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Disruption in Detroit: Ford, Silicon Valley, and Beyond (A)

*If I had asked people what they wanted,
they would have said faster horses.*

—HENRY FORD

As the early morning sunlight beamed upon the World Headquarters building of the Ford Motor Company in Dearborn, Michigan, on a warm spring day in May 2016, CEO Mark Fields was already in his 12th floor office thinking about new challenges the 113-year old automaker was facing. Since starting his automotive career within the marketing, sales and service organization at Ford in 1989, the energetic 55-year old Fields had steadily worked his way up through the company's executive ranks, previously serving as the automaker's COO between 2012 and 2014. When he became Ford's CEO in July of 2014, Fields stepped into the enviable role of running this iconic company, which had seen a dramatic turnaround under his predecessor, Alan Mulally. Just prior to the 2008-09 economic downturn, during which Ford's worldwide vehicle sales hit their lowest total in decades, Mulally and his CFO, Don Leclair, had presciently raised almost \$24 billion in cash—avoiding the need for a government bailout—by mortgaging nearly all of Ford's key assets, including its blue oval trademark.¹ Under Mulally's leadership since the recession, Ford's sales recovered and the company returned to growth through the production of attractive vehicle models such as the Ford Fusion and Ford's refurbished F-150 truck line.

With the automaker now leaner but profitable again, Fields' vision for the future direction of the automobile industry highlighted what he called “disruptive innovation.” The challenges that Ford overcame under Mulally during the steep automotive industry recession were clear and

¹ Dorin Levin, “Ford's Forgotten Man,” *Fortune*, May 25, 2011.

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compelling: declining sales, multi-billion dollar losses, ailing suppliers, and the need to cut manufacturing and employee headcount while still investing to build new cars. Fields, however, now believed that there was a fresh set of challenges that are more difficult to quantify and yet could pose an even greater existential threat to Ford's business model than the prior recession. These threats include a host of new competitors and technologies. Several of Silicon Valley's largest companies—Google, Apple, Tesla—as well as other well-financed newcomers such as China's BYD and LeEco have plunged into the automotive industry. These competitors brought with them sophisticated capabilities in areas such as autonomous driving, electric batteries, and entertainment that are becoming increasingly relevant to changing market demands.

As Fields rose from his desk and looked out of his corner office window toward the morning rush hour traffic on the Southfield Freeway below, he knew that both he and his executive team faced a number of questions and that their decisions would shape the future of one of the world's best-known brands. These questions centered on the shifting consumer preferences in Ford's different market segments and geographies; the significance of new industry entrants and technologies; and how much the automaker should bet on these new technologies.

With Fields already running a very large and complex business, these decisions made the task of reinventing Ford even more daunting. How could Ford's executive team continue to run its current automotive business effectively while also positioning itself for the future?

Ford Motor Company

*Be ready to revise any system, scrap any method,
abandon any theory, if the success of the job requires it.*

—HENRY FORD²

Ford had a long and storied history of innovation (**Exhibit 1**). Detroit in the early 1900s, where the enterprise made its start, was a hotbed of new automotive technology and entrepreneurship in the process of displacing horse-drawn carriages, the previously dominant mode of transportation. More than eighty different automakers, many headquartered in Detroit, were learning quickly from each other and vying for supremacy, experimenting with new kinds of engines and creating the first trucks, snowmobiles, and motorized postal vans. Henry Ford, the company's primary founder, implemented an assembly line process for building vehicles, reportedly inspired by his observation of a Chicago meat-packing plant. Mass production on an assembly line provided efficiencies and economies of scale superior to other firms, enabling him to offer a "good enough" Model T vehicle at a radically lower price point, and to gradually win out in his struggle with a swarm of hard-working competitors. Henry Ford was a polymath who befriended Thomas Edison and had other interests in power plants and airplanes as well as controversial political views, but his most durable vision was to create transportation for the masses. He accomplished this by furnishing consumers with a reasonably priced, durable vehicle while also raising wages for his own workers to make the car affordable to them. Henry Ford's vision resonated with the expansive spirit of his era and was enthusiastically embraced by consumers. Ford declared in 1913:

I will build a motor car for the great multitude...constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise...so low in price that no man making a

² *Ford News*, Page 2, January 15, 1923.

good salary will be unable to own one—and enjoy with his family the blessing of hours of pleasure in God's great open spaces³.

From the Model T to Rosie the Riveter. Since Ford's founding in 1903, the company has been through many stages. Its initial nationwide success with the Model T made Henry Ford one of the richest people in the United States and led to international fame and business expansion. The Model T era was followed by a period of changing tastes in the 1920s, during which the market fragmented and consumers began to favor vehicles with other types of styling and function such as General Motors's new Chevrolet. Ford and his namesake company were initially slow to follow these trends ("Any customer can have a car painted any color...so long as it is black"), but eventually broadened their product line, survived the depression, and became part of President Franklin D. Roosevelt's "arsenal of democracy" during World War II, mass-producing jeeps and planes for the military. Ford's Willow Run aircraft plant in Michigan was the workplace of the original "Rosie the Riveter," a representative of the many thousands of women who labored in factories during the war; this plant was justifiably famous for turning out one bomber each hour with its assembly line prowess.

Post World War II. In the prosperous era that followed the war during the mid 20th century, Ford served a public hungry for consumer goods and a return to civilian jobs and families. It expanded with brands such as Thunderbird and the fabled Mustang, which was first introduced in 1964, revitalizing the company's iconic status in American folklore. During this post-war period Ford also broadened its reach in Europe and other regions. Most of all, however, it was known for its tough, workhorse trucks, which became a familiar part of the rural American landscape as well as urban factory and construction sites.

1970s and 1980s. The last decades of the 20th century brought unprecedented challenges and corporate restructurings throughout the U.S. automotive industry. The era when fuel mileage was not important to consumers was punctured by oil crises in 1973 and then again in 1979. Although Japanese carmakers were at first scoffed at by Detroit's "Big Three"—General Motors, Ford, and Chrysler—they gradually earned increasing market share with their low-cost, fuel-efficient, high-quality vehicles. Ford had long prided itself on being a leader in introducing features such as safety glass, five mph bumpers, stronger body structure, collapsible steering columns, and side beams. However, during this era its reputation with consumers suffered from quality and safety issues such as the large-scale recall in 1978 of its Pinto model, which had been designed to combat imports, and opposition to proposed new airbag regulations. Over time, Ford absorbed useful quality lessons from Japanese manufacturing practices, benefiting from its alliance with Mazda while also rescuing this smaller Japanese automaker from bankruptcy.

Late 20th Century. Good times returned to Ford when Sports Utility Vehicles, an offshoot of its truck platforms, became a highly profitable line of business in the 1990s and early 2000s. These vehicles provided profit margins of well over \$5,000 per sale at a point when the company was losing money on each small and compact car it sold. Many customers liked the roominess and the sense of security they felt riding in a larger vehicle, and were willing to accept lower mileage in exchange for these features. SUV sales mesmerized Ford executives and continued to absorb much of their attention for over a decade, in spite of their obvious disadvantages in terms of fuel economy. This focus allowed the overall erosion of Ford's market share to continue as Japanese makers such as Toyota, Honda, and Nissan came to not only dominate the lower end of the U.S.

³ Ibid.

³ Robert Sherefkin, "Lee Iacocca's Pinto: A fiery failure," June 16, 2003, <http://www.autonews.com/article/20030616/SUB/306160770/lee-iacoccas-pinto:-a-fiery-failure>

market, but also to move upscale into higher-end models, meanwhile expanding their own presence in Europe and in other parts of Asia.

