

# The (Ir)relevance of Technology: Creating a Culture of Opportunity by Design

by Anthony Pannozzo

*Exploring the intricacies of business, Anthony Pannozzo fails to find a direct correlation between market success and the investment in technological innovation. Instead, with a trio of case studies, he posits that the biggest contribution to the bottom line is a keen understanding of consumer opportunities coupled with the management of design and technology to innovatively fulfill those opportunities.*



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Technology drives innovation: yes or no? The answer would seem to be a resounding yes, but for those who truly want to understand innovation, it doesn't tell the whole story. As the "innovation economy" surges forward, businesses and investors are seeking growth and profit from the successful implementation of innovation initiatives. More often than not, the innovation they seek is really just another word for technology—in particular, the kind of technology that transforms the framework of an industry. Since the dawn of the Industrial Age, from Edison to Silicon Valley, innovation for many has become synonymous with cutting-edge technologies—and, hopefully, windfall profits.

But to focus exclusively on technology is not only to miss the point of its ultimate value proposition—bringing

meaningful improvement to our quality of life—but also to miss entirely the full extent of the profit potential that can only be uncovered by understanding innovation in the context of *opportunities*. Opportunity is the sole criterion that defines innovation.

At HLB, our mission is to help companies to grow organically through innovation. To achieve this, we help them understand that making opportunity a priority (and making this a core competency) is the fundamental cornerstone of all innovation initiatives. In this paper, I will illustrate this point of view as it relates to what I believe are the two major categories of innovation—technology and design. I will then show that innovations in technology are not the only way to transform the framework of an industry.

To illustrate my point, I am going to look at innovation from the perspective of the technology, medical device, and consumer manufacturing sectors of the economy—the traditional markets for industrial design services. In particular, I will take a look at innovation in product development and portfolio management, as opposed to innovations in business model, process, or experience. *Technology innovations* are products of the intersection of opportunity and science; *design innovations* are the products of the intersection of opportunity and technology (Figure 1). While the types of innovation are distinctly different, both share a critical common component—the opportunity cornerstone.

Design innovations service opportunities by using existing technologies or technology enablers. Technology innovations service opportunities by leveraging science to create new technologies. These new technologies are the breakthroughs that investors covet. They are products like Viagra, Ethernet, and the microprocessor. There are two very important points in viewing technology within this framework. First, since opportunities define innovation, focusing on them allows you to see the entire field, not just



Design Innovation Crossroad



Technology Innovation Crossroad

Figure

the part understood from a technology- or design-biased perspective. Second, from the moment a breakthrough technology hits the market, it begins its journey toward commoditization. Along that journey, the technology becomes part of what I call the magic technology toolbox—that is, a resource of enablers that can be drawn upon to help address the full opportunity landscape.

Technology innovations are what we once referred to as *inventions*. This type of innovation happens in the lab of a Fortune 500 R&D center, at a major university's research institute, or in the garage of a home at the end of a cul-de-sac. It is driven by the belief that there must be a better way: a better way to detect cancer, a better way to protect a passenger in a motor vehicle, a better way to make a phone call, a better way to listen to music. That better way is often an interpretation of a need, which is a key component of an opportunity.

The people behind these innovations are research scientists and engineers. They form hypotheses, experiment, and analyze the results. However, they hardly ever think of the ultimate end-user experience of the product beyond the notion that serves as their guiding star—the basic need they believe their technology can fulfill.

Companies have historically operated on the assumption that technology innovation drives their growth and profitability. This is what CEOs mean when they talk about innovation. They assume it is driven by technology as opposed to design. This is because they believe design innovation is the product of creativity, not science, and that only science can transform the framework of an industry.

This is simply not true, as I will illustrate. Design innovation can change (and has changed) the framework of an industry. But whether that innovation comes from the creation of a new technology or is the product of design thinking is irrelevant. Neither category has meaning unless an opportunity has been identified. By making opportunity identification the first step of the innovation process, companies can then guide their shift to solution mode in a meaningful way. This means they can free themselves to create and evaluate all means of

solutions. Opportunity-driven innovation prevents companies from focusing on one type of innovation at the expense of the other.

