It is not enough to mine the meanings that exist in your data. The value of information is not realized until you use it to do something. Used properly, it can make the world a better place.
So much data; so little understanding

Upon this gifted age, in its dark hour
Rains from the sky a meteoric shower
Of facts…they lie, unquestioned, uncombined.
Wisdom enough to leach us of our ill
Is daily spun; but there exists no loom
To weave it into a fabric.

“Huntsman, What Quarry?”, 1939, Edna St. Vincent Millay

This poem by Edna St. Vincent Millay eloquently and poignantly describes our situation today. Our problem is not a lack of data, but rather our inability to make sense and use of what we have.
Information cannot speak for itself. It needs our help. It relies on us to give it a voice. When we do, information can tell its story, and will thus become knowledge. The ultimate goal, however, isn't knowledge; it is wisdom. Knowledge becomes wisdom when it is used to do something good. Only when we use what we know to make the world a better place has information served its purpose and we have done our job.

*Our networks are awash in data. A little of it is information. A smidgen of this shows up as knowledge. Combined with ideas, some of that is actually useful. Mix in experience, context, compassion, discipline, humor, tolerance, and humility, and perhaps knowledge becomes wisdom.*

The amount of information that is available to us has grown much faster than our ability to make use of it. We lack both skills in data analysis and tools that can be used to productively support the process.
To date, business intelligence has mostly focused on technology and project methodology, resulting in great advances. As a result, we have huge and fast warehouses of information. It is now time to focus on the true essence of business intelligence—important, meaningful, and actionable information—and the most powerful resources for tapping into its value are those that engage the tremendous capacities of human perception and intelligence to make sense of and communicate information.

Many organizations aren’t effectively analyzing the data they do have to improve their business. What’s more troubling, perhaps, is many companies that purchase powerful analysis and business-intelligence tools don’t use them effectively. Users of these products often generate the most basic and obvious reports and never get their hands dirty with the deep-analysis tools. By ignoring these products’ deep-analysis capabilities, organizations could be missing important trends—information that might show, for example, where a company is losing business. Companies might also see that business decisions that were made based on basic information were wrong and ended up costing money in the long run.

(eWeek, “With Data Analysis, Less Isn’t More, Jim Rapoza, Ziff Davis Media Incorporated, June 7, 2004)

Today much of science and engineering takes a machine-centered view of the design of machines and, for that matter, the understanding of people. As a result, the technology that is intended to aid human cognition and enjoyment more often interferes and confuses than aids and clarifies.

It will take extra effort do design systems that complement human processing needs. It will not always be easy, but it can be done. If people insisted, it would be done. But people don’t insist: Somehow, we have learned to accept the machine-dominated world. If a system is to accommodate human needs, it has to be designed by people who are sensitive to and understand human needs. I would have hoped such a statement was an unnecessary truism. Alas, it is not.

(Things That Make Us Smart, Donald A. Norman, Basic Books, New York, 1993, page s 9 and 227)
Data visualization has the potential to help business intelligence fulfill its promise of helping organizations function intelligently.
Data visualization is the loom that will weave the data that we collect into the fabric of understanding. Pictures of data can make visible the meanings that might forever otherwise remain hidden.
Though data visualization has become a popular tool of business intelligence only recently, people have been using graphs to display data visually for a long time. In 1786, a roguish Scot—William Playfair—published a small atlas that introduced or greatly improved most of the quantitative graphs that we use today. Prior to this, graphs of quantitative data were little known.
Today, 220 years later, graphs are commonplace, fully integrated into the fabric of modern communication. Surprisingly, however, Playfair’s innovative efforts—spring from meager precedent—are superior to most of the graphs produced today.
Most visualizations communicate poorly.
[When] we visualize the data effectively and suddenly, there is what Joseph Berkson called ‘interocular traumatic impact’: a conclusion that hits us between the eyes.

