Fresh Perspective

by Nicole M. Radziwill and Tracy Owens

Leverage the relationships among **innovation, technology and quality** to unlock your creative potential

In 50 Words Or Less

- The relationships among technology, innovation and quality are based on creating new value and sustaining the ability to continue creating it.
- Leveraging these relationships can help in pursuing the quality ideal, which involves releasing your creative spirit.
- Real-life examples illustrate how others tapped their innovative capacity to create new value.

IT IS NOT UNCOMMON in QP and other contemporary business magazines to find inspiring stories about teams that have partnered with customers and stakeholders to enthusiastically co-create new, innovative products or novel technologies. What is not often explored is the symbiotic relationship between technology and innovation—and how the processes and structures used to innovate are themselves technologies.

The framework for the ASQ quality body of knowledge describes four stages of the quality journey:

1. The pursuit of personal excellence.
2. The pursuit of operational excellence.
3. The pursuit of organizational excellence.
4. The pursuit of the quality ideal, which includes an emphasis on transformation, radical or discontinuous change, and methods for releasing the creative spirit.[1]

How can you leverage the relationships among technology, innovation and quality to enhance your personal innovative potential—releasing that creative spirit to actively pursue the quality ideal? The stories shared here provide some ideas for how you can make it happen through deliberate, sustainable value creation.

Sustainable value creation

According to the *Random House Webster's Unabridged Dictionary*, technology is "the sum of the ways in which social groups provide themselves with the material objects of their civilization."[2]

As long as there is a tangible artifact or outcome—such as a product, process, framework or tool—that advances human capabilities, there is technology. Looking at it this way, lots of things can be considered technologies, including:

- Quality systems because they provide the structures that enable you to consistently and reliably craft products and deliver services.
- Social and organizational networks because they connect you to new ideas and the people who create them.
- Art because it often provides you with the inspiration to create other material objects.

While innovation is a social process requiring collective knowledge and experience, technologies are inherently social products or outputs. Quality systems provide the glue to produce what is needed consistently, and to connect people with the innovations that will meet their needs.

The relationships among technology, innovation and quality are based on creating new value and sustaining the ability to continue creating it in the future. Innovation is, after all, quality for tomorrow.

There are two ways new value can be envisioned and created in a future context: peripheral knowledge and combinatory play. These approaches can be applied separately or together. The end result is the same, though: new insights, new ideas and new developments.

Peripheral knowledge

NEED NEW IDEAS? Having difficulty solving a vexing problem? Just change your context—that's the essence of opening up to peripheral knowledge. The recently developed topic of peripheral knowledge[3] has stimulated conversation among ASQ members and others.[4]

When your mind is focused squarely on a specific issue, you can become myopically entrenched in the problem and unable to pull back and see the bigger picture.

Completely pulling yourself or your team out of your typical day-to-day environment can have the beneficial effect of revealing new possibilities through similar, yet unrelated—peripheral—problem contexts.

Because you have been looking at one specific problem so intently, you may be able to find a parallel problem in a basketball game, trade show, restaurant or some other environment unrelated to your current context.

This is exactly what happened to Jim Mazotas, an entrepreneur from Dublin, OH. While watching his children play on the beach, he noticed that nearly all the kids there—regardless of age—were carrying some sort of electronic device.

Whether it was a mobile phone, a music player, or a handheld reader or game, each child tended to divide his or her personal time between typical beach behavior and catching up on their media players. He also noticed—as a lot of parents do—that there are many strangers on a crowded beach, and it's sometimes possible to lose sight of a child.

Mazotas' mind began to generalize and think of ways these devices could possibly help track and locate a child who has gone astray or is missing. The result of the peripheral knowledge that Mazotas picked up thanks to brainstorming on the beach was SafeHouse, a collection of programs that enable a handheld device to send a signal with its location to a parent's device.[5]

In addition, the child's device will use all the technology it has available, such as its global positioning system, camera, microphone and accelerometer, to gather context-sensitive information about the child's situation. The child's device also will be locked on open when a distress signal is sent, preventing any manual reset until the device is found.