Turnaround. Since the turn of the century, Ford has gone on the wildest roller coaster ride in its post-war history. Former CEO Jacques Nasser directed an ill-fated diversification and acquisition phase; a bitter public controversy over Firestone Tire explosions on Ford's Explorer model ended his tenure. Alan Mulally, recruited away from Boeing, led the company's admirable recovery from near-bankruptcy during the recession by refocusing the efforts of employees on its core automotive business and setting the tone for a more collaborative organizational culture. Mulally steered Ford's recovery with his "One Ford" mantra: he divested stakes the company had acquired in other nameplates—Volvo, Land Rover, Aston Martin, and Jaguar—while reviving the Ford brand and building greater alignment and efficiency across all of Ford's global regions.

Present. Mark Fields, Ford's current CEO, has been groomed for his role for decades. He held prior leadership roles in Argentina, Japan, and Europe as well as running the company's core Americas operation. He is very conscious of Ford's long and storied history, including the highly effective operating processes Mulally put into place—he came to know these well by serving as a key member of the leadership team and its business planning process throughout the former CEO's tenure. Fields inherited a healthy balance sheet, and he has benefited from major investments the company has made in global manufacturing capacity and Research & Development. In 2015, the first full year of Fields' tenure, Ford had total annual revenues of about \$150 billion, a net income of \$7 billion (**Exhibit 2**), and \$24 billion of cash on hand, with 67 manufacturing plants around the world. Although these numbers are impressive, Ford was still a much different enterprise than during the company's heyday in the 1960s. At that time it was the world's second largest automaker in terms of vehicle sales; now it ranks sixth in the world in the number of vehicle sales sold, with 200,000 employees. Ford's global market share is currently about seven percent, with 15 percent in its U.S. home market.⁴

Disruptive Influences

*The remains of the old must be decently laid
away; the path of the new prepared.*

—HENRY FORD

The term "disruption" has become a popular way of referring to the influence of new technologies and business models in unseating established players. Harvard Business School Professor Clayton Christensen, who was instrumental in bringing this terminology into contemporary awareness with his writings such as *The Innovator's Dilemma*, defines disruptive technologies as those products that "bring to market a very different value proposition than had been available previously. Generally, disruptive technologies underperform established products in mainstream markets. But they have other features that a few fringe (and generally new) customers value. Products based on disruptive technologies are typically cheaper, simpler, smaller, and, frequently, more convenient to use."⁵ These products have "good enough" quality, may attract an unfamiliar set of customers, and often require different kinds of organizational processes and systems to support them.

⁴ Ford Motor Company 2015 Annual Report; <http://corporate.ford.com/content/dam/corporate/en/investors/reports-and-filings/Annual%20Reports/2015-Annual-Report.pdf>

⁵ Clayton Christensen, *The Innovator's Dilemma* (Harvard Business School Press, 1997), p. xix.

The automotive industry now faces a long list of forces driving change, some of which appear to fit the classic definition of disruption and others which do not. These are being wielded in part by a new set of industry players that is strikingly different from the huge enterprises that have long dominated the list of the world's top twenty automakers. Sources of automotive industry disruption include:

1. *Powertrain.* Electric vehicles use a different powertrain (the mechanism that drives a car by transmitting power from the engine to the axle) than internal combustion engines. Tesla has achieved remarkable success with its all-electric vehicle line, introducing these vehicles initially not at the low end of the market, as with the examples in Clayton's research on disruption, but at the high end. On the other hand, BYD, originally a Chinese battery maker whose most famous investor is none other than Berkshire Hathaway's Warren Buffett, is selling large numbers of electric vehicles at half the price of many western models, buoyed by strong incentives from the Chinese government. With the ability to travel 200 miles or more on a single charge, some electric vehicles have begun to enter mainstream consumer markets by overcoming the "range anxiety" that consumers report feeling if their travel range is limited to shorter distances.
2. *Software.* Microsoft has become an important player in providing connectivity software and cloud data storage for cars. Apple's recent entry into the automotive market was no doubt in part stimulated by its own software and design prowess—it has miniaturized its iPhone technology through watches and now, at the other end of the size spectrum, sees the appeal of transportation devices for many of its core competencies, especially for younger consumers who tend to be more focused on the "riding" experience than the "driving" experience. An increasing amount of the value of each vehicle is devoted to providing information and entertainment, or "infotainment."
3. *Autonomous Vehicles.* Google's experimental vehicles are finding their way to an increasing number of communities where they are undergoing testing, mapping streets, and startling other drivers with their revolving rooftop sensors. Nearly every major automotive firm now has its own autonomous vehicle development program, and there is increasing recognition of the value of this mode of transportation for non-drivers such as seniors, children, or the disabled, along with drivers who would prefer to be focusing on work, entertainment, or conversation instead of driving. Supporters of self-driving cars tout the potential of these vehicles for making transportation more affordable and accessible, reducing congestion, and enhancing safety: "1.3 million people die every year in car accidents—94 percent of those accidents involve human error."⁶
4. *Car Ownership and Use.* Zipcar, Uber, and other companies have begun to transform traditional patterns of how cars are owned and used, and they are taking on entrenched players such as taxi and car rental companies, traditionally big customers for automakers. This, too, is a global market, and it is increasingly characterized by strange bedfellows—Uber's ambitious plans to expand abroad have been countered by Didi Kuaidi, a China-based competitor that has invested heavily in Uber's U.S. domestic rival Lyft. Meanwhile, Toyota has invested in Uber, offering to lease vehicles to its drivers, and Apple recently invested a billion dollars in Didi Kuaidi, aiming to better integrate its devices with Chinese cars and usage patterns.⁷

⁶ Steel City's New Wheels, Uber Newsroom blog post, May 19, 2016; <https://newsroom.uber.com/us-pennsylvania/new-wheels/>

⁷ Paul Mozur and Mike Isaac, "Apple bets on China amid rising scrutiny," *International New York Times*, May 14-15, 2016, pp. 1, 11.

5. *The Small Car Challenge.* The most successful makers of B-Cars, or subcompacts, for emerging markets are Japanese and Korean automakers such as Toyota or Hyundai. These automakers have also gained market share in the United States and Europe with incremental innovations and aggressive pricing that have had a substantial cumulative impact. U.S. automakers have long struggled to earn a profit on small cars, and have therefore placed greater emphasis on larger cars and trucks. However, the size of the middle class in the world's emerging markets will soon exceed the total number of consumers in the developed world. Forecasts indicate that within the next ten years, small cars will comprise a hefty two-thirds of the global market, and well over half of the sales volume will be in emerging markets, particularly in Asia. In order to capture this vast new market, automakers must be able to supply subcompact models that are affordable to new middle-class entrants in markets such as Asia, Africa, and South America, yet acceptable in terms of quality, safety, styling, and profitability.

“We Are Going to Disrupt Ourselves”

Fields is building a bridge from Ford's heritage and current business to the future with the slogan, “One foot in today and one foot in tomorrow.” He insists on achieving everyday performance results while bringing a renewed focus on innovation to Ford. Fields explicitly recalled the impact that Christensen's work had on him as a MBA student at the Harvard Business School and underlined this point by inviting Christensen to a well-publicized event shortly after his appointment as CEO. Fields continues to use the language of disruptive innovation with employees and the media.

