

Passion *and* Poetry *in* Raytheon Learning

In the interview that accompanies this article, Raytheon's chairman and CEO Bill Swanson talks about *passion* as a prerequisite for chief learning officers. I suspect that all of my colleagues on Raytheon's leadership team would resonate with that, as *passion* is the first thing Bill looks for in any of his leaders. "If you watch true leaders," Bill says, "they're willing to do unbelievable things for the success of their teams or their organizations. They have a passion that people just sense." Though that's undoubtedly true, why is passion important for an organization, and what does it have to do with learning?

My colleague Larry Hirschhorn points out that we often better appreciate passion in its absence, such as when we encounter people who lack enthusiasm and fail to bring a palpable level of energy to their work. They appear soulless, merely "going through the motions." In his paper "Passion and Group Life" (see Center for Applied Research, <http://www.cfar.com/campaigns/core/doc/Passion.pdf>), Larry defines passion in a way that Bill would agree with: It is "the measure of the level of meaning we accord to a task." As such, it is the sum of two emotions. The first is the feeling that an activity or a goal is important, that it has meaning beyond the mere requirements of a job. The second emotion emanates from the feeling that personal fulfillment can be achieved by greater engagement with the activity or achievement of the goal. In Larry's words, "It is the simultaneous completion of the self and the task that gives passion its motivating force." Passionate leaders often inspire others by creating a symbolic bridge across the gap between the current state of affairs and the end state to which we aspire, both for our work and for our sense of self. Bridging the gap between what is and what could be creates value for customers and shareholders.

These principles—passion, bridging gaps, and creating value—are the ingredients we use to build competitive advantage through learning at Raytheon. Success hinges on how well—and how timely—we deploy our resources to maximize efficiency and innovation, for those are the twin prizes of strategic learning.

Raytheon's approach to learning quickly is central to its strategy for value creation.

By Don Ronchi

Light of the gods

Raytheon's 80-plus-year history is a tale of technological breakthroughs that have significantly contributed to U.S. security and to the defense of democracy among U.S. allies, and to the improved quality of people's lives. Founded in 1922 by two former college roommates and an MIT scientist in Cambridge, Massachusetts, Raytheon—derived from the Greek for “light of the gods”—initially set out to launch the first home refrigerator with artificial coolants. The product flopped, with the prototype never leaving the laboratory. Undaunted, the founders turned to producing a new gaseous tube that ultimately made radios affordable and accessible to the mass market. The radio tube became a tremendous success in the late 1920s, and it drove the company's initial growth.

Raytheon would later become known for numerous innovations: the first commercial microwave oven, miniature tubes for hearing aids, early shipboard radar, the first successful missile guidance system, a space communications system, mobile radio telephones, the first combat-proven missile defense system, and Terminal Doppler Weather Radar, to name just a few. With 2003 sales of US\$18 billion and nearly 78,000 employees worldwide, Raytheon is one of the largest aerospace and defense contractors in the world, serving all branches of the U.S. military, as well as other U.S. government agencies, NATO, and many allied governments. Our electronics systems and products can be found in most U.S. military airborne and seaborne platforms in service and are a vital part of the United States' overwhelming strength in missile defense; precision engagement; intelligence, surveillance, and reconnaissance systems; and homeland security. Our business and special-mission aircraft company enjoys a strong reputation throughout the world under the Beechcraft and Hawker brands.

Raytheon's success over the decades is

attributable to the company's focus on customer needs, drive for technological innovation, strong program management expertise, and clear vision and priorities established by its executive leadership, now led by Bill Swanson. Yet, more than anything else, who we are—our culture and identity as a firm—is driven by a passion for the welfare and mission success of our primary end customers: the men and women in uniform. In his interview, Bill talks about meeting an F-15 driver who told him that one of our products saved his life. It's not unusual for customers visiting a Raytheon facility to thank employees personally for making a product that either saved lives or contributed to the success of a mission. It's pretty emotional stuff and, in a profound way, reminds us that we're part of a much larger project that began in colonial New England more than 225 years ago.

