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Oral History  
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Many as trial so retire it is it is years or the next lesson is learned in the library. Much from a Persian interview them a great pleasure. Who knows more about this. And I think it's a pleasure to be easy and charming and I'm pretty everything. I can hear you. This is more likely to consider trying to pin. Because it may be important for me in your views of how awful walls or things in run me off. So I guess the question is how do you come to manage it in the same category not have I was just start tackling I ask you to to run the defender program. He asked me in a nine hundred sixty one. I thought about it today is and says No I've got a great job the standard. Let's stay in August my wife and my then wife. First was Norma. And I took a trip to Europe. As a girl standards. Executive and the purpose of business purposes was to take some Latin resistance some of those run for a bit of European standards lapse. There in Calgary is N.P.'s and can do a great else with a side show and that is if in a sense and so I think. Well then Therese. And some of the jury were kind of excited. And we were going to see the U.S. ambassador and valid point because he was late. And he was late for two hours the secretary was Carson says. Please wait for him is a General de Gaulle it was the president. And he comes in the last hour is somewhat. This several that says you know I was to go for the big prices. Somebody screwed up I'm on and on traffic he's been stuck in a red zone has no idea it was because they don't with the excel. This is Easter. And I spent on this time reassuring him that yes we will be there is needed so I thought about it coming home and I said. That's true thing for you or for a car jacker next to the office till. But Jack said sure come you come to it so. So that's it's gotten this described the book and. That's how it happened. So what were you responsible is finding anything to what extent we imagine program. Well that's those are very profound questions you have and often. You knew that was confused at first I was hired to run all of the sender green or change his mind. Have to defend and. The prior director. Defender. And that didn't sit well with me into a recession but I have and you have going to wind up with the whole thing settled so I went to. And I found a few for. It was over one hundred million dollars per year budget which today is eight to ten times as much a billion dollars and it was and it had hundreds of contract brain cells and use much too complicated for anybody does. And too complicated to name. So the first things to go on top of what it was a man and had to have a lot to learn. But I was faster. Have some experience with the Arms Control Strategy community. So I knew what missiles were about a new been on some of the some committees. For some time. So I quickly realized that I had to really understand this well and be able to explain what was missing management's you're just using them to talk about sick then even if you had it was just and it was it is a bag of pieces. Helter Skelter was a little sensible. Structure. It's all. So I come through that and separated the field experiments. From the laboratory experiment. The series from the experiments. Engineering from the physics. Some obvious. Divisions were possible. And with and and made sure that I found good people do run. This is as well as looking for with people who are tickler who were knowledgeable about the broad things in the field knowledgeable

those that were and had some experience in that. So how do you want to rock with them is a good man. Interactive meeting landed in video from hand to day interact with the judge a hologram three very grainy P I talking each other and looking at the scene as you go through some of them and the first look was one of the big board of spoke at a lot of stuff of the spigot and no structure a lot. Except spoke to couldn't eat it except through the school. I was eating spoken today with a fork. That may be useful to be unable and but just before it will do fine. Because you're trying to get this piece is no such luck. Well. I had a rudiment of some section had built on. Reno recommended that I have really use it Colonel Cooper. Lieutenant Governor of engineer who ran the largest to the reentry physics. Program which was the real heart of many things. And we gradually sort of and also within the first week. Got another program. Acted on. Just from that me for instance is the gable. That was a program about doing and that assessment as to people of the U.S. missile. As attrition is the senses. And that was a brand new program. As a side to her prior to and. McNamara's and sectors a sense of duty generally Lukas and see what this does. And so with that as a very important message that is what runs and the real. And so we've got a grass to gether can sell and went to see. Ferguson said of course are the three star. And he didn't talk to me. What do we do. How do we do so and one big thing was the security. Those are going to deal with the real measurements on the real penetration of the real missile systems. More sensitive than which we could not think of anything else. So you know King I think one hundred programs. Yes and some bad another. Yes. Can we talk about the differences between opposing Fortenberry. How you evaluate what this is sort of in one competitive environment people are not fighting with the judge didn't have to talk and make a living doll but they were very competitive it was all political analysis is why do. Who signature did you get it straightened to the last week which I will sign on the hook up with this with this and myself and. It's in signs of delight. And thinking this through I can do some clues and I have to understand each other's order. Well enough to sign it well enough different for different folks. For example to reenter physics programmers the largest and most important. I rented to. This is teachers. Change that article. That was a big deal with money. Change. And I was personally. Going to see how the days over actually taken some technique to the classes. How would defend the program. We all did for cancer. Well let's let's get back to that high dex intercept program. One of the things of clear is it was a very good fellow who he liked to build really fast in this this is really good at it so we came up with a proposal to be the going was one of the other one isn't it true. And. We want to build fast in this effort. No context here is that there are a program US events. It's just a very much larger army program. The Nike Zeus program but just in the process of being deployed. The multibillion budget. At that time. We were the fancy technology. And McNamara. That was the few of us. So times a year. The Army secretary was always present and army chief research. And I prefer McNamara. I program back memories everything to leverage the army. And so when i first thing in the sense of around the secretary did you know about this service is enough to do that stuff and next. And then I said well I don't want to see how much you can drive the only program. So and so did the stories on. These are not easy to explain. But as I need one work done and that's cool. We issued for voters request. We've got to you drew the proposals and which these books. Picked was attentive in the

this is like for us and was larger than that. Competing with I think the boring. I knew this is going to be treacherous for us. Absolutely. Proof story. And three hundred and it was able to write a memo. Why does size do it. Did that satisfied everybody is supposed to check the lawyers and. And we went with Gore and the result was either explore. Which was several times. As far in terms of acceleration as his contender and or maybe double the planned for the gene pool fast interceptor. Yeah because of the billions. Thank you because I took them. So you're basically saying you make a decision between that was the source elections effective. That's a technical term. In the Pentagon the. You just say that if you didn't send a telegram ethics in the relationship with the on who had been taken seriously. How did this excessive the fact that tend to pawn off as a latent ship with the services. And does that lesson extend elsewhere in your work and there are several phases of the faces of the. McNamara broke with these agreements and so this is a is he would says that the decision to fix things. And how Brown has the lead and I was asked to do to make a draft and how we want to run for the. And they did. And that is Father Bob details next in America said no because that's when I was it was this is secretary and the Pentagon is not an unexpected. But that's the way it was not exact change. And later. When I was director. I had to fight some of these cells and I was not getting any help from McNamara's I just came out around that's gone to those different markets. But the key thing. I want to get back at the risk of some work top are going to start and is very important to study that period. And that record. And the records in the Eisenhower think ROOM. The base him. Texts or the national council meetings as in our usually chair. Was made as an officer. He can't be of the services are can so easily be directed to Gotta be the secretary's office. So it's OK in that. Careers are like that because that's an hour every project that I have a story that as soon as a are of the grant is stuff is picked was pretty good. And I said that we were working on position. Problems that so it has money and I took it as an accolade. And I soon as know how I was running for president I was not terribly impressed. It was for the other guys cups of them. But I was quite one of those lines that are just and yes I'm sure I'm a return on the family that he knew compared to other programs or the office or. Yes Let me give you don't need to are absolutely. To those who just after just a done so never did. Lad I did though it was not an excellent. It was good enough that I see movement started as a view of the people in the high frequency radio. To use the ways in the sea. As an indicator. In this was not a stupid idea was just not a great idea. But the whole thing was started under that flat. By the time I was onboard it with the there were turning it on never seeing stuff. He's a seat ways and I don't see it will be sure to issue a whole more than that expected to values and early warning. The centuries. It's value of heating. The average fifteen year. It's probably still one hundred percent. As it turns out to be an excellent radar telescope. We can produce. That will that we in the region that matters to you or to listen and Cornell. Progress. Of. There's a scope. So we have to physics and astronomy. People. And indeed. Look for people. Closely working with up to the you know. Yes very conventional He was what was criticized to fight off I think it's evolved into that like all of these implementations. And in spite of those attacks. It's amazing really that accomplished so many wonderful great team was being told. DON'T DO IT WAS NOT Yeah. Well there was a ten minute and then up to and I was certainly

