

TED演讲者: Gwynne Shotwell | 格温·肖特维尔

演讲标题: SpaceX's plan to fly you across the globe in 30 minutes | SpaceX计划让你在30分钟内飞遍全球

内容概要: What's up at SpaceX? Engineer Gwynne Shotwell was employee number seven at Elon Musk's pioneering aerospace company and is now its president. In conversation with TED curator Chris Anderson, she discusses SpaceX's race to put people into orbit and the organization's next big project, the BFR (ask her what it stands for). The new giant rocket is designed to take humanity to Mars -- but it has another potential use: space travel for earthlings.

在SpaceX, 又有什么新鲜事? 工程师格温·肖特维尔曾是埃隆·马斯克开创性的航空航天公司的第7名员工, 现在是该公司的总裁。在与TED策展人克里斯·安德森的谈话中, 她谈到了SpaceX公司将人送入轨道的竞赛, 以及该公司的下一个重大项目——大猎鹰火箭(BFR)。这个新的巨型火箭的设计目的是将人类送上火星——但它还有另一个潜在用途: 地球人的太空旅行。

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Chris Anderson: So two months ago, something crazy happened.

克里斯·安德森:两个月前,发生了一件很疯狂的事 [00:14]

Can you talk us through this, because this caught so many people's attention?

你能在这里跟我们讲一讲吗,因为它引起了很多人的注意? [00:17]

Gwynne Shotwell: I'll stay quiet for the beginning, and then I'll start talking.

格温·肖特维尔:我先不说话,看完视频我再讲。 [00:21]

(Video) Voices: Five, four, three, two, one.

(视频) 声音:5?4?3?2?1 [00:24]

(Cheering) Woman: **Liftoff**. Go **Falcon** Heavy.

(欢呼) 女声:发射。去吧,猎鹰重型运载火箭。 [00:29]

GS: So this was such an important moment for SpaceX.

格:对于 SpaceX 来说 这是一个非常重要的时刻。 [00:34]

With the Falcon 9 and now the Falcon Heavy, we can **launch into orbit** any **payload** that has previously been **conceived** or is **conceived** right now.

有了猎鹰9号和现在的重型猎鹰,我们可以将之前设想过 或者目前正在设想中的载荷,发射到轨道中去。 [00:38]

We've got a couple of **launches** of Falcon Heavy later this year, so this had to go right.

我们已经给重型猎鹰在今年晚些时候 安排了好几次发射任务,所以这一次必须得成功。 [00:48]

It was the first time we flew it, and the star of the show, of course, brother and sister side **boosters** landing.

这是我们第一次发射它,当然,这当中最耀眼的明星,便是侧推进器着陆。 [00:53]

Liftoff: n.发射;起飞时刻;搬走 **Falcon**: n.[鸟]猎鹰,[鸟]隼 **launch into**: 进入,投入 **orbit**: n.轨道;眼眶;势力范围;生活常规/vi. 盘旋;绕轨道运行/vt.绕...轨道而行 **payload**: n.(导弹,火箭等的)有效载荷;有效负荷;收费载重;酬载;(工厂,企业等)工资负担 **conceived**: v.构思;设想(conceive的过去式) **launches**: n.汽艇(launch的复数)/v.[航]发射;下水;投入(launch的单三形式) **boosters**: n.支持者(booster的复数形式);拉拉队

I was excited.

我很激动。 [00:59]

(Laughter) Thanking my team.

(笑声) 感谢我的团队。 [01:01]

By the way, there's maybe a thousand people standing around me right there.

顺便提一下,可能有上千人 在那里站在我的周围。 [01:03]

And Starman.

以及星侠。 [01:08]

Starman did not **steal the show**, though -- the boosters did.

不过,星侠并不是演出的主角——推进器才是。 [01:10]

CA: (Laughter) CA: There had to be some payload -- why not put a Tesla into space?

克:(笑声) 克:我想应该还有一些载荷——那么为什么不送一辆特斯拉上天呢? [01:13]

GS: Exactly. It was perfect.

格:是啊。完美。 [01:17]

CA: Gwynne, let's wind the clock back.

克:格温,让我们把时间 往回倒转一下。 [01:19]

I mean, how did you end up an engineer and President of SpaceX?

我的意思是,你是如何成为一名工程师,以及 SpaceX 的总裁的? [01:22]

Were you supernerdy as a girl?

在你还是小女孩的时候,是不是非常的书呆子气? [01:26]

GS: I don't think I was **nerdy**, but I was definitely doing the things that the girls weren't doing.

格:我不觉得那时候我是书呆子,但是我确实会做一些 其他女孩不会去做的事。 [01:28]

I asked my mom, who was an artist, when I was in third grade, how a car worked, so she had no idea so she gave me a book, and I read it, and sure enough, my first job out of my **mechanical engineering** degree was with **Chrysler Motors** in the **automotive** industry.

我妈妈是个艺术家。在三年级的时候我问她,汽车是如何工作的。她回答不了这些问题,所以她给了我一本书,我读了这本书。果然,我拿到机械工程学学位后的 第一份工作 是在汽车行业的克莱斯勒汽车公司。 [01:33]

steal the show: 抢出风头 **nerdy**: adj.书呆子式的/n.令人厌烦的人 **mechanical engineering**: 机械工程;机械工程学

Chrysler: n.克莱斯勒(美国产轿车品牌名) **Motors**: n.汽车;发动机(motor的复数);汽车公司证券 **automotive**: adj.汽车的;自动的

