Alan Kay
Oral History
Interviewer: Leonard Kleinrock
Date: 11/13/2014

LK: Before we get started, introduce yourself. Tell us a word or two about what you have been doing the upward funding year and then we are going to (00:11) but first share an introduction

Alan Kay: Well I guess..

LK: And your name.

Alan Kay: Yea, Alan Kay. Ok, the ARPA.. I started graduate school as I mentioned in 1966, two and a half year later, I got a PHD and I was at the ARPA project at the university vuitton and so like working with Dave Evans was my primary advisor but two other signers of my thesis were Ivan Sutherland and Tom Stockland, were both well-known people in that community. Then I did a post doc at Stanford, that finished out 1697 and I went to Xerox park and I was.. ran one of the research groups there and delved into most of the things that Xerox park was involved in, including user interfaces, personal computing, advanced programming languages, end user programming and so forth, a lot of different things

LK: So you were ARPA supported in your early graduate days

Alan Kay: Yes, I was. Best thing that ever happened to me

LK: So let's talk about that, what was the management style that you experienced working with the ARPA?

Alan Kay: First I should say, to wound up in the university of Utork, was completely by accident 'cause my undergraduate majors were in Pure Math and I got another degree in Microbiology and but I supported myself as a computer programmer working at the National Centre for Atmospheric Research and I learnt that trade in the Air force, paid my way through college. So after my sophomore year, I actually got thrown out of the first college I was in and wounded up going into the Air force and wound up as a programmer there and went back out and went to the university of Colorado, worked my way through school as a programmer, advanced programmer there and so the state I was in, when I graduated, I sort o burnt every end of the candle there, so I was exhausted

LK: There being?

Alan Kay: There being University of Colorado because I was also in theatre, I was a professional bass musician, had two minors as well as two majors, so I had an enormous job..

LK: So this is your undergraduate degree you are talking about

Alan Kay: Undergraduate degrees, yes. So the thought of going to grad school for either molecular biology or math, I just couldn't face it and the idea of getting a regular job, I just couldn't face that but programming was kind of fun. I thought maybe I should just get a master's degree somewhere but I liked the math here in boulder, so I went to the library, decided I would put in an application into every place in the country that had a degree program in computing and above 4000ft in altitude. It turned out there was only one which was the University of Utide. I later found out that Dave Evans didn't even look at my transcript which is good. He didn't believe in transcript as a predictor of performance in grad school; he looked at my resume.

LK: Did he interview you?

Alan Kay: No. Much later, I got the acceptance.. I showed up in his office literarily with a diamond in my pocket, that I wanted to deposit on my apartment. On his desk, he had a stack of brown covered documents which were the Lincoln lab's version of the Ivan sketchpad thesis and during the interview, it was short, I was already here and he handed me one and he said take this and read it and come back and see me. So when I came back, he asked me what I thought of those things and I said this is the best… this is beyond any dreams of any kind of contact I ever had with computing.

LK: Was Ivan with Caltech or…?

Alan Kay: Ivan was at Harvard at that point.

LK: I figured

Alan Kay: So it was just the extent as being the Deputy Director of IPPTO, well he was in the army actually and then gone back to Harvard so I mean honestly, I just about shit in my pants

05:02

really from looking at sketchpad because it took something that everyone knew about computing that you can make any computer do any job….other computer but the truth is it generally made the computer do a job that is very much like the computer you were doing the job on.

LK: That's interesting. You've got that wonderful clear version without seeing a demo

Alan Kay: There were a lot of.. there were a lot of pictures in the underscore sketchpad was one of the few graphics cd ever where every illustration produced by the thesis work, there are many many drawings yea. It wasn't that this (5:43) because he had made up some obscure technology for this and I have never seen that way of doing the certain things before. I was able to relate it slightly to something I had seen in the air force. To me the big deal was that it was not just interactive computing, it was not just computer graphics but it was a complete style of using your computer that I had not seen before and the other part of it was, it is different from its parent computer as you could possibly imagine any system. I had done a similar later, controller later of the 6600 and the 3600 when I was in NCAR because that was the key we were going to get from them and we wanted to start on the software early. So I knew how to do that but really, except for a few little tricks here and there. The 6600 was rather like the 3600, that parallel unit and stuff but sketchpad was a whole different.. sketchpad, you didn't even write anything remotely like residual code or program in terms of constraints and it had three problem solvers turn this constraints which were almost nonlinear into a composite solution; they did it in real time and serves like holy (7:13) and they were the strongest things I had seen that were like objects; so that was another thing it had and it had this whole way of thinking about what the… it is not just designing, it is not just imitating paper, but the whole point of the computer is to produce simulations so and because there was a reader, it struck me that this was… this was the next thing after the printing press because it did what the printing press did but it did it by unlocking the nature of the modules that you could write in, it wasn't just math, I think it was kind of living math that described these things, I was like Holy shit! this is just the best thing ever. So that was my first few minutes in the ARPA command, then I first found out that this stuff is all.. there are like 15 different places and there is all that stuff going on and the other thing was that Dave Evans maybe was even more postgraduate student below… I would say the ARPA community treated graduate students generally like they were just first class researchers who didn't have a phd yet; that was specially true Utton. Dave had this rather large budget just for graduate students travel, so pretty much he told me as I was graduating student No. 7 there, first thing he said was don't wait till you write a paper, get on a plane. I flew 100,040 miles in 21/2 years as a graduate student; that's how I met you. That was one of the first places I flew to. I first went to MIT and did that thing, the very next thing I did was to come down to UCLA to see Jerry Astra and what he was doing and I met you there probably in late 66's or early 67 or something like that. So I had stumbled into a world, a community that I would characterize as primarily funded as no community as ever been funded before at least in our field. That was remarkably able to argue in the pursuit of illumination rather than trying to win the arguments; that was a big big deal that graduate students were invited to argue with professors and it was just a lot of argument going on but in fact everybody agreed in the vision that Jacob Licklider had built this funding from, which was the destiny of computing was to become interactive intellectual complementary partners in a

pervasively network world so whenever you asked him what it was he was funding, so he would come up with percentages like that.

10:33

So the two parts of interactive computing somehow, it was pervasive network worldwide somehow , used to call sympathy early papers I saw later were memos addressed to the Intergalactic computing community and they asked him once why did you use the term "Intergalactic" and he says, " well engineers always give you the least and I want a worldwide network, so I am asking for an intergalactic one". So that kind of nails a lot of things right there

Do you spend much time with the (11:08)

Alan Kay: That was…. After he was at MIT, I spent some time with him, after he came back from MIT but that was a few years later

LK: So this environment you found yourself suddenly enchanted in, did you get the sense that the culture was directed from ARPA's philosophy or bubbled up from the individual PI and combination.

