

Technology brokering and innovation: linking strategy, practice, and people

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The pursuit of innovation has traditionally meant placing a sizeable bet that research on the leading edge of science and technology would someday payoff in the marketplace. Best practice firms hire the most advanced scientists and engineers in the field, buffer them from the demands of the operating divisions, give them discretionary time and money to pursue their pet projects, push them to think out of the box, and then wait for the inventions to flow. Historically, the results are remarkably disappointing.

Is there a way to grow through innovation that avoids its traditional gambling nature?

I have spent the last ten years studying the innovation process in modern organizations and in their historic counterparts – from IDEO Product Development to Edison's Menlo Park Laboratory, from Henry Ford to Hewlett-Packard, from Bell Labs to 3M. The most successful firms in this study systematized their innovation process in ways that turn upside-down the traditional assumptions.

These firms pursue an innovation strategy termed "technology brokering". Rather than chasing wholly new ideas, these firms focus on recombining old ideas in new ways. Rather than insulating themselves from the existing work of the operating divisions, they drew extensively from the divisions. And rather than nurturing individual geniuses, they developed strong social networks both within and outside their groups. The results, counter-intuitively, have sparked many of the technological revolutions of the past century and, equally importantly, produced a steady stream of growth opportunities for existing businesses.

Technology brokering works because it aligns three interdependent factors: a firm's innovation strategy, its work practices, and its people:

1. At the strategic level, technology brokers span multiple, otherwise disconnected industries and markets and, by doing so, put themselves in position to be the first to see how existing technologies in one market could be used to create breakthrough innovations in another.
2. Rather than attempt to invent the future, the work practices are designed to discover, synthesize, and deliver new and valuable combinations made possible through access to different markets and technologies.
3. The roles, responsibilities, and reward structures equally support identifying new combinations of old ideas – by collectively pooling their knowledge and experience – rather than individually pursuing novel inventions or discoveries.

Pursuing technology brokering means taking the management of innovation seriously. Whatever the level in the organization – as a firm, as a division, or as a project team tasked with innovation – the technology brokering strategy depends for its success on the

alignment of all three factors. A strategic plan that bets the company's future on innovation will fail without the appropriate work practices and human resources. No amount of creativity off-sites or brainstorming meetings will make up for an incoherent innovation strategy or resistant culture. And creative, motivated people will rarely stay where strategies and work practices constrain them to business as usual. Before addressing the core components of a technology brokering strategy, however, it helps to focus on the output – on understanding what a breakthrough innovation is and why it works.

The role of recombination in breakthrough innovations

If you want to make a silk purse from a sow's ear, it's best to begin with silk sows (Norman Augustine, President of Martin Marietta).

Popular discussions of the innovation process often confuse the origins and impacts of a new technology. According to conventional wisdom, both the introduction of a breakthrough innovation and the revolutionary changes that follow require revolutionary origins. Closer studies of the technical details, however, suggest the opposite: that it is the recombinant (rather than inventive) nature of revolutionary innovations that contribute to their dramatic effects.

Henry Ford, for example, didn't invent mass production but rather combined elements of technologies that were already developed and in use, some for almost a century, in other industries. In armory production he found the technologies of interchangeable parts. In canneries, granaries, and breweries he found the technologies of continuous flow production. In the meatpacking plants of Chicago, the assembly line; and in the emerging electric industry, the electric motor. As Ford once testified:

I invented nothing new. I simply assembled into a car the discoveries of other men behind whom were centuries of work . . . Had I worked fifty or ten or even five years before, I would have failed. So it is with every new thing.

A similar example lies in Apple Computer's recent success with the iPod digital music player. In 2001, Apple recognized the implications of the nascent market for MP3 players as both a complement to their existing computer business (adding value to the computing platform) and as a potentially new market (selling new products to the larger PC community). But rather than develop the necessary knowledge and capabilities internally, they chose instead to pull together resources from across the organization and outside. Apple did the design of the case and interface. They partnered with one firm, PortalPlayer, to provide the design (and coordination) of the audio components and with another, Toshiba, to develop the small, high-capacity drives, and five other major component suppliers to piece together the iPod. In the end, Apple got to market within eight months of starting the project. Two years later, unit volumes of the new iPod now equal Apple's computer sales (in the last quarter, Apple shipped 876,000 Macintosh computers, up 14 percent from a year earlier, and 860,000 iPods, up 183 percent), and both executives and analysts agree that the iPod business is driving the growth of its computer sales.

