ASQ's Accelerating Change Collaborative Series: A Challenge for Industry

Adaptation of existing knowledge can work.

by
Kevin Nolan

> *"THE CHALLENGE FOR URBAN educators is not to build more pilot programs, but to find a way to replicate selected reforms to create an entire system that works."*
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> *Rudy Crew*
> New York Times Magazine
> *Aug. 31, 1997*

With this statement, Crew, chancellor of the New York City Public Schools, challenged educators and improvement practitioners alike. The challenge is not for more research to further define the ideal system, but for more application of existing knowledge to accelerate the rate of improvement.

Educators should not be alone in this pursuit. Leaders in industry, health care, and government can also accelerate their rate of improvement by efficiently adapting existing knowledge into practice. They, too, should answer this challenge.

Evidence exists in health care and is emerging in industry that methods to adapt existing knowledge can work. The Institute for Healthcare Improvement (IHI) has been successful in using such methods in its Breakthrough Series in health care.

The work of IHI has resulted in dramatic improvements in such areas as waits and delays throughout the health care system, cesarean section rates, adverse drug events, and cardiac surgery.

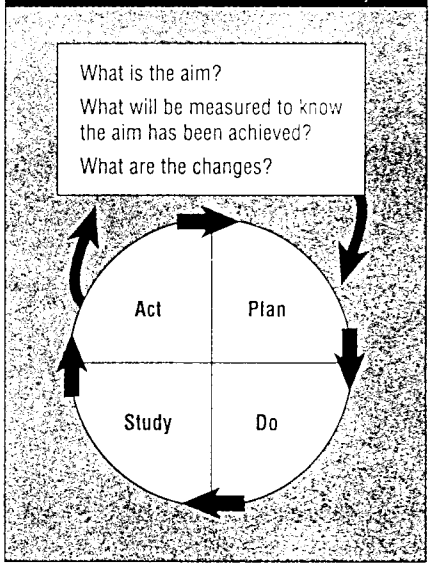
In the spring of 1996, ASQ and IHI began a project that used these methods. The ASQ-IHI project brought together 10 teams from across the country to reduce motor vehicle injuries in their communities.

Despite the challenges posed by community-based improvement efforts, success was such that the experts involved wrote, "Finally, and most important, we learned that by coupling a sound system and method with the right team and using interventions with demonstrated effectiveness, communities can be successful in implementing successful highway safety programs in a relatively short time."[1]

ASQ is embarking on a new initiative to spread the methods to industry. The initiative is called the Accelerating Change Collaborative Series (ACCS). The goal of the ACCS is to achieve measurable results during a six-to-nine-month period by spreading existing knowledge on a particular topic to multiple organizations.

Ron Asbury of Texaco, president-elect of ASQ, says, "As we enter the next millennium, an organization's value will shift from the value of its fixed assets to the value of its knowledge, the strength of its relationships, and the integrity of its reputation. The ACCS will enable this shift to take place by allowing organizations to learn from each other, thereby building the knowledge base necessary to compete in the 21st century.

Figure 1. Model for Improvement



"ASQ saw the importance of this knowledge exchange and created a new mission that drives involvement with methodologies such as this ACCS. This new mission statement is, 'To advance individual and organizational performance excellence worldwide by providing opportunities for learning, quality improvement, and knowledge exchange.'"

The idea of fostering cooperation and learning from others is not new. The American Society for

Testing and Materials (ASTM) develops and provides voluntary consensus standards to facilitate commerce. Driven by economic necessity, Xerox Corp. pioneered benchmarking techniques in the late 1970s. Xerox studied the best, compared the best methods to its own, and made the appropriate changes.[2,3]

ASQ, through its ACCS, will harness the power of learning from others to accelerate improvement. Topics for the series will be selected based on their importance to industry and whether a gap exists between what is known and what is practiced.

The first topic is employee retention and satisfaction. This topic was selected because the retention of good employees, especially in a time of low unemployment and high economic growth, is a key competitive strategy.

Internal costs of turnover have been well documented. Studies have also been performed that link employee attitudes to profitability.[4] Many successful companies are able to maintain low turnover rates and high employee satisfaction.[5] ASQ's goal is to extract, summarize, and spread the knowledge and experiences of these companies.

