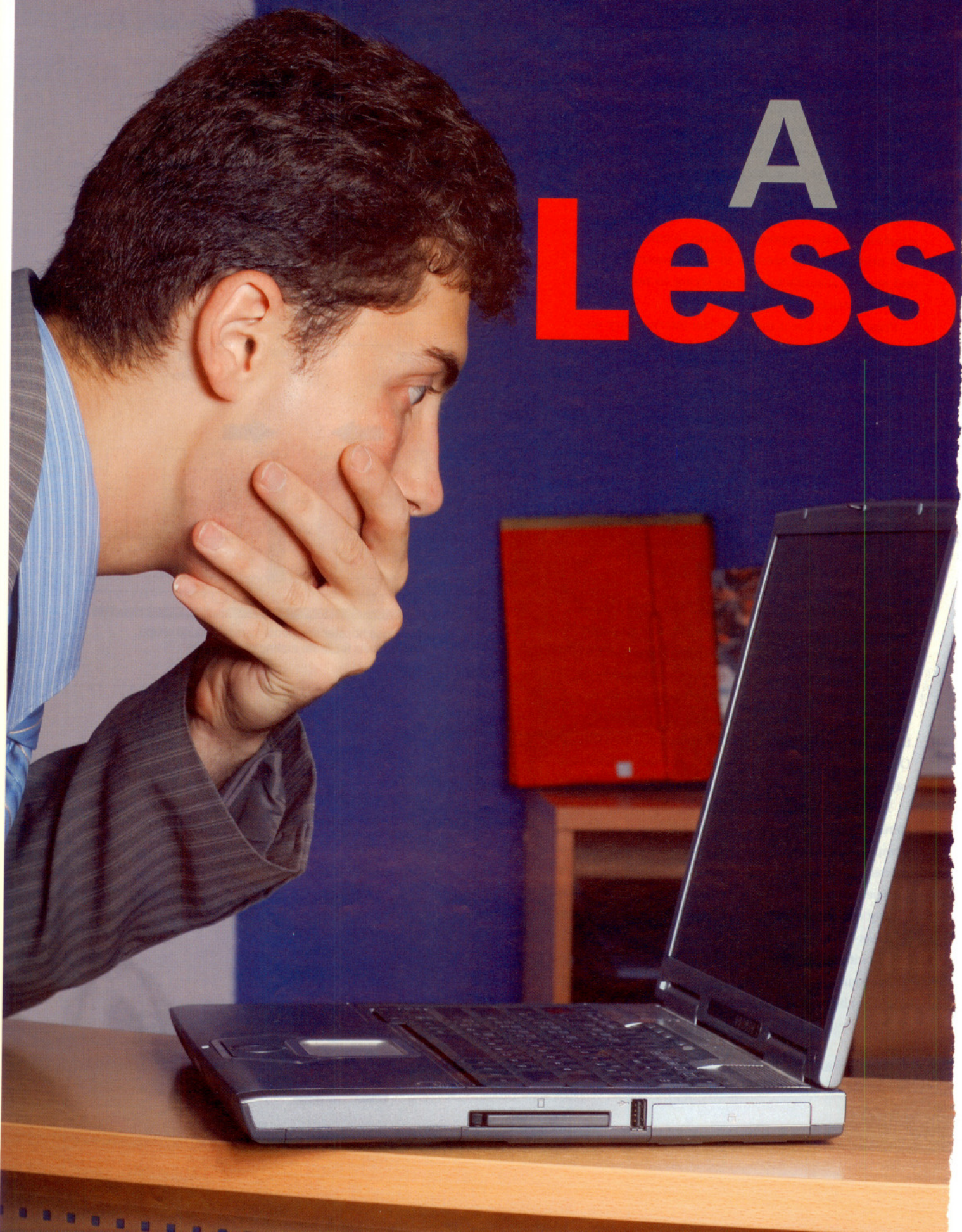


A Less



Costly BILLING PROCESS

by Lakshmi U.
Tatikonda

Using **lean Six Sigma** to reduce errors

In 50 Words Or Less

- The cost of billing errors, which often isn't measured by traditional accounting systems, can be significant.
- A 5% improvement in customer retention can add between 25% and 85% to the bottom line.
- Applying lean Six Sigma techniques can identify root causes, streamline the billing process and reduce errors.

DO YOUR CUSTOMERS complain about billing errors? If so, you are not alone. Companies of all sizes experience billing errors.

