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by Linda A. Hill, Greg Brandeau, Emily Truelove, and Kent Lineback

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oogle's astonishing success in its first decade now seems to have been almost inevitable. But step inside its systems infrastructure group, and you quickly learn otherwise. The company's meteoric growth depended in large part on its ability to innovate and scale up its infrastructure at an unprecedented pace. Bill Coughran, as a senior vice president of engineering, led the group from 2003 to 2011. His 1,000-person organization built Google's "engine room," the systems and equipment that allow us all to use Google and its many services 24/7. "We were doing work that no one else in the world was doing," he says. "So when a problem happened, we couldn't just go out and buy a solution. We had to create it."

Coughran joined Google in 2003, just five years after its founding. By then it had already reinvented the way it handled web search and data storage multiple times. His group was using Google File System (GFS) to store the massive amount of data required to support Google searches. Given Google's ferocious appetite for growth, Coughran knew that GFS—once a groundbreaking innovation—would have to be replaced within a couple of years. The number of searches was growing dramatically, and Google was adding Gmail and other applications that needed not just more storage but storage of a kind different from what GFS had been optimized to handle.

Building the next-generation system—and the next one, and the one after that—was the job of the systems infrastructure group. It had to create the new engine room, in-house, while simultaneously refining the current one. Because this was Coughran's top priority—and given that he had led the storied Bell Labs and had a PhD in computer science from Stanford and degrees in mathematics from Caltech—one might expect that he would first focus on developing a technical solution for Google's storage problems and then lead his group through its implementation.

But that's not how Coughran proceeded. To him, there was a bigger problem, a perennial challenge that many leaders inevitably come to contemplate: How do I build an organization capable of innovating continually over time? Coughran knew that the role of a leader of innovation is not to set a vision and motivate others to follow it. It's to create a community that is willing and able to generate new ideas.

The Link Between Leadership and Innovation

Few companies have the resources of Google at their disposal, but most of them can relate to Coughran's fundamental challenge. In 2005 we joined together to study exceptional leaders of innovation—how they think, what they do, and who they are. We found them across the globe—in Silicon Valley, Europe, the United Arab Emirates, India, and Korea. And we explored businesses as varied as filmmaking, e-commerce, auto manufacturing, professional services, and luxury goods. We didn't think the world needed more research on leaders or on innovation. Rather, we wanted to study a topic much less understood: the role of the leader in creating a more innovative organization.

The executives we studied are a diverse lot, but they all think about leadership in a similar way. They have moved away from the conventional view. Direction-setting leadership can work well when the solution to a problem is known and straightforward. But if the problem calls for a truly original response, no one can decide in advance what that response should be. By definition, then, leading innovation cannot be about creating and selling a vision to people and then somehow inspiring them to execute it. So common is the notion of the leader as visionary that many of the people we studied had been forced to rethink and recast their roles before their organizations could become truly and consistently innovative.

In the way they behave and structure the organizations where talented people work, leaders can draw out the slices of genius in each individual and assemble them into innovations that represent collective genius. The question is not "How do I make innovation happen?" but, rather, "How do I set the stage for it to happen?"

Why Innovation Requires a Different Kind of Leadership

The rhetoric of innovation is often about fun and creativity, but the reality is that innovation is hard work and can be a very taxing, uncomfortable process, both emotionally and intellectually. In fact, innovative problem solving may feel unnatural and even dangerous in many organizations if their leaders are not skilled.

Idea in Brief

THE CHALLENGE
Competitiveness depends in great part on the ability to innovate. The perennial challenge, then, is to build an organization capable of innovating again and again.

THE KEY
Traditional, direction-setting leadership can work well when the solution to a problem is known and straightforward. But if the problem calls for a truly original response, no one can decide in advance what that response should be. So the role of a leader of innovation is not to set a vision and motivate others to follow it. It's to create a community that is willing and able to innovate.

THE APPROACH
Fostering willingness means creating communities that have both a sense of purpose and shared values and rules of engagement that are designed to encourage collaboration, discovery-driven learning, and integrative decision making. Fostering ability requires developing three organizational capabilities: *creative abrasion*, *creative agility,* and *creative resolution*.