As the ACCS grows, ASQ will continually identify important topics through literature and the input of its membership. Other topics that are candidates for future collaboratives are improving aspects of the supply chain; managing part-time, temporary, and contract employees; cycle-time reduction; outsourcing; and reducing workers compensation costs. ASQ will also rely on its members for input into the best practices for a topic.

The Model for Improvement

The framework for improvement presented in this article, called the Model for Improvement, can be used to adapt existing knowledge into practice and thereby give some insight into this new ASQ initiative. This model is used in the work of IHI and has been used successfully in industry.

This article refines the model introduced by Ronald Moen and Thomas Nolan[6] and expanded on by Gerald Langley, Kevin Nolan, and Thomas Nolan.[7] Although some revisions to the model have been made, the key enhancements result from how certain parts are applied, particularly in developing changes.

The Model for Improvement (shown in Figure 1) provides a framework for a pragmatic approach to improvement. The model consists of three questions and the plan-do-study-act (PDSA) cycle. The use of three questions to form the context for improvement gives people flexibility in their approach to building and using knowledge. The PDSA cycle establishes a structure for adapting that knowledge into practice.

The three questions

1. What is the aim? The answer to this question guides the improvement efforts and keeps them focused. The aim could be to redesign an existing product, process, or service or to design a new one. The aim might also be improving a particular measure of a system, such as cycle time or a key characteristic of a product, such as dissolution time. In the ACCS, a common aim for the multiple teams will be developed for each collaborative.

The examples of aims shown in Table 1 include numerical goals. If a numerical goal is used well, it not only communicates expectations, but also communicates the support that will be needed. Ambitious, numerical goals reinforce the need to make significant changes to the system.

Table 1. Examples of Aims for Improvement Projects

1. Reduce return-to-work time for employees on workers compensation by 50%.
2. Decrease the median length of stay in the emergency department to less than two hours.
3. Reduce shipping claims by 25%.
4. Reduce pedestrian injuries in the elderly by 50%.

2. What will be measured to know the aim has been achieved? The answer to this question provides criteria or measures for monitoring progress. To understand whether the aim has been achieved for the examples in Table 1, data would be collected on time to return employees to work, length of stay in the emergency department, the number and cost of shipping claims, and the number of pedestrian injuries. These measures are directly related to the aim.

Collecting data on subsystem measures such as time to be placed in a bed in an emergency department or types of product that result in shipping claims might be useful to diagnose problems or evaluate specific PDSA cycles but would not be necessary to monitor progress toward achieving the aim.

Besides the measures that are specifically related to the aim, some additional measures are often needed to ensure that the system as a whole is improved. Examples of such "balancing" measures are cycle time when reducing scrap, patient and employee satisfaction when decreasing length of stay in the emergency department, and associated costs when reducing shipping claims.

The effectiveness of the improvement effort depends in part on the ability to collect data on the measures. The data for the measures related to the aim, and often the balancing measures, should be collected and plotted over time for the life of the project. If changes are made and the measures get better without adversely affecting the balancing measures, then one could conclude the changes led to improvement of the system.

3. What are the changes? Often, when answering this question people use their existing knowledge to review how the current product or system is functioning. They then identify problems, perhaps with the help of data, and develop changes to

Table 2. A Package of Changes for Shipping Claims

1. Water damage

- Put material on quality hold until completely dry.
- Decrease inventory of condensation-prone items during summer months.

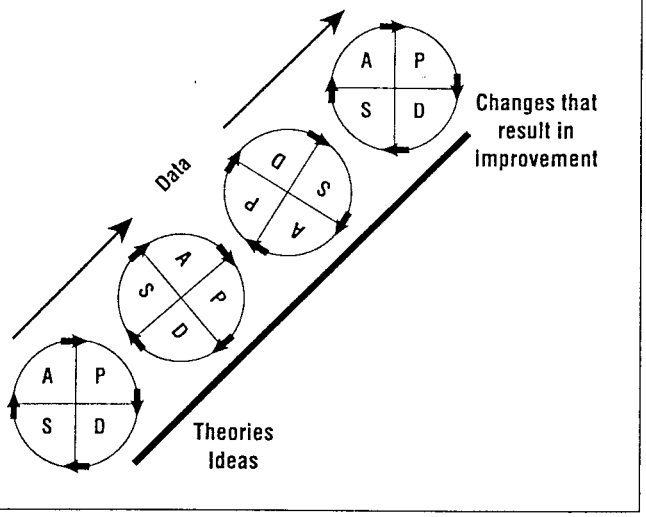
2. Handling damage

- Minimize loose loading on back of truck.
- Don't over-tighten bands on flatbed loads.
- Increase use of tautliners.
- Use extra stretch on top, bottom, and end to improve wrap integrity.
- Use a freight-restraint system.
- Use a package design engineer to work with the shipper.