In the early 1990s, customers of communications giant Motorola told then-CEO Bob Galvin, "We would do 10%, 20%, 40% (one customer said 300%) more business with you if you would quit screwing up our accounting people who have to take three weeks to reconcile a payment to you ... Why don't you admit you made a mistake? It takes us a week to convince you. Correct those things, and we will give you much more of our business."¹

The cost of billing errors—customer frustration, lost sales, delayed cash collections, rebilling and bookkeeping—can be significant and goes unnoticed because it isn't measured by traditional accounting systems.

Based on a survey of a diverse group of U.S. businesses, Boston Consulting Group concluded that 95% to 99% of a business's internal activities have little or no relevance to its customers. Studies indicate that a 5% improvement in customer retention can add between 25% and 85% to the bottom line.² A 10% increase in acquisition costs adds less than 2% to overall customer value, whereas a 10% increase in customer retention adds up to 30% to customer value. The impact of retaining 2% more customers is

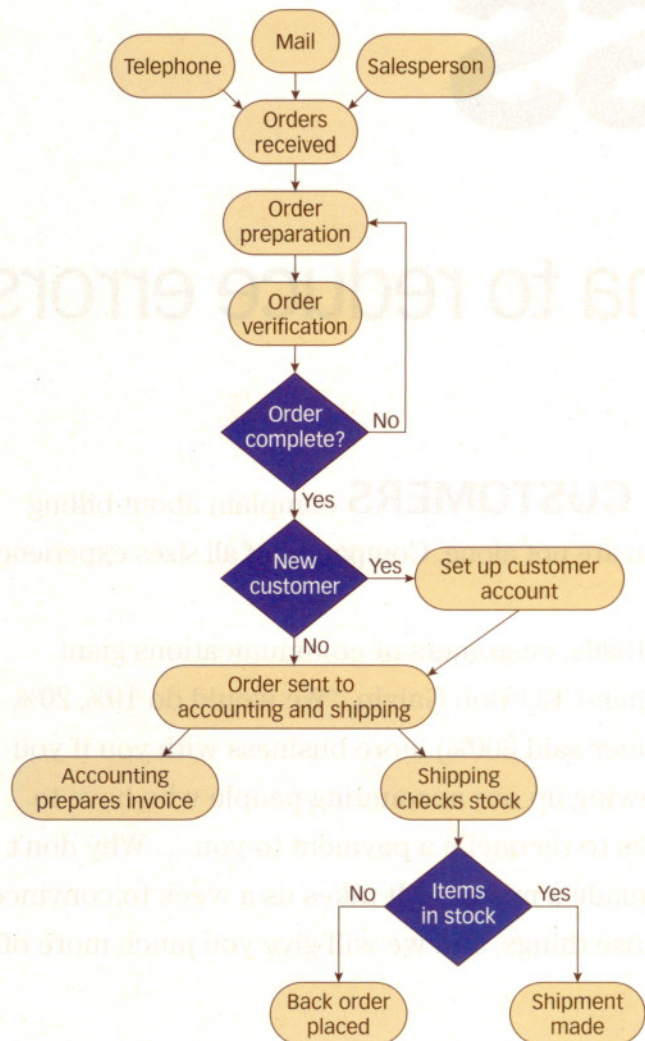
about the same as cutting costs by 10%.³

John Goodman, vice chairman of Technical Assistance Research Programs (TARP) in Arlington, VA, said customer complaints provide valuable quality assurance, as well as service and marketing data.⁴ However, many companies struggle to find a way to capture, analyze and learn from that valuable data.

That's where the quality tenets of Six Sigma and efficiency of lean enter the picture. Though lean techniques were originally developed for manufacturing companies, the techniques can be applied to a variety of fields, including healthcare, banking, insurance and academia. One area that seems to be lagging behind is accounting.

After describing the concepts of lean and Six Sigma, this article illustrates how companies can apply lean Six Sigma techniques to identify root causes, streamline billing processes and reduce billing errors.

Flowchart of billing process / FIGURE 1



A hypothetical billing problem

Hypothetical Company (HC) started as a small, family-owned company. For a long time, owners managed most of the operations, including billing, and customers were happy. Over time, the company grew steadily and acquired plants in the United States and many other countries.

Most of its operations were departmentalized, and the accounting systems varied among the many companies HC acquired. While HC successfully dealt with most of the problems caused by rapid growth, it remained unable to get a grip on billing errors. The customer service and billing departments were often flooded with complaints about erroneous bills.