Innovation usually emerges when diverse people collaborate to generate a wide-ranging portfolio of ideas, which they then refine and even evolve into new ideas through give-and-take and often-heated debates. Thus collaboration should involve passionate disagreement. Yet the friction of clashing ideas may be hard to bear. It can create tension and stress—particularly in groups of talented, energetic individuals who may feel as if there are "too many cooks in the kitchen." Often organizations try to discourage or minimize differences, but that only stifles the free flow of ideas and rich discussion that innovation needs. Leaders must manage this tension to create an environment supportive enough that people are willing to share their genius, but confrontational enough to improve ideas and spark new thinking.

Innovation also requires trial and error. Innovative groups act rather than plan their way forward, and solutions emerge that are usually different from anything anyone anticipated. Most organizations and the people in them prefer to move systematically toward a desired outcome. They set a goal, make a plan, assign responsibilities, work through the steps, and track progress until the goal is achieved. Isn't that approach just good management? Not when it comes to innovation. Leaders of innovation create environments that strike the right balance between the need for improvisation and the realities of performance.

Finally, creating something novel and useful involves moving beyond either-or thinking to both-and thinking. But this also can be challenging. All too often, leaders and their groups solve problems through domination or compromise, resulting in less-than-inventive solutions. Innovation requires integrating ideas—combining option A and option B, even if they once seemed mutually exclusive—to create a new and better option. It also requires that leaders be patient enough to let great ideas from people in all parts of the organization develop. At the same time, they must ensure that a sense of urgency and clear parameters allow integrative decision making to actually occur.

Fostering a Willingness to Innovate

To build willingness, leaders must create communities that share a sense of purpose, values, and rules of engagement.

In 2009, when Luca de Meo joined Volkswagen AG as the head of marketing communication (by the end of 2010 he had become the CMO of the VW Group), his task was to transform a fragmented marketing department into an innovation powerhouse. De Meo was energized by the ambitious goal that VW's CEO, Martin Winterkorn, had set just a year earlier: to surpass Toyota and General Motors and be leading the industry within a decade. This goal was about something deeper than being number one: It was about leveraging a near-century of VW history to create cars that made the world better—by delighting customers, limiting environmental impact, and pioneering what it means to be a 21st-century automaker.

> The rhetoric of innovation is often about fun and creativity, but the reality is that innovation can be very taxing and uncomfortable.

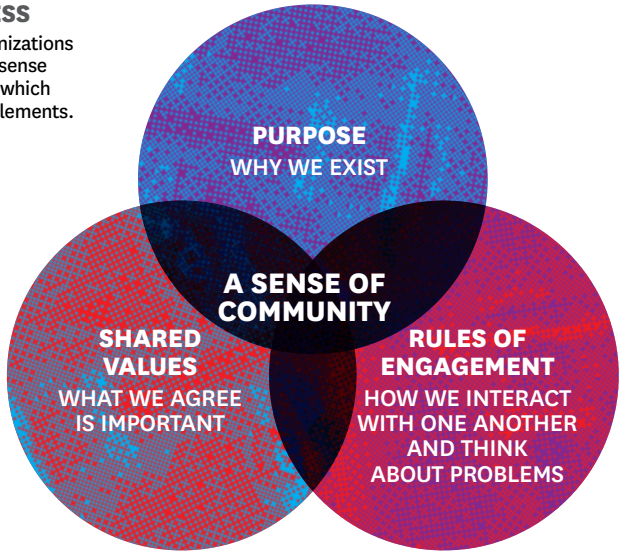
De Meo's mandate was to build a marketing department that could support this audacious ambition. Although the Volkswagen brand was strong in many markets, de Meo knew it could be stronger. Moreover, the brand was not unified. It was perceived differently across the world, especially in emerging markets, where VW was looking for

The Hard Work of Innovation

The role of an innovation leader is to create a community that is willing and able to innovate over time.