Virtual watering hole

In addition to finding innovation based on the capabilities of the technology being used or observed, there are several technology-enabled collaboration tools available to help stimulate innovation through the processes of idea generation and execution.

In their book, *Innovation: The Five Disciplines for Creating What Customers Want*, Curtis Carlson and William Wilmot describe the "innovation watering hole"—a recurring gathering in a workplace where people with new ideas can meet to share and discuss them in a safe and constructive environment.[6]

The idea's owner prepares a 30-second statement of value and presents that value proposition to the participants at the watering hole. Some attendees are given the role of "green hat" and their job is to point out the best features of the value proposition. The same number of individuals play the role of "red hat" to explore how to make the value proposition better, stronger or more compelling.

The shared purpose of both hats is to help the idea's originator refine the idea, improving its chance of being successful when pitched to senior decision makers.

A virtual watering hole can be created with a tool like Spigit.[7] Founded in 2007, Spigit promotes idea generation within an organization by accepting idea submissions, facilitating watering hole-type discussions and gathering advice to be posted for the idea's submitters and others to read. The software is enabled with voting capability so when ideas are competing for the same resources, they can be effectively prioritized.

Innovation is accelerated because peripheral knowledge can be leveraged across an entire organization in a manner that is always up-to-date and aligned with its priorities.

Evolution of context

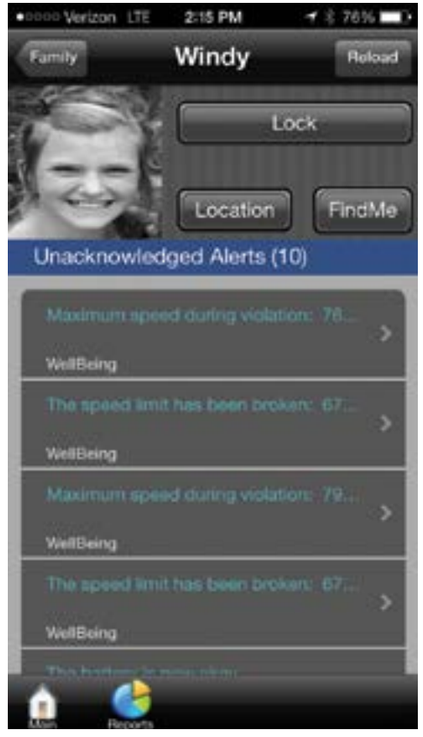
The story of Kathleen Niles is told in *The Executive Guide to Innovation*.[8] Niles worked for several years as a corporate trainer, learning that people learn best when they are given the information they need at the moment they need it, and that long, verbose descriptions of tasks are not always easy to comprehend.

In 2000, she began to develop work instructions and training material with as few words and as many pictures and visual aids as possible. The technology at the time limited her to storing materials on CDs, which took several minutes to load and access. This was not expedient for the user.

The introduction of local area networks enabled her to distribute her materials to the intended users much more quickly. Loading files was still time consuming, though, so the materials she created still were not used as often as they could have been. Undaunted, she kept surveying the environment for new technologies and new opportunities that her organization, Nessis, could leverage to solve this challenge.

Niles' breakthrough came in 2006 when her team was able to program web-enabled visual work instructions. Since then, her company has kept pace with new technology by integrating work instructions with clients' bills of materials, expanding into 3-D graphics and enabling tablets to access training materials faster than ever.

Nessis has accelerated the innovation process through its dedication to continuous learning about the environment in which it is embedded. For them, acquiring peripheral knowledge is a matter of habit.[9]



THE IDEA for SafeHouse, a technology that allows parents to track the locaton of their children using handheld devices, was sparked by peripheral knowledge obtained in a new context.

Uncovering invisible links

New ideas will not always materialize automatically, instantly crystallizing when you walk outside the office door. It may be necessary to force the association of new ideas to save time. Fortunately, tools such as Genrich Altshuler's theory of inventive problem solving (TRIZ), which was developed in the late 1940s to promote this kind of free association, have been around for decades.[10] TRIZ (an acronym of its Russian name) presents 40 different design constructs to stimulate innovation by encouraging the innovators to resolve technological contradictions.