not. I mean. I did not kill or C. Boyden love for five years didn't want to do. Soon after I was on board is it or you've got the good guys or is clunker. And said look into it a promise. This is the one thing as a tease by the way. It's an interesting scientific point that you'll enjoy the only improvement for the seventh room and for those people needed to be coming back. One was special and could be moved quickly to Dish receptacle. Isn't that expensive. This. Use the surface of the sphere. This bill is fear and not the easy fix or browser or which are trivial. So in order to make active antennas. Passive radios tested with new equipment sixty two with dusted resigned in protest of it. You have to have a stronger structures and the Gauteng know you will see. To look at this through pictures as it will be a good bigger. Sours a cap or is it. Person have to sit there to align before they turned it on the list. And so this. Here credit. That you were able to maintain those directions in the investigation went through you know I still think seven eight in the static. Many people wanted to stop that are. I found out later that one of agrees assessors tried to kill it as that is correct for the reader to do this if he failed his guardian angels. And so I I was freelancing this. Also the semi in Thailand. That I think it's time to present in the Vietnam war. And that's described in the book because the land in town and we want. We have those nodded. To survive in Vietnam if it does have a chapter. We need to talk about that in some of the conflicts. I helped to build of the senses lines and as on the back with lots and and was important and went on for years and years. While on things that were neglected. I have to add that in this is a serial centre. They were prevalent in the central privy to that without that the company so. No one has written a history of this. I'd like to know who we know precisely how many institutions twelve and tools and fourteen we get into that set made. They went on and there is still smile. When I see the reference to the origin of the paper because it's there. And many of the it was a highly computer program. Some people got it was on in some. And some got buildings or something on have that. I think it will be useful to write. If not for scientific history of the students coming of the press. I have no idea. I did. No one ever. Then forward looking into the glories of it is true. And that was an Eisenhower program. Put in by killing on the must do list. Who was making the decision to see who that. More money or there was a in the lab or. So I selection process was absolutely transparent. To essentially no prob protests. There were a few adjustments. But the automatic it was running when I came on board. They had already. It was very quick. It started in his neck and then sixty one most of the programs are running and that was a competent manager who was solid state. Actually campus. Who was running the program as well administered. It was centrally zero trouble. Before anybody who are not of the standard. Snipings. In that period. We see a shift from. We need to find it some of them. Yes me. Unsolicited proposals to the hour can easily be in the requests which you have posted people coming from you is that accurate and S.L.. How did that just take place and good is occurring other point that they are quickly. Offered the size of the program. The material is was a shift in from more. So freely offered proposals to the to it voted proposals. I think they have been better that's enough. Innocent people got smarter. We really and. Those were surrounding our speaking for the whole bunch. But six years. Because it's murder. It was the sixty's do a lot of wiser. But what have to be done. And what could be taken across the track. As a transom. So I think it was

deliberate and generally a good thing. I think what happened. The B.S.A. is a very useful technique her crown has the. And I say by the way I see our prize in economics playing the different. Remind you come back to it. It matters a little bit. But we we to be a announces a New Jersey. But it isn't in the next. And surprise X. and comes in the content. We did more and more of that as we saw holes in the program. For example. We want to who we invented an A.B.M. system. Ship that is it insisted that the sea to sea. I was one of the inventors is doing the Cuban missile crisis. Problem was. If the Russians launch a few missiles from to work. Can shoot them down from the from ship. We tried both into C.S. to fall and be followed up. We have three cruisers. After those and destroyers and he just radars and a very high performance missiles at people who sit missiles. I was a be a cop. But we also grow because it was of the good as it was better prices. And there was a marriage of convenience is as well from the Air Force. With after the sensors. One can indeed. Shoot down. Launch missiles from airplanes is the right. Everyone is getting to the point in the early days apocryphal awful would seek out or learn from what you can the doing great work in some domains and fun without making it a competitive pressure out of it and that that change it change to as we talk about the BE A GREAT anybody can. Back then and now an evaluation place plays. What was that share. And you feel it was affected. But as I said I think that changed its nose because it changes looked. We always went to the basic research. People that we wanted to work with the whole Arpanet as board as we do exactly the disney. We solicit is those people followed later. And that was the appropriate sequence. We again. And I wrote the piece for nature. Truly few years ago of the art of doing with. Nobody read that is are there to really isn't a good review my book. Which is kind of it. And I use the nuclear test a Texan program as the model. Two reasons one is a housing SUCCESS and two had very little to do with my fingerprints are not all over. So it was fun to use somebody else's success. Explained that year of series and defend that. When the influence your understanding of what he said ten cents or who or what it was not workshop. Running and modified defender program was what I did every day. Twenty two hours a day. And I learned and things differently. Tried something different that didn't work. And so on and so that others in the US basically consent. Let's move on quickly and we've covered some of this knowing you're wrong that didn't directly conflicts against a coupon. How did you get any chains. From the consecutive. Well it's to very important what is the. The the deputy director George ship was under Bob's from who was a direct quote now. The very well known that this is the great boss. The very smart. You know I have nothing but mutual support and. As I was wonderful. He knew little about defense and this. So said I want to be the deputy for the defense. I also want you to be the deputy is the one to do the godfather to this. I don't know much about it. He said I want to be the good tested section. Because I have been involved as a community and what to do is find. Is it all the way I want you to take care of themselves. It's excellent for us than what you mean. And I know what to do about it. And so that's my interaction began seriously the do everything that. I went to see them. I had to do the community to take. Not only will I pick the program director of the ship the section director for your program. I'll also be a staff. Let's deal with Mitch Weiss. Lots of fun. This is really and a lot is I think. No I think like lighter. This is my wrist and that the deepest not heed to but very profound on his programs and I program. And not buying everything he

