

Tesla Motors: A Silicon Valley Version of the Automotive Business Model



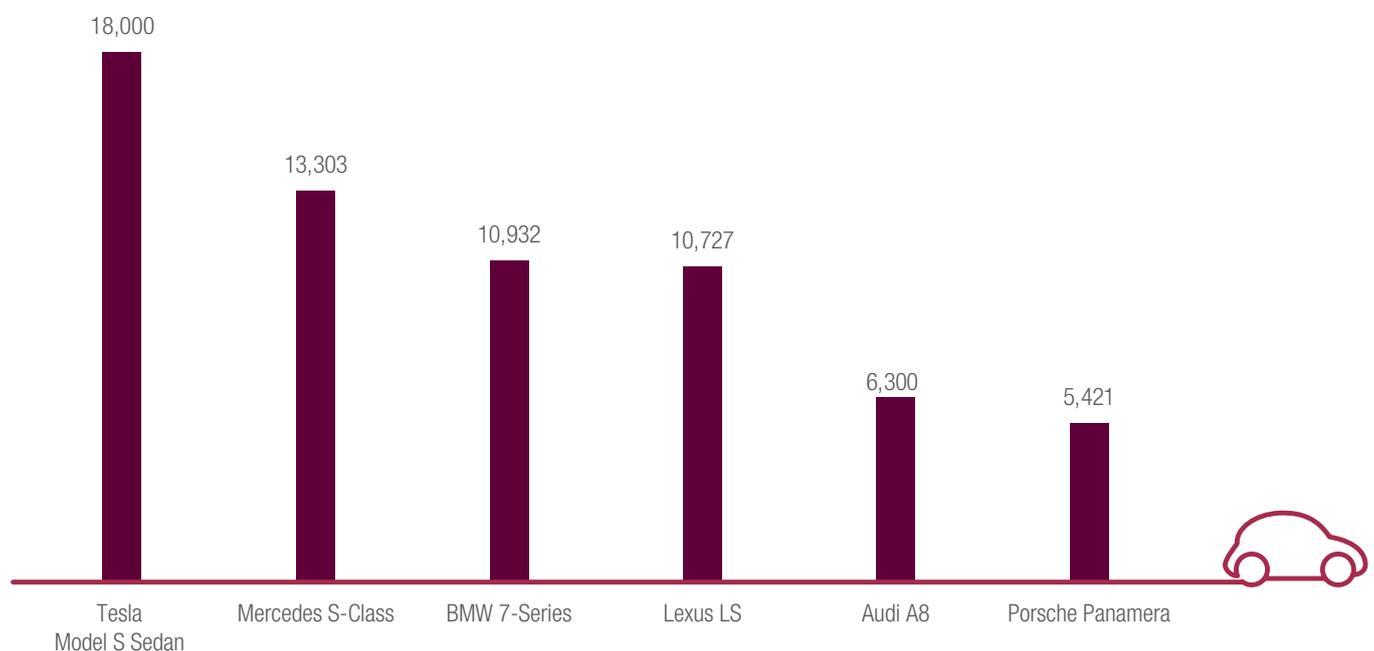
Tesla Motors – Revolutionizing the Driving Experience

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What does it take to drive a revolution and revolutionize how we drive? It requires a company that is willing to radically re-think a century-old automobile industry. A company that does not hold any aspects of the traditional industry value chain as sacred. This is about transforming everything: customer relations, the mechanics of the car, and the accepted business model. And consider that all this is being done by a decade-old company in a segment that is notoriously difficult to penetrate – the luxury sedan market. That company is Tesla Motors, founded by Elon Musk, 43, a co-founder of payments company PayPal.

Tesla is an American auto maker that makes luxury electric vehicles that retail anywhere between \$70,000 and \$100,000. The company has, to date, launched two models and announced multiple more. It has seen significant appetite for its second model, Model S. In overseas markets, such as Norway, there were months where the model was among the top-sellers¹. The company has also seen strong demand in its home market (see Figure 1).