Alan Kay: So a couple of… at first, a part of it was initially seeing the world from Utide and Dave Evans standpoint and Dave Evans was a great man and a great leader, you couldn't even see what he was doing but great things happened around him. I spent some of my years as a graduate student trying to understand because when I got through I spent a long time trying to understand and I did some consulting and he was just a great person and absolutely understood the hearts and minds of people, especially what it is like to be a student and he saved my life. I was philandering and I wasn't the only one; you will get stories from people that to unitel from (12:34), we were all kind of misfits and Dave did not absolutely care about anything except maybe your interest and he would basically use some of his funding as an investment. He would invest in people for two years, I found out later when I got on the faculty there, I found out how it works. With his idea, you can't.. it is really hard to predict ahead of time and but pretty much everybody who does something interesting with.. interesting in some way, the question is "can they turn what's interesting about them into something interesting in research world. So he would just anybody, some of the weird characters, he would bring in there; he didn't care. He would just support them. It was cheap to live in South Lake, way out in the boondocks and I don't know what is (13:34) 30-40%. If you look at the yield on the good side, you've got a lot of people. You have got one eyed Cadobi, you've got Ed Campbell, you've got Pixar and he was the one who caused 3D graphics to be invented in the modern form there and got Ivan to come out. I mean the guy was just fantastic. So I got to see that, then the first four visits around, what about you, you couldn't have been friendlier, you've never seen me before, I didn't have any status, didn't matter. Same thing I went through in Lincoln's lab, I was

bed fondling with Ivan's brother and I tell you from my standpoint, It was.. I felt like you've already done something; that was how Dave treated his graduate student and boy, only an idiot would let you guys find out that we couldn't do something. So I think it was a huge motivation. You had to live up to just the initial greeting. If somebody worthy of being in this thing, despite the fact that they hadn't done anything; it was just great. I just can't express how much better it is to start somebody at plus infinity and give them the opportunity to stay there.

15:09

LK: So do you think it was the influence of some really great graduate student, or was it the culture and the environment?

Alan Kay: It was old. I always… I think our aim.. and this is… of course there is a theory which is sometimes pursued a little more individually but I believe there is not.. there is only a few things that haven't proven mathematically, they are interesting about computing because there are too many.. our thing is finite and enormous and the degrees of freedom we have, we don't have how to fend them off in order to use ordinary mathematics, so we do the next best thing which is to try and write programs and build hardware that would be bugged and when an error happens, we say what we are really engineers and that's what happens in engineering and when things go right, we say, we are fair artisans, yea we do it a lot and the ARPA community was definitely in general of this type. It builds pretty much everything that it is computed with, the TX built before there was an ARPA but it was just caned out of I think, the spirit of it, I traced back to building 20 and radar in world war 2.

LK: Where was this? At MIT?

Alan Kay: At MIT. That from what I thought, I talked to Whisney a lot about that, he was a young person there. Seven Nobel Prices came….were given to people who were in there but where actually doing engineering; they had taken off their science hat, Robby put on his engineering hat because there was a job to do there and the whole period as they describe, could not better describe what we've got.

LK: That was pre-ARPA.

Alan Kay: That was pre-ARPA but I think it just propagated along, was that down there, was the air defense effort with World Wind and Sage, I think it just propagated through…Licklider grew up, he was a psychologist at MIT. He was consulting for BBM in the late 50s and early 60s, it was an arrow about it, Route 128 had gotten lodge in World War 2. It was.. so when the thing got set up, LIcklider idea was, we can't make up good goals from Washington, it was his vision and what we really want is for the PIs, the research scientist to come up with goals against this vision and so what they got was a very eclectic group of

projects that had actually different like angle bar headed, very different view on interaction with the computer was compared to McCarthy and both had very different ideas about computing, about lets say (18:30) and the cool thing was Licklider didn't care because he had not set up a religion. His vision didn't have why you were supposed to do it and that's how a good vision works, it gives you the desired features state of affairs without coloring and so when they asked Licklider back, he said,"no why? I am funding people and not projects and so I think the choice of the PIs which I think it is just done by Licklider personally and bring these lot of people and just having this confidence in them and Ivan was in discovery and Licklider wrote about that on his books and libraries. That stuff.. because ARPA started in 252 and that was when Ivan was doing his pieces and so sketchpad was kind of a bonus that nobody actually expected; it was a shock and Licklider writes about it in pictures of the future and he has a few things that I was like, 'Holly Molly! Take a look at this stuff.

LK: So you guys have any interesting picture that is ARPA culture about we should discuss this. In the American environment of exploratory free doing great success coming out of MIT, do you focus that on the MIT world or the larger world?

Alan Kay: I don't, `cause MIT.. `cause that… I think it is always generalized and being enthusiastic with… I went to Brooklyn Technical High School in New York, very competitive and it was a direct route to MIT and MIT is very competitive and the thing was cool was the ARPA IPTO things, they weren't that competitive, right. So I traced it back to building 20 because building 20, you checked your ego at the door.. remember we were only in world war 2 for like 2 1/2 years and in 3 ½ years, they turned a 185 radar systems not just in prototypes but in… so they could be manufactured, installed in every size, large and small, ground stations, vehicles; this is like one of the greatest.. for anyone who does engineering and science to actually be… and this is in packing TIPS. They had it in megaton solid state, it wasn't a transistor but was… it was just like "Holy smokes, how did they do it?" So if you.. and unfortunately, there were only a couple of books about it, not that great but I was curious about this and I knew Wisner because of the media lab stuff, I talked to him about it, what it was like there and he said, you know what, they have discussed and decided that the only thing that counted was progress. That was it

LK: And that culture..

Alan Kay: Forget about the rest of it. That was the culture also as I think about ARPA. The reason and this is where the people that have written about ARPA even the great dream machine book, which is the best of a lot, they just didn't get how the synergy worked. They just didn't get it and it was hard to see. So third thing I was gonna mention.. and the third thing was Dave Evans like to take his graduate students around, to show them the real world; he didn't pay us much. I asked him why other people are getting more, he says graduate school is an

unnatural state and watch it here. So I am giving you every encouragement, what do you say if he takes us around to see how the free world works. So he would take us around, when he went to ARPA, he would take us one or two along so we could see how he got money from and there was an ARPA contractors meeting which you may remember. Remember there was a row of graduate students back including myself, John Warlock and others. Dave invited us to sit on this thing, provided us with anything. At the end of the meeting, Taylor asked us whether we did have any comments and we did. Best one was Warlock who pointed out that since the graduate students are doing all the real work anyway, shouldn't there be a meeting for graduate students? That thing.. Taylor said, "yes, we would do it this summer" because that was in January or something in 68 and Taylor said we would do it on this, it was a great idea. It turned out that Warlock and I were the two chosen from Unttion to go to that Elton's House at Elonoy, where of course we had another opportunity to meet all of these people that we be colleagues.

LK: How much interaction was there among the graduate students?

Alan Kay: It was huge

LK: Let's talk about that

Alan Kay: Even more than with the PIs and it wasn't that the PIs were unapproachable, it was just that the graduate student were the natural allies so especially Steve Crocker and almost incessantly so we were very friendly with quite a few of Mavin Students, we were friendly. I knew Ivan surf back in the day. In those days, the raft of people at Conakry melon, Conakry Melon himself was one of the places. They had a whole spirit of quickly of how they dealt with graduate students coming in, was exemplary just a great thing and actually we should do it here in UCLA just to… they put in a lot of work to bring in the graduate students in a good way.