But I actually got into engineering not because of that book but because my mom took me to a Society of Women Engineers event, and I fell in love with the mechanical engineer that spoke.	但使我进入工程领域的实际原因 并不是因为那本书, 而是因为我妈妈带我参加了一个女工程师学会的活动。我迷上了那个上台演讲的机械工程师。[01:49]
She was doing really critical work, and I loved her suit.	她在做着真正重要的工作, 并且我很喜欢她穿的衣服。[01:58]
(Laughter) And that's what a 15-year-old girl connects with.	(笑声) 这就是一个15岁的女孩 如何跟机械工程扯上关系的。[02:02]
And I used to shy away from telling that story, but if that's what caused me to be an engineer -- hey, I think we should talk about that.	而我曾经总是避免去说起这段故事, 但是如果说我为什么会成为一名工程师-- 嘿,我想我们应该讲讲这个故事。[02:05]
CA: Sixteen years ago, you became employee number seven at SpaceX, and then over the next years, you somehow built a multi-billion-dollar relationship with NASA, despite the fact that SpaceX's first three launches blew up.	克:16年前,你成为了 SpaceX公司的第七位员工。然后过了几年, 你不知怎的,就跟美国航空航天局建立了涉及几十亿美元的合作关系, 即使SpaceX的前三次发射 都发生了爆炸。[02:12]
I mean, how on earth did you do that?	我想说的是,你是如何做到的? [02:29]
GS: So actually, selling rockets is all about relationships and making a connection with these customers.	格:事实上,销售火箭就是 关于与这些客户 保持良好的关系, 并与他们沟通交流。[02:31]
When you don't have a rocket to sell, what's really important is selling your team, selling the business savvy of your CEO -- that's not really hard to sell these days --	当你没有火箭可卖的时候, 很重要的事情就是推销你的团队, 推销你的CEO的商业智慧—— 现在这些都不难推销——[02:37]
critical: adj.鉴定的; [核]临界的; 批评的, 爱挑剔的; 危险的; 决定性的; 评论的 shy away from: 躲避;退出 multi-billion-dollar: 几十亿美元 rockets: n.[航]火箭,烟火;火箭弹(rocket的复数形式)/v.用火箭运载;飞速上升;猛涨(rocket的第三人称单数) savvy: n.悟性;理解能力;懂行的人/vt.理解;懂/vi.理解;知道	
and basically, making sure that any technical issue that they have or any concern, you can address right away .	并且大体上,要确保你能够 快速地处理好他们拥有的 任何技术上的问题或者担忧。[02:46]
So I think it was helpful for me to be an engineer.	所以我想我的工程师身份 对此是有帮助的。[02:51]
I think it was helpful to my role of running sales for Elon .	这对我能胜任为埃隆做销售这个角色 是有帮助的。[02:55]
CA: And currently, a big focus of the company is, I guess, kind of a race with Boeing to be the first to provide the service to NASA of actually putting humans into orbit.	克:目前,公司的一个重点, 我想,是与波音公司的竞赛。 看谁能首先为美国航空航天局提供 送人进入太空轨道的服务。[02:58]
Safety considerations obviously come to the fore , here.	对此,安全显然是最重要的考量。[03:12]
How are you sleeping?	你的睡眠怎么样? [03:15]
GS: I actually sleep really well. I'm a good sleeper , that's my best thing.	格:我实际上睡得很香。[03:18]
But I think the days leading up to our flying crew will probably be a little sleepless .	但是我想, 在载人上天之前的那些日子里, 可能会有一点小小的失眠。[03:22]
But really, fundamentally, safety comes in the design of the system that you're going to fly people on, and so we've been working for years, actually, almost a decade, on this technology.	不过基本上,安全来自那个 你即将用来载人上天的系统的设计。 而我们已在这项技术上工作了数年。 事实上,接近十年了。[03:28]
right away: 立刻 Elon: n.埃伦(可溶性显影剂粉末) considerations: n.考虑;注意事项(consideration的复数形式);体贴 fore: adj.以前的;在前部的/n.前部;船头/adv.在前面;在船头/prep.在前/int.(打高尔夫球者的叫声)让开! sleeper: n.卧车;卧铺;枕木;睡眠者 sleepless: adj.失眠的;不休息的;警觉的;永不停息的	
We're taking the Dragon cargo spaceship and we're upgrading it to be able to carry crew.	我们在发射天龙号货运飞船, 并且在升级它,以便能够载人。[03:38]
And as I said, we've been engineering in these safety systems for quite some time.	正如我所说,我们在这些安全系统上的设计 已经进行了相当长的时间了。[03:43]
CA: So isn't it that there's one system that actually allows instant escape if there's a problem.	克:是不是有一个系统 会在飞船发生问题的时候, 允许航天员即时逃脱? [03:49]
GS: That's right. It's called the launch escape system.	格:对的,它被称作发射和逃逸系统。[03:54]
CA: I think we have that. Let's show that.	克:我想我们有这个视频, 我们来看一下。[03:57]
GS: We've got a video of a test that we ran in 2015.	格:我们有一个2015年 测试时的视频。[03:59]
So this simulated having a really bad day on the pad.	那次模拟的是 在发射台上发生了严重的问题。[04:02]
Basically, you want the capsule to get out of Dodge .	基本上,你想要太空舱尽快逃离这里。[04:07]
You want it to get away from the rocket that had a bad day right below it.	你想要它远离下方发生问题的火箭。[04:09]
This is if there was an issue on the pad.	这是假设发射台上出了问题。[04:14]
We also will be doing another demonstration later this year on if we have an issue with the rocket during flight.	今年晚些时候 我们还会做另外一个试验, 模拟如果在飞行期间火箭出现问题 会发生什么。[04:16]

spaceship: n.[航]宇宙飞船 **upgrading**: v.升级;[矿业]提高品位(upgrade的现在分词)/n.叠积作用,加积作用 **simulated**: adj.模拟的;模仿的;仿造的/v.模仿(simulate的变形);假装 **capsule**: n.胶囊;[植]蒴果;太空舱;小容器/adj.压缩的;概要的/vt.压缩;简述 **Dodge**: n.躲闪;托词/vt.躲避,避开/vi.躲避,避开/n.(Dodge)人名;(英)道奇/n.道奇(汽车品牌)

CA: And those rockets have another potential function as well, eventually. 克:事实上, 这些火箭还有另外的潜在功能。[04:23]

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GS: Yeah, so the launch escape system for Dragon is pretty unique.

格:是的,天龙号上的发射逃逸系统 是非常独特的。[04:27]

It's an **integrated** launch escape system.

它是一个集成的发射逃逸系统。[04:30]

It's basically a **pusher**, so the **propellant** system and the **thrusters** are integrated into the capsule, and so if it **detects** a rocket problem, it pushes the capsule away.

它主要是一个推进器, 助力系统和推进器被集成到了太空舱, 而如果他检测到火箭故障 就会把太空舱推开。[04:32]

Capsule safety systems in the past have been like tractor **pullers**, and the reason we didn't want to do that is that **puller** needs to **come off** before you can safely **reenter** that capsule, so we wanted to eliminate, in design, that possibility of failure.

