Lighting the Way to Financial Reform

*By **Thomas C. Redman,** Navesink Consulting Group*

In a previous column, I noted the contributions poor-quality data may have made to the current financial crises.[1] But bad data is certainly not the only contributor. Many put excessive greed at the top of the list.

That may be the case, but bad data and excessive greed exacerbate each other, as bad (or sometimes falsified) data make it easier for the excessively greedy to proceed unchecked. Conversely, the greedy are strongly motivated to be opaque and "manage the facts."

From our perspective, though, it is easier to address poor data quality. That being the case, it is instructive to look at proposed financial market and regulatory reforms through the "data lens." There are no simple solutions, only hard choices among less-than-perfect alternatives. But the data lens suggests three interrelated points of light that should guide reform.

1. Financial innovation

Finance is generally not recognized as an innovative industry. For example, there are no finance companies on *BusinessWeek*'s most recent list of top 25 innovators.[2] In light of the damage associated with recent innovations (mortgage-backed securities spring to mind), some feel this is for the best. In fact, financial-services companies may argue now is the time to concentrate on balance sheets, not innovation.

Through the data lens, however, I don't see how we can rebuild and sustain the economy without financial innovation. There is already tremendous pent-up demand for new products—demand that can only grow.

For example, there are products that ease the severities and rates of foreclosure. Services to help distressed homeowners renegotiate terms have yet to stem the tide. Perhaps new forms of joint ownership between the homeowner and the mortgage-holder could give the homeowner more options, reduce the mortgage-holder's risk during bad times and spread the gains during good.

A further example can be found among recently unemployed people who are setting up companies and need seed money to do so. Many can't qualify for traditional business loans (and I certainly don't advocate the return of "liar loans"). Perhaps new forms of microfinance, which has proven so successful in developing nations, could be tailored to the rigors of the crisis and fill this need.

To put a capstone on the point, economic growth depends on innovation. The finance industry simply needs to do better.

2. Better financial data

In this area, I would include reporting (as in quarterly reports), product (as in the terms associated with a credit card offer), market (as in the transactions of a thinly traded security) and all other financial data, though I will use reporting as the primary example.

It is tempting to depend on regulation as the means to achieve this goal, but that is not the point of light I seek. Companies must follow the law and meet accounting and other standards. But doing so is not enough.

Ultimately, markets depend on trust, and in many financial markets, people no longer are willing to believe it when a company says, "We followed all the relevant reporting regulations, and our auditors signed off." Companies must do more.

The most obvious needs are for greater accuracy and transparency. Translated loosely, accuracy means that the facts presented are close enough to true, while transparency means that those facts represent a complete and coherent picture that is presented in an understandable manner.

My call for greater accuracy and transparency is more involved than it may seem. For one thing, the two can conflict. Today, what everyone really wants to know is what's going to happen three, six and 12 months down the road.

Given today's uncertainties, it is difficult to give an accurate answer. And companies may feel tempted to pull back. After all, an old adage advises that it is better to keep your mouth shut and have people think you're stupid then to open it and remove all doubt.

Another problem is that circumstances require different levels of accuracy and transparency. In some cases, accurate within $1 billion is good enough, while in others, accurate within $10,000 may not be. To resolve these issues, companies must develop far deeper understandings of who uses their

reports. They must recognize that different customers have different needs (a regulator is but one customer), and they must segment customers accordingly.

In particular, companies must recognize that, especially during times of crisis, they need to be more transparent and more accurate. This may mean they must provide predictions for:

- Worst-case scenarios and what management is doing to mitigate those scenarios.
- Best-case scenarios and what management is doing to make these scenarios a reality.
- Most-likely scenarios.

3. Better checks and balances

This is not a call for oppressive regulation. While some new regulations are undoubtedly needed, the unmitigated failure of the Sarbanes-Oxley Act proves we must not depend on regulation alone. Nor is this a call for the formation of an omnibus oversight agency or a grand regulatory strategy.

Since the Great Depression, a combination of the free press, ratings agencies and regulatory bodies has provided reasonable oversight. All failed to carry out their respective missions in some critical way in the run-up to the current crises.

While the precise reasons vary, the underlying theme is the failure to execute. The point of light I seek is tactical capabilities on the parts of journalists, raters and regulators to do their jobs.

As a first step, each must go back to first principles and reexamine their roles. They must ask the following questions:

1. Who are our customers (those who depend on us)?
2. What are their most important needs?
3. How are we doing with respect to those needs?
4. How do we address the gaps?

Then, of course, they must address those gaps.

Providing new checks and balances would also leave open the opportunity for players who don't fall in any of the traditional roles to participate, such as Morningstar's evolving roles in covering mutual funds.[3] While Morningstar is decidedly a for-profit company, its free services provide insights investors can't get elsewhere.

It's important to note I don't believe any one of these points is more important than the others. Nor do I think two of three suffice. Over the long haul, we need all three, lest we be left in the dark once again.