Another example is the Idea Generator app, which matches three random words together when you shake a handheld device. By considering unrelated words such as "musical," "hologram," and "instruction" in the context of your own current challenges, something entirely new may emerge for a market that was previously unserved or underserved.[11]

Not all free association requires a technique or an app. It may be sufficient to simply encourage your team to imagine how the technologies it is using or developing today might be introduced into another context.

General Electric's (GE) leadership team in Hong Kong has been asked to do just this—develop products or processes outside its established lines of business. The team members collaborate with GE engineers all around the world to explore new possibilities.

One pending success story from this collaboration is the development of an inexpensive, handheld, portable ultrasound machine that can be used to send vital information to physicians before they are even able to see the patient.[12]

Combinatory playgrounds

THE DYNAMIC INTERPLAYS among technology, innovation and attention to quality can be experienced through combinatory play, which is Albert Einstein's term for combining and recombining unrelated ideas within the context of a problem.[13]

While tools such as TRIZ and the Idea Generator app can help you think more expansively about a current challenge, sometimes you aren't pressured by a problem that must be solved immediately. Instead, the problem and the problem-solving environment emerge over time, along with the innovations that ultimately result. In cases like these, it can be beneficial to explore new possibilities in a more unbounded way.

PRESIDENT BARACK Obama shakes the hand of high school student Easton LaChappelle's 3-D printed, brain-controlled prosthetic arm at the White House Science Fair in 2013.

Technology helps see possibilities

The next three stories are inspired by two highly dynamic combinatory "playgrounds" in which radical innovation thrives. One is the annual Burning Man event in Nevada, where nearly 70,000 people gather to create a temporary city in the harsh environment of the Black Rock desert. Another is the Business Innovation Factory (BIF), a community of innovation enthusiasts who envision and test new models for delivering value. BIF is led by Saul Kaplan and based in Providence, RI, where its annual summit is held each fall.

Easton LaChappelle of Colorado didn't see the possibilities at first. All he wanted to do was create a robotic hand in his spare time because he thought it would be "really cool."

He was limited to the meager tools he already had available: resources on the Internet, fishing wire, a collection of servo motors and a pile of Legos—but no funding or staff, and certainly no formal education about how to pursue his vision.[14]

While building an early version of the hand, he realized how expensive and challenging it would be to machine all the parts for the light, flexible arm he was envisioning. At about the same time, he met a girl at a science fair who had been born without an arm. She wore an $80,000 prosthetic controlled by an implant in her spine, which would be re-implanted at great pain and expense as her body grew to maturity.

Knowing he could help her and others like her if he kept refining his design, he started exploring 3-D printing to create a prosthetic arm that would be affordable to nearly everyone.[15]

Three years and several prototypes later, he's developed a brain-controlled prosthetic arm that provides haptic feedback to its wearer to emulate a sense of touch. Even President Barack Obama has shaken its hand.

LaChappelle open-sourced his design and has already shared it in many places, including on YouTube and in *Make: Magazine*.[16] The best part? The materials to build the arm cost under $300 to ensure his innovation can have the broadest possible impact for those who need it.

Almost single-handedly (no pun intended), LaChappelle has created a revolutionary new technology that has the potential to transform the entire industry of prosthetics. Now, he can focus more on his next major project: graduate from high school this spring.

Quality guides technological decisions

Michael Emery wanted to immerse people in his art to provide them an inspiring experience, so he built the MerKaBa, a "portal of sound and image to transport participants beyond consensus reality."[17]

This art installation, which was built in the temporary metropolis of Black Rock City, NV, during the 2013 Burning Man event,[18] is a nine-foot dome made of steel with fractal patterns plasma cut into each of the dome's faces. Sound and lighting effects were designed to respond to visitors' proximity and movement patterns, giving them the opportunity to participate in the creation of art.

