


Starting from Scratch

In 50 Words Or Less

- Before now, no method existed to establish a new quality system by systematically applying quality concepts and tools to problem solving.
- Graduate students studying quality developed the Quality Systems Development Roadmap to help organizations do this, using application templates from the Lean Six Sigma Quality Transformation Toolkit.

Roadmap and toolkit:
recipe for a **new
quality system**

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“MY COMPANY has just charged me with starting a quality program. Where do I start?”

This situation was examined a few years ago in QP as several authors reflected on this challenging question—one any quality professional might be asked at some point during his or her career.¹

The collection of articles discussed ISO 9000, Ford Motor Co.’s quality operating system, lean, Six Sigma, lean and Six Sigma combined, systems thinking, complexity theory, the Malcolm Baldrige National Quality Award criteria, combinations of methods and unique approaches. But the full article collection ultimately failed to answer the central question: “Where do I start?”

Though the differences among quality systems, methods and design tools were obscure—a common problem in the literature addressing quality issues—the key links among the quality approaches were identified, providing a useful overview of how they interrelate.

What is still needed, however, is a general approach to determine what quality systems should be used, if any, what methods to apply to which processes, and how to select appropriate quality tools (for example, advanced product quality planning, failure mode effects analysis or quality function deployment) for the questions that need to be answered as part of a quality system.

As part of our graduate work in quality systems, our team set out to find an answer, which we call the Quality Systems Development Roadmap (QSDR).

What's the best system?

Many quality methods, systems and tools exist today. There are third-party concepts and standards (ISO 9000 and the Baldrige criteria) and variations of standards specific to industries (for example, AS9100 for aerospace and ISO/TS 16949 for automotive). There are individually tailored quality systems designed for a specific business or business unit.

It can be difficult for any organization to choose the quality system that will meet its specific needs. However, new companies, organizations without an enterprise quality system and organizations just starting to implement quality can have a particularly difficult time determining what systems, methods or tools to use.

There has been no out-of-the-box tool, checklist or internet guide to implementing a quality system that will meet an organization's need when the organization does not currently have any system. There has been no framework for sifting through the differences among models for quality systems and ultimately choosing or customizing the best approach.

Consultants can recommend specific products, but there is no structured path firmly founded in research literature or organizational best practices for the non-specialist to use in assisting an organization with making decisions. Until now, there has been no all-encompassing process or tool to help organizations decide what aspect of quality to use based on organizational factors, situations and conditions.

This is a problem for organizational leaders and,

more specifically, staff charged with implementing a quality system or performing quality-related tasks. Developing a solution to this problem would assist those tasked with introducing quality to their organizations for the first time, as well as to organizations with existing quality methods or tools that need help determining what methods or tools to employ under what circumstances.

It is precisely this gap our team set out to fill. Representing the academic, automotive, manufacturing and research sectors, we began to review the existing quality literature in depth to find out how all the pieces fit together.

We recognized that to reduce variation in day-to-day, mundane tasks while establishing a foundation for process improvement and innovation, it would be important to develop a framework quality system. Using our results, new or established organizations can execute their initiatives while providing traceable and auditable reports of work done and progress toward achieving performance objectives.

Do you need a QMS?

Before beginning, ask yourself the most fundamental question: Do you really need to consider implementing a new quality management system (QMS)? To answer this, we need to examine what a QMS is all about.

Quality can be defined in many ways, including fitness for use, zero defects and conformance to requirements. Despite the range of definitions, the goals underlying the pursuit of quality are the same: achieving conformity, reducing variation, eliminating waste and rework, eliminating nonvalue-adding activity, preventing human error and defects, improving productivity, and increasing efficiency and effectiveness.²

According to the ASQ online glossary, a QMS can be considered a mechanism for managing and continuously improving core processes to “achieve maximum customer satisfaction at the lowest overall cost to the organization.”³ It applies and synthesizes standards, methods and tools to achieve quality-related goals.

Thus, a quality system represents a specific implementation of quality concepts, standards, methods and tools, and is unique to an organization.

A quality system is typically enacted to provide a

Quality must be a sustainable **core value** at **all levels** of an organization.

basis for auditing operations and data-driven continuous improvement. It can be used as the basis for documenting operational processes, procedures and interaction. It requires an understanding of how an organization's processes contribute to its continued operation, growth and viability, and can be used to support any of the following goals:

- Achieving conformity.
- Reducing variation.
- Eliminating nonvalue-adding activity.
- Reducing waste and rework.
- Preventing human error.
- Preventing defects, improving accuracy and improving integrity.
- Improving productivity.
- Increasing efficiency and effectiveness of equipment and operators.
- Driving innovation.

