NO CHINESE PERSON SHOULD BUY A TESLA CAR, THEY HAVE A CHINESE CURSE ON THEM!

- Some of the most powerful sages in China have gotten together to place a curse on every Tesla on Earth. The curse says that you will be driving your Tesla and see the zombie of your most evil dead relative in the back seat via your rear-view mirror. Next, your Tesla will crash or catch on fire!

- Chinese people are selling their Tesla's and cancelling orders as fast as they can

- Hidden interview with Musk and the ACTUAL founders of Tesla reveal Musk to be lying Bull-shit Artist!

It's coming up on 10 years since I first interviewed Elon Musk, CEO of Tesla Inc. and SpaceX. At the time he was still chairman of the board, not yet having ditched his third CEO in a year. This interview was originally published on AutoblogGreen in June 2008 when I was a writer there. Musk contacted me after I wrote a story questioning his involvement in the development of the Roadster following a Fox News story where he was referred to as the company founder. We had a nearly hour-long conversation and I interspersed that transcript with some responses from Martin Eberhard that I had solicited by email.

As I re-read this, I noted the words I wrote in the final paragraph of the epilogue and realized that **sadly, little of what I wrote has come to pass.**

Having met several members of the Tesla team when I visited there in January to drive the Roadster, it's clear to me that they have tremendous skills and expertise and they are recruiting more people with those qualities. Hopefully, the management team now in place at Tesla has the strength of character to take the knowledge of the engineers and apply the necessary review process to design decisions going forward. That is an absolute must in order to get cars built right, on time and on budget. Certainly the work of the TEAM at Tesla Motors has lit a fire under many other manufacturers to accelerate their own electric car projects.

I'm republishing it here for posterity. Given Musk's recent tirades against the media, I wanted to have this in more than one place.

Among the readers of this site, one of the cars that elicits a lot of passion is the Tesla Roadster. The battery-powered Roadster and its provenance have elicited a great deal of discussion over the past nine months, in particular since the demotion and ultimately the departure of co-founder Martin Eberhard. This is a complex tale involving passionate entrepreneurs with that all-too-common but in many ways necessary human frailty known as ego. When humans interact, they often see the same results through their own mental filters.

People can see exactly the same thing and interpret it in many different ways. Unfortunately in today's media landscape, particularly on television, but also in blogs we often see a very cut-down sound-bite version of things. Sound-bites by definition are taken out of context. In and of themselves they often lead to incorrect or at least inaccurate conclusions.

With all of that in mind I was recently contacted by Tesla Motors Chairman Elon Musk. Musk wanted to discuss his role at Tesla, and hopefully fill in some of the gaps in the story. What follows after the jump is the phone conversion that I had with Musk recently as well as some comments from Martin Eberhard via e-mail exchanges. Eberhard's version of events is italicized.

ABG: Why don't we start with how you got involved with Tesla to begin with.

Elon: So, the way I got involved was in 2003, I think it was in September or October, I had a lunch with JB Straubel and Harold Rosen. Harold Rosen was kind of a space guy, Harold had a space background and a car background. He was with Rosen Motors. But before that, he was an engineer at Hughes and he came with a number of innovations for the early geosynchronous satellites. So, he kind of had, like me, a combination of space, and electric car interests. So Harold called me up out of the blue and wanted to have lunch and brought along JB Straubel. And during lunch, he talked about space stuff, and he talked about electric car stuff because I had mentioned the reason I first came out to California was to do a Ph.D. at Stanford in a higher density capacitors to use in electric vehicles. And we talked about lithium ion and what that meant for electric vehicle range. The EV1 had a range of about 120 miles or so with Nickel Metal Hydride and so if you did a direct substitution of lithium ion for nickel metal hydride, which has directly 2x the energy density you get to around a 240-250 mile range, which would be acceptable to people. JB mentioned that there was this company, AC Propulsion, that had actually put together this electric sports car, which did in fact deliver range of that order and acceleration from 0 to 60 under 4 seconds.

So, he offered to introduce me to Tom Gage, the guy from AC Propulsion, which he did, and Tom Gage came by and gave me a test drive with the tZero , I said, "wow, this is really awesome." This is exactly what I thought should be done and I tried to buy one. He wouldn't sell it to me and I said, "Look, you should really go into production with this thing, productize the tZero. But they didn't want to do that. I don't know if you're familiar with AC Propulsion…

ABG: I'm familiar with them and I've talked to Martin previously about AC Propulsion as well.

