3. Break each major heading into greater detail. As you move from left to right in the tree, the tasks and activities should become more and more specific. Stop the breakdown of each level once there are assignable tasks. If the team does not have enough knowledge to continue at some point, identify the individuals who can supply the information and continue the breakdown later with those individuals present.

4. Review the diagram for logic and completeness. Make sure that each subheading and path has a direct cause-and-effect relationship with the one before. Examine the paths to ensure that no obvious steps have been left out. Also ensure that the completion of listed actions will indeed lead to the anticipated results.

MORE:

- Case study – U.S. Naval Ship Repair Facility, Japan: http://rube.asq.org/2007/04/environmental-management-and-sustainability/reworking-equipment-and-methods-speeds-environmental-cleanup.pdf
- Case study – Singapore Housing and Development Board: http://rube.asq.org/2009/06/quality-tools/magic-huddles.pdf
- Webcast – "The Seven Management and Planning Tools Webcast Series Overview": http://asq.org/2010/06/quality-tools/the-seven-management-and-planning-tools-webcast-series-overview.html

Part III
Customer–Supplier Relationships

Whatever your role and whatever industry your organization is part of, you have customers and suppliers. You are both a customer *and* supplier, in some manner. If that's unclear, it will be explained below.

Customer–supplier relationships exist in all shapes and forms, and they are crucial to your business. They're even *more* crucial if you want to implement quality practices. Analyzing the feedback from customers and suppliers is one way to know that what you're doing is meeting expectations. How can you improve what you're doing? By analyzing the feedback and by maintaining a healthy relationship with your vendors and suppliers. They can help by doing things like giving you better materials, not damaging things you hand off to them before they go to customers, and so on.

Throughout the following discussion, we occasionally use the word "product" alone. In all cases, we are also referring to services. This information applies equally to product-based and service-based organizations.

CUSTOMERS

Internal

Internal customers are those within the organization. Every function and workgroup in an organization is both a receiver of services and/or products or services from internal and/or external sources and a provider of services and/or products to internal and/or external customers. These interfaces between provider and receiver may be one to one, one to many, many to one, or many to many. Each receiver has needs and requirements. Whether or not the delivered service or product meets the needs and requirements of the receiver, it impacts the effectiveness and quality of services and/or products to their customers, and so on.

The steps to improve processes and services are as follows:

1. Identify internal customer interfaces (providers of services/products and receivers of their services/products).
2. Establish internal customer service/product needs and requirements.
3. Ensure that internal customer requirements are consistent with and supportive of external customer requirements.
4. Document service-level agreements between providers and receivers.[7]
5. Establish improvement goals and measurements.

6. Implement systems for tracking and reporting performance and for supporting the continuous improvement of the process.

Effect of Treatment of Internal Customers on That of External Customers

Careless behavior of management (and management systems) toward internal customers may in turn create careless or indifferent treatment of external customers. Be wary if you see any of the following in your organization:

- Poor tools and equipment
- Defective or late material from a previous operation
- Incorrect/incomplete instructions
- Illegible work orders or prints
- Circumvention of worker safety procedures and practices
- Unhealthy work environment
- Lack of interest in internal complaints
- Disregard for external customer feedback

These can generate a downward spiral that could adversely affect an organization's business. Ignoring the needs of internal customers makes it very difficult to instill a desire to care for the needs of external customers. The surly and uncooperative salesperson, waitperson, housekeeping employee, healthcare provider, delivery person, or customer service representative is often a reflection of an organization's lack of caring for its internal customers.