25:17

LK: They had this…

Alan Kay: They had this innovation for us where they actually.. grad students and the professor, just works there, bond off with 6weeks mini courses and the incoming graduate would come early and they would take a mini course. Pretty much everything was going to be offered in grad school. I have got some of the notes, on the notes were summaries and all these things was just wonderful and of course, they got to meet all the graduate students, they got to meet all the professors during the 6 weeks period before they had to experience the… that was just great. I also spent a lot of time with the angle bar people, Bill Buxton and Geoffrey Wilson, Bob Kahn and also with the shaky people who also are alibi. So Wilson was involved in and also

Beth Raphael and with rand, so because I particularly resonated with what rand was after. They were the ones who were most interested in coming up with an intimate experience with the end users of computers. Pretty much everybody was looking for one kind of efficiency or another. One kind of controls, If you look at the different user interfaces but if you take a look at Jos done in the early 60s by Cliff Shaw or by himself, that was like gold. It was the only system at that time when an analoger was going to.. an (27:18) would give me pleasant little dingles. It is practically like saying girlfriend because just everything that you could do right, he did right and he said in his paper, that user interface design, is just the little things, hundreds and hundreds of little things. The reason why most user interface design is terrible is very few people appreciate that thought so and then the follow up to it was to add a force because they had to add event the very same year Malsis invented tablet which is 1964, when did the first really good tablet and it is was a tablet in many ways could be interchanged with the tablet used today. It was fast, it was , it was fantastic, it was expensive so today's dollars is actually like a 150 box to hand made, if you add one and you are in computer graphics and if you didn't have one, you weren't in computer graphics and these guys did a system on it called "Grail", that really used the first had character recognition system and adjust it. So I said about that system that most user interfaces, it felt like you were doing dangerous experiments in radioactive chemistry, using Walford's and the other side, you are trying to make something happen without an explosion whereas the grail system was like sticking your hands right through the glass of the display and touching those stuffs. They were the first ones that achieved that in a graphical user interface and I just love that. Personally, I think Tom Wallace, he was basically an hardware guy but I think he was an important visionary. As you remember, he was a man of very few words like Cliff Shaw; these are two fantastic eyes that hardly ever said anything and they've got vastly less recognition from posterity than they deserve because both of these guys just.. Cliff Shaw was the Shaw in Newell Simon and Shaw but also kind of like a silent party. He said like three words in a year but our conversations involved mostly him nodding in a friendly way.

30:00

He just wasn't a talker, so we could visit all of these, it is not the aim for today but we could visit all of these things just because I visited all of them and I have vivid memories from all of them even there were a couple of ARPA projects that were not so exciting like the ILLIAC 31, Buss Mikomick, that wasn't that exciting. That was very sludged

LK: That was defunded

Alan Kay: It was defunded. That one was probably more exciting when it started, they just couldn't. the thing it became ILLIAC 4 was really exciting when it was Solomon when Slut Nick was running it but it was a really hard thing to actually pull of so it wasn't a huge success

but it was at least very interesting whereas a lot of the other ones were completely fruitful in so many ways.

LK: So this graduate school community and this work community environment, I want it in a sentence, two questions. One, did you sense that it was being structured from above by ARPA or probably not and secondly, did you feel any influence from the..any ARPA military drive in those applications phones?

Alan Kay: No. so when I got there, Taylor was… Licklider was a couple of years, started in 62, Ivan was only 26years old as a second lieutenant. This famous story about Ivan, so he got drafted, went into the army and they eventually got him to the pentagon. Licklider's idea was that you shouldn't spend too much time away and you should train the guy who is going to replace you. You get out of there after two years. So Licklider left after two years and Ivan came at only 26years old. One of the famous stories about him was he was cheering and leading and had a lot of 3 stars and 4 stars and this general was going on and on and Ivan looked at his watch and said, "General, you have 3 minutes to make your point, if you have one".

LK: That's Ivan

Alan Kay: Second Lieutanant

LK: He was a man of few words

Alan Kay: It was perfect. That could be a made up story. It is almost too good to be true

It fits

Alan Kay: But if you know Ivan, it absolutely fits. Then Ivan trained Taylor and Taylor was also a devotee of Licklider. Taylor was also a cognitive psychologist doing similar experiments. He had known of Licklider when Licklider was an experimental psychologist and Taylor was at NASA and it didn't look like he was setting the thing up. Taylor was a devotee of Licklider so like Licklider, he wasn't a super technical guy but he understood at most what the deal was and so Taylor was there when I was in grad school and then Larry Roberts came in at the end, Taylor got him in and then Larry Roberts was there the last couple of years when I did my post-doc, Larry Roberts got me to run something I never should probably try to run but he was another man of few words and there were basically 4 ARPA IPTO directors in 8 years and there were vastly different personalities if I put it my way and if you took those 4 guys because Licklider was one way, Ivan was a very special kind of thing, Taylor was kind of like a Kennedy, you like one and he was kind of brash and Larry Roberts was kind of stern. That's four different

guys but from the standpoint of being out in one of these ARPA projects, I couldn't see any difference because they couldn't implement policy from the top.

35:07

I never saw any and I didn't see it after I got my PHD and got on the faculty of both Stanford and Utton. For a while, I just didn't see it and of course I know from reading that things weren't as rosy in the pentagon as it seems to us. They protected us. Things were shakier than I ever thought. I was reading Bishop Waldrof book, so there is a story that I am not privileged to. I am just going to report just what I saw and then the other thing was the culture was interesting because there was no culture imposed or theory imposed from the time up and yet the cultures were rather similar in an interesting way because I could sense that the graduate students were somewhat abstractly similar. I don't know how to describe it exactly. You couldn't imagine someone more different from Dave Evans and say Ivan but in fact they got along well.

LK: So did you attend any many PI's meetings?

Alan Kay: Couple. That's all. The one I particularly remember is that one at Utton were West Clark was demonstrating molecular modules and I was a big fan of the link once I knew what it was. I actually met West Clark through a different thing because he was a great friend of Bob Berthon, who I think of as the greatest hardware designer who ever lived and Berthon hardly liked anybody but he really liked West Clark and Berthon was in Utton. We didn't have very many professors but the ones that we had were tops and West was one of these guys were every end of the year or so, would have an insight that was absolutely pivotal on being able to make progress in a different direction. That's a way I would characterize it. I remember the talk that he gave at the History of Work Station Conference, the title of it was "the link was earlier than small".

LK: Beautiful title

Alan Kay: Beautiful title and his first line in the oral version was he was the only one he knew fired from MIT for insubordination. I guess first from the world when.. I guess twice from the world when the budget was upping and of course he was pivotal. He was the one who gave Ivan the TX2 three hours in the morning..

LK: West was our supervisor for Larry, Ivan and Myself at Lincoln and we all had this block of time.

Alan Kay: Yea… the other thing about Lincoln was when I started visiting, Paul Rovena was there and in those days you could just go, after midnight was playtime for the graduate student, some of them would be sleeping on desk and stuffs and other ones would be playing

on a machine and it was a time sharing system by then so you could do more things but he opportunities for just playing with interactive computing were few and far between back then except in the ARPA community.

LK: So as graduate students, you had your own constituency, you held your own meetings so tell me the gatherings of the graduate students across multiple universities.

