

A More Beautiful Question

Praise for *A More Beautiful Question*

“The genesis of many great startups is the simple question, ‘Wouldn’t it be cool if?’ Warren Berger helps you understand the power of questions to change the world. Real men ask questions, they don’t spout out answers.” —**Guy Kawasaki, former chief evangelist at Apple and author of *APE: Author, Publisher, Entrepreneur***

“Mastering the art of asking questions is essential to creativity and innovation. *A More Beautiful Question* should be standard reading for all aspiring design thinkers as well an inspiration to those searching for a life of curiosity and meaning.” —**Tim Brown, chief executive at IDEO and author of *Change by Design***

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A More Beautiful Question

THE POWER OF INQUIRY
TO SPARK BREAKTHROUGH IDEAS

WARREN BERGER

B L O O M S B U R Y
NEW YORK • LONDON • NEW DELHI • SYDNEY

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Always the beautiful answer
Who asks a more beautiful question.
—E.E. Cummings



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INTRODUCTION

Why Questioning?

As a journalist, I've been asking questions my whole professional life. But until a few years ago, I hadn't thought much about the art or the science of questioning. And I never considered the critical role questioning plays in enabling people to innovate, solve problems, and move ahead in their careers and lives.

That changed during my work on a series of articles, and eventually a book, on how designers, inventors, and engineers come up with ideas and solve problems. My research brought me in contact with some of the world's leading innovators and creative minds. As I looked at how they approached challenges, there was no magic formula, no single explanation, for their success. But in searching for common denominators among these brilliant change-makers, one thing I kept finding was that many of them were exceptionally good at asking questions.

For some of them, their greatest successes—their breakthrough inventions, hot start-up companies, the radical solutions they'd found to stubborn problems—could be traced to a question (or a series of questions) they'd formulated and then answered.

I thought this was intriguing, but it only had a small part in the book I was working on, so I tucked the idea away. Subsequently, I began to notice—as is often the case when something has come onto your radar—that questioning seemed to be everywhere I looked. In the business world, for instance, as I interviewed

corporate executives for my writing in *Harvard Business Review* and *Fast Company*, I found a great deal of interest in questioning. Many businesspeople seemed to be aware, on some level, of a link between questioning and innovation. They understood that great products, companies, even industries, often begin with a question. It's well-known that Google, as described by its chairman, is a company that "runs on questions," and that business stars such as the late Steve Jobs of Apple and Amazon's Jeff Bezos made their mark by questioning everything.

Yet, as I began to explore this subject within the business sector, I found few companies that actually encouraged questioning in any substantive way. There were no departments or training programs focused on questioning; no policies, guidelines, best practices. On the contrary, many companies—whether consciously or not—have established cultures that tend to discourage inquiry in the form of someone's asking, for example, *Why are we doing this particular thing in this particular way?*

MUCH THE SAME could be said about schools. Here again, as I talked to educators, I found a genuine interest in the subject—many teachers acknowledge it's critically important that students be able to formulate and ask good questions. Some of them also realize that this skill is apt to be even more important in the future, as complexity increases and change accelerates. Yet, for some reason, questioning isn't taught in most schools—nor is it rewarded (only memorized answers are).

In talking to social entrepreneurs working on big, thorny global problems of poverty, hunger, and water supply, I found that only a few rare innovators were focused on the importance of asking the right questions about these issues. For the most part, the old, entrenched practices and approaches tend to hold sway. The nonprofit sector, like much of industry, is inclined to keep doing what it has done—hence, well-meaning people are often trying to solve a problem by answering the wrong question.

In a way, this is true of all of us, in our everyday lives. The impulse is to keep plowing ahead, doing what we've done, and

rarely stepping back to question whether we're on the right path. On the big questions of finding meaning, fulfillment, and happiness, we're deluged with answers—in the form of off-the-shelf advice, tips, strategies from experts and gurus. It shouldn't be any wonder if those generic solutions don't quite fit: To get to *our* answers, we must formulate and work through the questions ourselves. Yet who has the time or patience for it?

On some level, we must know—as the business executive knows, as the schoolteacher knows—that questions are important and that we should be paying more attention to them, especially the meaningful ones. The great thinkers have been telling us this since the time of Socrates. The poets have waxed on the subject: E. E. Cummings, from whom I borrowed this book's title, wrote, *Always the beautiful answer / who asks a more beautiful question*. Artists from Picasso to Chuck Close have spoken of questioning's inspirational power. (This great quote from Close was featured recently on the site BrainPickings: "Ask yourself an interesting enough question and your attempt to find a tailor-made solution to that question will push you to a place where, pretty soon, you'll find yourself all by your lonesome—which I think is a more interesting place to be.")

Scientists, meanwhile, have been great proponents of questioning, with Einstein among the most vocal champions. He was asking smart questions from age four (when he wondered why the compass pointed north), and throughout his life Einstein saw curiosity as something "holy." Though he wondered about a great many things, Einstein was deliberate in choosing which questions to tackle: In one of his more well-traveled quotes—which he may or may not have actually said—he reckoned that if he had an hour to solve a problem and his life depended on it, he'd spend the first fifty-five minutes making sure he was answering the right question.

WITH SO MUCH evidence in its favor and with everyone from Einstein to Jobs in its corner, why, then, is questioning underappreciated in business, undertaught in schools, and underutilized in our everyday lives?

Part of it may be that we see questioning as something so fundamental and instinctive that we don't need to think about it. "We come out of the womb questioning," noted the small-schools-movement pioneer Deborah Meier. And it's true—any preschooler can ask questions easily and profusely. A recent study found the average four-year-old British girl asks her poor mum 390 questions a day; the boys that age aren't far behind. So then, it might be said that questioning is like breathing: It's a given, an essential and accepted part of life, and something that anyone, even a child, can do.

Yet chances are, for the rest of her life, that four-year-old girl will never again ask questions as instinctively, as imaginatively, or as freely as she does at that shining moment. Unless she is exceptional, that age is her questioning peak.

This curious fact, in and of itself, gives rise to all sorts of questions.

Why does that four-year-old girl begin to question less at age five or six?

What are the ramifications of that, for her and for the world around her?

And if, as Einstein tells us, questioning is important, why aren't we trying to stem or reverse that decline by finding ways to keep questioning alive?

On the other hand, that four-year-old may turn out to be an exception; she may be one of the rare people who *doesn't* stop questioning, like Bezos and Jobs, or like one of the "master questioners" featured in this book. And if that's the case, well, that raises questions, too.

Why do some keep questioning, while others stop? (Was it something in the genes, in the schools, in the parenting?)

And if we look at the questioners versus the nonquestioners, who seems to be coming out ahead?

THE BUSINESS WORLD has a kind of love/hate relationship with questioning. The business-innovation guru Clayton Christensen—himself a master questioner—observes that questioning is seen as “inefficient” by many business leaders, who are so anxious to *act*, to *do*, that they often feel they don’t have time to question just what it is they’re doing.

And those not in leadership roles frequently perceive (often correctly) that questioning can be hazardous to one’s career: that to raise a hand in the conference room and ask “Why?” is to risk being seen as uninformed, or possibly insubordinate, or maybe both.