External

External customers are those who are served by or who receive products or services from the supplier organization. There are many types of external customers:

1. Consumers/end users
   - *Retail buyer of products/services.* The retail buyer influences the design and usability of product features and accessories based on the volume purchased. Consumer watchdog organizations warn purchasers of potential problems. The factors important to this type of buyer, depending on the type of product or service, are: reasonable price, ease of use, performance, safety, aesthetics, durability, ease of purchase process, installation, instructions for use, post-purchase service, warranty period, packaging, friendliness of seller's personnel, and brand name. Increasingly, retail buyers also consider the organization's social responsibility standing: reputation, ethics, environmental practices, human rights record, and so on.
   - *Discount buyer.* The discount buyer shops primarily for price, is more willing to accept less-well-known brands, and is willing to buy quantities in excess of immediate needs. These buyers have relatively little influence on the products, except for, perhaps, creating a market for off-brands, production surpluses, and discontinued items.
   - *Employee buyer.* The employee buyer purchases the employer's products, usually at a deep

discount. Such procurement activities can be a part of a person's role for their employer. Often being familiar with or even a contributor to the products bought, this buyer can provide valuable feedback to the employer both directly, through surveys, and indirectly, through volume and items purchased.
   - *Service buyer.* The buyer of services (such as TV repair, dental work, and tax preparation) often buys inspired by word-of-mouth, either literal or online. Word of good or poor service spreads rapidly and influences the continuance of the service provider's business.
   - *Service user.* The captive service user (such as the user of electricity, gas, water, municipal services, and schools) generally has little choice regarding from which supplier they receive services. Until competition is introduced, there is little incentive for providers to vary their services.
   - *Organization buyer.* Buyers for organizations that use a product or service in the course of business or activity can have a significant influence on the types of products offered as well as on the organization from which they buy. Raw materials or devices that become part of a manufactured product are especially critical in sustaining quality and competitiveness for the buyer's organization (including performance, serviceability, price, ease of use, durability, simplicity of design, safety, and ease of disposal). Other factors include: flexibility in delivery, discounts, allowances for returned material, extraordinary guarantees, and so on.

Factors that particularly pertain to purchased services are the reputation and credibility of the provider, range of services offered, degree of customization offered, timeliness, fee structure, etc.

2. Intermediate customers
   - *Wholesale buyer.* Wholesalers buy what they expect they can sell. They typically buy in large quantities. They may have little direct influence on product design and manufacture, but they do influence the providers' production schedules, pricing policies, warehousing and delivery arrangements, return policies for unsold merchandise, and so on.
   - *Distributor.* Distributors are similar to wholesalers in some ways but differ in that they may stock a wider variety of products from a wide range of producers. What they stock is directly influenced by their customers' demands and needs. Their customers' orders are often small and may consist of a mix of products. The distributors' forte is stocking thousands of catalog items that can be "picked" and shipped on short notice at an attractive price. Customers seeking quality at a good price and immediately available mainly influence distributors stocking commodity-type items such as sheet metal, construction materials, mineral products, and stationary items. "Blanket orders" for a yearly quantity delivered at specified intervals are prevalent for some materials.
   - *Retail chain buyer.* Buyers for large retail chains, because of the size of their orders, place major demands on their providers. These demands include pricing concessions, flexible deliveries, assumption of warehousing costs for already-purchased products, special packaging requirements, no-cost return policy, and electronic order processing.
   - *Other volume buyers.* Government entities, educational institutions, healthcare organizations, transportation companies, public utilities, cruise lines, hotel chains, and restaurant chains all represent large-volume buyers that provide services to customers. Such organizations have regulations governing their services. Each requires a wide range of products, materials, and external services, most of which are transparent to the consumer. Each requires high quality and each has tight limitations on what it can pay (based on appropriations, cost-control mandates, tariffs, or heavy competition). Each such buyer demands much for its money but may offer long-term contracts for fixed quantities. The buying organizations' internal customers frequently influence the products required.
   - *Service providers.* The diversity of service providers buying products and services from other providers is mind-boggling. These buyers include plumbers, public accountants, dentists, doctors, building contractors, cleaning services, computer programmers, web site designers, consultants, manufacturer's reps, actors, and taxi

drivers, among many others. This type of buyer, often self-employed, buys very small quantities, shops for value, buys only when the product or service is needed (when the buyer has a job, patient, or client), and relies on high quality of purchases to maintain customers' satisfaction. This buyer is influenced by a provider's ability to furnish service and/or replacement parts for old or obsolete equipment, ability to supply extremely small quantities of an extremely large number of products (such as those supplied by a hardware store, construction materials depot, or medical products supply house), and product knowledge that extends to knowing how the product is to be used.

