Six Sigma is being used in lots of new ways. Critics call the trend dangerous.

BY BOB GILBERT

Six Sigma is back, and it is bigger than ever—maybe too big, critics say.

Seemingly destined for oblivion several years ago, this approach to reducing defects in corporations has made a stunning resurgence thanks to highly publicized successes, such as the claim by corporate icon General Electric Co. (www.ge.com) that Six Sigma cut $1.5 billion from its costs last year. By some estimates, more than a quarter of the Fortune 200 roster of big companies have Six Sigma projects under way.

Daniel Laux, president of the Six Sigma Academy (www.6-sigma.com), the consulting firm founded by the inventor of the practice, says it is the methodology's success that has led practitioners to greatly expand how it is used. While Six Sigma initially was applied primarily to manufacturing and logistics, Laux says it now can be applied to "all industries and all functions." Six Sigma can even be used in research and development to find innovative products, Laux says. This method for minimizing mistakes has become so all-encompassing that, according to Laux, some companies view it as "an enterprisewide business strategy."

Others aren't so sure. While acknowledging that Six Sigma is great in some uses, they say the system assumes that what exists is fundamentally sound and merely needs refinement. As a result, critics charge, Six Sigma is ill-suited for developing innovative products, finding fundamentally new internal processes, or setting overall corporate strategy.

Larry Keeley, head of the design and innovation consulting firm Doblin Inc. (www.doblin.com), is positively caustic about attempts to expand the use of Six Sigma beyond the original intent. "Consulting firms often need to relearn the truism that once you master a hammer, everything starts to look like a nail," he says. "The recent trend to use Six Sigma statistical process-control metrics for every damn fool thing is just the latest example of the adaptive instincts of modern consulting."

Six Sigma dates back to 1984, when Mikel Harry was an engineer trying to improve the quality of products in the Government Electronics Group of cellphone maker Motorola Inc. (www.motorola.com). He found that the average company runs at around what statisticians call three sigma, or 66,800 errors per million, in any process, such as manufacturing. He then set himself a truly audacious goal: He wanted to reduce that error rate to six sigma, or a mere 3.4 per million.

To make such a giant leap, he felt he couldn't rely on traditional methods, which he saw as part of the problem, not part of the solution. So he invented his own, called DMAIC (define, measure, analyze, improve, and control). Led by a hierarchy of instructors referred to as master black belts, black belts, and green belts, a DMAIC project begins by quantifying the unknown variables around a process. Auto maker Ford Motor Co. (www.ford.com), for instance, learned that the key factor in determining how well its car doors fit—and block out ambient noise and weather—was the location of their center of gravity. Max Allway, head of the Six Sigma Academy's consulting organization, says defining variables clears up a lot of mysteries. As an analogy, he says that stories about dolphins pushing drowning people to shore created a "mythology that dolphins love people." But if you do the sort of hard analysis that DMAIC requires, you find that "research has shown that dolphins don't love people; they simply love to push things. We never heard from the people who were pushed out to sea."

Once all the variables are defined, DMAIC prescribes rigorous statistical techniques for understanding what improvements are crucial to driving down the number of defects. As Allway puts it, "The data take you where you need to go." A typical project—of which there may be dozens or even hundreds under way simultaneously—runs four to six months and saves $150,000 to $500,000 a year, according to the academy.

Those savings can add up at a company such as Ford, a manufacturing colossus whose processes mostly carry over from year to year. Ford, whose Six Sigma projects each shoot for at least $250,000 in annual savings and at least a 70% reduction in defects in the area being targeted, has applied the methodology so widely that the corporation says it saved $325 million in costs last year. Phong Vu, the corporate deployment director of what Ford calls Consumer Driven 6-Sigma, which began in 2000, adds that, "In the first two months of this year we saved more than during all of last year."

A prime target has been the handling of the more than 3,000 parts that go into each of the roughly seven million cars and trucks that Ford sells each year. At the assembly plant in Wayne, Mich., for instance, chronic parts shortages seemed to require building more loading docks to allow for additional deliveries. Instead, a Six Sigma team devised a way to speed the handling of deliveries by scheduling trucks' arrival times right down to the minute. The plant saved $3.8 million annually. Spreading the process throughout the company is saving a further $6.2 million a year.

Similarly, Dow Chemical Co. (www.dow.com) helped a supplier save an estimated $20 million a year because a Six Sigma team sorted through the complex series of reasons that caused some injection-molding equipment to operate at a whopping 28% rejection rate. Tom Gurd, Dow Chemical's vice president of quality and business excellence, says the chemical concern's three-year-old Six Sigma program is more than halfway to its goal of saving at least $1.5 billion by 2005.

Dow and Ford don't limit themselves to applying the techniques only to manufacturing and logistical processes. Dow also applied Six Sigma principles to its legal department, for instance, and generated $240,000 of cost reductions through new procedures. Ford figures it saved $150,000 last year through one project that redesigned how its call centers handle employees' medical insurance inquiries, according to Ford's Mike Warzecha, deployment director for human resources. Vu believes Ford's savings soon will be equally divided between more efficient manufacturing procedures and improvements in internal business processes.