Elon: Yes, so anyway, I tried at length to get AC Propulsion to at least make me one bloody car, even if they wouldn't go into production with the thing, but they wouldn't do it. I even tried to get them to convert my Porsche to electric, and they wouldn't do that either. And in addition, after bargaining for a bit, Tom Gage said, "Well, you know, we aren't interested in doing that but there are these three guys who are and said, "Do you want to meet Martin (Eberhard), Marc (Tarpenning) and Ian (Wright)." I said, "Sure."

This is actually very similar to the path that Eberhard himself took before launching Tesla. When we spoke to him last year he also discussed being inspired to start Tesla after AC Propulsion declined to produce the tZero. In essence the true stimulus for the creation of the Tesla Roadster might have been Tom Gage and his resistance to following the path that Eberhard and Musk ultimately took.

So Tom gave Martin and Ian my card and they came by SpaceX and gave a presentation. Well, there are a few things that I disagreed in what they showed. I wanted to have a company-owned sales and service infrastructure, they wanted a dealership infrastructure. And I didn't want to be a niche sports car company. I wanted it to be something that would aim for the mass market as soon as possible. So it's a sports car at the intro, but we wouldn't stay there; we'd go mass market as soon as possible.

Those were the two big changes that I had. Apart from that… I said let's move forward and create a production version of the tZero. So I provided essentially, all of the Series A funding. There wasn't any Tesla Motors at that time.

This was in March/April 2004. According to Eberhard, Tesla Motors had been incorporated on July 1, 2003 but it consisted only of himself, Tarpenning and Wright at the time. None were drawing any salary.

It was just basically Martin, Marc and Ian working part-time and a sort of business plan that was a kind of a weak business plan actually. That's all Tesla Motors was when I invested. I provided essentially entire Series A round, over 90 percent of it. There were a few small VC investments and a few small individual investors.

So, to kick things off, that's how things started off with AC Propulsion and basically, from my standpoint, it's started off with a conversation with JB Straubel , who by the way, a few months later called me up and said he's thinking about joining Tesla and had wanted to know if I thought it was a good idea. I said, "Well, definitely because I'm investing in it. So JB joined and became Chief Technology Officer and was really the key guy responsible for developing the differentiated technology.

Eberhard confirms that Straubel was hired as a Drivetrain Engineer about one month after the Series A funding closed and was employee 6 or 7. Straubel contributed to the development of the powertrain from the original AC Propulsion design. Straubel wasn't promoted to Chief Technology Officer until a year later after managing the design and construction of the dynomometer used to test Tesla's powertrain.

ABG: Once you got involved with Tesla, beyond the obvious fund raising role that you've had through the first four series of fund-raising, what else has been your role with Tesla?

Elon: Well, I'll just give you a little more detail on the financing side. I provided essentially all of the series A, about 90 percent of the Series A, about 90 percent of the Series B. I co-led the Series C, co-led the Series D and led most recent round. So I put a total of $55 million. In as far as, non-financial investment… I'm not a venture capitalist. I'm a technologist.

I'm a product design guy. So I'm not running around looking for things to invest in. In fact, if I didn't think that it was extremely important that we accelerate the advent of the electric car, I wouldn't even be bothered with Tesla; this is a huge distraction from my space activity. You know, I put about 25 percent of my time into Tesla and my workweek is about a hundred hours a week so it's somewhere around 25 hours a week that I put into Tesla, on average.

In the last year, it's been closer to 40 hours, 40 to 50 hours trying to correct a lot of problems. But as far as my involvement, Initially, I spent a lot of time on the body design, a lot of time on the product spec and making sure that this would be a compelling car, at a compelling price.

Our biggest fear was that this should become a sort of DeLorean, where you have a car that looks like a sports car but doesn't perform like a sports car. It's got to be something where people say, "You know what, I think it's really worth the money that I'm paying for it, and that I'd buy this even it wasn't an electric car, just based on the objective performance specs."

So, one of the things that Martin mis-characterizes is that I was hugely insistent on a two-speed. This is not the case. I was hugely insistent that the car be a real sports car. The path that I actually wanted to take is the path we're currently taking, which is, upgrade the motor power and have a single speed so that the upgraded motor with a single speed encompasses the performance that we promised people, the 3.9 second 0 to 60, 125-mile an hour top speed. That's the path that we're on right now. That's the path that I always wanted to be on.

