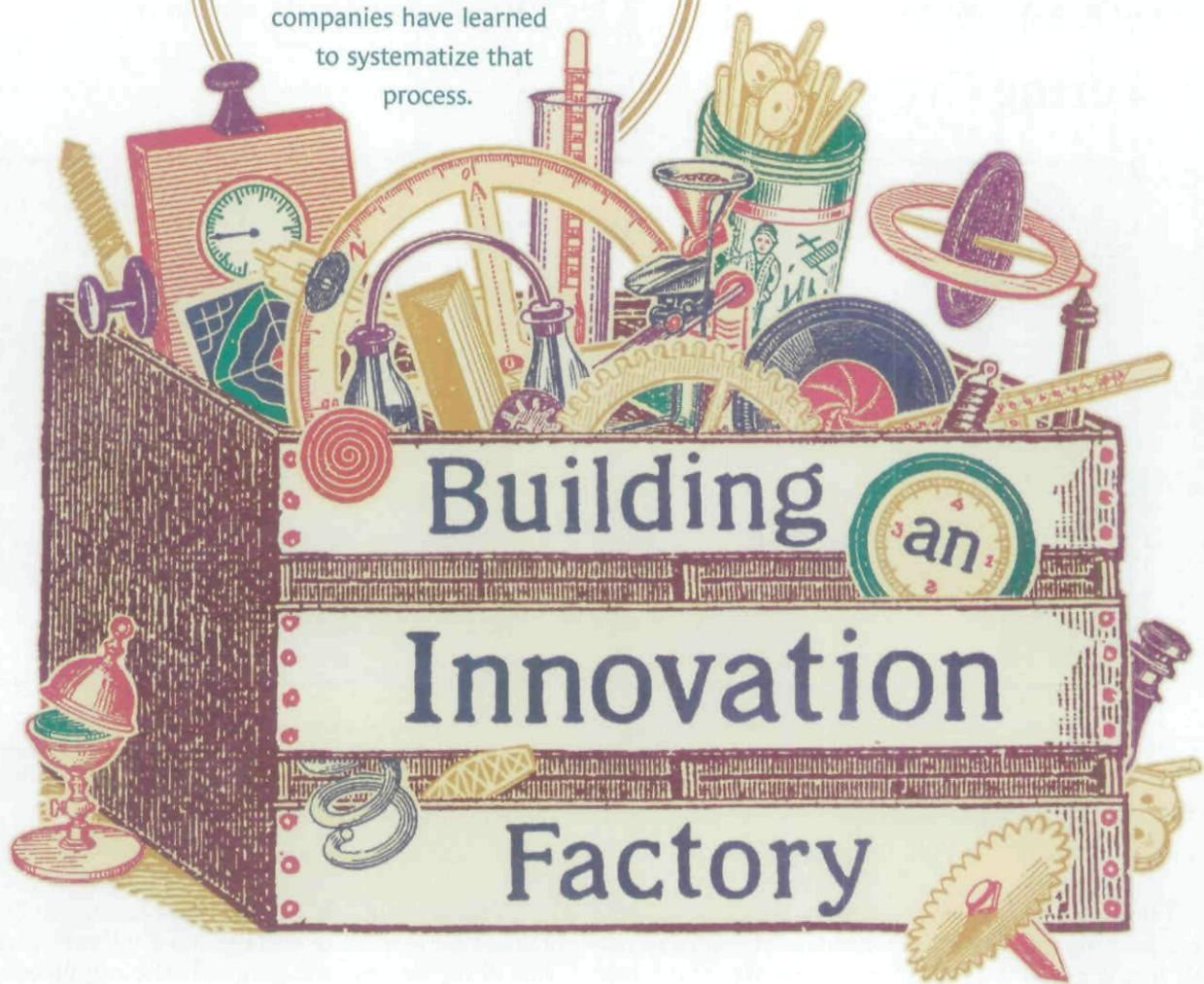


The best innovators aren't lone geniuses. They're people who can take an idea that's obvious in one context and apply it in not-so-obvious ways to a different context. The best companies have learned to systematize that process.



ARTWORK BY JOHN CRAIG

by Andrew Hargadon and Robert I. Sutton

ASK ANY CEO IN THE WORLD TO WRITE a top-five wish list, and we guarantee that "more ideas—better ideas!" will show up in some form. Most likely it'll be right at the top. CEOs know that ideas and innovation are the most precious currency in the new economy—and increasingly in the old economy as well. Without a constant flow of ideas, a business is condemned to obsolescence.

We've spent the last five years studying businesses that innovate constantly, and we have good news for business leaders. The best of these innovators have systematized the generation and testing of new ideas—and the system they've devised can be replicated practically anywhere, because it has everything to do with organization and attitude and very little to do with nurturing solitary genius.

We learned two big things. The first is that the best innovators systematically use old ideas as the raw materials for one new idea after another. We call their strategy **knowledge brokering**, companies that do it serve as intermediaries, or brokers, between otherwise disconnected pools of ideas. They use their in-between vantage point to spot old ideas that can be used in new places, new ways, and new combinations.