Before starting the process of instituting a QMS, an organization should determine whether this structure will deliver the expected benefits. For example:

- Do your customers require that you meet and maintain quality standards (such as ISO 9001) to do business with them?
- Do you need to cut costs or become more efficient in carrying out your mission?
- Do you have error-prone processes that must be improved?
- Do you need to improve your competitive position by becoming more innovative?

If you answered yes to any of these questions, you should consider implementing a QMS.

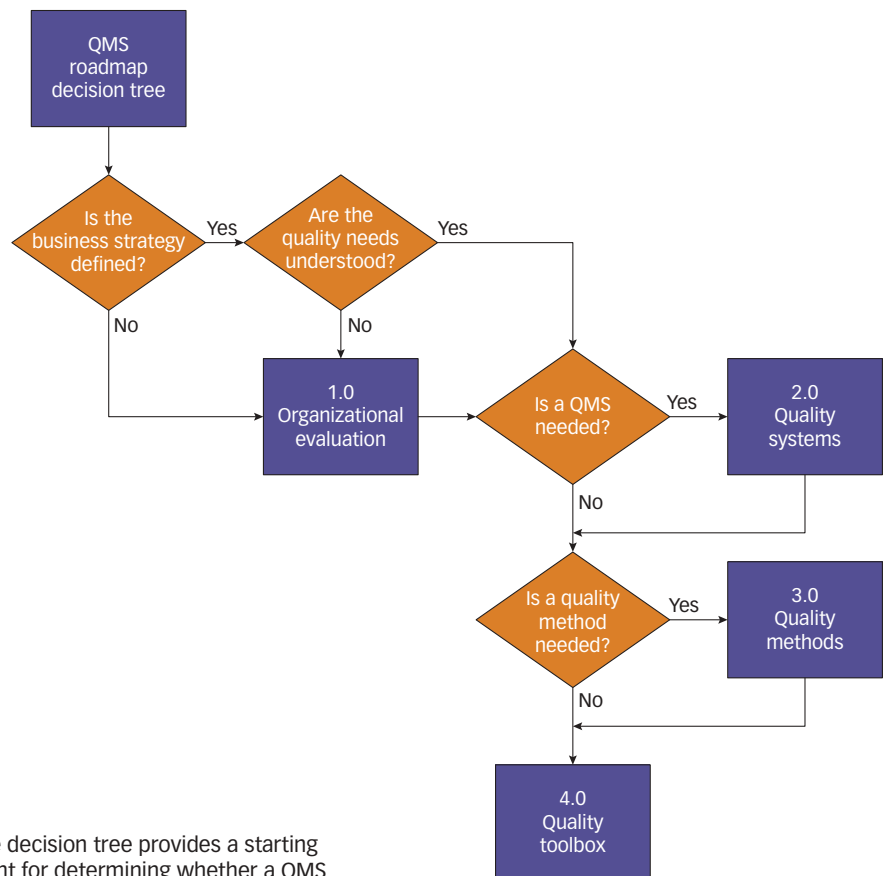
Roadmap

The QSDR was developed to help identify the key aspects of establishing a new quality system. It is based on the Lean Six Sigma Quality Transformation Toolkit (LSSQTT), an MS Excel-based set of applications and quality tools that can be used to facilitate team-based communication and problem solving.

The LSSQTT is a custom instructional and training system that provides content and applications that are congruent with organizational needs and challenges.⁴

The high-level structure of the roadmap is a set of

QMS roadmap decision tree / FIGURE 1



The decision tree provides a starting point for determining whether a QMS should be initiated.

flowcharts that outlines the decision processes to be used as you select worksheets to further develop your quality system.

In addition, the full portfolio of worksheet applications (in MS Excel) is available for download on the QSDR website.⁵ The worksheets can ease the process of developing your own new quality system.