Alan Kay: So Barry.. so Taylor… one of the interns for Taylor at that time Barry Westler and Barry was particularly… and you know all of these but just for the record, Barry is very interested in the upcoming thoughts about shouldn't there be an ARPA there and in fact that was one of the main topics of discussion at the first ARPA graduate student meeting which Barry ran, then the other person who ran that meeting was a graduate student except for the fact that he stumbled on a big idea and he got his PHD when he was still about 19years old which is Bob Waltson so he was our age or even younger and Barry was yet to get a PHD, he got his PHD at Dutton. I think Barry had a Masters at that point so there was nobody else there. This meeting was completely run by young people and then there were two students chosen from each place, from the places that weren't school like BBN. Two researchers were chosen, so it was two from each place and it was held just… it was a three day thing and they held it every year for years and lot of show intel you might guess and they would organize some plenary discussions and a lot of these graduate students already knew and met each other because of this travel policy that ARPA had. So Willy Crowther I already knew, I already knew.. Steve Crocker was there from MIT, so this is 68 from here right and I forget the guy who wrote all of the operating system books was a graduate student, I can't remember his name; he has got a huge publishing thing. Geoffrey Wilson was there from Missouri and so on and so forth. So this was just.. I am not sure any of us actually slept but it was based.. I presented the Flex Machine for the first time in public there and we saw bits of 16 by 16 bit panel display and there was just.. it was a perfect thing and they continued it for years. So basically the idea was.. I think the theory, I mean here is Abloger Theory, if you look at the difference between the Greeks having people like Accamities and Herostacus and they aren't scientists, I don't know who he is but they didn't have science because they didn't have the community of communications and (42:36). I think of science as really being invented by the royal society in England when Gale and Cappolority when Newton was just about to happen when this thing was set up. The skidden that they set up was pretty cool to the limit of human ability, they weren't willing to admit any idea no matter how crazy, otherwise they would have a dogma and realize they couldn't have a dogma and some interesting trip ups some hundreds of years where the slipton was like a Maxwell so they had this experience where they have openness of conjecture and then they tried to set up the best humans of criticism that humans have ever set up and a lot of these writings have come out of Bacon's writings in the early 1600s about what's wrong with our brains and we need to find process of what's wrong with our brains and those

are the actual first writings of what we think of science as of today and they manifested themselves. So ARPA was very good at this, in spite of the fact that, except for the physics of transistors. We were actually really soft; we were more of library science than physics.

LK: And computer science

Alan Kay: And computer science is really aspiration and because of that, because we were a synthetic field than an analytic field for the most part, we had parts and I think the core of the field up until a few decades ago was doing well and controlling the impulse to fed them but I think the commercialization of personal computing, more or less done in the field right now, I don't think we have a great field right now from this. So I think the thing that worked there and I believe it worked there because if you look at the ARPA graduate students and of course the PIs, if you look at the graduate students, you couldn't get a graduate degree in computing and that is really good because that is a soft degree. It is soft and one of the things that really helped is pretty much every graduate student there had a degree in something really difficult. It could be in engineering, it could me in science, microbiology, it could be.. Fitz Butler had one in physics from Harvard, it could be just pure math; It just had to be something solid, something you had to have discipline with and it really helped the bullshit assessment when looking at computing because the minute you see from that standpoint is wow, we may use the word "software engineering" but if we had.. whatever we are doing in that vane was something like the Egyptians were doing but it is nothing like building an empire state building and less of 3,000 people; that's engineering. We don't do anything like that with computers and the same thing as computer science. That got lost because if you ask any professor today in this institution or any other institution, whether computer science is what they do, what they teach in software engineering and so because of that, they have lost their ability to be self-critical right and because there was a huge undergraduate there and there is not really enough content, to have it weigh in. I always say learn something hard when you are an undergraduate and that would give you the best cases to be soft about a software like design thing, like computing because the softer the area, the tougher you have to be.

Great Counsel

Alan Kay: And I think ARPA did so well with so.. and of course, there were standards and I think of.. this is my view point of even things like words. To me, the PACK, if PACK wasn't like a baseball team, I don't know what it was like.

LK: I like to move to the period when you became a faculty member

Alan Kay: Yes

LK: At Stanford etcetera, you were PI at those supported locations

Alan Kay: No, I was never a PI, I was just a PON rather that a PI

LK: So what was your relationship with Paul?

Alan Kay: So I went to my girlfriend at the time, I had gone to South Lake city someone under protest and I said well you chose the next place and that really helped get my place ready and I was done in 2 ½ years. She said South California, so and I was trying to think.. I like Colorado, so I thought it would be fun to work with John McCarthy because he was in my top three or four of thinkers in our field and so Ivan called him up and said he should take me and said he should take me as a post-doc and that was that. And so I went there and I got jargoned into teaching a course which I was completely unprepared for. The thing I found there was, what everybody finds is that you can know something perfectly and you still have to prepare two or three hours for each lecture and I didn't know that and I just barely got through teaching this course on something I knew perfectly well.

LK: Did you learn something from teaching?

Alan Kay: I learnt something. I learnt that you really didn't want to quite do it like that. Yea because I had... Tom Stocken was one of the great teachers of all times and I took his course and I saw what he did and I never transferred it over to myself. By virtue of that, I was actually not just.. I was asked to call the lecture there in (49:54) to go to the faculties and I saw how that worked but basically, I was a post-doc, the (50:05) took care of everything at the Stanford AI project.

50:08

McCarthy and I became friendly but he was one of the shyest people I have ever met and we connected on some areas but.. so that didn't work out as,… I wasn't planning on doing work with him, I just thought I was curious to how his mind works because I was curious to do so good and then Larry Roberts decided he wanted to put a super computer on the ARPANET for AI and for some reason, he put me in charge of a task force to do this and he chose everybody that was gonna be on this taskforce and I was the leader. On the first meeting, here I am starting up there and here is Gordon Bell, here is Marty Trope, Alan Newell. Now seriously..

LK: I got to do this

Alan Kay: I obviously did it because I knew something about software. I had designed a programming language and I had already participated in the design of an advanced computer; the flex machine thing.

LK: Right

Alan Kay: So he made an extrapolation which was actually not particularly true and so this is good for your purposes for this thing because they could have destroyed me `cause it was little less in fact every single one of them, I became friends with through the process of struggling with this thing. Gordon did is C.MMP, then Hydra came out of this. We had a West Coast computer (WCC) that some of us designed and there is a third one, they were all proposals for a network community for doing AI. The only one that I got all of us to be on top of that one was the C.MMP thing, a processor that Gordon.

LK: This was under ARPA support though.

Alan Kay: It was

LK: So again, here is the enquiry that should go with the guidelines, directives, motivations, applications. It was zero.

Alan Kay: No, it was just one set of typical ARPA proposal which was fairly actually made to me which was one or two sentences long. We need X and I would like you to make it happen. Period!

LK: Did he give you a funding referral at that point?

Alan Kay: Not really

LK: Was it unlimited funds?

Alan Kay: Probably not

LK: So it was not even in your consciousness, you had enough money to..