Learning quickly

In the mid-1990s, the aerospace and defense industry underwent one of the largest consolidations in U.S. history. To position itself as an industry leader, Raytheon grew quickly through a series of acquisitions and mergers. By the late 1990s, the employee base included onetime fierce competitors now faced with the challenges of working together as “one company.” We needed a culture for the “new Raytheon” that would generate synergies among the recently combined businesses and thus create value for customers and shareholders beyond the mere sum of the individual parts.

Our approach to learning quickly became central to our strategy for value creation. Through Raytheon Learning, the way we are organized to learn, and to create and move knowledge, has several unconventional features born of the principles noted earlier: passion, bridging gaps, and creating value. We are organized not just to behave as if we are a business; we *are* a business. In his interview,

Bill Swanson mentions that my organization is an expense for the work we do internally. He also points out that we're in the learning outsourcing business, which we do globally on a large scale through Raytheon Professional Services LLC. Competing in the marketplace gives us an edge—a sense of customer focus—that I don't believe we would have if we were only an internal resource.

In addition, we are organized to leverage learning across the entire value chain. I'm the vice president of the supply chain, as well as the chief learning officer. That makes it easier for me and my organization to drive learning across all of the organizations that participate in adding value to our customers.

Last, we are extremely activist. We bring knowledge to where it's needed and get directly involved in turning it into value. Because I also have responsibility for Raytheon Six Sigma, my organization is constantly working alongside our businesses to create value for customers. The mission of Raytheon Learning goes far beyond “teaching.”

Behaving as one company means, first and foremost, that the know-how existing in one part of the company can be brought to bear on an opportunity arising in any part of the company. The means by which large, multibusiness firms coordinate their resources, including knowledge, across their business units is one of the cornerstones of contemporary strategy. Pinpointing relevant knowledge and rapidly moving it to where it's needed are the essence of a learning organization and require the following kinds of learning skills:

- Selecting—the ability to locate valuable knowledge wherever it may exist in the organization (or its environment)
- Targeting—the ability to match knowledge to organizational needs, particularly needs rooted in customer requirements
- Mobilizing—the ability to deploy

knowledge, with speed and agility, to create customer value.

Note the distinction between organizational learning defined in this way and “training.” Organizations are said to learn when they encode lessons based on experience in “routines”—the conventions, processes, procedures, formal rules, and informal norms that, collectively, we often refer to as “culture” (see “Organizational Learning” by Barbara Levitt and James G. March in *American Review of Sociology*, 1998, vol. 14). “Training” is all about investing in the skills of individuals. Organizational learning and training are distinct, but interdependent. Organizations learn from their members as individual knowledge becomes embedded in routines. Individuals, in turn, are socialized by the organizational systems in which they participate.

After the consolidation, we needed to become a learning organization that could quickly take advantage of the capabilities of the entire company. Any effort to merely improve incrementally wouldn’t have produced the “one company” synergy that the shareholders expected. The big play would come in the form of Six Sigma.

Formidable capability

The inception of Six Sigma at Raytheon is a story of how a company can take advantage of the deep knowledge that often exists within isolated pockets of a large organization. Raytheon had an active group of Master Black Belts who had earlier received Six Sigma training through the sponsorship of their legacy companies. Most of these individuals had spent much of their careers on the front lines of industrial improvement. They had been part of the evolution of approaches to quality management from early experiments with quality circles and total quality management to traditional Six Sigma with its emphasis on defect reduction. Some had been students of

renowned quality gurus such as Deming, Juran, and Crosby. Others had been trained in the techniques of Toyota’s famed lean production system and related approaches such as synchronous manufacturing and demand-flow systems. These Master Black Belts were deep, formidable talent but widely dispersed.