Fields cites several worldwide trends as drivers of industry change. These trends include the growing global middle class, environmental problems such as air quality, and generational differences in attitudes toward car ownership. He asserts that in the face of these trends, accompanied by rapid technological development, the challenge for Ford is, “How do we disrupt ourselves and our own company before others do it for us?”⁸ Fields has strong support from the company's Executive Chairman, Bill Ford, great-grandson of Henry Ford, who notes that although formerly the auto industry was more of a self-contained ecosystem, with breakthroughs developed within the industry, “we now have disruption coming from every angle, from the potential ways we fuel our vehicles to the ownership model.”⁹ Fields observed:

If you stand back and consider all of the enabling technologies available in our business today, we are at an inflection point in our industry. Software and connectivity technologies are driving innovation in vehicles faster than ever. New, non-traditional partners and competitors are now interested in our business. And a new generation of customers is hungry to use technologies to make their lives easier. Some people might see this rapid change as a threat to the auto industry. For us we view this as a huge opportunity. We understand that the winners will be the innovators and those willing to break with tradition to find new solutions. As a business it means we have to challenge ourselves and not take anything for granted. That can be difficult for a [113]-year old company. Yet we are pushing ourselves to think, to act, and disrupt like a startup company.¹⁰

⁸ Nick Bunkely, “Ford Lures Another Ford Newbie in Push for Fresh Thinking,” *Outside-in Strategy*, February 23, 2015, p. 4. <http://www.autonews.com/article/20150223/OEM02/302239961/fields-lures-another-ford-newbie-in-push-for-fresh-thinking>

⁹ “Bill Ford Charts a course for the future,” McKinsey Quarterly, October 2014; <http://www.mckinsey.com/industries/automotive-and-assembly/our-insights/bill-ford-charts-a-course-for-the-future>

¹⁰ Mark Fields, “Technology Isn't Threatening the Auto Industry—It's Transforming It,” Linked-In posting, June 8, 2015.

Fields' vision for the future is captured in part by the term, "Ford Smart Mobility," which combines innovation in several areas, including connectivity and autonomous vehicles. Ford has created a new entity called Ford Smart Mobility LLC, with operations centered in Palo Alto, California. Fields compares this organization to Ford Credit, which is a subsidiary of Ford with the role of supporting the core business. Ford Smart Mobility will have as its role to design, develop, build, invest in, and grow mobility services.

A mind-opening shift in thinking, according to Fields, occurs when the focus changes from a business model based on unit car sales to one based on vehicle miles traveled, whether this is through current patterns of car ownership, vehicle-sharing, or the use of autonomous vehicles by non-drivers such as children, seniors, or disabled people.¹¹ Mobility ultimately means getting people from one location to the next, he observes, and there are many ways to do this with much larger growth potential than has been realized by the automotive industry to date. In order to evaluate this new strategy, it is useful to examine in more detail the five disruptive challenges to the automotive industry outlined on pages 5 and 6, along with Ford's current response to each.

Powertrain

At no other point in the history of automobile engines has the industry experienced such unrelenting pressure to transform itself. Changes in vehicle propulsion, or powertrain systems, are being driven by concerns about emissions, safety factors, fuel consumption, urban congestion, and by customer expectations for better performance, features, and quality. Many of these concerns are increasingly reflected in legislative initiatives on the national or state level as well. The dilemma for today's vehicle makers is how to address the conflicting mélange of current market trends. The industry is producing a deluge of ideas in powertrain design, including battery electric vehicles, hybrid electric vehicles (HEVs), plug-in electric hybrids (PEVs), and hydrogen-powered vehicles.

Ford's approach to this dilemma is to create global vehicle platforms that have "plug-and-play" compatibility with various technologies, enabling the company to provide a range of affordable fuel and powertrain options. To accomplish this, Ford has introduced an all-electric Ford Focus, a hybrid electric Ford Fusion, and the Fusion Energi plug-in hybrid—all built on the company's global platform for mid-sized vehicles.

Ford is also working to improve the efficiency of more traditional internal combustion engines. A new technology, homogenous-charge compression ignition (HCCI), delivers diesel-like efficiencies in a gasoline engine. This and other improvements in combustion system design enable better fuel consumption, improved performance, cleaner engine-out emissions, and reduced need for expensive, bulky catalytic technology. The cost to build newer powertrain platforms is increasing as researchers are looking at a variety of systems, which include cylinder de-activation, variable valve timing, stop/start technology, and turbochargers and superchargers to improve internal combustion engine efficiency.

Powertrain systems must also handle alternative fuel sources. Ford currently produces a range of flexible-fuel vehicle models across its global markets. These vehicles run on either regular gasoline or E85 (a blend of 85 percent ethanol and 15 percent gasoline). In South America, Ford offers vehicles that can run on pure ethanol fuel. Although biofuels are not available in every

¹¹ Dyan Machan, "Ford's Focus Is on the Future of Mobility," *Barron's*, April 16, 2016.
<http://www.barrons.com/articles/fords-focus-is-on-the-future-of-mobility-1460781727>

market, they are widely available in the U.S., South America, and some parts of Europe. Biofuel availability is expected to increase globally. The European Union's Renewable Energy Directive mandates that 10 percent of energy in the transportation sector must come from renewable fuels by 2020. In the U.S., the Renewable Fuel Standard requires annual increases in the volume of renewable fuels, reaching 36 billion gallons by 2022. All automakers must meet these changing standards.

Ford plans to continue providing a wide range of powertrain technologies and fuel options without assuming that a single vehicle technology or fuel will dominate. Company executives have taken the stance that customers should determine the balance between how much vehicle performance comes from an electric battery versus a conventional internal combustion engine source. Depending on the type of powertrain configuration and power control strategy selected, the powertrain may operate on battery only, engine only, or a combination of battery and engine. Ford researchers have been developing a global energy model to understand the combination of vehicle technologies, energy technologies, and fuels that will reduce life cycle emissions from all light-duty transportation. Their model compares different energy and fuels, vehicle technologies, and technology adoption scenarios while trying to discern future trends.

Software

For the automobile industry, digital transformation means using the vehicle as a platform to deliver software services incorporating data, sensors, and analytics. In this rapidly approaching future, cars are shifting toward a mobile Internet world with autonomous, intelligent vehicles connected with the cloud and with each other.

Some entrepreneurs are betting on the increasing value of infotainment services in comparison with the value of cars as transportation devices. For example, Chinese billionaire Jia Yueting, who made his fortune building up a company sometimes described as the “Netflix of China,” has declared that cars are becoming little more than a smart mobile device on four wheels. His company LeEco has just introduced its own electric car, and Jia, who uses the term “disruption” himself with great relish, boasts that he could eventually offer cars for free, while earning money from the services his company sells to passengers.¹² LeEco is also investing heavily in its Faraday Future subsidiary, which is building a U.S. manufacturing plant in Nevada and planning a new site in Vallejo, California.¹³

In contrast to Jia's more radical approach, Ford has been working on vehicle connectivity for many years, gradually increasing the features it offers and the number of models in which these are installed. It has addressed three forms of connectivity: beamed in, brought in, and built in.

- *Beamed In:* Constant information can be beamed in into vehicles with the proper equipment. This information includes media and content obtained through satellite radio along with traffic data, weather forecast data, and other services. Such technology has been in place and evolving gradually over the past two decades.
- *Brought In:* Ford has positioned itself a leader in “brought in” connectivity. This means leveraging the content, contacts, computing, and communications capability of a smart phone

¹² Norihiko Shirouzu and Paul Lienert, “Taking on Tesla: China's Jia Yueting aims to outmuscle Musk,” Reuters, April 25, 2016; <http://www.reuters.com/article/us-autoshow-beijing-china-leeco-insight-idUSKCN0XL11X>

¹³ Charles Fleming and Samantha Masunaga, “Faraday Future seeks approval to build electric cars in California,” Los Angeles Times, May 26, 2016; <http://www.latimes.com/business/autos/la-fi-hy-faraday-vallejo-20160525-snap-story.html>

that the owner brings into a vehicle, whether this is an Android or Apple model. It is important for this technology to be safe, seamless, and capable of voice control to allow consumers to keep their hands on the wheel and eyes on the road.

