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The Hybrid Trap: Why Most Efforts to Bridge Old and New Technology Miss the Mark

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Strategy, Innovation, New Product Development, Innovation Strategy, Technology Implementation

Mature companies often lack the vision and resolve to fully commit to new technologies — even when consumers are ready for them. This leads companies to develop watered-down products with limited capabilities and leaves them exposed to upstart competitors.

Technological transitions are challenging, particularly for companies in mature industries. Incumbents are frequently blindsided by new technologies, fully missing opportunities to enter emerging markets early. While some established companies do possess the awareness and dexterity to become early adopters of new technologies, they typically lack the vision and the commitment to become leaders. Too often, they cling to the familiar, developing hybrid products that combine elements of the old and the new. The trouble is, hybrid strategies put even the best incumbent companies in a weak position when the market finally embraces the new technology. We call this the “hybrid trap.”

The transition from internal combustion engines to electric vehicles (EVs) demonstrates the dangers of hesitating to embrace the new. Several internal combustion engine makers, such as General Motors Co., and Honda Motor Co. Ltd., entered the EV market early, but they backed away from these projects in favor of continued emphasis on established technology. Gradually, most of the automakers focused on hybrid cars that combined old and new technologies. This opened the door to new competitors that pursued solely the EV technology, most notably Tesla Inc. It wasn't until established players saw the market's interest in Tesla that they began to question their hybrid strategies and realized that electric cars had the potential for broad market appeal. By mid-2017, nearly every old-line engine producer was playing catchup on EV technology, working to release new electric models in the next two to five years.

Meanwhile, Tesla, having established a strong brand in EV, continues its move down market as a more direct threat to incumbent automakers.

Tesla's first mass-market car, the Model 3, was announced in March 2016, and by summer 2017, it had a waiting list of more than 455,000 units. Although it is too early to know if Tesla will be successful in the long run, its clear leadership in EVs has exposed a fundamental weakness in the approach incumbents commonly take when faced with industry transformations, with lessons that apply to other industries that face similar transitions.

Conviction vs. Opportunism

New markets are often enabled by technological change and exploited by minds that can envision futures that are far different from the status quo. More so, they are convinced that such a future *must* happen. Amazon.com Inc. founder Jeff Bezos didn't invest in Blue Origin LLC, the rocket company he founded for space transportation, based on short-term financial calculations or because he likes to invest in wild ideas. Bezos made the investment because

he truly believes mankind needs to conquer space to survive and prosper. Steve Jobs led Apple Computer Inc. to enter the computer industry in the 1980s and the mobile phone industry in the 2000s with the belief that computers and phones needed to be not only fast and precise, but also easy to use and aesthetically pleasing. Like other innovators who have changed their companies and industries over the years, Bezos and Jobs had clear visions that they believed in and thought would one day become reality. Their convictions drove them to attempt what many would have considered wild or even insane.

It's interesting to contrast the bold visions of Bezos and Jobs with the hesitant approaches taken by GM, Ford, Toyota, Nissan, BMW, Daimler-Benz, and other established automakers in the emerging EV market in the 1990s. Although some of these companies had done exploratory EV research for some time and even entered the market early, none of them had the vision and conviction to push forward as leaders in the emerging market. Rather, they all settled back on a hybrid product strategy. (See "About the Research.")

About the Research

This article is part of our ongoing research project about incumbents' and new entrants' strategies during periods of technological transitions. We place particular emphasis on the role that hybrid products (products that mix elements of the old and new technologies) play during those transitions. While we have collected anecdotal evidence of technological transitions and respective hybrid products in many industries, our study is based on a large-scale longitudinal data collection in the U.S. automotive industry. Our data covers the entire period of technological transition from the mid-1990s, when the first electric vehicles and the first hybrid cars emerged, to 2015, when the industry began decisively moving toward electric vehicles. We collected detailed technical and market data on every model introduced by each of the companies competing in the U.S. market and conducted semistructured interviews with leading industry participants and industry experts. We have produced detailed histories and case analyses of the strategies followed by major auto manufacturers and traced how their strategies have fared in the market.

The Market Creators

In the eyes of many people, the credit for the emergence of electric cars is closely associated with Tesla and Elon Musk. However, there were other visionaries who also tried to open up the market, including Shai Agassi, who developed plans for Better Place around the same time Musk was planning Tesla's first car. Agassi's venture proposed a battery-swap technology that would be licensed to existing automakers. Despite raising more than \$1 billion, ultimately, he could not get enough traction in the industry, and the venture failed.¹

Musk chose a different route: Tesla would make its own cars, without having to depend on legacy players. The Tesla Roadster, announced in 2006 and released in 2008, was the first EV to use lithium-ion battery cells and have a 200-plus-mile range. In addition to being stylish (it was built on a Lotus chassis), it was fun to drive; it could reach 60 miles per hour in less than four seconds. The hype around being an environmentally friendly, premium sports car was immense, attracting celebrity buyers such as George Clooney, Steven Spielberg, Demi Moore, and David Letterman, who added to the brand's sex appeal. In 2012, Tesla released a luxury sedan, the Model S, with a 300-mile range. In 2015, the company started selling its crossover luxury SUV, the Model X.

