Fernando Corbato
Oral History
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He's actually some ice. You see back I had a lot. Not so much the great works. She made. That went from one side. To begin when he said stuff. Well I will have her back you want to go but I've had an opportunistic. Career. I've started acting. Actually U.C.L.A. before the war during the war and and then I decided that rather than be drafted I'd rather join the Navy. So I had. Because they have a lure namely the Eddie program which was a. A chance to be an electronic technician. And I had put in about seven months of U.C.L.A. but I bailed out because I didn't want to be drafted. And. When spent two years in the Navy isn't as electronic technician. One her full background and learned a lot. As a technician came back and with the G.I. Bill of my disposal I decided I could go to Cal Tech. And managed to get him. And I spent four fine Years it. Cal Tech. And then and majored in physics. Which was in those days sort of. The standard standard mode for people because physics is viewed as a very important subject. And one the know. Everyone ought to strive for. So then I went to graduate school. I pledged to graduate school. And one of the places I applied to was MIT and. I so I packed up all my stuff in my car and. Drove by myself. Cross-country and landed here. And. And spent. Spent the next five or six years working on my doctorate. Which I got in physics and then took a job at the MIT Computation Center. Which was being formed by Phil worse. Who was an entrepreneurial physics professor who had started up a copy Taishan Center and. So I got excited. I think I got exposed to working at Project world when. On the whirlwind. Computer which is was a pioneering first computer and saw that firsthand and then. At the Computation Center. So more said it when go to deal with in my I.B.M. to. Supply us with an I.B.M. seven before. Which MIT got the use of a thirty one so-called one shift. One shift was for some forty odd. New England colleges to come and share with. And the third shift was I.B.M. sent to the four ship which is the weekend. Was not spoken for of. So MIT use that to of. Anyway was a great environment. And I cut my teeth. Programming on. First on Whirlwind doing my thesis work and. Later on. Using the I.B.M. seven a for and which he gradually evolved into being an I.B.M. seven a medic. Eventually of as later models came up. Right there. Yes they were but that was classified. And I wasn't. Privy to that. He had to share it with you that. Back. Not so much time sharing. But as the significance of being able to interact with a computer and have a kind of almost a hands on the control of it. Oh there we. We didn't get already in those days that the resources so precious that people had to prepare their jobs in advance and. And on paper tape and we would run them and then skip that a lot of the way to what's the next person running and. So that was a. But it was his leash use we saw some of the the video outputs. You could see a cathode ray tube. Display a dynamic system working and. So he there was a sense of being able to get your hands on the machine. Later when we got to the idea and several for. Things have gotten. Almost automated in the sense that. Jobs them machine time soap. So precious that jobs were prerecorded on. Paper a mag tape. Then run through the computer and the opposite was run to mag tape and he would pick up here. So each run would have a turnaround time. A minimum of four hours. Say and. It was you were much more hands off. And

very frustrating. You make a stupid mistake and and. You would discover that. Here you know that turnaround time it was just just terribly frustrating. So the notion of being able to interact with a computer. In timesharing. Was a fundamental to our. Getting interested in that subject. Of course the person who really deserves a tremendous amount of credit here is a top John McCarthy. John McCarthy was the one who first. Supposed to ng timesharing. On the middle to put to fill Morse. The director of the Computation Center and was very articulate about it. He expresses what it would do and how good how about you could be. And I was as a as a call member of the Computation Center. John McCarthy was to the Who We Are. I had was greatly influenced by what he said and advocated and thought is a a a very valuable contribution to even discuss it and describe it. So the next stage and the evolution was that there was another member of the of Computation Center. Up. Professor Herb teeter. Who was sort of. Given the job of creating the a timesharing system around the hardware we had. And unfortunately Herman isn't here to defend himself he died several years ago. But but. He had a very grandiose vision of what he wanted timesharing his admits his view. And what a time jury system would do everything from handwriting input to the. What was it and I was going to take a long time. If by. So I decided I would put together a slap together a very primitive. Timesharing system. Just to