Beyond the Spreadsheet: Using Data Visualization to Drive Collaboration and Comprehensive Quality

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With the rise of Six Sigma methodologies to near ubiquity, the tenets of defined processes, frequent measurement, and statistics-driven leadership have spread from the board room to the aisles. Digitization of the workplace has made it easier than ever before for many managers to collect thorough and timely data. However, a wealth of information does not always become worthwhile insight. These well intentioned efforts to gather meaningful metrics often fail to convey actionable data in a way that leads key stakeholders to decisive, impactful, positive leadership.

Before choosing or reporting on key metrics, technical and production teams must consider the impact of the metrics chosen. Hauser and Katz discussed this topic at length in their paper *Metrics: You Are What You Measure*. They recount this story:

We recently worked with a credit card company to improve its products and services. This company had a long-standing tradition of using metrics, displaying more than 100 different measures in their lobby for all to see. One critical metric focused on the quality of the plastic used in their credit cards – no bubbles or blemishes were tolerated. But after talking to customers, we found that customers never noticed the blemishes as long as the magnetic strip on the back worked. On the other hand, customers were extremely concerned with other aspects of the service. By focusing on the quality of the plastic, the company was diverting resources away from issues that mattered to customers. By truly listening to and understanding the customer, we helped this company reduce the number of their metrics by more than half and refocus efforts toward those aspects of the service which increased revenues and enhanced profit.

The moral of the story is simple: focus on what matters. The credit card company’s focus on manufacturing quality created excess work and suboptimal results. This story, and other stories like it, became the basis of Hauser and Katz’s paper. They urge all business leaders to choose their metrics wisely, because these measurements will affect employees’ actions and decisions.

In spite of Hauser and Katz’s impressive results, we argue that they missed a more important point – there were more than 100 different metrics, all equally on display in the lobby, and all devoid of context and scope. We propose a different method, inspired by the rise of infographics: routine data collection should be visualized and presented in a way that is mindful of scope and impact.
Successful infographics are geared towards consumers of data. Creating an effective infographic requires that the author considers their medium, their audience, the emotional impact of their graphics, and the natural narrative offered by the raw data. Much of this is specific to individual segments, but some rules of engagement appear universally. These rules create an effective framework for consideration and communication.

**Unactionable Headlines**

Six Sigma practitioners emphasize measurements as a means to actionable insights. This is important, but if the problem at hand is simple enough to express in one figure, it’s key to collect that figure and ignore the rest. Realistically, the goal is to improve a metric too complex to attack directly. The infographic doesn’t shy away from this constraint. Consider some of the following headline values used in various infographics at infographicworld.com:

- **40,362,842**: UK internet users, “Internet Shopping Fraud in the UK”
- **100,000**: People ticketed per day, “Lowering Your Car Insurance Premiums”
- **34.7 million**: Average number of views for 2013–14 NFL wild card weekend games, “Sports and Social Media”

These numbers create a sense of gravity and scope, and encourage the audience to keep reading with this sense of weightiness in mind. They don’t create calls to action. They often don’t even describe the problem!

**Unordered Hierarchical Displays**

Infographics generally contain three or more focal points. Each tells an independent story about the main topic. These individual focal points contain structured, often hierarchical data. At large in the infographic, these data stories are more likely to be arranged for aesthetics rather than continuity.
In the above infographic from West Corporation, three common problems with SMS messaging strategies are called out as primary focal points. Each contains a headline, a statistic describing the problem, and a suggested fix.

The order of these points is not accidental. Interested in selling SMS services, West leads with a message of opportunity: lack of adoption, high engagement rates, and an inability to reach customers through this channel. The final point, too many texts, is only broached after the reader is primed to respond positively towards SMS campaigns. The vertical, mixed-text-size format allows this to be hidden below the fold.

**Discussion Above Direct Action**

A good infographic is informative on multiple points, above all else. The audience should leave feeling more informed about the scope and the nuances of an issue. In contrast, calls to action tend to be secondary, if present at all. In the above infographic, the only real use of the image as an SMS sales driver is to call attention to engagement rates. The infographic is more likely to be useful to steer discussion towards best practices and, in turn, improve West’s key customer-facing metrics.

