Without a systematic approach for understanding how to best apply technology, long term care providers will be missing the mark.

Technology. Just the word is almost a promise in itself. The speed of profound change and improvement to nearly every aspect of life as a result of technological innovation has raised both hopes and expectations. Older people today, and perhaps even more passionately their baby boomer adult children, believe that technology can improve quality of life from beginning to end.

However, technology has not entirely lived up to the promise that many in long term care may have hoped. Most technologies introduced to the long term care environment promise to improve administrative efficiency and to support existing ways of delivering care. The use of information technology to improve workflow, regulatory compliance, billing, financial systems, and clinical record keeping is the norm.

While laudable, investing to do more of the same—even if faster and cheaper—is not necessarily innovative and is appropriately viewed with skepticism by both providers and their financial backers. The long term care profession should view emerging technologies as a call to innovate and an opportunity to differentiate their individual businesses, bring new value to residents and families, and identify new sources of revenue.

A New Vision Of Long Term Care
Many of the new ideas to care for tomorrow’s seniors have already arrived in the form of information and communications technologies, advanced materials, robotics, and a variety of applications that cross these and other fields.

These technologies include smart devices that are able to talk with each other and smart rooms and buildings that can identify the who, what, and where of both patients and staff. Enabled by relatively cheap and infinitely small sensors, new systems can monitor and report a variety of data—weight, blood pressure, glucose levels, location of people and equipment, medication use, and systems supporting both staff and older adults.

Massachusetts Institute of Technology (MIT) researchers, for instance, are envisioning disposable electronics integrated into fabrics that will permit “smart diapers” to sense wetness, making optimal use of staff time while providing quality care. Under development are applications that have the computing power to do more than report “what is,” but “predict” what might be—a potential fall, for example, or a change in health status leading to a devastating and costly event.

Developments in robotics offer a number of applications that will support long term care. Although many envision robotics as something from science fiction, systems that assist with facility maintenance, medication adherence, tracking and detecting people, serving as reminders, or, simply, as virtual companions are here today and rapidly developing in a variety of forms and functions—from Roomba’s robotic vacuums to Sony’s robotic companion dog, Aibo.

Engaging Families As Consumers
The traditional approach to providing long term care is resident-centric: not incorrect, just incomplete. Spouses and adult children may not be direct end users, but they are critical consumers.

A recent study conducted at the University of Pittsburgh indicates that
caregivers who experienced caregiver-related stress prior to placing their family member in a nursing facility were just as stressed and depressed after placement. In many cases, making daily visits or providing other supports such as dressing and feeding contributed to reduced well-being.

Another prominent source of stress is the caregiver’s concern to adequately monitor and advocate care, especially among those that live at a distance. Providers’ experience indicates that those families that are unable to regularly monitor their loved one’s changing health are more likely to pursue legal actions.

Several new technology applications may help providers to reduce the stress on family members, thus eliminating lawsuits that may arise from incomplete information rather than insufficient care.

For example, MIT researchers have developed a device that would enable a family member to participate in collaborative decision making around the care of a loved one. The handheld device would provide “visibility” to all the people involved in the care of the older adult, allowing the family member to know what is taking place as well as to contribute to important care decisions.

Systems that facilitate such collaborative care are likely to emerge as a powerful value proposition for families determining where to place their loved ones.

Researchers at Georgia Tech have developed the Digital Family Portrait, a device that is both a picture frame that holds a photo and a means of visually assessing the well-being and activities of a distant loved one. The device enables the older adult and the family to “see” how the other is doing. Unlike a typical frame, the Digital Family Portrait contains icons on the frame’s edge that reflect changes in the person’s life such as interaction with other people, mood changes, and general health.

Although originally designed for those aging independently, this type of communication of mom or dad’s well-being at a glance is likely to become more common.

The Promise Of Robotics
Robotics may provide another means for staying, quite literally, in touch with loved ones.