The billing process at HC evolved over time, resulting in a lack of consistency among billing personnel. Customer order taking and billing procedures were confusing, inadequate and obsolete. Not all billing clerks had the same level of knowledge and training. A lack of documentation added to the confusion and aggravated the situation. Billing personnel followed the policies and procedures they thought were reasonable and did things the way they felt was right.

To get a handle on its billing problem, HC appointed a Six Sigma team comprised of employees with various interdisciplinary backgrounds and expertise. The Six Sigma team discussed the problem, researched Six Sigma and lean tools and techniques, learned from other companies and consulted with experts in the field.

Data collection and analysis

The Six Sigma team took an in-depth look at direct and indirect costs of billing errors. This was an eye-opener to many. Some costs identified included:

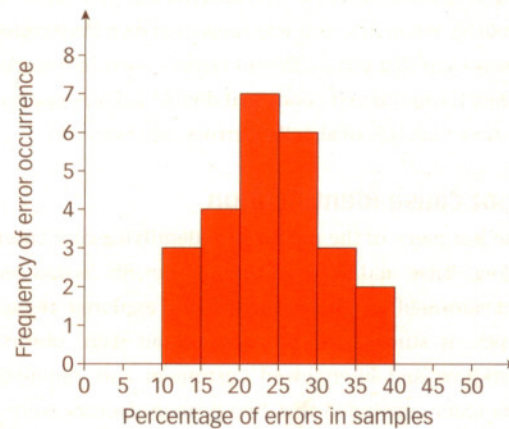
- Borrowing due to cash flow problems.
- Resolving billing errors.
- Rebilling.
- Bookkeeping.
- Customer defections and lost sales.
- Delay in cash collection as irate customers held payments until discrepancies were resolved.
- Interest lost due to late collection.
- Arguments among sales, shipping and billing departments, leading to a loss of morale.

The first thing the team did was study the billing process and prepare a flow chart (see Figure 1). The team then reviewed how billing errors were resolved. Most scenarios followed a similar path:

A customer calls to inquire about a bill and listens to a pre-recorded message with menu options. The customer listens to several options that don't describe their particular problem and gets frustrated when the system only deals with select inquiries. After several minutes, the customer finally gets to speak to a customer service representative, but only after being put on hold or bounced from one representative to another, forcing the customer to repeat the problem several times. Finally, the customer is assured the problem will be corrected, only to have the next month bring the same bill, the same error, the same complaint, the same aggravation and, in the end, the loss of an annoyed customer.

A further study revealed many different types of billing errors:

Histogram of error frequency / FIGURE 2



- Bills with wrong prices and charges.
- Bills sent to the wrong customer.
- Bills sent to the wrong address.
- Double billing and late billing.
- Billing for unordered goods.
- Billing for returned goods.
- Billing before the goods were shipped.

Like many companies, HC did not have an accurate record of how many erroneous bills were prepared and the frequency of each type of error. That meant the Six Sigma team had to collect, organize and analyze data.⁵

The Six Sigma team took 25 random samples of 200 bills and found the percentage of errors varied from sample to sample and ranged from 10% to 40% (see Table 2). The team then created a histogram to present the data graphically (see Figure 2).

Tenets of lean / TABLE 1

Defining value	Value is defined by the customer and is the result of functions and features of products and services.
Identifying value streams	Value stream is the chain of value-creating activities and processes. Value stream mapping is the physical representation of processes that transform into outputs.
Making value flow	Flow is the rate at which things move in the value stream. Obstacles such as clutter, blockages, bottlenecks, defects, errors and organizational policies and procedures slow or stop the flow.
Pull systems	Pull systems refer to work performed only when needed by the customer or the next operation downstream.
Pursuit of perfection	Pursuit of perfection is the process of continuous improvement.

Frequency of billing errors / TABLE 2

Sample size = 25	
Percentage of errors in sample	Frequency of occurrence
< 10%	0
11 – 15%	3
16 – 20%	4
21 – 25%	7
26 – 30%	6
31 – 35%	3
36 – 40%	2
> 40%	0

The Six Sigma team's next step was to identify which subset of errors was more significant than others. A review of a sample with 40 errors revealed five different types (see Table 3). When this data was presented on a Pareto chart, it was clear that three different errors—incorrect amount, billing for unordered goods and double billing—appeared in more than 80% of all billing errors (see Figure 3).