demonstrate the ideas and. So that was what came to be called. C.T.'s S.. The compatible timesharing system. And what it was it was shoehorned into the. Using the main operating. The batch operating system. As a background system and. We would still basically run in the foreground. Letting people. Operate from teletype tell them well typewriters an issue like a typewriter. I.B.M. Selectric typewriter see where the input output. At the time and then you know displays were still in the future. I was wholly on. Yes yes. The list was so so it was not let me try to reconstruct a little bit here. Look was not directly. It was not I'm immediately part of the. Well the first. I guess the chronology was. I M I T was. Was running. Was beginning to saturate its computers and. So their work is a committee set up. I don't recall. I'd have to do. Background research to come back with the names of who was on the committee but the with the goal was to to look up to look for the long range. The. To help a mighty decide what the future computing equipment should be. And to try to alleviate the. Shortage of computer time. And so tried are having trouble recalling weather. Which came first the little lick. Lick me back up and try to make Islam or cohere. Another side. Angle was that. McCarthy who is or was advocating timesharing was also a consultant for the B.N. and Licklider at that time was a Debian and. McCarthy encouraged him to build a small time sharing system on a think it's a P.D.P. for. Might have been a P.D.P. one. And so they did. They did create such a thing. And look latter was fascinated with the ability to interact with a computer. And he when he got a chance to to go down to ARPA and they recruited him I think of. He saw that as a great position to be him to go and encourage timesharing to be developed. Elsewhere. So he came around to the various institutions. Sizing up and sound sounding out to see which might be interested in making proposals to the beast. Some sort of timesharing development centers. And like came around to MIT and the initial reaction was and meanwhile McCarthy had also been advocating. And mighty should get a million words of memory. To add to our. Seven zero four and. That was very early. An extravagant. Amount of memory. And everyone accused to move. Wanted to just create a machine

that was good for running lisp. The which is probably true too but in any case. McCarthy was a bit of a troublemaker in that sense. He was always stirring things up. So as I said a little earlier. I created this. Last up this sort of interim time sharing system. Already demonstration time sharing system which can be called the compatible time sharing system. Too much to say when we're so spacey T.S.S. became its acronym. And I was sitting there when like letter came around looking for. Places to fun time sharing. Research and fun. We initially were very disorganized all the people who were potentially people who could be involved and follow is the one who spotted. So that we need sort of a coherent response to lick. And he can he keep he'll acted. In he spoke he knew the From look had a long history of having been MIT faculty. Earlier and. And then going on and so far no lect were knew each other quite a bit. And finally the elected he would write a proposal after getting some good some sense from look latter what he expected and. So he wrote the proposal for Project mac and. I don't have the dates. My fingertips Exactly. The. Right. OK. So. So that was a. A tremendous opportunity. Of for everything to cohere and MIT and lick mannish to. Attract most of the. No computationally sophisticated people over to to text where we're where the with the building. There's no room on campus. So we ended up using Reddit space over at a building called the it was initially well. In tech Square. And we had the Initially the eight to nine floors. Later. Through the years who we acquired many more of the floors. But. And the ninth floor was a machine room floor and. And the which because the I.B.M. says seven of fours and nine says. You know I thought time work. And fifty fifty box ensembles. The massive pieces of machinery have a little more innovation. One here. Am I who was injured. So now he is acting up. Like the old that was two way. Synergistic coming one direction. Well. If I think it's you know roughly accurate. In the sense that. McCarthy had it basically done a good job of of talking up the. The benefits of time sharing. And in him. Both. At MIT is a professor. And then as a consultant to B.B.N. it Prime did. Product there too. So you know. And like it's just great. He checks his back. Oh oh oh oh. I think so. I mean I may be an oversimplification but no liquids certainly appreciative he lip was fascinated with when he had a hands on experience with a small computers. And so he saw that as a as a as a something to be nurtured and expanded. This. I think look look. Was he was never a huge. He never understood. Large projects of people working on a machine. On a program. Here he saw it as a one on one experience