- *Built In:* The most advanced vehicle connectivity frontier converts each vehicle into an independent node on a network with a data modem that is part of the vehicle's architecture. Each car thus acquires an inherent capability to both transmit and receive information. This means, for example, that the vehicle is able to receive software updates, send commands upon request to turn on lights or appliances at home, and transmit information about its battery charge level to the cell phone of a driver who is away from the car sitting in an office. The modem can also be programmed to transmit raw data about driving habits. Part of Ford's mobility strategy involves using this data to make useful suggestions to customers before they actually perceive or express the need themselves.

Ford has engaged with numerous technology partners to help design and develop more advanced built-in connectivity features for its consumers. Microsoft was the original partner for its SYNC infotainment system, which was first released into the retail market in 2007. After great success with the initial launch of SYNC, the next version, MyFordTouch, featured innovative touch control and voice interaction, but had numerous bugs and user interface issues that were a headache for consumers and for company executives. Subsequent updates have improved the quality and features for entertainment, navigation, and communication, but the company was painfully scarred by this technology foray. The latest version of this system is known as SYNC 3, which has adopted BlackBerry's QNX operating system. In the process, Ford has shifted its Microsoft relationship from the vehicle to the cloud, leveraging Microsoft for off-vehicle control, storage, and computing. In another software company alliance, Ford has teamed up with an application development company, Pivotal, giving the automaker the capabilities of an innovative software team to deliver an enhancement to SYNC 3, called SYNC Connect, that offers consumers the ability to start, lock, or unlock a vehicle from a remote location, as well as remotely access vehicle information such as fuel level. This capability is not new to the automotive world but is a harbinger of other related developments to come. Ford also recently announced a collaboration with Amazon that would enable its SYNC Connect to interact with Amazon's Echo home automation hub, so that customers can send commands to the car from their kitchen ("Ask my Ford to start"), or from the car to their home ("Set the home temperature to 70 degrees").¹⁴

For car owners who are more interested in the riding experience than in the driving experience, Ford continues to upgrade its entertainment and communication systems. The new SYNC 3 system includes AppLink, which allows drivers or passengers to voice-control smartphone applications such as Spotify from the driver's seat. Other more futuristic possibilities include operating a drone from a pickup truck, or ordering birthday presents from your car.

Autonomous Vehicles

As with powertrain and software challenges, Ford has approached autonomous vehicle research with a strategy designed to provide multiple options to consumers while partnering with other companies to supplement in-house technology. It is already pursuing intensive research and development efforts focused on aspects of autonomous driving that can be of immediate use in conventional vehicles as well, and which may help drivers make a gradual transition to a more

¹⁴ Antuan Goodwin, "Ford, Amazon working to connect cars to smart homes," CNET Car Tech, January 5, 2016; <http://www.cnet.com/news/ford-and-amazon-working-to-connect-cars-to-smart-homes-via-echo-alexa/>

autonomous world. Ford has begun to offer semiautonomous driver assist features such as automatic parking, traffic alerts, lane-keeping assist, adaptive cruise control, blind spot monitoring, rearview camera, pedestrian detection, trailer backup assist, and automatic braking. These features enable drivers to take advantage of autonomous technologies at their own discretion, simplifying the driving experience and making it safer while allowing them to retain independent control over their vehicles.

To accelerate the development of fully autonomous vehicles, the company has announced plans to triple its testing fleet, which will make this the largest test fleet in the industry. Autonomous vehicle testing is underway in Michigan and Arizona, and at Ford's research center in Palo Alto. A key technology partner for this effort is Velodyne, the maker of those rotating car top LiDAR sensors—Velodyne has also worked closely with Google. In addition, Ford has been speaking with government regulators and insurance companies to shape a commercial environment where manufacturers can introduce autonomous vehicles to the market without incurring massive legal or financial risks.

Ford envisions a future in which autonomous cars coexist with conventionally driven cars and pedestrians. Other projects at its Palo Alto research center include an autonomous vehicle virtual test drive system that allows virtual interaction between an autonomous car and pedestrians. Sensor fusion blends together the information from autonomous sensors to create a 360-degree view of the car's surroundings, including street signs and pedestrians; this is supplemented by camera-based pedestrian detection. LiDAR data must be combined with high-resolution maps to enable driverless cars to navigate successfully, so mapping is another massive project. Visual indicators can become unrecognizable in foul weather, and such conditions must be taken into account, too. Ford has conducted successful tests in the snow along with other testing in the desert at night which have demonstrated that the sensor technology combined with high-resolution maps could eventually surpass the capacity of human senses, not to mention avoiding the sometimes fatal mistakes made by distracted drivers.

Fully autonomous vehicles are still a work in progress. CEO Fields has pointed out that “You can’t reboot a vehicle when you’re going down the highway at 70 miles an hour.”¹⁵ His ambition, in keeping with Ford’s heritage, is not to be first on the market with the type of luxury offering targeted by some competitors, but rather to democratize this technology in a way that is accessible and affordable for ordinary citizens.

Car Ownership and Use

The rise of alternative mobility patterns such as the Zipcar rental service and ride-hailing services like Uber and Lyft has potentially serious implications for automakers. One industry analyst predicts that with the advent of shared, driverless cars, U.S. auto sales could drop as much as 40 percent over the next 25 years. This prospect has prompted automakers to embrace the idea that their mission must expand beyond selling cars to a broader definition of movement and mobility. General Motors, for example, recently invested \$500 million to purchase a 9 percent stake in Lyft.¹⁶

Ford’s Executive Chairman Bill Ford, who was an early supporter of environmental causes and hybrid vehicles during times when these were not readily embraced in Detroit, has been vocal about the need to rethink the century-old ideal of personal car ownership. He believes that the

¹⁵ Geoff Colvin, “Ford CEO Mark Field’s Daring Attempt at Transformation,” *Fortune*, January 13, 2016, video interview with Mark Fields.

¹⁶ Keith Naughton and David Welch, “Detroit Has Valley Envy,” *Bloomberg Businessweek*, May 2, 2016, p. 21.

model of mobility propagated by his great-grandfather's Model T is under severe threat, noting that automakers must provide solutions to address traffic congestion in the world's mega-cities—for years he has been using the term “global gridlock.”

Research also points to significant changes in the attitudes of the U.S. millennial generation Y (those born between the early 1980s and mid-1990s) and the more youthful Generation Z (those born during the mid-1990s and after) toward car ownership. A poll conducted for Ford by the Penn Schoen Berland research firm found that their millennial and Generation Z survey respondents fear “other motorists driving dangerously” more than public speaking, death, spiders, or snakes.¹⁷ These young drivers also report being open to sharing rides with others, and rank car rides second only to book lending as items they are most open to sharing.

Sheryl Connelly, a futurist with Ford who studies buying trends, claims that even as millennials start purchasing cars in bigger numbers, their attitudes will remain different than those of previous generations. Owning a car and getting a driver's license aren't the milestones in life they once were, and this may be a permanent change. In order to remain in step with these shifts, approximately four years ago, with Bill Ford's support, the company began supplying cars to Zipcar locations at 350 college campuses. This program helped put the company's products in the hands of young people who do not own cars, and aligned with Zipcar's model of promoting fuel-efficient cars to be used only when needed.