Root cause identification

The last piece of the puzzle was identifying root causes. Using cause and effect diagrams, the Six Sigma team brainstormed potential causes and explored them in depth. It studied the procedures and data, observed workflow and interviewed customers and employees. The team concluded that two primary factors were responsible for most of the errors (see Figure 4, p. 36): lack of communication (for example, failure to inform billing of partial shipments), and lack of knowledge and training (an inability to answer customer questions).

Streamlining the billing process

To gain a better understanding of the sources of communication errors, the team members decided to walk through the billing activities. Customer orders arrived via mail, fax and phone. At each step, they were batched and queued for processing. The main steps included: order taking (folders made for each customer), order preparation (current and new customers sorted, information added), order pricing, shipping and billing. Table 4 (p. 36) provides a detailed description of the activities.

The team was surprised by how many departments and steps were involved in preparing an invoice. At every step, the team observed employees burdened by piles of papers waiting to be prepared and moved to the next step. In many cases, documents moved from person to person, and the same data was entered multiple times.

The team then prepared a value stream map for the current state of the billing process (see Figure 5, pp. 38-39) to illustrate the movement of inventory, documents and information, along with the location and quantities of inventories, cycle times and value adding and nonvalue adding times.⁶ Cycle times and inventory quantities were obtained through observation and personal interviews. Inventory days were calculated by dividing the inventory quantity with the average number of customer orders per day. On average, HC received 100 orders via mail and another 100 orders via fax and phone. The cycle time for the billing process varied from 19.5 days for a current customer to 29.5 days for a new customer. The cycle efficiency varied from 0.5% to 0.54%.

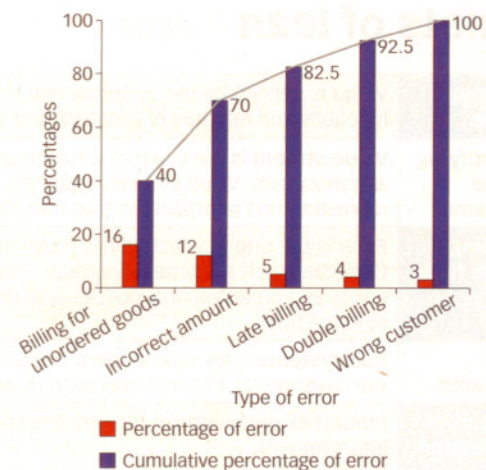
A careful study of the value stream map indicated some specific causes for billing errors:

- Sending items not ordered.
- Sending invoices before shipments.
- Not updating customer addresses.
- Human errors in data entry.
- No timely communication of returned items.
- Inconsistencies among order takers.
- Too much waiting.
- Too many steps and handoffs.

Tally sheet for billing errors / TABLE 3

Date: 7/20/2006		Bill numbers: 57001-57200	
Bill preparer: John Doe			
Type of error	Tally	Number	Percentage
Incorrect amount	11	12	30%
Wrong customer		3	6%
Double billing		4	10%
Billing for unordered goods	1	16	40%
Late billing		5	14%
Total		40	100%
Error rate = 40/200 = 20%			

Pareto chart for billing errors / FIGURE 3



The team developed a value stream map reflecting the future state (see Figure 6, p. 36) and performed a series of *kaizen* blitzes to streamline the billing process. In the future state, the billing process had three steps:

1. Order taking, order preparation, new customer setup and order pricing were combined into order processing.
2. Checking credit and calculating sales tax and total amounts were combined into billing.
3. Shipping.

By reducing the billing process to three steps, the cycle time was reduced to less than a day, and cycle efficiency increased to 10.4%.

To achieve the future (expected) state, the Six Sigma team:

- Identified the necessary activities and the order in which they must be performed.
- Developed and documented policies and procedures to ensure all employees performed the activities in the correct order.

BILLING DISCONNECT

While completing this article, one of the major multinational telecommunications companies gave me a great real life field story. I was a customer of this company for more than 40 years and used its services for all phone calls. Sometime last February when I called India, I got the message, "International calls can't be made from this number." I thought this was a technical problem and would be corrected. The next day, I got the same message.

I called the company's customer service, but the representative had no clue how to address the issue and connected me to another clueless person. After 40 frustrating minutes, I hung up. I called again the next day and encountered more clueless people. Finally, the sixth person I spoke to told me the company had cut my service because my bill was too large. I told them there had to be an error, but the representative could not provide any details about my bill, which I had not yet received. I decided to wait until the bill came to address the issue and until then used phone cards for international calls.