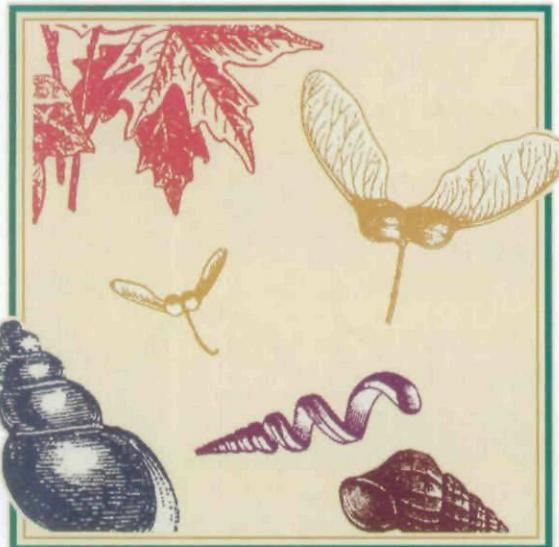


in mines for 75 years before Robert Fulton thought deeply about the original innovation, wondered how it could be used to propel boats, and developed the first commercial steamboat. Nobody had done what Fulton had with that particular local, specific knowledge: he made the leap of applying it to the altogether different problem of powering boats and implemented it in a way that was accepted by the marketplace.

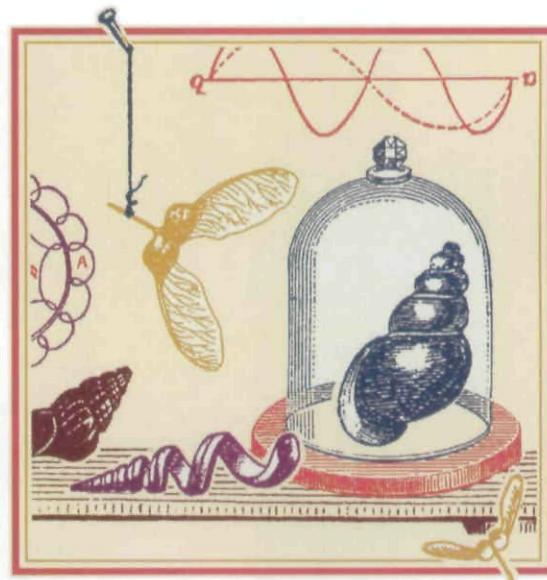
PHOTOS: PHOTODISC

Brokering Cycle

The Knowledge-



1 **Capturing good ideas.** Knowledge brokers scavenge constantly for promising ideas, sometimes in the unlikeliest places. They see old ideas as their primary raw material.



2 **Keeping ideas alive.** To remain useful, ideas must be passed around and toyed with. Effective brokers also keep ideas alive by spreading information on who knows what within the organization.

Taking an idea that's commonplace in one area and moving it to a context where it isn't common at all is not a new way to spark creativity, of course. The history of technological innovation is filled with examples. The steam engine, for one, was used

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The companies we studied have found out how to make that leap again and again (which is the second big thing we learned). We call their approach the **knowledge-brokering cycle**. It's made up of four intertwined work practices: capturing good ideas, keeping ideas alive, imagining new uses for old ideas, and putting promising concepts to the test. We'll show how innovators execute this strategy and what other companies can learn from them about innovation.

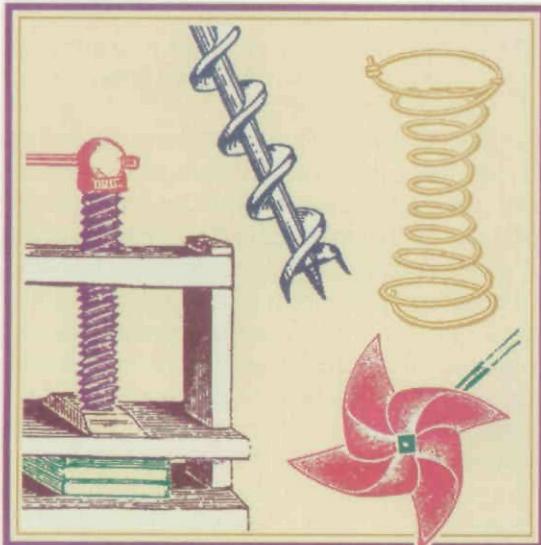
The Knowledge-Brokering Cycle

We found systematic innovators in all kinds of settings. There were product design firms like IDEO Product Development, business model inventors like Idealab!, knowledge traders inside consulting firms, and brokers such as Hewlett-Packard's supply-

