Bringing Quality to the Masses: The Miracle of Loaves and Fishes

How will workers of the future learn about quality?

by Gregory H. Watson

ONE OF MY MOST REWARDING EXPERIences as a member of the American Society for Quality (ASQ) board of directors was serving on the Futures Team. The team was challenged to think futuristically about what the world will be like in the year 2010 and how four possible scenarios could affect the practice of quality. The learning the team experienced during this nine-month project was extraordinary, and the potential implications for the quality community were exceptional. The real challenge was not just to stimulate insight into future possibilities, but to prepare individuals and the quality community for the future. The only way to do this is to ensure that everyone is aware of the trends, changes, and factors that could affect the quality profession.

Over the past two years, the Futures Team has published the study results, and members of the team have described the conclusions at conferences and local sessions. The time has come, however, to discuss specific elements of the study's findings in more detail. What does the future hold for the transition of the body of quality knowledge from quality professionals to the masses?

Interpreting the futures scenario

Scenarios are used to define possible outcomes based on current, observable trends and understand the potential outcomes of future events. One trend that existed across all scenarios studied by the Futures Team was the change that occurs in the quality profession as a result of technology and its impact on knowledge management.

What is knowledge management? It is an approach for sharing knowledge using technology as a creative enabler to evaluate contextual information that incorporates new experiences, resulting in actions that provide unlimited growth potential.[1] In other words, knowledge management is a way to apply technology that links the organization's body of knowledge with the minds of individuals in a current business situation to help make better judgments about potential actions. Quality tools and methods provide an analytical basis for such problem solving. John A. Young, former CEO of Hewlett-Packard, once commented on the reason for making a significant investment in infor-

FRED HILLIARD/SIS

mation technology: "By putting a personal computer on each worker's desk we have created a virtual network for problem solving and sharing ideas across the whole company." Knowledge management provides a means for linking contextual information about problems with problem solvers using information technology.

How does one prepare for this type of future? There are two foundations that must be developed before the vision of the future can be described. The first is how to transfer knowledge from one person to another applying the principles of adult learning theory. The second is the set of technological enablers that make adaptive learning systems possible. To develop this line of thinking, one must consider the transition of knowledge and the technological enablers of this transition before looking into the crystal ball.

Managing the knowledge transition

A pragmatic question can be asked: Is the future best foretold through the cartoon characters Pogo and Dilbert? As the famous quote from Pogo succinctly states: "I have met the enemy and he is us." Sometimes people are their own worst enemies. Quality tools cannot be reserved only for quality professionals. These tools are like religious faith; they become more meaningful when they are shared. As the Greek poet Aeschylus said, it is the knowledge of useful things that makes one wise. But, what are the useful things in the body of quality knowledge, and how can technology be used to communicate them in the decision-making process?

Kaoru Ishikawa claimed that 80% of the problems encountered in business could be solved by applying basic quality tools. This thought can be extended by using the Pareto principle to postulate that 80% of the remaining 20% can be solved using advanced quality tools. This means a company could be successful (solving 96% of its problems) when quality tools are used ubiquitously. But, if there are fewer quality professionals in the future organization, who will do the training and how will the organization ensure that its people are knowledgeable in using these tools, both reactively and proactively?

As Scott Adams, the creator of Dilbert, observed: "All the technology that surrounds us, all the management theories, the economic models that predict and guide our behavior, the science that helps us live to 80—it's all created by a tiny percentage of deviant, smart people. The rest of us are treading water as fast as we can. The world is too complex for us. Evolution didn't keep up."[2] This truism, spoken by a dissatisfied customer of the quality movement, implies that quality practitioners will be challenged in transitioning their knowledge to the masses, especially in finding a way to transfer their knowledge so the masses will find it useful in their applications. This means that such application must address the learning principles that apply to adults, which focus on providing new, profound knowledge that is applicable to the task at hand, not knowledge for the sake of knowledge. As Adams observed: "Everything I've ever learned in my entire life can be boiled down to a dozen bullet points, several of which I've already forgotten."[3] It can be expected that an organization's customers will forget what they are told, so what can be done to remind them to apply these tools and methods to their work? This is where technology comes in. Before discussing the technological enablers, however, remember the solutions that should be avoided.