When the bill came, I was startled to see I was charged \$7 per minute for calls to India. For many years, I had an international calling plan with a \$1 flat fee per month, plus 30 cents per minute. When asked, I was told that was the old version of the company. This was the new version, and that is why I was charged \$7 per minute.

No one could explain what this new and old system was about, why I was not told about it earlier, and why I should pay \$7 per minute. After many hours of arguing, the customer service representative agreed to recalculate the bill and told me the amount I owed. I promptly sent a check for that amount with a note stating the error and what customer service told me to pay. I thought this was the end. I was wrong.

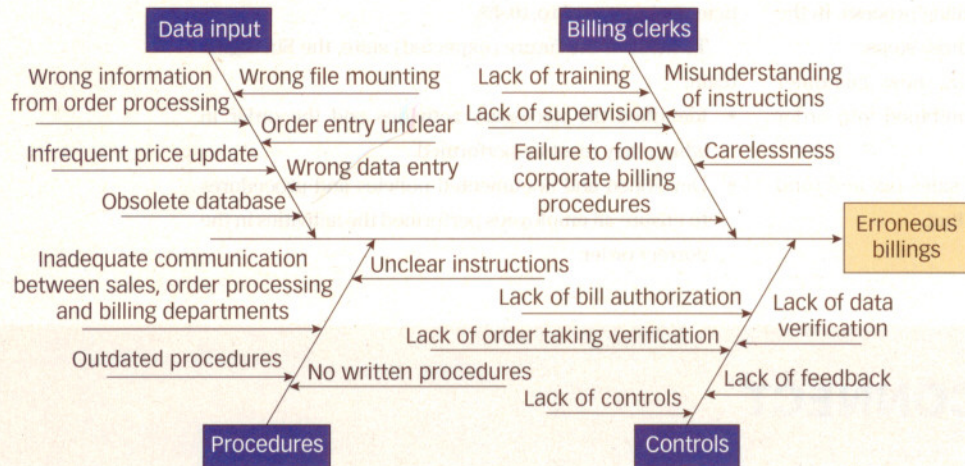
The next month, I received a much larger bill with a statement that the amount was overdue. This fiasco continued for several months. I also received a letter from the company's accounts receivable (AR) department stating that unless I paid the overdue amount, my phone services would be cut off and my account given to a collection agency. I explained what happened to the AR representative, but she said she had no communication with the billing, cash receipts or customer service departments and insisted I pay the total billed amount or face having my service cut. Shortly after that, the company cut my long distance service.

Unable to resolve the issue with the company's personnel, I sought the help of the Better Business Bureau (BBB). BBB took my complaint, agreed with my statement and contacted the company. A short time later, the company called me, apologized for the error and overcharges, credited the overcharges to my account and refunded the excess I paid.

By this time, annoyed with its arrogance and lack of respect for customers, I said goodbye to that company and chose another carrier as my phone service provider. Of course, it didn't take long for me to receive several letters asking me to reconsider my decision, as well as discount coupons to rejoin.

The bottom line: The company demonstrated that its billing process was flawed and there was no communication between billing, cash receipts, customer service and accounts receivable. It overcharged, harassed and bullied me (I heard similar stories about the same company from many other people), wasted hours of my time and took four months to accept it made a mistake, only after the intervention of the BBB. In the end, the company lost a long-term, loyal customer. — L.T.

Cause and effect diagram / FIGURE 4



Data and activities included in the billing process / TABLE 4

Customer

- Orders via mail, fax, phone and e-mail.
- Average daily orders: 200/day.

Central mailroom

- Receive outside mail.
- Sort according to departments.
- Put in boxes.
- Deliver to departments.
- Stamp postage and send outgoing mail.

Order taking

- Receive orders from customers and central mailroom.
- Open customer mail orders.
- Record customer phone orders on paper.
- Sort all orders by customer name and stamp date.
- Prepare folders with customer order information.
- Move batch of customer orders to order preparation once a day.

Credit check

- Check customer credit once a week.
- Add credit status to folders.
- Sort customers according to acceptable and not acceptable credit.
- Batch and move the sorted folders to billing.