Six Sigma's proponents acknowledge that problems can arise, but they say the problems relate to bad implementation rather than to the methodology itself. Proponents say difficulties may stem, in particular, from a lack of commitment from senior management or from a lack of patience. Success with Six Sigma is "a five-year trip at least," says Dave Amos, who heads Ford's Six Sigma efforts in certain product-development areas. "For the first two years, people had to keep telling [former GE Chief Executive] Jack Welch, 'You're not going to see bottom-line results right away.'"

Critics say those acknowledgments gloss over the fundamental limits of the methodology. "Despite the extravagant claims, Six Sigma success is not synonymous with business success," management writer and consultant Michael Hammer says. "Some of its early adopters—Eastman Kodak Co., Xerox Corp., and Polaroid Corp., among others—have experienced significant business reversals recently. Even Motorola has seen its performance fall and rise and fall again, despite its continuing practice of Six Sigma."

International Business Machines Corp. (www.ibm.com) serves as a good example. Six Sigma was almost a religion there in the early 1990s and was improving product quality across the board. The company won a Malcolm Baldrige Quality Award at the facility in Rochester, Minn., that makes the AS/400 line of minicomputers. The use of Six Sigma didn't, however, help the company spot a glaring problem: IBM was, in many cases, building the wrong products.

While IBM was focused on reducing the defects in its networking equipment, Cisco Systems Inc. (www.cisco.com) was innovating with a new type of networking equipment, known as routers. While IBM was making incremental improvements to its disk drives, EMC Corp. (www.emc.com) was pioneering a wholly new approach, known as RAID, for redundant arrays of inexpensive disks. Cisco and EMC tapped into explosive growth and took the leading position in their markets away from IBM. IBM has never recovered in networking equipment and recently announced plans to essentially leave the hard-disk-drive market.

The use of Six Sigma also failed to help IBM spot a strategic fiasco in its personal-computer business. The business was using the Six Sigma methodology to improve its forecasts for consumer demand—when the right approach would have been to do away with the forecasts. As rival computer maker Dell Computer Corp. (www.dell.com) has shown, it is far more efficient to wait until a consumer orders, before building the computer. Because IBM just made incremental changes to the wrong approach, it posted losses of as much as $1 billion a year in the PC business in the 1990s and ultimately abandoned the consumer part of the market.

IBM's turnaround since 1993 was accomplished without Six Sigma. "We were encountering a whole set of problems and issues that went beyond the elimination and reduction of defects," explains Fred DeWald, an IBM vice president. "So we shifted our focus to business process re-engineering."

Six Sigma principles still exist in IBM's business units and manufacturing sites under the rubric of "operational excellence," DeWald says, but the company decided that Six Sigma operates at "too low a level to supply answers to macro problems."

Even when a company is happy with Six Sigma, results don't always match expectations. Ingeborg Rittweiler, vice president of Six Sigma at Bombardier

Inc. (www.bombardier.com), says the transportation company began the effort in the hope of saving money. Now, though, Six Sigma projects are measured on whether they speed up and improve processes or increase customer satisfaction—not on savings. Savings don't enter into the equation. Rittweiler says, "There are much cheaper cost-reduction programs than Six Sigma, which is a very training-intensive program" that takes years for a company to internalize.

Jeff Goding, an analyst with Hammer's consulting firm, says Six Sigma is poorly suited to sorting out complex process snarls. He says he knows of a pharmaceutical company where "18 different operating units are selling to the same customer. Is that a statistical analytical problem?" He says the disjointed sales efforts are "an entirely different genre of problem" than Six Sigma was devised to handle and call for techniques specifically created for redesigning processes.

Goding says, "You have to use the right tool for the right problem."

THE 'TO-DONT'S' OF SIX SIGMA

Although people disagree on how widely Six Sigma techniques can be applied to business issues, there is considerable agreement on where this data-driven methodology can go wrong.

"Where you don't do it is where you can't measure the quality of the outcome," says Ford Motor Co.'s Dave Amos, who oversees Six Sigma at the auto maker's design studio, among other areas. Amos says Ford devises "mathematical transfer functions" to translate "critical customer requirements" into engineering language, which works fine for brakes and hood latches. But quantifying the all-important intangibles involved in styling "has been a challenge," he says, "because those [designers] are artists."

The Six Sigma Academy offers a list of reasons for failed projects:

- Lack of commitment from top management.
- Using part-time instructors.
- Having projects tied to insignificant criteria.
- Setting incorrect targets, perhaps based on the number of people trained and certified rather than on bottom-line results.
- Poor project management.
- Treating Six Sigma as a "quality" initiative, which creates cynicism.

Hammer & Co., a process-design firm (www.hammerandco.com), argues that "stretching the definition of Six Sigma to include process redesign and process management is like stretching the definition of basketball to include baseball." Among the company's Six Sigma "don'ts" are:

- Don't oversell what Six Sigma can accomplish.
- Don't position it as the only tool for improving performance.

- Don’t apply it to all business problems.
- Don’t unleash a flood of uncoordinated projects.
- Don’t let Six Sigma be the province of an autonomous group.