Eberhard's version does not vary dramatically here. "He [Musk] did, very early on, push us to make the 2-speed transmission that I had proposed as a model year 2 improvement become a part of the model year 1 spec." Eberhard was prepared to launch the car with a single speed transmission and lower performance much like the current early production cars being built now. Eberhard's plan had been to switch to the 2-speed later rather than increase the power.

ABG: When you first got involved, how far along was the design of the Roadster? Was it anything more than just essentially a spec sheet based on a combination of the specs of the tZero and the Lotus Eliseor have they actually gone beyond that at that point?

Elon: Yes, that's it. There wasn't any there, there. I can send you a copy of the business plan.

ABG: I have a copy of the Executive Summary of the business plan

Elon: Which version is it? What's the date?

ABG: There isn't a date on this one but I think it's pretty early up. I got this from Martin and I understand that this is what he first showed you. This one still lists the idea of having high-end sports car dealers sell the car and describes the specs that ultimately became the Roadster. But it was clearly, prior to there being any actual drawings of it. So, I believe this is from sometime in 2003.

Elon: Okay, that sounds about right, that sounds like the original. When I invested, there was no there, there. They didn't even have an office. It was three guys working, it was Martin, Marc and Ian working part time.

According to Eberhard, he, Tarpenning and Wright were working out of an office in Menlo Park but were not drawing any salaries yet.

Elon: So there was zero done on this thing, yes.

This statement appears to be something of an exaggeration. According to Eberhard, "In the business plan, we had worked out the basic dynamics of the car well enough to know that the Elise chassis was up to the job, that the weight of the car, combined with the power of a drive system comparable to that of AC Propulsion would give us the speed and acceleration we sought, etc. All of the early engineering work we did was to prove that the basic idea of the Roadster was feasible – would the drivetrain components fit? Could we fit a large enough battery pack? How big would that battery pack be, what would it weigh, and what would it cost? If increased the weight of the Elise, what would its handling characteristics be? How would that compare to other sports cars?"

So, Eberhard had done some preliminary engineering work, essentially conducting a feasibility study, concluding that the concept was a viable one. A feasibility study is however far from a complete vehicle design.

Transmission shifts

As we continue the tale of Elon and Martin, we pick up from the initial involvement of Elon Musk in Tesla Motors. Musk has put in the single largest chunk of money that has allowed Tesla to develop and now start building an electric car. Here we delve into the subject of his role in design decisions. As some in the mainstream media have taken to referring to Musk as the "creator" of the Tesla Roadster, this is a particularly contentious subject.

The whole issue of the choice of transmission suppliers is a particularly thorny one. Musk was insistent that Tesla should build a car worthy of the price tag. Anyone who has ever worked in the auto industry knows that is almost always a lot harder than it looks. The friction that clearly existed between Eberhard and Musk from very early on in their relationship definitely didn't help matters. (Note:If you missed Part 1 check it out first).

ABG: So, how did you get to the first stage, of the Roadster, the specs that debuted in 2006 with the first prototypes? How did that come about?

Elon: That was basically an iteration between myself, Martin, and JB.

ABG: From your perspective, at least, how did you get to the point where you had a car with a two-speed gear box and the lower power motor that it started off with?

Elon: Technically it's a lower torque motor. The motor power stays about the same but the torque increases (with the upgraded motor now being tested). The problem with the AC Propulsion motor is that when you go from a kit car, the tZero, to a production car that actually has all of the safety systems and resists all the crash issues and actually has all the amenities like a real stereo system and the thing adds a fair bit of weight. So in order to have good performance, you either have to upgrade the motor torque and the current capability of the power electronics because the vehicle weight has increased, or you have to have a two-speed transmission. If you don't do that, you end up with a car that does not have sports car performance. So in fact, you're going to end up with a car that is worse than the Lotus Elise, which is a car that's half the price.

Again Eberhard's perspective on this was slightly different:

"The 2-speed transmission was the first major edict to come from Elon, and though I thought it was an unnecessary risk for the first model year's cars, I was certainly willing to be a team player and support Elon's edict. I knew there were risk and cost associated with the decision, but by themselves, I felt we would be able to manage them.