Ford is conducting more than 30 global mobility experiments to gain insight into changing consumer transportation preferences. Several pilot programs are under way: GoPark, which offers a predictive parking system in London capable of directing drivers to streets where they are most likely to find a space; GoDrive, a car-sharing program in London that provides vehicles with guaranteed parking at busy locations such as London City Airport; and Dynamic Shuttle, a program at Ford's Dearborn, Michigan, campus that allows employees and visitors to summon point-to-point rides on demand. Another trial is taking place with a fractional car ownership program in India. Working with car-sharing vendor Zoomcar in Bangalore, Ford has identified three-person groups with complementary schedules, allowing each pod to share a single vehicle. The company has also used Getaround, a San Francisco based Airbnb for vehicles, to experiment with car-sharing options with pre-screened drivers in six U.S. cities: Berkeley, Oakland, San Francisco, Portland, Chicago, and Washington DC.¹⁸ The new FordPass is a free, digital platform and mobile app that provides a marketplace for mobility services such as parking and sharing; this is also the app that enables the remote functionality of SYNC Connect.

The Small Car Challenge

The global market for subcompacts is becoming an increasingly important battleground for automakers. In an earlier era it was easy to dismiss or deemphasize this low-price, low-margin market, especially for North American makers enjoying the lion's share of their profits from SUV and truck sales. However, Ford has forecasted that global sales of small, low-cost cars will grow 35 percent between 2012 and 2017, far outpacing the expected 12 percent rise for the industry as a whole. Ford says that 44 percent of the market for such small cars will be in South Asia and South America.

¹⁷ Jim Motavall, “Millennials and Gen Z fear other drivers more than death, public speaking and spiders,” MNN, June 25, 2015; <http://www.mnn.com/green-tech/transportation/stories/millennials-and-gen-z-fear-other-drivers-more-death-public-speaking-and-spiders>

¹⁸ “If car buyers dwindle, Ford is trying to find what's next,” *Washington Post*, June 24, 2015; <http://www.sfgate.com/business/article/If-car-buyers-dwindle-Ford-is-trying-to-find-6347469.php>

There are many competitors in the subcompact market such as the VW Polo, Fiat Uno, Chevrolet Onix, and others. Japanese and Korean carmakers such as Toyota, Honda, Nissan, and Hyundai/Kia have captured much of this segment in key emerging market locations. Dominant market share across many developing countries provides them with economies of scale, and their established dealer networks and aggressive pricing form barriers to entry for relative newcomers. In India, a market with huge growth potential, the largest carmaker by far is Maruti Suzuki, originally a joint venture between the Japanese company Suzuki and the Indian government. This venture has captured close to 50 percent of the Indian market, and many companies are now attempting to challenge its semi-monopoly, as the government has divested its shares and India shows considerable promise for growth.

Ford's prior history of small car development has produced mixed results. In general its vehicles, particularly the Fiesta, have been well received for their quality and safety features in comparison with other models in their segment. Price has been an issue, however, as Ford's internal standards and supply chain have not been able to achieve prices or levels of profitability that would make the company a breakout success in most developing markets. Vehicles originally designed to be price-competitive often take on more cost during the development cycle as engineers responsible for quality and safety wrestle with how to maintain company standards along with affordability and profitable sales.

The new Ford Figo Aspire, recently introduced in India, is designed to be a compact car champion by offering unprecedented levels of style, feature-rich smart technologies, and high levels of safety. It will still be priced higher than many rival models, however, and must compete on its reputation for fuel efficiency and overall value. Ford is striving to make the best of this equation, challenging local consumers to "expect more from their car." He points to the design, craftsmanship, safety, and smart technologies that buyers in India and other locations will receive in exchange for paying a bit more.¹⁹

Ford's global team has also designated the redesigned Ka model to compete in this subcompact segment. The Ford Ka will cut costs, for example, by not having a touch screen. In its place there will be a docking station to accommodate a smart phone, allowing the driver to view navigational and other features. This type of small car strategy still requires a great deal of work to move forward. Among other challenges, Ford must establish new supply chain partners in countries like India that can provide parts at an acceptable level of quality with a significantly lower cost basis than current global suppliers.

The Competitive Landscape

The global automotive industry is changing at a dramatic rate. China has become the world largest market in terms of sales volume. In 2011 it passed the U.S., which is once again on the rise economically, but unlikely to ever again exceed the Chinese car market in size in the foreseeable future. Europe has been wracked by major restructuring, and South Asia and Africa, after many years of relative neglect, have caught the eye of executives as markets with strong future potential. After decades in which industry leadership was stable, over the last ten years a succession of leaders has been deposed by financial, technical, and ethical disasters: General Motors by financial woes culminating in bankruptcy, Toyota due to quality failures, and Volkswagen because of a crippling scandal over cheating on diesel emissions tests. The current automotive industry is highly competitive, and it has become far more global in scope than it was

¹⁹ Ajinkya Paralikar, "Ford Figo Aspire Revealed at New Sanand Facility in India," *DriveSpark*, March 27, 2015; <http://www.drivespark.com/four-wheelers/ford-figo-aspire-revealed-at-new-sanand-facility-in-india-010189.html>

in its early days. The list of the largest 20 automakers now includes companies from Japan, Germany, the U.S., Korea, Italy, China, France, and India.

Toyota

Toyota is back at the head of this automotive lineup after briefly ceding this position to Volkswagen; it has earned its status over many decades through a classic disruptive progression from modest econo-boxes to a full range of cars and trucks. Toyota gradually evolved from dominating its home market to becoming the best-selling importer to the U.S., eventually setting down roots by placing manufacturing facilities in relatively low-cost locations such as Kentucky and Texas. It has expanded worldwide over the years, with a substantial presence in the EU and dominant market share in important emerging market countries such as Indonesia and Nigeria. Toyota executives are quite aware of disruptive industry forces, having grown to prominence as systematic disruptors themselves. They continue to invest their mountain of accumulated cash in major technology bets: Toyota's hybrid Prius vehicle line has won acclaim from environmentalists for its fuel economy and reliability, and the company is forging ahead with hydrogen systems and infrastructure as well.

Hyundai

Hyundai from South Korea is another energetic competitor, having passed Ford in global vehicle sales to displace it as one of the world's top five automakers, causing Ford to fall to number six. Among Hyundai's other ambitious global growth plans, it is seeking to emulate Toyota's Prius success with its new Ioniq model line that will eventually offer hybrid, plug-in hybrid, and all electric versions. Hyundai has a partnership LG Chemical, a world-class Korean maker of electric batteries that will be able to provide it with leading-edge technology at highly competitive prices. Hyundai is challenging other automakers with aggressively priced small cars in major emerging market locations, and it is second only to Maruti Suzuki in India, for example, with 15 percent market share there.

Silicon Valley

Major Silicon Valley players have also entered the automotive industry, scrambling the traditional battle lines of competition. Tesla was at first underestimated by Ford, where many employees dismissed the new entrant as a minor niche player with an eccentric leader whose interests would soon shift toward more exciting pastimes such as launching rockets with his SpaceX company. In the meantime, however, Tesla has moved down market, the opposite of the usual direction taken by disruptors, and with its Model 3 is targeting the mid-market segment inhabited by Ford and others. The U.S. electric vehicle industry has been averaging about 10,000 units a month in sales, with about 20,000 sold worldwide last year for Ford. Tesla's Model 3 has reportedly received almost 400,000 pre-orders,²⁰ a number equal to the entire electric car stock currently on the road in the U.S. Elon Musk, Tesla's CEO, bullishly predicts annual production of one million vehicles by 2020, which would give it a much more significant market share. Although his company has yet to achieve consistent profitability, Musk asserts that "Tesla is going to be hell-bent in becoming the best manufacturer on earth."²¹

²⁰ Tom Warren, "Tesla has received almost 400,000 pre-orders for the Model 3," The Verge, April 21, 2016; <http://www.theverge.com/2016/4/21/11477034/tesla-model-3-preorders-400000-elon-musk>

²¹ David Baker, "Tesla charging ahead with million-car goal," *San Francisco Chronicle*, May 6, 2016, p. 1.

