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inner structure.嗯。nbsp I was based at space x,making rockets and the space x factory was really super clean. super light,super open,and so when we were able to acquire the ces LA f factory,we said,okay.we need to make it similar to space x.so here we see the philosophy of a tesla factory. it is the philosophy of the yeah,the the rocket production principle.嗯，好的，那我们看到它这边的设计理念啊，特斯拉呃，因为它也是其实跟呃space x的设计理念是类似的，对吧？它的厂房设计，因为呃在。在那个space x，他当时就是呃，这个厂房也是特别大，然后又特别干净，特别亮堂，对吧？但当他们来做特斯拉的时候呢，说唉，我要把这个设计理念也带到特斯拉的这个工厂来。嗯，white the commons white were going to make it bright where we have the ability to have skylights were going to have the light from the sky，you know，and。so here they also show some aspects which are relevant from the point of view of ergonomics because they bring the light from the top down and from the sky. let's say,and so the complete production looks very.very bright and very Nice。嗯，好的，那我们呃，这个之前呃，上学期给大家上的这个人机课里面给大家讲到的这个工厂设计里面有一块很重要的，也是光照对吧？那它呃，所有的光呢都是从呃这个顶上往下打的，然后呢它而且它的光呢就调的特别亮堂。the psychology of that is if you want quality,you need people to feel at ease. you need people to feel like this is your quality place.here we see how this guy is doing quality,checking the quality of the paint,and this is really AA big point.because he uses his fingers and to feel and to feel and to feel if it's smooth.对，我们可以看到它这个质检的人啊，就是他在呃检查这个油漆是不是呃？是不是好它都是就是戴的手套，它其实是用手一点点去触摸去感受，是不是呃上好了，有没有这个小的斑点，或者说是瑕疵嗯？we were utilizing automation to the fullest we have about one hundred and sixty wab arts,the latest technology you can find on the planet.that are able to do very diverse tasks.robots are extremely good at repeatability accuracy of motion,but humans are more intelligent than robots. therefore,we need to use humans where there is a lot of value for that intelligence.here we're on city conveyor,right? so you have wonderful universities,you know,stanford,berkeley,UC davis,you name it,so we have a lot of talent,so we.t.nbsp what is unique about building the monoliths and electric vehicle is a lot of the components are.be very different like the drive units,the battery pack,the battery modules a lot of those components do not exist anywhere else so.we need to do a lot more than any other factories that I have been at in terms of subprocesses inside the factory.we do about ninety five percent of our stamping in house. we do a lot of the machine achining in house. we do some coordinating inhouse. we do painting in house. we do the center display in house.so the level of integration is very,very high. and because everything is here,it speed things up greatly,and that speed has a lot of intrinsic value.in terms of innovation,adaptability,flexibility,all of them.t.I hope you noticed also that the complete complete movie here,as it is provided by.tesla,they always use the colour red,even the cars are red,so they try to focus on the color red when they prepare such movies,although.the colors of the cars are also very different.阿狗。t.嗯。now we see the foot screen.怒。啊yes，yes啊。