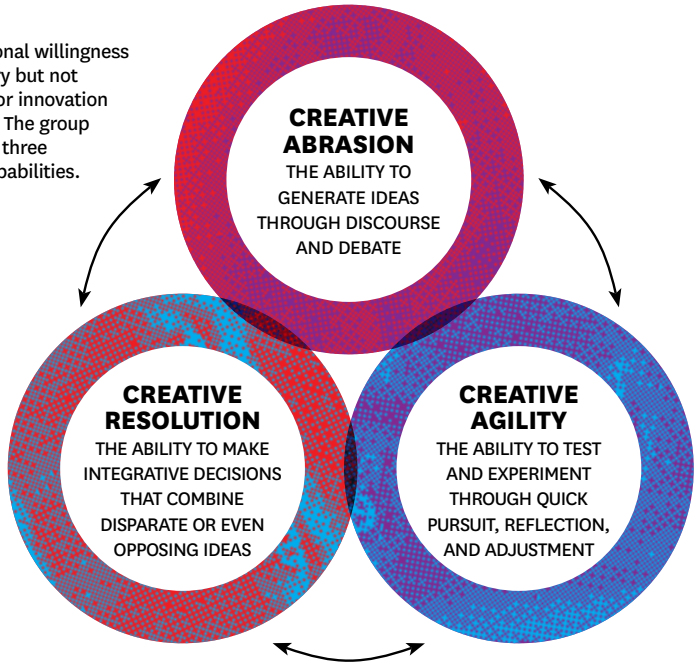
WILLINGNESS

Innovative organizations must nurture a sense of community—which rests on three elements.



ABILITY

Organizational willingness is necessary but not sufficient for innovation to flourish. The group also needs three specific capabilities.



dramatic growth. A former board chairman of Fiat and CEO of Alfa Romeo, de Meo knew, as he puts it, that "you build a brand from the inside out." VW's brand elements—innovation, responsibility, and value—had to be more than rhetoric. The company and its people had to live them day in and day out.

VW operated in 154 markets, and its marketing was highly decentralized. Most of the company's marketers had worked only within their home countries and had had limited opportunity or incentive to interact with their colleagues in other countries or at corporate headquarters in Wolfsburg. The silos and the "highly linear processes" the marketers followed to do their work discouraged them from speaking with "one voice," de Meo told us.

Perhaps more concerning, de Meo found that at VW innovation was considered the province solely of engineers in product development, not of people in marketing—a common problem we see in engineering- and product-focused firms. De Meo believed that everyone at a world-class company has to be an innovator, a strategist, a global thinker. If his team was to create a powerful global brand, the marketers had to feel like citizens of a cohesive, collaborative community. Facing a desperate need for new capabilities and a ticking clock, de Meo nonetheless focused first on building that sense of community. Without it, his experience had taught him, people would be unwilling to innovate.

Purpose. One of his first steps was to create Marketing Worx!, a series of two-day "codesign labs" that brought together people, many of whom had rarely interacted before, to work on marketing problems. De Meo believed that the mutual trust and respect needed to create a community could come only from interaction and dialogue. He wanted his marketers to grow familiar with one another and with the innovation process, from collaborating to experimenting to integrating ideas. But more than that, he wanted to put his people in new situations that would force them out of old behaviors and catalyze new patterns of interacting. There would be no PowerPoint presentations and few seated activities. Rather, the labs would be a place for prototyping, testing, and arguing until the best solutions came to life. Some attendees were enthusiastic, but many were skeptical. De Meo had to push them into participating.

Purpose is not *what* a group does but *who* is in it or *why* it exists. It's about a collective identity. Purpose makes people willing to take the risks and do the hard work inherent in innovation. At

Marketing Worx!, de Meo encouraged his team members to reflect on what being part of VW meant to them. They didn't hold back: They said they were proud of the company's history as the maker of the "people's car," of providing the freedom of mobility, of VW's role in driving technological and economic progress, of its environmental focus (in the 1970s, long before "sustainability" became a buzzword, the company had established a department for environmental protection). They were excited to be part of an effort to build the industry's leading brand.

He also encouraged the team to think about the department's reason for being. "Why are we all here?" de Meo would ask. A group purpose soon emerged: Marketing's job was to reflect VW's powerful legacy and build a brand that spoke with one voice around the world. This purpose lifted its work from "necessary but not crucial" to "strategic." As de Meo told the group, "Brand is not fluff. There is very concrete evidence of what great brands do. It's real business, not just magic." At VW, which was trying to revolutionize its industry, de Meo's team would have to play a central role.

Shared values. To form a community, members have to agree on what's important. By shaping the group's priorities and choices, values influence individual and collective thought and action. They vary from community to community, but we found four that truly innovative organizations all embrace: bold ambition, responsibility to the community, collaboration, and learning.