What could make Tesla an even more serious competitor is the \$5 billion “Gigafactory” for electric batteries that it is building in Nevada. Estimates suggest that this scale of mass battery production, with a facility the size of one hundred football fields that will double the world’s lithium ion battery manufacturing capacity, could lower its costs by as much as 30 percent, giving it an edge over competing electric vehicle makers. An additional battery storage product that will be built in the same factory, the Powerwall home battery, will enable consumers to store rooftop solar power and thereby recharge their cars without participating in the fossil fuel economy.

Google, another company that has invited itself to join the automotive industry, is in many ways a nightmare competitor. It has some of the world’s deepest pockets for research and development, with three times as much cash on hand as Ford, a large cadre of brilliant engineering talent, expertise in technologies such as geo-mapping that are critical to autonomous vehicles, experience in big data analytics, a treasure trove of sophisticated market information about customer preferences, and close contact as well as cachet with a young generation of buyers. Android Auto, Google’s infotainment solution for the auto industry, both complements and threatens Ford’s Sync investment—Ford and Toyota have even explored the possibility of working together to retain control of their dashboards.²² Consumers will most likely vote with their purchases in favor of the most user-friendly system. In addition to Google’s ongoing autonomous vehicle development efforts, the company’s co-founder Larry Page has reportedly invested more than \$100 million of his own fortune to fund two startup companies attempting to build flying cars; innovations in autonomous navigation, electric motors, batteries, and materials have suddenly made ideas that once seemed far-fetched more feasible.²³

Apple, too, could readily expand its influence if one envisions the biggest disruptive influence in the automotive industry as being software for connectivity, information, and entertainment. Teenagers riding with their parents already view the car as primarily an entertainment device, and may express a keen sense of deprivation when connectivity is lost. As fully autonomous vehicle technology becomes available—some estimates by industry insiders are within this decade—it is intriguing to imagine adding the technology for a rolling office or family movie theater. If the future of the car turns out to be centered around a flexible workspace or an entertainment system on wheels, then Apple already has most of the right ingredients. In the meantime, it has been poaching experienced auto executives from Detroit and elsewhere to help it add a chassis and wheels to its existing bundle of software and hardware. Apple, like Google, has already created a its own contribution to the infotainment dashboard, Apple CarPlay, and this could be just the first step towards an Apple vehicle that embodies the company’s penchant for clean design, interoperability between devices, and intuitive user interface.

China

Many of the competitive battles between the global contestants now vying for automotive industry supremacy will probably be decided, not in the U.S. or Europe, but in China. Chinese consumers in the world’s largest market have shown a preference for larger cars, SUVs, and luxury vehicles when they can afford them, and they represent a relatively young demographic that is open to disruptive features. Many buyers are first-time car owners who have a less fixed idea of what a “car” or a “brand” signifies than Westerners who have already owned a half dozen or a dozen vehicles in their lifetime. The Chinese government, attempting to counter the country’s appallingly high levels of air pollution, has also put significant incentives in place that are

²² Patrick George, “Ford and Toyota Don’t Want Apple and Google Taking Over the Dashboard,” *Jalopnik*, June 4, 2015; <http://jalopnik.com/ford-and-toyota-dont-want-apple-and-google-taking-over-1708960335>

²³ Ashley Vance and Brad Stone, “Propeller Heads,” *Bloomberg Business Week*, June 13, 2016, pp. 56-61.

stimulating growth in sales of electric cars and plug-in hybrids. Annual plug-in electric passenger car sales there have just exceeded those in the U.S., with the local manufacturer BYD leading the pack in sales volume.

There are more than forty carmakers headquartered in China alone, although some of these are smaller firms based in a particular province. Nearly every major global automotive enterprise has entered China as well through obligatory joint ventures, producing a spaghetti bowl mixture of overlapping companies and alliances. China's carmakers—for example, Beijing Automotive Group, Brilliance Automotive, Chang-an, Chery, Dongfeng Motor, Geely, and Great Wall—have their own ambitions for incorporating new technologies and expanding abroad.

Ford was comparatively late in making a serious commitment to the China market, investing most heavily in new manufacturing facilities and dealerships over the last ten years. Its 5 percent market share, although almost double what it was before, puts the company at a competitive disadvantage in comparison with longtime multinational players in China such as Volkswagen, General Motors, and Toyota that have two or three times the scale. On the other hand, Ford's current vehicle mix and large joint venture manufacturing presence in Chongqing, a major city in China's southwest, position it to serve second- and third-tier cities in this region that are now growing more rapidly than urban areas in the eastern part of the country.

How Much Disruption is Enough?

Ford won renewed respect from the industry and general public during the tough recession years of the last decade. Unlike its Detroit-based rivals GM and Chrysler, Ford navigated through the economic crisis without declaring bankruptcy or taking U.S. government bailout money. Its executives stared reality in the face and made countless difficult decisions, including deep expense cuts essential to the company's survival along with gutsy investments to reinvigorate its core product lines of cars and trucks. At present, Ford is making plenty of money and expanding in key geographies. However, new industry entrants are now announced in the press almost every month, and the technology that has powered the automobile for more than a century is changing rapidly.

In response to the question, "What keeps you up at night?", Fields says that he loves his job and is dead tired by the end of the day, so there is nothing that keeps him awake. However, Fields goes on to underline that he takes very seriously the level of competition Ford now faces from both traditional and nontraditional sources, and the importance of positioning it for a future that is not simply an extension of historical industry trend lines.²⁴ During his waking hours as a busy CEO visiting auto shows and dealerships, speaking with global partners and government regulators, or participating in internal meetings about R&D investment and new product development initiatives, he must wrestle with a myriad of questions regarding whether to invest, partner, or stay the course.

Fields' prior experience makes it possible for him to affirm Ford's heritage while navigating an uncertain future. He has a global perspective acquired from roles on four different continents: North America, South America, Asia, and Europe. After becoming the CEO of Mazda in 1998 at the youthful age of 38 (especially for Japan where most corporate leaders are at least 15 or 20 years older), he guided a remarkable transformation of a company that had made poor strategic choices, piled up massive debts, and was bleeding so much cash that it consented to Ford control. Fields later witnessed firsthand Ford's difficulties with diversification and acquisitions in the first decade of this century, and was a primary author of "The Way Forward" plan for restructuring

²⁴ Gerard Baker, "CEO Mark Fields Maps Ford's Future," *The Wall Street Journal*, April 12, 2016.

that became a vital component of the company's recovery, and ran the core Americas Division. More recently he was instrumental in the radical and expensive decision to convert to aluminum-bodied pickup trucks, touching an icon that many would have hesitated to mess with, but eliminating unnecessary weight and improving mileage by close to 30 percent. Ford's consumers have subsequently endorsed this move with strong demand.²⁵ By leveraging the theme of disruption, Fields aims to actively leverage future trends rather than have Ford take a more reactive stance.

It is easy to state that the company should keep one foot in today and one foot in tomorrow, but far more difficult to prescribe how much weight it should place on each foot. By asking employees, "How can we disrupt ourselves?" while at the same time insisting that the company stay focused on meeting its current business targets, Fields seeks to open up the company to innovative thinking while striking the right balance. How much disruption is too much or too little?