(Visualizing Data, William S. Cleveland, Hobart Press, 1993, page 12)
Hans Rosling of Gapminder.org has become one of the real stars of information visualization in the last couple of years. When Rosling took the stage at the TED conference for the first time in 2006, he managed to get people up on the edges of their seats to watch—believe it or not—a bubble plot that used animation (motion) to show change through time. When he finished, the crowd rose to their feet to give Rosling a standing ovation. For most of the people there, data presentation had never been so compelling.

Rosling has used relatively simple visualization techniques, featuring animated plots, to tell statistical stories that are compelling, not only because they are told with great charisma, but because they reveal important truths about the world, such as the changing relationship between wealth and child mortality. I applaud his success, in part because it is success that we can share in, for it illustrates to the world at large what infovis can do when it is done well and it is used for worthwhile purposes.
When Al Gore rode a scissor crane up to the top of the CO₂ emissions graph in the film *An Inconvenient Truth*, he became a superstar of visual communications. He compellingly used graphs to tell the story of global warming, which helped public opinion in America to finally reach the tipping point.
Often, the simplest form of display is the most powerful.

(The original version of this display was created by Dr. Robert Kosara of the University of North Carolina.)
Let's be clear about what we mean by simplicity. Information isn’t made simple by displaying with cute and flashy effects. Eye candy might be fun to look at, and there’s nothing wrong with having fun, but fun isn’t the goal—understanding that leads to good decisions is. When cuteness or flashiness undermines the clear, accurate, and comprehensive presentation of information, it becomes worse than useless—it becomes the enemy of truth.

With data visualization, “simplicity” is achieved when information is presented to our eyes so they can clearly see and perceived by our minds so they can clearly understand the meanings that live in the data.

We are often drawn to things that don’t work. Research has shown that people often indicate a preference for data displays that are least effective for presenting that data clearly, resulting in understanding.

We needn’t guess about what works—we have this wonderful thing called “science” that provides ways to find out what works. Data displays must be based on the findings of science, not on whim. Designers of all types, not just those who focus on data visualization, value simplicity for one reason—it works.
The *Oxford English Dictionary* includes among its many definitions of the word “simple” the following:

“Presenting little or no difficulty; easily done or understood.”

Why force people to rely on a legend to figure out what each slice of the pie chart represents, causing them to jump constantly between the chart and the legend to read the data.

Even if you label the slices directly, however, it is still difficult to compare each slices percentage of the whole. Which is greater, Slovakia or Saudi Arabia, and by how much?

You could solve this problem by including percentages on the chart, but if you must do this to make it possible for people to interpret the data, what's the use of showing it in a graph? You might as well give them a table, which would be easier to read.
Or, how about presenting the data graphically in a way that actually supports comparisons, such as this simple bar graph. When we decide how to display data, the choice should be arbitrary—it should be based on the type of display that presents the data most clearly and accurately for the task at hand.
Another *Oxford English Dictionary* definition of “simple” is:

“Not complicated or elaborate; characterized by a lack of grandeur or luxury; plain, unadorned.”

3-D rarely adds value to business graphs. In fact, it almost always makes it harder to see and comprehend the data. The bar graph on the left demonstrates a common problem with 3-D graphs: occlusion. Notice how the bar that represents “Fax” for “2001 Q3” is hidden behind other bars. Being able to spin the graph around to see the hidden bar isn’t a practical solution, because once you do, you’ll no longer be able to see other bars. One of the great benefits of a graph is the ability to see all the values and compare them at once.

The data in the particular bar graph could have been easily and clearly displayed in a line graph, which would have revealed the shape of change from quarter to quarter. A 3-D line graph, such as the one on the right, wouldn’t do the job. Notice how difficult it is to see and compare the patterns formed by the lines.
One more *Oxford English Dictionary* definition of “simple” is:

“With nothing added; …neither more nor less than; mere, pure.”

Simplicity is achieved when information is displayed for what it is, neither more complicated than it is nor over simplified resulting in the loss of complexity that is really there.