With some exceptions (such as very small organizations), most organizations segment their customer base in order to better serve the needs of different types of customers. Customers may be segmented by:

- Purchase volume
- Profitability (to the selling organization)
- Industry classification
- Geographic factors (such as municipalities, regions, states, countries, and continents)
- Demographic factors (such as age, income, marital status, education, and gender)
- Psychographic factors (such as values, beliefs, and attitudes)

Providing the exact same product or service to every type of customer is no longer feasible. Henry Ford is reported to have said, "People can have the Model T in any color—so long as it's black." Black was the only paint color available that dried fast enough to allow Ford's assembly-line approach to work. Does this attitude still seem valid in any industry today?

An organization must decide whether it is interested in simply pursuing more customers (or contributors, in the case of a not-for-profit fund-raiser) or in targeting the right customers. It is not unusual for an organization, after segmenting its customer base, to find that it is not economically feasible to continue to serve a particular segment. Conversely, an organization may find that it is uniquely capable of further penetrating a particular market segment, or may even discover a niche not presently served by other organizations.

CUSTOMER FEEDBACK

Customer relationship management (CRM), also referred to as relationship marketing or one-to-one marketing (serving the unique needs of each customer), is receiving emphasis in today's fast-paced, ever-changing environment. CRM relates less to the product or service provided and more to the way business is conducted. In a customer-focused organization, the thrust is usually more toward nurturing existing customers than a drive to attract new customers. A key principle of good customer relations is determining and ensuring customer satisfaction.

Perceptions of customer satisfaction must be corroborated or rejected through sound means for collecting, analyzing, and acting upon customer feedback. Effective systems for utilizing customer feedback involve several elements:

- Formal processes exist for collecting, measuring, and analyzing customer data and for communicating results to the appropriate business functions for action.
- Feedback mechanisms are in place to determine how well an organization is meeting customer requirements.
- Most organizations choose a combination of methods to get a more complete picture. Once customer satisfaction data have been gathered, sophisticated techniques can be used to analyze the data and target areas for improvement.
- Data are stored appropriately and made available to those who need it.

Some examples of the origins of customer data that can be useful in determining customer needs and satisfaction are:

Data from within the organization

- Customer complaints, when logged and tracked
- Past records of claim resolutions
- Product warranty registration cards and guarantee usage
- Service records—product failure, product maintenance

- Input from customer contact personnel
- Customer satisfaction surveys
- Transaction data
- Data from established "listening posts"
- Lost-customer analysis
- Market research

Data from outside the organization

- Data about competitors' customers
- Research including magazine and newspaper articles, trade journal information
- Public information including customers' and competitors' annual reports
- Advertising media including brochures, TV, radio, websites
- Industry market research

Table 2 presents different levels of customer satisfaction.

Level	Is Your Customer:	Then Your Customer:
1	dissatisfied?	has probably departed forever.
2	marginally satisfied?	is casual (any supplier will do).
3	basically satisfied?	is borderline, uncommitted.
4	delighted?	is a return customer (retained).
5	a committed advocate?	is loyal, appreciates what you do, and tells others.

Table 2 Levels of customer satisfaction.

We'll now discuss a few of these customer feedback concepts in greater detail.

Complaints

Complaint data, when appropriately captured and analyzed provides a wealth of information about customer satisfaction. However, it must be realized that the data do not constitute a valid statistical sample: Many customers find it a burden to complain unless there is a serious problem, and the majority of customers have no discernible complaint to register.