in is the way I felt like and. So he didn't understand things that took an army of people like could never have run the sage program. For example. But yeah but he was he was inspirational in his in pinpointing why things were beneficial and why it mattered. And so he wrote it. He wrote a couple key paper. Or at least one key paper in her early on which inspired a lot of people including follow the about of the benefits of of of interacting. You then computer. Cindy osis. I was a famous paper and. It's not a long paper but it's. It's it really had a lot of influence. So now. My age. Should pay you back. You know. Fish you. He. Well in fact it was is a little bit of a the opposite direction. The pendulum it would had already gone too far in the interest of keeping the machine. Busy all the time. So that's why the computer users were more more edgy to out of interacting with a computer. When you. In fact you didn't just. In the very early days you walked up with a punch card deck. Put it in a in a card reader and ran your computer your computer job by itself. On the computer. That was too

inefficient. And so people had already begun to use satellite computers. I.B.M. fourteen zero ones to prerecord. The the punch card decks. On the on a mag tape. And then the output of the computer wasn't wasn't up computer listing or put the print out. Instead was another mag tape which contained the output which was then taken back to the fourteen zero one. To be printed. So everything gotten focused on the keeping the machine. Busy as hell and their computer. The user's interactive abilities were just squeezed right out of the picture. Exactly. And that fact right. So the notion of being able to interact and get answers and in a few seconds. There was was the tantalizing and. So it's a few seconds. Well. Will a seen Davina's of the. It seems obvious if it could be done. Mind you there are no timesharing systems at the time. So. So it. But having to wait hours to get interaction. In the transition to anything that was five or six seconds. Seem like a tremendous move forward. And as people got used to timesharing. I had five or six seconds. And of course became more impatient and wanted to be faster and. Today we see that with her her personal computers. You know we're late. Now by phone. I just meant that we are fine. Yeah. You know. I think so I don't I'm not certain of that but I think so the it was a big contract for the day. And it was ambitious and final had. Had to worry about a lot of things including naming the lab. The. He has told me many times that he chose to call a project Max. So that it wasn't a laboratory. And therefore not in competition with all the other laboratories. And he he wasn't in it wasn't a new department. Which again the. Another major transformation and because a lot of scrutiny from everyone. So were factors. Yes of far no. Lured people in to the building. Well. You couldn't you couldn't be a member of the project unless you had an office in the building and so you wanted to make it a coherent group with. Pieces. Well most of you much of it but not us now exclusively. There were a pup you people who are not question. Sounded awfully. So a. Follow the course of action. Well I think yes a good and became a little bit. Yes it did it gradually became a little bit of a problem. But this is again. The pharmacist skill in trying to minimize ruffling feathers. And he had. Of we had had people. Had to have an office. Had to have their. Their main office over a text queer. And he didn't try to he didn't try to create a new department. And he said. So that people were not threatened directly. And in those days it the project. Did not start out like a. You know it wasn't as big as it got to be today. The A gradually has grown in importance. And it's still a laboratory at MIT today. Call CSAIL computer science an Artificial Intelligence Laboratory. A lot of history there. So yeah. Look here. Like this multi. I don't know the exact history of the funding. I wasn't directly involved. Most a time of photos running away running all the interference or. The. But saw no no no it's a director of Project mac to until about sixty eight. And then he took a sabbatical I believe. And. He invited a look to be enter and to director. And he was made I've got my history with. You know looks like succeeded. Funnel for about a year or so like was not a good good manager. He focused on the broad picture not the details. And he would. But people didn't recognize that because they were so. At first because they were so. Persuaded by his wonderful description and his paper on men men the sheen is in the osis and his general. This you know hurried views and but as a manager he was not very good. And so after about a somewhat to most just years two of licks running project mac. And Fred can. Who is another person that had a lot of influence on Lake. And vice versa. Actually a but Fred can the forces