The words of Henry David Thoreau, which I quote in my title—"Simplify, simplify, simplify”—must be balanced by the words of Alfred North Whitehead when he said “Seek simplicity and distrust it.”
People are confused about data visualization.

So much of what is called “data visualization” gives it a bad name and causes confusion about what it is, how it works, and what can be accomplished when it is properly done.
Software vendors are competing to out dazzle one another with silly visual effects that treat data visualization like it’s a video game.
This notion of data visualization is not about understanding and communication, it’s about bling.
Dashboards are notorious for featuring graphical glitz over substance. Too many dashboard vendors and designers have lost sight of the bottom line: communication. They emphasize graphical glitz over clear and meaningful content. For every item of information on the screen the designer should ask the question: “How can I display this information in the most meaningful, clear, and efficient way possible?”

The graphics in this dashboard from Business Objects, created with Xcelsius, are beautifully rendered, but is the information effectively displayed? The Xcelsius team clearly possesses exceptional graphical skill. This isn’t surprising, given the fact that most of the original team of developers formally developed video games. Unfortunately, they failed to make the transition from video games to data visualization.
So what?

You might argue that the poor example set by the vendors doesn’t really influence people in the real world. Unfortunately, that’s not the case. Take a look at a few examples of data presentations that were submitted by graphing specialists to a competition sponsored by *DM Review* magazine.

In this particular part of the competition, contestants were asked to design a display that could be used by the VP of Human Resources to compare salaries of the company’s eight departments as they fluctuate through time, in total and divided between exempt and non-exempt employees.
Every charting software vendor out there, with almost no exceptions, feature 3-D graphs. They look so impressive, but do they work? Users fall prey to the notion that 2-D displays are old-school, and that they must advance to displays like the one shown above to be taken seriously. The problem with 3-D displays of abstract business data, however, is that they are almost impossible to read.
Vendors introduce display methods that are absurd, that show a complete ignorance of visual perception. Trends cannot be discerned by examining a series of pie charts and quantitative values cannot be effectively encoded as differing hues.
Based on the example set by the vendors, users attempt to dazzle their audience with bright colors and pretty pictures, often resulting in displays like this that completely obscure a relatively simple message. I challenge you to make sense of this graph.
This example features software that uses a visual object called a glyph, which is meant to simultaneously encode multiple variables about an entity. In this case a set of nine small rectangles represents a company's expenses for a given month, and each of the individual small rectangles encodes the expenses in dollars of a single department for a given month. Glyphs are meant to do something quite different from this example. They are not meant and are not able to effectively encode departmental expenses as they vary through time. Why has this user applied this software so absurdly? Because the vendor itself promotes such use.
Finally, we see a visual display that works. Departmental expenses are encoded as simple line graphs, which beautifully present the overall trend and individual ups and downs of the values through time. This arrangement of eight graphs within eye span, one per department, sorted from the greatest to least expenses, tells the data’s story clearly. Here’s a rare case where a vendor’s expert design and thoughtful examples encouraged users to communicate effectively.

When I ask software vendors why they feature silly, flashy features that don’t work, they always give the same answer: “We need to show the flashy stuff to get potential buyers’ attention.” I always answer that you get can people’s attention by doing things right. That well-designed visualizations and functionality can pack more punch and get people to say “wow” than superficial dazzle. This conference proves my point. During demos of Tableau, I’ve watched your eyes widen and your jaws drop, and nothing that you’ve seen doesn’t work. It all packs a punch without sacrificing substance.
Over a year ago it occurred to me that I could use the juxtaposition of bad and good examples in an entertaining way to expose people to effective visualization practices in the form of what I called the “Graph Design IQ Test.” It’s simple Flash program that walks people through a series of questions that ask them to choose the better of two visualizations. Thousands have taken this test and passed it on to their colleagues.
Everyone, even without any training in graph design, scores highly when they take this test, because the difference between what works well and what doesn’t is generally easy to see when a bad visualization and an effective alternative are shown side by side. That’s the whole point: I want them to see how easy it is to design a graph effectively when they are shown alternatives, so they’ll be encouraged to seek out resources for learning these skills. When they do happen to get a question wrong, I use the opportunity to educate them a little, explaining why their choice doesn’t work, of course, after chiding them a bit with humor.
Most of the data analysis that is needed in the normal course of business requires relatively simple data visualization techniques, leaving little that requires the sophisticated techniques of statistical and financial analysis. If you search for resources that teach data analysis skills, you’ll find many books and courses that present the sophisticated techniques needed by the few, but few resources if any that teach the simple techniques that most of us need to make sense of business data. The skills that most of us need to infuse our businesses with needed insights can be learned without a background in statistics, but these skills don’t come naturally – they must be learned. You must develop expertise, but it is expertise that can be easily learned with the proper direction and practice. You must learn to see particular patterns in data that are meaningful.