Yet—as recently documented in a fascinating research study of thousands of top business executives—the most creative, successful business leaders have tended to be expert questioners. They’re known to question the conventional wisdom of their industry, the fundamental practices of their company, even the validity of their own assumptions. This has not slowed their rise in business—rather, it has “turbocharged” it, to quote Hal Gregersen, a business consultant and INSEAD professor who, along with Christensen and another business professor, Jeff Dyer, coauthored the research showing questioning to be a key success factor among innovative executives.

Indeed, the ability to ask the right questions has enabled business leaders to adapt in a rapidly changing marketplace, Gregersen notes. Inquiring minds can identify new opportunities and fresh possibilities before competitors become aware of them. All of which means that, whereas in the past one needed to appear to have “all the answers” in order to rise in companies, today, at least in some enlightened segments of the business world, the corner office is there for the askers.

Considering all of this, one almost can’t help but ask the following:

If we know (or at least strongly suspect) that questioning is a starting point for innovation, then why doesn't business embrace it?

Why don't companies train people to question and create systems and environments that would encourage them to keep doing so? And if companies were to do this, how might they go about it?

Regarding those first two questions, one possible answer—and it may also apply to similar questions about why nonprofit organizations don't question more, and why schools don't teach or encourage questioning—is that questions challenge authority and disrupt established structures, processes, and systems, forcing people to have to at least *think* about doing something differently. To encourage or even allow questioning is to cede power—not something that is done lightly in hierarchical companies or in government organizations, or even in classrooms, where a teacher must be willing to give up control to allow for more questioning.

ANYTHING THAT FORCES people to have to think is not an easy sell, which highlights the challenge of questioning in our everyday lives—and why we don't do it as much as we might or should. Clearly, it is easier (and more “efficient,” as a nonquestioning business executive might say) to go about our daily affairs without questioning everything. It's natural and quite sensible to behave this way. The neurologist John Kounios observes that the brain finds ways to “reduce our mental workload,” and one way is to accept without question (or even to just ignore) much of what is going on around us at any time. We operate on autopilot—which can help us to save mental energy, allow us to multitask, and enable us to get through the daily grind.

But when we want to shake things up and instigate change, it's necessary to break free of familiar thought patterns and easy assumptions. We have to veer off the beaten neural path. And we do this, in large part, by questioning.

With the constant change we face today, we may be forced to spend less time on autopilot, more time in questioning mode—attempting to adapt, looking to re-create careers, redefining old ideas about living, working, and retiring, reexamining priorities, seeking new ways to be creative, or to solve various problems in our own lives or the lives of others. “We’ve transitioned into always transitioning,” according to the author and futurist John Seely Brown. In such times, the ability to ask big, meaningful, beautiful questions—and, just as important, to know what to *do* with those questions once they’ve been raised—can be the first steps in moving beyond old habits and behaviors as we embrace the new.

HOW CAN WE develop and improve this ability to question? Can we rekindle that questioning spark we had at age four? During my conversations and visits with more than a hundred business innovators, scientists, artists, engineers, filmmakers, educators, designers, and social entrepreneurs, they shared methods of asking questions and solving problems. Some shared stories of how questioning guided their careers or their businesses. Others recounted how a particular question helped change their life. Many offered insights, techniques, and tips on the art of inquiry.

Based on their experience—while also borrowing ideas and influences from existing theories of creativity, design thinking, and problem solving—I devised a three-part Why–What If–How model for forming and tackling big, beautiful questions. It’s not a formula, *per se*—there is no formula for questioning. It’s more of a framework designed to help guide one through various stages of inquiry—because ambitious, catalytic questioning tends to follow a logical progression, one that often starts with stepping back and seeing things differently and ends with taking action on a particular question.

A journey of inquiry that (hopefully) culminates in change can be a long road, with pitfalls and detours and often nary an answer in sight. That’s why it can be helpful to approach inquiry systematically, as a step-by-step progression. The best innovators are able

to live with not having the answer right away because they're focused on just trying to get to the next question.

THIS BOOK IS structured around questions, with one leading to another. Forty-four questions divide up sections within the chapters, and lots more questions are embedded within each section. The thirty “question sidebars” scattered throughout the book tell stories of breakthrough ideas, innovations, or new ways of thinking that began with a powerful (and sometimes offbeat) question. A “Question Index” is at the back of the book—because if facts are entitled to an index, then why not questions?

As to what, exactly, constitutes a “beautiful question”: When I first launched the idea behind this book as the blog *A More Beautiful Question*, I laid out the following entirely subjective definition:

A beautiful question is an ambitious yet actionable question that can begin to shift the way we perceive or think about something—and that might serve as a catalyst to bring about change.

That definition makes clear that this book is *not* about grand philosophical or spiritual questions—*Why are we here? How does one define “good”? Is there life after death?*—all of those great questions that spark endless, impassioned debate. I am not particularly qualified to discuss such questions, nor do they fit within the category of what I would call actionable questions.

The focus here is on questions that can be acted upon, questions that can lead to tangible results and change. The esteemed physicist Edward Witten told me that in his work he is always searching for “a question that is hard (and interesting) enough that it is worth answering and easy enough that one can actually answer it.”

We don't often ask such questions; they're not the kind of queries typically typed into the Google search box. While it could be said that ours is a Golden Age of Questioning—with all the online resources now available for getting instant answers, it's reasonable to assume people are asking more questions than ever

before—that distinction would be based purely on volume, not necessarily on the quality or thoughtfulness of the questions being asked. Indeed, on Google, some of the most popular queries are which celebrity is or isn't gay. In many cases, our Google queries are so unimaginative and predictable that Google can guess what we're asking before we're three words into typing it.

This book is more concerned with questions that Google cannot easily anticipate or properly answer for you—questions that require a different kind of search. *What is the fresh idea that will help my business stand out? What if I come at my work or my art in a whole different way? How might I tackle a long-standing problem that has affected my community, my family?* These are individualized, challenging, and potentially game-changing questions.

In my inquiry into the value of inquiry, I've become convinced that questioning is more important today than it was yesterday—and will be even more important tomorrow—in helping us figure out what matters, where opportunity lies, and how to get there. We're all hungry for better answers. But first, we need to learn how to ask the right questions.



CHAPTER 1

The Power of Inquiry

If they can put a man on the moon, why can't they make a decent foot?

What can a question do?

What business are we in now—and is there still a job for me?

Are questions becoming more valuable than answers?

Is “knowing” obsolete?

Why does everything begin with Why?

How do you move from asking to action?

If they can put a man on the moon, why can't they make a decent foot?

Back in 1976, long before there was a Google to field all of our queries, a young man named Van Phillips started asking the question above, first in his head and then aloud. Phillips felt his future depended upon finding a good answer, and no one seemed to have one for him.

He was twenty-one years old and had been living the charmed life of an athletic, handsome, and bright young college student.

But one day in the summer of that year, Phillips's fortunes changed. He was water-skiing on a lake in Arizona when a small fire broke out on the boat pulling him. In the ensuing confusion, the boat's driver didn't see that a second motorboat, coming around a blind curve in the lake, was headed straight at Phillips.

Phillips awoke from anesthesia the next morning in a hospital. He recalls, "I did the proverbial 'I don't want to look, but let's see'" and checked under his blanket to find "an empty place where my left foot should have been." The limb had been severed, just below the knee, by the other boat's propeller.