Alan Kay: No no, I wasn't part of the… at least in my experience, I never saw anyone worry about money even when things were tight like because they've.. my first experience was that was when I was a member as a graduate student in the middle of some other thing with Dave Evans and a couple of people. Dave broke off and kind of looked up at the corner of the room and said, "we are almost out of money, you've got to look for where to get some more" and a couple of weeks later, we had more money. So I didn't go on that trip, so I didn't exactly but I remember Lars Ernest was fantastic. Lars had been with Mida and Mida came just for the purpose… and Mida sort of sprung out of the sage effort. I think it actually came out of Lincoln lab and to put together to be the action arm and Ivan had met Lars when he was in Washington and Ivan said, "well, John wouldn't answer phone calls or write reports". So Ivan solution was not to go out and parade John but to go out to Lars Ernest and say Lars, can you…

LK: John …

55:00

Alan Kay: Yea,John was not interested in any of that stuff and I think the general theory was, if you had a genius and just be glad with a genius and get someone to help him, so that's how Lars got from Mida out there and Lars was fantastic. He was just another one of these guys who knew how to get a report out, who knew how to make sure you got funds even though there is hardly any fund, it was just that these guys were problem solvers; that was how I think of it. It was like they were building 20 fingers; they were out after progress. I never heard anybody say you can't do X, Y or Z. That was the point of Alchemy.

LK: This is soft one but where there reporting requirements or visits from the sort of people?

Alan Kay: So I would characterize.. let me ask you if you have the same, my impression was that ARPA barely.. it is almost the opposite of NSF. ARPA barely cared about proposals. It really.. any proposals that they think was long, it wasn't worth well funding because usually the PI already knew too much so my impression was pretty much every proposal for new money was pretty short and they really liked reporting

LK: This is from unsolicited reporting

Alan Kay: No, I mean this is from their own PIs. When their PIs..

LK: That's what I meant

Alan Kay: Yea, We need this. We need this for that and they weren't any justifications or exceptions for that and I am saying my own experience but the other thing was that I think that's generally true if you look at the extent documents. It is they are really like reports. They didn't care about paper writing but if you look at the general reporting, there were some classic ones like the MIT Mack report and the McKinney thing, Stanford AI reports and the jams which were not we did this and the other thing, we were providing content of what it was and there was useful learning material who anybody who wanted to understand this stuff. Some of the stuff that would allow a quick short proposal would be the longer stuff and the reports about what we wanted to do next and the lot of things that you would just be referred to. So that was exactly my impression. NSF was exactly the opposite; they had this ridiculous proposal writing thing that pretty much prevents you from writing a research proposal. We are all engineering like in various ways and NSF does not care the kind of proposal that you write, because they assume the academia is going to take care of that with all the paper writing craziness so they just don't really value the reports. Some reports I wrote for NSF or gens, compared to most of them just because I didn't have the habit of the ARPA thing and the good news about that was

they got accepted instantly, just because they were much more luminous and about what the thing was.

LK: Our proposal was a minimum. We typically did a seminar and technically described what we wanted to do with the ARPA and they were high quality stuff. Now is the good time to break so we can..

Alan Kay: Yea, so I was going to say that because we had to implement things for the most part, in order to better our ideas, pretty much everything interesting in the ARPA community that… the ARPA community came up with, winded up getting implemented and checked out that way. So the thing that was reminding of, was something much more like a baseball team and when they started giving out words for this stuff, my thought was, in baseball, the only thought that really counts is the blue series ring; that is what everybody…. And again to even the broadcasters

1:00:00

Everyone connected to the organization that won the world series, get exactly the same commementative item and it is more important in any other thing like baseball and there were things like MVP awards or golden gloves or those kind of things. All of these things are things that you hear more about because they have hero's journey kind of things but the missing.. the real point about baseball is that it's a team sport and you cannot get by without having different kinds of people; synergy brings you guys together in a particular way and so from my stand point, there were only a few awards that actually even come close, like even the Draper price missed it a bit. I think the GPS one was one of the better ones. They've got pretty much the whole team there. The one they've got.. Taylor, Buckler and I got, we thought they should have been at least three more people there `cause ACM system software was and there was another one they would give groups for doing something. I like that reward a lot better than the Treeing reward. Treeing reward essentially misses it and for almost all of the..

LK: Congratulations

Alan Kay: No, my reaction for those kind of reward was, 'hey, wait a minute, if you are going to reward anybody, about rewarding the funders. Let's look at what's going on, the reward for any researcher, virtually any researcher is going to be rewarded by having the privilege to do things with that work. It is like the most incredible thing to be able to work on something really difficult and pull it off. Jesus!

And they pay you

Alan Kay: What more do you….? And that is a big reward and it is kind of relatively early so like 40 years later, so what? And then the question, which is to me, who is most deserving? I like the idea of the funders are handing out gold medals knowing most of them are going to turn into lab, right because they are handing out funding and taking and they are lucky if they get 30% really good results and they are willing to invest in this thing. They are the ones that have to deal with people who are likely to be unpleasant. They are the ones protecting them. I feel like the fund.. so if I were going to give a reward, I would give group awards to various projects that did things and not worry about who did what and I would also give awards to say the four ARPA guys.

LK: Absolutely

Alan Kay: Just because if we didn't have them, it just wouldn't have happened, so absolutely would not have happened

LK: So let's talk about that. The funding they provide and the way they did it and occur to them, you feel it is as well as the talent that was available to them.

Alan Kay: The talent… so the way I look at talent is suppose you were born with twice the IQ of Da Vinci Leonardo but in 10,000DC, so IQ is overrated in the sense that it is dominated by the knowledge of the time and the knowledge of the time is dominated by the epistemology of the time; the way the time actually looks at things. So I think in this context first, the epistemological frame work you are in, that would cause knowledge to be generated and if the epistemology is strong and there is knowledge generated, then somebody who have propensities is going to be vastly amplified beyond any story like way of looking at what talent is. So I think of what the ARPA… what happened in computing… when I say ARPA, I mean of course you cannot leave Mavin Denicuff out of the thing; he was the very important founder.

1:05:00

He just had a smaller fund, let's say 4 or 5 million bucks but he started off a lot of things even ARPA IPTO and such, he was Ivan funder for getting new projects started. So If you take a look at these guys and by setting up a community and not having any party, in other words, being as different from other project D that we have today. It was possible, it could possibly be. What they got was this community of ever building knowledge that made my generation of graduate students, the luckiest generation of graduate students there ever was in computing. So because we had four or five years of you guys and first round of inventions, Daniel knew everything to feast on when we were thinking about what computing is all about.

LK: So you kind of have the structural picture here, you have got the grad students, the PIs, the IPTO pns, the directors, the ARPA directors, DOD

Alan Kay: Exactly (1:06:18) was a big factor back then

LK: So…

Alan Kay: (1:06:21) wasn't a big factor back then

LK: Let's talk about the… theirs is a transformation, somewhere down that pipe where it blossomed.

Alan Kay: I think it was when the.. and again, no amount on my debt so let's just say that in the beginning, just piecing what I could piece together. I think Veneva Bush was a key factor everywhere and I think the technological world that he was the prime advisor in helping with World War 2, was a huge factor. I think the Russians starting the cold war as they did. I think the martial plan, probably the most remarkable thing in United States has ever done under the circumstances says wait a minute for the time zone for a commercial zone was 3 years after we just had almost 6,000 people killed in World War 2 and revelations about the concentration of camps and everything else like that and be able to understand that that was the right thing to do and to be able to do it. It is like unrecognizable today. When you tell somebody about it today, most people don't know about it, they cannot believe that we actually were able to do that. We were unable to do it with the Russian and the Russians collapsed and we are going to pay for that. So the way I look at it, it was actually.. there was something about the depression of world war 2, the way science got involved in World War 2 despite the tendencies of knowing the territory would be against it.