The very first time we brought the senior Six Sigma players together, we committed to an “open architecture” philosophy. We would never fall into the dual trap experienced by many well-intentioned improvement initiatives: the tendency for practitioners to become so enthralled with their methodology that they lose sight of the true objective—value creation—and that they become cult-like and closed to new ideas. Today, a stylized umbrella positioned over the characters “R6σ” is the symbol of our trademarked Raytheon Six Sigma brand. It symbolized our pledge to be inclusive with respect to the tools, approaches, and ideas that comprise Raytheon Six Sigma.

Formally, Raytheon Six Sigma is defined as “the knowledge-based process for transforming Raytheon’s culture to maximize customer value and grow the business.” The focus is on the identification and execution of projects that deliver clear, measurable value to our customers. The process for defining and delivering value through a Six Sigma process consists of the six steps in the figure.



The principle difference between our approach and traditional Six Sigma can be seen in the first step. Six Sigma typically begins by defining “critical to quality” elements, followed by measurement and analysis of the root causes of variability. In Raytheon Six Sigma, we begin with a visualization process designed to create an image of what perfection would look like (or as close to perfection as a team can imagine). That kind of visualizing often “breaks the frame” of how an organization has been thinking about a situation and opens a project team to new possibilities. It also establishes one pole in the force field associated with passion. The image of a highly desirable future state is later juxtaposed to the current state in the “characterize” step, creating a tangible gap. The distance between what we believe could be and what currently exists sets up a tension that is the source of genuine passion.

As a Six Sigma team embarks on a journey to close the gap by achieving its desired future state, with clear measures of progress, it begins to experience the motivating power that comes from being in a position to attain a valued goal. In this way, Raytheon Six Sigma is a template for embedding passion in the learning process as numerous project teams first establish and then traverse the breach between today’s reality and tomorrow’s promise.

Since launching Raytheon Six Sigma, the company has completed more than 2500 projects touching all parts of the company, many of which involve customers and suppliers directly in the process. We’ve also developed more than 1 percent of the employee population as “Experts,” trained more than 1200 senior-level leaders and over 7000 managers in the basics of Raytheon Six Sigma, and qualified more than 20 percent of the employee population as “Specialists.” We use the term “Experts” for the role known as Black Belt in Six

Sigma. These Experts are trained to lead complex projects and to train and mentor Specialists and other employees. Expert training involves a blend of instructor-based classroom training and e-learning, and a considerable amount of project-based coaching by practicing Experts and Master Experts (roughly analogous to Master Black Belts). Experts typically serve in the role fulltime for two years. They're expected to become certified through a rigorous process that includes a 360 assessment and a defense of their project work before a board of executives and practicing Raytheon Six Sigma Experts. Specialists are equivalent to Green Belts in traditional Six Sigma. Upon demonstrating the competency required to lead a Six Sigma project, one can become a Qualified Raytheon Six Sigma Specialist. Raytheon Six Sigma training and project work have also created numerous opportunities for building cross-company networks that form the channels for subsequent knowledge transfer and collaboration.

Raytheon has achieved a considerable return-on-investment in the development of its Experts. To date, the average gross financial benefit contributed by an Expert is \$1.1 million per year. Recently, we upgraded our Expert development process and targeted an average annual benefit per Expert of \$2 million.

Knowledge creation and transfer

Most of Raytheon's legacy companies had learning organizations that were nominally brought together during the consolidation as Raytheon Learning Institute, or RLI. During its first couple of years, RLI reported into one of Raytheon's businesses and focused on coordinating and integrating the learning resources that were distributed across the company. In 1999, the structure was changed to reflect the fact that learning had become an enterprise capability, and RLI became part of Raytheon's corporate

center, reporting to me as Raytheon's first chief learning officer.