At the hospital, Phillips was fitted with "a pink foot attached to an aluminum tube." The "foot" wasn't much more than a block of wood with foam rubber added; such was the state of prosthetic limbs at the time. Phillips left the hospital with instructions: Get used to your "new best friend," walk on it twice a day, and "toughen up that stump." One of the first times he tried to walk on the foot, Phillips recalls, he tripped "on a pebble the size of a pea." He knew, right then, this was not going to work for him. He recalls visiting his girlfriend's parents' house around that time, and being taken aside by her father, who said, "Van—you're just going to have to learn to accept this." When he heard that, Phillips recalls, "I bit my tongue. I knew he was right, in a way—I did have to accept that I was an amputee. But I would *not* accept the fact that I had to wear this foot."

At that moment, Phillips exhibited one of the telltale signs of an innovative questioner: a refusal to accept the existing reality. He'd shown other signs before that in childhood—as a kid, he once went through his house and removed all the doorknobs (mischievous *What If I take this apart?* childhood stories are common among questioners). But now, as an adult, he was experiencing a critical Why moment, as in *Why should I settle for this lousy foot?*

This did not seem an unreasonable question to Phillips, particularly since he was very aware—as was everyone else at the time—that amazing things were happening in the world of technology, particularly in the U.S. space program. Hence, he naturally wondered why some of the vast means and know-how that enabled

a man to walk on the moon couldn't somehow be applied to his down-to-earth problem.

What he hadn't thought of at that time—it would become clear to him later, as he got to know more about the field of prosthetics—was that some problems do not have governments or large corporations rushing to solve them. The prosthetics industry had been “in a time warp for decades,” Phillips recalls. No one was investing in it because the customer base, amputees, was no one's idea of an attractive business market. “But this worked to my advantage in a way,” Phillips told me, years later. Since progress had been stalled for so long, it left plenty of room to question outdated approaches and status quo practices—and to inject much-needed fresh thinking.

Still, Phillips quickly found, as a naïve questioner sometimes does, that his Why and What If inquiries weren't particularly welcome in the realm of What Is. Frequently in various professional domains—in hospitals or doctors' offices, in business conference rooms, even in classrooms—basic, fundamental questions can make people impatient and even uncomfortable. Phillips's questions about why there weren't better prosthetic limbs, and whether that could be changed, could be taken as a challenge to the expertise of those who knew far more than he did on the subject—the doctors, the prosthetics engineers, and others who understood “what was possible” at the time.

As an outsider in that domain, Phillips was actually in the best position to ask questions. One of the many interesting and appealing things about questioning is that it often has an inverse relationship to expertise—such that, within their own subject areas, experts are apt to be poor questioners. Frank Lloyd Wright put it well when he remarked that an expert is someone who has “stopped thinking because he ‘knows.’” If you “know,” there's no reason to ask; yet if you *don't* ask, then you are relying on “expert” knowledge that is certainly limited, may be outdated, and could be altogether wrong.

Phillips was not going to convince the experts that he knew better (and in fact, he didn't “know” better—he only suspected).

Somewhere along the line, he took another critical step for a questioner tackling a challenge: He took ownership of that question, *Why can't they make a better foot?* To do this, he had to make a change of pronouns: Specifically, he had to replace *they* with *I*.

THIS IS AN important concept, as explained by the small, independent inventor and inveterate questioner Mark Noonan, who once, after suffering his umpteenth backache from shoveling snow, wondered, *Why don't they come up with a better shovel?* Noonan solved the problem himself, inventing a shovel with a long handle, a lever, and a wheel—when you use it, you no longer have to bend your back. Noonan observes that if you never actually *do* anything about a problem yourself, then you're not really questioning—you're complaining. And that situation you're complaining about may never change because, as Regina Dugan, a former Defense Advanced Research Projects Agency (DARPA) director, has observed about problems in general, "We think someone else—someone smarter than us, someone more capable, with more resources—will solve that problem. But there isn't anyone else."

When Van Phillips realized that he was going to have to answer his own question, he also understood, almost immediately, that to inquire about prosthetics in a meaningful way he would have to wade into that world. He had been a broadcast major in college, but now changed directions and enrolled in one of the top prosthetics study programs in the United States, at Northwestern University, from whence he found work in a prosthetics lab in Utah. He began to understand how and why prosthetic limbs were designed the way they were.

He would spend nearly a decade grappling with his original question, then forming new ones, and eventually acting upon those. Phillips's journey of inquiry led him to some unusual places: He extracted lessons from the animal kingdom and borrowed influences from his local swimming pool as well as from the battlefields of ancient China.

In his pursuit of a better foot, he faltered many times—literally, he fell to the ground again and again. This would happen as he was

trying to answer his latest question (*I wonder if this prototype will hold up better than the last one?*) by taking it for a test run. He would receive his disappointing answer each time the new version of the foot broke under him. He would curse and swear, and then, inevitably, he would begin to ask new questions—attempting to understand and learn from each of his failures.

Then one day, the foot under him didn't break. And Phillips knew, at that moment, that he was about to change the world.

What can a question do?

The Pulitzer Prize-winning historian David Hackett Fischer observed that questions “are the engines of intellect—cerebral machines that convert curiosity into controlled inquiry.” Fischer’s “engine” is just one of many metaphors that have been used to try to describe the surprising power that questions have. Questions are sometimes seen as spades that help to unearth buried truths; or flashlights that, in the words of Dan Rothstein of the Right Question Institute (RQI), “shine a light on where you need to go.”

The late Frances Peavey, a quirky, colorful social activist whose work revolved around what she called “strategic questioning” aimed at bridging cultural differences between people, once observed that a good question is like “a lever used to pry open the stuck lid on a paint can.”

Maybe we talk about what a question is *like* because it's hard to wrap our minds around what it actually is. Many tend to think of it as a form of speech—but that would mean if you didn't utter a question, it wouldn't exist, and that's not the case. A question can reside in the mind for a long time—maybe forever—without being spoken to anyone.

We do know that the ability to question, whether verbally or through other means, is one of the things that separates us from lower primates. Paul Harris, an education professor at Harvard University who has studied questioning in children, observes, “Unlike other primates, we humans are designed so that the young

look to the old for cultural information.” He sees this as an important “evolutionary divide”—that from an early age, even before speech, humans will use some form of questioning to try to gain information. A child may pick up a kiwi fruit and indicate, through a look or gesture directed at a nearby adult, a desire to know more. Chimpanzees don’t do this; they may “ask” for a treat through signaling, but it’s a simple request for food, as opposed to an information-seeking question.

So then, one of the primary drivers of questioning is an awareness of what we don’t know—which is a form of higher awareness that separates not only man from monkey but also the smart and curious person from the dullard who doesn’t know or care. Good questioners tend to be aware of, and quite comfortable with, their own ignorance (Richard Saul Wurman, the founder of the TED Conferences, has been known to brag, “I know more about my ignorance than you know about yours”). But they constantly probe that vast ignorance using the question flashlight—or, if you prefer, they attack it with the question spade.

The author Stuart Firestein, in his fine book *Ignorance: How It Drives Science*, argues that one of the keys to scientific discovery is the willingness of scientists to embrace ignorance—and to use questions as a means of navigating through it to new discoveries. “One good question can give rise to several layers of answers, can inspire decades-long searches for solutions, can generate whole new fields of inquiry, and can prompt changes in entrenched thinking,” Firestein writes. “Answers, on the other hand, often end the process.”