过去的太空舱安全系统 一直是类似于牵引器的设施。 而我们之所以不想继续沿用这种系统, 是因为, 在你安全的重返太空舱之前 需要先将那些牵引器剥离。 所以, 我们想在设计上就将那种 可能的失败消除掉。[04:42]

CA: I mean, SpaceX has made the regular **reusability** of rockets seem almost routine, which means you've done something that no national space program, for example, has been able to achieve.

克:我是说, SpaceX已经使 火箭的常规回收 看起来成为了日常, 而这意味着, 你做了一些 此前的任何太空计划 都没能达到的事情。[04:56]

integrated: adj.综合的;完整的;互相协调的/v.整合;使...成整体(integrate的过去分词) **pusher**: n.推进器;推进式飞机;推销员;非法销售者 **propellant**: n.推进物;推进燃料;发射火药/adj.推进的 **thrusters**: n.[航]推进器(thruster复数) **detects**: 发现 **pullers**: n.张力辊;拉的人;拉具(puller的复数) **puller**: n.拉的人,拉具;吸引人的东西,招揽顾客的东西 **come off**: 举行,成功;表现;脱离 **reenter**: n.重进入,再加入/vt.重新加入/vi.重新入内,重返 **reusability**: n.可重用性

How was that possible?

这是怎么做到的呢? [05:09]

GS: I think there's a couple of things -- there's a million things, actually -- that have allowed SpaceX to be successful.

格:我想有一些事情—— 事实上,成千上万的东西—— 使SpaceX能够取得成功。[05:12]

The first is that we're kind of standing on the shoulders of giants. Right?

首先,我们很大程度上 是站在巨人的肩膀上。对吗? [05:20]

We got to look at the rocket industry and the developments to date, and we got to pick the best ideas, **leverage** them.

我们能够看到到目前为止 在火箭领域的发展, 而我们能够挑选其中最好的想法, 并且利用他们。[05:23]

We also didn't have technology that we had to include in our vehicle systems.

同时,我们也不需要考虑 必须包含在我们车辆系统中的技术。[05:32]

So we didn't have to design around **legacy** components that maybe weren't the most reliable or were particularly expensive, so we really were able to let physics drive the design of these systems.

所以,我们不必设计那些 不可靠或特别昂贵的遗留组件。 我们能够真正的 让物理学驱动这些系统的设计。[05:38]

CA: I mean, there are other programs started **from scratch**.

克:我想说,还有些其他的项目 是从零开始的。[05:49]

That last phrase you said there, you let physics drive the design, what's an example of that?

你刚才说的最后一句话, 你让物理驱动设计, 有什么例子吗? [05:51]

GS: There's hundreds of examples, actually, of that, but basically, we got to construct the vehicle design from, really, a clean sheet of paper, and we got to make decisions that we wanted to make.

格:实际上,有几百个例子, 不过基本上,我们要从一张白纸上 开始构造车辆设计, 而我们要做出我们想做的决定。[05:57]

leverage: n.手段,影响力;杠杆作用;杠杆效率/v.利用;举债经营 **legacy**: n.遗赠, 遗产 **from scratch**: 白手起家,从头做起

The tank architecture -- it's a common **dome** design.

罐子的构造—— 是一个常见的圆顶设计。[06:11]

Basically it's like two beer cans **stacked** together, one full of liquid oxygen, one full of RP, and that basically saved weight.

基本上它就像是两个 叠起来的啤酒罐, 一个装满了液氧, 另一个装满了火箭推进剂, 而这基本上节省了重量。[06:13]

It allowed us to basically take more payload for the same design.

它允许了我们在同样的设计中 获得更多有效载荷。[06:23]

One of the other elements of the vehicle that we're flying right now is we do use densified liquid oxygen and densified RP, so it's ultracold, and it allows you to pack more propellant into the vehicle.

我们正在试飞的飞行器 的另一个元素是, 我们使用了致密液态氧 和致密火箭推进剂, 所以它的温度极低, 并且使你得以将更多的推进剂 装进飞船。[06:27]

It is done elsewhere, probably not to the degree that we do it, but it adds a lot of margin to the vehicle, which obviously adds **reliability**.

这是在别的地方完成的, 可能不像我们所做的那样, 但它给了飞行器很多余量, 这显然增加了可靠性。[06:40]

CA: Gwynne, you became President of SpaceX 10 years ago, I think.

克:格温,我想,你是在 10 年前 成为 SpaceX 的总裁的。[06:48]

What's it been like to work so closely with Elon **Musk**?

和埃隆·马斯克如此紧密合作 是什么感觉? [06:53]