Microsoft’s new “Teddy Bear,” for example, helps parents watch their children through the toy’s embedded camera. The robotic Teddy includes voice capability and facial recognition technology to make it interactive with a child, but this technology certainly presents opportunities down the road for interacting with an older loved one.

Where a voice and smile may not be enough, Carnegie Mellon researchers have developed the Hug—essentially a
robotic pillow. The small, velour-covered cushion is shaped like a person with two outstretched arms that can link grandparents and grandchildren by telephone. A grandchild can squeeze the Hug, which then contacts the grandparent's device and enables the older adult to receive a "hug" as well as to respond by sending one back.

**Improved Alzheimer's Care**

With people living longer, Alzheimer's care is one of the fastest growing services provided by long term care facilities. A technology called "cognitive orthotics" is being developed to assist people with a wide variety of daily activities such as maintaining a complex medication regimen. MIT is developing a family of Pharm Animals that rely on the user's emotions to reinforce drug compliance.

Similar to Tamagotchi toys that require care and frequent interaction, MIT's Pill Pet is a cuddly handheld creature that reminds individuals to take their medications. If the reminders are not acknowledged, the pet becomes "sick" and eventually dies.

The University of Michigan has developed the Autominder System. Tested on a handheld computer and integrated into a robotic "nurse," the Autominder goes beyond simply reminding a person to do something.

It applies "artificial intelligence" to advise the person how, under what conditions, and when an activity should be done. Further on the horizon are wearable computers that will be in the fabric of the user's clothing.

Researchers at MIT are developing such "remembrance agents" that will both remind and suggest relevant information to the older adult depending on the situation.

Safety and security are of major concern for patients with advancing Alzheimer's. Although a wide range of systems exist, most rely on alarms and perimeter security alone. MIT engineers have developed Talking Lights, an application that uses existing fluorescent lighting to communicate with a small receiver that the patient wears. If a patient should wander beyond a safe zone, a Talking Lights transmitter will trigger both a voice from the receiver to gently ask the person to stop, while simultaneously sending an alarm to an attendant's station identifying both the patient and his or her location.

**Technology As A Force Multiplier**

The recently released National Commission on Nursing Workforce for Long Term Care estimates that...
nearly 96,000 full-time equivalent nursing and certified nurse assistant positions are going unfilled. The daily demands on caregivers are contributing to employee stress, injury, and absenteeism and may even be threatening the quality of care provided. The military aggressively pursues the use of technology to serve as a “force multiplier,” which enables one soldier to perform the tasks of many. This technology could potentially serve the same purpose for caregivers.

Technology has historically helped with the “heavy lifting” of care. MIT researchers have developed an active hammock-like bed sheet that uses robotic arms to gently assist the movement and transfer of bedridden patients with minimal caregiver effort.

Other robotic assistants on the horizon include Carnegie Mellon’s “nurse-bot,” which promises to assist in reminding patients to take medication, escort them to physical therapy sessions, deliver food, or provide other basic services that could free up human caregivers.

Information technology at the point of care is making considerable strides in ensuring staff effectiveness and quality care. While current point-of-care technology allows staff to input information, a new generation of educational and training systems are making their debut at bedside.

These systems can remind or train caregivers on the spot about best practices or new techniques in areas such as wound care, thus improving staff capabilities and reducing the likelihood of error.

The capacity to access off-site health expertise promises to improve care and enable providers to redefine their facilities from stand-alone places of care, to facilities that are networked to the best care anywhere, anytime.

**Transforming Technology**

The availability of technology is only one element of achieving real innovation in long term care. There also needs to be a systematic approach for understanding how best to apply technology in response to today’s patients and tomorrow’s technology-savvy older consumers. This is beyond the capacity of the provider community alone. A comprehensive approach by government, private insurers, consumer advocates, and technology firms must be developed to optimize emerging technologies and the coming wave of investment in new facilities. An enterprise-wide vision of the future will harness the power of technology, improve care, and minimize the likelihood of costly experimentation.