says. Testing to get that he swallowed a large part of my time. And I kept the defender for it on his father the sense of. Oh yes very good director after was that free it was a. Ran the program creates understanding. So large part of the issues. As a number of issues of concern is I trust that you know I had two years more doing it is good enough. We were going for them to improve. So. And so I was happy and imagine looking like. Let's talk about how healthy I fly. How did how did it go. Form just talk about that and how was your Saturday night work. Well that's what have you learned and this is not a book group you hear about the book. Reserving this for because on the topic of that or rather. The Licklider. I can do in the fall of the sixty will look like other gave a seminar at the Pentagon. And that was in my wrists our king was my second decision of the science is truly a phenomenon again gave three seminars about the computer chip Giga. In the forty eight forty nine time frame. He gave a talk at Illinois. In the same month and that isn't in the phone book. This is TALK OF rejected popular is not very much wanted to see that at that refresh. Then the way to look later came and talked about the new ways of doing. That's not me everybody including myself had seen the or batch process. Give her a program where your problem goes away programs. Then he he runs in there as you can start to again and finally comes back with a sucker paper which is alleged that the answer is that it is very carefully. And that's a miserable is a real service president. As Aberdeen when I was her me as a live band. And those that had started a research program. Of complicated matrix. As it was an order to that in its history. Look like the said this is all wrong. What you need. And I know how to do. This is you need a direct interaction. Their general sense is real machine. You can now don't have to this situation is in place to do it all of that some magic system that expression. There's a lack of network was invented shortly after Well long story short we know how it looked like to run if the IT TO existed was new and original. And that's true it was actually in it. I never went to see those. He's going to look like or is there had enough to do think that was look I I had a hidden agenda. This is look we have huge machines. And it is link and elsewhere to do these enormous is a reduction. I don't have much confidence of this estate or the other instances. It's just a look into the never really does not in that timeframe. Really was a presence on trade you know we invited me to meetings which I went to invited him to meetings. And this is part of my. Becoming a good for other people. One of the glue factory was in nine hundred sixty two was still new Iraq three key. Letters one. He knew Kissinger who was a professor at Harvard is in Rio just taking the was program. And no you can do is the connect up to you. And he'd help about I was sick of the second or open one come as good as I please don't talk to him. But Kissinger invited neutrons centers of her told me about the house and institute reduce funding. They gave statistical analysis to have started in time showing who was a professor of economics at her and who was just starting it. Ten years. And I was HIS of the future of the he was teasing. Missiles. For this is just like it is wrong and I did study done first it's gotten defense jointly. Secret. And helpless as I say these itself. And a call for help and. Each response was very interesting. Each response was quite different. It was to this historic from those so let's a little deeper into the formation and say it was there to make life. Yes. Greg Appel interact. Yes. We have been getting what were these. When he joined us in that southern line and I wanted to

whoever he was a night. Yes I think the things that started visiting. As links. Looked like a suggestion. There is a place is. I did not get to use it layered on disease. At that stage. I came later. And I really didn't feel like I had more than a sort of function. It was a suspected that when I became the father. To go into a different view and started thinking about recruiting career paths. You know one thing I know is that the earth seems to be several distinct academic communities and involving computer science. Which by the way was influenced by the people who were official televisions people. Not always a happy marriage. Then there were to lecture the juniors. To members of the. I don't know what they were doing fabulous thing I have to learn. So I realized that I was as you would see it. And that's very unlikely that there were a lot of very bright people and not looking back and say dozen of computer science department who isn't physics department. In the information in the telephone numbers and this is AS IS NEAR as a way out and interesting sort of. When I became Got father. As a not going to tie his hands. So the answer is simple really expensive. Lease and twenty five hours shop from every word every two years ago that was it was a lot so I started talking to people who were in the Congress said Would you consider a deal that a package deal more than a line of the time. And this is what you want to do. And so we're thinking of the network is an overlay is it for progress toward or too much is it a Z. won't work. It won't grow can be on trial. That was my fatal. You've got the same message that was the sale and service is it's one thing you know that a lot of the truck is a post that has the details you can. Jokers with some of those it can't be done. While he tells me I think of three different ways to drive anything. So I said OK go there because cricket. But at that moment. The community. Need is the home. The sociological studies. The thing is in it for the newly only vertically. We have. But let's just try to make one. That combining pieces. Pretty good. And those are very deliberate move. On the number and we started thinking about who should get the jobs for the good English and who are going through the net. Orders. It was Dr proposals given for for supercomputers as the program was cleaning the minded people. I want to follow up with networking. Yes absolutely fly the next year. You picked it up recognizing wait for me to get it you want to tell us and yes let's follow that path to the rock through those guys. And that. By the way the reason that I dropped out of the nine hundred sixty seven. As I started so I could not talk to the people in the weather and I really did. And I went to work. I think he was a pedophile. And while I started talking about the earth a little bit. Casually Ijaz. I'd never succeeded in getting them to be interested in the open it as an institution. One with the concept of the up and how didn't evolve from all the articles or those I said in the title. So look at where with me believe will start in that work to be called the open where somebody else may have wished those years. Claimed claiming that invention of the. It was because it was common. And it was part of our language and was looked like as I detail T.V. I mean you. I don't know if you lose as a matter of principle. To do more than give boundaries. As is done shall to have a different machine and language on each side. Just so you don't get trapped into the deck so I mentioned earlier that I've been settling for example said yeah you can successful. Vet germinating needs and uses Well I don't know I don't remember having to of it. I think I did. Mostly make sure I had good access to the device for the tablet. The obstacles and the like and on that he was feeding my interest in that.