My most immediate top priority as CLO was the alignment of RLI with Raytheon's operating system. Like many large multibusiness companies, we'd initiated an annual cycle of core governance processes consisting of the HR Review, the Strategic Dialogues, and the Annual Operating Plan. The HR Review addresses all aspects of our human capital, including succession planning and organizational and individual development plans. The Strategic Dialogues deal with the competitive strategies of each of our businesses, as well as the mix and alignment of enterprise resources to support those strategies. The Annual Operating Plan defines the financial and operational objectives for each business and the overall company for the coming year. My job was to ensure that RLI had programs in place to provide or develop the capabilities needed to support the strategy, along with the infrastructure and processes necessary to link every Raytheon employee to the learning resources they would need to execute their individual development plans.

The first step was to organize RLI around the key learning capabilities mentioned earlier: selecting the critical knowledge needed to support the strategy, targeting knowledge for customer value, and mobilizing our resources to respond to specific opportunities with speed and efficiency. After recruiting a leadership team drawn from across the company (and, in one key area, from academia) and from numerous functions (those with a learning background were in the minority), we set out to create a set of institutes that would serve as the focal points for knowledge creation and transfer in the key capability areas considered strategic for Raytheon. Our institutes are based on recognized "fields" containing a body of theory and practice that we believe can generate competitive edge for Raytheon. In cases in which there exists an enterprise-

wide function that has responsibility for the field within Raytheon, RLI works with the function—typically through an enterprise council that is responsible for the coordination of functional initiatives and best practices across the company. Collaboration between the institutes and councils helps ensure that curricula meet business needs, while reducing the cycle time for curriculum development.

The institutes are responsible for the following categories of deliverables, and each institute leader is measured according to how effectively she or he supplies these deliverables to the businesses:

- Knowledge—locating, capturing, creating, and packaging the knowledge (explicit and tacit) that drives value creation
- Human capital—creating processes to effectively and efficiently transfer knowledge to Raytheon employees, customers, and suppliers
- Social capital—creating opportunities for bridging gaps in the social network that links employees across Raytheon, where that bridging creates value through knowledge sharing.

RLI comprises these five institutes:

Raytheon Six Sigma Institute was launched in 1999, to design and deploy the curriculum to prepare Raytheon Six Sigma Experts, Specialists, and Master Experts, as well as to educate leaders, employees, customers, and suppliers in the tools and techniques of Raytheon's unique brand of Six Sigma. This institute designs and leads Six Sigma interventions that have enterprise-wide implications, including initiatives that directly involve key customers and suppliers.

Engineering Institute is the primary vehicle for knowledge transfer among the more than 30,000 professionals engaged in engineering activities across the company. The institute provides common curricula across the company in all engineering disciplines and monitors the learning maturity of each of our engineering organizations. The current focus

of the Engineering Institute is on strengthening our systems-engineering capability, which is critical to Raytheon's strategy to provide broad mission systems integration solutions to our customers. Each of Raytheon's businesses manages complex, highly technical, long-cycle programs that support U.S. security priorities, with more than 7000 active programs across the company.

Program Leadership Institute is responsible for the design and delivery of a comprehensive curriculum designed to prepare employees for roles in program management. The institute is closely aligned with the enterprise Program Leadership Council and is engaged with that council, as well as other groups, to diagnose the root causes of problems that affect program performance—and promote preventive measures through individual training and ensuring that lessons are incorporated into program management practices.

Established in 2002, the **Customer and Supply Chain Institute** reflects our commitment to value creation across the entire value chain. Knowledge is the primary engine of value creation at any stage in the product and service delivery process. To the extent that a firm can move knowledge across the entire value chain, with minimal constraint or decay due to organizational boundaries, it will derive benefits from all of the capabilities that exist anywhere in the chain. This institute is crucial to Bill Swanson's strategy for differentiating Raytheon by becoming the most customer-focused firm in the industry. It designs programs to deepen customer intimacy in order for Raytheon employees and our suppliers to be able to "walk in their customers' shoes"—much like the way the internationally acclaimed design firm IDEO develops innovative solutions through the intense observation of end users (see *The Art of Innovation* by Tom Kelly, Doubleday, 2001). Raytheon's Customer and Supply Chain

Institute constantly looks for opportunities for our employees to work alongside our customers and return with insights from the experience. This institute also has the lead for delivering selected RLI programs to key Raytheon suppliers.