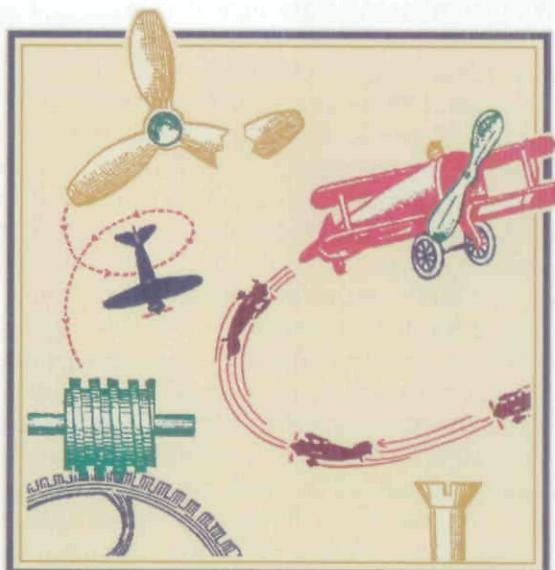
chain consulting group working inside huge corporations. Their markets and settings were diverse, but their approaches were not. Indeed, the four intertwined processes we observed were remarkably alike across companies and industries.

Capturing Good Ideas. The first step is to bring in promising ideas. Brokers—companies that innovate by engaging in knowledge brokering—tend to span multiple markets, industries, geographical locations,

brainstorming session, and the meeting was delayed for ten minutes while engineers took apart our new toy to see how it was designed and manufactured. IDEO designers visit the local Ace Hardware store to see new products and remind themselves of old ideas, and they take field trips to places like the Barbie Hall of Fame, an airplane junkyard, and a competition where custom-built robots fight to the death.



3 **Imagining new uses for old ideas.** This is where the innovations arise, where old ideas that have been captured and remembered are plugged into new contexts.



4 **Putting promising concepts to the test.** Testing shows whether an innovation has commercial potential. It also teaches brokers valuable lessons, even when an idea is a complete flop.

or business units. They keep seeing proven technologies, products, business practices, and business models, and they recognize that old ideas are their main source of new ideas—even when they are not sure how an old idea might help in the future. When brokers come across a promising idea, they don't just file it away. They play with it in their minds—and when possible with their hands—to figure out how and why it works, to learn what is good and bad about it, and to start spinning fantasies about new ways to use it.

Designers at IDEO, which is based in Palo Alto, California, seem obsessed with learning about materials and products they have no immediate use for. At lunch one day, we watched two engineers take apart the napkin container to look at the springs inside. Another time, we brought a new digital camera to a



Brokers capture even more ideas from doing focused work on specific problems, especially when studying new industries or visiting new locations. More than 100 years ago, Thomas Edison's instructions about how to start a new project were as follows: "First, study the present construction. Second, ask for all past experiences...study and read everything you can on the subject." (For more on Edison and his successors, see the sidebar, "The Original Innovation Factory.") Invention factories like IDEO and Design Continuum in Boston do pretty much the same thing today when they're trying to come up with new designs. They collect related products and writings on those products, and—perhaps most important—they observe users.

When Design Continuum was hired to improve the tools and techniques used in knee surgery, its engineers went to a con-

vention for surgeons where they had the doctors re-create the surgical process in a way that allowed the engineers to watch and talk with the surgeons.

One of the engineers described the scene: "We wanted to observe the procedures, so we had a cadaver lab, which was actually in a swank hotel. One room was the lecture room and the other held 12 cadavers. They had the room chilled down to 50 degrees, with the cadavers in there and a guard 24 hours a day making sure nobody accidentally walked in. We just wanted to see how doctors used the tools, the little blocks and stuff they use for doing the procedures."

The result? Designers noticed that surgeons had developed elaborate habits to make up for what one engineer described as the "missing third arm." This inspired them to develop a new surgical tool that allowed doctors to hold, rotate, and operate on the kneecap.

When Design Continuum was asked to develop an innovative kitchen faucet for a client that had been producing faucets and related products for decades, it undertook a massive benchmarking exercise in order to learn not just about kitchen faucet valves but also about valves used in automobiles, medical products, and toys. The final design, drawing on

many of those ideas, was for a pullout faucet that housed an integrated filter and circuitry to track filter life. The faucet delighted the client, whose engineers had assumed, after many years in the business, that they knew everything

The history of technological innovation is full of examples of knowledge brokers bringing together ideas from disparate contexts.

there was to know about valves. As CEO Gian Zaccari put it, Design Continuum's strategy "frees you from the dogma of any one industry."

Brokers also scan for new ideas in more generalized ways, because such scanning may pay off on the next project or the one after that. Andersen Consulting's Center for Strategic Technology brings in executives from diverse industries to talk

about ideas for products. Joe Carter, head of the center, explains, "We invite people whose job it is to worry about the future of their companies." Engineers at Boeing's Operations Technology

Center keep ideas flowing by holding companywide technology forums. And members of HP's supply-chain consulting group participate in workshops like the Stanford Global Supply Chain Forum to learn about practices used in different industries and countries.