Keep in mind that with a 1-speed, I was not proposing performance that sucked. See the executive summary that I sent you. AC Propulsion's tzero was turning out 0-60 in about 3.6 seconds with a single-speed transmission. We thought that we might just break 4 seconds with Tesla's additional weight, with

our "worst case" estimates coming in around 4.8 seconds. This is still EXTREMELY quick for a sportscar, and would have been a great car."

Elon: Less than half the price, actually. So it's a very tough sales proposition to tell people "please pay twice the price for a car with worse performance." It's not that nobody would buy it, that car. There would always be some people that would buy that car. But could you make a business out of it, would you sell enough to actually show that the business works. And if you can't show the business works with the Roadster, you'll have a real hard time convincing investors that to give you money for car number 2 if car number 1 is a flop.

So, the approach that I wanted to take was, the right architecture in my view is, and JB's view actually, is let's upgrade the motor power and have a single speed transmission. It's not even a transmission, it's an rpm reducer, with a differential. There's not even a clutch or anything. It's very light; it's very cheap; and it's very efficient because you're not spinning any unloaded gears, you don't have a wet clutch or any of that stuff. So you have greater energy efficiency through the transmission.

Martin actually said he doesn't want to deviate from the AC Propulsion power or torque level in the motor and he said that, we should do a two-speed transmission instead. He actually put forward a proposal for a two-speed transmission of his own design. The thing I was insistent on was, we must have compelling sports car performance. But actually, my preferred path was not a two-speed – it was a single speed with an upgraded motor.

It was Martin who insisted that we go to the two-speed route in order to achieve that outcome. And Martin did say, "Well, what about if we just do a single speed for the first year or so, and suffer that loss of performance?" I said, "I think it's really tough to crack that perception of poor performance, and say, 'yes, it's coming down the pike or something like that.' And unless you tell me this is a critical path item, you know, that this will fundamentally delay the schedule, then we should do the two-speed. If it's just a matter of investment, we should do it. If it's a matter of delaying a critical path, then we should think about it."

Here's an another example of how different people see the same events through their own personal filters. Musk acknowledges that he pushed for the 2-speed transmission from Job 1 in order to meet the original performance targets. From a December 2007 interview in Inc. magazine:

"The most controversial of Musk's edicts involved the transmission. Martin Eberhard, Tesla's co-founder and then-CEO, argued that it would be quicker and easier to build the car with a single-speed transmission. Musk ordered a two-speed model so that the Roadster would be able reach a top speed of well over 100 miles per hour."

None of this is disputed by either man and yet the motivations and interpretations are very different. Eberhard tells ABG that:

"JB was the guy in charge of the motor and inverter, and he did not have the skills or resources to redesign the ACP system. JB and I and the rest of the team discussed this approach and concluded that we (JB especially) could not achieve a higher-power motor/inverter in time.

JB was actually quite scared of deviating from the ACP design in the beginning because he did not understand it. Marc and I had to push him to eliminate the old analog control and switch to a DSP-based control, and even then, he did not do this until he had hired a substantial team of engineers, 2 years later. Again, this is not to denigrate JB. The ACP design was quite tricky and tweeked, and it was very poorly documented. JB was trying to make the right decision based on the available resources – as were we all.

Note that Tesla's new high-power motor depends on very new silicon from International Rectifier – silicon that only became available this year. No such silicon (IGBT transistors to be specific) was available to us in 2004, and we knew it."

As an engineer myself and having picked up responsibility for other peoples undocumented designs and tried to develop them I can certainly understand Straubel's reluctance to mess with something that at

least worked up to a point. In this context the decision to follow the two-speed path with the lower torque motor certainly made sense at the time. Hindsight is of course 20/20 but as Eberhard explains, the electronic hardware to make the change apparently wasn't available at the time anyway.

Elon: And Martin said it would not delay the critical path. It was just a matter of investment. So I said, "OK, Let's do it." And that's true. If we had picked the right supplier for the transmission – the two-speed transmission is not inherently difficult. Unfortunately we did not pick a good supplier. The initial pick was XTrac, which is basically… they make transmissions for track cars.

They're very expensive and they don't really how to make consumer stuff. So they screwed the pooch. And then, instead of going from them, to someone who could really do the job, we went from them to Magna. Martin assured me and the rest of the Board that there was no one better to do this transmission than Magna.