GS: So I love working for Elon.	我热爱为埃隆工作。[06:57]
I've been doing it for 16 years this year, actually.	事实上,到今年为止,我已经做了 16 年了。[06:59]
I don't think I'm dumb enough to do something for 16 years that I don't like doing.	我并不认为我会傻到做一件 我不喜欢的事情 长达 16 年。[07:02]
dome : n.圆屋顶/vi.成圆顶状/vt.加圆屋顶于...上 stacked : adj.妖艳的;(女人)身材丰满匀称的/v.堆放(stack的过去分词)	
reliability : n.可靠性 Musk : n.麝香;麝香鹿;麝香香味	
He's funny and fundamentally without him saying anything he drives you to do your best work.	他很有趣,而根本上讲,他能够在什么都不说的情况下,驱使你把工作做到最好。[07:07]
He doesn't have to say a word.	他一个词都不需要说。[07:16]
You just want to do great work.	你就是想把工作干好。[07:17]
CA: You might be the person best placed to answer this question, which has puzzled me, which is to shed light on this strange unit of time called "Elon time."	克:你可能是 回答这个问题的最佳人选, 这个问题已经困扰我很久了。你能否阐明一下“埃隆时间”这一奇怪的时间单位? [07:19]
For example, last year, I asked Elon, you know, when Tesla would auto-drive across America, and he said by last December, which is definitely true, if you take Elon time into account.	比如,去年,你知道的,我问过埃隆,特斯拉会在什么时候全自动驾驶 穿越美国,而他说,在去年12月之前,而这绝对是真的,如果你把埃隆时间 考虑进去的话。[07:30]
So what's the conversion ratio between Elon time and real time?	所以,埃隆时间和实际时间的 换算比率是多少? [07:44]
(Laughter) GS: You put me in a unique position, Chris.	(笑声) 格:你把我放到了一个独特的位置, 克里斯。[07:48]
Thanks for that.	谢谢你。[07:51]
There's no question that Elon is very aggressive on his timelines , but frankly, that drives us to do things better and faster.	毫无疑问,埃隆在时间规划上 非常激进,但坦率的说,这驱使着我们 做得更快更好。[07:53]
I think all the time and all the money in the world does not yield the best solution, and so putting that pressure on the team to move quickly is really important.	我想世界上所有的钱和时间 都不能产生最好的解决方案,所以给团队施加压力,让他们快速行动,真的十分重要。[08:01]
puzzled : adj.困惑的;茫然的;搞糊涂的 shed light on : 阐明;使...清楚地显出 conversion : n.转换;变换;[金融]兑换;改变信仰	
timelines : n.时间线;大事记(timeline的复数)	
CA: It feels like you play kind of a key intermediary role here.	克:我感觉你在这里担任着 非常重要的中间角色。[08:11]
I mean, he sets these crazy goals that have their impact, but, in other circumstances, might blow up a team or set impossible expectations.	我的意思是,他设定了这些 疯狂的目标,但,在其他情况下,这可能毁掉一个团队 或者设定不可能达到的期望。[08:14]
It feels like you've found a way of saying, "Yes, Elon,"	看上去你似乎找到了一种对埃隆说 “是的,埃隆”的方法。[08:24]
and then making it happen in a way that is acceptable both to him and to your company, to your employees.	然后让事情变得能够同时被埃隆,以及你的公司和员工,所接受。[08:28]
GS: There is two really important realizations for that.	格:有两点非常重要。[08:34]
First of all , when Elon says something, you have to pause and not immediately blurt out, "Well, that's impossible,"	首先,当埃隆说了点什么,你必须停住,而不要脱口而出,“那是不可能的,” [08:37]
or, "There's no way we're going to do that. I don't know how."	或是说 “我们不可能做到。我不知道怎么做。” [08:46]
So you zip it, and you think about it, and you find ways to get that done.	你把这个想法封住,然后仔细思考这件事,然后你便会找到方法来完成它。[08:49]
And the other thing I realized, and it made my job satisfaction substantially harder.	而我意识到的另一件事是,这让我对工作的满意度大大降低。[08:53]
So I always felt like my job was to take these ideas and kind of turn them into company goals, make them achievable , and kind of roll the company over from this steep slope, get it comfortable.	我总觉得我的工作 是 接受这些想法,然后把它们变成公司的目标,让它们成为可能,然后让公司翻过这个陡峭的斜坡,让它感到舒适。[08:58]
intermediary : adj.中间的;媒介的;中途的/n.中间人;仲裁者;调解者;媒介物	
all : adv.首先 blurt : vt.未加思索地冲口说出;突然说出 substantially : adv.实质上;大体上;充分地 achievable : adj.可完成的;可有成就的;做得成的 steep : adj.陡峭的; 不合理的; 夸大的; 急剧升降的/vt.泡; 浸; 使...充满/vi.泡; 沉浸/n.峭壁; 浸渍	
And I noticed every time I felt like we were there, we were rolling over, people were getting comfortable,	而我注意到,每次我觉得我们 就要到那里时,我们即将翻过陡坡,人们变得更自在的时候。[09:12]
Elon would throw something out there, and all of a sudden , we're not comfortable and we're climbing that steep slope again.	埃隆便会拿出一些东西,然后,忽然之间,我们不再安适,而我们需要重新爬那个陡坡。[09:18]
But then once I realized that that's his job, and my job is to get the company close to comfortable so he can push again and put us back on that slope, then I started liking my job a	不过后来我意识到这是他的工作,而我的工作便是 让公司 尽可能的感到舒适,这样埃隆就可以再次推进,将我们放回陡坡上。这样,我开始更喜欢我的