Order preparation

- Receive folders with customer order information.
- Sort folders according to new and current customers.
- Send new customer folders to data processing.
- Receive new customer folders from data processing.
- Move customer order folders to order verification.
- Receive folders from order verification.
- Make two copies of customer order folders.
- Send one copy of the order to shipping and one copy to billing.

Data processing

- Receive new customer folders from order taking.
- Batch the folders, assign a customer number and create customer record.
- Add new customer number and other information to customer folders.
- Batch customer folders to order preparation once a day.

Order verification

- Receive customer order folders from order preparation.
- Check stock availability.
- Make price estimates.
- Add price estimates to customer order folder.
- Move the folders to order preparation once a day.

Billing

- Receive copy of customer order folders from order preparation.
- Send new customer folders to credit check.
- Receive customer folders from credit check with credit status.
- Sort the customer folders according to acceptable and not acceptable credit.
- Send the customer folders with not acceptable status back to order takers.
- Send the acceptable customer folders to sales tax department.
- Receive customer folders from sales tax.
- Calculate the total amount (purchases, taxes) to bill.
- Enter all the necessary data into computer and print invoices twice a month.
- Address envelopes, fold, insert invoices and close. Move the envelopes to central mailroom twice a day.

Shipping

- Receive customer order folders from order preparation.
- Pick and pack the items in the order.
- Print and paste address labels on the boxes.
- Ship the packages twice a day.

- Replaced the existing batch and queue system with a flow system. Customer orders were processed one at a time as they arrived. Individuals in each step were trained to do all activities in that step.
- Automated the billing system and encouraged customers to submit orders via the internet.
- Trained order processing employees to take data correctly, verify data for accuracy and completeness, and look for special terms.
- Created a system in which data was only entered once and transmitted electronically, with passwords to limit access.
- Developed standard formats with built-in internal checks and flags to alert users about incomplete data, incorrect part numbers and faulty descriptions.
- Trained shipping personnel to communicate with the billing department in a timely manner regarding partial shipments and returned goods.
- Sent invoices only after receiving confirmation from shipping personnel that orders were sent.
- Printed the name and phone number of the customer's contact person, due dates and discounts on invoices to avoid runaround experienced by customers. Highlighting payment due dates and available discounts minimized customer calls and shrunk collection intervals.
- Simplified the chaotic pricing structure and computerized it. Any deviations from the posted prices were immediately communicated to the necessary parties.

- Suggested blanket agreements be negotiated and invoices sent on a monthly basis via the internet when possible. The free time that resulted would be used for training, to pursue value adding activities and to perform further *kaizens*.

Final actions

The Six Sigma team believed in the saying "what gets measured gets improved," and developed a set of relevant performance measurements to track the efficiency and effectiveness of the billing process. The metrics selected were:

- Total number of billing documents processed divided by the number processed per day.
- Lead time to process customer order.
- Cycle time to prepare a customer bill.
- Average amount in accounts receivable divided by average number of sales.
- Percentage of accounts received past due.
- Sum of the dollar amount in accounts receivable, multiplied by the number of days since the sale, divided by the total number of days.
- Percentage of erroneous bills.
- Average time to correct an erroneous bill.
- Number of billing complaints.
- Average time to resolve billing complaints.

The team was fully aware of the powerful nature of working in cells and the success of just-in-time

LEAN SIX SIGMA

Lean uses simple tools and draws on employee creativity to add customer value. The five tenets of lean are defining value, identifying value streams, making value flow, pull systems and pursuit of perfection.¹

Sigma is a statistical term that represents deviation (defects in the process) from the mean. A defect is a nonconformance to specification, such as a part that does not fit or, in this case, an incorrect customer bill. A process with one sigma quality has a 34% chance of producing a defect, whereas Six Sigma reduces that number to 3.4 defects per 1 million opportunities.

Successes of Six Sigma are well documented. Motorola used it to dramatically improve quality and earned the highly coveted Malcolm Baldrige National Quality Award. Black Belts save companies about \$250,000 per project.² General Electric (GE), one of