Figure 1: Luxury Sedan Car Sales in the U.S. in 2013



Source: Forbes, “Tesla Sales Blow Past Competitors, But With Success Comes Scrutiny”, January 2014; Tesla Motors, “Tesla Motors Investor Presentation”, 2013

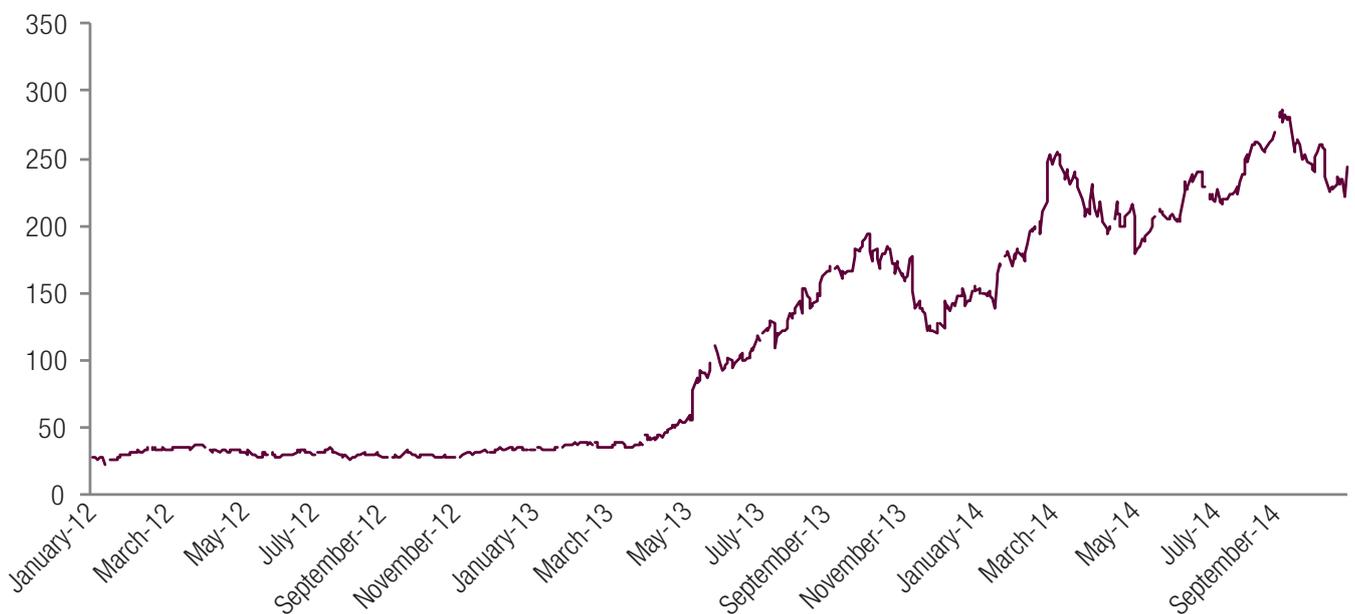
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Tesla has opened up its entire patent portfolio to speed development of electric vehicle technologies.
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Tesla is determined to do things differently. In 2014, it announced the set-up – by 2020 – of a Gigafactory battery-manufacturing plant that should reduce the company’s battery costs by 30%². In June 2014, Tesla also announced the opening up of all of its patents related to electric vehicles, so as to speed up their development across the industry³. Investors have consistently placed their faith in Tesla, as its share performance shows. Between January 2012 and October 2014, Tesla’s share price increased from ~\$27 to ~\$250 (see Figure 2).

Tesla’s competitors have reportedly set up dedicated task forces to understand this innovative new competitor. What is it about Tesla that excites such attention? The answer is the way Tesla has used digital technologies to transform the traditional road taken by an automobile manufacturer. Tesla has adopted digital technologies like a true digital native.

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Tesla’s Gigafactory is expected to reduce the company’s battery costs by 30%.
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Figure 2: Tesla’s Share Price in USD: January 2012 – October 2014



Source: Yahoo Finance

A Disruptive Business Model to Break into a Traditional Industry

Tesla's accelerated performance can be boiled down to three broad technology-driven choices that the company made. These include cutting out the middleman dealership, extensive use of technology both in the car and in its production, and changing the rules of production and innovation in the automotive industry.

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Tesla has turned the traditional car dealer network on its head with its direct-to-consumer model.
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No More Middleman: Creating a Direct Digital Connection with Customers

Tesla has turned the traditional car dealer network on its head with a direct-to-consumer model. The company refrains from using middlemen and all its sales orders are taken online.

For customers wanting to view the car prior to purchase, Tesla has exclusive company-owned stores that are focused on engagement and interaction (see Figure 3). While actual selling at these stores is restricted, interactive touchscreens showcase the vehicles' innovative technology. Information kiosks address the most pressing questions that customers tend to have about owning and using an electric vehicle.