yeah,OK,let's continue last time. we also introduced this matrix,um.and this matrix is very important because er it shows the many activities which have been done have to be done.on the product site on the technology site on the organization site on the facility site on the employee site even on the finances site.because we have a lot of investments to do,and then there are investment bills which have to be paid. so the finance has to be considered.very carefully as well,but of course the money will only flow stepwise,so first maybe the production will be established.yeah,infact,am factory like the automotive factory is built up um.is built up at the same time,but the investments and the payments of the suppliers has to be in line with.uh,the setting up of the factory,so I think when we look into these,uh,let's say factory planning.er,a lot of activities come together er because the product has to be clear and sometimes even during erection of a factory the product still is changed.嗯，好的，那我们呃上节课也给大家这个呃，最后讲到这个function and planning这一块对吧？就是我们在呃。做这个工厂设计的时候呢，它这边呃从呃不同的这个职能要素对吧？它这块是负责是生产还是负责是这个接收货物是吧？运输还是什么？这是我们纵轴方面的，对吧？横轴方面呢？是哎，它的这个嗯，影响到哪个区域对吧？是影响到生产区域还是技术还是它的整个的组织结构对吧？还是我们的员工，还是我的财务，那我就有这么一张嗯，这个表格对吧？有这么一个matrix去对应呃。然后呢？我们也可以把它在呃，在这个呃factory planning的时候呢，去运用这张表格来一一对应呃，每个地方的不同的职能OK？yeah,and of course all the areas,all the production. let's say,uh,production.er er steps er are then herein considered and also some things like the for instance transport.or technical support functions we have seen in the movie that there is a maintenance area for the uh stamping pieces.so the stamping pieces in the car has to they have to be repaired,or they have to refurbished. so we have a lot of technical supports which normally is not seen and also.communication support the computer and the technology which tells US which piece has to be assembled into the carp so they are.this is everything is here。it driven even the robots are getting their instruction automatically，嗯，那我们可以把这张表格对应前面我们看到的这个特斯拉工厂的这个案例里面，对吧？就唉，比如说我们前面它的这个呃呃钢板被冲压完以后呢，它呃其实是先要放储存到一个地方，对吧？那它在这个中间呢，它也需要做一些。呃，这个维护和一些测试对吧？那呃，这个我们呃方群呃呃system这个最后两行里面，比如说有一些technical support。还有一些communication support，比如说诶，你的这个呃要做测试的这些呃实验室啊，对吧？这些技术支持，然后包括呃我的这个呃。互相之间不同的工序之间的沟通啊，对吧？那我诶，比如说现在我需要呃这个生产了，那我这个相应的零部件，我要从我的这个仓库里面调出来，对吧？然后呢？包括这个呃，我的这生产的这个流程，整个的监控，现在基本上呢都是用呃电脑，或者说是用IT系统和我人机的这个交互对吧？我的嗯。我的机器人和这个人工进行一个协调来做呃，那这个呢，就需要一些complication support对吧？OK.so um,when we look into these,into these factories,and here with this movie,we have seen very clear.t.e coils at the beginning and secondly it is the production the steps of production where we have the welding.um,yeah,this it starts with the stamping and the setting up of the white body,the the painting and the.the assembly which are production costs because every step has its own costs,its here also the.let's see the time where the robots are acting on them,on the,on the car and finally what we have seen as weller,a lot of humans are still in the factory,so we will have always the labor costs on top.and so the um,their,their,their value creation is um um I sum. all those processes which are inhouse production share of inhouse production.so when we talk about factories,eh? then we can also talk about supply chains and supply chains are,let's say,a network of factories,but every time.we are looking into the factory planning. we go deeper into exactly this point where we are then.er looking hower this internal activity,er can be performed best.