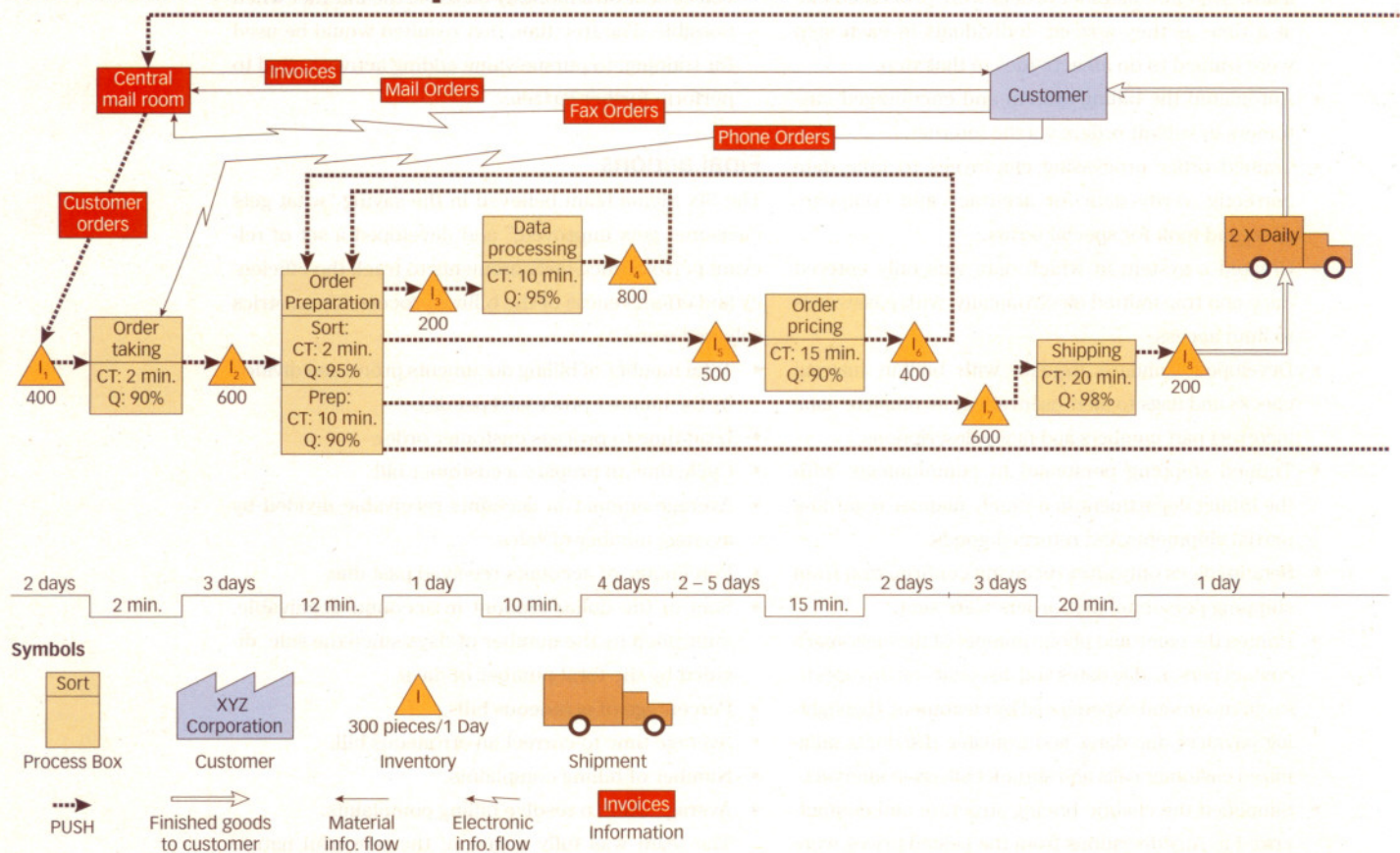
the pioneers of Six Sigma, estimated the benefits of its efforts during the first five years of implementation at \$10 billion.³

In 1999, Xerox hired GE Capital to handle its billing process. GE showed Xerox lean Six Sigma, and Xerox made a serious commitment to the method in 2002, training its top executives, including CEO Anne M. Mulcahy, who led the effort. All told, Xerox invested \$14 million in the method, earned a \$6 million return in 2003 and expected even bigger payoffs in the years to come. With the lessons it learned, Xerox helped customers like Bank of America, which consolidated its document centers and saved \$800,000.⁴