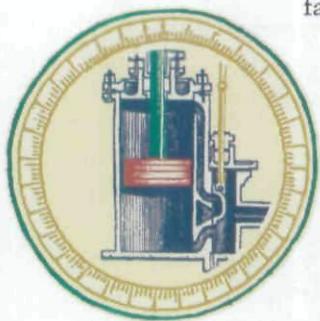
Brokers thus create massive collections of ideas; some will lead to innovations, some will not. The important thing is that they're there. Edison once said: "To invent, you need a good imagination and

a pile of junk."

Keeping Ideas Alive. This second step is crucial because ideas can't be used if they are forgotten. Cognitive psychologists have shown that the biggest hurdle to solving problems often isn't ignorance; it's that people can't put their fingers on the necessary information at the right time, even if they've already learned it. Organizational memories are even tougher to maintain. Companies lose what they learn when people leave. Geographic distance, political squabbles, internal competition, and bad incentive systems may hinder the spread of ideas.

The product design firms we studied are particularly good at keeping ideas alive, in part because much of each company's stockpile of ideas is embedded in objects that designers can look at, touch, and play with (it's easier to search through an actual junk pile than a virtual one). IDEO has made a science of accumulating junk. Many designers put plastic parts, toys, prototypes, drawings, and sketches on display in their offices. One engineer, Dennis Boyle, has an amazingly eclectic assortment of items that he constantly talks about and brings to brainstorming meetings to inspire new designs. A few years ago, it included 23 battery-powered toy cars and robots, 13 plastic hotel keys collected during trips, a flashlight that goes on when the handle is squeezed, an industrial pump, 11 prototypes of a portable computer, 14 prototypes of a computer docking station, six computers in various stages of disassembly, 15 binders from past projects, a pile of disk drives, a collection of toothpaste tubes, a toy football with wings, a pair of ski goggles he designed, a Frisbee that flies underwater, and dozens of other products and parts. He portrays this collection as "a congealed process – three-dimensional snapshots of the ideas from previous projects."

But there's more to the story. Six IDEO offices in scattered locations have cabinets known as Tech



*"To invent,
you need
a good
imagination
and a pile
of junk."*

Thomas Edison

Innovation Factory

The Original

Thomas Edison cultivated his image as inventor-hero and lone genius, but his greatest creation may have been the invention factory itself. His Menlo Park, New Jersey, laboratory—the world's first dedicated R&D facility—demonstrated that a stream of promising ideas could be generated if a company was organized in the right way. Rather than focusing on one invention, one field of expertise, or one market, Edison created a setting—and ways of thinking and working—that enabled his inventors to move easily in and out of separate pools of knowledge, to keep learning new ideas, and to use ideas in novel situations.

A hallmark of Edison's inventions was that they used old ideas, materials, or objects in new ways. The



phonograph blended elements from past work on telegraphs, telephones, and electric motors. And the lab's early work on telegraph cables later helped its engineers transform the telephone from a scratchy-sounding novelty into a commercial success. Edison built the laboratory for the "rapid and cheap development of an invention" and delivered on his promise of "a minor invention every ten days and a big thing every six months or so." In six years of operation, it generated more than 400 patents.

Modern invention factories are springing up everywhere today. Since its founding in 1978, IDEO has developed thousands of products—from the Palm V for 3Com to the Twist 'n Go cup for Pepsi—in more than 40 industries. IDEO's work with companies in dissimilar fields—such as medical instruments,

furniture, toys, and computers—gives the company a broad view of the latest technologies. Lessons from IDEO's diverse client base inspire many original designs. For example, a Chatty Cathy doll supplied the idea for a reliable, inexpensive motor used in a docking station for an Apple laptop computer.

Incubators for start-up firms are also invention factories—they just invent business models, not physical products. Bill Gross's Idealab! is the most renowned of these. His "Internet factory" in Pasadena, California, houses about 20 start-ups at any given time. The companies try to succeed on the Internet by entering diverse markets using a broad range of business models. Gross encourages "cross-pollination" among all the people in the building and is himself a skilled knowledge broker, spreading ideas from one group to another.

Boxes in which designers have placed a shared treasury of over 400 materials and products: tiny batteries, switches, glow-in-the-dark fabric, flexible circuit boards, electric motors, piezoelectric speakers and lights, holographic candy, single-piece hinges, a metal-plated walnut, a widget from the bottom of a Guinness can that's designed to produce a foamy head, commercial toothbrushes, plywood tubes, and flip-flops from Hawaii. It began as Boyle's collection of interesting ideas, but it became a status game as people at IDEO competed to contribute cool new stuff.

Just as Boyle's collection would be useless if he didn't constantly talk about the items and discuss how they might be used, the memories in the Tech Boxes would soon die if designers didn't constantly look at the stuff, play with it, and use it in their work. Each Tech Box is now maintained by a local curator and each piece is documented on IDEO's intranet. Designers can find out what each product or material is and who knows most about it inside and outside IDEO. Engineer Christine Kurjan, head curator of IDEO's

Tech Boxes, hosts a weekly conference call with the local curators in which they talk about new additions and the uses to which items are being put in new projects.