3. Short shipments

- Use load diagrams to conform ship quantities.

Figure 2. Sequential Use of the PDSA Cycle



overcome the problems.

At times, creative thinking methods might be used to stimulate more innovative solutions, or technology may be applied. Change concepts can also be used to stimulate ideas for change. Change concepts are general notions or approaches that have been found to be useful in developing specific ideas for changes that result in improvement.[8]

Examples of change concepts are smoothing the flow of work, doing tasks in parallel, and using multiple processes. The use of change concepts accelerates the quality and quantity of ideas for change. Lloyd Provost and Gerald Langley write, "A change concept is not specific enough to use directly. Change concepts must be applied to a specific situation and then turned into an idea."[9]

In many cases, it is not clear whether the changes developed will improve the system. Tests are needed to determine if the changes should be implemented as is, refined, or abandoned. In the Model for Improvement, these tests are carried out within the framework of the PDSA cycle. In individual improvement activities within an organization, this approach can lead to improvement, especially when the development of the changes is guided by change concepts.

When the goal is to spread innovation quickly throughout an educational or health care system or in industry, there is a need to create and disseminate specific changes that are known to result in improvement.

Often, the knowledge needed to reduce the time to return employees on workers compensation to work, decrease length of stay in an emergency department, reduce shipping claims, reduce pedestrian injuries in the elderly, or make other important improvements already exists from research or from successful application in limited areas. Significant time should not be spent developing changes for these applications. Instead, the key changes that exist need to be identified and summarized.

Existing research and organizations that have achieved benchmark results in practice should be relied on to identify the key changes. Since each change should make a significant contribution to the aim, matching the changes to change concepts should assist in identifying those that should result in improvement at the system level.

Besides its positive impact at the system level, a change should also exhibit other properties that will accelerate its rate of adoption. These properties are compatible with existing values, easy to try and reverse, minimally complex, and observable in a relatively short period of time.[10]

Since existing knowledge cannot usually be copied but must be adapted to local settings, it is not sufficient to just identify the key changes. They must be summarized or packaged in such a way that they can be easily adapted to different systems. The use of the word "packaged" is important since the implementation of the group of changes contained in the package will result in the aim being achieved.

Karel Cool, Ingemar Dierickx, and Gabriel Szulanski write, "... efforts to accelerate diffusion could be best aimed at ensuring that all potential adopters have access to conveniently priced and adequately developed innovation...." An adequately developed package of high-leverage changes for a specific topic should be considered an innovation.[11]

This notion of a package of changes developed by experts lays the foundation for ASQ's ACCS. An example of the structure of such a package of changes for reducing shipping claims is contained in Table 2. Experts in distribution would develop the specific changes that represent best practices.

The PDSA cycle

The PDSA cycle is the primary means for turning ideas into action and for connecting action to learning. The cycle can be used to help answer any one of the three questions; that is, to develop an aim, define what should be measured, or develop changes. The primary use of the cycle, however, is to