Tesla has made user forums a key part of the online experience. It encourages its user community to interact with the company – and each other – in total transparency on the Tesla website. This approach creates a rich content base and demonstrates to prospective buyers the passion of Tesla owners for their vehicles⁴. Taking constant feedback from customers is something that CEO Elon Musk takes seriously, stating: “I think it's very important to have a feedback loop, where you're constantly thinking about what you've done and how you could be doing it better⁵.”

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Tesla stores serve the sole purpose of increasing visibility of its cars.
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Figure 3: Tesla's High-Tech Showroom



Source: TeslaCentral.com

Tesla also ensures that each vehicle in its Model S series is bespoke and tailored to individual customer tastes. You can use a Tesla configurator to choose your preferred paint scheme, interior, wheels and roof type. Customers can save their car designs at the kiosks and access them seamlessly across multiple devices such as PCs and tablets.

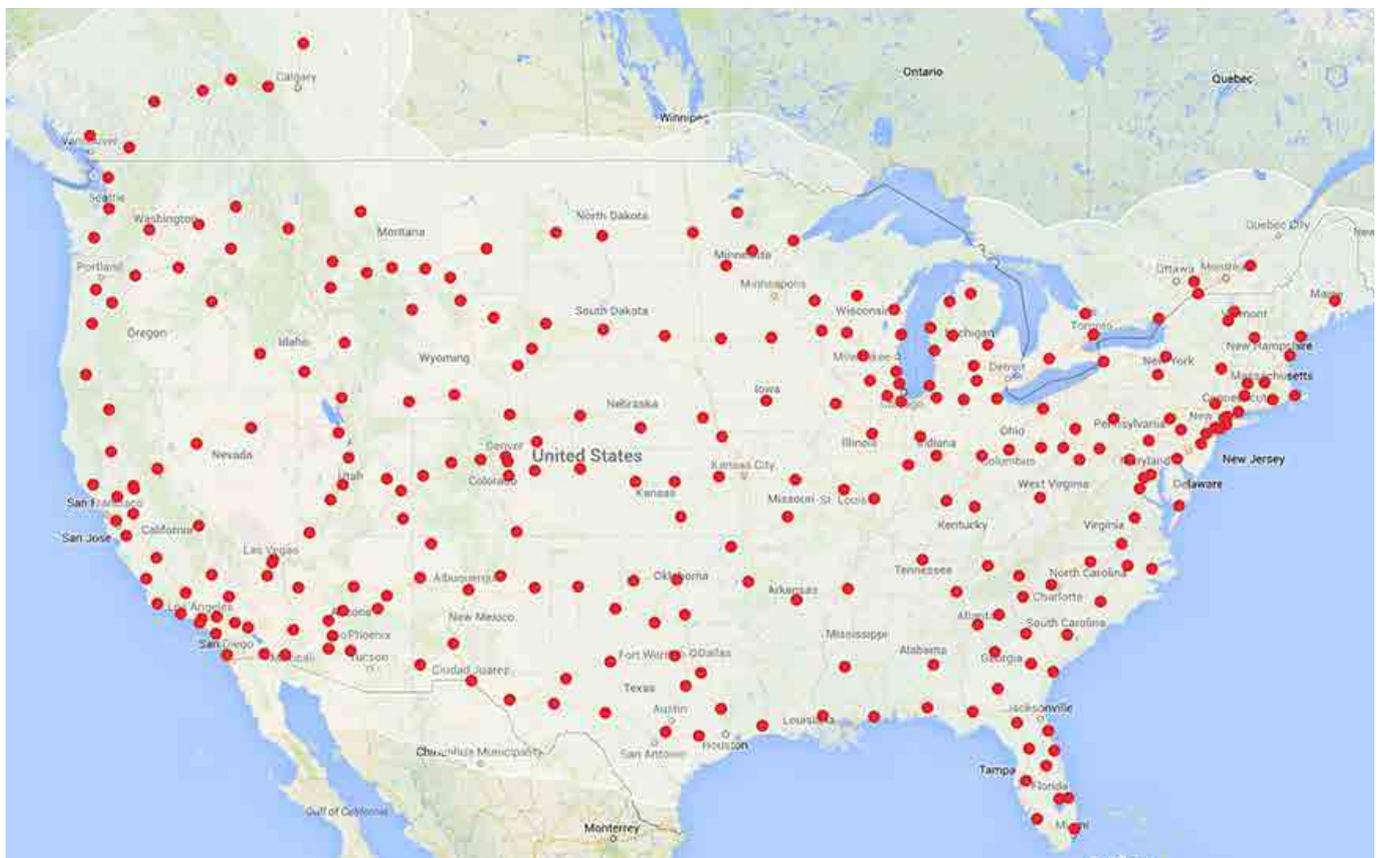
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Tesla also tackled head-on the twin challenges that hold back adoption of electric vehicles – lack of adequate charging infrastructure and anxiety about the driving range that can be achieved⁶. A recent survey in the UK cited lack of charging points and range anxiety as the top two reasons for not buying an electric vehicle⁷. One way that Tesla is allaying customer anxiety is by building a network of charging stations across its key markets. In the US, for instance, the company is aiming to cover 98% of the population with its charging network by end of 2015 (see Figure 4). The company is also currently offering free charging to its customers. In many charging stations,