Many organizations openly solicit complaints. Think of the restaurant waitperson who inquires about your satisfaction with your food; the organization that serves mail-order customers and includes a self-addressed, stamped reply card; the hotel that seeks feedback on your satisfaction with your stay at its facility; or the online store that emails you a link to a survey about your shopping and purchasing experience on their website. Buyer satisfaction is greatly improved when a complaint is quickly resolved, as is a customer's intent to repurchase from a supplier.

Customer Surveys

Many organizations solicit customer feedback with formal customer surveys. The aims of a survey are to get as high a response rate as possible, to obtain the most representative sampling of the customer population surveyed, and to acquire as much useful data as possible. Designing surveys and analyzing the data received are processes involving much expertise and knowledge. Administering the survey process is expensive. Misinterpretation and inappropriate use of the data can be even more expensive.

Methods of administering surveys include:

- Mail
- Electronic (e-mail or through a website)
- Telephone
- In person, one-to-one
- In person, group
- In person, panel

Each method has its advantages and disadvantages. The relative effectiveness of one over another also depends on the purpose of the survey, the population to be surveyed, and the benefit-to-cost ratio of conducting the survey. For example, one-to-one interviews can generally only reach a small number of persons and are expensive to conduct, but the personal contact involved often yields great insights. The mailed survey has its costs but can reach unlimited numbers of potential respondents. The response rate can be low and the types of customers responding may not represent a reasonable sample. This method, however, is far less expensive than one-to-one surveys. Electronic surveys are relatively inexpensive when integrated with other website material, but they can yield very low response rates and may produce responses from only the wildly delighted, the highly dissatisfied customers, and the "loyal" customers willing to help.

The organization should word questions at a level that the customer can understand, and not formulate questions' content based solely on what it thinks the customer would want to answer.

It's important to select a random and representative group of customers. Not doing so will result in responses that are not statistically valid. This can also happen when a low quantity of responses is analyzed. Any analysis done from such a sampling won't be valid since the extremes of satisfaction and dissatisfaction tend to respond to surveys more frequently than those who are neutral.

Analyze survey results closely. Taking action based on answers to inept or misdirected questions can cause the organization to focus on the wrong or less important improvement effort. Then use sound survey results analysis in the organization's strategic planning and continuous improvement efforts.

Transaction Data

Many organizations collect a wealth of data about their customers through direct interaction with them. Examples include data collected on consumer buying habits through the use of store-issued identification cards (the use of the cards is supported by discount incentives) and through the analysis of "hits" and "buys" from users of websites.

Another way to gather transaction data is to engage external "mystery shoppers" to make purchases of your product and provide feedback to your organization about the experience. (The same approach is also used to "shop" the competitors and check out their approaches.)

Data From Established "Listening Posts"

Organizations have many employees who periodically interact with counterparts at customer or supplier organizations: engineer to engineer, salesperson to salesperson, CEO to CEO, delivery person to receiving person, and so on. In a majority of these interactions, whether face-to-face or via telephone, fax, or e-mail, the customers' people express opinions, suggestions, complaints, or compliments about the supplier's organization, the quality of its products/services, delivery, price—even about the level of personal attention they receive. Excepting severe negative expressions, these comments, casually and informally made, are seldom captured. Be sure to do so! Having a formal process for collecting and analyzing these data allows an organization to spot the early stages of an eventual customer problem. It also permits the direction of compliments to the responsible people as positive feedback.[8]

Tracking, Measuring, and Reporting

Producing tabulations of customer satisfaction data, trend charts, and so forth is of minimal value without an established objective against which to compare. To make sense of the time and energy involved in collecting the data, there must be a target. To justify preventive action that may be indicated by the analyzed data, there must be a basis for estimating the anticipated gain to be achieved by the action, a means for tracking progress toward achieving the objective, and a basis for evaluating the effectiveness of the action taken.