Figure 3. Simultaneous Sequence of PDSA Cycles to Reduce Shipping Claims

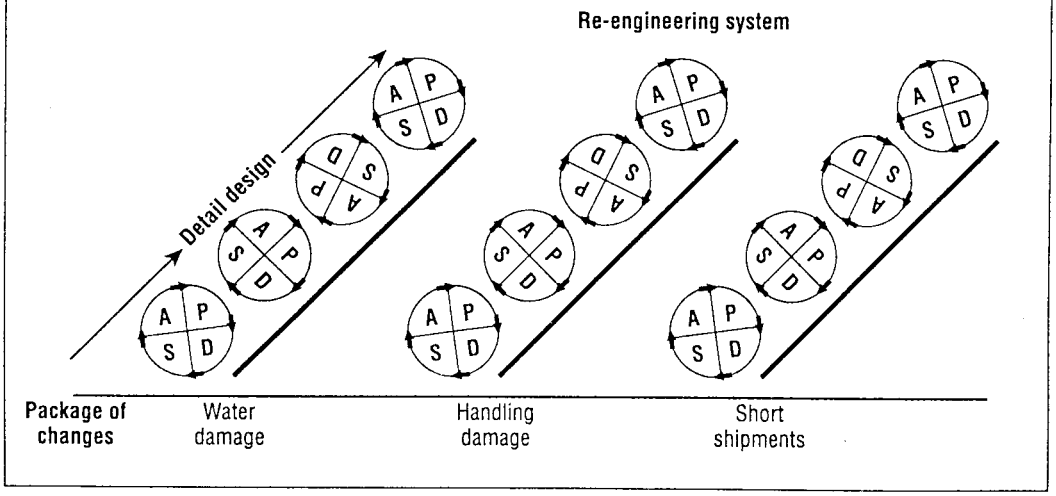
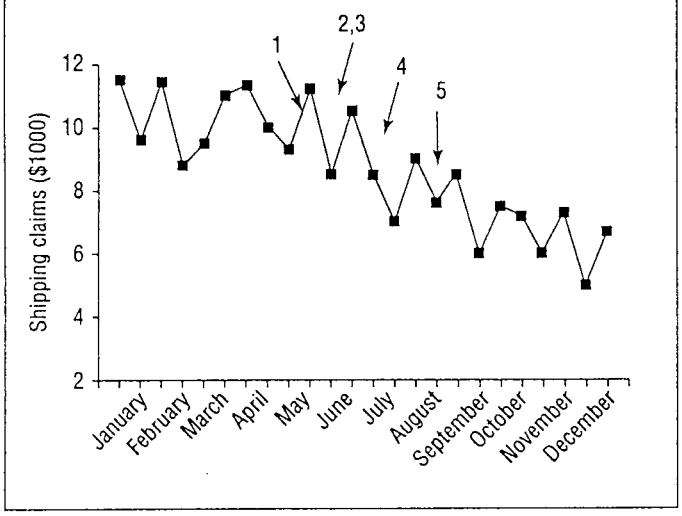


Figure 4. An Annotated Time-Series Graph for Shipping Claims



adapt or test changes.

There is an important distinction between adapting and testing. A cycle to test a change is used to evaluate one or more alternatives. During a test, knowledge is gathered on whether the change will impact the system favorably or should be abandoned. Some tests are expected to fail, so the risks involved determine the scale of a test.

A change might be tried in one facility or unit, or with one customer, with only a few people, or over a short time period. As learning occurs, the scale of the test can be increased. If changes are known to be successful in similar situations and a package of the changes is adequately developed, the cycle is used as the framework to adapt existing knowledge into practice.

Based on such a cycle, the change may be implemented as is or refined, but rarely entirely abandoned. The PDSA cycle is needed to tailor the change to a particular system to achieve the predicted improvement. The complexity associated with adapting a change should determine the scale of the cycle. The structure fostered by the PDSA cycle will assist in the successful adaptation of the changes. Each phase—plan, do, study, act—requires attention to detail.

The cycle is first *planned* by determining who is going to do what and when. In the *do* phase, the change needs to be monitored to determine whether it is being carried out as planned. When the results are *studied*, refinements to the change may be needed and then the appropriate *actions* determined.

If further refinement of the change is required, additional cycles can be used before the change is made part of the day-to-day operations of the system. This sequential approach to improvement (depicted in Figure 2) is in contrast to using one cycle to accomplish everything.

To impact shipping claims, a group of changes to reduce handling damage might be adapted as a series of PDSA cycles. In the first cycle, loose loading might be minimized and additional tautliners used. After delivery, the material could be inspected for damage.

Depending on the results, additional cycles might be used to refine the loading techniques or the use of tautliners, to expand the learning to other trucks, or to introduce other changes. Cycles would continue to be used to adapt the changes until the predicted results are achieved. In the ACCS, experts will work closely with the participating organizations during the collaborative to assist them in adapting the changes to their systems.

As mentioned earlier, when adapting existing knowledge into practice, the changes are considered as a package. In Crew's words, their combined influence results in an entire system that works. Therefore, to efficiently make the changes part of the system, more than one change can be adapted at a time.