**The perils of technology-focused innovation**

The development of new technologies is very expensive. Funding basic and applied research does not guarantee success. In fact, what makes technology development even more daunting is that there is no strong correlation between spending and output. According to a 2005 Booz Allen Hamilton Global Innovation Study, "There is no discernible statistical relationship between R&D spending levels and nearly all measures of business success, including sales growth, gross profit, operating profit, enterprise profit, market capitalization, or total shareholder return."<sup>1</sup>

As if that is not enough, technology-driven innovation often fails because developers fail to understand the barriers of behavioral change. Technology's success rate improves when user behavior is only minimally affected. Improvements to microprocessors that lead to faster PCs succeed, for example, because users benefit without having to change the way they work. The same is true for LED taillights, which don't change the way we apply our brakes, or for technology innovations from pharmacology that add value to our lives without forcing changes in our behavior or lifestyle.

Technology failures abound. Most technologies die almost instantly, rarely making it to the public domain of cautionary tales. At HLB, we

believe the biggest reason technology innovations fail is that they simply do not understand the opportunity—or lack thereof—in the market. One of HLB's clients, I-Robot, introduced the Roomba Robotic Floor Vacuum in 2000 (Figure 2). It was not the first robotic floor vacuum on the market; several companies had produced robotic vacuums before the Roomba was introduced. But the Roomba succeeded where others failed because, despite being a "technology company," I-Robot understood that without the existence of a meaningful opportunity, there was no way it could provide value. The opportunity in the market was not for a robotic vacuum capable of replacing a vacuum; the opportunity was to create a robotic vacuum capable of *complementing* a vacuum. This enabled the Roomba to be priced nearly a thousand dollars below European competitors that attempted to replace the vacuum entirely. By understanding where the true opportunity was, I-Robot can today boast of selling more than 2 million robotic vacuums.

**Design innovations**

Design innovations, on the other hand, have rarely been identified as such. They have been called successful new products, but rarely has the term *innovation* been bestowed upon them. They are products like the Swiffer, the Walkman, and the minivan—products that didn't invent new technologies but used enabling technologies (from that magic technology toolbox) to meet unfulfilled opportunities in the market. What is remarkable about these examples is that despite not having created any new technology, they transformed the framework of their industries while simultaneously creating enormous value for P&G, Sony, and Chrysler, respectively. They created new categories and segments that in time attracted competitors and became targets for technology innovation.

To illustrate my point, I have selected three examples of design innovation that succeeded in changing the framework of an industry—that drove growth in both the top and bottom lines and did it all without inventing any new technology.



Figure 2.

1. Barry Jaruzelski, Kevin Dehoff, and Rakesh Bordia, "The Booz Allen Hamilton Global Innovation 1000: Money Isn't Everything" (<http://www.boozallen.com/media/ffle/151786.pdf>).

**Design innovation: Recorded music**

Thomas Edison invented the phonograph in 1877. His scientific understanding intersected with a simple need to produce a truly transformative technology innovation (Figure 3).

Interestingly, the need Edison sought to fulfill was not the need to record and play music; his motivation was instead his belief that people would welcome the opportunity to record their and others' "last words." Of course, many inventions find success fulfilling needs they weren't originally intended to address, and the phonograph is a fine example. As new technological innovations came into existence, the machine evolved along with them (Figure 4). Its core purpose became one of producing sound, and hence the improvement of sound quality became important, spurring further innovations in technology (better speakers, a variety of recording media). The basic need the device fulfills has not changed (nor have the behaviors of its users), but the device's ability to meet those needs has been improved by advances in technology.

Similarly, with the emergence of a potential new need—the need to enjoy music outside the environment in which the device resides—the miniaturization of technology allowed a solution to a *design* need. The state of the art of technology at this point allowed the consideration of new use models and the exploration of the potential of portability—in other words, the first Walkman (Figure 5).

The Walkman, however, is a design innovation. Where Edison's phonograph represented a transformative technology innovation, the Walkman introduced no new technology. The technology that enabled the Walkman was found quite readily in that magical technology toolbox. What Sony saw in 1979 was an opportunity defined by the convergence of societal trends (physical fitness and mobility) with the combined miniaturization and commoditization of enabling technologies. This intersection of opportunity with technology produced a design innovation that created an entire new segment of the recorded music device industry, changing its framework.