lot more, instead of always being frustrated .	工作了, 而并非总是感到沮丧。[09:24]
CA: So if I estimated that the conversation ratio for Elon time to your time is about 2x, am I a long way out there?	克:那么,如果我估计 从埃隆时间,到你的时间的换算比 是大约两倍的话, 我差的远吗? [09:37]
GS: That's not terrible, and you said it, I didn't.	格:那还不算太糟糕。而且这可是你说的,不是我说的。[09:46]
(Laughter) CA: You know, looking ahead, one huge initiative SpaceX is believed to be, rumored to be working on, is a massive network of literally thousands of low earth orbit satellites	(笑声) 克:你知道的,展望未来, 有一个重大项目, 据传,Space X 正在研究, 一个由成千上万颗低地球轨道卫星 组成的庞大网络,[09:48]
to provide high-bandwidth, low-cost internet connection to every square foot of planet earth.	以此为地球上的每一寸土地 提供高带宽、低成本的互联网连接。[10:04]
all of a sudden : 突然地,出乎意料地 frustrated : adj.失意的,挫败的;泄气的/v.挫败;阻挠(<i>frustrate</i> 的过去式和过去分词形式) estimated : adj.估计的;预计的;估算的 rumored : adj.传闻的;谣传的/v.谣传(<i>rumor</i> 的过去式和过去分词形式) low-cost : adj.廉价的;价格便宜的	
Is there anything you can tell us about this?	对此你有什么可以告诉我们的吗? [10:10]
GS: We actually don't chat very much about this particular project, not because we're hiding anything, but this is probably one of the most challenging if not the most challenging project we've undertaken .	格:我们实际上并不怎么谈论 这个特别的项目, 并非因为我们在藏着些什么, 而是因为这可能是我们所承担过的 最具挑战性的项目之一。[10:12]
No one has been successful deploying a huge constellation for internet broadband , or basically for satellite internet, and I don't think physics is the difficulty here.	还没有人能成功地 部署大范围的互联网宽带, 或者说卫星网络, 而我并不认为物理是这里的难题。[10:22]
I think we can come up with the right technology solution, but we need to make a business out of it, and it'll cost the company about 10 billion dollars or more to deploy this system.	我想我们可以找出 技术上的解决方案, 但我们需要从中获利。 部署该系统 会让公司付出大约100亿美元 或更多的代价。[10:33]
And so we're marching steadily along but we're certainly not claiming victory yet.	所以,我们在稳步前进, 但我们肯定还没有宣布胜利。[10:43]
CA: I mean, the impact of that, obviously, if that happened to the world, of connectivity everywhere, would be pretty radical, and perhaps mainly for good --	克:我的意思是,显然, 如果这发生在世界上, 建立无处不在的连接的影响, 会很剧烈, 而且或许主要是好的影响——[10:50]
undertaken : v.从事;开始进行(<i>undertake</i> 的过去分词) deploying : v.部署(<i>deploy</i> 的ing形式);配置;展开/n.分发 constellation : n.[天]星座;星群;荟萃;兴奋丛 broadband : n.宽频;宽波段/adj.宽频带的;宽波段的;宽频通讯的 come up with : 提出;想出;赶上 marching : adj.行军的;步进式的/v.行军;进军(<i>march</i> 的ing形式) steadily : adv.稳定地;稳固地;有规则地 connectivity : n.[数]连通性	
I mean, it changes a lot if suddenly everyone can connect cheaply .	我是说,如果突然间每个人 都可以廉价地互相联系,[10:58]
GS: Yeah, there's no question it'll change the world.	格:是的,毫无疑问,它会改变世界。[11:02]
CA: How much of a worry is it, and how much of a drag on the planning is it, are concerns just about space junk?	克:人们对太空垃圾 的担忧有多少, 对计划的拖累有多大? [11:05]
People worry a lot about this.	人们对此很担心。[11:11]
This would a huge increase in the total number of satellites in orbit.	这会显着增加绕地球的卫星数量。[11:12]
Is that a concern?	这是一个问题吗? [11:16]
GS: So space debris is a concern, there's no question -- not because it's so likely to happen, but the consequences of it happening are pretty devastating .	格:那么毫无疑问, 太空碎片是个问题—— 并非因为它发生的可能性很大, 而是因为,一旦发生了, 后果不堪设想。[11:17]
You could basically spew a bunch of particles in orbit that could take out that orbit from being useful for decades or longer.	基本上,你可以在轨道上 喷出一堆粒子, 而这会使得轨道在几十年 或更长时间内变得无法使用。[11:27]
So as a matter of fact , we are required to bring down our second stage after every mission so it doesn't end up being a rocket carcass orbiting earth.	事实上, 在每次任务后, 我们都被要求取下我们的 二级卫星, 这样它就不会变成 一块绕地球运行的火箭残骸。[11:36]
cheaply : adv.便宜地;廉价地 drag on : 拖延 debris : n.碎片,残骸 consequences : n.后果,结果;影响(<i>consequence</i> 的复数) devastating : adj.毁灭性的; 全然的/v.摧毁(<i>devastate</i> 的ing形式); 毁坏 spew : vt.喷出;呕吐/vi.喷涌;呕吐 a bunch of : 一群;一束;一堆 take out : v.取出;去掉;出发;发泄;把...带出去;邀请(某人)外出;开始 as a matter of fact : 事实上 bring down : 降低;打倒;打死;击落 carcass : n.(人或动物的)尸体; 残骸; (除脏去头备食用的)畜体 orbiting : v.[航][天]轨道运行;轨道运动;转圈(<i>orbit</i> 的ing形式)	
So you really need to be a good steward of that.	所以你真的需要做一个好的管家。[11:46]
CA: So despite the remarkable success there of that Falcon Heavy rocket, you're actually not focusing on that as your future development plan.	克:所以尽管猎鹰重型火箭 取得了巨大的成功, 你实际上并没有把注意力放在这上面 作为你未来的发展计划。[11:50]
You're doubling down to a much bigger rocket called the	你们的注意力集中在另一个 大了许多的火箭,叫做