The extremes of the lone-ranger quality professional, where one individual solves all problems, should be avoided, as well as the Socratic situation, where the quality professional is a full-time teacher of basic skills or team facilitator who doesn't really want external participation. To be successful in the long term, line managers need to acknowledge and solve their own problems. That way they will take responsibility for preventing the recurrence of such problems. So, how can a future be designed that achieves good for society by applying the quality professional's skills?

Understanding technological enablers

This problem is similar to the Bible story in which Jesus was faced with a large, hungry crowd and performed a miracle to solve the problem. He fed the masses by multiplying a few fish and loaves of bread into a feast. This miracle illustrates the multiplier effect that quality professionals must create to distribute their body of knowledge to the hungering masses. Fortunately, technology provides enablers that accel-

Preparing for the Future: The Transition of Quality Competence

"The quality professional's role will change dramatically....In 2010, it is likely that fewer quality professionals will exist. However, those who do exist will have a new and more complex role. It will involve the development of business-related strategy, using quality approaches. It will demand superb strategic thinking, information retrieval, communication, and interpersonal skills. The quality professional of 2010 will probably be much closer to bottom-line results, have a view of how they can be increased, and be much more closely associated with directly improving business results.

"Every professional, in almost every field, will need to know advanced quality tools and approaches in order to succeed. In fact, every organization will need to apply the quality principles, or will be overrun by those that do so successfully.

"For other managers and individual contributors, the knowledge and application of quality tools and techniques will be mandatory. Quality management will be pervasive and integrated into the way things get done every day. Managers will need to undertake organizational self-assessment based on quality principles and be attuned to where both their own organizations and others are headed."

—Quality, the Future, and You: An ASQ Consideration of the Year 2010

erate the deployment of quality methods to the appropriate point of application by an organization's internal customers. Which technologies will play a role in this future knowledge management process and allow quality professionals to leverage the lessons learned from their experiences? Consider the following technologies that could enable the achievement of this possible future state:[4]

- **Expert systems**. These are computer programs that capture the knowledge of experts as a set of rules and relationships used for such applications as problem diagnosis or system performance assessment. This technology permits the thought patterns and lessons learned by the "gray beards" to be consolidated and used by "green workers" to evaluate their problems directly. It provides the foundation for many of the smart systems for learning that are part of the crystal-ball system.
- **Relational databases**. These are databases with logical pointers that create linkages among different data elements to describe the relationships between them. This technology permits logical relationships between data elements to be preserved within the operating system for consistent application across the entire organization.
- **Groupware**. This is computer software that allows a number of users to access the same document or program simultaneously. It permits a group of people to create a common document (whether it be a proposal, set of data, or research report) in real time.
- **Agent technology**. This technology permits a surrogate computer program to learn and think like the individual it represents (either a computer user or a master expert). It serves to monitor a preprogrammed set of conditions or adaptively learns what is important to the host by monitoring frequent activities and emulating those that pass a certain test (e.g., the host does this about three times each day, and therefore, the agent will do it continuously).
- **Electronic books**. This technology allows an individual to create a personal electronic notebook that specifies information used on a regular basis. It may be used to compile a personal collection of data or software helpful in certain task-related activities. In its simplest form, the book is merely a text document that is downloaded to a product similar to a personal data assistant, which has smart applications included, such as agent technology that monitors relational databases based on an expert system algorithm.
- **Adult learning theory**. This theory holds that the experience of discovery is the best teacher, and grounding new learning in past experiences is the best approach for getting people to change their behavior. Learning is a process of active inquiry, not passive consumption. Thus, to learn effectively, individuals must learn as part of a larger team that shares their desire to know. Adult learning theory can be applied to individuals in an organization and supplemented by agent technology, expert systems, or individuals who become virtual team members through participation in internal or external networks that are formed based on communities of competence.
- **Contextual information**. This is information that fits a particular context or situation. For instance, when a shipment is made from a factory, certain information becomes relevant. Every time a shipment is made these types of information are automatically linked to form a basic report that is recorded as the activity, along with any exception data that are provided by monitoring systems, to describe events that occur outside of the regular process.
- **Adaptive systems**. This technology permits a system to learn from data patterns or repetitive situations by monitoring data flows to detect, characterize, and record events that describe the actions to be taken in similar events.