People can learn pattern-detection skills, although the ease of gaining these skills will depend on the specific nature of the patterns involved. Experts do indeed have special expertise. The radiologist interpreting an X-ray, the meteorologist interpreting radar, and the statistician interpreting a scatter plot will each bring a differently tuned visual system to bear on his or her particular problem. People who work with visualizations must learn the skill of seeing patterns in data.

Data sense-making begins with (1) searching through data to discover potentially meaningful facts, (2) examining those facts more closely to understand them so we can (3) explain what we’ve learned to those who can use that knowledge to make good decisions. Most of what we need to recognize and understand in our business data is not all that complicated.
I became fascinated by data visualization—the use of our eyes in close collaboration with our brains to make sense of and communicate information—not because I’m a visually oriented person (I in fact am much more verbal than visual) but because it offers solutions to real problems in the world that concern me, solutions that stand apart in their ability to enlighten.

Perhaps the world’s top expert in visual perception and how its power can be harnessed for the effective display of information is Colin Ware, who has convincingly described the importance of data visualization. He asks:

Why should we be interested in visualization? Because the human visual system is a pattern seeker of enormous power and subtlety. The eye and the visual cortex of the brain form a massively parallel processor that provides the highest-bandwidth channel into human cognitive centers. At higher levels of processing, perception and cognition are closely interrelated, which is the reason why the words ‘understanding’ and ‘seeing’ are synonymous. However, the visual system has its own rules. We can easily see patterns presented in certain ways, but if they are presented in other ways, they become invisible…The more general point is that when data is presented in certain ways, the patterns can be readily perceived. If we can understand how perception works, our knowledge can be translated into rules for displaying information. Following perception-based rules, we can present our data in such a way that the important and informative patterns stand out. If we disobey the rules, our data will be incomprehensible or misleading.

Human perception is amazing. I cherish all five of the senses that connect us to the world, that allow us to experience beauty and an inexhaustible and diverse wealth of sensation. But of all the senses, one stands out dramatically as our primary and most powerful channel of input from the world around us, and that is vision. Approximately 70% of the body's sense receptors reside in the eye.

The presentation of quantitative data as text, such as you see in this table, is perfect when you need precise values or when the purpose is to look up or compare individual values, but not when you wish to see patterns, trends, and exceptions, to make broader comparisons, or wish to rapidly get a sense of what’s going on. When this is your goal, visualizations work best.

When data is presented visually, it is made visible, and from this picture we can easily glean insights that would take far longer to piece together from the same data presented textually, if ever. This graph of the same data that appears in the table makes brings to light several of the stories contained in the data that weren’t obvious before, and it did so instantly.
This small table contains only eight quantitative values, yet a clear pattern that exists in the data is difficult to discern. One group of employees exhibit job satisfaction that is much different from the other groups.

The fact that job satisfaction for employees without a college degree decreases significantly in their later years doesn’t jump out at you when you examine the table, but it is immediately obvious when you examine the graph.