of his own. You know he had. He ended up stepping in and becoming that. The director of Project mac for a while and. So we now. All. Wild Lake. The way. I told that last. I'm not absolutely certain of how to answer that because I wasn't in the in the negotiating. Our discussion periods or. It lead usually was between. The director of the laboratory. And an ARP itself. Musta been a few more people involved than. But I wasn't directly involved. I could use a fresh. Hey hey hey. Well the see we have to back up a little bit. One of the first things promote our part of why did was encouraged to talk about a new system. And we see T.S.S. was a supposedly our interim system. To get us going and stablished the point. And we came to we ended up sees me. We ended up. Of developing the. The system this came to be known as Multics propose in this case is that the system old X. and. We had to shop around for a piece suitable Harbor vendors. We ended up. Picking G.. Because the architecture that was was that they use was seen. Well suited for it. A time Sharon's a modular time sharing system that could be expanded. And Bell Labs gotten into interested in through the leadership of a David. They got interested in participating too. In the development of most success. And so therefore this. Three headed. Stew. Of in mighty. G.E. and and Bell Labs. And we began the Multics project. The most express ject. Was. We never were asked how long it would take. We probably would have said here to the took longer than that by quite a bit. And we were very humbled by the fact that it was a tough tough. Project to pull together and. After about three years or so. I think our post was becoming somewhat rest of the fact that we hadn't finished and got it going it. And we didn't off and. Thanks to funnel. Found want to find has heard earlier inputs was. You must describe what you're going to do before we do it in so we had written six papers which had a lot of impact. About this future system that we had not yet begun to do. And turned out to be a real bear to try to carry out the plan that we'd love to leak. Set out for ourselves and. I think our poets getting a little rest of their where they. Felt you know they were used to getting into long term projects and of that sort and. So we got a little and so a few tough situations were. We were scrutinized by committees and the like. He he. Yeah. Which member by now look it's been come part of Project Max. So he encouraged our predicament and look at us. Yeah. Not sure which a true which. This could be unraveled was a vote of effort but could not have I'm not a real to use with the C.D.C. yet. She's right. We're talking about sixty eight ish. OK. Of this. Were were people were beginning to wonder if. If the project should be cut up. The and we of course. Who'd worked on for several years. Were fighting tooth and nail to make sure that didn't happen. He said. In all know within a might well. Arco a seismic persuadable one where the other big if if if they had gotten a recommendation to shut it down. They probably would have. But. They didn't get a recommendation shut down. We had a very coherent team. And we were all working as hard as we could and. We were able to demonstrate to the people who it came and looked at us that. It's things we're still making making progress. Although not as quickly as we had hoped. There was we're seeing it through. And so in that place. Yeah it was just beginning and it came to fruition around seventy I think the first. But my question was the position that it has. And that I was all. She does that have changed. If you hate it when I tell you that you know. Well I guess I don't know how it was felt. We were conscious of the OP and that being proposed and and I saw it as an interesting and useful interaction. Useful development.

The notion that also it's good to use it a distance. Was obviously appealing. And the to some extent. Are. I remember our involvement was the direct involvement with with the ARPANET was was some a minimal. In the sense that. The the Great. One of the great ideas of the Arpanet was it. The notion of the amp. Because that allowed us to decouple the. The Arpanet. Construction from our particular problems of our running our machines to and so that interface. Computer was invaluable in terms of. Insulating a stream which the development of the net and. We had a few key people. Who came to specialize and in the interaction with the ARPANET. One was Dave Clark. And. STANDEN was another key programmer who would learn to program. The I.B.M. seventy seven fifty which is a gigantic. Control. Telephone line controller that I.B.M. is constructed initially for the Sabre project. In which was the interface we used for all our telephone lines. To put terminals all around campus and stuff. With it what else. I don't know. I don't. So that it was allowed us to separate the notions of the timesharing system from the from the. From the network problems. But. So we didn't see it as a threat. We saw it as a. It's an amplification of what we're doing. And the notion that people could use computers at a distance. Seemed very good. We already had the went