Although people changed their behaviors to adapt to the benefits the Walkman provided, this phenomenon should not be confused with the behavioral *barriers* so often presented when

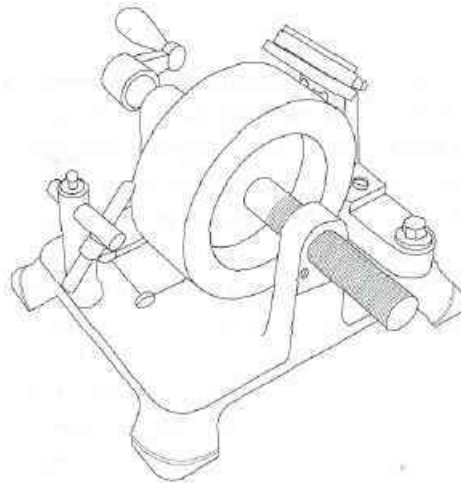


Figure 3.

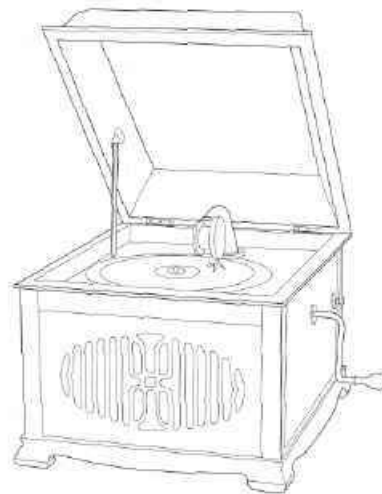


Figure 4.



Figure 5.



new technologies are introduced. What Sony identified were *emergent behaviors*—behaviors that actually pull the development of technology. This is very different from the behavioral change caused by the *pushing of technology* on consumers.

The Walkman 1.0 ultimately defined a broader opportunity that drove the technology innovations that evolved the state of the art. The result was the development of the Walkman 2.0 (otherwise known as the digital music player) and, most recently, the Walkman 3.0 (otherwise known as the iPod). The technology that supported this evolution sometimes hit the target

and sometimes missed (for instance, compact discs replaced cassette tapes, but were not supplanted by digital audio tape). What ultimately created the success of the Walkman 3.0 was the design (and business model) innovation represented by iTunes. Linking the use of the product with the marketplace for content, Apple was able to create a design innovation that leveraged *existing* software and operating

system technology to address the emergent behaviors of consumers exhibited by the explosive growth of music piracy.

***Design innovation: The automotive sector***

The automotive industry is one that has not only understood the difference between design and technology innovations but has also exploited them to great success. The very concept of the automobile (a self-operative vehicle) is a technology innovation. And from the first automobile, there have been thousands of advances in technology that have improved driving performance, fuel efficiency, comfort, and safety. But each advance in technology has come with a hefty price tag. R&D costs for technologies such as airbags, fuel injection, anti-lock

brakes, and hybrid engines are staggering. In fact, four of the top six R&D spenders globally are Ford, DaimlerChrysler, Toyota, and General Motors. In 2005, they spent a combined \$28 billion on R&D.<sup>2</sup>

Interestingly, it has been design innovation, not technology innovation that has defined some of the most remarkable success stories this industry has had over the past 25 years.

In 1982, Chrysler Corporation was on the verge of bankruptcy. Once known as technology innovators, it had become a struggling relic of Detroit's golden age. What saved the company (from an innovation perspective—not a government bailout perspective) was not the introduction of a new technology but the introduction of a new design innovation—the first minivan.

The minivan represented a new vehicle category, not a new technology. It recognized that baby boomers were having children. It recognized that boomers' lifestyles differed from those of their parents. They took their kids on long trips, on vacations, to soccer and hockey practice. They began fixing up their homes themselves and needed to haul equipment and raw materials. They had needs that station wagons—which were merely sedans with an extension over their trunks—did not fulfill.

The minivan was a classic design innovation. Everything, from the materials and processes used to the production method and the technologies involved, was off the shelf. It all came from that magical technology toolbox. Nothing needed to be invented to meet the needs that design aspired to serve.

In 1984, Ford was in a similar situation. Struggling to compete with the Japanese, Ford, like Chrysler before it, turned not to technology innovation but to design innovation. The first Taurus was a design tour de force. It leveraged the science of aerodynamics in its styling. It took the bland family sedan and made it cool. It met the emotional needs of suburban boomers, who worried their new minivans were eroding their youth and vitality.