Tesla uses solar panels to offset energy use. These ‘Superchargers’ are capable of replenishing half charge of a Tesla Model S in as little as 20 minutes⁸.

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Figure 4: Tesla’s Proposed ‘Supercharger’ Network by end 2015



Source: Company website

Tesla also offered all of its Model S customers free data connectivity as well as Internet radio for four years⁹. All of these aspects have helped reinforce its customer centricity. The results are telling. In 2013, the Tesla Model S received an owner-satisfaction score of 99 out of 100 in an annual owner-satisfaction survey by Consumer Reports¹⁰.

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Making Battery Replacement Easier than Refueling

Tesla announced in 2013 an upgrade to its supercharger station – the Tesla Station. These stations would be capable of both supercharging the battery in under an hour or swapping the battery and replacing it using a robotic arm. Such a battery swap takes less than 90 seconds, which is less than the time required to fuel a regular car. While the pricing is still to be established, Tesla has said that it will cost roughly equivalent to 15 gallons of gas (\$60--\$80). Customers will be given the option of either going in for a free (but slow) charging facility that takes one hour, or they can opt to swap their batteries for a cost. Tesla has said that the first swapping station will be up and running by December 2014.

Source: Extreme Tech, “Tesla demos 90-second battery swap tech, coming to Supercharger stations in 2013”, June 2013; SlashGear, “Tesla’s first battery-swap station opening by year-end”, October 2014

The Four-Wheeled App: Digitizing the Heart of a Car

While the digital customer experience is a top priority for Tesla, the superlative driving experience is also the result of a sustained investment in digital technologies. Tesla is using digital technology to redefine how its cars are designed, built, and driven.

Using Technology to Drive Advances in Car Design

“Think of the Model S as an app on four wheels,” says the Tesla website. Given the amount of computing power that is inside the car, it could be described as a Formula 1 app. The impressive technology within the car, which is built on Tesla’s own operating system, is controlled by a touch-screen user interface (see Figure 5).

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Think of the Model S as an app on four wheels.
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Figure 5: Tesla Model S’s Digital Interior



Source: Cleantechnica, “Tesla Adds First Driver Assist Features To Model S”, October 2014

The interface not only controls all the basic functionalities of the car, but also allows you, at your convenience, to add future functionalities through software updates. In the past, Tesla has made features such as hill start assist, traffic-based navigation and remote start available through remote software updates. Effectively, this changes the time-cycle for feature enhancement from days (involving trips to the service station) to minutes (done anywhere).

'Appifying' the Car's Controls

While Tesla has used digital technologies significantly in the design of the car and its actual production, the company has also made sure that the technology extends to the customer. The Model S includes a mobile app that you can use to monitor and control the car's charging process and remotely adjust the temperature using climate control. You can also check the status of charging, start the car, track the car's location in real time, and identify where it is parked by remotely activating its lights/horn.

Using Analytics to Enrich After-Sales Service and Drive Customer Satisfaction

Tesla's cars are connected wirelessly to a remotely managed central corporate office. Each car generates huge amounts of data. This is then analyzed, with any required enhancements made remotely to upgrade the car's systems. Upgrades, which are rolled out every quarter, tend to be about the car's safety parameters or adding new features or hardware changes¹¹. For instance, in 2013, when three Tesla Model S cars suffered burn-outs, the company released an update to change its vehicle's suspension settings. This gave the car more clearance at high speeds, thus averting similar problems in all future models.

Using Advanced Robotics to Drive Manufacturing Process Efficiencies

Tesla has installed 160 robots at its assembly line¹². While typical robots in the automotive industry perform a single function, Tesla robots perform 4 tasks on the Model S car¹³. For instance, a robot at the Tesla factory can be involved in welding, riveting, bonding and installing a component, while other robots typically do only one job. This level of automation resulted in the company achieving a gross profit margin at 25% in Q4 2013, compared to Ford's 15.5% and General Motors' 12%¹⁴.