BFR, which stands for ...	BFR, 它代表着.....[12:00]
GS: It's the Big Falcon Rocket. CA: The Big Falcon Rocket, that's right.	格:它是大猎鹰火箭 (BFR)。克:大猎鹰火箭,没错。[12:07]
(Laughter) What's the business logic of doing this when you invested all that in that incredible technology, and now you're just going to something much bigger. Why?	(笑声) 这么做的商业逻辑是什么, 当你在这一不可思议的技术上 做了所有那些投资, 而现在你只是要做一个 放大版的东西。为什么? [12:11]
GS: Actually, we've learned some lessons over the duration where we've been developing these launch systems.	实际上,我们已经吸取了一些教训 在开发这些发射系统的这段时间里。[12:22]
What we want to do is not introduce a new product before we've been able to convince the customers that this is the product that they should move to, so we're working on the Big Falcon Rocket now,	我们想做的并不是 在还没来得及推出新产品前 就让客户相信这是他们应该 转移到的产品。 所以我们现在正在研究大猎鹰火箭,[12:27]
but we're going to continue flying Falcon 9s and Falcon Heavies until there is absolute widespread acceptance of BFR.	但我们仍将继续试飞 “猎鹰9号” 和 “猎鹰2号”, 直到大猎鹰火箭被广泛接受。[12:39]
steward: n.管家;乘务员;膳务员;工会管事/vi.当服务员;当管事/vt.管理 remarkable: adj.卓越的; 非凡的; 值得注意的 doubling: n.加倍;并线;折回;防护板;衬里/v.使加倍;使成双(double的ing形式);绕过;握紧/adj.双重的;折叠的 Heavies: 重烟熏	
But we are working on it right now, we're just not going to cancel Falcon 9 and Falcon Heavy and just put in place BFR.	我们现在正在努力。 我们不会取消猎鹰9号和重型猎鹰号 而用大猎鹰火箭取而代之。[12:46]
CA: The logic is that BFR is what you need to take humanity to Mars?	克:这里的逻辑是,大猎鹰火箭 能够将人类带去火星? [12:54]
GS: That's correct.	格:是的。[12:59]
CA: But somehow, you've also found other business ideas for this.	克:不过,你也发现了一些 其他的商业想法。[13:00]
GS: Yes. BFR can take the satellites that we're currently taking to orbit to many orbits .	格:是的。大猎鹰火箭能够将 我们目前正在发射的卫星 送入轨道。[13:04]
It allows for even a new class of satellites to be delivered to orbit.	它甚至允许一种新的卫星被送入轨道。[13:09]
Basically, the width, the diameter of the fairing is eight meters, so you can think about what giant telescopes you can put in that fairing, in that cargo bay, and see really incredible things and discover incredible things in space.	基本上,整流罩的宽度,直径是8米, 所以你可以想想有什么巨大的望远镜 你能够安装在 整流罩里,在货舱里, 然后看到一些惊人的东西, 在太空中发现不可思议的东西。[13:14]
But then there are some residual capabilities that we have out of BFR as well.	不过在大猎鹰火箭之中 也有一些剩余的能力。[13:28]
CA: A residual capability ? GS: It's a residual capability.	克:剩余能力? 格:它是个剩余能力。[13:33]
humanity: n.人类; 人道; 仁慈; 人文学科 orbits: n.[天][航]轨道(orbit的复数);[昆]眼眶/v.环绕...的轨道运行;进入轨道(orbit的三单形式) fairing: n.[航][船]整流罩;集市上卖的礼物;酬谢礼品/v.天气转晴;衔接协调;装配平整(fair的ing形式) residual: n.剩余;残渣/adj.剩余的;残留的 have out: 讨论或争论得出结论,邀请出去 capability: n.才能, 能力; 性能, 容量	
CA: Is that what you call this? Talk about what the heck this is.	克:你们是怎么叫它的吗? 讲讲这到底是什么吧。[13:36]
Oh wait a sec -- GS: That's Falcon Heavy.	哦等一下—— 格:那是重型猎鹰。[13:39]
That's worth pointing out, by the way.	顺便说一下,这值得被指出来。[13:41]
What a beautiful rocket, and that hangar could just fit the Statue of Liberty in it, so you get a sense of size of that Falcon Heavy Rocket.	多么美丽的火箭, 那个飞机库刚好能装下 里面的自由女神像, 这样你就能大概知道 猎鹰重型火箭的尺寸有多大了。[13:43]
CA: And the fact that there are 27 engines there.	克:以及 它有 27 个引擎这一事实。[13:54]
That's part of the design principle that you, rather than just inventing ever bigger rockets, you team them up.	这是设计原则的一部分, 你,并不是仅仅发明更大的火箭, 而是把他们组合在一起。[13:56]
www.XiYuSoft.com 锡育软件	
GS: It's exactly this residual capability.	格:就是这个剩余能力。[14:02]
We developed the Merlin engine for the Falcon 1 launch vehicle.	我们为猎鹰1号运载火箭 开发了梅林发动机。[14:04]
We could have tossed that engine and built an entirely new engine for the Falcon 9.	我们可以把这个引擎扔了, 然后为猎鹰9号 制造一个全新的引擎。[14:07]
It would have been called something different, because Falcon 9 is nine Merlin engines, but instead of spending a billion dollars on a brand new engine, we put nine of them together on the back end of Falcon 9.	它会有另一个名字, 因为因为猎鹰9号是9个梅林引擎。 但我们并没有花 10 亿美元 来研发一个全新的引擎, 而是把它们九个 一起放在猎鹰9号的后端。[14:12]
hangar: n.飞机库;飞机棚 rather than: 而不是;宁可...也不愿 inventing: v.发明(invent的现在分词);创造 Merlin: n.灰背隼 tossed: 扔/后甩/抛硬币的方法/辗转反侧	
Residual capability: glue three Falcon 9s together and you have the largest operational rocket flying.	剩余能力: 将三个猎鹰9号粘在一起, 你就能让最大的操作火箭升空。[14:23]