Modern data graphics can do much more than simply substitute for small statistical tables. At their best, graphics are instruments for reasoning about quantitative information. Often the most effective way to describe, explore, and summarize a set of numbers – even a very large set – is to look at pictures of those numbers. Furthermore, of all methods for analyzing and communicating statistical information, well-designed data graphics are usually the simplest and at the same time the most powerful.

This pattern only becomes visible when displayed in a graph that is designed to highlight this particular aspect of the data. The type of graph that is selected and the way it’s designed also have great impact on the message that is communicated. By simply switching from a line graph to a bar graph, the decrease in job satisfaction among those without college degrees in their later years is no longer as obvious.
To visualize data effectively, you must understand visual perception.
Visual perception is not just camera work.

Square A is darker than B, right?
Despite how differently they look in the original image, squares A and B are exactly the same color. What we see is not a simple recording of what is actually out there. Seeing is an active process that involves interpretations by our brains of data that is sensed by our eyes in an effort to make sense of it in context. The presence of the cylinder and its shadow in the image of the checkerboard triggers an adjustment in our minds to perceive the square labeled B as lighter than it actually is. The illusion is also created by the fact that the sensors in our eyes do not register actual color but rather the difference in color between something and what's nearby. The contrast between square A and the light squares that surround it and square B and the dark squares that surround it cause us to perceive squares A and B quite differently, even though they are actually the same color, as you can clearly see above after all of the surrounding context has been removed.

The ability to use graphs effectively requires a basic understanding of how we unconsciously interpret what we see.
This image illustrates the surprising effect that a simple change in the lightness of the background alone has on our perception of color. The large rectangle displays a simple color gradient of a gray-scale from fully light to fully dark. The small rectangle is the same exact color everywhere it appears, but it doesn’t look that way because our brains perceive visual differences rather than absolute values, in this case between the color of the small rectangle and the color that immediately surrounds it.

Among other things, understanding this should tell us that using a color gradient as the background of a graph should be avoided.
We do not pay attention to everything in our field of vision. Visual perception is selective and must be, for an awareness of everything out there would overwhelm us. Attention tends to be drawn contrasts to the norm. For this reason, to successfully see meaning in the data, we must visually encode data in ways that allow what’s interesting and potentially meaningful to pop out.

In the image above, the two sections of texture that stand out: one left of center and one right of center. What’s not apparent is that these two regions in the image are exactly the same. They differ from what surrounds them because the lines that form the texture on the left are smaller than those that surround them, and those that form the texture on the right are larger than those that surround them.

Because our eyes are drawn to things that stand out as different, data visualizations must allow what’s important to clearly stand out from what’s not.

There is a distinct image that has been worked into the picture of the rose, which isn’t noticeable unless we know to look for it. Once primed with the image of the dolphin, however, we can easily spot it in the rose.

Data visualizations must encode meaningful information as patterns that we can learn to spot and understand.

(Note: The image of the rose was found at www.coolbubble.com.)
Our cognitive abilities are extraordinary.

From this set of six playing cards, select one and remember it. I will now identify and remove the card that you’ve selected, then rearrange those that remain. As I advance to the next slide, you’ll discover that your card has been eliminated.
Amazing. And I can do this again and again. If you go back to the previous slide and again pick a card, when you return to this slide you will see that I’ve once again eliminated it.

Actually, as I’m sure you realize, this card trick is an illusion that makes use of the limitations of short-term memory. None of the cards on the second screen are the same as the cards on the first screen, but you probably didn’t notice this because you only remembered the card that you selected, not the others.
In addition to understanding visual perception, visual analysis tools must also be rooted in an understanding of how people think. Only then can they recognize and support the cognitive operations that are necessary to make sense of information.

Memory plays an important role in human cognition. Because memory suffers from certain limitations, visual analysis tools must be able to augment memory.

The example above illustrates one of the limitations of working memory. We only remember that to which we attend. Any part of this image that never gets our attention will not be missed when we shift to another version of the image that lacks that particular part. If we don’t attend to it, we might notice the change from one version of the image to the next, but only if the transition shift immediately from one to another, without even a split second of blank space between them.