Because one of the big blocks everybody stops. Is a look at. And neutered veterans is called for his request. But I really I don't think at that time I focus on trying to identify what it has had left. I'm with an out who picked up the idea of the networks and you. Well as I remember. Hiring Taylor I have to prove that one of the things I learned very quickly. When I was that the director. Office director. It's a lot of two years each for kids for one job. And I find it difficult to Goodwill. And I was going down the list on the list. When Halo came up and don't know how I met him. But I think he was recommended to display a person who worked with this brace of input. Is because it's that some potentials. Sooner. So I hired him with understand your job goes on to start working on a and look legislation is about to do. He's not that you left the preamble it was a good half of the school book because it's critical and. I don't blame because the leader is no we just very quickly. But then very early showed need for me that is secret. Office in the sense. As I can tell you actually in the his record office next year. Yes. And you went to the to the secret office is difficult for. He had worked on the Kosik terms and forecasts are good to each going. Connected to one of the four sets. He explained how he could use this couple of the talk to his side. Can you use this term knowledge or talk to that's not that's a good six and that was make real memory of what I threw into the team has a way. It was it set because I was traced. Then the machinery is correct. Larry Roberts a rock bore. Larry. Here. By the way I have to muscle. Get some muscle guys that are eight holes thought he was not doing that later found out he was and is quite happy to try to live in to him because one of my principles was that I get everything's photons have to competence in seriousness. Larry. I don't think the current people delegation may yet. Very important. It is as big is in part of my life forever. All my life. I've enjoyed being boss and expected to delegate. So we'll get to that. Absolutely and not me. So this is the one. He can remember. How was the overall talking based application because it was more than just you know that is started out as a proposal by his from the outside is a generally profession. To the second one was not on some thousands. And so one was very busy. So we. There was a standing invitation. Invited to the same as for the stuff that was done and I think this is fair number of trips to go to various places. To attend seminars. Has Been there was a member famous dinner in Cambridge Massachusetts with several of the great. Minsky was one of his comeback was in fact in getting that this is really. But that changed. As we got more. And some of these committees were set up the advisory committees. And they said he talked to. And then later. Going to the big machines. We had that well it's obvious from Illinois says. It's is for which this is a supercomputer. So this is a funny story. When we did differ from the picture one. For a conviction. To this is what's next for. I was ready to take up interest to do that. As put interesting predictions and it was nothing out of the anybody thought that we had. When the strange architecture. Its leaders are going to something in the in the classified sense that much later. Specialty items. There was no coherence. They seek is. The system. OK to try to fix a problem here. To get so you know the actual reality member. Yes I agree. Which is the same with the act or because they're that Mia flapping are finding one of the problems. Young member that you tell us. There is no that was it that we basically they are four of us a new kid on the block. It was a new architecture I believe. Much higher degree of was that that was the other time. When it was a single processor machines



for the most machines and. We had a very strong. Substance is what it is for as we have gotten early in the look good tested section in the Navy Marine got in on the sound in the ocean. We had found early on that the civic base is incredibly quiet. Because typically. For many many hours of the time and very state the cure graphically. So one. It whooshes in the nuclear test a direction. Was the seismic a record which was built in is ten. For the for the ground. Look at this direction and then blood from our shoe was my deputy as to why don't we do one in the ocean and why would one do the. Well if Basically if you have a grid of points to do the same operation was different they could be relatively easy to solve the problem. The wrong. Had been the problem this is this that that was one of the motivating forces for the area For Ergative. It was not for the solid state or. Because there are so different regions of the city Grayson. A good tunes does he find really in particular. I was NOT have seen a printer not. So you now you've raised an interesting issue here who you sounded who who defended the earlier. Truth is you know what you offer is it was him who was it that was it was not only is it tough for me stuff that it could be maybe it was that thing of of her that I didn't see much you know knowing that I'm no dance like what we are. And there are some of us. But the other issue I wanted to raise with you now open it up is I think P.R.I. none of my motivation was for military application. Quest. And that was two of many My Kind Of course. So the question is how given was office. Motivations in funding the surge which our view has no military and point. Why is there another Kerry nothing that lays some of those isn't once something that one of the lot of one of those in the right on top of the. Yes but one thing that is yeah. I've been that's not the simple answer is no. I was afraid of bumping into the ram air force. Program as it away from the. So I had a cover story everybody has a cover story they can talk about that somebody could talk about immigration hearings. So I focus on the story line I like this about one hundred big machines in the country. That was the sixty's. But there are probably a thousand. Several thousand people who didn't do their problems. This is a way to bring the machine to people. Let's have a powerful. Workstations at every person. And how did a lie it be invented. Urban that is big machines of you know. Did you have. Was that the stories sold to who I mean how does got absolutely absolutely. And the through the Congress are as brilliant or Johnny Foster thought it was. He's really care about problem. He didn't realize it was a rouge and sent it to do. But I've heard the inside story. Twice. So I was so yeah. As I could try. This is really very quick and my mind. Savage's going to look all going to go there was no back story. Because this been. We're always yes I question. Do you have a military. Now all what was above. I had your level involved. We don't know and I would make it clear there was no such military. No there was nothing like a shooter was not in the military look we are one is ludicrous. Because it was never our full enough to be robust enough to be spread enough to the parents and so can I just interrupt pretty quick and yes it would be really great if you could say that again. But address the problem first broke I don't think we got that on tape. OK The problem being the justification your justification. Very good. Important. Thank you for the for the leverage. The point when I decided I have to try it. I have to have a very good story. That was real it could not be made up. I respected the intellectual or professional morals or not I couldn't tell the stupid story of the builders is expensive and the story evolved by the time it

took it to Congress it ran like this one hundred big machines in the country. There were big machines of big ideas and says. And they're going to give us hours and several thousand scientists and engineers who ought to be doing problems who's in search of this on as a tool so rather than having building. Computed issue centers that people go and live away from home. You are a good. Workstation cotton and just a P.C. a tablet. If you were there can do that as a home and how they're tied to it that tied to it with the Arpanet which we are going to try and build. And this is really the first one. I was not modifying something. I didn't like. And very few people have that except that you guys are just heard from that one third the right in this story about crashing your two machines. But on the second letter is wonderful things and off. It is exactly where we go. And so we have lots to do to correct in my view is that Internet Protocol need your invention. Engineering invention. And I think it's most important is nearing Benjamin twentieth century has a plan for invented one thousand and nine. Rules were mentioned eighteen. You guys got to be a century. Really now. It changed everything. I don't know very many things that changed everything that happened. And I threw the first step. And you guys built. And it's wonderful. But I also think they're going OK generally laughing with the also to blame for the vulnerability. We talked about. Mr that's too hard. That's really the need to walk away from a good product that's not in one of the that's better code can you repeat the part about it not being a military thing. You know the Terry comes. You know it was. This is a goalie in the other uses of the. We have lots of effort. On the we contributed to the limits of the worldwide community control system. We have so far as the sea is so Monaco that. What was it called No No Rand was a stand alone. To say stuff about and there was much of the same as me saying this is a different purpose and and I talked about them because we made contributions. The country to this engine earring because Drew is ideas because Drew did two committees. Important. We staffed a lot of the committees and and said. Right and some not as is so what were his actions but you actually were getting back again to the OP in that justification. Yes. In addition to getting access to the scientists. Yes. The people who finishes themselves often. Jealous of the other people with machines. That was graphics it used to decipher for missing airliner I hated hated us our I needed the new C.I.S. wanted. All that capability and their own something to talk about was that another part of the justification. Pretty stupid right. Well it was beyond my original to clearly. Except as more of those calling myself from the nation. Because I want a system where the scientist who's working at home with this person has his science. On the Net for his days on the net accessible to and by self so you can reach. Is data and is science. Well as well he is that should be totally independent of the location of anything. That's the essence of the problem. Really need to replicate. Absolutely. Well. I was not smart enough or around at the critical time to determine that. But that was my line. Throughout the years that I was not actively involved. I got involved as soon as. We came here because he brought in a lot. And that was happy because he almost made it into getting that government. That's another story. But I think it is very important point that the driving need to emphasize you know I'm glad it came out. He has always felt that clear enough. Has access to health and health benefits. So I will be on the are connecting sections. Can you tell us about the meeting that you bought a pair of a guy quest to find how do you know what actually happened. We're just like