好的，那我们看到啊，就是我们对于这个生产，或者说是纯从这个生产的角度去说，那我们的这个呃，我们把这个生产流程在呃，我们厂房里面做的对吧？叫in house production那。那它整个呢，就是一个呃创造价值的这么一个流程，对吧？那我们呢？可以看到呃，就像前面特斯拉的这个案例里面，我们从最初的进来的这个原材料，这个铝。铝铝材卷对吧？到最后我是出去的，是一个呃车子那呃，这个呢，就是它的一个增值的过程，对吧？那我们中间的产生的所谓的呃跟。生产相关的这些支出，那包含了我们最初的这些原材料的一些支出，然后呢呃，包括我们的机器对吧，我们厂房里面有这么多台。呃，机器人对吧？包括我们的机器，然后呢？呃on top的呢？就是我们的人工的一些支出，那构成了我们呃这三个部分呢？组成了我们呃这个所谓的生产成本。嗯。um,I forgot to to mention this slide here more because the it is quite clear from the.em that that the tesla factory,it is a complete factory,although we put here on the left side a truck and on the right side a truck.the the cars are leaving alone so they don't need the truck.t maybe we can say it like that,but er it is it shows in principle that we have a receiving area and finally.er,finally,the the shipping area and all the process in between this week would like to call complete factory.however.even in the tesla case here,we have at the end maybe a truck or a train because the the cars are put several May be.floor on a truck and then they are moved to the final customer or to the different corresponding shops.so the complete factory is from that point of view er,something where we are having an area.where let's say a product is produced,or let's say it is,yeah,we have in principle part kind of.production here in the middle,but on the other end it is assembled as well,so mostly it is a combination of own production and assembly.eh,we have of course many factories which are just only at the moment only assemblies.and this is because,uh,outsourcing is has become a major effect of when we talk about companies,but the complete factory is producing the individual piece which is tesla also doing.producing their own pieces and finally doing the assembly,but here a lot of with the robots.嗯哼，好的，那the next one is the pure assembly，then we see that it is a cut factory and the assembly factory。is a very simple way of doing effective,it is because people are not taking over responsibility for the complete production chain.um,they are in principal experts in assembly by combining a lot of individual products,and so it's in principle if you like.a combining factory and another one is the final step,which is just only distributing,so people bring in the finished goods.then they are stored and then according to dem and then they are delivered so we can see that er here is a clear step towards the customer.so here we have the customer incorporated here as well,but here only with assembly and finally a pure direct.t好的，那我们从这个工厂它呃，它的功能呢？我们把它呃。分为三种不同类型的工厂啊，首先最上面的这个呢，我们可以说是一个完整的工厂，就是说它从原材料进来，对吧？到生产，然后到组装，然后到成品出库，对吧？这个是它整个流程都都在这个工厂里面做，那它就是一个嗯从呃，所以说我们中间也看到它从这个大卡车对吧，左边的大卡车进来，然后我的叉车把它。原材料先放到我的原材料仓库，然后呢，进行我的这个生产工，后面呢，进行我的生产工作，生产完的一些中间部件呢，那我放到我的这个所谓的中间仓库，对吧？那接下来呢？就是呃嗯，它就是呃组装对吧？就是assembly，然后组装完了以后呢？再把它放到成品区的仓库，最后呢？再呃。呃，就是最后的sending对吧？到再发发货发到这个嗯shipping area那这个呢？是一个完整的工厂的形态，对吧？它既有生产，也有组装，也有呃这个运送货。