Defining a knowledge system

How can these technologies be integrated into a comprehensive learning system? First, consider an analogy that describes this type of learning system: playing a video game where the participant gets caught up in a virtual conversation with the gaming environment. The challenge in designing a system that permits this type of interactive dialogue is that the prospective audience's reaction can have thousands of permutations in its learning experience. Designing such a computer-based learning machine requires the art of interactive storytelling. In this art, the storyteller recounts a tale, and when the audience responds with a question (or a hiss, boo, cheer, or some other linguistic expression), the storyteller adapts and responds to its stimuli. This type of interaction is less rigid than the print media most people have become accustomed to using for training and expressing thought. A significant difference is that the written media are linear, and the learner must follow the instructional approach of a teacher. Knowledge is gained by imitating the pattern of the teacher. In an interactive session, it is the learner who controls the pattern of learning and determines the sequence, topics, and depth of learning that is achieved. This system supports empowered learning where each person can learn what he or she needs to know and when to apply it to a specific problem. What would this system look like at work?

Looking into the crystal ball

Once upon a future time, a new problem was presented to a competent young manager. He transmitted a broadcast e-mail to his network of collaborators around the company asking if anyone had encountered a similar situation. One colleague suggested he activate Dr. Quality to see what she thought about the situation.

Dr. Quality is the name given to the organization's chief quality agent, who inherited all the knowledge about past problems and appropriate problem-solving methods. Dr. Quality actually has three related agent heads: Joe, Valerie, and Ed. This team specializes in resolving management, engineering, and statistical problems related to the organization's products (goods or services) and processes (work or business). Dr. Quality is invoked (prayerfully, like the oracle at Delphi) to identify the type of situation being experienced or, when a new situation is discovered, to categorize it into a problem type that may be addressed using the generic quality tool kit that was placed in the hands of Joe, Valerie, and Ed years ago by the wise ones of the organization.

Once invoked, Dr. Quality quickly evaluates the adequacy of information for the descriptive event and categorizes the situation based on rules applied from its knowledge base. Analogous problem approaches are identified quickly, and solution methods are sorted for adequacy of information at the current time. When information to support a decision is lacking, Dr. Quality asks the host system of the information owner to conduct a query to provide the missing data and then analyzes the information to determine how to proceed with the analysis needed to

provide a solution to the problem. Once a set of potential solutions is generated, Dr. Quality supervises pilot simulations of the alternatives to test the adequacy of each option. The best simulated solution is presented as the answer. Is this scenario a dream? Well, maybe and maybe not. But, it is one future scenario that could answer the question of how to provide quality training to the masses.

Setting an action agenda

If this futures scenario is to be achieved, then quality professionals and organizations must take some positive steps in this direction. They must sponsor or support research that seeks to establish the technological linkages described here. Many of the basic quality tools and methods can be taught through adaptive learning systems and distributed broadly via the Internet as a point solution to a particular learning requirement defined by a work situation. In addition, the means to characterize problems using standard logical criteria is another area where research is appropriate to determine similar types of problems and may be resolved by similar analytical approaches. A third area for involvement of quality professionals and organizations is in the development of expert systems. When experts retire from an organization, they take with them their expertise. Without this expertise, the system suffers. If the future is to be supported by smart systems such as Dr. Quality, quality organizations need to sponsor or support research that captures this expertise.

Gregory H. Watson is managing partner of Business Systems Solutions, Inc. in Tampa, FL. He is an academician with the International Academy for Quality. Watson is a senior member of the American Society for Quality (ASQ) and the Society's vice president of research and technology. He was instrumental in developing ASQ's technology plan following his participation in the ASQ 1996 Futures Project.

References

1. Thomas H. Davenport and Laurence Prusak, *Working Knowledge: How Organizations Manage What They Know* (Boston, MA: Harvard Business School Press, 1998), pp. 1-14.

2. Scott Adams, *The Dilbert Principle* (New York, NY: HarperBusiness, 1996), p. 9.

3. Ibid, p. ix.

4. Gregory H. Watson, *Business Systems Engineering* (New York, NY: John Wiley and Sons, Inc., 1994), pp. 3-16 and pp. 126-138.