repeat that. Then Bob Taylor came to me to propose it or was it you know the price it was million dollars. And you know before hand because I've seen all the order dropped before the case. I was not surprised to Julie. And to hear that talk about the notion that he was. That was first discussion and had about you know where is a complete service. And he got to know him well afterwards. Both of us dollars and he was a laugh. And he brought me in good. So our relationship matured. But then he decided not to go and pick up business and you know the president's other words. And he's the only one who rejected it and use it. Which is it is in the news for us and never said. And I was kind of a fish out of water. Why was it there. Were you Mr says. It's an interesting story. And then the sensation. Got a clearer. The medal. Physically. Picture which it is as easy as it is a long time coming. That's all right. I was in from my father. She wants to do a lot to get enough credit. And so we have a short meeting uses or lose it as fast as it was short because we have read in the other group to the program as agree to the dollars million. And offers the office director for his job and he had a job. Every office director gave him a budget. As part of the budgeting process. You can expect X. dollars and ten percent plus or minus. And that's when the it will be so if he was not surprised if the budget must have been twenty. To let me bring in Larry Roberts off no funding was approved by you. I'm not sure of members I'm sure it doesn't matter because these things will live in honor of course and is his I call the director of link of life. Larry coming. Breaking news good careers Lincoln. To come through here to her. That was no surprise. And of course over you in honor of course the money was given there. And then there was a no brainer that it was all the site. And as I said. I did this is our group all of the other discussion. Style of magic. I gave every office director. It preview of the budget. And we went through the preview. I did was the money people and and said that to your programs. I think you should spend more here but here and Sun This was a standard preview. We did before we submitted to officially to the do you talk about the internal DARPA's talking. So you know the new diet did this for years. So what I'm hearing is that you didn't take at their hit a budget you pass along. When one level deeper look at I did but ask them to bring it. I have to eat get rector. Bring your budget. The program to happen for reasons. Start Stop the socket on and aim for my blog we have make a ten percent. Maybe then present more have feel free to freelance. Tell me about using the hardest thing I found was to get people to tell me about of you without killing. I was ten percent Christian then you have not that you want to tell me how do you tell me this is about what these new ideas coming from the program manager is from B.P. I was talking to I didn't care. I didn't know and I didn't care. That was between me and the office to as my relationship with them. Expected them to manage the program. That includes deciding how much money and includes. Adding and subtracting stuff. Let so easy. Let's go in the opposite direction. You have to go for the people above us to talk about repeat the question Do you know yet about that about me or whatever. You know I was the only one with that there are records of it's a search engine which is the beginning. And Johnny forces left. And I had a meeting with them. He he made it had a meeting of all the Deputy use. Is that it is. Which I was technically one. I saw as inappropriate I thought it was inappropriate for the other there because like one for strategic systems. For example that I was it he said on the Dr program some of the sicknesses offense but he had to have a say on the darker

program. On a patrician age it was listening to those all. I had to be done to scare was understanding the roots of the Month Club meeting. I thought I had won the last budget because Johnny had one who would trendy a million twenty five million dollars. Hundred one of them a sideline which I can't do that was in the budget. He wanted to get the other vilifies which I want. He never forgave. So this does have in some sense to the delegation of. Yes you're going to keep the question and answer. What level did the notion of this wonderful delegating down to trusted point to make their own decisions in their own direction. Whether that's where that your level or get above your level that fills that began because it's got me from yellow to love it permeates right down to the graduate students is here is you know not really because I put a discipline week and again these repeated look at the issue. The individual graduate student was not my budget. Scutcheon ever. Not a but it was a higher structure that the structure. To look a should basically ended at the program that it level as presented by the office manager. The Office director. The director of the prison. The programs he wanted in the next budget. And with discussion the substance of people with his name. I did not want to hear about which students. If you want a different tickler person hired or given a grant. That was his drop. I wanted him to tell me to make that a condition. Prove or condition. Never stood in the way within. Example A delegation. So this is a phenomenally successful management is it. I mean you broke any and was it did begin with that your vision did do that where when we don't think before. And I have rated. Sandy. He was director for a number of years. And for two years after. And what I found he built it was a complicated structure. But he was very good at it and he was very informal great adventurous. An invitation by Rina to walk or pentagon or. He ran to get exercise and that took about twenty five minutes. And I was I was amazingly let down the block. There are bodies office. Whom you knew was that hearing. And then it was amazing what events you would decide as you walked so the confusion of the descender program which is what every hand. Needs like six. Was what was the result of his style and my successors preacher says it was complicated. It was a lot of weight. So get it with the patient on me on. Project press was one of those new programs. Of the hundred million or so. Twenty five million the press which was the project on quadrant and on the ground who are. And once a radar has lots of infrared consumers to it is a search. And we look at it really ripped into the local branch from the OR with the readers. And we took all of the did I. Interestingly one radar. Was so good. They cut that individual pieces of track. Is there returned in the stratosphere. And I showed that. On the skull. To Congress is in the visual which you can't do that with these as many give you with. So anyway. So who inherited his style. But I have a discipline and Harry does his vision of the stuff that added more discipline. And then what other people knew. Is it added more discipline and the son got lost. So you're talking about moving the first kid you know that. Yes. After you left something without sounding. We tell you any time you have a sense of the new collection Lalage is a technology for support the aftermath. Or just the need for and met them yet. You know where the technology is going to come from. Well I think the question from the. I do the technology very came from because these for the two years that it is direct I made a serious effort to learn about all the technologies that I was interested. Every. And it was high on the list. Lovers like to say that was a fun. Technical and because it was