Simplified steps for determining what it is worth to retain customers are:

1. Segment the customer base by types of products or services sold to each segment.

2. Select an appropriate time period (for customers buying consumer products, perhaps 2 years; for homeowner insurance buyers, maybe 30 years).
3. Compute the average annual profit each customer segment produces. For example, the annual value of the home computer buyer segment equals the average initial purchase price (including a three-year service contract) plus the average price of add-ons purchased within the three years, divided by three, times the number of customers in this segment.
4. Compute the value of each retained customer. To the value of an individual customer in this segment, add the dollar value of upgrading the customer to a new computer at the end of the three-year period. Determine how many customer upgrades represent a challenging but possible goal. Multiply the individual customer's figure by this number of upgrades. This is what it is worth to retain your customers through their first upgrade.
5. Determine what actions are needed, based on your customer satisfaction data, to retain your present customers and estimate the cost of these actions.
6. Compute the estimated net gain from customer retention efforts—the worth of customers minus cost to retain the customers.[9]

7. Do this for each segment. Note: Some segments may not be worth added retention effort. You may also discover a segment of customers for which even initial efforts to sell to them may not be economically wise.

Kano Model

In an organization's efforts to increase customer satisfaction, it is critical to understand what satisfies customers, what does not, and what new or improved products and services could excite customers. Japanese professor Noriaki Kano devised a model that describes the interrelationship among three product qualities: those qualities that must be present, those that are "delighters" or "exciters," and those that are "one-dimensional." A "must be" quality is a dissatisfier when absent and is acceptable (and often not consciously noticed) when present. A "delighter" is unexpected and is a satisfier. However, over time, a "delighter" becomes a "must be," as in the case of the remote TV controller. A "one-dimensional" quality affects satisfaction in direct relationship to its presence; for example, as the price of gasoline goes down, satisfaction increases. Customer research is often used to determine dissatisfiers, satisfiers, and potential delighters. Problems do arise when an organization *thinks* it knows what its customers need and want without having done adequate testing within the various market segments it purports to serve. See Figure 22 for Kano's model.

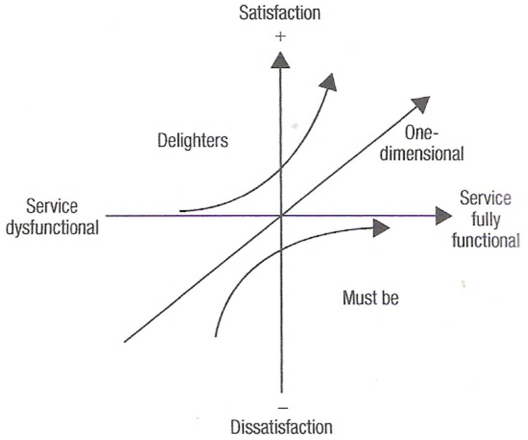

Figure 22 The Kano model.

SUPPLIERS

Internal

Internal suppliers are the "providers" discussed in the earlier section on internal customers. Internal suppliers include not only those providers directly involved in producing the products/services, but also support functions such as tariff checkers in a trucking company, materials management and cost accounting functions in manufacturing, facility

maintenance in a school, the pharmacy in a hospital, the motor pool in a government agency, and market research.

In many organizations, internal suppliers establish service-level agreements (SLAs) with their customers. These agreements, usually for primary processes or sub processes, provide the requirements that must be met by the supplier and allow for quantitative measurement of results. Internal data processing and information technology groups have used SLAs for many years to mutually establish customer requirements and measure performance to requirements.

External

Communicating stated expectations and requirements between customer and supplier is frequently a problem. Because of the pressures to acquire and keep business, suppliers often accept poorly communicated requirements.

Often, a smaller organization fears losing business by antagonizing a large and perhaps major customer with more extensive probing as to what the customer really needs. In some situations, this may mean asking the customer more about how and where the supplier's product will be used (usually essential in medical device manufacturing). A commonly used international standard for quality management systems requires the review of contracts and clarification of customer requirements before the acceptance of an order.