LK: Eyes and all

Alan Kay: Eyes and all of the cold war; there were a whole bunch of things. It would be hard to duplicate in a way that.. it had this particular way of thinking, it was kind of like an all-boys club, where the all-boys were kind of trustworthy, like they really did do big decisions at the Cosmo clubs that were actually good for the country and good for civilization. It was just different, the way I pieced it together, it was actually a different kind of thing. There was a lot more money in flow because of the cold war and there was a place.. that period in between when the cold war started and the huge problems that the Vietnam conflict brought up, in between, there was a place where a lot of stuffs get done. I am sure a lot of bad stuff get done but there is room for a lot of good stuff and we were the beneficiaries of the good stuff and the US also.

LK: So here we are today in a different era and we still have a funding community, funding culture, one way or another

Alan Kay: Sort of

LK: How is the change, how is it affecting the abilities for these golden eras to emerge again?

Alan Kay: I don't know how to actually answer that in a larger way because Xerox park was only set up because of the failure of the conversion of ARPA to DARPA.

LK: So let's talk about Xerox parks

Alan Kay: Yea, so Taylor's interest… so there were a couple of forces, so Xerox in the 60s, Xerox in the 50s was much like an ARPA project as you could possibly imagine and really interestingly so.

LK: In the 50s

Alan Kay: In the 50s when they invented dry copier twice and went through , of those conflict and difficulty in trying to ligate IBM to build the thing, it was a famous story there was a book by John Daser, one of the executives of… my (1;10:50) was what he wanted, was what we read later and we went to park, the 60s, these are the stories there, they are the ones through use their life insurance and retirement funds to build factory pray for the 1914 themselves because IBM rejected it and the 60s, they were one of the fastest and largest growing companies and among other things, acquired mainframe company and towards the end of the 60s, they got to afford the research scientist by name Jack Goldban, who said to the guy who is the CEO at that time, who was successor because the first one died Jack Wilson, so he said to Mack kolo who is the successor that Xerox should have a long range research center, should have it for things that knows about it, should have it for some things that doesn't know about one of those things that should be computing and so there was a connection between Xerox and the guy who is the chancellor of Washington University where West Clark ARPA project was, that was George Pay and that was how Taylor came in you know, I think West again was possibly the person who said to George Pay, you should talk to Taylor, Taylor was at Dutton right now doing a sabbatical after ARPA, you should talk to him.

LK: Visited about 66?

Alan Kay: 69 and right around that time, the process that was going to result in a man's field amendment, was going to result in a congress about the protest from the Vietnam War and so forth. Taylor was good at looking ahead and so in the fall of 1970, he decided to join Du pack, there was nobody there but he started talking to people that he knew. I was one of them and I was at Stanford at that time and he and his wife and I and my wife, stayed up all night in their hotel room talking about what this thing would be and Taylor said quite a few things and said look there is no question that this man would ask, that is going to kill off how

ARPA has been and the only way.. and this is the pitch they had to make, who wanted to work for the company

LK: Right

Alan Kay: Right, so his pitch was we need to finish up the ARPA dream and we aren't going to get funding from anybody in Washington for doing it. Now, the only recourse is to work for the company and I have been negotiating with them. They have an agreement that they would let us do what we want to do for 5 years and so will you join? So I edged my bets because I was going to go work on personal computing at Bolt, Martin and Newell and so I had signed on as consultant. I was still doing this thing with Larry Roberts so that was September of 70 and in January 1971, Taylor got popular in the whole earthly computer creation.

1:15:07

He included not only some of the best people and I knew most of these people. So we've got Butler, Peter George, Jim Mitchell, Ed Fialar, Chuck Dakar and a couple of months later, then various things happened. There were approach I wouldn't go into but it was fun. Things were.. and I call it New Orlean and Bell and said, something good is going to happen here, I am going to stay, please forgive me but I am not going to come out because I could see especially Butler, Butler was like a world force, the guy is just… and I liked Taylor. Taylor is really brash and had all of these things but you know what, I grew up in New York. I liked.. Taylor was a student, Taylor would talk to you about what he was gonna do because he had studied Licklider and he didn't think the talent that Licklider had but he would study. He thought he knew better about what Licklider did to be a success than Licklider did and this is true, absolutely true and Taylor had distilled it all down and he would tell you exactly what the jobs were of everything, so it was ARPA++. That was what it was and everything that we liked about ARPA was just more that pack, it was the simplest way of describing it.

LK: Flexibility

Alan Kay: The flexibility of cut off level for talent was high so you could see how it worked, what he had to do as a manager, he didn't want anybody he could manage, so he saw it as organizing the social dynamics of the place, when this group of long wolves needed to co-operate, they probably would. That was and he was fantastic at it and he was working so he could do any goddamn thing he wanted but when he needed to cooperate, he was supposed to be in the mood to cooperate. Like when we did ALTO, `cause when you want to do hardware, you just cannot d o 15 things and so we wound up doing something like 1500 altos and so the billage of that month… so there was only a dozen of us there, so the billage of that small group to really produce depended in no small part on Taylor's theory of it, the fact that he trusted Butler. So Taylor never gave us a suggestion once and he never … Butler had the power, Butler

was wise enough to use his power for good. I was amazed that Butler tolerated and he and I were friendly, but my way of doing software was different from his way of doing software and yet he helped me even as he was doing something completely different. So I've never forgotten that because he could've destroyed me and he had the power and I didn't

So if you… can you draw any differences between the ARPA community and the park community, you've described a lot of similarities, were they really…..?

Alan Kay: I think park was too small a sample to say that if you only have a few dozen, everyone there was kind of like a PI

LK: Was it an emotional PM in the structure?

Alan Kay: No, there was no… So this is a good one, there was a question of title and Taylor fought like mad and won. He said, look there should be only one title "Member of Research Staff" and if we are successful, that would be the most coveted title in the world of computer science. Period! Forget about layers because that's bullshit.

LK: Remember we..

Alan Kay: The research staff of Xerox staff, he was the one who named it park. He started to refer to it as park rather than (1:19:58), it is park.

1:20:00

The alto was originally called the engine dynamo book. So he was the shaper of what I think of as in thought environment; the environment in which you thought. He was the one that set up the weekly meeting and the dynamics of that weekly meeting was the dynamics that he chose and all those things so he was.. So I think of him as the… and I think Butler does also. I think of him as the… he was the most critical person in the park even though he didn't do anything technical. Just because he loved absolutely. He was the most essential person there and to me, Butler and Chucker, the next two. Butler was the next most essential person because I mean the guy was just… he could be an up and himer, he was someone of an up and himer type and year at that level but Butler never really done a computing. He was…came out of physics,, he was probably the leading operating system designer of the world but when we did the mainframe, the fake PDP 10, Chuck had his hands full doing the membrane and there was nobody doing the CPU so Butler said well if you fix it so that I don't have to look at anything other than a telescope, I will do it. This is a 14 face clock machine, he never done a… it is the most impressive thing I have ever seen and he did it in just a few months.