Modern art, such as Emery's MerKaBa, are works of technological complexity and artistic performance. His artwork integrates a rotating column of mirrors, six video projectors and 12 infrared motion sensors all controlled by three tiny Raspberry Pi computers. When the sensors were triggered, sound clips were selected and played by the software, which he wrote in Python, a high-level programming language. Together, his goal for the technology was that it would provide a reliable and consistent user experience.

XIAO XIAO'S MirrorFugue is a technologically enhanced player piano that captures the facial expressions, body movements and hand positions of the musician in a projected reflection.

Unfortunately, when Emery deployed his creation in the harsh Black Rock desert, his code wasn't performing the way he had expected. The sensors were being triggered in unexpected ways, and dedication to his standards of quality pushed him to quickly solve the problem.

Soon, the challenge became obvious: "I always try to anticipate potential problems and write my code to avoid them, but I didn't expect a giant fire-breathing dragon," wrote the project's software developer. "The dragon sculpture was a couple of hundred yards from the MerKaBa Project on the Playa. Every time it belched flames, it set off the infrared sensor pointed in its direction. The infrared sensors can detect humans up to 30 feet away, but a fire-breathing dragon generates a lot more heat. Next year, I'll plan for dragons!"[19]

Unlocking potential, assessing progress

The role of art is to support and inspire people in their search for meaning and purpose, a process which often naturally integrates combinatory play. Sometimes technology can help you find that meaning and purpose, and as a result, being more deeply connected with inner

sources of inspiration can help you unlock your creative potential. With your power untapped, you can more readily share the knowledge, skills and gifts you have with those around us. This enhances productivity and stimulates the authentic, engaged contributions that lead to innovation.

Xiao Xiao, a doctoral candidate working in the Massachusetts Institute of Technology Media Lab, has internalized this lesson in MirrorFugue, a technologically enhanced player piano she developed.[20]

Recognizing that so much of the richness of piano performance lies in the expressions and body language of the player, her invention captures the facial expressions, upper body movements and hand positions of a musician in a projected reflection onto the piano itself, along with a recording of the song that musician has played.

The entire performance can be replayed, along with the music, on the MirrorFugue piano. Multiple musicians can be replayed at once, and you can even play along with the recordings.

Although created to address the need for improving piano pedagogy and making it possible for students to learn more effectively without an in-person instructor, MirrorFugue provides the opportunity to "interact with content over distance and time as well as to visualize musical structure."[21]

The device can be used to learn from experts in a richer, more immersive way, or can even be used to provide a musician with a creative way to see how much he or she has improved and progressed. Imagine being able to play a duet with yourself as a child, and then again as an adult: What better way to viscerally explore the extent of your own continuous improvement?

Let it flow

Innovation is a social process, and inspiration can come from people and situations you might not always consider at first. Shifting your team's attention to an unrelated area can give its members the fresh perspective needed to truly innovate—to acquire new knowledge to develop new technologies that will bring new value in the marketplace.

Continuous learning can help expand peripheral knowledge. Free association and combinatorial play can expand your awareness of opportunities and possibilities.

The theme connecting all these stories, however, is personal: To expand your innovative capacity, make the effort to explore what lies beyond your own personal boundaries. Get out of your confines; immerse yourself in a new and different environment; and see, feel or experience something new.

You may leave with a lot more than you expected. QP

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NICOLE M. RADZIWILL is an assistant professor at James Madison University in Harrisonburg, VA, and chief sorceress of the Burning Mind Project. She earned a doctorate in technology management and quality systems from Indiana State University in Terre Haute. An ASQ fellow, Radziwill is an ASQ-certified quality manager and Six Sigma Black Belt.

TRACY OWENS is a lean practice leader at Ohio Six Sigma in Dublin, OH. He has a master's degree in international business from Seattle University in Washington. He is a founding member of ASQ's Innovation Interest Group and coauthor of The Executive Guide to Innovation *(ASQ Quality Press, 2013). Owens is an ASQ-certified quality engineer and a Baldrige examiner for the state of Ohio.*