This expansive effect of questions has been studied by Dan Rothstein, who along with his colleague Luz Santana established the Right Question Institute, a small and fascinating nonprofit group formed in order to try to advance the teaching of questioning skills. Rothstein believes that questions do *something*—he is not sure precisely what—that has an “unlocking” effect in people’s minds. “It’s an experience we’ve all had at one point or another,” Rothstein maintains. “Just asking or hearing a question phrased a

certain way produces an almost palpable feeling of discovery and new understanding. Questions produce the lightbulb effect.”

Rothstein has seen this phenomenon at work in classrooms where students (whether adults or children) are instructed to think and brainstorm using only questions. As they do this, Rothstein says, the floodgates of imagination seem to open up. The participants tend to become more engaged, more interested, in the subject at hand; the ideas begin to flow, in the form of questions. *Harvard Business Review* writer Polly LaBarre echoes this in describing the effect that lively and imaginative questioning can have in business settings: Such questions can be “fundamentally subversive, disruptive, and playful” and seem to “switch people into the mode required to create anything new.”

HOW DO QUESTIONS DO THIS?
The neurologist and author Ken Heilman, a leading expert on

creative activity in the brain, acknowledges that scant research has been focused on what’s happening in the brain when we ask questions. Neurologists these days can tell us what’s going on in the cerebral cortex when we daydream, watch a commercial, or work on a crossword puzzle, but, strangely, no one has much to say about the mental processes involved in forming and asking a question. However, Heilman points out, there *has* been significant neurological study of divergent thinking—the mental process of trying to come up with alternative ideas. Heilman notes, “Since divergent thinking is about saying, ‘Hey, what if I think differently about this?’ it’s actually a form of asking questions.”

How might we prepare during peacetime to offer help in times of war?

The exigencies of war have brought forth many a beautiful question. In 1859, a young Swiss Calvinist named Henry Dunant traveling in Italy came upon the aftermath of a bloody battle between the Austrian and French armies. On the battlefield some forty thousand men lay dead or wounded, and Dunant hastily organized the locals in binding wounds and feeding the injured. Upon his return home, Dunant wrote: “*Would there not be some means, during a period of peace and calm, of forming relief societies whose object would be to have the wounded cared for in time of war by enthusiastic, devoted volunteers, fully qualified for the task?*” And thus the Red Cross national relief societies were born. The subsequent idea of pooling the skills and resources of various Red Cross Societies to provide humanitarian assistance in peacetime, and not just during war, also was championed by Dunant.

What we know about divergent thinking is that it mostly happens in the more creative right hemisphere of the brain; that it taps into imagination and often triggers random association of ideas (which is a primary source of creativity); and that it can be intellectually stimulating and rewarding. So to the extent that questioning triggers divergent thinking, it's not surprising that it can have the kind of mind-opening effect that Rothstein has observed in classrooms using RQI's question-based teaching.

Rothstein points out, however, that questions not only open up thinking—they also can direct and focus it. In his exercises, students may begin with wide-open, divergent “what-if” speculation, but they gradually use their own questions to do “convergent” (focused) thinking as they get at the core of a difficult problem and reach consensus on how to proceed. They even use questions for “meta cognitive thinking,” as they analyze and reflect upon their own questions. “People think of questioning as simple,” Rothstein says, but when done right, “it's a very sophisticated, high-level form of thinking.”

It is also egalitarian: “You don't have to hold a position of authority to ask a powerful question,” noted LaBarre. In some ways, it can be more difficult or risky for those in authority to question. In Hal Gregersen's study of business leaders who question, he found that they exhibited an unusual “blend of humility and confidence”—they were humble enough to acknowledge a lack of knowledge, and confident enough to admit this in front of others. The latter is no small thing given that, as author Sir Ken Robinson has observed, “In our culture, not to know is to be at fault, socially.”

Being willing to question is one thing; questioning well and effectively is another. Not all questions have the positive effects described above. Open questions—in particular, the kind of Why, What If, and How questions that can't be answered with simple facts—generally tend to encourage creative thinking more than closed yes-or-no questions (though closed questions have their place, too, as we'll see).

What may be even more important is the tone of questions.

Confronted with a challenge or problem, one could respond with the question *Oh my God, what are we going to do?* Faced with the same situation, one might ask, *What if this change represents an opportunity for us? How might we make the most of the situation?*

Questions of the second type, with a more positive tone, will tend to yield better answers, according to David Cooperrider, a Case Western professor who has developed a popular theory of “appreciative inquiry.” Cooperrider says that “organizations gravitate toward the questions they ask.” If the questions from leaders and managers focus more on *Why are we falling behind competitors?* and *Who is to blame?*, then the organization is more likely to end up with a culture of turf-guarding and finger-pointing. Conversely, if the questions asked tend to be more expansive and optimistic, then *that* will be reflected in the culture. This is true of more than companies, he maintains. Whether we’re talking about countries, communities, families, or individuals, “we all live in the world our questions create.”

What business are we in now— and is there still a job for me?

One of the most important things questioning does is to enable people to think and act in the face of uncertainty. As Steve Quatrano of the Right Question Institute puts it, forming questions helps us “to organize our thinking around what we *don’t* know.” This may explain why questioning is so important in innovation hotbeds such as Silicon Valley, where entrepreneurs must figure out, seemingly daily, how to create new products and businesses from thin air, while navigating highly competitive, volatile market conditions.

Sebastian Thrun, the engineer/inventor behind Google’s experimental self-driving X car and the founder of the online university Udacity, acknowledges the two-way relationship between technological change and questioning. The changes are fueled by the questions being asked—but those changes, in turn, fuel more

questions. That's because with each new advance, Thrun said, one must pause to ask, *Now that we know what we now know, what's possible now?*

In some sense, innovation means trying to find and formulate new questions that can, over time, be answered. Those questions, once identified, often become the basis for starting a new venture. Indeed, the rise of a number of today's top tech firms—Foursquare, Airbnb, Pandora Internet Radio—can be traced to a *Why doesn't somebody* or *What if we were to* question, in some cases inspired by the founder's personal experience.

One such example, which has become a modern classic business story, is the origin of the Netflix video-rental service. The man who would go on to start the company, Reed Hastings, was reacting to one of those frustrating everyday experiences we've all had. Hastings had been lax in returning some movies rented from a Blockbuster video store, and by the time he got around to it, the late charges were exorbitant. A frustrated Hastings wondered, *Why should I have to pay these fees?* (He has admitted that another question on his mind at the time was *How am I going explain this charge to my wife?*)

Surely, others have been similarly outraged by late fees. But Hastings decided to do something about it, which led to a subsequent question: *What if a video-rental business were run like a health club?* He then set about figuring out how to design a video-rental model that had a monthly membership, like a health club, with no late fees. (Years later, Hastings would question whether Netflix could and should expand its model: *Why are we only renting the films and shows? What if we made them, too?*)

Through the years, companies from Polaroid (*Why do we have to wait for the picture?*) to Pixar (*Can animation be cuddly?*) have started with questions. However, when it comes to questioning, companies are like people: They start out doing it, then gradually do it less and less. A hierarchy forms, a methodology is established, and rules are set; after that, what is there to question?

But business leaders sometimes find themselves thrust back into questioning mode during dire or dynamic times, when those

rules and methods they've come to rely on no longer work. Such is the case in today's business market, where the speed of, and need for, innovation has been ratcheted up—forcing some companies to ask bigger and more fundamental questions than they've asked in years about everything from the company's identity, to its mission, to a reexamination of who the customer is and what the core competencies should be. Much of it boils down to a fundamental question that a lot of companies find themselves asking right now:

With all that's changing in the world and in our customers' lives, what business are we really in?