Even for firms that compete at the border of advanced science, such as pharmaceuticals, some of the biggest breakthroughs have come from using old drugs in new ways – either by recognizing that the drug treats more than one disease or that a side effect of one treatment can be honed and marketed as a main effect somewhere else. Take Pfizer's Viagra, for example, which was originally developed for the treatment of angina. When Pfizer had to cancel the clinical trials because of health concerns, a number of patients did not return their

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samples. After exploring further, Pfizer scientists found another opportunity in one of the pill's side effects, enhanced male erections.

A strategy of technology brokering

To pursue a strategy of recombinant innovation, technology brokers must put themselves in position to be the first to see how existing technologies in one market could be used to create breakthrough innovations in another. To do so, these firms must span multiple, otherwise disconnected industries and markets.

Gaining access to otherwise disconnected markets can take several forms. IDEO Product Development, the largest and arguably most successful product design-consulting firm in the country, has developed over 3000 new products in over 40 different industries since it was founded in 1978. CEO David Kelley once said:

Working with companies in such dissimilar industries as medical instruments, furniture, toys, and computers has given us a broad view of the latest technologies available and has taught us how to do quality product development and how to do it quickly and efficiently.

For example, IDEO's inspiration for the slit valve for Specialized's bicycle water bottle derived from shampoo bottles and artificial human heart valves. And they first saw the reliable and inexpensive motor used in a docking station they designed for an Apple laptop computer in a "Chatty Cathy" doll. IDEO's consulting model enables them to move easily between otherwise disconnected markets.

For large multi-divisional organizations, on the other hand, a strategy of technology brokering means tapping the different markets – and the competencies they've acquired competing in those markets – but doing so across the boundaries of the different business units. CEO A.G. Lafley has encouraged Procter & Gamble to recognize how ideas already learned in one market context could be applied in another. Take its recently acquired Iams pet food brand; P&G's knowledge of human health needs and products enabled Iams R&D group to introduce new pet foods based on weight control, anti-oxidants, and tartar-fighting. And Mr. Clean AutoDry, a car-washing sprayer, represented a collaboration between P&G's home-care R&D and the Pur Water purification and Cascade teams (who know how to dry dishes without spotting).

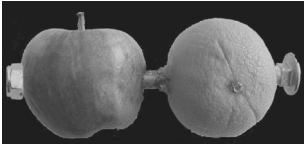
Work practices

A strategy of technology brokering – by spanning multiple markets – creates a diverse knowledge base in the organization. But that's no guarantee that the right people will be able to find the right knowledge at the right time to make the innovative connection. Nor, for that matter, will the right practices be effective without the diverse experiences that such a strategic position brings in. The work practices that support technology brokering are designed not to invent the future, but to discover, synthesize, and deliver new and valuable combinations of existing technologies.

Discovery

Discovery involves defining the project as a business venture (What are the existing technologies that might apply? What are the market and organizational needs this project can address?). And it involves understanding the resources of the entire value chain and how it can be tapped in new and effective ways. There are many work practices that can support discovery. For example, IBM has begun pulling R&D scientists out of their labs and

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putting them in the marketplace, where they can find valuable problems on their own. As one IBM scientist, raised in the R&D lab, said after visiting customers, “For me it was a real eye-opener, coming from the lifestyle of writing academic papers to learning about markets and what business is all about . . . It was like going to a foreign land – there were ‘Aha!’ moments in both directions” (incidentally, the same practice can be applied to executives). Developing skills in observation and empathy can bring startling discoveries to R&D managers who tend to focus solely on the technical issues surrounding a potential innovation.

Synthesis

Synthesis entails bringing together, exploring, and integrating the various needs and resources learned in the discovery activities (Where are the synergies? Where are the fatal flaws?) and building prototypes (Will it work? Will it make money? How will users understand it?) in order to uncover and evaluate potentially valuable combinations. Brainstorming meetings that bring together people from across the organization to work on a particular problem can be a powerful way to synthesize valuable combinations. IDEO’s brainstorming meetings have brought together people (and ideas) from medical products to agricultural equipment, from sporting goods to computers – and the solutions they generated covered the same range.