LK: So..

Alan Kay: So I think of this guy.. but still, I believe every single person there, it was the context because Butler had never been that powerful and it was always Butler. Butler was always a PI. He was a PI when he was a grad student, he was just an amazing person but at park, it was his ability to influence things positively was fantastic and it was because of the context, how the people were chosen and everything

LK: Was there a sense of cooperation, competition with the ARPA community at Lincoln park?

Alan Kay: Yea, cooperative. We all considered ourselves just another ARPA project. It was that simple

LK: Was there any interaction with somebody?

Alan Kay: We had, tons.

LK: Give me examples

Alan Kay: Like a bunch of us were on the internet in that community. Self was running, so the train back then internet networking, an interesting sideline on the internet itself. Pack actually had one so there was one. Again, by virtue of Butler and so the park people to a perso , you will not hear a peep from them about this.

LK: Talking about pop?

Alan Kay: Yea, you will not hear a peep about pop. I think everybody.. first stage, they don't really care. Butler… these people, they don't need anything. I can imagine… the other thing was I just believed, pretty much everybody said to themselves, it is just monitoring the water, it is not important that there was a pop which really worked well. It was extensive, it was all over the United States, the level of it, the alto's activated gateways like the amps.

LK: So was there any influence of the pops on the TCP development?

Alan Kay: Yes because and there were some very funny stories there. One of them is the things at Stanford that Suff was running, that he was going over something and Med Café was sitting in that meeting, I was sitting at the back of the room in that meeting, I didn't really participate in these meetings but I went to these meetings occasionally. John Shack as there and some other

1:25:00

People from pack attended these meetings regularly. There was one part where Med Café was going on because we weren't supposed to.. there was this complicated thing about publishing at park and Suff looked at him and said you've already done this before which was true.

LK: And what did Med Café say?

Alan Kay: Medcafe smiled but everybody…this is also a big statement that I might make but everybody in that whole regime was again about progress. Just trying to make progress and I believe the reason why the world hasn't heard peeps about pops is I think part of the theory is that pack is already gone an incredible amount of glory for wide group of things and maybe this is the.. this one more thing that had to happen. I think maybe they thought it is not just worth bringing that one up too right because it doesn't… the important thing that happened was that a combination of the TCP IP stuff plus the fact the Gordon Bell went to the NSF to do the back bone which is a whole story that I haven't seen anywhere but it happened also. It is interesting what we had to do there because there wasn't a computer science director there before he went out of.. I believe size was set up when Gordon went there. He agreed to run the thing but one of the things that was his default was to make sure the backbone got funded, which he was lucky because the funding was not available for other sources. That's a whole another sideline . I just… I mean to me, this whole thing is… like I said, I like the world series reign concept because when I had to write because work station thing, pretty cool thing happened, it was still not complete but it was good that ACM organized a conference on history of work stations in mid 80s and invited everybody that they could think of and the cooperate was probably and the first among the eagles there was probably the park people but West pack gave a thing, Apollos was there, Bernex G15 mentioned. So if you look at that book, there was a conference proceeding. It was actually a… something in which the older given off by the whole was rather like what happened, even though every single part of it occurs from the point of view that we did the wrong work but ARPA point was getting the whole thing together. When I .. I wounded up giving a bank work talk there because I had written a 150 pages on the paper I was supposed to write and I had not quite gotten the story to pack yet and I did not know how to not say everything that had happened and that's the problem and a couple of years later, they had the history programming languages conference, I got asked to write a small talk and well like 60 pages and what I wrote was accurate and what I had to leave off a lot of things was positive and especially negative `cause a lot of design is motivated by things you think is horrible from other people, strictly in programming languages and the problem is, you can't just say, "this is horrible, you can say this is good. This one filler is for the good and you don't have to say anything more. If you say it is horrible, then in history, you've to say why. That was what got me into trouble on the work station then I was trying to tell the truth. Then I realized, well history cannot be the truth because if you are trying to compress **(1:30:00)**

X years into fifty pages, you can't get it. It's too…the past is too complicated. So, uhm, the programming language thing is too tricky because there are lots of different kinds of programming languages, and some people do look at prior work and some people don't, and some people give prior work credit, and some people don't, and it's a field where, uhm, like for me, I've spent two years trying to correct a renaming of object oriented programming, which is a term I made up for something that I had done, and Phil decided to rename it unto something else, and after two years I gave up. Something is missing in there? Well, no. It's named what it is, but it has very little to do with the term I originally put on it. And I just believe that's what actually happens because when it gets out of the actual research community, once it gets out into the pop culture, you're dead, because the pop culture is going to turn it into stories, and stories have heroes, and they are simplified, and they get retold, and there's nothing you can do, absolutely nothing. And the other way of looking at it, who cares whether the pop culture likes it or not. Right? Because they don't know what it is. You hope the historians will get that part right. They don't. They absolutely do not, and they refuse to look at primary material in a strong enough way. That's why we're being treated like the recent book on Steve Isaacson books… and he's an intelligent guy.

LK: So you don't think that in the long run things get straighter than that?

Alan Kay: No.

LK: You think they are settling in a given direction…?

Alan Kay: I think they've got…there's something…something gets out. But it's not what gets out, it's what didn't get included, what gets omitted. My attitude about it is I would be perfectly happy if I'm anonymous but I get pissed off when I read a wrong account. **didn't get the next line well** because that would be fine, because you have to have a lot of ego or insecurities to wanna be known for something…just have the inner satisfaction of having done it. But, the problem is, when histories are reported wrongly, it's just needless…from the standpoint of…if you think what is the history good for? What you'd really like to know is what the processes were actually like. !!!!LK: So we can learn from them!!! R: Yeah. So, pretty much any history that's done in the form of a movie is pretty much dead. Movies can't do it. Books are better because some thought patterns can at least be inferred and followed. I think it's really tough, like these oral histories are too long. Nobody is going to look at them. They are going to be cut into..

LK: You don't think the scholars are//or// the future..

Alan Kay: They don't know how to resolve the !!Not sure!! "Rashawnan…or Rash Oman… Problem"

LK: Oh, wow. Different views.

Alan Kay: This is why I like the history of workstations conference. Because it gives "Rashawnan…or Rash Oman…" and it doesn't try to resolve it. And everybody at that conference was well behaved. And so, putting the jigsaw puzzle together I think will be no man feed. I'm not sure you'll get good from that. What was good about it is that they didn't try to go further than this-happened-here, this-happened-there, and these-are-the-approximate-dates, these-are-the-people-who-did-this-thing, and maybe a couple of them are grandstanding, and maybe not…etc. This guy, Michael (honan?), he was I think at Princeton, he was a historian for science and he was the one who was engaged by ACM for the history of programming language. He said, "what we want to know is what they thought and when they thought it". That was the advice he gave to people trying to write these things. And I just…I wasn't unhappy with the way mine turned out but it was a good object lesson in helping you read other things. If you go to Wikipedia or something, you're dead because people are actually making things up. And in fact, actually one of the interesting things that you see everywhere is that people have decided, completely rationally, that Butler's memo about the Alto was the thing that launched the Alto project. Absolutely untrue! Not even remotely true. The project was going before the memo was written before some executive came back and went ballistic when he found out that the project was going on. Butler wrote that memo to justify what we just decided to do by ourselves without asking anybody permission. If you read the memo carefully, you can see that. If you look at it, without happening to know what actually happened, there's no way you can come up with the correct inference on that thing. Because in a normal world, which Park was not, you would expect there would be some sort of memo before...no, we didn't do that. We just decided to do something and did it, there was no asking permission.