AS COMPANIES ARE forced to ask tough questions in the face of change, so, too, are the people working for those companies, or, increasingly, working for themselves or just trying to find work, period. The same forces roiling businesses—rapid technological upheaval, leading to changes in how jobs are performed and what skills are required—are creating what the *New York Times* recently characterized as a perfect storm in which no one, whether blue-collar or white-collar and whatever level of expertise, can afford to stand pat. “The need to constantly adapt is the new reality for many workers” was the theme of the piece headlined “The Age of Adaptation.” The story had a term for what is now required of many workers—*serial mastery*.

To keep up, today's worker must constantly learn new skills by, for example, taking training courses. But as the *Times* article points out, these workers “are often left to figure out for themselves what new skills will make them more valuable, or just keep them from obsolescence.”

Stories like this have been appearing with greater frequency—the *Times* columnist Thomas Friedman has written extensively about a new global economy that is ruthlessly demanding more skills and more inventiveness from the workforce. A quick scan of the stories' online comment sections reveals how people feel about all of this: worried and bewildered, but also, in some cases, angry and bitter. *I went to school, got a degree, picked up a skill, gained*

expertise in my field—I established myself over the years. Why should I have to start over?

Unfortunately, that's a Why question that, however justified and reasonable it may seem, doesn't lead anywhere. The rules Friedman is talking about have already changed; fair or not, like it or not. The challenge now is to figure out what these new conditions mean for each of us—what openings they create, and how best to exploit those openings and possibilities. A training program may be appropriate, but before taking any action, fundamental questioning is essential. How can you know whether retraining is worthwhile, or which kinds of training, without first spending time on questions such as:

- How is my field/industry changing?
- What trends are having the most impact on my field, and how is that likely to play out over the next few years?
- Which of my existing skills are most useful and adaptable in this new environment—and what new ones do I need to add?
- Should I diversify more—or focus on specializing in one area?
- Should I be thinking more in terms of finding a job—or creating one?

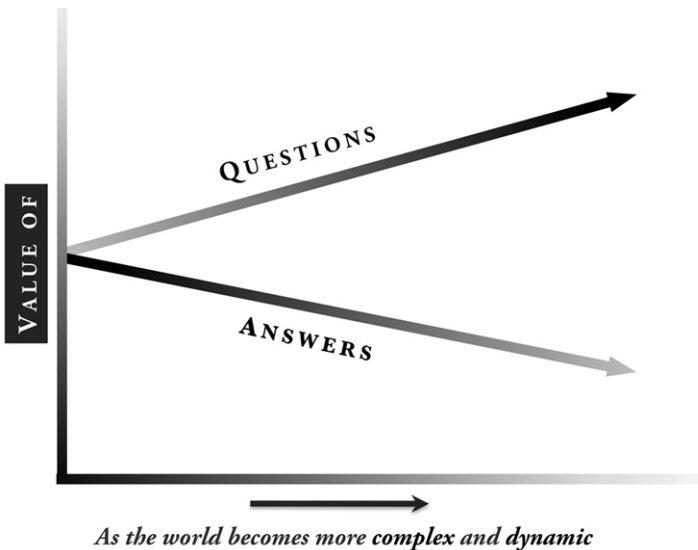
Changing tracks in a career is a form of innovation, on a personal level—and requires the same kind of rigorous inquiry that a business should undertake in pursuing a new direction or strategy. What's required is not just a onetime adaptation; more likely, we'll all have to be adept at *continually* changing tracks as we move forward.

Joichi Ito, the director of the esteemed MIT Media Lab, offers an interesting theory about the need for lifelong adaptation. When the world moved at a slower pace and things weren't quite so complex, we spent the early part of life in learning mode. Then, once you became an adult, “you figured out what your job was and you repeated the same thing over and over

again for the rest of your life.” Today, Ito explains, because of constant change and increased complexity, that rinse-and-repeat approach in adult life no longer works as well. In a time when so much of what we know is subject to revision or obsolescence, the comfortable expert must go back to being a restless learner.

Are questions becoming more valuable than answers?

As expertise loses its “shelf life,” it also loses some of its value. If we think of “questions” and “answers” as stocks on the market, then we could say that, in this current environment, questions are rising in value while answers are declining. “Right now, knowledge is a commodity,” says the Harvard education expert Tony Wagner. “Known answers are everywhere, and easily accessible.” Because we’re drowning in all of this data, “the value of explicit information is dropping,” according to Wagner’s colleague at Harvard, the innovation professor Paul Bottino. The real value, Bottino added, is in “what you can do with that knowledge, in pursuit of a query.”



The glut of knowledge has another interesting effect, as noted by author Stuart Firestein: It makes us *more* ignorant. That is to say, as our collective knowledge grows—as there is more and more to know, more than we can possibly keep up with—the amount that the individual knows, in relation to the growing body of knowledge, is smaller.

The good news, Firestein notes, is that there is more ignorance for us to explore. There are more “collectively known” things that we, as individuals, can learn about and a vast expanse of unknown things we could, potentially, discover. Overall, there’s more darkness into which we can shine that “question flashlight.”

Another way to think of it is that as we increasingly find ourselves surrounded by the new, the unfamiliar, and the unknown, we’re experiencing something not unlike early childhood. Everywhere we turn, there’s something to wonder and inquire about. MIT’s Joi Ito says that as we try to come to terms with a new reality that requires us to be lifelong learners (instead of just early-life learners), we must try to maintain or rekindle the curiosity, sense of wonder, inclination to try new things, and ability to adapt and absorb that served us so well in childhood. We must become, in a word, *neotenous* (*neoteny* being a biological term that describes the retention of childlike attributes in adulthood). To do so, we must rediscover the tool that kids use so well in those early years: the question. Ito puts it quite simply: “You don’t learn unless you question.”

QUESTIONS TRUMP ANSWERS: Some people have been saying this for a while, among them John Seely Brown. The former chief scientist at Xerox Corporation, Brown headed up its famous Palo Alto Research Center (PARC) for years. More recently, as cofounder of an innovation think tank known as the Deloitte Center for the Edge, Brown advises some of the world’s leading companies on how to keep pace in a turbulent environment. He has also written about how our approach to education must be completely rethought, in light of what he calls the “exponential change” that is upon us.

Things are changing so fast, Brown told me, “I have to reframe how I even think about using all of this technology. I find myself asking all kinds of fundamental questions. And as I do that, I eventually realize that the lenses I’m looking through to see the world around me are wrong—and that I have to construct a whole new frame of reference.”

The problem is not just rapid change—it’s also the sheer volume of information rushing at us from all directions and many sources. Without a filtering device, we can’t separate what’s relevant or reliable from what’s not. When we’re overloaded with information, “context becomes critical,” Brown says. “What matters now is your ability to triangulate, to look at something from multiple sources, and construct your own warrants for what you choose to believe.” That can involve “asking all kinds of peripheral questions,” Brown notes, such as *What is the agenda behind this information? How current is it? How does it connect with other information I’m finding?*

The author Seth Godin is touching on a similar idea when he writes, “Our new civic and professional life is all about doubt. About questioning the status quo, questioning marketing or political claims, and most of all questioning what’s next.” To navigate in today’s info-swamp, we must have, according to Bard College president Leon Botstein, “the ability to evaluate risk, recognize demagoguery, the ability to question not only other people’s views, but one’s own assumptions.” The more we’re deluged with information, with “facts” (which may or may not

What if we could paint over our mistakes?