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Needs, Wants and Expectations

*By **Kathy Schroeder,** Polk Global Automotive*

The key to surviving in today's economic environment is to do more with less—less people, less money, less time. As companies cut budgets, scrutinize capital spending, reduce contracted and internal labor, and curtail all but essential operations, the task of doing more with less can become overwhelming. How can organizations decide what are "need to have" parts of their businesses and what are "nice to have" elements?

It begins with developing an understanding of what your customers want, need and expect from your product or service. Very rarely are all three the same. It is essential that a company be able to clearly articulate all three on behalf of its customers.

Know your terms

Needs are the basic requirements that must be satisfied to justify the cost of the product or service. For example, I need a new five-passenger car that will safely and reliably get me to work and back each day for $18,000.

Wants are the nonessential elements, features or attributes that make the product or service more attractive to the customer. Customers may express a desire for a feature or function, but if they are not willing to pay for it, then it is a want. An organization must seriously consider whether the cost to implement the feature or function is justifiable.

Going back to the car example, for my $18,000, I want heated leather seats, four-wheel drive, seven-passenger seating, built-in GPS and 50 miles per gallon.

Most organizations have processes or techniques in place to gather information on the wants and needs of their customers. Some common methods include voice of the customer, forums, surveys, customer satisfaction indexes, request for proposals, competitive intelligence, customer feedback and contract renewal or negotiation sessions.

What about customer expectations? Are expectations merely a combination of wants and needs related to your product or service? Not usually. In most cases, expectations are created long before the customer has come in contact with your product or service.

Expectations come from two sources—claims and prior experience. Claims are gathered from collateral material, sales personnel, the service desk, current and former customers, advertising, promotions, press releases and competitors. Prior experience includes exposure to a company's product or service, as well as exposure to similar products and services.

Abstract notions

So, what does the customer want, need and expect? All too often, the answer is that the customer wants low prices, needs fast service and expects high quality. That sounds great but means nothing.

Quality is an abstract term. Like terms such as faith, hope, integrity, trust and customer satisfaction, abstract concepts can only be defined in relation to the constructs that measure them. Therefore, it is unhelpful to say, "Our customer satisfaction level is 98%." It is much better to say, "Our customer satisfaction, as measured by the percentage of people willing to recommend our company to an associate, is 98%."

Likewise, the statement, "Our customers expect the highest level of quality," is not an actionable statement. The statement, "Our customers expect our level of data quality to be 99.5%, as defined by name and address accuracy and as measured by the percentage of deliverable mailings," is measurable and actionable.

Unlike needs and wants, proactively gathering and understanding customer expectations is not a common business practice. Service level agreements (SLAs) are perhaps the most common vehicle for expressing expectations, but they are generally demanded of the organization by the customer, rather than developed proactively by the organization.

When a customer specifies the SLA criteria, the organization is put in a reactive position. A more proactive approach would be for the organization to define and measure the SLA criteria prior to a customer request. To do this successfully, the organization must determine the key product or service success factors from a customer's perspective.

Once the critical areas of product or service satisfaction are identified, they need to be documented, quantified, measured and reported. If the customer values timely customer support service, for example, the first step is to determine what the key success criterion of that activity is from the customer's viewpoint (support availability, call handling time, issue resolution time, issue resolution quality or any combination of these).

Next, the organization needs to determine its ability to act on those factors—in other words, current-state process capacity. How long does it take to answer a call, to acknowledge an e-mail or to respond to an online chat request? How long does it take, on average, to resolve an issue?

An organization's internal metrics may measure the percentage of inquiries that are resolved without escalation to level-two support, but if your customer does not care who resolves the problem, then it should not be included as part of the customer SLA development.

Once the current capability level is understood, the next step is to quantify the customer's level of expectation for these same factors. If the two match, setting expectations is as straightforward as documenting the current level of service and communicating this to the customer base.

More often, however, the two do not match; customers' expectations do not align with reality. Assuming this to be the case, a gap analysis will need to be conducted to determine the extent of the discrepancy so corrective actions can be taken to close the gap.

Time to share

Typically, it is not necessary or desirable to wait until the current

state matches the expected state to share metrics with the customer. As long as the corrective actions are being implemented with a sense of urgency and in a way such that the customer can see improvement in the metrics month over month, an organization is well on its way toward meeting customer expectations.

Everyone involved in the delivery of the SLA needs to be aware of what success looks like and how it will be measured. Because expectations will change over time, SLAs should be reviewed and updated on a regular basis. An update to the SLA may result in a new out-of-alignment condition. This is remedied the same way it was in the past—implementing corrective actions until current state and customer expectations are back in sync.

With rigor and diligence, companies can understand and manage the key drivers that define customer expectations and impact customer satisfaction. By understanding a customer's wants, needs and expectations, an organization can focus its limited resources on the most essential aspects of its product or service.

