** A new manager was asked to explore who suffers most from travel stress. The company believed people who travel most experienced the highest levels of travel stress. Carlson Wagonlit had built programs around that assumption. In reality, the data showed the opposite. The more people travel, the more predictable their stress is. In response, the company adjusted its programs, changed its client communications, and modified what they offer clients who travel infrequently.
Context is the foundation of good charts.
Perceptual fluency research suggests that if a chart is hard to interpret, people view the information as less credible. This reinforces the importance of data visualization. It may be better not to show anything than to show a bad chart.

When people look at charts, two things happen:

— They analyze the “grammar.” This is a mistake because it is the ideas in the chart that matter, rather than the chart’s colors or format. Even if the chart’s grammar is perfect, it doesn’t mean the chart is good.

— They engage in preconscious processing. The brain likes pretty charts. However, attractive charts aren’t necessarily good. They may simply be eye candy.

The foundation of good charts is context. Before people make charts, they must ask: What am I trying to say to whom and where? It’s important to ask questions that will clarify the idea of the chart, rather than its structure:

— What does the audience know already?
— How much time do I have to present?
— How will the charts be displayed?
— What am I trying to accomplish with the charts?
— How big is the room?
— What do I want the audience to do with the information?
— Has the audience ever seen this type of chart before?
— Who else might see the chart?

Good charts combine high contextual awareness and good design principles.

Based on context, simple data sets can take on many different forms.
Berinato used an example from the audience to show how context can influence how charts are constructed. A session participant provided data about how students contact the institution.

Figure 4: Sample Data - Student Central Contacts
Berinato presented this data set in six different ways to show how context matters:

1. I want to compare totals. This presentation stacks the data and provides an immediate impression of phone, in-person, email, and virtual agent contacts. With this chart, it’s possible to make judgments about what’s happening over time.

Figure 5: Compare Totals

2. I want to highlight a trend. This presentation focuses on digital communication trends by combining email and virtual agent data and using orange to attract viewers’ attention to email and virtual agent contacts.
3. **I want to see snapshots.** The audience may be interested in snapshots of the data on a year-by-year basis. This presentation shows the yearly changes, but doesn’t show the spikes over time.

**Figure 6: Highlight a Trend**

![Graph showing students moving to email and virtual agents](image)

4. **I want to snapshot a trend.** Using the year-by-year presentation, it is possible to emphasize the shift to email and virtual agents.

**Figure 7: Yearly Snapshots**

![Graph showing student central contacts](image)

5. **I want to see the simple trend.** Slope charts simplify trend lines, by picking the snapshot points and connecting the lines. In this case, a slope chart shows year over year what the trends are for student contacts.

**Figure 8: Snapshot of Trends**

![Graph showing students moving to email and virtual agents](image)

6. **I want to highlight the simple trend.** By using gray for the email and in-person trend lines, the chart underscores that virtual agents soon will be overtaking phone contacts.
Democratization means data visualization is accessible to more people, but the results aren’t always good.

As technologies mature, they encounter a democratizing moment. That occurs when the technology becomes cheap enough to acquire and easy enough to use that many people start using it. Thanks to democratization, anyone can create music using Garage Band software and anyone can create websites with HTML.

The same dynamic is occurring with data visualization. Chart Wizard in Excel has made visualization accessible to the masses. More visualization doesn’t, however, equate to good visualization. In many cases, convenience trumps the skill and art required for effective data visualization.

Today, analytics dashboards have become easy to build. Yet, they are often confusing and frustrating. In the example below, the dashboard on the left is intended to show the ranking of different business units in a company. After sketching and prototyping, Berinato offered a more effective way to show how business units were performing against one another and against the average, as seen in the chart on the right.

Effective data visualization is a team effort.

Many organizations invest in data tools and data scientists, but don’t get the visualization results they were anticipating. They expect to find one person who possesses data thinking and data wrangling skills, as well as subject matter expertise. Those individuals are unicorns—they don’t exist. A team approach is required today, just as it was in the past.