When electric typewriters became popular in the 1950s, the ribbons made it harder to erase typing errors—a problem noticed by Bette Nesmith Graham. Graham worked two jobs: bank secretary (and heavy typist) by day, commercial artist at night. One night while doing artwork, she wondered, *What if I could paint over my mistakes when typing, the way I do when painting?* She filled a small bottle with a paint and water formula and brought it to the office. Her “miracle mixture” made it easy to cover over typing errors, and soon Graham was supplying hundreds of other secretaries with her correction fluid. The year before she died in 1980, Graham sold Liquid Paper for close to \$50 million, giving half of that to her son, the former Monkees band member Mike Nesmith—who used it to fund innovations of his own at the pioneering multimedia recording company Pacific Arts.

be), views, appeals, offers, and choices, then the more we must be able to sift and sort and decode and make sense of it all through rigorous inquiry.

CAN TECHNOLOGY HELP us ask better questions? For the most part, it is better suited to responding to questions—not so good at asking them. Picasso was onto this truth fifty years ago when he commented, “Computers are useless—they only give you answers.”

On the other hand, technology can serve up amazing, innovative, life-changing answers—if we know how to ask for them. The potential is mind-boggling, as IBM’s Watson system demonstrates. Its winning appearance in 2011 on the TV quiz show *Jeopardy!* proved it could answer questions better than any human. Today, IBM is feeding the system a steady diet of, among other things, medical information—so that it can answer just about any question a doctor might throw at it (*If patient exhibits symptoms A, B, and C, what might this indicate?*). But the doctor still has to figure out what to ask—and then must be able to question Watson’s response, which might be technically accurate but not commonsensical.

When I visited Watson and its programmers recently at IBM’s main research facility—where the machine, consisting of a stack of servers, resides alone in a basement, humming quietly and waiting for questions to crunch on—I inquired (directing my queries to the nearby humans, not the machine) whether Watson might ever turn the tables on us and start asking *us* wickedly complex questions. While that’s not its purpose, its programmers point out something interesting and quite promising: As Watson comes in increasing contact with doctors and medical students currently using the system, the machine is slowly training them to ask more and better questions in order to pull the information they need out of the system. As it trains them to be better questioners, Watson will almost certainly help them to be better doctors.

Is “knowing” obsolete?

Today, only a small group of medical professionals are using the Watson system to answer their questions. But eventually, all doctors—and all the rest of us, as well—will have access to some form of cloud-based super-search-engine that can quickly answer almost any factual question with a level of precision and expertise that’s way beyond what we have now. Which reinforces that the value of questions is going to keep rising as that of answers keeps falling.

Clearly, technology will have the answers covered—so we will no longer need to fill our heads with those answers as much as we once did, bringing to mind a classic Einstein story. A reporter doing an interview concludes by asking Einstein for his phone number, and Einstein reaches for a nearby phone book. While Einstein is looking up his own number in the book, the reporter asks why such a smart man can’t remember it. Einstein explains that there’s no reason to fill his mind with information that can so easily be looked up.

In the current era of Google and Watson, with databases doing much of the “knowing” for us, many critics today question the wisdom of an education system that still revolves around teaching students to memorize facts. One such education critic, the author Sugata Mitra, made just this point at a TED Conference by tossing out the provocative question *Is “knowing” obsolete?* Of course, not all knowledge is mere factual information; the TED question, as worded, is overly broad. But if we zero in on a narrow kind of

Why did my candy bar melt? (And will my popcorn pop?)

During the World War II years, Percy Spencer, a self-taught engineer leading the power tube division at defense contractor Raytheon, focused his efforts on the magnetron—the core tube that made radars so powerful they enabled U.S. bombers to spot periscopes on German submarines. Standing next to a magnetron one day, Spencer noticed that a candy bar in his pocket had melted. He then wondered, *Could the energy from the radio waves be used to actually cook food?* He placed some popcorn kernels near the tube and soon was munching on the world’s first microwave popcorn. In 1947, Raytheon put the first Radarange microwave ovens on the market—but it took another twenty years before the appliances were small enough to fit on a countertop.

knowledge—stored facts or “answers”—then that kind of “knowing” might be better left to machines with more memory.

But if we can’t compete with technology when it comes to storing answers, questioning—that uniquely human capacity—is our ace in the hole. Until Watson acquires the equivalent of human curiosity, creativity, divergent thinking skills, imagination, and judgment, it will not be able to formulate the kind of original, counterintuitive, and unpredictable questions an innovative thinker—or even just your average four-year-old—can come up with.

Moreover, only through effective inquiry can we fully explore, probe, access, and, hopefully, figure out what to do with all those answers the technology has in store for us. This goes beyond just being able to query a search engine or a database; immense resources and capabilities are available today to those who are able to access and traverse the network that now exists online.

By tapping into social networks, online sources of information, and digital communities, it is increasingly feasible, MIT’s Ito points out, for an individual to tackle a large challenge or question, or to launch an initiative or movement. One can do so relatively quickly by “pulling resources—answers, expert advice, partners, sources of funding, influence—from the network as you need it.” However, “the main way you pull support from the network is by querying it. And you need to understand how to frame the questions to get the best response.”

In light of this, there’s never been a better time to be a questioner—because it is so much easier now to begin a journey of inquiry, with so many places you can turn for information, help, ideas, feedback, or even to find possible collaborators who might be interested in the same question.

As John Seely Brown notes, a questioner can thrive in these times of exponential change. “If you don’t have that disposition to question,” Brown says, “you’re going to fear change. But if you’re comfortable questioning, experimenting, connecting things—then change is something that becomes an adventure. And if you can see it as an adventure, then you’re off and running.”

Why does everything begin with Why?

As Van Phillips began to proceed further on his own journey, he was, to use Brown's words, "questioning, experimenting, connecting things." He revised his initial Why question—*If they can put a man on the moon, why can't I (not they) make a decent foot?*—and began to immerse himself deeply in the world of prosthetics.

The more Phillips learned, the more questions he had: about the materials being used (*Why wood, when there were so many better alternatives?*); about the shape (*Why did a prosthetic foot have to be shaped like a bulky human foot? Did that even make sense?*); about the primary purpose of a replacement foot (*Why was there so much emphasis on trying to match the look of a human foot? Wasn't performance more important?*).

This all comprises the first stage of innovative questioning—first confronting, formulating, and framing the initial question that articulates the challenge at hand, and trying to gain some understanding of context. I think of this as the Why stage, though not every question asked at this juncture has to begin with the word *why*. Still, this is the point at which one is apt to inquire:

- Why does a particular situation exist?
- Why does it present a problem or create a need or opportunity, and for whom?
- Why has no one addressed this need or solved this problem before?
- Why do you personally (or your company, or organization) want to invest more time thinking about, and formulating questions around, this problem?

The situation Van Phillips confronted was unusual in some ways. He didn't have to go looking for his Why problem; it came to him. He didn't have to wonder about whom it affected or whether it was worth his time. But when the problem was thrust upon him, he asked a proactive Why question (instead of just passively wondering, *Why did this have to happen to me?*). Then he

kept asking more Why questions as he explored the nature and the dimensions of the problem.