The fanfare around Tesla's products triggered reactions from existing automakers. Nissan, for example, launched an all-electric car, the Leaf, in 2010, aimed at the mass market. In 2007, BMW unveiled a new strategy labeled Project I, centered on alternative mobility concepts and new materials. Its first product was the experimental Mini E, an electric version of the popular Mini Cooper that was first made available to 500 U.S. customers in 2009. For its part, Daimler-Benz produced test quantities of its Smart car, the Smart ED, in 2011, using Tesla technology. However, with the exception of Nissan's Leaf, production volumes of EVs were low. The mainstream was still hedging.

Indeed, most of the industry pursued a path typified by GM. Seeing the Tesla Roadster at the Detroit Auto Show in 2006, then GM vice chairman Robert Lutz reportedly challenged his company to produce an all-electric vehicle.^{2,3} "All the geniuses here at General Motors kept saying lithium-ion technology is 10 years away, and Toyota agrees with us — and, boom, along comes Tesla. So, I said, 'How come some teeny little California startup run by guys who know nothing about the car business can do this and we can't?'"⁴ But Lutz was in the minority; other GM executives argued that the technology was not there yet for an affordable electric car. They suggested that GM move forward on a "transitional car," a hybrid vehicle that had a small battery pack with an all-electric range of 38 miles and a small gasoline-powered engine acting as a generator to extend the range. GM's transitional car, the Chevrolet Volt, was introduced in December 2010. Its battery-engine configuration was designed to overcome the limitations of prior EVs. GM's obsession with the past kept it from seeing the future — even with Tesla directly in its line of sight.

Wasting Precious Time

GM's Volt is a good example of what incumbents in many industries do during times of technological transition: design and produce products that bring the old and new technologies together in a single product. Companies may tell themselves that this is the approach their customers will be most comfortable with, but more often, it is simply the only strategy the company itself has the collective nerve to execute.

It is a repeating pattern. In the 1960s, U.S. electronics companies responded to the introduction of Japanese transistor radios by developing products that blended transistor technology with traditional vacuum tubes.⁵ In the early 1990s, Kodak tried to sell a "film-based digital imaging" product, which merged film photography and digital technology.⁶ And a decade ago, BlackBerry tried to respond to the challenge of the iPhone by releasing a phone that had both a touchscreen display (like the iPhone) and a traditional keyboard (like earlier BlackBerry phones). At Verizon's insistence, BlackBerry later came out with the Storm, which featured a specially designed touchscreen that still maintained the sounds and sensation of pushing buttons that BlackBerry users were accustomed to.⁷

These hybrid efforts, however common, have ultimately underperformed in the market. Why? For one thing, our research found, they give established companies a false sense of safety. In addition, they typically deliver suboptimal performance.

False Sense of Safety

Hybrids allow incumbents to claim they are investing in the new technology when, in reality, this is only partly true. By definition, hybrids require companies to acquire some knowledge about the new technology. However, companies approach the new technology from the perspective of the old one. Also, in the face of uncertainty, established organizations fall back on learned patterns, further slowing the development of the new technology. This is why most hybrid products developed by incumbents, particularly the earliest ones, are weighted toward the old technology. Toyota's first Prius, for example, was primarily an internal combustion vehicle; it only used battery power at low speeds and recharged through the traditional engine, with no plug-in capability. Until the mid-2010s, most other hybrid autos operated in this manner. Indeed, although a hybrid strategy might seem to be a reasonable “bridge” strategy when the technological transitions take a long time to unfold, the reality is that hybrids never capture a significant portion of the market. (Hybrid cars represent only about 2% of total U.S. auto sales today.⁸) More important, they end up exposing incumbents to inroads from other actors who are fully committed to the new technology.

Suboptimal Performance

The second problem with hybrids is that they typically don't optimize or excel in either the old technology or the new one. What's more, they cost more and tend to be larger and clunkier, since they have to be designed to host subsystems and components for both technologies. When Japanese companies began selling portable transistor radios in the 1960s, U.S. manufacturers produced hybrid radios that used both transistors and older vacuum-tube technology, making them twice as heavy as the Japanese portable transistor radios.⁹ Starting from scratch on product design, the Japanese companies produced radios that were smaller and lighter than the U.S. hybrids. Since transistors required less power than vacuum tubes, they were able to reduce the dimensions of tuning capacitors, speakers, battery supplies, and other elements.¹⁰ Another example is Kodak's Photo CD, which was bulky, expensive, and difficult to use, and soon superseded by advances in digital photography. Early versions of the Chevy Volt suffered from similar limitations — it was relatively heavy and had a small battery.