through a lot of help. Trying to work with the. Geographically disparate places. G. in Phoenix. The Bell Labs. And MIT and. Because most of the effort in the Multics project was. Was was was local and had MIT of the had meant. Most the burden fell on the people and Bill labs to come to us from vice versa and Siri. I love it. Few weeks and you maintain. No I very strange collaboration in their peers. You know we didn't see it as a threat. Who is A. I think. I guess that the folklore at the time was it would look and and encourage the ARPANET because he wanted to make better use of its resources. And instead of having a P.V. ten every small car which he could have a few feet deep you tense. Shared by many. But it was a that was true or not I don't know so be it the price you pay five. Sounds. You know one. Delegates that he has to a first trip to a first order. Yes. We. I know that people like final image and I don't know all these subsequent directors. Paid a lot of attention to the TARP and because obviously they had the upper hand from the funding point of view but. So. But we didn't we didn't feel we took directions from her from our past so my question you have. You write a post as if a lot of stuff people you met at the Met in Delhi. I like both the way we ran the project was the rather the Multics project was we. We had a sort of the senior members. Seniors senior people. My Ted Glaser Bob Graham. Myself and. Motive included wanted to others but there was a people that would interact with with the people it had Bell Labs. Who are Vic the sites key Peter Newman. And. And then there were people there about a dozen people down a pole labs that were interested in participating. And in Jesus or not as many They were more the vendor. Advance was one of the people early days but. And we would have meetings periodic lead to try to discuss. The evolution of of the most project. And we had maybe three or four meetings like. It's over a few years. And up. But the. Within the within project mac. The staff that I controlled. There were. There were. They would basically. There was a little structure but not much. We would have subdivisions by people just doing the file system. Working on working on various components of the other system. Thank you. The key. One of the key principles we used in the building the system was we already had the. Five or six. Papers about describing what was it ought to be. So that sort of set the high level

calls. Of. And people would our rule was that people have to. If they wanted to work on something they had to write it up before they implemented it. And then people would critique the proposed description. And then the people would go off and try to implement it. So it was a closely monitored. Evolution of the software and a couple times we found were. When people. Had bitten off too much more than they could chew. The software. Exposed see. Ludicrousness of the of the of that particular approach. And people would then be told to go back and cut it down streamline it. And redo it. So. It was a trial and error of type of approach. And people working in small small groups or teams to reach others can. Code. And then when we get Gazza later days when we're able to try to test runs. Trying to run the system in prototype form a new trick and. And of course doesn't that consisted of them. Starting up the system and letting it run to a crash stand or. Until we took a dump of some sort. And then come back and scrutinize what was going wrong and then. So it was a tough tough period trying to get going there. So it was merely a collie. Perhaps. Jack. P.R.I.. There's not much. You know. It beyond the place. You put paid and you interact. So you can cross it. I may have been to one or two and putting of those want to I want to sell as a member of the pretty sure I did you know. Talk about was very slightly less collaboration. Actually what let me. One of the key things that it happened. When finally started up the project is e. Initiated by having a summer study period. Program. Of the vote six weeks. And invited about two hundred people to attend and come visit MIT and see what time sharing was to Mind you this was timesharing in the OR in the with C.T.'s S.. And that sort of. Prime the pump and got everyone per excited. I mean people like Angle barking and saw to it was excited and. There were many others I can't remember tough atop my head. But. So we all have. We also my knew each other. And I think we all felt we were going the same direction. The. The the Saudi I've lost my train of thought. After the I hope you very much. Show. That. I think it was it yes it was very that was very useful. We all know that we are kind of knew each other and what having some. I mean you see in those days that so was a a really the polyglot. Set of equipment. So it was a Each time sharing venture or development effort. Was almost idiosyncratic up based on the people local people. There are people like butter Lampson. I'm the one of the S.D.S. machines. There was. Angle Barker who was to mirror what