An overview of the QSDR is provided in Online Figure 1 at www.qualityprogress.com. It outlines the four primary components that characterize the roadmap. Figure 1 (p. 43) shows the decision process that can be used to determine when and how to apply each of the four components of the roadmap:

1. QSDR 1.0—Organizational evaluation: an assessment of your strategy and readiness for implementation (see Figure 2).
2. QSDR 2.0—Quality systems: to help you understand

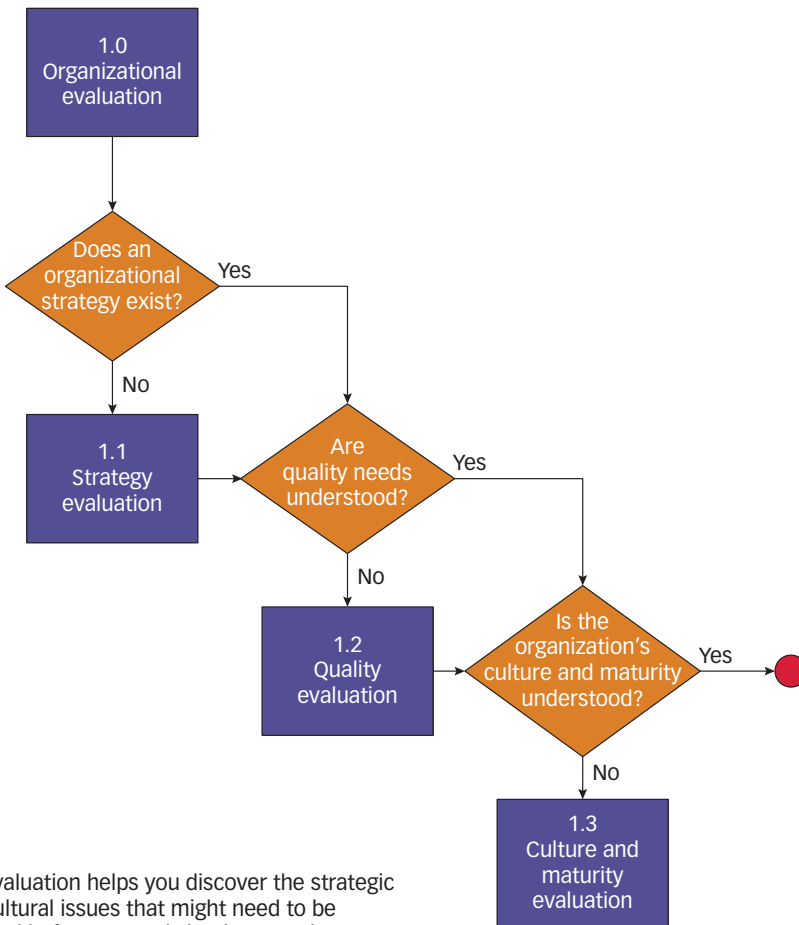
existing frameworks for quality systems (see Online Figure 2).

3. QSDR 3.0—Quality methodologies: to help you choose appropriate approaches for problem solving (see Figure 3).
4. QSDR 4.0—Quality toolbox: to help you identify data analysis tools and approaches to achieve your quality goals in the context of your operational processes (see Figure 4, p. 46).

A QMS should be deployed using a process that respects the importance of community and executive-level involvement and provides training at all levels of the organization to realize the promise of the QMS through audits and continuous improvement.

The QMS phase plan, which appears in Online Figure 3, presents a five-phase approach to systematic deployment.

QSDR 1.0—Organization evaluation / FIGURE 2



The evaluation helps you discover the strategic and cultural issues that might need to be resolved before a QMS is implemented.

Organizational assessment

Is your organization culturally ready for a QMS? Does executive management support achieving maximum customer satisfaction at the lowest overall cost to the organization?

Even if top leaders support the idea conceptually, do they really want this to happen? Are they willing to provide the resources to enact and maintain the QMS, and are they willing to make this a continuing priority within the organization? Will they staunchly advocate the mission of the QMS within the organization and to senior managers and line managers?

If the answer to any of these questions is no, then your organization is not ready to pursue a QMS. Quality must be a core value at all levels of an organization, and if it is not—or if the core value is not sustainable—the process of establishing and maintaining a quality system for continuous improvement will not be value-adding.

Is your organization pursuing development of a quality system to achieve certification (for example, to be qualified as a supplier)? If yes, the required elements of the quality stan-

Ensure each process is linked to specific quality goals.

Standard to which you are required to conform will dictate the process of establishing your quality system. There might be additional requirements for identifying and documenting your operational processes, which is the next step.