The first Taurus, as well as the first minivan,

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was built with the same materials as every other car on the market. They used similar drive-train, transmission, and electronics technologies. They addressed opportunities in the market not through the costly development of new technology, but through the technologies that enabled those opportunities. And both brought segment leadership and new growth.

The record of technology innovation within the automotive industry has been more slow and steady. Where design innovations like the minivan and the Taurus had dramatic market impact, technology innovations like the airbag and anti-lock brakes have added to a continuum of functional improvements to existing needs. They are driven by these needs at a high level; yet they represent the advancement of the state of the art.

An example of a new product driven by a technology versus a design innovation was the introduction in Japan in 1997 of the Toyota Prius. This first generation of Toyota's hybrid technology was put into a compact package. Although criticized for not beginning in a more premium vehicle (where the margins and the expectations of technology are greater), it established Toyota as an innovator in hybrid technology. However, it took until the release of the second generation in 2004 for the vehicle to show a profit. Technology innovations don't always show immediate returns on investment.

Companies whose innovation strategies see technology innovation and design innovation as complementary, not conflicting, understand that what they have in common (the needs that define the core of business opportunities) is what is truly vital to their growth and profit potential. Once companies embrace the two-prong approach to innovation, they then need to see the implications and opportunities this has for their innovation pipelines. Managing a pipeline is like managing any investment portfolio. To best diversify, you need to understand the differences in cost and risk between design and technology innovations. This will allow you to make short- and medium-term gains in design innovation that can fund your riskier plays in technology.

### Recognizing design innovation

The good news is that design innovation isn't hard to adopt, especially when you understand that innovation is not a zero sum game. You can have design innovation without sacrificing technology innovation. It is also all around us. We just fail to give it its due.

Many people consider Apple to be a leader in technology innovation. I disagree. When I look at the success of Apple over the last decade, what I see is a company that is a leader in design innovation. I am not talking about industrial design and brand excellence when I say design innovation. I am talking about Apple's ability to use enabling technologies to create framework-changing and profitable innovations. Since the return of Steve Jobs, Apple has not invented anything new. From the first iMac in 1998 to the iPhone of 2007, Apple has merged opportunity with existing enabling technology to create value while spending less on R&D (5.9 percent versus 7.6 percent<sup>3</sup>) than the industry average.

Surprised? Consider the iMac's value proposition: a CRT screen with easy Internet connectivity that comes in your choice of six colors. A transformative new technology? Hardly. How about the iPod? A digital music player with a hard drive. Did Apple spend billions on R&D inventing the hard drive? No, they just ordered them from Toshiba. Disruptive technology? No. Framework-changing innovation? I'll let you answer that.

Looking back at the last 10 years, a clear pattern emerges. Apple, considered by many to be the most innovative company in the world, has not achieved this status through technology, but rather through design. The beauty of the Apple innovation strategy is how it uses the magic toolbox to leverage highly profitable, yet relatively inexpensive, design innovations. To put

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Apple's approach into perspective, consider the following. Remember the \$28 billion dollars the top four automakers invested in R&D in 2005? Apple spent \$489 million dollars. That's 1.8 percent of the car giants' total.<sup>11</sup>

#### Making Opportunity a Priority

Understanding how design and technology innovation can work for your business is important. However, the key mindset to embrace is that both design and technology innovations are driven by the same thing— identifying a meaningful opportunity in the marketplace.

Companies may consider themselves driven by technology, but only when they adopt a mindset of opportunity—and even create a culture of opportunity—will they see all their options for success, not just those presented by the continual improvement of technology.

4. Ibid, p. 9.

Seeing innovation in terms of opportunities, rather than solutions, will help demystify technology and limit its potential to eclipse lower-cost yet potentially higher-yielding solutions. No longer in the position of a hammer in search of a nail, companies can evolve from technology cultures to opportunity cultures.

Making opportunity a priority will give your organization the most vivid and complete view of your growth and profit potential. It will allow you to hone your strategy and best align it with your R&D and M&A activities. It will serve as a guiding principle that will prevent over-reliance on technology, leverage core competency, and give you the time to acquire new competencies to meet your objectives. But above all, recognize that not a single second of energy is worth spending on answering the question nobody asked. 1

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