While hybrids might succeed in attracting customers and providing a reasonable value proposition for a period of time, they distract incumbents from developing the new technology. Incumbents that focus on hybrids waste precious time they could use to develop a real competitive advantage based on the new technology. It is no coincidence that the most successful companies producing and selling hybrid products tend to be the slowest ones to move to the new technology. As late as 2017, Toyota didn't offer an EV, and it does not plan to begin mass producing EVs until 2019.¹¹ Moreover, by focusing on hybrids, incumbents hand the new entrants a valuable advantage: sufficient time to not only gain technological leadership and market visibility, but also to build or acquire the assets they require to be successful in the long run.

The Role of Complementary Assets

According to a classical framework in innovation management, innovators often don't profit from being early in complex markets because they lack the “complementary assets” needed to scale the innovation into a sustainable business.¹² The experience of EMI Group, the British company that invented the CAT scanner and was the first entrant in the emergent market for CAT scanning machines in 1973, offers a good example. After introducing its

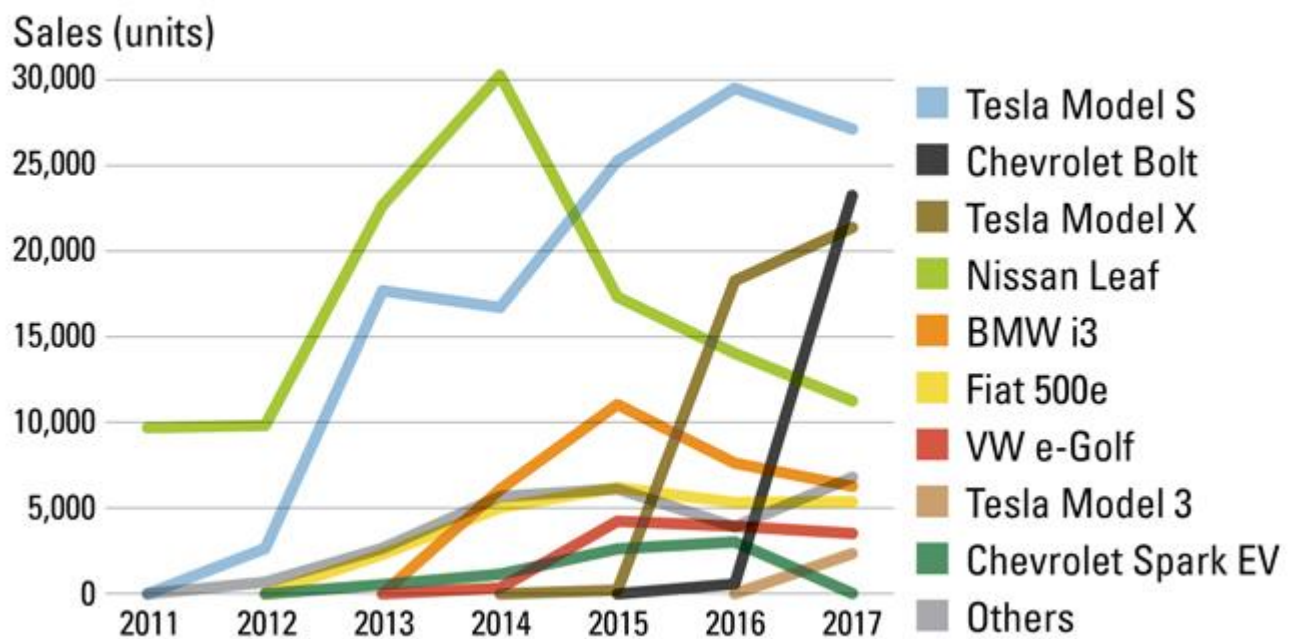
early products, EMI wasn't able to fend off the fast moves of competitors in the medical equipment business, such as General Electric Co. and Technicare, which within two to three years had competing products in the market.¹³ The established companies already had large, strong manufacturing capabilities, international distribution, recognized brands, equipment support, and training and service capabilities. Within a few years, GE and other companies developed CAT scanners that were more advanced than EMI's, and they used their resources and complementary assets to take control of the market.