那我们看到刚才前面的特斯拉的这个工厂，它其实基本上也是从这个原材料开始干，一直到这个完整的，对吧？但是很多的一些车厂，它只做assembly，只做。装配对吧？它比如说呃，很多东西都外包掉了，然后呢，我这边进来的是我的一些中间件儿，或者说是一些呃完成的零部件那呃，就像我们那天跟大家说的CKD的那个一样就是。唉，它呃，这个呃车我我就已经基本上生产完了，然后你比如说发到印度或发到哪里，然后我就最终在呃这个运送到那个国家，以后我就只是组装一下，组装完了以后我。我就直接就发掉了，对吧？我这边不进行生产的工作，那呃，最后一种呢，就是它也不不组呃，不生产也不组装，它只是做一个。呃，做这个分拣对吧？和这个发货就是distribution所谓的，那我们呃，这个呢？就是呃，成品进来，然后我进行一定的分拣，这个很多的，比如说像我们电商的一些仓库，对吧？那它一般呢，就是做的这个distribution HUB会比较多，那我们从它的这个功能的完整程度来说，我们把它分为这三类。工厂嗯。well,what is quite clear is also that,and I think in all these present discussions and movies we have seen that er.呃呃。we have here always a complex system in mind and we need ya analytical investigators creative solution presentations and decisions.um,so what we have to do here is understand better how there is an interaction between the many people and the many departments.嗯，好的，那我们呃可以看到哦，就是我们的这个整个factory planning工厂的设计呢，它其实是一个呃比较复杂的，这个系统化的过程对吧？那呃，它中间呢？包括我们说诶如。如何的合理的，或者说是把生产资料呃进行一个优化的选择和组合，唉，这个听起来好像是比较简单的，但其实它背后呢嗯是。隐藏的一个由分析调查，包括呃，我们要有一些创造性的解决方案，还有包括我们要展示，决策等等组合起来的一个复杂的决策系统。when we think about your abilities er,what you are learning in your study,in your study you learn how to apply.artificial intelligence for programming how you automate er er robots eventually or other equipments.you always do this because there is a customer,so the customer orientation is everything which is the driving a force if you like.er for all our activities,so we have to be always aware what is the customer,although you and your jobs will not see necessarily the customer.the customer is far behind heiser,he is getting the final product and eventually you are doing only services for one of the products or for manufacturing or for assembly.or even for product development,but there is always the customer behind,so whatever you do,you have always to keep in mind.there is a final customer who needs this and eventually when you are looking in to this er and you cannot see the final customer then you see er and your neighbor,the guy who has to work with you.software or with your solution,then this is your customer and you have to do always something for your customer and think about the customer so.whatever we do here is as well seeking about the customer although. we know that the factory to do very is very complex,and we have to manage everything but we can not go to the customer and tell him.oh，we are so sorry，you can't get our peace because，it's so complex嗯，好的嗯，教授也是说就是一般来说我们的整个的这个工厂设计的目的呢，也是为了。呃，满足我们的客户的需求对吧？但是有时候，可能你在整个的设计的过程中，不一定能够嗯。时时刻刻的了解就是，哎，这个客户他的呃，他最终是到底需要什么，对吧？就是然后呢？就包括每一个他的系统的每一个功能的设计，那呃如何的去合理化的安排，最终能够满足。足我客户的需求，因为它这个其实嗯，工厂它如果从嗯，我们说的这个平地啊，开始一直到它建造完成呃，它里面的所有的function要满足它的话。它其实是一个非常复杂的一个系统，然后呢，甚至是一个跨学科的任务，对吧？那呃，我们如何的去跟呃这个客户沟通，包括我们中间可能有可能都见不到它，对吧？那我们怎么去能够达到他想要的东西嗯？嗯。ander,what we have seen when we look into complex systems,we always divide it in sub tas and even sometimes subtasks are too complicated. so we divide again into subtasks and further sub tas.so from the simple screw up to the complete or the bullets or or or the profiles of metal.eh to the eh complete car eh we have eh kind of structures where we have to a kind of hierarchy of products or sub products.嗯，那呃，我们就是处理这个复杂系统呢，一般它都会把它分解成多个子系统，对吧？