Innovative questioners, when faced with situations that are less than ideal, inquire as to why, trying to figure out what's lacking. Oftentimes, these questions arise out of mundane, everyday situations, such as that “late fees” problem encountered by Reed Hastings before he founded Netflix. Similarly, Pandora Internet Radio founder Tim Westergren, a former band musician, observing all the talented-yet-struggling musicians he knew, wondered why it was so difficult for them to connect with the audience they deserved. Airbnb cofounder Joe Gebbia, along with roommate Brian Chesky, wanted to know why people coming to his town at certain times of the year had so much trouble getting hotel accommodations.

The *New York Times* technology reporter David Pogue has written about how so many things that are now part of our everyday lives—such as ATM machines, computer documents, and shampoo bottles—all started the same way: We get these breakthroughs, Pogue writes, “when someone looks at the way things have always been done and asks why?”

And the phenomenon isn't limited to business innovation and invention stories; asking Why can be the first step to bringing about change in almost any context. Gretchen Rubin showed how a simple Why question could be applied to one's everyday life—and be the spark that leads to dramatic change. One rainy day, looking out the window of a New York City bus, Rubin pondered, *Why am I not happy with my life as it is?* This question got her thinking about the nature of happiness, then researching that, then applying what she learned to her own life—and, importantly, to the lives of others. Thus was born her immensely successful multimedia venture known as *The Happiness Project*.

We can and should ask Why about career, family relationships, local community issues—anywhere we might encounter a situation that is ripe for change and improvement. *Why is my career not advancing in the way I'd hoped? Or if it is advancing, and I'm still*

not happy, why is that? Why is my product or service failing to connect with customers who ought to love it? Why is my father-in-law so difficult to get along with?

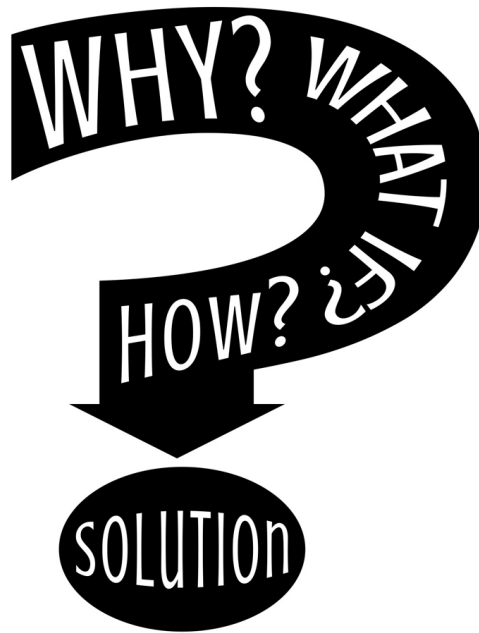
Sometimes questioners go out looking for their Why—searching for a question they can work on and answer. The term *problem-finding* is used to describe this pursuit, and while it may seem odd to go looking for problems, according to the business consultant Min Basadur—who teaches problem-finding skills to executives at top companies—it’s one of the most important things to do for an established business, large or small. As Basadur notes, if you are able to “find” a problem before others do, and then successfully answer the questions surrounding that problem, you can create a new venture, a new career, a new industry. Here again, as Basadur attests, it applies to life, as well—if you seek out problems in your life before they’re obvious, before they’ve reached a crisis stage, you can catch and address them while they still offer the best opportunities for improvement and reinvention.

Why aren’t the players urinating more?

Many companies and even entire industries can be traced back to a question—but they’re usually not as odd as this one. In 1965, Dwayne Douglas, a football coach at the University of Florida, wondered, *Why aren’t the players urinating more after the games?* The coach was baffled because he knew his players were drinking water on the sidelines; what he didn’t realize was that they were sweating away more fluids than could be replaced with water. Douglas shared his question with J. Robert Cade, a professor of renal (kidney) medicine at the university—who set about formulating a drink that could replace the electrolytes lost through sweat. Cade’s mixture was first tested on the freshman football team—who proceeded to defeat the upperclassmen in a practice session. The drink became known as Gatorade (named after the team mascot) and helped launch a sports drink industry now worth almost \$20 billion.

JUST ASKING WHY without taking any action may be a source of stimulating thought or conversation, but it is not likely to produce change. (Basic formula: Q (*questioning*) + A (*action*) = I (*innovation*). On the other hand, $Q - A = P$ (*philosophy*). In observing how questioners tackle problems, I noticed a pattern in many of the stories:

- Person encounters a situation that is less than ideal; asks Why.
- Person begins to come up with ideas for possible improvements/solutions—with such ideas usually surfacing in the form of What If possibilities.
- Person takes one of those possibilities and tries to implement it or make it real; this mostly involves figuring out How.



The Why/What If/How sequence represents a basic and logical progression, drawing, in part, on several existing models that break down the creative problem-solving process. For example, current theories of “design thinking,” used by IDEO and other leading designers to systematically solve problems, have laid out a process that starts with framing a problem and learning more about it (similar to my Why stage), then proceeds to generating ideas (which corresponds to What If), and eventually builds upon those ideas through prototyping (which could be thought of as the How stage).

A similar progression—moving from understanding a problem, to imagining possible solutions, to then going to work on those possibilities—can also be seen in the creative problem-solving processes of the business consultant Min Basadur (who, in turn, owes a debt to earlier processes developed by the little-known but legendary Creative Problem Solving Institute of Buffalo, New York). Echoes of this are even in the classic four-stage process of creativity—Preparation/Incubation/Illumination/Implementation—developed nearly a century ago by the British psychologist Graham Wallas.

All of which is to say there is good reason why the stages of questioning proceed in the order laid out in this book. It corresponds to what has been learned, through the years, about how best to confront problems and work toward possible solutions. It's also based on observation of how many of the questioners featured in the book cycled through the process of coming up with innovative solutions.

The Why/What If/How progression offers a simplified way to approach questioning; it's an attempt to bring at least some semblance of order to a questioning process that is, by its nature, chaotic and unpredictable. A journey of inquiry is bound to lead you into the unknown (as it should), but if you have a sense of the kinds of questions to ask at various stages along the way, you've at least got some road markers. Indeed, this is the beauty of "process" in general: It may not provide any answers or solutions, but, as one design-thinker told me, having a process helps you to keep taking next steps—so that, as he put it, "even when you don't know what you're doing, you still know what to do."

How do you move from asking to action?

At some point, Van Phillips progressed from Why to What If. Phillips was by now working in the prosthetics industry and doing his own "contextual inquiry" (inquiring up close and in context) in his endeavor to understand how things were done in that business, so that he could question more intelligently.

Yet even as Phillips began to gain expertise in prosthetics, he tried to maintain his original “outsider” perspective. As he was working on his project, he was advised by a mentor to go to the patent office and research everything that had been done on prosthetic foot inventions. “My reaction to that was ‘I’m not going to pollute my mind with everyone else’s ideas. I’m following my own path, not somebody else’s.’”

Phillips was not in a hurry; he was not looking for quick answers from experts. “If you give the mind time and space, it will do its own work on the problem, over time,” he said. “And it will usually come up with interesting possibilities to work with.” Gradually, those possibilities began to surface in Phillips’s mind. At the What If stage the imagination begins to go to work, whether we’re conscious of it or not. The mind, if preoccupied with a problem or question long enough, will tend to come up with possibilities that might eventually lead to answers, but at this stage are still speculations, untested hypotheses, and early epiphanies. (Epiphanies often are characterized as “Aha! moments,” but that suggests the problem has been solved in a flash. More often, insights arrive as What if moments—bright possibilities that are untested and open to question.)