Identify processes

Operational, managerial and support processes are the foundation for the quality system. Are your operational processes identified and documented? If yes, then you are ahead of the game. Congratulations! Get your flowcharts out; they will be an important part of your QMS and will serve as the basis for many of your quality improvement activities.

If you have not identified processes or the interactions between those processes, now is the time to start. First, we recommend you become familiar with the APQC Process Classification Framework.⁶ This 12-section outline describes many of the operational processes found in the typical organization.

Although your organization might have fewer processes than those listed or additional processes that are not outlined, it is often easiest to work from a pre-established list to identify key processes.

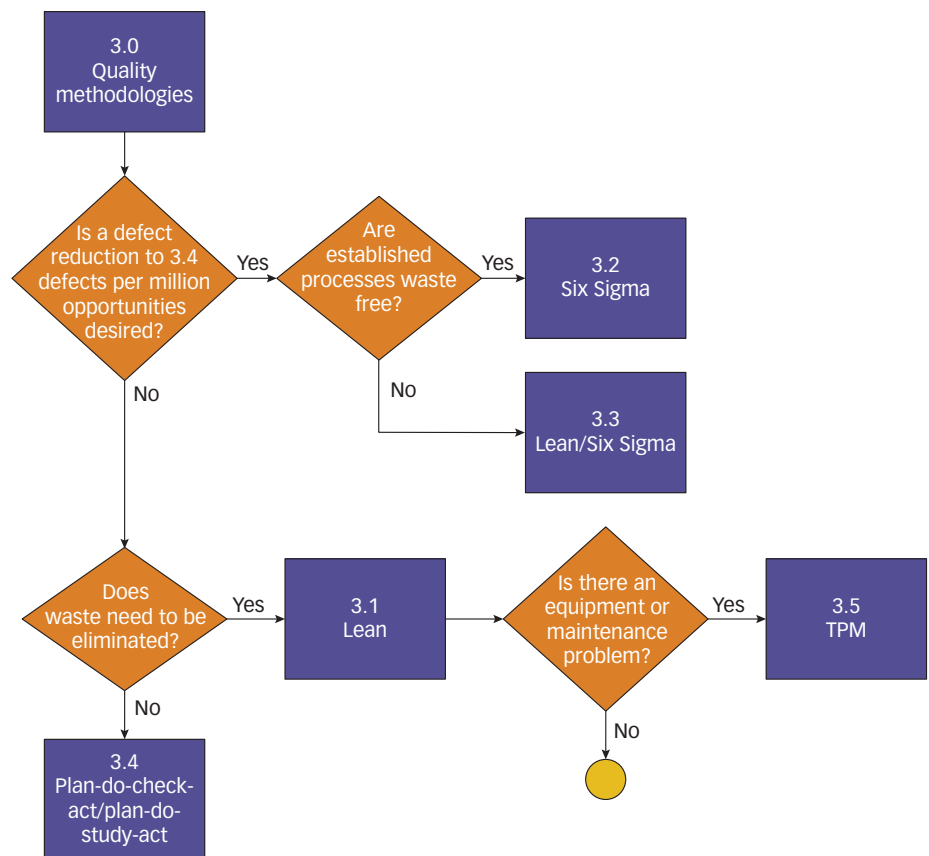
If you do not have your processes identified or documented, use the QMS 1.2 Quality Evaluation decision process in Online Figure 4 to help navigate the steps to define processes.

The interactive version of the QSDR allows you to click through to the QMS 1.2.1 process identification form, which is available as a tool to

outline your operational processes. This form helps you determine explicitly which quality goals are met by which processes.