It's harder to keep ideas alive when they're not embedded in tangible objects. The people who designed knowledge management systems for Andersen Consulting and McKinsey originally thought reports, PowerPoint presentations, and lists of best practices would be sufficient. They supposed that consultants would be able to solve problems just by reading through databases. But consultants have found that those systems are most useful as annotated yellow pages, helping them find out whom to talk to about how the knowledge was really used and might be used again. Perceiving a need to link consultants together rather than refer them to stored information, McKinsey created its Rapid Response Team, which promises to link—within 24 hours—any consultant facing a problem to others who might have useful knowledge. The team accomplishes this feat largely by knowing who knows what at McKinsey.

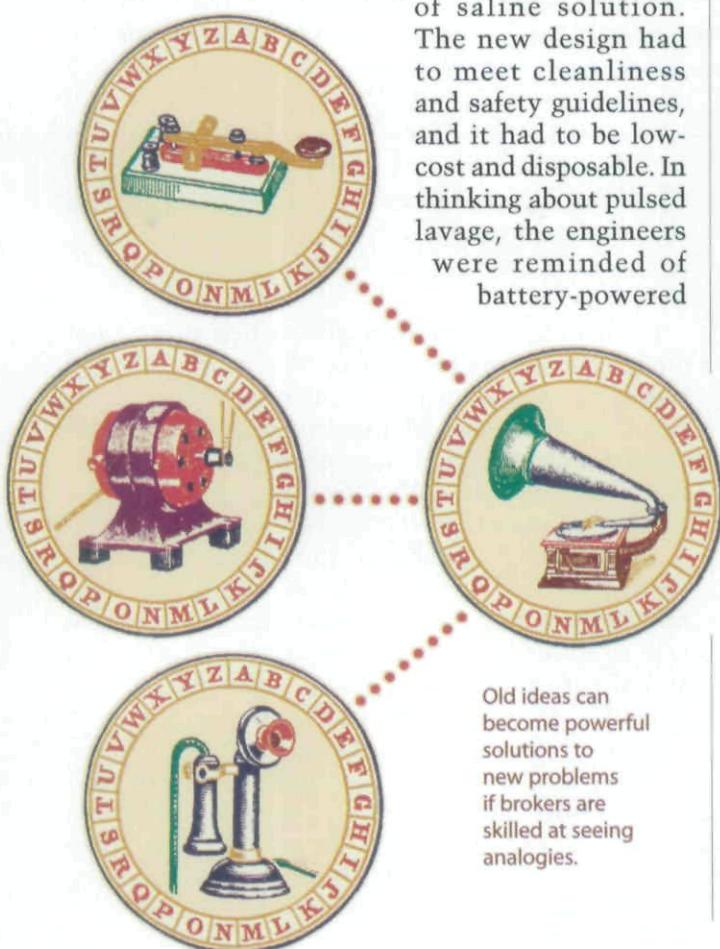


Spreading information about who knows what is a powerful way to keep ideas alive. Edison was renowned for his ability to remember how old ideas were used and by whom. The most respected people at IDEO are **part pack rat** (because they have great private collections of stuff), **part librarian** (because they know who knows what), and **part Good Samaritan** (because they go out of their way to share what they know and to help others).

Imagining New Uses for Old Ideas. The third step in the cycle occurs when people recognize new uses for the ideas they've captured and kept alive. Often those applications are blindingly simple. When Edison's inventors were developing the light bulb, the experimental bulbs kept falling out of their fixtures. One day, a technician wondered whether the threaded cap that could be screwed down so tightly on a kerosene bottle would hold light bulbs in their sockets. He tried it, it worked, and the design hasn't changed since. Old ideas can become powerful solutions to new problems if brokers are skilled at seeing such analogies.

Design Continuum engineers used analogical thinking to develop an innovative pulsed lavage, a medical product for cleaning wounds with a flow of saline solution.

The new design had to meet cleanliness and safety guidelines, and it had to be low-cost and disposable. In thinking about pulsed lavage, the engineers were reminded of battery-powered



squirt guns. Once they'd seen the similarities between an emergency-room tool and a child's toy—similarities that would not have occurred to most observers—the engineers could incorporate the squirt gun's inexpensive electric pump and battery into a successful design for a new medical product.

Design Continuum went through a similar process when Reebok hired the company to design a product to compete with Nike's Air technology. The people at Design Continuum asked themselves whether they could make a shoe that reduced injuries by providing more support and a better fit. The Reebok Pump with an inflatable insert was their answer. It drew on ideas from inflatable splints, medical IV bags, and tiny pumps and valves used in diagnostic equipment.

An effective broker develops creative answers to hard problems because people within the organization talk a lot about their work and about who might help them do it better. Companywide gatherings, formal brainstorming sessions, and informal hallway conversations are just some of the venues where people share their problems and solutions.