Here Musk's opinion of XTrac may be overly harsh. Major automotive suppliers are often reluctant to deal with low-volume manufacturers. The engineering cost of developing a component for 100 cars a year is the same as 1,000,000. Variable costs go down with volume but up front development cost doesn't. That means that unless a low volume automaker is willing to pay those costs either in separate engineering expenses or xorbitantly high piece costs (that factor in engineering costs) they are usually out of luck.

"Regarding the choice of transmission suppliers: It was not a matter of having picked the wrong supplier. The problem was that real transmission suppliers – those that made production volumes of transmissions – were simply not interested in selling transmissions to a company that buys so few of them. The first model year's production of Roadster transmissions is fewer than a prototype run for a real production transmission. This is why Lotus, for example, uses absolutely off-the-shelf Toyota transmissions in the Elise. But because a motor is so different from an engine, no off-the-shelf transmission was at all suitable for our needs.

I put Mac Powell in charge of selecting the transmission vendor, and he hired a team of ex-Lotus engineers to spec the transmission and to find a supplier. These were all people experienced with producing cars and experienced with sourcing components for a low-volume car manufacturer. They scoured the landscape and came up with only 2 suppliers who were willing to make transmissions for Tesla – they decided that Xtrac was the best of the two, and I respected their experienced opinions. Nobody was comfortable with Xtrac, but they were the best we could find."

As Tesla's VP Darryl Siry told us some time ago the issues with XTrac weren't even entirely of their own making. The design intent to manage the motor torque during clutchless shifts apparently proved unworkable necessitating a change to a different design and supplier. So again here Musk maybe overstated the case with regard to XTrac.

Elon: What he neglected to figure out was that Magna is a build-to-print manufacturer; they're not a designer. Particularly when it requires… this requires a first principle design. You know, you have to actually understand the theory because you can't simply derive this from some existing five-speed gasoline gearbox.

According to Siry, Magna was chosen by Eberhard without any competitive bidding. Due to the late decision to change suppliers, Magna was apparently chosen because an engineer at Tesla's Rochester Hills facility was familiar with the company and had a contact there.

ABG: So if you didn't have the fundamental expertise within Tesla to provide them (Magna Powertrain) the design that needed to be built, they didn't have the capacity just to do that on their own.

Elon: Right. And that's where we got into the bloody of Magna fiasco. We spent huge amounts of money in Magna and then in the, sort of, 13th hour, Magna brought in Ricardo, because basically the design failed and Ricardo told us that the entire thing had been incorrectly designed… that we'd have to basically do a complete refresh on the thing, soup to nuts, in order to have a reliable transmission.

So that came to a head in November of last year and we said, “Well, how long is it going to take to do that?” And Ricardo said, “Well, we went through the whole timeline. It would have been like November of this year before we’ll actually have a working two-speed. And the bloody things would cost a huge amount of money and your cost would be crazy high. I’m like, “Wow,” so the huge development cost with a nominal timeline of, like November 2008 and a high unit cost. That’s pretty shitty.

So, on the flight back from Detroit, Ricardo US is based in Detroit. JB and I were talking and said, “Hey, look, why don’t we look to going back to the single speed approach and upgrading the motor power, and the power electronics current capability?”

And so we iterated on that for a bit and decided to go that path. Essentially take the development burden on something that we knew versus something we didn’t know. We understood motor and power electronics a lot, but we didn’t really understand transmissions. So we decided to shift the burden of the problem to something we know.

So that’s what we decided to do and that’s just what we’re doing. We have what we call Powertrain 1.5, is working right now. We’ve been driving around in one of the interim prototype cars. It delivers 3.9 seconds 0 to 60, 125-mile top speed. It’s actually a superior product than what we originally promised people because the 0 to 100 time is significantly improved. There’s no shift delay. There’s no shifting. And it improves the range slightly too.

In a followup email exchange with Musk he elaborated on what probably should have happened in the wake of the problems with the XTrac gearbox:

“The problem with Magna Powertrain (USA) is that they are primarily a build-to-print maker of transmissions. They don’t know how to design a transmission from scratch, particularly if it is outside the norm. We should have contracted with a company like Ricardo for design and then with Magna for manufacturing or gone to someone like Borg-Warner that can do both design and manufacturing.