Too Far, Too Fast

Skeptics who witnessed Ford's previous era of diversification and distraction from its core business in the early 2000s could raise doubts about whether the company is heading down the wrong path again. Having returned to a profitable business model, why rock the boat? If electric vehicle sales constitute a miniscule segment of the global market—they are still only a small fraction of one percent of the billion cars on the world's roads—and widespread use of autonomous vehicles is at least a decade away, why spend a lot of time and money on these? As for changing patterns of car ownership and use, fast-growing ridesharing firms like Uber and Lyft are a much bigger threat to taxi companies than to automakers. In fact, their luxury services, with those shiny SUVs, are most likely to boost lucrative conventional auto sales as they seek to attract consumers away from aging taxi fleets. Uber has actually begun testing self-driving cars using the Ford Fusion.²⁶ Isn't it most essential for Ford to continue with an intense focus on the area that has been the company's most vital profit driver for decades, the North American truck and SUV business? And aren't there more immediate competitive threats to worry about in the form of imported or locally produced vehicles from Asian manufacturers? Many of these standard models are packed with valuable electronics and other features, while being strategically priced to undercut Ford's lineup.

It is also not entirely clear that adopting the notion of disruption itself is the best way to comprehend contemporary auto industry changes or to shape strategic responses. Tesla's example, with its first generation models priced above \$80,000, doesn't seem to fit Christensen's low-priced, "good enough" definition of disruption; likewise, many consumers are willing to pay substantially more, not less, to purchase Apple infotainment products because of their appealing design and functionality. Government regulations, such as incentives for electric vehicle purchases in China that favor domestic manufacturers, may reshape the competitive playing field even more than the latest technology, and what about the importance of social and institutional systems—charging stations, insurance, product liability, and so on? The infrastructure crucial to making new powertrain options or driverless vehicles feasible on a broad scale is as much in the hands of public officials as in those of swashbuckling entrepreneurs. Rather than relying on the trendy language of disruption, Ford might be better off employing straightforward strategic measures such as identifying and prioritizing the most serious competitive threats and then

²⁵ Doron Levin, "Ford Motor's Mark Fields Raked in a Well-Deserved Fortune in 2015," *Forbes*, March 20, 2016; <http://www.forbes.com/sites/doronlevin/2016/03/20/ford-motors-mark-fields-raked-in-a-well-deserved-fortune-in-2015/#3056d26b64e1>

²⁶ Emily Price, "Uber is testing self-driving cars, but not in San Francisco," *San Francisco Chronicle*, May 19, 2016; <http://blog.sfgate.com/techchron/2016/05/19/uber-is-testing-self-driving-cars-but-not-in-san-francisco/>

making plans to address them, while using its institutional muscle to shape the regulatory environment.

Too Little, Too Late

Other critics feel that Fields is not moving quickly enough in response to rampant industry disruption, and will be eclipsed by more radical changes than it anticipates. Notes one critic: “His bold idea probably isn’t bold enough.” For example, Fields describes Ford’s Palo Alto subsidiary as dedicated to Ford and working on the company’s own vehicles. Some industry observers express the view that it should have more autonomy to work with various other manufacturers and to even cannibalize Ford’s own products. How can the whole company embrace a world of lighter, smaller, cheaper cars in a driverless and ride-sharing future if it is so well structured to serve a very different type of customer need?²⁷

Within Ford, Fields’ admonition to “think like a startup” carries a real sense of urgency for company employees who recognize that areas where the company has deep expertise—for example, internal combustion engines or the “driving” experience—may become less relevant for some vehicle segments that convert to new technologies. In the meantime, there are critical enabling technologies that Ford did not create in-house and must purchase or partner with outside suppliers in order to obtain: laser sensors, geo-mapping, electric batteries, software for connectivity and entertainment, and cybersecurity systems. These technologies are rapidly changing the basis of competition and attracting a host of outsiders for whom they are core competencies. No less an authority than Bill Ford points out that the company must be a “thoughtful integrator” of technologies from various sources and “understand where we can add value.” He cautions that some mobile handset makers, for instance, have found themselves in a position where most of the value is added by others.²⁸

And if the next billion members of the global middle class are generally going to be purchasing smaller vehicles, how can any carmaker remain viable throughout the next several decades if it is not well-positioned to serve them? Challenging Indian consumers to recognize the upscale characteristics of Ford’s subcompact Figo Aspire model, for example, is a strategy more common among the disrupted than among disruptors, which tend to offer adequate value at a lower price.

Just Right

The approach that Ford has elected to take to the five disruptive factors described above is generally flexible, broad-based, and customer-driven. For instance, the company is offering multiple power train solutions. It is positioning itself to cater to both the driving experience and the riding experience, and to serve markets where semiautonomous driver assist capabilities and fully autonomous vehicles each play a role. The long list of semiautonomous features Ford now offers, many of them targeted at increasing safety (e.g., blind spot monitoring), may help anxious young people to overcome their concerns about dangers posed by other drivers by providing the kinds of high-tech fixes they have become accustomed to deploying in other aspects of their lives. Ford has built a proprietary infotainment system and is also seeking to incorporate technology from Google and Apple by making it easy for drivers and passengers to link up their smart

²⁷ Timothy Lee, “Ford’s CEO has a smart plan to save his company from disruption. It won’t be enough,” *Vox*, April 8, 2016.

²⁸ “Bill Ford Charts a course for the future,” *McKinsey Quarterly*, October 2014; <http://www.mckinsey.com/industries/automotive-and-assembly/our-insights/bill-ford-charts-a-course-for-the-future>

phones. The Ford Smart Mobility initiative integrates responses to two major disruptors—connectivity and autonomous vehicles—with related initiatives to leverage the customer experience and the use of big data, all with the goal of making mobility accessible and affordable.

Conclusion

The only history that is worth a damn is the history we make today.

—HENRY FORD²⁹

Ford has tremendous advantages: 200,000 employees with deep industry expertise and loyalty to the company, sophisticated systems for vehicle design and production, factories and dealerships around the world, a famous brand name, and multi-generational customers. Yet the research on economic disruption teaches that the built-in advantages of established firms can become disadvantages when they are competing with startups that provide adequate products at lower prices, have a lower cost base, are willing to build systems around newer technologies, and seek out new markets and customers that may at first look insignificant in comparison with existing lines of business.

Ford's struggle to reinvent itself is also symbolized by its plans for a massive renovation to its facilities in Dearborn, Michigan, a suburb of Detroit. The ten-year renovation project, designed to attract and retain top automotive talent, will redevelop buildings once dedicated by President Dwight Eisenhower in the 1950s. The two new campuses will gather up employees from many different sites into more centralized locations that feature sports facilities, greenery, walkable paths, e-bikes, autonomous cars, and shuttles. A key theme is to bring employees within easy walking distance of each other while also featuring advanced connectivity, geothermal heating and cooling, and a zero-waste sustainability showcase building. The architecture and engineering firm working on this renovation is the same one that has designed facilities for Tesla, Google, and Microsoft.³⁰

Will these new facilities be skin-deep imitations of other high-tech campuses, or will they embody changes already taking place as Ford employees more fully embrace the innovative DNA and serial ingenuity that made the company so dominant in earlier eras? Bill Ford has advocated that the company must become exceptionally curious and accessible; this means leaving behind insular habits and resistance to change based on past successes. Ford Motor Company's near-death experience through recession and recovery has forged a renewed commitment to innovation among a seasoned, globally savvy generation of employees—the organization has also hired thousands of new employees with a fresh perspective—yet most of them also face demanding lists of objectives related to the current business.