At VW, de Meo encouraged marketers to use the three components of the VW brand—innovation, responsibility, and value—to guide their work. At one Marketing Worx! session he encouraged a team to flesh out a sustainability initiative ultimately called Think Blue, a concept that unified VW's previous efforts and focused its future ones. An expression of "responsibility," Think Blue built on both the rich heritage that de Meo's team cared about deeply and VW's bold ambition for social, economic, and technological progress. At the end of Marketing Worx! all the participants signed a "manifesto" declaring personal commitment to Think Blue.

Rules of engagement. Together with purpose and values, rules of engagement keep members focused on what's imperative, discourage unproductive behaviors, and encourage activities that foster innovation. After the success of Marketing Worx!, de Meo turned to changing the way his group did its ongoing work. Getting talented people to function as a team is far from easy, but Marketing Worx! served as a "positive shock," he says, pushing people together. The tensions inherent in collaboration may not only slow down progress but even threaten to tear a creative community apart. Rules of engagement can help control those destructive forces—for example, by keeping conflict focused on ideas rather than personalities. In every organization we studied, we saw leaders foster and enforce the rules, even becoming directive when the need arose.

Generally, the rules of engagement fall into two categories. The first is how people interact, and those rules call for mutual trust, mutual respect, and mutual influence—the belief that everyone in the community has a voice and that even the inexperienced and less tenured should be allowed to influence decisions. The second category is how people think, and those rules call for everyone to question everything, be data-driven, and see the whole.

Consider how the VW marketing group revamped its approach to rolling out a new car. It created cross-functional launch teams responsible for developing integrated marketing strategies for the entire life cycle of each new model. No longer would marketing operate like a bucket brigade, with separate teams responsible for each phase of a car's maturity.

Rules of engagement can help control the tensions inherent in collaboration, which sometimes threaten to tear a creative community apart.

One team, for instance, focused on a new model in the up! series of small cars. It reported directly to de Meo, who set high expectations but withheld specific direction. The team had never experienced that kind of autonomy and responsibility before. De Meo made it clear that the members were to take risks and play out their own ideas, according to the rules for "how we think." Keeping them on track were key performance indicators that the marketers had defined in the codesign labs.

After some time, when the team was unable to reach conclusions without the formal authority of a senior manager, de Meo named a young leader from outside the group to act as "the first among peers" and facilitate the decision-making process. The up!

Paradoxes of Innovation

At the heart of innovative problem solving is the need to both unleash individual slices of genius and harness them into collective genius. Unleashing talent is essential to developing promising ideas and options. Harnessing talent is essential to shaping those ideas and options and selecting new and useful solutions from among them.

In our research we identified six innovation paradoxes. The challenge for leaders is to help the organization continually recalibrate between:

- affirming the individual…*and* the group
- supporting…*and* confronting
- fostering experimentation and learning…*and* performance
- promoting improvisation…*and* structure
- showing patience…*and* urgency
- encouraging bottom-up initiative…*and* intervening top-down

Leaders who stay on the right side of these paradoxes will never unleash the full genius of their people; they will have few or no ideas to harness. Those who stay on the left side will have lots of ideas and options to work with, but won't be able to turn them into new and useful solutions; instead, conflict and chaos will reign. The correct position at any moment will depend on the circumstances. But the goal will always be to take whatever position enables the collaboration, experimentation, and integration necessary for innovation.

The leaders we studied understood how to adapt their behavior according to the situation at hand. Conventional notions of leadership, discomfort with conflict or loss of control, and personal preferences can all limit a leader's willingness to shift strategically across the paradoxes. Many leaders find it hard not to favor one extreme over the other. Continually recalibrating requires superb judgment, courage, and persistence.

Finding solutions that are truly new and useful is not easy, in part because the process of innovation is so messy and full of the tension embodied in each of these paradoxes.

team delivered: Its 130-page plan was "probably one of the most integrated launch strategies done recently at Volkswagen," according to de Meo.

Like all the other leaders we studied, de Meo took a comprehensive approach. He transformed VW's marketing department culture and capabilities—developing cross-functional teams, establishing centers of excellence, instituting quarterly roundtables to connect marketers globally. Those steps may not sound particularly revolutionary. What was unique about de Meo's approach was that he used such seemingly mundane changes not as ends in themselves but as mechanisms with which to build a community.