A more accurate depiction of the approach of adapting changes in sequential cycles is contained in Figure 3. If the package of changes is developed correctly, the impact of each individual change is not an important consideration. The key objective is to show and sustain improvement.

However, similar to testing a change, if there is cost involved or there is a need to replicate only the key changes at other similar sites, one or more of the following approaches can be used to separate the effects of the changes:

- Some can be stopped to see the effect on the system.
- When the changes are introduced, they can be staggered in some appropriate way so the effect of each change can be seen more readily.
- If replication is an issue, a factorial combination of the changes could be tested at different sites.

When the changes are being adapted, an annotated time-series graph or run chart plotted for the life of the project should be used to monitor whether the changes are achieving the predicted results. The measures plotted in the time series are the ones specifically related to the aim (for example, time to return employees to work, length of stay, number and cost of shipping claims, and number of injuries) and perhaps the important balancing measures.

Notes are made on the time series when a change is introduced. A transition period from the old system to the new system often occurs while the changes are adapted using PDSA cycles. The time series, therefore, would be expected to resemble the graph shown in Figure 4. This graph represents the dollars expended for shipping claims. An additional time-series graph that contains dollars for shipping claims due to handling damage might be developed if this is a key aim of the project.

The goal of the ACCS is to achieve measurable results during a six-to-nine month period by spreading existing knowledge on a particular topic to multiple organizations.

The numbers shown on the graph represent when a particular change or group of changes was introduced. The number 1 might represent changes introduced for the loading of trucks and the use of tautliners, 2 might be the changes related to water damage, 3 the stretch wrap changes, and so forth.

Changes are introduced into the system based on the ability to manage the detail of the project. Since the changes are known to be successful in similar situations, the aim of the time

series is not to determine whether the new system is an improvement over the old or to determine the impact of a specific change, but whether the package of changes is being adapted adequately.

When a group is testing changes, a time-series graph of the measure related to the aim is still a valuable tool. There may be, however, more of a need to measure the impact of a specific change.

Holding the gains

Once the changes that result in improvement to the system are in place, practices need to be established so the changes become part of the normal way the system is run. Holding the gains requires some intervention in the system to ensure that the changes are maintained. Some of the practices that help make improvements permanent are:

- Standardization—Establish specific, recognized policies and practices that act as a model or guideline for a process.
- Documentation—Written information can be used to represent how the process works, for education and training, and for consistency from one group to another.
- Measurement—Data collected from the process ensures that the changes are continuing to lead to the desired results and show whether those results are predicted to continue in the future.
- Training—Some form of training is usually required after a change is made. Depending on the complexity of the change, the training could range from a short, one-time discussion with the workers affected to extensive, formal classroom training.

Improvement is accelerated because successful changes are used for specific aims, and teams collaborate and learn from one another and from a group of experts.

Implications

The Model for Improvement provides a flexible approach for a wide range of improvement efforts. Use of the model focuses the effort on the subject matter. This obviates the need for extensive improvement training.

Individuals and teams within an organization can use the model as a framework to guide their projects. The model can also be used when the focus of improvement is on a single topic that is important to a large number of organizations within an industry. The goal then is to spread existing knowledge to multiple sites.

Spreading existing knowledge on important topics to multiple sites is the goal of the new ACCS initiative from ASQ. As part of the ACCS, specific aims, system-level measures, and changes based on best practices will be developed for each topic. The changes will be packaged in a way that allows 25 to 40 teams to adapt the changes to their local settings using multiple PDSA cycles.

Improvement is accelerated because successful changes are used for specific aims, and teams collaborate and learn from one another and from a group of experts. Ths existence of a large number of teams creates a high probability of a few having success in the first two to three months. This success can then be shared with the other teams.

Individual teams will also be given a framework to spread the knowledge they gain to other parts of their organization. Given this initiative by ASQ and the methods to support it, the wish of Crew and many others to "find a way to replicate selected reforms to create an entire system that works" can be realized.

Acknowledgement

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Kevin Nolan is a statistician with Associates in Process Improvement, Silver Spring, MD. He earned master's degrees in measurements and statistics from the University of Maryland, College Park. Nolan is a member of ASQ.