Many brokers also use a physical layout that enables (perhaps "forces" is a better word) such interaction. At the Menlo Park Laboratory in New Jersey, all of Edison's inventors worked in a single large room where, as one put it, "we were all interested in what we were doing and what the others were doing." Bill Gross put his Internet start-up factory Idealab! in a 50,000-square-foot, one-story building in Pasadena, California. It has few walls, so that everyone is forced to run into everyone else. His office is in the center, with concentric circles around it. The innermost desks are for start-ups in the earliest phases, when new ideas and support from others are most crucial. As businesses grow, they move farther from the center. If they reach a critical mass of around 70 employees, as eToys and CarsDirect.com have, they leave the incubator for their own buildings.

IDEO's studios are also laid out so that everyone sees and hears everyone else's design problems. We witnessed hundreds of unplanned interactions in which designers overheard nearby conversations, realized that they could help, and stopped whatever they were doing to make suggestions. One day we were sitting with engineers Larry Shubert and Roby Stancel, who were designing a device for an electric razor that would vacuum up cut hair. We were meeting at a table in front of Rickson Sun's workstation. He soon shut his sliding door to muffle the noise from our meeting, but he could still hear us. He emerged a few minutes later to say

he'd once worked on a similar design problem: a vacuum system for carrying away fumes from a hot scalpel that cauterized skin during surgery. Sun brought out samples of tubing that might be used in the new design and a report he had written about the kinds of plastic tubing available from vendors. The encounter shows how having the right attitude drives people to help each other solve problems. Shubert commented, "Once Rickson realized he could help us, he had to do it or he wouldn't be a good IDEO designer." (For more on attitudes—and people—see the sidebar "The Right People, the Right Attitudes.")

Putting Promising Concepts to the Test. A good idea for a new product or business practice isn't worth much by itself. It needs to be turned into something that can be tested and, if successful, integrated into the rest of what a company does, makes, or sells. Quickly turning an imaginative idea into a real service, product, process, or business model is the final step in the brokering cycle. By "real" we mean concrete enough to be tested; by "quickly" we mean early enough in the process that mistakes can be caught and improvements made. "The real measure of success," Edison said, "is the number of experiments that can be crowded into 24 hours."

Knowledge brokers are not the only businesses that use prototypes, experiments, simulations, models, and pilot programs to test and refine ideas. The difference is that collecting and generating ideas, and testing them quickly and well, are more than just some of the things brokers do: they are the main things brokers do.

Brokers must be good at testing ideas, at judging them on merit without letting politics or precedent get in the way. Brokers' attitude toward ideas is usually "Easy come, easy go." They treat ideas as inexpensive and easily replaceable playthings that they are supposed to enjoy, understand, push to the limit, break, and change in ways the ideas' inventors never imagined. If an idea seems to solve a current problem, they build on it. If an idea doesn't work out, they look for another. Brokers rarely keep trying to make something work in the face of evidence that it won't. They focus on finding the best ideas for solving problems, not on solutions they can claim glory for. We call it the nothing-is-invented-here attitude. It means they reach out—early and often—to anyone who might help them solve problems and test ideas. The more familiar not-invented-here syndrome—in which people, believing they know more than

others in their field, reject all new ideas that are "not invented here"—is viewed by brokers as inefficient, arrogant, and ultimately fatal to innovation.

Almost immediately after thinking of a promising concept, a development team at a place like IDEO or Design Continuum builds a prototype, shows it to

"The real measure of success is the number of experiments that can be crowded into 24 hours."

Thomas Edison

users, tests it, and improves it. The team then repeats the sequence over and over. Prototypes can be anything from crude gadgets to elaborate mock-ups. IDEO designers in the Boston office built a full-size foam model of an Amtrak train to test ideas about seating, layout, and signage. To make more refined prototypes, IDEO's machine shop uses computerized milling machines and other sophisticated tools. IDEO's machinists can take a rough sketch and quickly turn it into a working model.

Testing prototypes is a way of life at Idealab! as well. Idealab! companies often start as experiments that cost between \$10,000 and \$250,000. Often they are prototype Web sites, opened temporarily to find out how many people will visit and whether customers will buy the product or service offered. For example, Bill Gross had the idea of selling cars on-line—not just using the Internet to send customers to a dealer but selling cars directly, as Dell sells computers. Gross didn't spend a lot of time planning. Instead, he quickly assembled a group to try out the idea. Instead of creating a fancy Web site that could link dealers or handle a lot of traffic, the group built something simple that worked just well enough to test the idea. Gross hired a CEO for 90 days and told him his job was to sell one car. The plan was that if a customer ordered a car, Idealab! would buy the car from a dealer and resell it to the customer at about a \$5,000 loss. On the first day, the test site got 1,000 hits and sold four cars. The experiment led to the founding of CarsDirect.com.

Putting a concept to the test doesn't just help determine if it has commercial value. The process also teaches brokers lessons they might be able to use later, even when an idea is a complete flop. Brokers remember failures in part so that they can help the more focused businesses they serve avoid making the same mistakes.