The use of robotic systems also extends to recharging the car's battery at Tesla's Supercharging stations. The company's latest system removes the old battery and replaces it with a new one in 90 seconds, as opposed to the earlier charging time of one hour¹⁵.

“Unlike typical automotive industry robots, Tesla robots perform 4 tasks on the Model S car.”

In-house Development

Another key differentiator for Tesla is the scale of vertical integration that it undertakes. The company makes most of the components used in its Model S vehicle, in contrast to the industry standard, where components are sourced from third-party suppliers. This approach delivers both quality and cost advantages. It also allows Tesla to

innovate quickly in creating and executing new designs and their associated components, such as batteries, electric motors, and control systems.

“The company makes most of the components used in its Model S vehicle, in contrast to the standard industry protocol of sourcing components from third party suppliers.”

Tesla realized that it needed to have its own IT solutions to drive production volumes and build its online model. Tesla therefore built its own internal ERP system and e-commerce platform¹⁶. Tesla's CIO and his team built the system in 4 months. As the CIO says “I'm super confident that it's going to be able to scale very well. It's now one of the best systems we have¹⁷.”

High-Velocity Innovation: Changing the Rules of Automotive Innovation

Tesla does not see itself as just another car manufacturer – it is a change agent in the automotive industry. This philosophy can be seen in a range of actions. The company open sourced all of its patents related to electric vehicles. The idea is that other auto companies will share theirs as well and, collectively, the industry can progress more rapidly towards the development of electric vehicles. Elon Musk says: “What we are

doing is a modest thing. You want to be innovating so fast that you invalidate your prior patents, in terms of what really matters. It's the velocity of innovation that matters¹⁸"

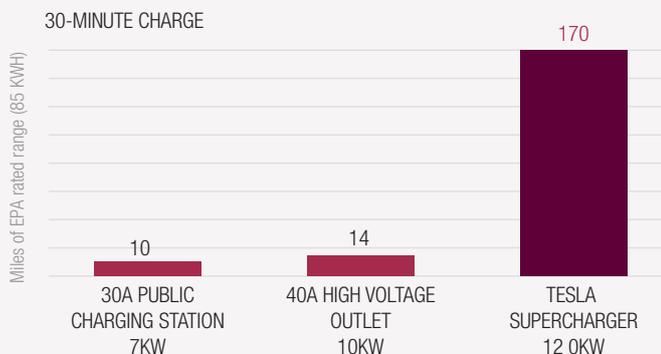
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In its proposed new swapping station, Tesla uses robotic arms to swap the exhausted battery with a new one in under 90 seconds.
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Similarly, the state of battery technologies is one of the biggest challenges facing rapid development of electric vehicles. Tesla has already announced plans to set up a “Gigafactory” to be used to manufacture Lithium-Ion batteries used in electric vehicles. The scale of production is projected to be so high that, by 2020, it is expected to produce as much battery capacity as the entire world produced in 2013¹⁹. Japanese technology major Panasonic has already joined forces with Tesla in constructing this factory. Tesla

already supplies electric vehicle batteries to other automobile manufacturers, such as Daimler AG and Toyota. Through both open sourcing of its patents, as well as setting up a gigafactory, Tesla is pitching for the vanguard role in the digital automotive industry – one that is free of fossil fuels and heavy on technology usage.

A Factory for the Future

Tesla's innovative battery and charging technology has given it a competitive advantage and meant its batteries are cheaper to produce and recharging its vehicles is quicker. A Tesla car charged at one of its supercharger locations for 30 minutes can travel as far as 170 miles, far exceeding the distance that can be achieved from a 30 minute charge at other charging stations.



To drive even more efficiencies in car batteries, Tesla plans to build a “Gigafactory” in partnership with Panasonic to produce lithium-ion battery cells. The company also hopes to run its factory entirely on renewable energy by building solar and wind facilities. The Gigafactory aims to employ about 6,500 people and produce about 50 GWh of battery packs per year by 2020.

Source: Mashable, “Tesla Announces Game-Changing ‘Gigafactory’”, February 2014

Staying Ahead of the Digital Curve

Tesla's success is a function of its digital-savvy leadership, its technology-centric vision, its commitment to partnerships, and a sustained investment in recruiting digital talent.

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Elon Musk was named Industry Week's Technology Leader of the Year, Fortune's top people in business in 2013 and was ranked #1 on Vanity Fair's "The New Establishment" 2014 list.