Arguably, leadership is the most studied and written-about topic in the field of management and organization. Most firms approach the task of leadership development through a combination of challenging assignments in conjunction with an educational program designed to transmit basic leadership skills with a healthy dose of what are considered to be the core "values" of a firm. Raytheon's **Leadership Institute** does those things, with a focus on the social environment in which a contemporary leader must learn to operate.

When we created the Leadership Institute, we started with the assumption that the limiting factor to the exercise of effective leadership in large, multibusiness firms was not explicit knowledge about contemporary management practices, but tacit knowledge about how to exercise coordination across organizational boundaries (both within and beyond the firm). Raytheon had come to recognize the limitations of traditional hierarchical structures, in terms of the transaction costs these structures exact and the propensity for hierarchical organizations to become silos that inhibit the exploitation of synergies across groups. Raytheon has eliminated a number of organizational layers and restructured into broader, flatter units. Though such organizational structures impose fewer constraints, they require positive leadership to ensure that organizations make the shift from hierarchical to coordinated control. If contemporary strategy is about leveraging a firm's resources, especially its knowledge, then strategic leadership is all about creating the conditions within which investments in, and allocations of, those resources create maximum value.

In that context, the social capital of leaders—the relationships that link them to, or distance them from, others in and outside the organization—become critical variables in leadership success. Often what a leader knows (her or his human capital) is secondary to the web of relationships in which the leader participates when it comes to early access of valuable information or the means to influence others over whom he or she has no formal control. Given the impact of network dynamics in modern firms, I recruited a leading scholar of social networks and strategy to set up and lead Raytheon's Leadership Institute. Ron Burt, professor of sociology and strategy at the University of Chicago's Graduate School of Business, became vice president of strategic leadership in 2000. In his article "The Social Capital of Structural Holes," Ron describes social capital as "the contextual complement to human capital. The social capital metaphor is that the people who do better are somehow better connected. Certain people or certain groups are connected to certain others—trusting certain others, obligated to support certain others, dependent on exchange with certain others. Holding a certain position in the structure of these exchanges can be an asset in its own right." (See *New Directions of Economic Sociology* by Mauro F. Guillen, Randall Collins, Paula England, and Marshall Meyer, Russell Sage Foundation, 2002.)

Leadership Institute programs are anchored at the most basic transition points of a leader's career, the crossroads at which the demands on a leader significantly shift. These are the transition

- from individual contributor to team leader
- from team leader to strategic thinking about the value a leader adds in the broader organization and market
- to leading other leaders and coordinating value across a broad canvas.

Within these programs, leaders are taught strategies for creating and leveraging social capital, including how to take advantage of informal processes, such as gossip, to shape reputations that can augment their ability to influence others. They also learn techniques for systematically analyzing patterns of connectivity within the company and between units of the company and our customers and suppliers. The result is leaders who are better prepared before, rather than after, job demands shift—which means they add greater value and enjoy higher morale for themselves and their teams.

Totality of learning assets

We use the term “Raytheon Learning” to refer to the totality of learning assets that exist within Raytheon. In addition to RLI, which focuses on Raytheon employees, customers, and suppliers, Raytheon Learning includes a limited liability company, Raytheon Professional Services. RPS operates in the commercial marketplace providing a full range of learning outsourcing services to customers in a wide variety of industries. While RLI and RPS have independent organizational roles and identities, they operate as a single, seamless organization in which lessons learned in the service of external customers are quickly brought to bear on internal opportunities as appropriate. At the same time, processes and curricula developed for internal purposes are made available to customers where and when they can add value. The fact that learning is both a commercial business *and* a player in Raytheon’s strategy makes Raytheon Learning unique within the training industry.