Many organizations are changing their approach to external suppliers from the traditional adversarial relationship to a collaborative relationship. In past times, a supplier (more often called a "vendor") was considered an entity beneath the status of the buying organization. The "purchasing agent" of old would seek to pressure vendors until the lowest price was obtained. Often the buying organization was significantly larger than the vendor's organization and wielded the power of offering potentially large orders. Price and delivery were the primary drivers in the vendor selection process. If quality became a problem, an order was canceled and another vendor selected.

Increasingly, buying and selling organizations are forming quasi-partnerships and alliances to collaborate on improving the buyer–seller relationship, as well as the quality of the products or services being purchased. Buying organizations have been able to substantially reduce the number of suppliers for any given product or service and cut costs through improved quality. It is not uncommon now for the buying organization to assist a supplier with training to use quality tools, material handling and stocking practices, and so forth. In this collaboration, the buying organization expects that the established quality and service levels will be consistent with its needs, that the supplier's practices will be continuously improved, and that lower prices will result. The supplier often receives assurance of longer-term contracts, assistance in making improvements, and sometimes certification as a preferred supplier.

SUPPLIER FEEDBACK

Suppliers need to know how they are performing. If suppliers are providing products or services vital to quality, the customer must have a formal process for collecting, analyzing, and reporting supplier performance. Some common assessment and measurement tools for supplier performance are described here.

Questionnaires/Assessments

Suppliers may be asked to complete a survey about how their quality systems are designed and what plans for improvement have been developed. The customer may also conduct on-site assessments.

Survey questionnaires are usually mailed. They may be used to assess prospective or new suppliers or to reassess existing suppliers on a periodic basis. Use of questionnaires is one of the ways suppliers are "qualified" for the customer's qualified supplier list.

The same design comments and cautions that apply to customer surveys pertain here as well. The difference between supplier questionnaires and customer questionnaires is that the customer expects a 100% response from suppliers. Many suppliers begrudgingly fill out the questionnaires because not to do so would mean loss of business. Large customers sometimes require lengthy questionnaires of even their smallest suppliers, without considering the burden placed on the suppliers.

Product Data

Suppliers may be requested to provide product quality data from the pertinent production run with each delivery, which is used in place of formal verification by the customer. The customer may then analyze the data for compliance to specification as well as process stability and capability.

Delivery Performance

Supplier performance against delivery requirements (for example, total number of days early and total days late) is typically tracked and compared against order requirements.

Complaints

Tracking and reporting complaints about supplier performance is necessary in order to maintain a list of qualified suppliers. An unacceptable number of complaints may result in a supplier being suspended from the list, placed on probation, or totally removed. Usually a hierarchy of categories (types of reasons) is devised for use in coding complaints. The acceptance tolerance for numbers of complaints may vary depending upon the category.

Corrective Action

When a problem is reported to a supplier with a formal request for corrective action, a tracking process is needed to ensure that the supplier responds. These records should be analyzed to determine whether the supplier has been timely in its responses as well as effective with its corrective actions. Without good follow-up by the customer, some suppliers will tend to ignore corrective action requests. Making supplier action mandatory through contracts is a way to resolve this situation.

Product Price and Total Cost

Organizations continually try to reduce the cost of raw materials and services, or at least to minimize increases. The

ability of suppliers to continually show progress in this arena is encouraged and tracked.

Certification and Rating

Some customers have programs for "certifying" qualified suppliers. Typically, certified suppliers have demonstrated their ability to consistently meet the customer's requirements over a period of time. Suppliers are rated on a predetermined scale that may include most of the measurements already noted, as well as others. As the supplier fulfills the time and rating requirements, the supplier moves up through a two- or three-phase plan to full recognition as a certified supplier. The customer usually provides concessions to the certified supplier, such as no incoming inspection requirement, arrangements to ship directly to stock, a long-term purchasing contract, and "preferred supplier" status.