In 1912, data science was an expensive, labor-intensive endeavor that required teams of dozens. By the 1950s, data visualization was more accessible, but was still a team effort. Even today, it is essential to assemble visualization teams composed of a design thinker, a data wrangler, and a subject matter expert. This is worth the investment. Data visualization teams engage in agile practices and are ideally co-located so they can learn about one another.

Boeing, for example, uses a practice called paired analysis. This approach was used to address bird strike problems with aircraft. A subject matter expert and a data tools expert reviewed the strike data by time of day, day of the month, and geography. Contrary to what people believed, they discovered that many strikes occur at night. In response, takeoff and landing patterns have been changed, as have flight schedules. A designer then created charts to clearly convey the information to executives. The result is charts with very little data that clearly address the context.
Biographies

Scott Berinato

Scott Berinato, senior editor at Harvard Business Review, is an award-winning writer, editor, content architect, and self-described “dataviz geek” who relishes the challenge of finding visual solutions to communication problems. At HBR he has championed the use of visual communication and storytelling and has launched successful visual formats, including popular narrated infographics, on HBR.org. In addition to his work on visualization, he also writes about technology, business, science, and the future of publishing. He has a master’s degree in journalism from the Medill School at Northwestern University.

Dr. Darla M. Cooper
Director of Research & Evaluation, Research & Planning Group (The RP Group) for California Community Colleges

Dr. Darla M. Cooper is an educational leader and expert in research and evaluation dedicated to using inquiry, data, and evidence to improve the lives of all community college students. She currently serves as the Director of Research and Evaluation for the Research and Planning Group for the California Community Colleges (RP Group). In this role, she oversees all the research and evaluation projects for the organization. Dr. Cooper has worked in the California Community College system for almost 20 years, having previously held institutional research director positions at Santa Barbara City College, Oxnard College, and Ohlone College.

She led Student Support (Re)defined, a research project that examined what supports student success, and has been invited to present on this work at various venues across the state. Dr. Cooper is currently serving as one of the coaches for the American Association of Community Colleges’ (AACC) Pathways Project, and on the advisory committee for the California Guided Pathways Project. She is also co-directing a research study funded by the College Futures Foundation that will examine what happens with students who appear ready to transfer, but do not.

Dr. Cooper has extensive experience serving as an external evaluator for several federal and private foundation grants and has worked on various other projects designed to promote student success including the Aspen Prize for Community College Excellence, and the RP Group’s Bridging Research Information and Culture (BIRC) initiative, Student Transfer in Professional Pathways Project, and Accreditation Study. Dr. Cooper also has direct experience assisting students in achieving their educational goals in her previous work at the University of Southern California as a director of research and information, student services counselor, and ombudsperson. She holds a BA in Psychology from the University of California, San Diego, and an MS.Ed. and Ed.D. from the University of Southern California.

Dr. Kevin Pollock
President of Montgomery County Community College

Dr. Kevin Pollock is the fifth President of Montgomery County Community College. He began his tenure on April 1, 2016. Dr. Pollock has more than 35 years of education experience at four-year private and public colleges as well as community colleges. His diverse roles include college administration, strategic planning, leadership, and teaching. He is a national expert on student success models, a frequent national speaker who has spoken more than 100 times at conferences and colleges, and has authored multiple book titles, particularly for AACRAO. His next article, “IT: The Forgotten Student Success Partner”, will be featured in AACRAO Quarterly.

Before arriving at Montgomery, Dr. Pollock served as President of St. Clair County Community College in Port Huron, Michigan, from 2009 to 2016. During his tenure, the institution experienced record enrollment, embarked on new student success initiatives, increased its grant funding, became a leader in green initiatives, and strengthened its connections with the community. The institution also adopted a new vision, mission, and strategic plan that is tied to national best practices and is based on data.

Prior to assuming a presidential role, Dr. Pollock spent nine years as Vice President of Student Services at West Shore Community College in Scottsville, Michigan. He also held a number of leadership roles in admissions and recruitment, and taught middle and high school English early in his career.

Dr. Pollock holds a Ph.D. in Higher, Adult, and Lifelong Education from Michigan State University and a Master of Arts in Education and Bachelor of Science in Education from Central Michigan University.