It's interesting to compare what happened with EMI in the early years to Tesla's experience. In many respects, Tesla and EMI were in similar positions. Tesla was new to the auto industry, and it had no dealership network, no manufacturing capabilities, and no brand name. It was totally lacking the complementary assets presumably required to compete. However, in contrast to the medical equipment incumbents that reacted quickly to EMI's product, the auto industry incumbents didn't treat Tesla as a serious threat. Why? Perhaps because the auto industry incumbents did not immediately see a big performance improvement with the EV. Electric vehicles still transported people from point A to point B, looked very similar to the existing cars, and were used in a similar fashion (wheel, accelerator, brake, etc.). Because the benefits of the new technology were not obvious (convenience of charging at home, in the office, or in the parking garage; zero noise and no pollution; software-driven interface, etc.), incumbents may have miscalculated its importance and, thus, missed the opportunity first to lead and then to react in a timely manner to Tesla. In contrast, from the start, CAT scanners were visibly superior to existing X-ray technology — they provided much richer, highly valuable information to doctors and patients. Incumbents in the medical device industry saw the writing on the wall: They had to either embrace the new technology or be left behind quickly.

In the case of Tesla, slow incumbent reaction gave Tesla time to build its production capacity, brand reputation, and distribution capabilities. It also gave Tesla time to create other complementary assets that were specific to the new technology, which helped the company fend off the late-entering competition. (See “Tesla's Growth in the U.S. Electric Vehicle Market.”)

Tesla's Growth in the U.S. Electric Vehicle Market

Since introducing its first electric vehicle in the United States in 2008, Tesla has become the EV industry leader. Although it is too early to know if Tesla will be successful in the long run, it exposed a fundamental weakness in the way incumbents approach changing technology. *Editor's note: This exhibit has been updated to include products that were inadvertently excluded from the original version.*



Source: *Inside EVs, WardsAuto*

Chief among these assets is a network of fast and dependable electric charging stations. As of July 2017, Tesla had more fast-charging outlets in the United States than other providers.¹⁴ In recognition of the fact that one of the major obstacles for EV adoption would be “range anxiety” — that is, fear of running out of battery power — Tesla’s cars are designed to go farther than any of its competitors (approximately 300 miles between charges). And the way the company planned its network of charging stations was intended to minimize range anxiety: While competing EV charging networks are primarily concentrated in cities or narrow corridors within the United States, Tesla focused on offering intercity charging capacity so that a Tesla owner could drive throughout the country and always find a supercharger within range.

What’s more, Tesla made an important strategic decision with regard to its charging technology. Tesla supercharging stations, which charge significantly faster than other EV chargers, are based on a closed technology that can be used only on Tesla cars. Tesla owners therefore have the best of both worlds: In addition to having access to Tesla’s proprietary charging network, they can charge their cars on the other available charging networks using an adapter that comes with every Tesla vehicle.¹⁵

Avoiding the Trap

The stark message from our analysis is that hybrid product strategies are usually a lure toward failure. In the midst of threat and uncertainty created by an emerging technology, new and old competitors stake out positions in the new. However, as we have noted, only incumbent companies introduce products that combine elements of both new and old systems. The idea seems to be that the hybrids give them a beachhead in the new technology while enabling them to take advantage of their experience in the old technology. Hybrids, the

thinking goes, help incumbents learn about the new technology while it is still developing, thereby assisting them in making a smooth transition.¹⁶

The problem with this argument is that the clock often moves too quickly for hybrid-focused incumbents. During most technological transitions, the pace of the transition is dictated by new entrants, who commit all of their resources and efforts to the emerging alternative. New market entrants rethink and redesign their products to take full advantage of the possibilities of the new technology. That is what Japanese radio makers did with the transistor, and it is what Tesla has been doing with the EV: exploit new technological knowledge, develop new complementary assets, establish strong market leadership, and both create and satisfy an appetite on the part of investors and customers for products that perform well in terms of range, responsiveness, and user interface.

Tesla's hybrid-free vision does not stop with EVs. It has envisioned the electric vehicle as being part of a much larger system, one that includes batteries and home charging and backup systems, and even extending to roofing materials embedded with photovoltaic technology. If the company's expansive vision pans out (though it is still far too early to tell), incumbent auto companies and others may come to see the hybrid trap as bigger and deeper than they could have imagined.

So, is the answer for incumbents simply to walk away from products based on the old technology and jump headlong into the new? No, it can't be. Products based on old technologies may yield profitable results for years. But it is essential that a company's legacy operations don't hamper its ability to pursue new technology. Based on our research, this is the single biggest risk of hybrids. Not only do hybrid product strategies lead to products that underperform from the perspective of both the old and new technologies, but they also limit a company's imagination and creativity. New technologies can open opportunities that extend well beyond the scope of legacy products, within both current markets and new ones. But such opportunities can be seen only by companies that are willing to view the world through the lens of the new technology.

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