The roots of RPS can be traced back through several of Raytheon’s legacy companies to the 1930s, and the initial development of training simulators and early programs to design and operate “pilot schoolhouses” for the U.S. military. RPS has accumulated more than 70

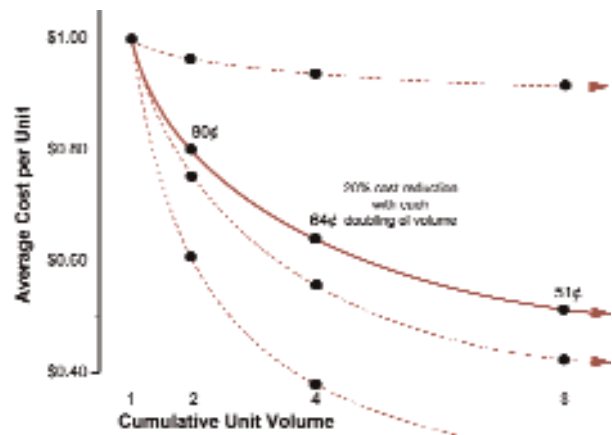
years of experience in providing learning solutions to government customers. In the early 1990s, RPS began performing end-to-end learning services in the commercial arena—primarily in automotive, financial services, transportation, and high-tech industries. RPS brings together diverse, multidisciplinary teams with back-

grounds in such disciplines as systems engineering, organizational psychology, physics, education, process and software engineering, mathematics, anthropology, instructional systems design, and law to create customized, integrated solutions that measurably improve the business performance of our customers. RPS delivers learning solutions to customers in more than 50 countries on six continents.

Most of our customers are global firms with widely dispersed workforces. They operate in highly competitive industries where having an edge in knowledge can determine market leadership. The scope of our commercial programs varies from project-based out-tasking of a specific learning activity to the comprehensive outsourcing of all learning processes and systems. Our two largest programs, currently valued at nearly \$1 billion and serving a single global customer, are among the largest-ever learning outsourcing awards in the commercial sector.

The lifeblood of innovation

All of Raytheon’s learning programs share a common, simple architecture defined by the contrast between two orthogonal approaches for framing learning within an organization. A handy image for the first frame is the traditional learning



curve. (For a comprehensive review of the literature on learning curves, see *Organizational Learning* by Linda Argote, Kluwer Academic Publishers, 1999.) In the early 20th century, psychologists coined the term *learning curve* to describe their discovery that the time required to perform a task and the number of errors made declined at a decreasing rate with increasing experience with the task. One of the earliest studies was on typing proficiency. Later, the same phenomenon was found to hold for manufacturing output in the aircraft industry. Studies of the semiconductor industry conducted in the 1960s found evidence for a 20 percent reduction in cost with each doubling of volume. The amount of efficiency gained with each doubling of cumulative output, expressed as a percentage of its former value, came to be known as “progress ratios” and is still commonly used as a measure of learning rates, as illustrated in the figure.

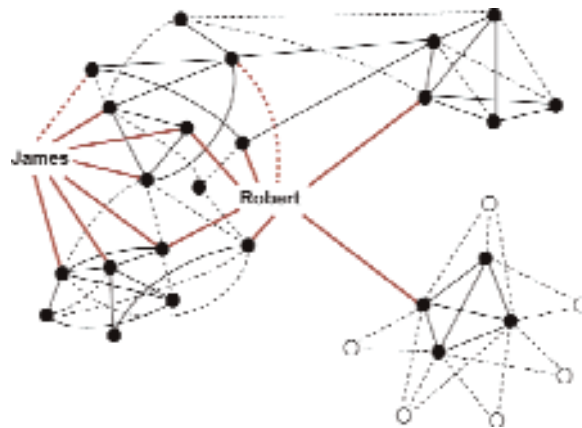
No single image captures the power of the learning curve as a frame for organizational learning as does the story of the production of Liberty ships in the United States during WWII. The first Liberty ship, the *Patrick Henry*, was launched on September 7, 1941, and took approximately 230 days to build. Slightly more than a year later, the *Robert G. Peary* was launched after four days and 15 and one-half hours. Over

the course of producing more than 2700 Liberty ships, the average number of labor hours required to build a ship decreased by 45 percent and the average time to completion shrunk by 75 percent.