And so it was expensive to do, but it was a much more efficient path than starting from scratch.	这样做很昂贵, 但从零开始相比, 这是条更高效的道路。[14:29]
CA: And the BFR is the equivalent of how much bigger than that, in terms of its power?	克:而且就其功率而言, 大猎鹰火箭相当于比它大多少? [14:34]
GS: BFR is about, I believe, two and half times the size of this.	格:大猎鹰火箭大约是我相信, 它的二点五倍大。[14:39]
CA: Right, and so that allows you -- I mean, I still don't really believe this video that we're about to play here.	克:对,那么这就允许了你—— 我的意思是,我仍然不太相信 我们即将播放的这个视频。[14:42]
What on earth is this?	这到底是什么? [14:48]
GS: So it currently is on earth, but this is basically space travel for earthlings .	格:它现在是在地球上, 不过这基本上是地球人的太空旅行。[14:50]
I can't wait for this residual capability.	我等不及这个剩余能力了。[14:56]
Basically, what we're going to do is we're going to fly BFR like an aircraft and do point-to-point travel on earth, so you can take off from New York City or Vancouver and fly halfway across the globe.	基本上,我们要做的 就是像飞机一样飞行大猎鹰火箭, 并且在地球上做点对点的旅行。 你可以从纽约或者温哥华出发, 然后绕地球半圈。[14:58]
equivalent: adj.等价的,相等的;同意义的/n.等价物,相等物 in terms of: 依据;按照;在...方面;以...措词 earthlings: n.世人,俗人;凡人(earthling的复数形式) aircraft: n.飞机,航空器 point-to-point: n.越野赛马/adj.越过原野的;定点越野的 Vancouver: n.温哥华(加拿大主要港市)	
You'll be on the BFR for roughly half an hour or 40 minutes, and the longest part -- yeah, it's so awesome .	你会在大猎鹰火箭里待上 大约半小时到四十分钟, 然后最长的部分—— 是啊,这太棒了。[15:12]
(Applause) The longest part of that flight is actually the boat out and back.	(掌声) 这趟飞行中最长的部分 其实是摆渡船的往返。[15:18]
(Laughter) GS: I mean. Gwynne, come on, this is awesome, but it's crazy, right?	(笑声) 克:我想说。格温, 这非常棒,但它很疯狂, 对吗? [15:24]
This is never going to actually happen.	这永远不会发生。[15:28]
GS: Oh no, it's definitely going to happen.	格:哦,不,这肯定会发生。[15:31]
This is definitely going to happen.	这绝对会实际发生。[15:33]
CA: How?	克:怎么发生? [15:35]
(Applause) So first of all, countries are going to accept this incoming missile --	(掌声) 首先来说,所有的国家都要 接受这个进来的导弹——[15:36]
(Laughter) GS: Chris, so can you imagine us trying to convince a federal range, Air Force bases to take the incomers ?	(笑声) 格:克里斯,你能不能想象 我们试图说服 一个 联邦范围内的空军基地 接受入侵者? [15:44]
Because we're doing it now, regularly, right?	因为我们现在正在定期做这件事, 对吧? [15:52]
We're bringing the first stages back, and we're landing them on federal property on an Air Force base.	我们带回一阶火箭, 然后将他们降落在 空军基地的联邦财产上。[15:54]
So I think doing it, I don't know, 10 kilometers out from a city, maybe it's only five kilometers out from a city.	所以我想这样做,我不知道, 离城市十公里, 也许离一个城市只有五公里远。[15:59]
awesome: adj.令人敬畏的;使人畏惧的;可怕的;极好的 incomers: n.进来者;移民;新来者;侵入者 stages: n.[计]阶段(stage的复数);舞台;戏剧表演/v.计划;表演;分阶段进行(stage的三单形式)	
CA: So how many passengers can possibly afford the fortune of flying by space?	克:所以大概有多少乘客 能负担得起这笔 通过太空飞行的费用呢? [16:05]
GS: So the first BFR is going to have roughly a hundred passengers.	格:第一代大猎鹰火箭能承载 大约一百名乘客。[16:08]
And let's talk a little bit about the business.	我们来稍微谈一谈这桩生意。[16:13]
Everyone thinks rockets are really expensive, and to a large degree they are, and how could we possibly compete with airline tickets here?	每个人都认为火箭非常昂贵, 而很大程度上的确是这样, 所以我们怎么才能和飞机票竞争呢? [16:16]
But if you think about it, if I can do this trip in half an hour to an hour, I can do dozens of these a day, right?	但如果你仔细想想, 如果我能半个到一个小时内 飞完这趟旅途, 我能在几天内完成几十趟,对吗? [16:23]
And yet, a long-haul aircraft can only make one of those flights a day.	然而,一架长途飞机 每天只能做一次这样的飞行。[16:31]
So even if my rocket was slightly more expensive and the fuel is a little bit more expensive, I can run 10x at least what they're running in a day, and really make the revenue that I need to out of that system.	所以即使我的火箭和燃料 会稍微更昂贵一些, 我能在一天内达到他们 至少十倍的运行量, 并从这个系统中获得我需要的收入。[16:35]
CA: So you really believe this is going to be deployed at some point in our amazing future. When?	所以你真的相信这会在 我们了不起的未来的 某一时被部署。什么时候? [16:45]
GS: Within a decade, for sure.	格:肯定会在十年内。[16:50]
compete with: 与...竞争 long-haul: adj.长途的;长运距的;长时间的 deployed: v.部署(deploy的过去式);展开	
CA: And this is Gwynne time or Elon time?	克:那这是格温时间还是埃隆时间? [16:53]
CA: That's Gwynne time. I'm sure Elon will want us to go	格:这是格温时间。 我很肯定埃隆会想让我们走得

faster.	更快。[16:55]
(Laughter) CA: OK, that's certainly amazing.	(笑声) 克:好的,这绝对很了不起。[16:59]
(Laughter) GS: I'm personally invested in this one, because I travel a lot and I do not love to travel, and I would love to get to see my customers in Riyadh , leave in the morning and be back in time to make dinner.	(笑声) 格:我个人投资了这个,因为我经常旅行,而我不喜欢旅行,我很想去利雅得看看我在那里的客户,早上离开,然后及时赶回家做晚饭。[17:05]
CA: So we're going to test this out.	克:所以我们要试一试。[17:17]
So within 10 years, an economy price ticket, or, like, a couple thousand dollars per person to fly New York to Shanghai .	那么,在十年内,一张经济舱价格的机票,或者大概每人几千美元的价格,从纽约飞到上海。[17:19]
GS: Yeah, I think it'll be between economy and business, but you do it in an hour.	格:是啊,我想这会在经济舱和商务舱两者之间,只不过你在一个小时内完成旅途。[17:28]
CA: Yeah, well, OK, that is definitely something.	克:是啊,嗯,好吧,这绝对很了不起。[17:32]
(Laughter) And meanwhile, the other use of BFR is being developed to go a little bit further than Shanghai.	(笑声) 同时,大猎鹰火箭正在开发中的另一个用途比上海走得更远一些。[17:35]
Talk about this.	讲讲它吧。[17:43]
You guys have actually developed quite a detailed, sort of, picture of how humans might fly to Mars, and what that would look like.	你们已经发展出了一幅详细的,关于人类如何飞往火星的图景,以及它看起来会是什么样。[17:44]
Riyadh : n.利雅得(阿拉伯半岛中部的城市) Shanghai : n.上海(中国东部港市)	
GS: Yeah. So we've got a video, this is a cropped video from others we've shown, and then there's a couple of new bits to it.	格:是啊。我们有一个视频,这是从我们以前展示过的视频中剪辑出来的,同时增加了一些内容。[17:53]
But basically, you're going to lift off from a pad, you've got a booster as well as the BFS, the Big Falcon Spaceship.	总的来说,你要从一块垫子上起飞,你有一个推进器,同时也有BFS,大猎鹰飞船。[17:59]
It's going to take off.	它即将起飞。[18:07]
The booster is going to drop the spaceship off in orbit, low earth orbit, and then return just like we're returning boosters right now.	推进器会将宇宙飞船送入轨道,低地球轨道,然后返回,就像我们现在返回助推器一样。[18:11]
So it sounds incredible, but we're working on the pieces, and you can see us achieve these pieces.	这听起来不可思议,但我们正在一步步研究它,而你能看到我们一步步实现这些目标。[18:19]
So booster comes back.	助推器回来了。[18:23]
The new thing here is that we're going to actually land on the pad that we launched from.	这里新的事情是,我们实际上要降落在我们被发射出去的平台上。[18:25]
Currently, we land on a separate pad, or we land out on a boat.	目前,我们降落在一个独立的发射台,或者在船上降落。[18:29]
Fast, quick connect.	飞快,迅速的连接。[18:33]
You take a cargo ship full of fuel, or a fuel depot , put it on that booster, get that in orbit, do a docking maneuver , refuel the spaceship, and head on to your destination, and this one is Mars.	你带着一艘装满燃料的货船,或油库,把它放在助推器上,让它进入轨道,做一个对接操作,给宇宙飞船加油,然后接着前往目的地,这一次是火星。[18:34]
cropped : adj.裁切不正的 as well as : 也;和...一样;不但...而且 depot : n.仓库;停车场;航空站/vt.把...存放在储藏处/adj.药性持久的 docking : n.入坞/adj.入坞的/v.入港;为...设置船坞(dock的ing形式) maneuver : n.[军]机动;演习;策略;调遣/vi.[军]机动;演习;调遣;用计谋/vt.[军]机动;演习;用计;调遣 refuel : vt.补给燃料/vi.重新得到燃料 head on : 迎面地	
CA: So, like, a hundred people go to Mars at one time , taking, what, six months? Two months?	克:所以,一次有一百个人去火星,要花上,多久?六个月?两个月? [18:50]
GS: It ends up depending on how big the rocket is.	格:这最终取决于火箭有多大。[18:58]
I think this first version, and we'll continue to make even bigger BFRs, I think it's a three-month trip.	我想,在第一代,旅行会耗费三个月,而我们会接着制作甚至更大的大猎鹰火箭。[19:01]
Right now, the average is six to eight, but we're going to try to do it faster.	目前,平均时间是六到八个月,不过我们会试着做到更快。[19:09]
CA: When do you believe SpaceX will land the first human on Mars?	克:你认为SpaceX能在何时首次将人类带上火星? [19:13]
GS: It's a very similar time frame from the point-to-point.	格:这和点对点旅行是一个很相似的时间范围。[19:17]
It's the same capability.	他们的功能是相同的。[19:20]
It will be within a decade -- not this decade.	这会在十年之内发生——不是这个十年。[19:21]
CA: In real time, again, within a decade.	克:又是真实时间里的十年之内。[19:25]
Well, that would also be amazing.	唔,那同样是非常了不起的。[19:28]
(Laughter) Why, though? Seriously, why?	(笑声) 但为什么呢?我是认真的,为什么? [19:30]
I mean, you've got a company where this is the official stated mission.	我的意思是,在你的公司里,这就是官方声明的义务。[19:34]
Has everyone actually bought into that mission, given that, I	是不是每个人都参与了那个任务,考虑到,我是说,