De Meo's efforts are clearly having an impact. Marketing began to challenge other functional areas at VW and now plays a catalytic role throughout the company worldwide. Think Blue grew into a guiding principle for the whole organization, with employees in other functions and more than 40 countries launching their own innovative Think Blue projects. Some 600 such projects were in the works by 2013. One, the Think Blue Factory—undertaken by the manufacturing function—aimed to reduce environmental impacts by 25% at every VW plant by 2018. "Blue marketing," as de Meo describes it, is truly "at the heart of the organization."

Building the Ability to Innovate

Willingness is necessary but not sufficient for innovation to flourish. Companies also need the ability to innovate. That requires developing three organizational capabilities: for collaboration, *creative abrasion,* or the ability to generate ideas through discourse and debate; for discovery-driven learning, *creative agility,* or the ability to test and experiment through quick pursuit, reflection, and adjustment; and for integrative decision making, *creative resolution,* or the ability to make decisions that combine disparate and sometimes even opposing ideas. To see how this works, let's return to Bill Coughran at Google.

As Coughran began talking with his staff about the need for a new storage system, two self-organizing groups of engineers emerged, coalescing around two promising alternatives: One wanted to add systems on top of GFS that would handle the new storage needs. This was the Big Table team. The other believed that Google's new storage requirements were so different from those of search alone that GFS had to be replaced, not adapted. This was the Build from Scratch team.

Coughran managed the two teams in a manner that he describes as "deliberately loose." He gave as much freedom as possible to his engineers, all the while "keeping the reins in enough so that we didn't degenerate into chaos." He and his engineering directors—a "brain trust" of tech-savvy managers and top engineers that he had assembled to help him lead the group—conducted regular review meetings "to force teams to assess their progress relative to their goals." He avoided giving direction and instead tried to ask penetrating questions to "inject tension" and "intellectual reality" and to drive debate.

Coughran set certain clear expectations: that each team would move forward through rigorous testing of its ideas, and that its members would respond to challenges and disagreement with objective data. He rarely had to say "Don't do that"—words that he believes destroy talent and

motivation. Nor did he answer questions directly, in spite of his expertise. "You want to challenge people to think for themselves," he says.

Creative abrasion. Coughran made sure that the review meetings were forums where ideas were put to the test. Honest discourse and rigorous debate were the goals. He encouraged both teams to grapple seriously with the apparent limits of their systems—scalability for the Build from Scratch team, and servicing an ever-growing number of applications with different systems requirements for the Big Table team. He wanted both teams to question their assumptions. Coughran was supportive, but he knew that if creative abrasion was to occur, he had to inject some confrontation into the system. He explains: "You don't want an organization that just salutes and does whatever you say. You want an organization that argues with you."

The two ingredients necessary for creative abrasion are intellectual diversity and intellectual conflict. Coughran encouraged diversity by allowing teams with fundamentally different approaches to move forward. He ensured that conflict was productive through his intense questions and challenges. He and the other leaders decided to remain "deliberately vague." He realized that "90% of the value of having the engineers speak with me was the fact that they did not know what I was going to ask," he says. "If they knew I was going to ask 12 specific questions, they'd be less likely to ask themselves broadly, 'What are we doing?'"

Coughran was also sensitive to the drawbacks of bringing the two teams together for debate too early or too often. "If one team was building the perfect left-handed thing," he says, "and the other was building the perfect right-handed thing, and you put them in the same room, you might not get anywhere, even with a respected mediator."

Creative agility. Coughran expected the members of both teams to proceed through the three phases of creative agility that virtually all our leaders encourage. First, he pushed them to pursue new ideas quickly and proactively with multiple experiments. That involved some planning, but he placed much greater emphasis on gathering data about how their ideas actually worked. Second, he expected them to reflect on and learn from the outcomes of those experiments. Third, he expected them to adjust their plans and actions on the basis of the results and to repeat the cycle incorporating this new knowledge—until a solution ultimately emerged or it became clear that the basic approach was not going to work.

Creative resolution. After two years, Coughran had to admit that Build from Scratch was not stable enough for Google's needs, and Big Table couldn't handle the growing array of Google apps, including YouTube. However, he believed that the Big Table approach was more viable in the short term.

Creative agility involves quickly pursuing multiple experiments, learning from the outcomes, and then adjusting plans.