he's using vote maybe might have been a P.D.P. ten. And. There was it. Your group done it. Of U.C.L.A.. There were. So is that it was a very the and it. Very good set of people. But all trying to evolve. The hardware was still evolving and the systems people were building revolving systems turned out to be much more complicated than people expected. I think of me. Because the. It's one thing to wave your arms and say something should happen. And to make that actually happen. This is a. Turns out to be a lot of other detail work. OK. Whether we ever presented as a second language. Or if you know how many and show. Life. You have there. Where was this what was a look at it was you know why I guess. I don't think I was part of that and I think I agree with her members or. Yeah. I might serve all its application and last I've already crossed the net somewhere. Surely you must have. Q four with the P.R. director. That can be. If. For cause. Well the whole the whole thing about our poll was. Let me back off a look at the moment. Using. The. The most magnificent thing about Harper was that they came in with about ten times the funding level who we could get out of the places like N.S.F. and the contrast between

N.S.F. where you would. Work your butt off to get up. A small contract and. Have you put in a similar amount of workers are permitted. But you had maybe ten times the amount of money. And here and there wasn't much less of this peer of you. Scrutiny which drove everyone crazy with the are good and S.F.. Are pose a few people. If you could persuade then you had a good idea. You were in and if you didn't. You're out of this is a much more fruitful. Interaction from our point of view. And it paid off big time. In my view. And S.F. has been letting our phones with an eyedropper. When. ARPA good is basically was a drinking glass. So such a difference. And. I think that's one of the UN's one of in major contributions are for made at those in that era was to. Get a lot of research going. Based on people's best judgment of what was good research. Rather than putting out for the long. The long process of the peer review that. And I said was basically hampered because if filled it had is its major. Overseers were the congressman. And so they worried about every state. And every week and covering all of the their bases with careful review procedures which made everything so ponderous that it was hard to get anything through them. People did. I think the message issues were probably the ones who were forced to deal with our with in a civil law. Put good. Having a hell of a carpet was a tremendous change. Back Track. I haven't thought about that too much although Harper tend to be. Once you're in the inner circle you're tended to be there for a long time. Are pros not capricious. And that that I hope to introduced ability to the funding. Question. So. Very soon so that the pack. Security. Must take that back. Very clear. So. What was the impact. Showing up. I'm not sure I could know how to answer that home. There are a few key people like you know our in our valley work. So I dated cork. Who was both an end of the member of the most extent all of them and. Came to take on the role of network development. So he was a. He he. I'm sure would be the person has fat questions. The and. I think the decoupling of the network from the computer some cells. As I said earlier was and is very important idea. Because of we had one target. To worry about namely how to get to the amp and. This. And the rest. And they in turn had didn't have to worry about the a ticket. Idiosyncrasies of our particular machine or set up and. So that was a tremendously valuable decoupling. The. As the OP and that got going. It hit it. Nischelle it was. Very valuable for file transfers. And programs. And for remote logons. Which was Looks great dream I think of the. And then of course. Superimposed on that was was email. Email came to be among those who are part of the Arpanet. They marry convenient. And almost natural way of communicating and so. He emailed has become as we know today. Part of the fabric of American life. Where of love life. So that was a tremendously. Important. Fruit of of of the Arpan that's existence. The the next major improvement. That I hadn't noticed. Well everybody's noticed. Has been the World Wide Web. And that. Relied on the on the existence of the Arpanet. Well the ARPANET evolve. As you know. The. It evolved into initially just a network of our contractors. But then it. He vowed to do what the Internet. Which of the company and. Yes. Then sir. Of push that's true. And that was a great. Generalization of the Arpanet. I in my view of and. Today that has become as important as the invention of electricity. Of the lector it lights. We use the Internet every day every way. You know everything and everything from from the portable phones to our cell phones to two laptops to everybody's on the Internet. And so it's it's it's reminiscent to me of tales my father used to tell of. As a young boy in Spain or his group.