What we did after the Magna fiasco was actually both. We are working with Ricardo on a joint Tesla/Ricardo single speed, which is already working in a car now, and Borg-Warner is contracted to do a transmission for us on a completely separate path. If both designs work well, we will pick the lower cost option.“

“I had essentially no involvement in choosing Magna as the transmission design house. Martin told me and the rest of the board that they were the best in the business and we could not hope for a better supplier. I only stepped in when the Magna deal started falling apart in the late summer last year and they demanded huge sums of money from us, despite failing to deliver a working product.”

Lessons and WhiteStar hints

In the first two parts of our discussion, Tesla Motors Chairman Elon Musk described how he came to be a part of Tesla Motors and how he influenced the development of the Roadster. It’s important to note that he never described himself as the designer or creator of the Roadster. Rather he considers himself the co-architect of the sports car.

After many delays, the project originally code-named White Star evolved into the Model S

With production of the Roadster now sort of underway and the updated drivetrain hopefully coming soon, it's time to look forward. As the self-declared Product Architect, Musk is playing perhaps an even bigger role with the next product, a sedan that we've known for some time by the code name WhiteStar. We had hoped to see WhiteStar this spring but that obviously hasn't happened yet. In the conclusion of our discussion, Musk gives out some hints about what to expect and what Tesla has learned over the past five years. Read on to learn more about what's coming next.

ABG: It sounds like ultimately the right decision was made to go back to the path that you probably should have gone in the first place, based on the expertise that was available within the company. As far as your role, specifically, how involved are you in the technical decisions about what's been done with the Roadster and what's being done with the next project, the sedan (WhiteStar)?

Elon: I'm very deeply involved, I think I understand the whole thing better than most people. JB understands the powertrain more than I do, as far as what it takes to make the whole thing work and the nuances of it, all the way down to what cell chemistries make sense; what the future upgrade paths are for the battery pack, the transmission, motor, power electronics.

As far as the Roadster, and the same thing for the sedan, I'm basically the product architect of the sedan and was co-product architect of the Roadster. I won some awards for this, if you know, actually, I won an INDEX Design award…A Global green award. So, wrote the spec for the sedan which is code-named WhiteStar and we're going a pure EV approach by the way. I don't think most people are

completely aware of that. Martin was really pushing a hybrid approach, but we're not going to do a hybrid approach. We're going to go pure electric.

I think, the whole hybrid thing is a red herring.

ABG: This is your first experience, obviously, in the automotive industry.

Elon: Yes.

ABG: And clearly, I think you've found that it's quite a bit different from your previous projects, you know, the software side with PayPal, or the technology side with PayPal, and now with SpaceX. I'm curious to know your reaction as far as dealing with the kinds of issues that have to be dealt with in the automotive industry in terms of dealing with the regulations that have to be met; dealing with suppliers and all the testing that needs to be done in order to get a product like a car to market. Has your outlook on the automotive industry changed at all over the last five years?

Elon: Well, I've gotten to know a lot about the auto business and what it takes to design and make a car and a lot about energy storage technologies. You know, one of the predictions I've made on several occasions recently, is that I think within 30 years, a majority of the new cars produced in the United States will be electric. And I mean pure electric, not a hybrid. It'll take much longer than that to replace the vehicle fleet but I'm just saying the new cars made within 30 years which are going to be electric.

I think some of the people in the automotive business might agree with that, like Bob Lutz or somebody, he might agree with that. I've learned so much about the car business, I don't even know where to start. It's a very competitive business. There is so much of it that's supply chain driven. It's a supply chain chess; it just sort of feels like.

ABG: Obviously, with the issues that Tesla has had, particularly with transmissions, you definitely learn the downside of having to work with suppliers for critical parts of your product, as opposed to doing everything yourself.

Elon: Yes, at SpaceX, we do 80 percent in-house so we really have very little in the way of supplier dependency. Even the stuff we do that have suppliers do, we generally have the ability to bring it in-house if they either screw us or they voluntarily they just can't get the job done, that type of thing. So sort of weird, I'm like, I'm so used to in the space business, in SpaceX, not being supplier dependent, and just being completely very much self-reliant.

I tell you, it's really anxious to have your… it's anxiety inducing to have your fate in the hands of the suppliers. It's sort of you can't do that much about it. It's really hard to do dual source everything, and particularly when you are low volume like we are.