Exploring What If possibilities is a wide-open, fun stage of questioning and should not be rushed. Today, the idea of “sitting with” and “living with” a question may seem strange, as we’ve gotten used to having our queries answered quickly and in bite-size servings. Stuart Firestein, in his book *Ignorance*, wonders if we’ve gotten too comfortable with this. *Are we too enthralled with answers?* he asks. *Are we afraid of questions, especially those that linger too long?*

Often the worst thing you can do with a difficult question is to try to answer it too quickly. When the mind is coming up with What If possibilities, these fresh, new ideas can take time to percolate and form. They often result from connecting existing ideas in unusual and interesting ways. Einstein was an early believer in this form of “combinatorial thinking”; today it is widely accepted as one of the primary sources of creativity. Since

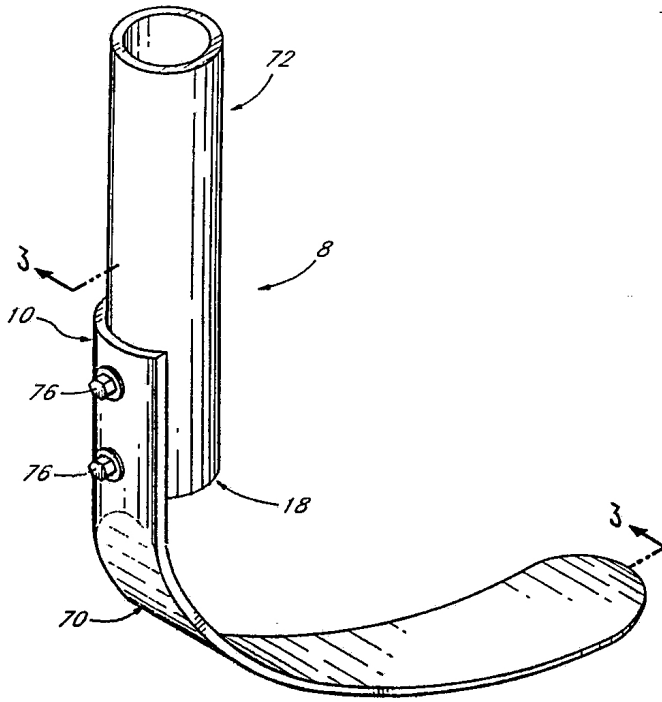
this type of thinking involves both connections and questions, I think of it as *connective inquiry*.

AS VAN PHILLIPS got, in his words, “knee-deep” into his foot project, he did lots of interesting, offbeat connective inquiry. For example, he’d started thinking about the spring force of a diving board and wondering, *What if you could somehow replicate a diving board’s propulsive effect in a prosthetic foot?* Somewhere along the way he learned about animal leg movements—in particular, about how the powerful tendons in a cheetah’s hind legs produced remarkable spring-force whenever the legs were bent and the tendons compressed. *What if a human leg could be more like a cheetah’s?*

He also made a mental connection with a distant memory. When he was growing up, his father owned an antique Chinese sword with a C-shaped blade. Phillips had always been fascinated by this sword because the curved blade was actually stronger and more flexible than a straight one. This created a fresh possibility in his mind: *Instead of a traditional L-shaped lower leg and foot, what if he dispensed with the heel and created a limb that was one smooth, continuous curve, from leg to toe?* With such a design, and with the right materials, he’d be able to incorporate the elasticity of a cheetah’s tendons and the bounce of a diving board. On such a limb, an amputee could not just walk, but run and jump.

What if a car windshield could blink?

In 1902 Alabama tourist Mary Anderson watched her New York streetcar driver struggling to see through his snow-covered windshield and wondered, *Why doesn’t someone create a device to remove the snow?* (The “someone,” of course, became Mary, designer of the first windshield wiper.) Sixty years later, Bob Kearns brought the windshield wiper into the modern era by posing a new question of his own. Dissatisfied with wipers that moved at one speed whether it was pouring or drizzling outside, Kearns inquired, *Why can’t a wiper work more like my eyelid, blinking as much (or little) as needed?* Kearns worked on his “intermittent wiper” idea in his basement, eventually coming up with an elegantly simple three-component electronic sensing and timing device. (The sad story of how the Big Three car companies infringed on his patent is told in the 2008 film *Flash of Genius*.)



WHAT IF POSSIBILITIES are powerful things; they are the seeds of innovation. But you do not get from idea to reality in one leap, even if you've got spring-force dynamics on your side. What sets apart the innovative questioners is their ability—mostly born out of persistence and determination—to give form to their ideas and make them real. This is the final, and critical, How stage of inquiry—when you've asked all the Whys, considered the What Ifs . . . and must now figure out, *How do I actually get this done?* It's the action stage, yet it is still driven by questions, albeit more practical ones.

How do I decide which of my ideas is the one I'll pursue?

How do I begin to test that idea, to see what works and what doesn't?

And if/when I find it's not working, how do I figure out what's wrong and fix it?

Today, most of us are in a better position to build on our ideas and questions than ever before. We can use computer sketch programs, create YouTube videos of what we're doing, set up beta websites, tap into social networks for help—or even launch a Kickstarter project to fund our efforts to solve a problem or create something new.

PHILLIPS DIDN'T HAVE any of those resources at the time he was working on his foot. He sketched by hand, then built clay prototypes in his basement lab. He would trek up to the kitchen to bake in his oven the ingredients that would go into his superfoot. "I was curing parts between fifty-pound hot plates in my oven, burning myself a lot," he told me.

Phillips created somewhere between two hundred and three hundred prototypes of the Flex-Foot, and "a lot of them broke the first time you put your weight down on them." Every time a foot broke, he dissected the failure through questioning: *Why did it break? What if I change the mix of materials? How will this new version hold up?* Each time Phillips fell, he landed in a place that was further ahead, closer to the breakthrough. He was failing forward, the whole time.

The Flex-Foot prosthetics that Phillips introduced, starting in the mid-1980s and continuing until he sold the line and his company in 2000, revolutionized the prosthetics industry. While the Flex-Foot line had various models for different uses, its most dramatic was the Cheetah—which incorporated various disparate influences (the diving board, the animal leg, the curved Chinese sword). With its curved blades, it changed everything: the way we think about prosthetics, how they're supposed to look, what an amputee can do with them. Using Phillips's creation, an amputee climbed Mount Everest; the runner Aimee Mullins became the first double-amputee sprinter to compete in NCAA track and field, for Georgetown University; and most famously, the South African

runner Oscar Pistorius ran on two Cheetahs as he competed in the 2012 Olympics. As for Phillips himself, his prosthetic foot—the decades-long answer to his original question—enabled him to return to one of his deepest passions in life: He now runs every day, on the beach near his home in Mendocino, California.

When he's not running, Phillips is hard at work trying to create new versions of limbs that do even more for less. In fact, almost as soon as he developed the Cheetah, he was asking, *Why does it have to cost so much? What if the design were tweaked in some way—through new materials, different processes—so as to make the limb accessible to more people? How might I make that work?*

It's common for questioners to do this; each "answer" they arrive at brings a fresh wave of questions. To keep questioning is as natural, for them, as breathing. But how did they come to be this way? And why aren't more people like that?