In addition to not remembering, we also don’t clearly see that on which we don’t focus. To see something clearly, we must focus on it, for only a small area of receptors on the retinas of our eyes are designed for high-resolution vision.

(Source: This demonstration of change blindness was prepared by Ronald A. Rensink of the University of British Columbia. Several other examples of this visual phenomenon can be found at http://www.psych.ubc.ca/~rensink/flicker/download/index.html.)
Memories are stored as chunks of information. A chunk can be as small as a single tiny fact (for example, revenue equals $56,384 for the quarter) or a larger set of facts that you've learned to think about as a single complex unit (for example, a trend line on a time-series graph that shows revenue increasing from month to month throughout the year.) The better you get at seeing and understanding meaningful patterns and relationships in data, the better able you are to store more data as a single chunk. Working memory is where information is stored while we are thinking about something. It is like the working memory, or RAM, in a computer. Our brains are constantly swapping chunks of information in and out of working memory from either what we perceive in the outside world or from the more permanent storage of long-term memory. There is a limit to the amount of information that can be held in working memory at any one time, which is estimated by researchers to be about three chunks.

By using graphs, rather than tables of text, working memory is augmented by storing more information into the same limited amount of space.
Good visualizations don’t fragment related data into separate views.

It is very difficult with most software to combine all of the information that you want to see together on a single screen without needing to scroll. You often end up bouncing from screen to screen to see separately what you would ideally like to see together in order to make comparisons and get a sense of the big picture.
Now, however, with expenses for 15 separate departments visible at the same time, this display serves as an external aid to working memory, making it easy to make comparisons.

When exploring and examining data, it is important to place as much as possible within eye span. If you see patterns in a graph and then try to compare them to patterns in another graph on a different screen, you won’t remember everything that you were looking at previously. You’ll end up bouncing back and forth between displays, wasting time and getting very frustrated in the process.
Data visualization is much more than just graphical reporting, more than dashboards. Beyond its use for communicating information that cannot be communicated with tabular data, its greatest potential is exhibited in its use for analysis. The best techniques for making sense of business data are visual techniques, which extend our ability to find and understand meaningful patterns in data by offloading much of the work traditionally performed by the conscious mind to preconscious and parallel processors in the brain’s visual cortex. Most BI vendors provide some graphical functionality in their software, but few actually support visual analysis in more than rudimentary ways.
Most data analysis software discourages exploration and analysis.

The traditional BI approach to analyzing data using tables of text, including crosstabs or pivot tables, is severely limited and discouraging. It is so time consuming and cumbersome, people are discouraged from exploration.
The tabular model forces us to view small slices of information one piece at a time, which cannot possibly be stitched together in our brains to tell the whole story.
When new recruits by intelligence organizations are trained in spy craft, they are taught a method of observation that begins by getting an overview of the scene around them while being sensitive to things that appear abnormal, not quite right, which they should then focus in on for close observation and analysis.

A visual information-seeking mantra for designers: ‘Overview first, zoom and filter, then details-on-demand.’


Having an overview is very important. It reduces search, allows the detection of overall patterns, and aids the user in choosing the next move. A general heuristic of visualization design, therefore, is to start with an overview. But it is also necessary for the user to access details rapidly. One solution is overview + detail: to provide multiple views, an overview for orientation, and a detailed view for further work.

(Ibid., page 285)

Users often try to make a ‘good’ choice by deciding first what they do not want, i.e. they first try to reduce the data set to a smaller, more manageable size. After some iterations, it is easier to make the final selection(s) from the reduced data set. This iterative refinement or progressive querying of data sets is sometimes known as hierarchical decision-making.