The learning curve is about transmitting knowledge—which is often tacit and difficult to articulate—to others. It is best done in groups that are collocated and highly cohesive. Collocation and cohesion encourage dense interpersonal ties that lead to frequent, highly textured conversations through which employees can access each other's tacit knowledge. Cohesion also facilitates trust within a team based on the reputation of its members. Team members develop a sense of commitment to each other and to the task, driving alignment and productivity.

Variation is the enemy of learning curves. Whatever its sources, variation makes it difficult to capture knowledge and gain and apply wisdom that would otherwise come from accumulated experience. This is why the quality movement has historically made controlling variability a key priority and why traditional Six Sigma has been focused on statistical tools for analyzing and eliminating the root causes of variation.

In contrast to efficiency fueled by team cohesion, the second frame of our basic learning architecture is about innovation fueled by diversity. The image we often use for this second frame is the ubiquitous “bridge and cluster” structure of social networks. Individuals, as well as social units of all sizes, tend to group together in cliques, in which members with similar characteristics and interests develop close ties with each other. The cliques are separated by “white spaces,” or what Ron Burt calls “structural holes” in his book *Structural Holes* (Harvard University Press, 1992). The figure illustrates a small bridge and cluster network.



Consider the two hypothetical managers in the figure, James and Robert. James has developed rich, dense social ties with colleagues and staff. He has fashioned a cohesive team around him, a situation ideally suited for rapid diffusion of knowledge among team members because the ties that hold the group together are highly redundant. The people in James's orbit have a lot of conversations through which the same kinds of information are shared.

Robert has shaped a very different social environment. Though he has some strong ties to people in his own organization, those ties tend to be with people who sit in different cliques. Much less redundancy exists among Robert's ties within his own organization. He has also cultivated relationships with people from very different organizations. In one case, he provides the only link between his organization and another group. Robert is an entrepreneur, someone who stands between different worlds and makes connections that create value. The history of innovation in any field is rife with stories about how people like Robert cause ideas to collide which, in turn, produces amazing outcomes. One of my favorites is how Akio Morita, one of the founders of Sony and a profoundly curious man who enjoyed visiting the engineers in his

various labs, decided it would be worthwhile to have a meeting between a team pushing the limits of technology for the miniaturization of stereo cassette players and a separate group working on new technologies for headsets. The result: the Sony Walkman, which created a vast new market that revolutionized the relationship between mobility and music for millions of consumers.

Variation is the lifeblood of innovation. Variation emanates from exposure to diversity, from encounters with the “strange and different,” from what is outside the zone of the familiar. People like Robert and Morita put themselves at risk of encountering variation and, therefore, are proportionately more likely than people like James to have the *Eureka!* experience that sets off mental alarms signaling, “Wow, I can do something with this!”

In his article “Structural Holes and Good Ideas” (*American Journal of Sociology*, 2004), Ron Burt describes a strong association between the production of independently validated good ideas and network structures like Robert's. Ron's work suggests that innovation may be less a product of the heroic work of uniquely gifted individuals than a function of an “import-export” business run by network entrepreneurs “who have early access to diverse, often-contradictory information and interpretations that give them a competitive advantage in seeing and developing good ideas.” Ron's data also shows that people with entrepreneurial social networks do better in terms of such outcomes as performance reviews, salary increases, and promotions. As Bill points out in his interview, diversity is the morally right thing to do. When you show that it makes a tangible difference in a firm's ability to innovate—and an individual's ability to profit from his or her efforts—that creates a

compelling story, especially when you can tell the story with hard data.