In the infographic below, a call to action isn’t even implied. It acts instead as the start of any number of conversations: gender equality, Hispanic enrollment, student recruitment, or the impact of rising enrollment overall.
TAKEAWAYS AND APPLICABILITY TOWARD ROUTINE METRICS

Infographics are infamous for cursory descriptions and information overload. Turning your current metrics collection program and converting it unchanged into a visual format is no better than a hundred metrics in the lobby. Our goal is the same as Hauser and Katz: focus on the important and separate the noise from the signal. At first glance, infographics seem to be questionable vehicles for this. Infographics were born in the soundbite era and are almost explicitly geared towards providing a breadth of information for educational entertainment. Yet, the approach engages the audience in a way that leads to the desired outcomes.

Eyes on the Prize

First, consider the unactionable headline. In a business context, this needs to be the ultimate goal. Profits, dividends, growth, market share, customer satisfaction – all of these are excellent choices for headline values. This creates a sense of purpose and primes the audience to think of the bigger picture. We aren't looking at plastic blemishes vs. cost per unit. We're talking about success.

The point still applies to departmental communications. HR has training and recruitment costs and average time to fill vacancies. Production has defect rates. Marketing has customer base growth and cost per sale. Each department has a bigger picture that is in danger of being lost in a sea of metrics that may be arbitrarily chosen as key performance indicators. By headlining the complex metric that can only be shifted with success and excellence, the conversation can be framed in terms of overall success without loss of insight into the particulars.

Diversity in Data

Infographics provide data that is simultaneously unordered and hierarchical. Similarly, the stories of our success are multifaceted, hierarchical, interrelated, and imbalanced.

Reports or spreadsheets cry out for symmetry. If you want to tell a story about profit in detail, you expect to see dollars bucketed into line items throughout. This creates two separate pressures: 1) Assign a semi-arbitrary dollar value to every value add, or 2) Report on fewer items.
Visual data presentation makes no such demands. The cost of poor quality can be expressed in dollars, time, waste, or disappointment. The value of services can be expressed in revenue, profit, product upsells, or goodwill. Labor can be both a cost and revenue source in the same breath. Loss leaders can be framed in terms of their associated ecosystems. The data points we know with certainty can be left in their absolute terms, even if they aren’t line items towards calculating the headline value.

**Describe, Don’t Dictate**

Perhaps most importantly of all, the consumer of visual data is a human being. Good data needs to be engaging. We want data to create confidence, drive questions, and invoke creativity. Data should describe problems and opportunities, and leave the human factor to find solutions. In spite of everything Six Sigma may tell you about the world, business is not an optimization problem. Business is a conversation writ large between brands and buyers. Business is innovation and competition. Business is a high stakes team sport.

Spreadsheets are data. Spreadsheets are optimization problems. Material costs down, labor costs up, unexpected capital expenditure, solve for $x$. The calls to action are relatively simple, but short-sighted. There is a place for spreadsheets, but they don’t drive constructive conversations. Their logic is cold and reductive.

The producers of visual data have the power to recontextualize the powerful metrics derived from a spreadsheet into a broader conversation. Mathematics and measurements are still the cornerstones of informed business decisions, but if we want to consistently drive improvement for our departments, our brands, or our businesses, we need to look beyond the spreadsheet.
A CASE STUDY IN ROUTINE DATA VISUALIZATION

Meet CEEQ. Pronounced “seek,” CEEQ stands for Comprehensive End to End Quality. West Corporation’s Interactive Services unit adopted CEEQ as its standard measurement of software quality. The most recognizable aspect of CEEQ is the CEEQ score, a (nominally) 0–10 score that reflects on several aspects of quality ranging from defect severity, to the status of the fix, to where the defect was found.

The first thing you’ll notice about CEEQ is that it’s not an infographic in the slightest. CEEQ is visual data reporting informed by the rules of audience engagement, illustrated by successful infographics.