甚至呃，有的时候呢呃，它的这个呃。子系统或者说是子任务还是很复杂的话，那它又要下列嗯，又把它再分解成这个呃。这个各各个的这个分解成各个子系统，或者说是子任务，那这个就类似我们嗯呃，其实跟建筑里面也是一样的，大家一般来说一个大的项目，它会拆成几个小项目，对吧这个？小项目可能又是再再分拆，对吧？还很多像我们造房子一样，它就是呃，这个会分给呃大的这个建筑商会分给一些小的建筑商，然后小的建筑商再分给一些包工头等等的就是。那它就会有一个呃，有一个等级比较明确的，一个树状的，对吧？一个等级制的这么一个系统嗯。and a very interesting point when we look in such big factories like the thrysler one,we see that there are many disciplines. there are people,experts about er.er,let's say that the technical solution,how to pinch cars,cars,but they are also building people for architects. er,they are business people eser.uh,having to do with the money flow,let's say we have the computer people,then we have such a sociology people,psychology people,we have eventually a.ergonomics people er so all the time we have different types of people who interact and who form whoa sate amer only as a team they are able to set up such complex play.嗯，好的，那我们可以看到啊，就是呃，因为呃，前面也是给大家说到了，就是这个工厂的呃，就比如说像刚才特斯拉这种工厂对吧从呃？呃，开始筹建，然后一直到最后完成，那它中间需要不同学科的这个专家来一起完成，对吧？那包括我中间可能要用到不同的这个。呃，工程师团队对吧？建筑师包括我们可能一些经济学家呃，或者说是一一些这个计算机学家对吧？或者说是一些社会学家。等等的就是从他的这个专业角度，或者说有的人要去做法律法规，对吧？有的人要去看环境等等的，那这些人呢？组成了一个整体。去完成这么一项任务，那所以所以呢，它就是一个呃呃，我们互相之间团队之间的一个沟通啊，包括相关的这个技术的匹配啊，都提供。都是呃，提出了非常高的要求嗯。the next slide is in principle just AA slide with which is a under,under,under pinning or underlining everything.because here we see the.maybe not all of them,but a alot of them like the logistics planer,like the organizational plan er.like the architect,like expert engineers about heating sanitary engineering,electrical engineers.civil engineers,experts about pollution control and design authorities,business economies.suppliers humorous sources,people facility managers,manufacturing planners,isn't it beautiful to see how all these people together are finally setting up?such a such a yeah impressive uh production.嗯，好的，那我们看到啊，这边呃，也是刚才前面跟大家说的这个工厂规划是作为一个跨学科的，这么一个复杂的一个系统，对吧？那中间呢，会需要非常多不同领域。专家来完成呃分门别类的一些呃任务，对吧？那这个中间包括诶，有一些人是规划我的整个的这个组织结构的呃，那还有一些建筑师，那我是来呃造房子对吧？包括这个。这个地皮的一些规划那唉，这个呃，有一些专业的不同专业的工程师，有的人唉，比如说我的整个厂房的呃，怎么去通风啊，制热啊，或者说是呃，甚至是专门呃去考虑它的。卫生情况对吧？它的电力系统的工程师那还有呢？就比如说是呃，这个城市系统的工程师就比如我跟呃，这个呃。周边的道路，包括我的整个的这个呃结构的这么一个对接，对吧呃包括呃，还有一些人呢，可能是要做我的这个。呃，这个整个的这个财务上的规划对吧？呃，那还有的人力的做，有的人呢？是做这个人力资源管理对吧？有的人是做这个安全管理，那我们可以看到啊，就是。嗯，这个每个我们大致的列了一下啊，包括呃不同行业不同学科，然后他们分门别类要管哪些事情，大家可以看到。这是一个非常复杂的，这么一个系统，但是呢，也是一个很呃，怎么说就是呃，让我们感觉也是很和谐的一个系统啊，就大家在这个情况下要。呃齐心同呃协力的一起来完成这么一个效果OK嗯。an der,everything er can also be part of because everybody is doing his work. so every er activity itself can also be very dangerous. it can be stopping the project er.authorities can,uh,let's say,um,not accept approvals or not. uh,and then suddenly complete factory stops because of some authority.missing some approvals and by the way it has happened already,that factory constructions have been.stopped because of authorities interventions，嗯，好的，那我们也看到啊，甚至我们有一些这个工作室需要一些这个相关职能部门的专家，对吧？嗯，去。呃，做一些审批对吧？包括我们诶土地审批啊，环境审批啊等等的，那我们经常呃之前也给大家举过例子啊，因为审批没有通过，那这个项目无法启动，或者说延期，或者说做了一半诶呃，突然之间。这个呃，跟我之前的这个条例是不符合的，那可能甚至要呃完成了以后也不能使用等等的，对吧？