His conclusion was a tough call. "It was easy to make a decision when something failed completely or succeeded completely," Coughran says. "The ambiguous cases were the hardest to deal with, and that was where a lot of the complexity of our systems showed up. We were constantly considering and reconsidering our systems. Something that worked well at one scale would likely fail at another. There were few certainties, and since Google was pretty unique in terms of computing resources, there were no precedents."

Coughran enlisted Kathy Polizzi, his engineering director for storage and a member of his brain trust, to help him persuade the Build from Scratch team that its system had major limitations. The two encouraged the team to test its approach and "bump up"—as Coughran loves to say—against reality. Polizzi pressed the team to bring its system to a semi-operational state and to run performance and scalability tests. She set a time frame within which it would have to eliminate concerns about its system's ability to handle the massive scale at which Google operates. She also put team members in joint meetings with the operations teams that were responsible for keeping Google up and running—the people whose pagers summoned them in the middle of the night when something went wrong. As Polizzi says, those people "put a human face" on the problems, issues, and priorities that any new storage system would have to deal with. Finally, she says, "the team started to see the limitations of the system they were building."

Ultimately, the storage stack developed by the Big Table team was implemented throughout the company. But Coughran confronted his initial challenge anew: This system would be able to handle Google's storage requirements for only a few years.

Are You an Innovation Leader?

Start by asking yourself these questions about your organization:

- Do members of my organization feel part of a community?
- Does my organization have a shared purpose—one that binds us together and compels us all to do the hard work of innovation?
- Does it live by rules of engagement supportive of a set of core values: bold ambition, responsibility to the community, collaboration, and learning?
- Do we have the ability to generate ideas through candid discourse and debate?
- Do we have the ability to test ideas through quick pursuit, reflection, and adaptation?
- Do we have the ability to make integrative decisions, rather than compromising or letting some groups dominate?

Ask yourself some questions about your own leadership mind-set and practices:

- Do I think my primary job as a leader is to create a context in which my team can innovate?
- Am I comfortable serving as the "stage setter" as opposed to the visionary leading from the front?
- Do I have the courage and patience required to amplify differences, even when discussion becomes heated and when ambiguity and complexity loom?

If your answer to any of these questions is "no" or even "I don't know," it's probably time to look again at your own leadership role and at the leadership potential that may be hiding in your organization. Many of the remarkable innovation leaders we studied had to encourage others to rethink their ideas about leadership and to recognize that operating in the ways we've described is far from easy—especially for those who may be passionate geniuses themselves.

So he asked the two most senior engineers in the systems infrastructure group to work on a next-generation system that would eventually replace it. He invited the Build from Scratch team to join the effort, and indeed, some of the ideas developed by its members played key roles in the next-generation system—for example, by allowing it to handle a dramatically larger set of data objects and files than had ever before been possible, and by safeguarding data in the event of drive or server failure.

By taking the course he did and avoiding a top-down decision, Coughran helped the company develop the best solution to its near-term problem. He also made progress on creating the disruptive new storage system Google would need for the future. But to him, the most important concern was fostering a community that would be capable of innovating time and time again. "I never wanted to pull rank and tell a team to stop working on something they were passionate about," he says. "We hire innovators, and if I were to forbid a motivated team to do something, it really would misuse their talents."

Consider how the approach of a more conventional leader would have stifled innovation in this situation. Preserving harmony by muffling creative disagreement would have limited the number of good options considered. Exercising discipline and control by marching the group to a predetermined solution would have discouraged the trial-and-error efforts that led to the best short- and long-term answers. And making choices early and often would have prematurely shut down work that led to the most creative and thoughtful solutions.

Developing Leaders Who Can Create Collective Genius

If the point is to foster organizations that are willing and able to innovate over the long haul, then tomorrow's leaders of innovation must be identified and developed today. Consider: At Google, Coughran believed that the problem he faced was more a people challenge than a technical one. For all Google's riches, it suffered from a dearth of innovation leaders. To him, individuals who understood that leadership is about creating collective genius were absolutely crucial to expanding and sustaining the innovation capacity of his organization.

Great leaders of innovation, as we've said, see their role not as take-charge direction setters but as creators of a context in which others make innovation happen. That shift in understanding is critical to fostering the next generation of innovation leaders and must permeate the organization and its talent management practices, because those with the potential to lead innovation, we have found, are often invisible to current systems. We should let them take roles that put their skills on display and provide them with the experiences and the tools they need to both unleash and harness the individual slices of genius around them.

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