Figure 1.0

Internal Testing: 7.64 / 10
CEEQ Score Trend Graph, Affected Version: Phase 2

CEEQ Component Distribution

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The report above is sent out with testing daily summaries on software development projects. The headline value, 7.64/10, sets the tone for the following graphs. The trend graph shows the CEEQ score over time. This is an older project, so bug discovery and remediation are relatively rare compared to the more chaotic early stages. Next, the component distribution graph details the impact on the CEEQ score on a per-component basis. The above table of defect counts gives a rough sense of the average defect severity, both overall and relative to components.

Quality metrics existed long before CEEQ. In particular, West relied heavily on test failure rate as the primary quality metric. Quality was distilled to a single, actionable metric: 8% of test cases failed here. 4.7% of test cases failed there. 9.1% of test cases failed somewhere else. The conversation was straightforward: “Hey, Software/Application Development managers... Why is your code so buggy?” The cause was assumed and the conversation was lost in the metric.

In reality, the causes of defects are complicated. The impact from defects is similarly complicated. CEEQ presents some of the nuance in its reports. The data is sufficient for traditional Six Sigma analyses like Pareto Analysis, both in terms of defect density and CEEQ score impact. More importantly, though, those metrics aren’t headliners. The headline is the complex metric, the metric that only shifts through actual success in reducing the overall impact of defects. The CEEQ score frames the data for the human, and the human can get an overview of the problem in the secondary metrics.

Another instance of how CEEQ differs from an infographic is in the fact that the generation of its visualization is 100% automatic. In this system, we pull data from the popular issue tracker, JIRA, and run it through a relatively simple Python program to generate the score and pass the data to a web front-end. The CEEQ score, while based on our research into what measurable values correlate with a subjective feeling of quality, is not survey-driven. Instead, it is a calculation combining multiple factors – many of which have been used as standalone metrics in the industry, such as defect severity index, defect resolution status, and defect density/distribution.
In the given report, we see defects mostly in newly written application code (as would be expected), but longer lasting defects in specialty voice-recognition grammar code. We see a surprisingly high number of defects related to application design. We also find a number of defects unrelated to the application development team, mostly in voice recordings. Notably absent are components other than the three listed (CEEQ actually measures seven components in the average client implementation). The causes of test failures no longer need to be assumed, and the normal target of the assumption is no longer in a position to blame co-workers for poor metrics, neither deservedly or undeservedly.

**DATA VISUALIZATION DRIVES BEHAVIOR**

At West Corporation, we have found great success with the CEEQ score and strongly advocate its use for both internal and external projects in combination with other key measurements. CEEQ provides the insight we need to deliver applications to our clients with minimal disruption, and influences employees towards a comprehensive, end-to-end, quality-first mindset. The CEEQ score was developed for solutions where the infrastructure (or platform) and the application layers are not abstracted from each other, and they are more tightly coupled than traditional Platform-as-a-Service (PaaS) applications. However, the model works well with Infrastructure-as-a-Service (IaaS), client-agnostic products and platforms.

CEEQ emphasizes overall “feel” of quality by shifting focus to critical bugs and bugs in core components, and incentivizes doing things right the first time, and thoughtful resolution of discovered defects. It provides actionable data for future releases of the same product and root cause analysis for functional group performance. It can be implemented with simple integration into modern issue tracking software and, most importantly, it simplifies metric consolidation into a single impactful statistic. Through data visualization, CEEQ Score helps drive the appropriate conversations around recurring patterns of issues, and provides all project stakeholders better visibility into risk, enabling them to make more informed decisions.

**ABOUT WEST**

West delivers communication solutions that help brands create connected customer experiences. We have 30 years of experience strategically improving customer interaction, enhancing productivity and increasing profitability, with clients in healthcare, education, utilities and diverse commercial industries. West Interactive Services solutions include IVR & Self-Service, Proactive Notifications & Mobility, Cloud Contact Center and Professional Services. Experience Connected at [west.com/interactive](http://west.com/interactive).

**REFERENCES**