but also er another group of people,the business economists have to do some some work and in case the financing is not.eh is suddenly in danger because the banks are not willing to pay any more suddenly a factory production,a factory.a planning or factory erection due even during construction of the factory can stop,we have several ruins of a factories of buildings.where during the construction suddenly，the financing was crashing嗯哼，好的，那我们看到也还要有一些财务专家来支持我们的。支持我们的这个工作啊，因为。嗯，因为我们的这个呃呃有很多项目啊，就比如说唉，突然之间可能银行不拨钱给你了，那有的呃，工厂或有的这个项目，它可能造了一半。呃，就有一次精炼的断裂，就继续不下去了，或甚至有的工厂嗯，因此就是倒闭了都有嗯。and experts even looking onto the soil mechanics saw something really out of our consideration of a factory the soil.eh they can,eh either they can stop or they can. uh,make the price AH rise,the price of the construction,construction because for instance in croup in a.in Brazil,they they build a factory,but later they notice that the soil is not a solid in US. its kind of swampy area.and so they had to put in a lot of additional columns into the ground in order to stabilize the building,which will be erected on top of that.eh,what a desi ned um dei problem,madam rational is vague.那里还是没有嘎的呢嗯。我是个11本。那肯定百姓火车百度。阿苏。they are here by them,expert and gets me down DAS MU zog art in bordon and bordon good ear den bow,who DAS the bordon arc aven khan bent his boughs while im MA sch wearer rig a boi de dr ouch stein no.ya abi th glower the bottom where needs to fit tight to body body for its tail is iss is obviously.t.eh，that's the em items to riu m here。I know it is an expert，I know it is a，yeah，I know it is a client stricken to the yeah 1边哦，嗯。也。inter 3到c1专区课程。ye ain't viya zin'tv eh vic what is it zi yak dear is vagye why VI yat's why zin'd da HON VI ya munter sheet ley here?嗯，那主要就呀。dou hurst ig ni XO dun amish annoit re.yeah,it's on. it's Nice,it's,it's on,it's on big.看哪样弄，非得提着钉儿一扫不行，按时还能打一个。要要要，那要不要吃饭就不会要死？嗯呀。our maggot's elk saw my dear abu phy. lastics's elk saw we dear ab ap hy lastics's elk,whilst elk,whilst so clima vex al vida in flu ling tussis flu lit.free as medicaid，haha yagi now free as medicaid OK，看故事啊。嗯。然后好的嗯。回来了吗？回来了，刚才重启了服务器哦，这个还是第一次发生呢，这个问题OK没问题。好，那我们继续啊。OK,we can continue. OK,so in the end,uh,this many examples show that there are a lot of experts,and you?you are studying here will be one of these experts later in such such a big environment。嗯，好的，那我们看到啊，就是呃。这个工程设计呢，它也是需要各行各业的不同的专家，对吧？然后呢？负责不同的工作，那我们也希望啊，大家通过我们这边呃，这个几年的学习的。大家在将来也可以成为这个中间的呃呃一，这个可能是某一个领域的专家，或者说能负责某一个某一块的工作啊，就是在通过我们这个。呃，在这边的学习以后也成为呃哪哪一块的专家，对吧？OK,but eh? we also have to think about the factory of the future and the factory of the future is a factory which is.ya developing even more,and it is.is capable of the flexibility of absorbing development trends together with new technological developments.so factory is never a astatic system,it is always as the tesla guy has said.they are continuously trying to improve their processes and now the problem,however,is when their processes need more space or less space.what to do then with less space,it's not a big problem because we can bring space free,but if there is needing more space because maybe sorting activities are making processes more efficient.小伟老师，您一下啊，这这个还没起来，他课堂的那个软件还没起来哦，好嘞。不是这样的。这个是。是现在你们没有不能分配到每一台电脑上，还是怎么样？是的，东方我这台能看到。哦。不行就打到大屏幕上吧，还是？我看大大屏幕，关键对这个。