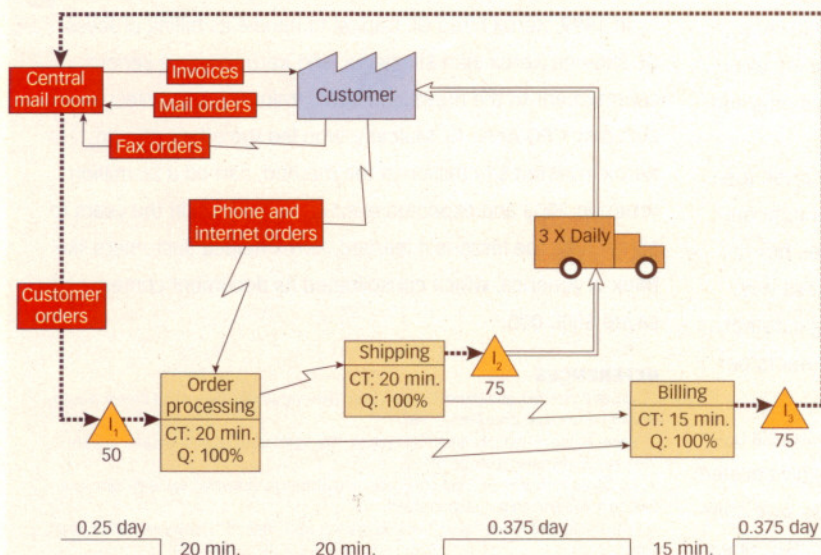
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HC value stream map: current state / FIGURE 5



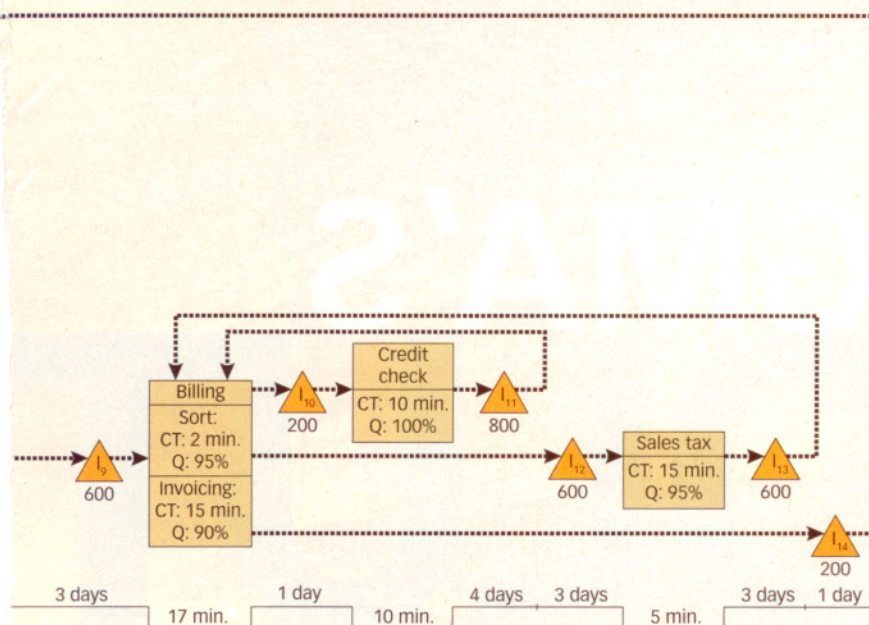
HC value stream map: future state / FIGURE 6



manufacturing methods. For the next level of improvement, the team suggested that HC consolidate all activities into one cell manned by a team of personnel from sales (covering order taking, order preparation, order pricing and data processing), accounting (covering credit check, sales tax and billing) and shipping.

The cells would be located in the shipping area, and cell personnel would take full responsibility for all activities from order taking through invoicing. Throughout the improvement project, the team communicated with HC management and received management's support.

With a resolution in place, HC figured out what Motorola learned more than a decade ago: sometimes a lean approach is needed when the customer's patience with the billing process is wearing thin.



Inventory Legend

1. Mail and fax orders.
2. Customer orders in folders.
3. New customer order folders.
4. Folders with new customer record information.
5. Customer order folders.
6. Customer order folders with verification and pricing.
7. Customer order folders with shipping information.
8. Boxes waiting to be shipped.
9. Customer order folders waiting for invoicing.
10. Sorted new customer folders waiting for credit check.
11. Customer order folders with credit status.
12. Customer folders waiting for sales tax to be added.
13. Customer folders with sales tax to be added.
14. Invoices to be mailed.

	Invoicing	
	Current customer	New customer
Process time	51 minutes	71 minutes
Non-value adding time	19.5 days	29.5 days
Total cycle time	156.85 hours	236.18 hours
Cycle efficiency	0.54%	0.5%

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NOTES

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