Another core practice involves building prototypes – of the technologies involved, of the finished look and feel, of the business and financial models. These prototypes play an equally strong role in identifying unexpected problems (discovery), and in communicating ideas to others in the organization (delivery), but their main effect is in making “real” the possible combinations being discussed. In one project for a major HMO, IDEO designers mocked up hospital waiting rooms to get a better feel for some of the more promising concepts. This learning-by-doing generates valuable knowledge much faster than abstract conversations about solution spaces and market demographics.

Delivery

The third set of work practices that supports technology brokering are those that deliver the innovative projects to others, outside the project team, who must carry it forward. These work practices have two main functions: to communicate the project to others, and to lay out the necessary next steps for everyone involved. These are the practices most often overlooked and underdeveloped. Expecting that good ideas will sell themselves, many R&D teams will devote their energies to making the “best” solution and then wonder why nobody adopted it. At one firm, the project team created a simple but moving “video” to communicate the market and emotional appeal behind their proposed product. In another firm, an R&D team had to build an entire enterprise and begin selling to customers before they could convince the brand managers that their project was viable.

People

In the framework of technology brokering, the role of the R&D team is no longer to advance the leading edge of science and technology but rather to connect what’s already there. The roles, responsibilities, and reward structures of the people engaged in the innovation process must also be focused on creating new combinations of old ideas – by collectively pooling their knowledge and experience rather than individually pursuing novel inventions or discoveries.

Roles and responsibilities

The roles and responsibilities of the R&D teams must include the discovery of existing needs and resources, their synthesis into potentially valuable combinations, and their delivery as viable new businesses. This requires close collaboration between R&D personnel and the business units and manufacturing operations that will ultimately take the projects and bring them to market. Such collaboration should be reflected in the roles linking the project team to

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others across the organization, and to the responsibilities that hold the team accountable for getting their projects adopted by the larger organization. In too many R&D organizations, scientists and engineers are not accountable for the percentage of corporate growth (in revenue or earnings) that result from their projects. So too, the business units should have a role – and a stake – in allocating investments across R&D projects and in exploiting the outcomes. The executive teams in both camps need to formalize these responsibilities.

Skills

When it comes to the skills needed to push for breakthrough innovations, success hinges on the ability of individuals and teams to learn from and empathize with users, to understand the strategic direction of the businesses, and to craft their work in ways that capture both the market and organizational needs. One of IDEO's core advantages is that their engineers and industrial designers, as skilled as they are in their own fields, are comfortable talking with users and with corporate executives. Their ability to move across these different worlds makes it easier for them to discern opportunities that others might not. People with these skills often show up on the organizational radar because they have demonstrated a track record of innovative thinking combined with execution. Ken Katuragi demonstrated he had such skills when he built Sony's video game business around the wildly successful PlayStation 2. In Sony's traditionally Japanese culture of hierarchical deference, he once publicly told hundreds of Sony executives that, “The old guys should step aside to make way for the young.” In a culture of conformists, he was a deviant advocating nothing short of revolution. And so Nobuyuki Idei, Sony's chairman, decided to do something equally untraditional. He gave Mr. Katuragi access to Sony executives and board meetings, and he named him to the committee charged with mapping Sony's future in the electronics business.

Rewards

It's one thing to establish strategies that move a firm between worlds, or that build new project teams that link disparate divisions. It's another for the individuals involved to not only commit, but also thrive in the new settings. Research indicates that people embrace technology brokering as a firm (or group, or project) strategy when the reward structure – their own path to success – also lies in brokering. Individuals' value in these organizations comes not from any fixed position or authority, but rather from their ability to see connections between their past experiences and the problems others are facing now.

Bring strategy, practice and people together

Companies that innovate routinely by creating new combinations of existing ideas – whether that's Edison or Henry Ford at the turn of the century or IDEO, Apple, and Procter & Gamble now – do so because they have aligned their innovation strategies with the appropriate work practices and the right people. Transforming traditional R&D organizations, to build the same competencies for continuous innovation, requires committing to a strategy of technology brokering, and to putting in place the complementary work practices and people that can execute such a strategy.