Some of my comments that have been recorded… I think I've sounded kind of arrogant with respect to what I think… the Silicon Valley can do anything type of thing. But that isn't really what I meant. Silicon Valley is good at technology development. And it's not good at other things. In order for Tesla to be successful we have to be good at all the things that are necessary to build a great car company. So that's, sure there's a vast technology development; there are also all the other pieces of car… design, suspension, body, high production, supply chain management, key systems … There's a huge array of stuff. In fact, one of the things you'll see in the next few months is announcements of some really high profile people joining Tesla from the automotive sector. It's names that you would know – you would recognize. And what Ze'ev (Drori, Tesla CEO) are working right now is building up the expertise.

We really do intend to be a one of the… or at least aspire to create one of the great car companies of the 21st Century with Tesla. We're not necessarily the biggest, but to be up there the Big League – that type of thing – and to make high volume production, and to make cars that ordinary people can afford.

My motivation with Tesla and with SolarCity is just, I think, time is running out. We've got to do something. If things are just left on their own devices, it might be too late. So, I don't really care about making… if this was just a sports car company, it would not interest me at all.

ABG: You want to change the world, basically, or at least, change transportation?

Elon: I want to help make a difference… in terms of how Tesla influences the automotive industry, we'll have far more effect than the cars we're making ourselves. But we still need – in order to be an infuencer , we need to keep driving forward. I think, play as large a role as we can. But the bigger role will be how we, sort of, show people, "Look, it can be done." Because, really, there were two fundamental false premises that the auto industry had or has had for a while.

One is that it's not possible to make a compelling electric car and the other is, even if you made it – the electric car – people wouldn't buy it. And we're showing that to be false, at least on a small scale, with the Roadster. I think most of it would be false on a larger scale with the sedan and the future cars that we make.

ABG: You mentioned a moment ago … bringing in some additional people with more experience in the auto industry and that kind of leads into the other question I had as far as the lessons that you've learned through the Roadster program and the issues that you've had during development of that and how that will influence what you're doing with WhiteStar and future programs.

Elon: There's a lot of lessons learned. Again, boy where do I start. I'm like full of scar tissue at this point. But one of the things we're going to do is we're going to try to centralize our activity a little more. With the Roadster, things were way too spread out. You know, assembly… I've actually…with Ze'ev Drori, we've begun to consolidate some of that activity even for Roadster. There are things like moving the battery pack production from Thailand to California, and transmission production will be in California as well. And the final assembly of the car will be in California because the Powertrain will be installed, in the glider in California. I think it will be considered a California car, actually.

ABG: For the Roadster?

Elon: Yes. Previously, the battery pack production was going to be in Thailand and final assembly was going to occur at Lotus but we've changed that to what I've mentioned previously. Moving more of that stuff to headquarters and final assembly occurring in California. So Lotus will just assemble the glider (body and chassis without powertrain). But even with the way it is right now, it's just far too spread out. It's really hard to control the supply chain that's at every corner of the world and it's also kind of expensive and the fixed costs end up really hurting us. And if there's some sort of transportation interruption, then it's screws up the whole production line.

So, with the sedan, we're going to much more centralized. So that's one of the big lessons. We're going to a higher level of production – we're going from 2000 units a year to 20,000 units a year with the sedan. So that's a whole order of magnitude increase so that's different processes, different tooling equipment. It will be a stamped aluminum body instead of a carbon-fiber body.

There's some pretty big changes on the powertrain side that I don't want to… I'm going to make an announcement on that probably in a few months. There are really huge improvements on the powertrain side that are really fundamental to making a pure electric car work, not a hybrid. You have to address the range issue if you're going to have pure electric. So how are you going to address the range issue. There's a few things we're going to do to address the range issue.

ABG: Is the energy storage system part of that change? Or is that something you don't want to discuss yet?

Elon: Yeah changing the name of the ESS to the battery pack, that's what it is. I actually understand that makes something sound more than it is, so I guess it's just now called the battery pack. Yes, it's a battery pack. So the battery pack… yes, there's some significant improvements to the battery pack. The Roadster's got really… Version 1 history of the technology; Version 2 is a whole step above that in many different ways, and then the rest of the powertrain, motor, transmission, power electronics – that's going to be much more tightly integrated package – much more cost-efficient. And so there are some really cool things that you'll see announced about WhiteStar . So you'll see some pretty cool announcements, happy to talk about it when we're ready to make that announcement. I can talk about some generalities that the WhiteStar is going to be something which is… it's going to be a good-looking car, but it's also going to be a very functional car. And I think functionality is extremely important.