The paradox of variation is that it can be both muse and devil, Dr. Jekyll and Mr. Hyde, depending on one's perspective. All organizations need to strike a balance between learning how to drive out variation where it negatively impacts cost and performance, and embrace it where it stimulates innovation. As Jim March has pointed out in "Exploration and Exploitation in Organizational Learning" (*Organizational Science*, 1991, vol. 2), organizations are predisposed to favor what he calls the "exploitation" of what we know versus the "exploration" of what we don't know. The benefits derived from accelerating progress down known learning curves are relatively certain compared to the benefits that may accrue from the exploration of new knowledge through experimentation, play, discovery, and innovation. Because learning to be more efficient (exploitation) and learning to be more innovative (exploration) compete for scarce resources, it's easy for an organization to fall into the trap of over-investing in the kinds of learning that drive efficiency. Though that's very attractive in the short term, it can be disastrous in the long term in declining growth and vitality.

Leadership and learning poetry

Bill misses no opportunity to impress upon Raytheon's employees that customer focus creates customer success, that customer success drives growth, and that growth creates shareholder value. The key is customer focus, being open to new information and to learning from exposure to diverse ideas and frames of reference. This focus on the customer helps strike a healthy balance between investing in learning to become more efficient and investing in learning to become more innovative.

For example, over the past year we've worked to make the Raytheon Six Sigma tool kit as "heavy" on the side that holds

the innovation and variation-seeking tools as it is on the side that holds the efficiency and variation-reduction tools. Our curriculum, which initially had been more like traditional Six Sigma in its emphasis on efficiency and "fixing things," has become more populated with approaches for how to "grow things." We recently had a Raytheon Six Sigma project in which we worked with a customer to enhance the probability that U.S. Congress will appropriate funds for a program that this customer considers to be very important. It's a competitive program. Though we think we have a good chance of winning it, whether we do we know it's what our customer needs, and helping our customer secure funding, regardless of who wins, is an illustration of customer focus.

One way we are not trying to strike a balance between efficiency and innovation is to specialize by creating a division of labor such that people are earmarked for career paths as either "trappers" or "skinners." In contrast, consistent with Bill's commitment to developing a strong leadership pipeline, over the past year he has moved some very senior people from operations roles into business development roles and vice versa. Similarly, we have more engineers moving from design roles to production roles, and the other way around. Now we understand that rotating people into different jobs is one of the most powerful ways to create and transmit knowledge, particularly tacit knowledge.

We want our leaders to be able to work both sides of the learning equation—to be as comfortable with learning for innovation as they are with learning for execution and, perhaps more important, to have the wisdom to know when to emphasize which.

There's a time to teach people the "right way" to do things and a time to teach people how to be open to discovery. In firms, as well as in schools, it's often easier to do the first. Billy Collins, a former Poet Laureate of the United States,

makes that vividly clear in his short poem, "Introduction to Poetry" (*Sailing Around the Room*, Random House, 2002):

*I ask them to take a poem
and hold it up to the light
like a color slide
or press an ear against its hive.*

*I say drop a mouse into a poem
and watch him probe his way out,
or walk inside the poem's room
and feel the walls for a light switch.*

*I want them to water ski
across the surface of a poem
waving at the author's name on the shore.*

*But all they want to do
is tie the poem to a chair with rope
And torture a confession out of it.*

*They begin beating it with a hose
to find out what it really means.*

We don't teach poetry in our leadership programs, but we try to teach some of the things that poetry and leadership have in common. One of those things is passion for the truth. Dogmatism—the kind of narrow thinking that's often visited upon those who live in closed groups—suffocates a passion for the truth as readily as a beating with a hose.

In our senior leadership programs, we emphasize the value that leaders create when they ensure that diverse ideas are present in their meetings and when they stimulate vigorous debate between at least two alternatives prior to making a decision. It's in the juxtaposition of alternatives, and the arguments made to support them, that wisdom is often discovered. **TD**

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