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Technology Savvy Leadership

Tesla CEO Elon Musk has a proven history of successful leadership. He co-founded the payments company Paypal, eventually selling it to eBay. He has also started another company, SpaceX, a space transport services company with the goal of reducing space transportation costs and enabling the colonization of Mars. He has often been compared to late Apple founder Steve Jobs in terms of his vision and leadership and was named Industry Week's Technology Leader of the Year.

A Technology-Centric Vision

Elon Musk has a clear vision for the company: "Our goal when we created Tesla a decade ago was the same as it is today: to drive the world's transition to electric mobility by bringing a full range of increasingly affordable electric cars to market". A distinctive philosophy and commitment to technology form a powerful rallying call for the company and its people: "The overarching goal of Tesla is to help reduce carbon emissions and that means low cost and high volume. We will also serve as an example to the auto industry, proving that the technology really works and customers want to buy electric vehicles²⁰." This

technology-centric focus has also rubbed off on other automotive majors. Leading companies such as GM and Ford are said to have hiring software developers by the hundreds²¹.

A Laser-sharp Focus

One of the biggest reasons for Tesla's success can be traced back to its technology industry roots – focus on doing one thing at a time and do it perfectly. Tesla kept down the overall portfolio of its cars and its focus on the

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We will also serve as an example to the auto industry, proving that the technology really works and customers want to buy electric vehicles.

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*– Elon Musk,
CEO Tesla Motors*

premium market both with its Model S and the upcoming Model D. The focus is on selling one car at a time. Elon Musk shared Tesla's 'Master Plan' a few years back when he outlined four key steps, and Tesla is sticking to that very closely²²:

- Build sports car.
- Use that money to build an affordable car.
- Use that money to build an even more affordable car.
- While doing above, also provide zero emission electric power generation options.

Building a Digital Talent Pool

Tesla has created a digital security unit to address the security concerns that result from a car that is connected to the Internet. The unit is even recruiting a dedicated team of hackers who help identify potential bugs within the system.

In line with Elon Musk's desire for the company to develop its own "autopilot" technology, Tesla is also hiring engineers for its autonomous driving unit to develop a self-driving car. For the initiative, the

The Future is Already Here – Model D

In 2014 Tesla unveiled its Model D, a variant to its Tesla S sedan. The car will travel from 0 to 60 mph in 3.2 seconds while reaching speeds of 155 mph (250kmh). The features put the car in the league of one of the fastest sedan vehicles on the market.



The Model D is packed with technology, including advanced safety features. Its sensors are able to detect the presence of small children or dogs and it will avoid collisions. Additionally, the car has the ability to "read" speed limit signs and adapt accordingly. The Model D also offers an autopark feature that parks the car once the owner steps out of the vehicle. Owners, when on private property, will even be able to summon the car to pick them up autonomously.

Source: Wired, "The Model D Is Tesla's Most Powerful Car Ever, Plus Autopilot", October 2014

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Tesla has a reasonable chance of rocking the trillion-dollar car industry by flooding the market with fun-to-drive EVs.

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- Morgan Stanley

company has hired executives with expertise in robotics for leadership positions.²³

Forging Partnerships to Drive a Connected Car Experience

Partnerships play a key role in Tesla's game plan. These include partnerships with telecom operators, content providers and ecommerce platforms among others. For instance, Tesla has partnered with AT&T in the U.S. and Telefonica and TeliaSonera in Europe to provide Machine-to-Machine connectivity for its Model S vehicle. The partnership is aimed at enabling connectivity for Tesla's infotainment telematics, the car's two-way vehicle communications and remote vehicle diagnostics²⁴. Similarly, the company has partnered with large online platforms to sell its cars as well. For instance, in China, Tesla has partnered with Alibaba to enable its customers to book cars online²⁵.

Tesla has begun paving the way for international expansion of its electric vehicles. Europe already accounts for 18% of current sales and the company is looking to expand across 15 countries including China, Australia, and Hong Kong²⁶. Elon Musk wants to deliver 250,000 to 500,000 vehicles-per-year globally by the end of the decade, stating: "We have a lot of work to do. We'll do our best to make it happen²⁷."

In a recent report, Morgan Stanley has said: "Tesla has a reasonable chance of rocking the trillion-dollar car industry by flooding the market with fun-to-drive Electronic Vehicles²⁸." The Tesla story is one of singular ambition and bold vision, fuelled by technology. The company has blazed a trail through a traditional industry, using digital to ensure it stays a lap ahead of the competition.



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