(Ibid., page 295)
Shneiderman’s technique begins with an overview of the data—the big picture. Let your eyes search for particular points of interest in the whole.
When you see a particular point of interest, then zoom in on it.
Once you’ve zoomed in on it, you can examine it more closely and in greater detail.
Often you must remove data that is extraneous to your investigation to better focus on the relevant data.
Filtering out extraneous data removes distractions from the data under investigation.
Visual data analysis relies mostly on the shape of the data to provide needed insights, but there are still times when you need to see the details behind the shape of the data. Having a means to easily see the details when you need them, without having them in the way when you don’t works best.
Direct dynamic interaction with the properly visualized data allows us to see discover meaningful patterns, trends, and exceptions in the display and to interact with it directly to filter out what we don’t need, drill into details, combine multiple variables for comparison, etc., in ways that promote a smooth flow between seeing something, thinking about it, and manipulating it, with no distracting lags in between. This is what I call “visual analysis at the speed of thought.”

Great analysts, like great scientists, great artists, great people of all sorts, accept the call to serve as a voice for data. Important stories can be found in data. We can learn to discern the meanings that live in information and to unravel the stories that are woven through it. What I do isn’t just work; it is my mission. I work hard to learn the world’s stories and to tell them truthfully. I believe that there is no higher calling. I fight against those who try to hide or alter the truth. I believe that the truth really can set us free.
What I call “faceted analytical displays” allow us to see a set of data displayed in multiple ways simultaneously, which provides several perspectives at once and supports comparisons that could not be made otherwise.
Tools like Tableau will help you transform information into knowledge, but only you can make the next step happen by putting that knowledge to good use.
O perpetual revolution of configured stars,
O perpetual recurrence of determined seasons,
O world of spring and autumn, birth and dying!
The endless cycle of idea and action,
Endless invention, endless experiment,
Brings knowledge of motion, but not of stillness;
Knowledge of speech, but not of silence;
Knowledge of words, and ignorance of The Word.
All our knowledge brings us nearer to our ignorance,
All our ignorance brings us nearer to death,
But nearness to death no nearer to God.
Where is the Life we have lost in living?
Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?

Excerpt from The Rock, 1930, T.S. Eliot

[Image source: www.irishastronomy.org]
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[Image source: www.trekvisual.com]
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[Image source: www.i.pbase.com]
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Excerpt from The Rock, 1930, T.S. Eliot

[Image source: www.shepherdpics.com]
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Where is the Life we have lost in living?
Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?

Excerpt from *The Rock*, 1930, T.S. Elliot

[Image source: www.i163.photobucket.com]
The value of information depends on how it’s used.

O perpetual revolution of configured stars,
O perpetual recurrence of determined seasons,
O world of spring and autumn, birth and dying!
The endless cycle of idea and action,
Endless invention, endless experiment,
Brings knowledge of motion, but not of stillness;
Knowledge of speech, but not of silence;
Knowledge of words, and ignorance of The Word.
All our knowledge brings us nearer to our ignorance,
All our ignorance brings us nearer to death,
But nearness to death no nearer to God.

Where is the Life we have lost in living?
Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?

Excerpt from The Rock, 1930, T.S. Elliot
The value of tools depends on how they’re used.

Freedom and well-being

Time

Good tools, from stones for crushing or cutting to computers for augmenting cognition, when used properly, set us free and make the world a better place. When misused, they make us lazy, dumb, slaves. The choice is ours.
The folks at Tableau face the choice every day to stay true to their vision, resisting the temptation to make easy money by giving customers what they ask for even when they know it won’t work. To date, they have faithfully focused on good design by adding only what’s really needed to their products and taking the time to make every new feature work well. Tableau's success demonstrates that it pays to stick to the principles of effective data visualization, rooted in an understanding of visual perception and human cognition. Tableau is proving that software vendors can choose to do the right thing, and it will pay off in happy customers, not just immediately, but down the road as well.

Those of us who don’t work for Tableau, but use their software to work with information, each have the choice of seeing our work as important—a way to make the world a better place. Tableau is a tool that can help us make sense of information and pass what we discover on to others, but no software can make us use information wisely. This is a moral choice. Knowledge is power. You can use it to do more than avoid doing harm; you can use it for good.