little fun. Take the stuff which I had to do very well. But that was my fun. And I was going to play with the like tend to. Devices and watch. When I was in would go and see. Radar tapes. Real time I went to college a line charge. Actually solves going on. I like to do like to see others who doesn't always learn something. But I think I was as knowledgeable as anybody in. It's all about the often at technology on it and then I didn't know what I knew I'd learn about your are understood to have the Mavericks a little bit because as I said I used to notice this you can expect and this is these are just special cases. Some of which I learned through the holes and there's a study. That is very soon as I knew that have to be a driver. I knew enough about how the things were connected. Because that's what I'm saying that I do. As Like think about convictions of everything. That's why I know a lot about science because the attention of what. Depends on what your drive to discover success is just as interesting. So that's kind of my middle name. If you have to have a tendency to see the connection. So connection. The connection or she's offended not honestly satisfying and interesting. And Danny Hillis is a brilliant guy and he said he has asked for help were a flaky often at recess. I mean it came six point one six point two six point three level. Investigation of the crude was six point one six one two six one three. BUSH It has nothing to prevent curfew. Six point one six point three or four inside the vented control of reprimand as a way to sort out the dollars spent with. It's one of his addresses these six tools laboratory. Six three was industry less. So why didn't they call it that. In fact we did. Because it was it's a detour. It was I think is this crisis of process. And spent years as I was trying to make it fit the process. Not good. Does it give up I have a favorable quality over six wanted ecstasy. Which I have to write up. Decently. By the way because but this is grist for the smell. I have a long list which we haven't even gotten to the question of what's right and what's wrong. For let And that is maybe some you for after lunch we should do and have one more question. Absolutely and then we can and then because I noticed he did some work with the Bush and the A.T.C.C. high performance in Q Yes she's. In your mind is there a range of change from often at to the eventual like a formal computer can of course. So why talk about the link is is really very clear due to people who understand is not at all to the result the people who just called by the roads. Think they understand that the act of firmest computing initiative doesn't critically. On target audience. It makes no sense as standalone have performed. Machines. Fact you can't even as for the Apple because you run them against each other on similar products and see who wins. Like chess. And I think the Amazon do a good thing. As a skeptic good comes out of their assists. But the one with the sinking of the which you can do. But note that performance computing. Initiative was one of the series of initiatives that were begun. After the. One was every year or two. Bill. The supercomputer. And proposals will come in view so this is. It was three years and next machine. Some don't some pretty soon the revoking are to give us a less serious problem with problems elude. Typing errors and using that. It was there. Well all of these grants US Ans and all of these I think we're a motivating factor for their friends. Into the internet group from the computing. Community as a natural. You know that work for them as hard as it. The whole computing you need for us is because you know. Except it's much bigger and. There's a super computer as every know. As least one. And just like the caller that we got to the targeted with the T.V.. And what's funny.

So somebody to start building super computers from Doug. Is that I know roughly when that had been traces and as I was covering is that so when that was probably brought the THINK IT WAS YOU DID HE is it I'm going to put you on that committee. I was ice jam. Office chair and brought it back to business that we can share. And I helped write the terms of reference. This is a billion dollars. Money into them to leave that. I mean that in a session with the deputy director of girl without you I said every billion dollar budget item of do it was one new idea into that like that with a silver tricep for. What's your said is is is I can compete with the money looking to which was the kind of promising but there's never really have it's not a simple as to some. But he was persuaded this is the business. But let's try and see another billion never quite happened. And it's still languishing to some extent. And the reasons for that which I'd like to talk to provide in the dark are question. But not if it's before lunch. But you don't have one more question. It's a lot of questions. What was our goal as well as seventy eighty P. C. An't you even have this many times I have like if you want to comment that I might be a puppy dog or he he did you know those are because the senator. Giving more money he put into it and he really did and use a certain resonance about making me. Senator Gore and he really did. I think he went over did that. Later on and there was a paper going here that claims he was a little enters into that to that was he also never claimed that people did it in his name or that was fine but I think he understood the soon. Seeing beyond the relation between the two very well. The feeling and I thank him for what is it was a great help and six perfectly reasonable. As he was one of the to political enjoys of the Internet because of his class action. Class Member. Because it does not it was very much. Appropriate that the Be that as you are there is a. You know for the computer science. Telecommunications right. So I think for corporate The National Association for. I happen to change. I mean. Yes he had to testify. He'd been growing for his committee and really. And that sort of generated semi D.M.V. if you know ideas for the H.P. can harness the graduations Thank you. Well that. I tell you this in my theory time grandma. Is it. Right. This one's going to hold up in front of you. Yeah. It's a hundred and I comment on is a this is whether there's a woman around the excited. It is the only one example of the squad like a really serious or shocking secret this is not is you're bored. No one from earth was mentioned and not in the index of the who's not who was chairing the economic. I don't know it's always it's only I have I seen that naturally I look for my name in the ad that group. Pretended that. People were like and Jews and are happy to talk or identify the toilet. OK So let's pick up on that and just cover a little bit of the to read a fair bit less likely. Can you give you a little more detail of how bought talent was found and corrected. How vulnerable I have bought palace was founded selected to Michael. Who recommended him. And no recollection. He lifted into. You have or a bit of sending letters on comment on the time. His name came up. One of these and I just don't see it all here in the should say enough that when I realize that I have to do it for two for a senior people every year. I couldn't do that with a casual in groups and I thought of it so this is the home. In the evening with a letter or a phone call. So is this a people do. And do that and. Approach that when. You point out properly the quality of the people you forward in a position that he and they have that same job of the any quality program managers who know that we have when they had

given that year. Well except that the task to a different and and a consensus to explain the office to activists to them through the. You've got to get your people to pay attention to the sing act that you're going to have to do for the sake of the I'm just done. And in the end. There is mishaps and wrote. As you came up with there was a mess. But that's part of when I was SO I'M A P I want to be a quality the program our kids we're working with her. That's no longer the case. Why is that just take place because they're throwing even bigger vigor for me more P.N. higher percentage of the population recruit from is bigger than on the ten guaranteed to Lorien of the average will. You think the opposite that would be more high keep people you would find. That's And there's Can you can you wrap that up in one sense and start by saying that you were talking about program directors. Can you refresh my memory. What do you have the quality of the program manager. Yes. Shifted some excellent for not several more parent. Why is it the thing why you want to talk about that and what it was that program. I think that the average quality of all of the government says on the program is written. It's a larger percentage of the population. Do you still have to have a serious are going to make the agree. They don't anymore. For this state which is good as for. It's clearly not what you could sell their out when your selection process is having these visitors or is it always comes the Titian for who's available who can you get the tape problem that. The good people don't call criticism of the do not what did things that attracted them I think the good people in the early days was the quality of the environment. They were going to work with yes but that was very variable. If you just look at the organizations that are funded or do. In the Pentagon. The on our blog or is are very different places. One or had a relatively much skill and seriousness of professionals. You're forced Not really. And that was a reminder that we were going doco off the quality was high. Because we worked very hard to keep it so I think people relaxed that for and to get this. I think this settle for less. It's a convenient thing to do we work a lot less hard with the services. Some of it has a long terrible self destructive effect. OK So let me I think question about how little audible sound embroiled in the history of that. If you don't know that it is it is out of history. I only know that. Reno invited him to give us something or he came highly recommended. This could actually excellence. It was wonderful time to talk to the to do we have to say was this is really the silence and yes in the great end of story. It's obvious. And little light of what another quality as well not really a hard sciences. Continues and do psychological subject science is one of those that considered then only applies. Well there's one other factor. Look like it was hired to run the social sciences. Which the same time to office is going to do the job. And so you have to cover the skills experience of those songs. And he did very well. And the story of the record. When hearing the noise of the news reader thinking of the converting the to the ideal and turned out to the bird's wings. Understudy could result in a very big trend. Because it looked like the engineers who are getting the most from it have a clue. But could be that he has example who is not the sun is example of her profession for moving to another those events that there was any was no I don't value. So a logical question now. I'd like you to articulate the elements of that awful culture. Putting lack of zest versus acceptance that Ferrier like if you practice that by saying why are you talking about it and try to. I think a what was that the magic of that culture