globally had um gathered the restraints ewe blocked here.one do the speeching zion dusting desc ini shed on the exist，那现在打到大屏幕上了嗯，那就再开始吧，对就放到大屏幕上吧。大家都都看前面的有有那个吗？有写呃，有投影仪吗？这边还是什么啊？行，那我们都看大屏幕就完了好吗？大家不行，往前坐一点呗，往前面坐一点呗嗯。t.t.the i volta no a here's are i can test US eh? let's ly here,it is a factory of the future,and if noah alpha and fabric is the慢zo of parson and zim US so.dinger for bag n ym or the dinger er amer k ly hindi n of common burden MON dun mo sma ne vending ton was conto flock flexibility. a theisen was CON to.logistic oriente o tide,he is son vass is ED integrated with a participatory azo tibet aili hun ke h fund dimension indies of fabric damit US in scu z amp tau flan gaz ish good good kid.the handsome bash pit end the room in the in she hi ite model and as the lighter her curt sare brightened wouldn't whether darcy found a qualificate soon had noa qualificate soon bauch in.other the public most arrogantly is for Ireland in gobs curated effect of future future of the two community s.嗯，好的，那刚才教授呢？也是给我们讲了，就是说我们呃这个工厂啊，就是特别是我们所谓的未来工厂啊，必须要能够灵活的去。嗯，顺应整个的发展趋势，还有我们的这个新技术的发展，对吧？那前面我们在特斯拉的这个案例里面也看到啊，它的那个manager也在说诶，它就是一直。是要呃，希望这个工厂是与时俱进的，那它也是，比如说很多工作就由我的机器人来代替了，对吧啊，包括呢，它整个的这个效率呢，呃，希望越来越高，对吧，然后成本能够降下来。那这个呢呃。呃，从这呃，从今天这个角度来看呢，未来工厂呢，我们必须具备哪些特性呢？一个就是说它希望是柔性的，对吧？flexible，然后呢？第二个的，它是以物流为导向的，就是它整个的这个。呃内企业内部的它的这个物质流动和信息流动对吧？以及它的整个集成化程度和参与化程度。嗯，也是需要被很呃，就是考虑的点很重要的考虑的点，对吧？那这边的这个所谓的呃。灵活性，或者说我们的柔性呢，就意味着就是我们现在很多的相关产品，因为它根据它的呃，这个技术的革新对吧，它需要有一些。呃，更更比如说我们的产品类型，它需要它的柔性程度更高，它的适应性更好，哎，我的种类和我的这个生产的批次，比如说呃，那。再经过调整，比如说我有一个新产品呃上去了，那它就不需要额外的一个成本，对吧？它的工厂的适应性要高，那物流导向呢？是说就是意思呢？就是说从我。呃，原材料对吧？进来或者说我的供应商进来。这个直到我这个东西发到我的客户，整个的价值链里面的流程的优化啊，包括呢，要缩短我的这个内企业内部的处理时间，吞吐时间，对吧？还有呢，整个的系统和流程是希望这个集成的这个角度来说呢，是希望尽量的能够避免。浪费包括呢呃，有一些不必要的，这个接口对吧？不必要的过程，或者说是呃，一些这个。那比如说是撤回啊什么的，就是一些不必要的，这个流程设置，那我们尽量要避免那呃，另外呢，还有就是说所谓的参与度参与度呢就是。呃，未来的这个工厂的设设置呢？也是呃，要依赖于员工的创造力和他的积极性，他的参与度对吧那呃？因为如果员工投入到我的整个工厂的呃设计或变更呢啊，比如说我的有的时候厂房要扩建啊，或者说怎么改建啊等等的，那就可以呢，确保在实施过程中。我的员工的接受度就比较高，对吧？比较好，然后呢？就更容易成功OK？I thinker when you look into your life,you also will change all the time your skills er,it is said that people like you being very young.have to learner new jobs er maybe three to four until you go retire er and you totally start new with new skills.and artificial intelligence is now a days new,but it will take over new responsibilities and you have to learn other things as well. so I think even the humans erin.have to learn the new jobs which are needed then when I started my career I had learnt in the past with fortran and basic s.t.small talk and now we are with the ID is HP aha piss on and now it's piss on so.so I mentioned in this short time seven different programming languages throughout this relatively short time.那is is the title home呢？没有吗？很粗好的，那我们这个最后教授也是总结啊，因为我们未来工厂啊，不仅说是我的这个呃，工厂内部的这个技术以及我们的这个呃装备。它的一个革新，包括人，你也要有这个与时俱进的能力，对吧？那刚才教授也是呃，简单的讲了一下啊，就包括他那个时候在读书的时候呃，因为他也是呃，很多的这个工作是跟软件相关的嘛他。那时候唉，比如说最早的时候，他们是用帕斯卡什么的，然后后面到C语言对吧？包括CC加加c sharp等等的，然后到现在哎，我们用linux或者说用。那个JAVA用那个呃，到现在用p等等的对吧？那这个过程那你就一直得学新的一些呃，编程语言对吧？那我们呢？呃，其实在呃，这个现在我们大学里学的知识包括以。以后未来要用的，包括我们现在也在学一些新的，对吧AI啊等等的，那都是需要与时俱进的OK，那今天我们就先上到这儿吧呃。大家呃，大家今天也是五一节的最最后一堂课了，对吧？那也是希望大家呢？节日快乐。好吧，那我回头把视频发给大家。嗯，那我们今天到这结束。