At HP's supply-chain consulting group—known as SPaM, for Strategic Planning and Modeling—one engineer explained that she could be just as helpful to members of an HP division by telling them about what didn't work in other places—and



why—as she could by telling them what did. And Gross claims he learns at least as much from business ideas that don't fly as from concepts that do.

Brokers also benefit from failures because, in learning about why an idea failed, they get hints about problems the idea might solve someday. Edison's laboratory had a contract to design a new telegraph cable that would span the Atlantic Ocean. One approach the engineers tried was insulating the wires with a carbon putty. The cable worked on the lab bench but short-circuited in water. They eventually figured out that it failed because water pressure transformed the putty from an insulator into a conductor. But when they tried the carbon putty again a few years later in another application, the result was an inexpensive, effective, and reliable microphone that helped make the telephone commercially feasible.



Building Your Own Knowledge Broker

Most of the examples in this article are drawn from stand-alone innovation factories, but any company can use part or all of the knowledge-brokering system. Large companies in particular desperately need to move ideas from one place to another. The

larger a company gets, the harder it is for anyone to know what everyone is doing. The specialization and separation that help business units maintain focus also hamper communication. Internal competition magnifies the problem, because it encourages groups to hoard rather than share what they've learned. Knowledge brokers that build reputations as trusted third parties thrive in such places. They find new uses for what the company knows and help dispersed groups avoid reinventing the same wheels—and making the same mistakes—again and again.

Take Hewlett-Packard's SPaM group, formed about ten years ago to help optimize HP's often-convoluted supply chains. Partly because they were measured against one another, few divisions were eager to share information about successes or failures with any of the more than 150 other divisions. Enter SPaM, which was, in leader Corey Billington's words, politically neutral. SPaM used powerful modeling techniques to save its first clients millions of dollars. Each new project also taught SPaM what clients were doing right and wrong, so the group soon had more than modeling techniques to sell inside HP.

Or take the Optics Technology Center (OTC) at 3M, formed in the 1960s after 3M engineers devel-

The Right Attitudes

The Right People

Companies that specialize in innovation hire people with varied skills, interests, and backgrounds. The product design firm Design Continuum, for example, has plenty of engineers on staff, but it also has anthropologists and English majors—even a theater designer. And some of its engineers moonlight as sculptors, carpenters, or rock musicians. We once went to a brainstorming session at IDEO where an engineer who'd grown up on a farm sketched a miniature version of a harvesting combine as a novel haircutting device for a major national salon chain.

Sometimes it's not people's backgrounds as much as their passionate interests that make the difference. Engineer Dennis Boyle's lifelong fascination with toys has

helped him and others at IDEO design laptop computers for Apple, Dell, and NEC, handheld computers for Palm and Handspring, and hundreds of other products. "Toys have so many neat things to offer," Boyle says. "They're high volume, mass produced, often plastic, and very clever because they're so cheap. I especially love Japanese toys. We bring them out in brainstorming sessions and apply the ideas to computers or surgical skin staplers or whatever."

There's a lot of movement into and out of innovation factories. IDEO rehired several employees who, after working elsewhere, came back to apply knowledge they'd gained on the outside. When former IDEO engineer Walt Conti worked for filmmaker

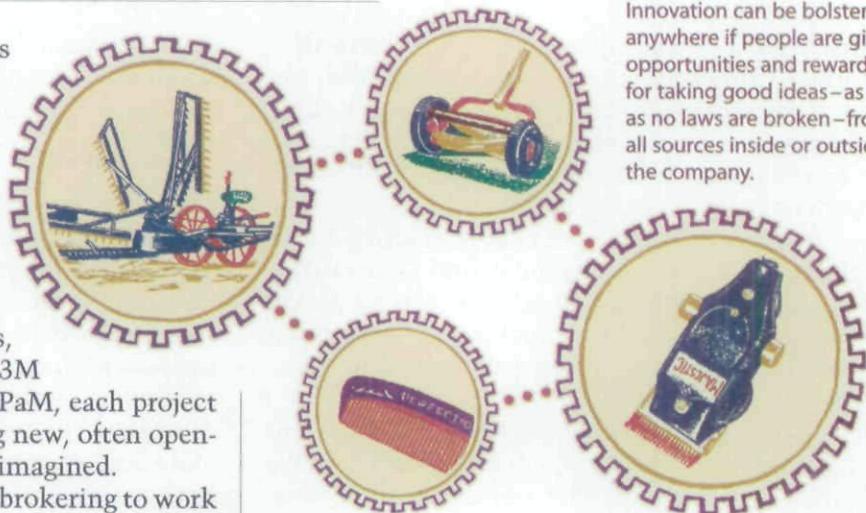
George Lucas at Industrial Light and Magic, he discovered that the movie industry wasn't using the sophisticated control systems and electromechanical technologies he had seen in high-technology firms. Conti returned and, under IDEO's aegis, founded a company called Edge Innovations that designs, builds, and operates realistic machines and creatures for films. Edge designed a life-size, 8,000-pound animatronic killer whale for the film *Free Willy* that audiences couldn't distinguish from Keiko, the real whale. (In fact, Keiko tried to mate with the mechanical killer whale.)