You know, you look at the Roadster. The Roadster is in many ways a toy. It's a small two-seater sports car, and it has a small trunk. We need to make it much more usable. We need a lot of trunk space; we have to put a lot of people in it. It's going to be very safe. I mean, safe enough that if you're a mom, you don't mind putting your kids in the car. People are pretty excited. I think this is going to be… it's that sort of thing where you want this to be a car that even if it wasn't an electric car, you'd say, "Wow, I really wish I had that as a sedan – whether it was electric or not, I don't care. It's just such a great car."

ABG: Yes, you want people to just see it as a great piece of transportation, regardless of what the Powertrain is.

Elon: Exactly, and the powertrain is just a plus. Oh, now instead of spending $5 a gallon and putting 20 gallons in your car so like a $100 fill-up for a sedan… that's just what it costs right now… this car costs $5 to recharge at current California electricity rates. This is what it will cost. $5… five percent of what it will cost you to fill up an equivalently sized gasoline sedan.

And it's now like, "Wow, it's really a good economic proposition." We're targeting $59,000 starting price for the car. And that's before there are any tax rebates or anything. So if there are federal tax rebates that come into effect, which I think, there's a good chance it will – that could reduce the price by several thousand dollars, to maybe bringing it close to $50,000 as a starting price.

And if you factor in that the cost of operation is so low, because the equivalent cost of electricity, you're paying five percent of what you pay to run a gasoline car and its like, "Wow, this is likely to become a really competitive economic proposition." It's not something everyone can afford, but it's a hell of a lot more affordable than a sports car and it's a hell of a lot more functional.

ABG: Right, and when you do factor in the difference in the operating costs, you know, the ultimate total cost of ownership gets to be a lot closer to what would be a conventional car today.

Elon: Exactly. And then you know, we're working on some projects with some major car companies, you probably read some of the rumors and I think there's some exciting stuff that will come out of that as well.

ABG: Thanks for taking the time to talk today.

Elon: Bye.

Epilogue

During the course of our discussion Tesla MotorsChairman Elon Musk described how he came to be a part of Tesla Motors and how he, as "Product Architect," influenced the development of the Roadster as and what will become the WhiteStar sedan. Based on his description of the events, that sounds like a perfectly reasonable title. Even as told by Martin Eberhard, co-architect doesn't seem inaccurate, although Eberhard might have preferred it to be otherwise. One thing that isn't in doubt is that Musk is not a founder.

2018 Update: *One thing that has become clear over the years since I originally wrote this is that meaning of the term "founder" is a very fluid one in Silicon Valley. While someone's name might not have been on the original documents and they might not have even had a hand in directly forming the organization, it is often granted as an honorific to those that came in relatively early and participated in some significant way. In Musk's case that was with financing and some ideas of what the first product should be.*

Some in the mainstream media over-simplify things by referring to Musk as the creator of the Roadster, and if anything Musk's sin here may be more an error of omission. By not speaking up to clarify his role in the process previously, he has at least appeared to passively take credit for more than he should. If nothing else, as with so many successful entrepreneurs, his self-assurance can certainly come across as arrogance. I don't know the man personally so I can't really comment as to what he is like on a personal level. Aside from the financial aspects his role is probably most analogous to that of Bob Lutz at GM where he makes high level decisions about design direction which are then brought to

fruition by the engineers, designers and technicians. Read on after the jump for the rest of my conclusions.

Based on the available information from those involved it doesn't appear that there is a huge discrepancy about the facts of the story of Tesla. The conflict seems to be more about the interpretation and whose point of view you look at it from. The contentious relationship between Eberhard and Musk very likely exacerbated the problems that the development team had. They certainly didn't help. Mistakes were undoubtedly made on all sides. Fortunately, what will hopefully be the biggest ones appear to have been recognized and addressed before a significant number of these cars are on the road.

Tesla Motors certainly wouldn't be where it is today without both of these men and I think each grudgingly acknowledges that. Musk likely would not have pursued such a project at all had Eberhard, Tarpenning and Wright not already started it. The founders could not have moved forward without Musk's money. The passion of all involved made the Roadster a reality.

Musk obviously has a very strong personality and tends to get what he wants. One thing that became clear in the process of putting this story together is that things are by no means black and white. There are always shades of gray and as I've said before when human emotions get involved, things can turn ugly.