Rating supplier performance can be done in a number of ways. Boeing, one of the world's largest aerospace companies and the manufacturer of commercial jetliners and defense, space and security systems, uses a color-coded scale for its 17,525 suppliers in 52 countries:

- Red: Unsatisfactory supplier performance, clearly failing to meet expectations
- Yellow: Improvement needed in supplier performance to meet expectations
- Bronze: Satisfactory supplier performance, meeting expectations

- Silver: Very good supplier performance, meeting or exceeding expectations
- Gold: Exceptional supplier performance, clearly exceeding expectations

Boeing calculates these ratings based on the supplier's averaged scores on three criteria: delivery, general performance assessment (GPA), and quality. For more on Boeing's system, see the article "The Way to Engage" in ASQ's *Quality Progress* magazine.[10]

Needless to say, reporting on the supplier's certification, rating, and/or overall performance should be done on a regular basis, such as quarterly.

Driving Continuous Improvement

Material and services from suppliers, when they are direct inputs to the product realization process, can substantially impact product quality, customer satisfaction, and profitability. Efforts to improve incoming material and services from suppliers (including their correctness, completeness, accuracy, timeliness, and appearance) are often given less attention by the customer than the customer's own internal processes. It should be noted, however, that defective material and inadequate services just received have not yet incurred the added costs of the production process. When a product is rejected at any stage up to and including its use by an end user, costs have been added at each stage in the cycle. At any stage, including the failure of a product under warranty, the quality of the incoming material or services could be the real root cause of failure. The tendency of some customers to

"work around" supplier deficiencies is not acceptable and will eventually hold the customer back.

Initiatives to continually improve suppliers' performance are critical to building and sustaining customer confidence. As mentioned earlier, the emerging trend of greater collaboration between customers and their suppliers is opening new opportunities for improvement, often developing into partnerships and alliances.

Conclusion

Good news: by learning and using the ideas found in this guide, you will make huge improvements by being more process oriented in your thinking and applying quality tools as needed.

The bad news? You have probably thought it at some point while reading: many problems are extremely difficult to solve and intimidating in scope. A lot of them require advanced thinking and tools described in books that fill entire professional libraries. So what about those problems?

Begin to tackle them by learning more about those "macro" quality models and systems briefly outlined in the section of the same name. Becoming familiar with the concepts and tools in this guide will give you a huge jump-start. In fact, some quality professionals like to say that any new management concept that comes along, from Six Sigma to lean to anything else, is just a repackaged version of the quality basics, and there is some truth to that. In some ways, those models are simply a specific way or sequence to apply a certain portion of the tools.

Despite the impression you might get from a quality fanatic, quality isn't magic. Management simply directing employees to "do quality" or "do Lean-Six Sigma" won't accomplish as much as it could. We won't lie: you *will* see some results even with a partial or half-hearted use of quality management techniques and approaches. They are that powerful. But using the concepts and tools with greater nuance and complexity will, not surprisingly, yield even bigger and better results. With this book at your side, we hope you seek out such results; they will benefit you personally in your career and your organization in its competitiveness and success.

Lastly, we ask you to reflect on the content in this guide. If you were completely new to quality before reading, did we pique your interest? If so, we have provided numerous other resources, many of them completely free, that will allow you to go deeper. Also consider studying for and testing for ASQ's Quality Improvement Associate certification (CQIA). This guide contains much of the content you'll need to know to pass the exam.

Even if we *didn't* interest you in quality, we still want to hear from you. Please email us at authors@asq.org with any feedback you have on how to make this guide more useful to your needs.

Additional Reading

In addition to the following resources, remember that the sections "Quality Models and Systems" and "Tools" also include articles, case studies, books, and webcasts for further study.

The very first book to seek out is *The Quality Improvement Handbook, Second Edition* by the ASQ Quality Management Division and John E. Bauer, Grace L. Duffy, and Russell T. Westcott, editors. Much of the content for this guide was adapted from the *Handbook*. Its content is thus the next step up in depth from this pocket guide.

Auditing

Arter, Dennis R. *Quality Audits for Improved Performance, Third Edition* (Milwaukee: ASQ Quality Press, 2003).