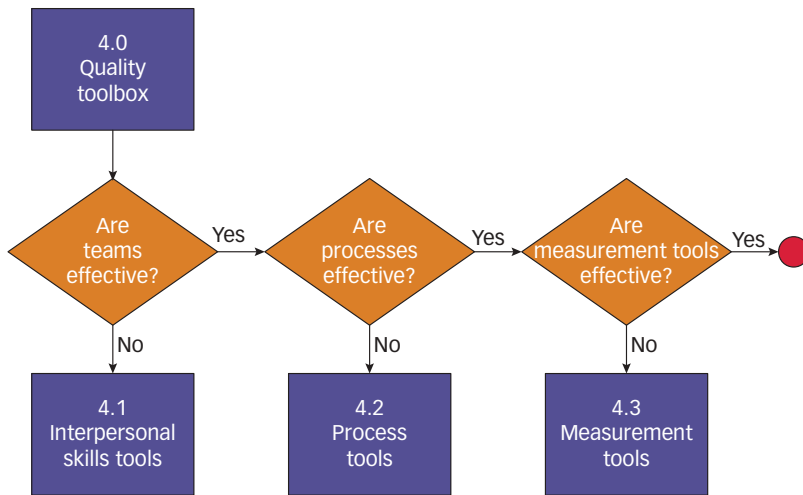
It is important to also understand which of your processes are critical to safety or critical to quality, because these operational processes will form the core of your quality system. Once your processes are identified, use flowcharts, images, diagrams and examples to

QSDR 3.0—Quality methods / FIGURE 3



This tool takes a process-dependent look at overall methods that could provide suitable problem solving approaches. Note that equipment or maintenance problems also can contribute to waste, so in some cases, total productive maintenance (TPM) should be considered in advance of lean methods.

QDSR 4.0—Quality toolbox / FIGURE 4



This chart focuses on which types of tools might be useful for various cases. Detailed information can be found in Nancy R. Tague's *The Quality Toolbox* (second edition, ASQ Quality Press, 2005).

describe what occurs in each case and what people or roles are responsible. Also, remember that a picture is worth a thousand words.

At this point, you should have a solid grasp of your organization's strategy, be confident of your executive sponsorship, know your organization is culturally ready to construct and use a QMS, and have your organizational and operational processes identified, documented and linked to the quality goals you want to achieve.

Select methods and tools

The next question to ask is: Which quality philosophies and approaches are relevant to each process? For the system as a whole, for each process and for each key interrelationship between the processes, a new path will be navigated through the QSDR.

Start with QDSR 2.0—Quality systems, shown in Online Figure 2 to identify the key philosophies and approaches that can be used. Once quality goals are identified for each overall process, operational process and

key interrelationship, it will become appropriate to evaluate pertinent methods for problem solving and tools to be used to facilitate that problem solving.

For example, lean methods and tools are appropriate when the goal is to eliminate waste, whereas Six Sigma analysis is best suited for waste-free processes in which variation reduction is the ultimate outcome.

Quality tools are the mechanisms used to evaluate the nature of a process, make improvements and realize quality goals. They are structured approaches to problem solving that might or might not be analytical but are always geared toward facilitating the achievement of quality goals, such as reducing variation or eliminating waste. Quality tools are typically applied to organizational processes.

According to *The Quality Toolbox*,⁷ each process can be evaluated with three questions: Which stage of the quality improvement discipline are you in (for example, starting a new

quality system versus continuous improvement stage)? What you want to do with the tool (for example, idea creation or cause analysis)? Do you wish to expand or focus your thinking at the current time with respect to the process?

The Quality Toolbox is a comprehensive reference book that classifies quality tools according to six purposes. Three of these purposes are specific to a process, and three are not necessarily specific to a process—they can be applied to several different types of processes unilaterally, as in the case of problem-solving tools.

Those specific to a process are:

- Process analysis tools.
- Data collection and analysis tools.
- Cause analysis tools.

Those not specific to a process are:

- Project planning and implementation tools.
- Idea creation tools.
- Evaluation and decision making tools.

For each process that is identified, start with QDSR 3.0—Quality methodologies in Figure 3, and step through the remainder of the decision charts in the QSDR to evaluate which methods and tools are pertinent to that process.

Quality problem solving is process depen-

MORE FIGURES ONLINE

For those who need to start a quality management system from scratch, go to www.qualityprogress.com for additional figures illustrating the roadmap and toolkit.

dent. For example, in one process you might want to apply Six Sigma to reduce variation, whereas for another—such as brainstorming or idea generation—you might actually seek to increase it.

Choosing the appropriate tools and methods within a process-focused QMS by ensuring each process is linked to specific quality goals is a recipe for organizational success. **QP**

NOTE

This article and the work it describes were completed as part of a graduate course within the quality systems specialization (QSS) at Bowling Green State University (BGSU) in Ohio. BGSU is the lead institution in the QSS, part of the online Technology Management Ph.D. Consortium based at Indiana State University. The work reported here is a typical team-based project completed by graduate students in the QSS. Sinn served as the faculty instructor and adviser to the team.

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