mean, there's a lot of people around who think, come on, you've got so much talent, so much technology capability.	有很多人认为, 拜托, 你有这么多天赋, 如此多的技术能力。[19:38]
at one time: 曾经, 一度; 同时 stated: adj. 规定的; 阐明的; 定期的 / v. 规定 (state 的过去分词); 陈述; 阐明	
There are so many things on earth that need urgent attention.	地球上有多东西需要紧急关注。[19:47]
Why would you have this escape trip off to another planet?	你为什么要逃去另一个星球呢? [19:50]
(Applause) GS: So I am glad you asked that, but I think we need to expand our minds a little bit.	(掌声) 格: 我很高兴你问了这个问题, 不过我想, 我们应该 拓展一下我们的思维。[19:53]
There are plenty of things to do on earth, but there are lots of companies working on that.	在地球上有很多可以做的事情, 不过有很多公司都在这方面努力。[19:59]
I think we're working on one of the most important things we possibly can, and that's to find another place for humans to live and survive and thrive.	我想我们正在做我们可能做的 最重要的东西, 而这便是, 找到另一个 可供人类生存并繁荣的居所。[20:04]
If something happened on earth, you need humans living somewhere else.	如果在地球上发生了什么, 人类需要找到别的地方生活。[20:13]
(Applause) It's the fundamental risk reduction for the human species.	(掌声) 这减少了人类的基本风险。[20:20]
And this does not subvert making our planet here better and doing a better job taking care of it, but I think you need multiple paths to survival, and this is one of them.	这并不是说我们会停止 让地球变得更好, 更好的照顾它, 但我想你需要多种生存的途径, 而这是其中一种。[20:25]
And let's not talk about the downer piece, like, you go to Mars to make sure all earthlings don't die.	而让我们不要谈论令人沮丧的方面, 比如, 你去火星来确保 所有地球人不会死。[20:37]
subvert: vt. 颠覆; 推翻; 破坏 downer: n. 镇定剂; 令人沮丧的人	
That's terrible, actually, that's a terrible reason to go do it.	事实上, 这很糟糕, 这是做这件事 的一个非常糟糕的理由。[20:43]
Fundamentally, it's another place to explore, and that's what makes humans different from animals, it's our sense of exploration and sense of wonderment and learning something new.	从根本上说, 这是另一个值得探索的地方, 这就是为什么人类和动物不同, 这是我们的探索感, 惊奇感, 和学习新东西的感觉。[20:46]
And then I also have to say, this is the first step in us moving to other solar systems and potentially other galaxies, and I think this is the only time I ever out-vision Elon, because I want to meet other people in other solar systems.	然后我还要说, 这是我们迈向其他太阳系的第一步, 或许甚至是其他星系, 而我想这是唯一一次 我的愿景超过了埃隆的, 因为我想见到 其他太阳系里的其他人。[20:57]
Mars is fine, but it is a fixer-upper planet.	火星还不错, 但它是个 需要修缮的星球。[21:11]
There's work to do there to make it habitable .	要想让它适合居住, 还有很多工作要做。[21:13]
(Laughter) I want to find people, or whatever they call themselves, in another solar system .	(笑声) 我想在另一个太阳系里找到人类, 或者任何他们自称的东西。[21:15]
CA: That is a big vision.	克: 这是个很大的愿景。[21:21]
Gwynne Shotwell, thank you.	谢谢你, 格温·肖特维尔。[21:23]
You have one of the most amazing jobs on the planet.	你有着世界上 最令人惊叹的工作之一。[21:25]
wonderment: n. 惊奇; 惊叹 step in: 介入; 插手干预; 作短时间的非正式访问 potentially: adv. 可能地, 潜在地 fixer-upper: 需要修缮的房子 habitable: adj. 可居住的; 适于居住的 solar system: [天] 太阳系	
GS: Thank you very much. Thanks, Chris.	格: 非常感谢。谢谢你, 克里斯。[21:27]

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