Is Fields' emphasis on disruption ultimately a distraction from a healthy business or the right medicine for future growth? Can he and others at Ford effectively juggle past and future, current business requirements and new sources of competition? With so many technology changes and

²⁹ Bryce C. Hoffman, "American Icon: Alan Mulally and the Fight to Save Ford Motor Company" (Crown Business, 2012), p. 388.

³⁰ Michael Martinez, "Ford unveils 10-year plan to transform Dearborn campus," *The Detroit News*, April 13, 2016.

new entrants now encroaching on an industry accustomed to a more stable list of players, can a 113-year old company actually respond by disrupting itself?

Case Discussion Questions

1. In what ways are consumer preferences changing in Ford's different market segments and geographies? Are consumers able to articulate what they will be eager to buy five years from now?
2. How significant are the new industry entrants and their technologies? Have any of them introduced truly disruptive innovations that are potentially lethal for established automakers?
3. Which Research & Development initiatives should the company bet on, and how aggressively should it invest to build new capabilities?
4. What kinds of partnerships should Ford initiate to acquire technologies that it cannot or does not want to build in-house?
5. Does the concept of "disruption" provide a helpful model for understanding Ford's current dilemmas? What are the limitations of this model, and are there other ideas that are more useful for understanding Ford's competitive landscape?
6. How can a company reinvent itself when it has such a long history, an established business model, and massive legacy infrastructure? Has Mark Fields chosen the right approach?

Exhibit 1 Ford History Timeline

1896	Henry Ford builds the Quadricycle.
1899	Henry Ford joins a group that founds the Detroit Automotive Company.
1901	Henry Ford defeats the top racecar driver of the era.
1903	The Ford Motor Company is incorporated.
1904	The Ford Motor Company of Canada is founded.
1907	Ford introduces the scripted typeface of its trademark.
1908	Ford introduces the Model T.
1913	Ford introduces the integrated moving assembly line to auto production.
1914	Ford institutes the famous “\$5 day” — double the existing pay for factory workers.
1917	Ford begins construction of the River Rouge Complex.
1917	Ford Motor Company produces its first ever truck.
1918	Ford’s River Rouge Complex’s begins manufacturing antisubmarine patrol boats.
1919	Edsel Ford succeeds Henry Ford as president of the company.
1922	Ford acquires the Lincoln Motor Company.
1925	Ford begins production of Ford Tri-Motor airplanes.
1927	Ford begins selling the 1928 Model A.
1932	Ford introduces the flatbed V8 engine.
1936	Ford begins selling the Lincoln Zephyr line.
1938	Ford unveils the medium-priced Mercury brand.
1941	Ford begins producing jeeps for the U.S. military.
1941	Ford signs its first contract with the UAW-CIO.
1942	Ford halts civilian auto production in the U.S. to produce military equipment.
1943	Edsel Ford dies.
1945	Henry Ford II becomes president of Ford Motor Company.
1948	Ford introduces the F-Series line of trucks.
1948	Ford introduces the 1949 Ford.
1954	Ford introduces the Thunderbird
1954	Ford begins crash testing its vehicles.
1956	Ford becomes a publicly traded company.
1956	The Continental Division of the Ford Motor Company introduces the Continental Mk II.
1957	Ford introduces the Edsel.
1959	Ford Credit is founded.
1964	The Ford Mustang goes on sale.
1965	Ford-Philco engineers unveil the Mission Control Center to put a man on the moon.
1965	Ford Germany and Ford U.K. collaborate to release the Transit in Europe.
1966	Three Ford GT40 Mk IIs sweep the podium at the 24 Hours of Le Mans.
1970	Ford introduces the three-point, self-adjusting and retracting front outboard lap and shoulder belts.
1976	Ford of Europe introduces the Ford Fiesta.
1978	Ford introduces the downsized Panther platform.
1980	Philip Caldwell succeeds Henry Ford II.
1981	Ford begins selling the fifth-generation Escort world car
1985	Ford revolutionizes automotive design with the Taurus.
1986	Ford introduces the modular assembly line at its St. Louis assembly plant.
1990	Ford introduces the Explorer.
1993	Ford introduces the Mondeo as its new global sedan.
1996	Ford produces the Ford Ranger Electric Vehicle.
1998	The introduction of the Lincoln Navigator spurs rapid growth in the luxury SUV segment.
2001	Ford’s board of directors names Bill Ford to replace Jacques Nasser as CEO.
2003	Ford celebrates its 100 th anniversary.
2004	Ford introduces the GT as its premium sports car.
2006	Alan Mulally becomes Ford’s president and CEO.
2007	Ford begins offering SYNC in vehicles sold as 2008 models.
2009	Ford begins offering its turbocharged EcoBoost line of engines.
2011	Ford discontinues the Mercury line to concentrate all of its efforts on the Ford and Lincoln brands.
2014	Ford introduces the 13 th generation, 2015 F-150.
2014	The Ford Mustang celebrates its 50 th anniversary.
2014	Mark Fields succeeds Alan Mulally as Ford’s president and CEO.
2015	Ford redefines the truck market with the groundbreaking aluminum body on the F-150.

Source: Ford. See corporate.ford.com/company/history.html

Exhibit 2 Ford 2013-15 Financial Results

FORD MOTOR COMPANY AND SUBSIDIARIES CONSOLIDATED INCOME STATEMENT (in millions, except per share amounts)			
	For the years ended December 31,		
	2015	2014	2013
Revenues			
Automotive	\$ 140,566	\$ 135,782	\$ 139,369
Financial Services	8,992	8,295	7,548
Total revenues	149,558	144,077	146,917
Costs and expenses			
Automotive cost of sales	124,041	125,025	120,190
Selling, administrative, and other expenses	14,999	15,716	10,850
Financial Services interest expense	2,454	2,699	2,860
Financial Services provision for credit and insurance losses	417	305	208
Total costs and expenses	141,911	143,745	134,108
Automotive interest expense	773	797	829
Automotive interest income and other income/(loss), net (Note 18)	1,188	76	974
Financial Services other income/(loss), net (Note 18)	372	348	348
Equity in net income of affiliated companies	1,818	1,275	1,069
Income before income taxes	10,252	1,234	14,371
Provision for/(Benefit from) income taxes (Note 21)	2,881	4	2,425
Net income	7,371	1,230	11,946
Less: Income/(Loss) attributable to noncontrolling interests	(2)	(1)	(7)
Net income attributable to Ford Motor Company	<u>\$ 7,373</u>	<u>\$ 1,231</u>	<u>\$ 11,953</u>
EARNINGS PER SHARE ATTRIBUTABLE TO FORD MOTOR COMPANY COMMON AND CLASS B STOCK (Note 23)			
Basic income	\$ 1.86	\$ 0.31	\$ 3.04
Diluted income	1.84	0.31	2.94
Cash dividends declared	0.60	0.50	0.40
CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME (in millions)			
	For the years ended December 31,		
	2015	2014	2013
Net income	<u>\$ 7,371</u>	<u>\$ 1,230</u>	<u>\$ 11,946</u>
Other comprehensive income/(loss), net of tax (Note 17)			
Foreign currency translation	(1,132)	(36)	(521)
Marketable securities	(6)	—	—
Derivative instruments	227	(182)	215
Pension and other postretirement benefits	(81)	(23)	(47)
Total other comprehensive income/(loss), net of tax	<u>(992)</u>	<u>(241)</u>	<u>(353)</u>
Comprehensive income	6,379	989	11,593
Less: Comprehensive income/(loss) attributable to noncontrolling interests	(2)	—	(7)
Comprehensive income attributable to Ford Motor Company	<u>\$ 6,381</u>	<u>\$ 989</u>	<u>\$ 11,600</u>

The accompanying notes are part of the financial statements.

Source: Ford 2015 annual report, page FS-2.