which worked so well in those days here in the heyday of. To very big order to build a repeated questions and that was a distinct culture. Centrally the quest for the nest for us went there. But it was easy to install something. The shape the most and was involved because branding to the top repeat people I agree with more of the same and a little bit more system. It in the grope real sense says that it was also true that some systems engineering analysis and some became more will come to those a series of counties also there are seconds there is it was an easy thing to do. In fact. So there's a little story. McNamara secretary. He surely hitch. Was comfortable. Charlie hitch was from right hand to read my book and systems and this is going on with this is an X.. How do computer. Up to mix. Who have mixed. Aircraft herbals who is on the equations and. Well. We all read. This good it relation. So that was in the recent secretary of defense and faced with a similar problem of showing our craft to disaster. How do you decide. He answered. Going to wait for the tell me what the system command and that was all. And he meant to stand up and know them and well. And she was a good. I was a pawn in four years of G.G. and complete loss. And that is something that I put down as one of the catastrophes really. When the school. And we've got everything. We've all of it. We don't remember how it was. It's not perfect of the coach or our culture or as you do. Tradition. There's no tradition of what that simple. So I think that's something that's in the week understand. My time. Maybe not today. And maybe not this venue. But something to be stuff. I don't have a custom. No one's asked me to write this up because I'm caught. Just as soon in full conversation about people who are trying to do. To rappel. But talk about the risk averse for example for your the long term family. Whatever their way I like to put it isn't that that there's a big change in the country or in terms of what people do who we were expected to fix the problem with the expected study. He has to build do. Systems. Not all the way but not the smell it seems as if you in the. Now everybody settle for study. Excuse me and some it doesn't do. I for one. And that interested in the great problems of mankind. As is over to your brain because it's like something like six. Like the persuade people who are in truth which will carry your public. That talk about the challenge. I guess the challenge is gone out of it and the challenge problems that have happened. Like the automobile. Challenge will drive this car is a good idea it was not followed through. I thought we had four entries said finish the challenge. I recommend this study what needs to know when selling to lose this density is going to do list and was critical was the guy who ran the job program was not used to isn't care. At all and said Now there was a loss of some has truly does not. There's a careful. What about Falun Gong. When nobody who who didn't complete the course got had to pay that would come down without a to do the run. That was the chap that I'm talking about the generals back in the sixties. We had a relatively small number of big fiscal years. When one was really the exterior from in front of you. Was the man with the rocket ship that killed to fly notices are gone. Because they were trying to get the rocket was tried was smart and. Yes time and work reasonably well. And then. So that the term wind turbine for were the major driver for a class of cruise missiles. The five hundred were built up with an engine. So it was not all on but there was a dumb idea. And you have a very noisy. Gerrard takes to yell. Does not strike me to have that tactic that I was changing the infantry for six months. So new with that was about to end up with no self. Anybody. Them and easy. Problems in the



Senate. We built a machine then General Motors build it. I'm walking man. Two legs. Cabin. If you have a picture. To be good to fun. And it fails then this is really because this is as much interested in just the sanity of putting the added to taking less hazardous and. It really every response and I'm for that had to say was the response was in various things to do. There's a discipline the stronger. It made his four point two phases. Newer model improvements or resupply that the credit is good that's nice. No that was expected that we would look something similar to that would take several times. And it's absurd to think you know to solve any of these big problems with that as in our menu propose without physics. No one is right here. Who thought. This is an easy one was that this is not intended to. And that's not how I knew it was in Killian he was. Because these are not stupid people. And you get much pushback. Because it was selecting well known success so research is funded heavily without a competitive process of selecting heavily in long term and not and they have to this is that was a time when people started to complain about how many proposals they had to write this in any way you can get that shortened the process. They were writing. Made friends and. After the rising temperatures. When we got ninety. Some of these days. It was only a cancer. Every single solution was to select early. Know the solution was to select. Based on known. Qualities or to do. Not do the notion that you have to prove over and over who you are isn't enough to inside. To get the. But then the people put this on you are pretty stupid. So they don't know the good people. So what you do on the competition. Again. You know that is a serious sickness and says. And you can tell us is driving the different level of the law is coming and for sure. The next. It's a dumb or just. OK. By the way. I have a C. Per's solution to this problem as it were things that is wrong on this is a diversion but takes me back to one of the big points. We have no tradition and little knowledge of history of our subject. Elected a number of reasons for this one is everybody's focused on Razor search papers. The size of a Ph D.. It's every Monday has been has been forced into the why. Because that's the main funding. So there's a counter that. I've understood. For a long time. Give prizes for people who write Who do you miss the press it's just doesn't know. I think the last. Smashing good review because it was easy. Next week. I take a look here. That newer stuff and even know some idea about the subject and try and establish and this is to agree that fancy. Dreamer. Know what we've done. If the pieces are we know there's more there. And so it's sort of you pay the price of his silver to have. And then give it if the price. And you know that when I can walk very valuable and some people can. Well I think it's a usable idea that it's not new. I've been hearing this as you around with me and trying to persuade people for years. It's not done. I mean there are a few exceptions. That are. Classics on publications. But this is done. But. But the fees are not even if you're big enough. They're kind of joke book like the bonus of it as C.S. and you have to worry that was another doctor doesn't. That they had here. OK. You had some ideas you've acted as well so let's hear you right here thinking. Yeah. Let me. Well with this gotten away from the big project as he did in the movie. So looking through those Internet. The all over the place. There were about you got to start. And organizations are created is necessary. This is going out of place. And we are not come. Limited to do small things. No I think what's happening is people try to do everything but can't save enough money to do anything big. So they're looking for a