Russell, J.P. *The Internal Auditing Pocket Guide: Preparing, Performing, Reporting and Follow-up, Second Edition* (Milwaukee: ASQ Quality Press, 2007).

Customer-Supplier Relationships

Parks, Kirsten and Timothy Connor. "The Way to Engage" from *Quality Progress* magazine, April 2011 (Milwaukee: ASQ).

Schoenfeldt, Thomas I. *A Practical Application of Supply Chain Management Principles* (Milwaukee: ASQ Quality Press, 2008).

Overview on the ASQ website of supplier quality: http://asq.org/learn-about-quality/supplier-quality/overview/overview.html

Process Management

Andersen, Bjørn, Tom Fagerhaug, Bjørnar Henriksen, and Lars E. Onsøyen. *Mapping Work Processes* (2nd ed.) (Milwaukee: ASQ Quality Press, 2008).

Webcast – "Delivering Process Excellence Through Process Management" by Scott Rutherford, Michael Nichols and Joe Basala: http://asq.org/2012/10/process-management/delivering-process-excellence-through-process-management-webcast-slides.html

Teams

Joiner, Brian L., Barbara J. Streibel, and Peter R. Scholtes. *The Team Handbook* (3rd ed.) (Madison, WI: Oriel Inc., 2003).

Overview on the ASQ website: http://asq.org/learn-about-quality/teams/overview/overview.html

Tools

Andersen, Bjørn. *Business Process Improvement Toolbox* (2nd ed.) (Milwaukee: ASQ Quality Press, 2008).

Tague, Nancy R. *The Quality Toolbox* (2nd ed.) (Milwaukee: ASQ Quality Press, 2005).

If you want to:							
Gather ideas	**Group ideas**	**Analyze**	**Sequence steps**	**Draw a picture of data**	**Track data over time**	**Prioritize or get group consensus**	**Show relationships**
Affinity diagram	Affinity diagram	Cause-and-effect diagram	Flowchart	Histogram	Check sheet	PICK matrix	Relations diagram
Cause-and-effect diagram	Cause-and-effect diagram	Force-field analysis	Arrow diagram	Pareto chart	Run chart	Multivoting	Scatter diagram
Brainstorming		Relations diagram	Tree diagram	Run chart	Pareto chart	Nominal group technique	
Force-field analysis		Pareto chart		Scatter diagram	Control chart	Relations diagram	
Benchmarking		Five whys		Control chart		Decision matrix	
Audit							

Tool selection chart.

Source: Modified from *There Is Another Way!: Launch a Baldrige-Based Quality Classroom, Second Edition,* by Margaret A. Byrnes with Jeanne C. Baxter (ASQ Quality Press, 2013).

End Notes

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4. Economou, M. "Quality's not costly." *Manufacturing Engineering* 120, no. 3 (Dearborn, MI: Society of Manufacturing Engineers, 1998): 20.
5. International Organization for Standardization strategic advisory group on corporate social responsibility, preliminary working definition of organizational social responsibility, ISO/TMB AGCSR N4, 2002.
6. Ron Bialek, Grace L. Duffy, John W. Moran. *The Public Health Quality Improvement Handbook* (Quality Press, Milwaukee, WI 2009), p. 170.

7. Westcott, R. T. Quality level agreements for clarity of expectations. *Stepping up to ISO 9004:2000* (Chico, CA: Paton Press, 2003), appendix C.

8. Westcott, R. T. Tapping the customer's many voices. *Stepping up to ISO 9004:2000* (Chico, CA: Paton Press, 2003), appendix B. Article describes the "LCALI" (listen, capture, analyze, learn, and improve) process for establishing listening posts and using the data collected.

9. F. Reicheld, and C. Fornell present a more sophisticated approach to determining the worth of retaining customers in "What's a Loyal Customer Worth?" *Fortune* (December 1995).

10. http://asq.org/quality-progress/2011/04/supplier-quality/the-way-to-engage.html

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