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Making Design of Experiments Accessible

*By **Bradley Jones,** SAS Institute*

Arguably the most profitable of statistical methods, designed experiments have their roots in agriculture, growing out of the work of Ronald A. Fisher in the 1920s at the Rothamsted Experimental Station in Harpenden, England.[1]

In Fisher's work, the application of a rigorous scientific approach toward the improvement of crop yields had an enormous positive impact that revolutionized agricultural science. Decades later, the use of designed experiments had such a positive impact at Motorola that the founders of Six Sigma included design of experiments (DoE) as a core component of their program.

It may seem surprising, then, that the use of statistically designed experiments is not standard operating procedure (SOP) in modern engineering and R&D. More disturbing are reports that many Six Sigma consultants are cutting back on their DoE training or eliminating it altogether.

Why are these things happening? First, there is the argument that designed experiments are too expensive. A second reply is that while designed experiments may work in other settings, "my system or process is too complex." For Six Sigma trainers, a common complaint is that DoE is too mysterious and difficult to grasp. Cutting back seems expedient when training budgets are tight and consultants are hungry.

Bye design?

Most Six Sigma courses cover experimental designs such as full factorial, two-level and fractional factorial. Some also delve into Latin squares, central composite designs and Box-Behnken designs. But, six months after taking a course, even when there are actual projects involving a designed experiment, the aforementioned designs are little more than recognizable names rather than tools ready to be deployed.

It is easy to see how full-factorial designs can seem prohibitively expensive, especially when a system under study has many inputs. To lower the cost of experimentation, most statisticians recommend the use of highly fractionated two-level factorial designs. But, to many engineers, two-level designs seem too simple to be adequately descriptive of a real-world system.

Experienced users of two-level fractional factorial designs have learned how to simplify the description of the process to suit the design. The ability to do this requires a high level of expertise and faith that the simplification will have no bad effects. SOPs cannot reasonably depend on faith and expertise. They need to be easy enough for the average person to understand and follow.

What is a Black Belt to do when there is substantial day-to-day process variation and the experimental budget allows for three days, not four? Suppose there are multiple

suppliers and several processing lines. What if certain factor combinations will not work or are even dangerous to run? Textbook designs are too restrictive to accommodate all of these practical considerations.

There is an alternative approach to design creation that does not require the experimenter to change the description of the process or expend more resources than are budgeted. You could call this approach custom design because the result is a custom-built design that matches the particular system rather than requiring an alteration in the system description to suit a predefined design.

Using custom designs dramatically lowers the level of expertise required to employ designed experiments. For custom designs to become a standard engineering tool, however, it is not enough just to match the design to the system description. It is necessary for the analysis of the resulting data to yield information that allows the experimenter to accomplish the goals of the design.

One such goal is to determine the relative importance of the input variables. Another is to predict the behavior of the system with a view toward finding the best operating conditions. Custom design makes use of computer algorithms for generating optimal designs, which are well suited to both goals.

Optimal solution

The mathematical theory of optimal design was developed by Jack Kiefer in the 1950s and 1960s.[2,3] Upon the publication of the exchange algorithm by Valerii V. Fedorov[4] and the DETMAX algorithm by Toby J. Mitchell,[5] optimal design moved from an exercise in mathematical theory to a viable option for practitioners to use.

Despite their capability for providing a tailor-made solution to experimental design problems, optimal designs have been criticized by important members of the statistical community. This significantly slowed their widespread acceptance.

Nevertheless, by the mid-1980s, commercial software firms began supplying tools to produce optimal designs for the study of problems in science, engineering and business. Ruth K. Meyer and Christopher J. Nachtsheim published an algorithm that made the computer generation of custom-built optimal designs lightning fast.[6]

Garnering support

Now, we live in a new millennium, and optimal design of experiments is still not standard practice, even though the benefits of their use are well documented in numerous published applications. Part of the problem is the continued lack of unanimous support for optimal design in the statistical community.

The early proponents of optimal design focused heavily on their mathematical properties. They were criticized—justifiably—for placing too much emphasis on a single measure of design quality. Subsequent research has shown how it's possible to overcome these difficulties.

The mathematical elegance of optimal design is interesting to theorists, but what makes the difference to practical experimenters is the ability to use the optimal design machinery to build a study that fits the problem at hand. It is flexibility that really matters to the practicing experimenter.

At a session of the Joint Research Conference on Statistics in Quality, Industry and Technology in June 2006, a mock debate was held that pitted computer-aided optimal design methods against so-called classical design. Even the debaters for classical design admitted the only practical choice for most real-world design problems was optimal design.

And, in August of this year, there was an invited session of the Joint Statistical Meetings titled, "Are the Paradigms for Design of Experiments Changing?" Each of the speakers presented work supporting the routine use of optimal design.

By using optimal design algorithms, computer-generated custom designs can deliver the quality, economy and flexibility necessary for making DoE a routinely used engineering tool.

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