Born. Oh. Of the evolution of the electric light. Oh. And his house. They had one bill hope. It was a long extension cook. Long cord and they would take it around like a candle to the various rooms. Yet. He was a. He he he saw that evolve in the. He saw radio and then he sold movies and. You know the whole the whole evolution of modern the modern world you know. And I think we've seen something. Those of us lucky enough to seen the evolution of of the Internet. Of have seen something the sense in a similar way of the internet's not going to go away and had so it's probably one of the major contributions to American life. Well international life at this point. Yeah. Oh. You said. And you try. Actually. No I think the answer to that is just simply no. We didn't feel the pressure to to conform to what the Saints go. The. And I think one of the valuable things about that was it or one of the valuable return of the readers we felt that way. Was there is no security. Of constraints us. Mind you I had seen. By my for uses the uses the world and computer. Which was working on the same system that was under wraps. And I was not part of. And so we wouldn't. Luckily we had this niche of time. We could use Worland. But it was a third shift and. So I kept some crazy hours for a while. But the law a lot of what I know I'm about to say just I learned later. And the. So it's. That compartmentalization I don't think was beneficial. And live in the surfers. Security reasons but it didn't help. Didn't help matters to have a compartmentalise. And I think. I think our pose very benevolent and. It's sort of not imposing any kind of military structure on its developers and hopefully that are powerful so we're getting a good return for their investment. A change. Sure. Well I wasn't too involved in the management side of things that late. I do remember that one of the things that. Oh I thought I was driving arpa. Was it. There was a thing called the Cuban missile crisis. Who the Russians had decided to locate a bunch of this was in Cuba. And when the US government of that. Pandemonium broke out and. One of the folks stories I've heard. Which may or may not be true. Was that the military were aghast that they could get answers from there. From the various computer systems they had about what the potential they had to do. To retaliate or did. To do anything. And they were appalled that it took thirty minutes to get an answer to a simple query. So they were enthusiastic for anything that allowed for a more interactive approach. To getting information back. And perhaps apocryphal. But still the right direction. The. He did you hear. And the T.X. hero is a test computer for the T.X. two. It was the Lincoln. Which is part of MIT officially to the hood. Donated its use to to the campus. And Jack Davis took on the role of trying to make use of it. And so he with a bunch of students I think through together. A mini time Jerry system also and it was sort of a. I would characterize it as a a clubhouse system. Oh the were the aficionado's that build it. Knew how to use it in use it for their own benefit. There are a lot of those floating around at the time and. So Jack was very knowledgeable and. He's one of the. One of the key people who came over to project mac is so so so you know he was happy. Right. Which culture. Oh my God I am sure. Laughter is why. I think the key reason ARPU so successful. Was that they relied on the person a person persuasion. Rather than peer review. They would go around and shop ideas around her. Or go around looking to see if there were interest people interested in something. And if they got a response. They didn't demand a thirty page memo back. They demanded a career. Stuart memo that said what you hope to doing and whether you're going the right direction. And that's that lack of of the over.

Overbearing. Documentation which I. Accused in a set of before. I think it is one of the key reasons why. Our POWs so successful. Of just by basically having shark. Program managers. They could. Size up pretty quickly. Whether they had people who seem to know what they're talking about or who didn't. And revels she would say thanks to the fact they had a good amount of money behind them. A good hand out. Good size research efforts. The little Not pretty could present. So that that sort of the easy money. Really made a difference. And I think to a first order. Are probably not have realized it. But they prime computer science research. The United States. In a way that has left talk of lasting impact. And hopefully still lives but I'm not in that. I'm not a Met circle right now. So I don't know. But the. It's having good people. Managing our prisons and good people. Manage. Being able to spot good people. On the basis of a personal knowledge rather than. Long winded proposals. As far as such he played. Who I'm sure there are projects that are pust put money into that petered out and allowed to peter out because it. They didn't pan out the way they wanted. But I don't I don't recall the detail. I recall. As I said earlier. Our own project. Became a candidate for that of and. We fought hard to make it happen. And. I think we. I guess in some sense. What motivates ended up showing. Was that. It could be done. It was a little ponderous more ponderous and people expected. But it could be done to handle. He was we're seeing through the eventually. Gee for its own reasons sold its computer division to Honeywell and Honeywell in turn. There was a maximum of. I believe two hundred sites. And there is a on a Web site run by Tom Van black. Who's one of the programmers on the most expensive. Caldwell tissues dot org And it's a true magnificent history of of Multics and it reached a high watermark of two hundred machines. The and then gradually people back to way from that. But. So. Hey. We could probably do not go along for a long time and. I have no idea. Well what I do know is that. It's getting tougher and tougher is I to maintain a timeline exactly. When things happened. So I you know I have to construct a linear graphs. Sometimes sort out.