The best knowledge brokers are relentlessly curious. They're also fairly casual about where an idea comes from, as long as it works. Intense

oped a way to create tiny prisms on the surfaces of lenses for overhead projectors. Management believed the engineers were on to something bigger, so OTC was formed to discover ways to spread the technology, called microreplication, throughout 3M. It is now used in traffic lights, industrial grinders, mouse pads, and dozens of other 3M products. As was the case with SPaM, each project taught OTC engineers something new, often opening their eyes to uses they hadn't imagined.

Companies can put knowledge brokering to work in various ways. Some companies—especially large ones—will want to emulate HP and 3M by building full-fledged internal consulting groups dedicated to knowledge brokering. To get started, the companies should identify people who have important information that a substantial number of groups in the company don't have. Those people needn't be the world's biggest experts; they just have to be more knowledgeable than the groups they're going to help. (If they do their job well, they'll learn from each project, and before long they will be among the world's biggest experts.) Initially, the experts may

Innovation can be bolstered anywhere if people are given opportunities and rewards for taking good ideas—as long as no laws are broken—from all sources inside or outside the company.



need to make an effort to sell their ideas; 3M's OTC once built an entire pilot production line to show management that tape products with microreplication could be manufactured in adequate volumes using existing machines.

Other companies may not wish to develop full-scale, formal knowledge-brokering groups. As an alternative, a company can develop the habit of hiring people who have faced problems that are similar or analogous to problems the company faces. Hiring such people can be an efficient way to import fresh

curiosity and a willingness to beg and borrow prompt people to reach out, early and often, to anyone who might have useful ideas.

As their openness to others' ideas suggests, good brokers are not arrogant. But they hardly lack confidence. An internal consultant told us that she has realized she needs to "swagger" while selling ideas she has seen elsewhere in the company: "If you act like you don't believe in the ideas, why should anybody else believe they're any good?" This balance between willingness to listen and hubris is reflected in an informal test applied by James Robbins, who has helped launch at least ten incubators in areas including computer software, e-commerce, and the environment. Robbins uses an "ego

scale" as one way to screen staff for start-ups. On a scale of one to ten, he looks for people who are at about a seven or eight. Tens act as if they knew everything and had nothing to learn; threes and fours—however bright they are—lack the confidence to be successful entrepreneurs.

The characteristics we've described—curiosity, a habit of reaching out for ideas and help, and a mixture of confidence and humility—help create a highly collaborative culture within knowledge-brokering firms or groups. The companies use financial rewards to further support collaborative behaviors. People in Idealab! companies not only get equity in their own start-ups, they get equity in Idealab! itself to encourage them to help other companies in the

group. At IDEO, financial rewards are based in part on the reviews each person gets from colleagues.

Money is just part of the picture. The respect of peers is an important factor too. At several IDEO studios we visited, designers who focused on their own projects and didn't take time to help others were shunned and bad-mouthed. As one engineer told us, "At the first hint I don't know something, I ask, 'Does anyone know about this?' If you don't ask for help here, you're incompetent—you're useless to us." Conversely, designers who consistently contribute great ideas in brainstorming sessions not only gain respect from peers, they are invited to work on the most technically challenging and fun design projects.

solutions. For example, the tiny stents that Guidant Corporation developed to prop open obstructed heart vessels don't appear to have anything in common with the planes and missiles that defense contractors develop. Yet Ginger Graham, president of the Vascular Intervention Group, tells us that engineers hired from NASA, Hughes, Lockheed, Ford Aerospace, Raychem, and General Dynamics have bolstered Guidant's efforts to design stents and other medical products by bringing in materials and design solutions that are new to the industry.

For still other companies or divisions, occasionally renting an outside broker can make sense. We are wary of companies that outsource all innovation, because doing so undermines an organization's ability to learn or to evaluate new ideas on its own. But when a business needs ideas in an unfamiliar field and a broker knows the field well, renting the broker can be a wise move. As HP's Billington says, "If someone wants to streamline their supply

chain, they might learn great stuff from talking to the hundreds of people we have worked with inside and outside HP. But it is a lot faster and cheaper to work with us."

The most important lesson from all this is that business leaders must change how they think about innovation and must change how their company cultures reflect that thinking. Innovation can be bolstered anywhere if people are given opportunities and rewards for taking good ideas—as long as no laws are broken—from all sources inside or outside the company. The image of the lone genius inventing ideas from scratch is romantic and engaging, but it's a dangerous fiction. Innovation and creativity are far less mysterious than that image implies. They are a matter of taking developed ideas and applying them in new situations. If your company has the right connections and the right attitude, it works. □

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"Don't forget the safety features."

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