twenty year program and even this is only a three to only take so used to do ten years. But some of it was the some things we do now and stretch for twenty years that have become. Not very ambitious. In that sense. Examples. Well. The complex systems. Ideas before his there was a mother. Then you had all the moving parts in the school building and what we've got is this is my group progress in that sense is just this one. This one small two Rishon. And it was something from the very her side. It's more like big hands of you. The here and. No stretching is now. Yes it appears that some are big ideas. There are some big obvious going to Mars is a big. I had a hand in this was in the first space mission and the president put together. The person that was a stay station in the context was going to Mars with twenty of the latest. Ninety five station. Twenty years and. You can do that. That's all been on the public has lost interest in the program. And by the school of that is it was a different subject I can see that Casey. And with that. This is a symptom is fatal. And so what do we have an army of basically a centralized is about. That's getting through. Interesting very important. Not knocking at this very different. And you don't meet the space station for you. In fact it was that kills me. Of this edition of the really serious physics experiment. Off. Board the space station is that God is walking around in the space station. She could do much to that's what this basis. In fact almost everything. Can. So. Can the job. So that. But the comparison is different. Difficult but have. Even six years who seem very big changes. There's no training course and not help desk for the director is not that they used to have. I mean the guy who ran the Sandia had to be a vice president and operating was of he was and the like. You didn't get to the presidents and dozens. Too few years and. That's on not no one has any patience is sitting next to me and that's too bad it was some have a score card which I will put through writing and basic early success failure of on the big programs. And the technical military. Category. The policy in the politics. Was nixed the policy is a failure in the politics of the time I was successful in both policy and politics. No To knows because it is the center of it is a lot of policy success. And was a political problem. Does not like it if the other half was not the one that under certain conditions. Is got six to a professional scientists who is to give that project. And then put the right. People on this. If the technical military success policy success. Politics. Doublecross change everything is nothing better. It's a definition of a successful program is one cannot do better than that self. Not one of the things I emphasize in the book that's a place that I have a lot of help. And everybody along with the story that. Serious people professional very successful all kinds of prices of them in their own health. Nobody was in the commanding position. Anywhere ever. And that's influence. So let me have this excess is measured in the number one mentions the anything that one other professor. What was it because of the. I see world that enable. I think both of the suspects out over that. MAGINNIS kept there was a serendipity. Could have happened in another office such a sex only fact it did not lead to the nuclear test addiction which was a very good program. Very successful. Politically successful in it and see Board President. Some of the presidents to enter into complicated and control room. This Man's of hers was our political decisions and then how does the whole thing is not was used. It's a long time and allies in the event that I was never very clear. So it. But nobody cares to prove a loser. One difference I think it. Said asylums or that most of them. Reached out

to the commercial. Consumable military programs had a confined space and it's a great experience for that one time as this is. Well dramas are becoming common. I'm skeptical about how people will like to draw on the fly and I think it will happen if you do crashes. Before that is true or. It's hard to get real with our G.'s if thought went their ways when I think. Because no one except maybe little later. Understood the importance of the social media and the only cells that ticket. Scripts the explained the many talk about the. Rhapsodic and. Wouldn't it be wonderful if. Most use was so you've got the same speech. And the answer is yes of course. Now. I contend that that materials. Modernization. Was an absolutely necessary briefing room without which that as five six is this five is a pretty. Your pocket. Your Business. And what it is that over the long. Will let me see the funny Chrisler years ago when I was still think I was trying to understand. The following problem. Looking at you and shifting like is more. How much competition. I'll add to the wild ass guess. No one has in the room. This. To. Well maybe ten percent of the article called it tended to three great powers in on happens less than one hundred milliseconds reusable rocket. That's a god or. It is not not magic. Not religion. It's the stuff of you that makes most of the butterflies. So how about that that we need to hear the second line of the joke. You decide story Gary Qualls you made him laugh and we know there's a diversity of any failure. Absolutely. And this is the age of a lot of Jesus and get it rich. And this is going to centuries of physics and there are stages. Twenty first century apologies and teach me. If you want to do your thing. So no I'm blind people. No one knows for sure. But that's been done it knowledge easy. Socialism classes like every US. Is nobody's right here don't you know there used to be a classified German which I started for which got killed and another who had before isn't that good. It's gone it's very hard to stir. And it was not great. It was pretty good. And it for twenty years. The other body of refereed. Mind you knowledge of classified information was there for really classified clearly expert was published like Says agree with you and it's gone. And I would be at his briefing. Jury. For this community reception. Why papers tell me what the interviews are and I think about giving him. Those think about that. There's no there's no reliable referees. Technology forecasts for national security. I try to do a cop was when I was in common. National security strategy. To go back to the things in the first was a very difficult things do you really need to think hard. What kind of entity. One is the problems with this junction objectives. What is undecided. Do you want to consensus to do you want. The slow view. And so on I think we're in a dangerous position not just the size of society. In a society that is driven by and limited by dignity. And our lives in this country. So there's no management tools in any publication than a hundred. Influencers. These people who work with the president's office is sensitive knowledge and they don't know what to do and the president does not know what the so and. And the think that's a bigger problem if you forgive the new. Then fix in Europe or not if one were serious about the list of water that are good things to fix but they're going to go a long way to addressing those who drive up. So the. Sources of the concern about the big and issues that are and the ridiculous shoes. How do you think about. Funding what he reads on. The good thing. No idea for something to see through a conference. This is pretty that every project. Of the government that has a large technological overruns budget to and the same time. Percent. Pretty much.

And examples and little bit of Omar who would give what the Affordable Health Care and instructed of. It sure would. President Obama's response to the problem. That he has the wrong idea about that is that this case. He says. And sorry that I am not a programmer and. He has no idea that it was this ng is a logical structure of the problem. If you have to do before you write the first line go. And then he's working along and when he doesn't know it. And he's very smart guy but he's so far only educated in the modern way that he doesn't even know when to put the which door number has so you see God who now has a thing with programming. Move in reverse of course. He shouldn't know the real problem is not programmed in the logical structure which you may want them to get even more. If you have a thing he does not know the difference. If you use it. If you have to use it all of the songs and. I bet. Can a commander can. Well I I love the little bit about programming and he says we have it. There's. Is I suppose the program. And it turned out he couldn't make it work either because he didn't understand it. I think people are so complicated organization. He could not see his hands in the lead is one thing more than half the program has a duty work for insurance. Very different. Different. The other big problem. This is a chronic source for the which was the I T. T. ball. As to when they couldn't. That they couldn't make one design. Had six and for national political reasons. Each country. Company had to do their design. Some naturally the economy is still never knew a captive. Norm. Instead of a community or major switching question. Yeah. And and the. D.S.S. or any other that was it is a teaching machine in November. And they won them and isn't the better job in wind up of course doing exactly what he said they wouldn't do everything didn't know what they have it basically. Except you don't have to go analog digital evidence is that there yet is it. But that was. Nobody was allowed to think of that. And well really not until you know what are from that that the Internet is because when we had such a thing for sure if you didn't think it won't work with one. They were given economic Of course no gravity one day because of him of course. And in that short sense that was her record called of course. Absolutely the long term. That was then this the transformation that's happened as a consequence of the vision room where a but that's no way for a thing of course of course it was a good city that was really. So anyway. Listen this isn't with. This is this is terrific.