There's an archaistic point. The tricky part of freedom is not hubris. You don't want to…overreaching, in the Greek tragedy sense, brings nemesis. So, the tricky thing about being given a lot of freedom is not to overreach. And I think you have to give ARPA full marks for being really diligent. Pretty much everybody really tried to do what they said they were going to try to do. That's the way I look at it.

LK: Under reach is the other flipside of that

Alan Kay: Yeah, you don't want to have under reach. ARPA did have a couple of under reaches. Like (ENIAC?) I think was an under reach. But if you look at the level of the risk that was being taken, and pretty much people were able to operate, very successfully write at the edge of disaster, it was just amazing how successful…like the (INCUBAR?) thing, that was a (half-nip?) 24-bit machine running 20 people on a time sharing…and it was because Butler designed the operating system and Peter wrote the file system and that worked…so that was synergy. And that happened only because Taylor forced STS to make copies of the Berkley Project GENIE

machine…STS didn't want that machine. And the irony was that machine was so successful, which Taylor forced them to make…then launched the time sharing industry and that was why Zucks bought it for a billion dollars, never checking to see whether STS had actually designed that machine at all and…that was what Dave said, "MAX Polosky couldn't run a company but by God he could sell one". !Laughs! And then, supreme irony, a few years later, here we are in Zirox running a PDP 10 and Zirox says, "how about a segment 7? Because we bought this, right?". And then Butler, the very person who was at the very root of them buying the company in the first place, them not knowing this, winds up doing the CPU of a PDP 10, so it could be compatible with the rest of the ((())) I mean, this is a beautiful story that should be told just as a little nugget in itself, because it gives a sense about how few people that were actually involved back then, just like a few hundreds of people. Everybody knew everybody else.

LK: That brings me to a kind of concluded question. How would you describe the upper funding culture of that period that we're discussing, the one that produced this remarkable genius, and at the same time, what the flipside of that culture is? Can you summarize what makes the opposite successful?

Alan Kay: Well, similar questions have been asked about Park. Could you set up a Park? The terms to do Park have been unsuccessful for a variety of reasons. And you would like to think that things weren't so special, that these were unique. I don't think they were because Park was a fresh thing with a more rarefied version of ((())) had done well. About the funding stuff, I was never a P.I. I saw Dave Evans dealing with Harper, Taylor decided to do a sabbatical after he left ARPA at Utah, so I got to know him quite well before the Park thing. I got a chance to talk to him a lot there. I think one hole, I'm not sure I can give a complete picture of it but when people can this thing the ARPA Dream, it was a dream that was so well characterized it became our dream. Our dream being the destiny of computing…it was a destiny, it was romantic. It did have some of these tropes of a romantic quest. It was romantic. It was artistic in a sense that…you know the feeling of…I think if you were a computer person, one of the feelings that you'll get a warm and fuzzy feeling from is to be able to make a computer system that would scale. It's hard to explain to the outside world but when you come up with a nice scaling principle, it's art. It in itself is really nifty and there were quite a few peel in response to this. I think people really connected a lot on this thing that wasn't spoken about a lot which was just how neat everything, how neat the whole thing was, how neat that we were working on this stuff. It's like everybody there understood that they were in the middle of something special. You could feel it. And ((())) he's particular because he wasn't a technologist, because he hooked up to this big idea of somebody else's. He was big. And he got people who were big…(())) big. One of the big differences between then and now was that these funders were perfectly happy to pay for problem finding, not just problem solving. So, that's one of the big differences. Another big difference was that they didn't confuse responsibility and control. They were

responsible but they knew they couldn't control, shouldn't try to control. Virtually every funder today, wherever, whether it's in government or business, thinks they have to control things. The top down thing just doesn't work here. You have to pay for problem finding. ARPA did. (Intersef?) won't, that's why the intersect proposals were (()). So, all of those seem to be huge factors, trust, being willing to take…to consider like…to not thing of projects that don't work out as failure…to think of them as…if you get 40% breakthroughs, the 60% are not failures, they are the cost of doing business in cutting edge research…in baseball, it's not a failure to strike out, it's just hard to get a hit. A failure in baseball is not catching a flyball, which is a technical thing. Failures in the ARPA community, or Park, would have been technical failures where we they didn't know Ohm's Law the right way or something. Like if we'd been unable to make computers, or operating systems, that would have been a failure because that's…we're supposed to know how to do that. But fucking up on this research problem, that research problem…good ideas are hard to come by. So, I may that distinction the big way, and ARPA was hugely tolerant of this idea that, "hey! don't worry about what isn't happening, the real question is 'what is happening'?". And (()) said on one interview or something, if 30-40% of this works, that would change the entire world, and that's exactly what happened. Nobody cares today about the stuff that didn't happen but If he'd try to cut it so close to only make the hits – this is the Hollywood problem – if you try and cut it that close, you're not gonna make any hits. You're not gonna get anything. I think that is such a deep property of that community. It was kind of like good parenting, because the kids have to let that the whole point of parenting is not to have the kids guided their whole life, they have to be allowed to make mistakes, and do this and that, and get more competent about doing things. I think a lot of the bad funding today is being like bad parenting.

LK: Do you have any comments or advice for programming languages or the structure of the funding today, like could we improve?

Alan Kay: I think one way to look at it is, if you look at what the D.O.D budget was when Lick got his…it was just a few bucks left over from the transfer of the space program from ARPA over to NASA, that was where the initial funding for project MAC came from. And, in the scale of things, it was nothing compared to what we were spending from the standpoint of computing, It was a lot! It was millions of dollars. It was like we could solve the education problem of the US today, with like a couple of weeks of what Iraq or Afghanistan cost. One of the pieces of advice here is don't forget to count your zeros here when you're worrying about priorities because portfolio investing gaming theory says, "You must allocate a small percentage to high risk things to get the best rewards". Don't try and control the high risk things, just make the percentage small enough so it's pizza money, you don't worry about it. It's like petty cash, you're not gonna worry about what it is further, we gonna just allocate that much, that's gonna be pre-qualified. And I think this is one of the big mistakes they make. Some companies.. so if

you look at what Park computer science today, if you were to do similar expanding in today's dollars, that's maybe like 12million bucks a year,

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what was that compared to the development of fortune 500 companies in one of them, it is a fly speck but beam counters cannot see the difference, see what one half of one percent from one standpoint; this is free money because I want it and like 1 ½ of one percent and the noise lets give it to 25 of the smart people and just not cry about anything if it happens. That's what is missing in the scale of 1 – 10. Xerox was asked by Neon, won't this be expensive and Neon said I am not going to hire any good people and he said you know you cannot approximate a great person with any number of good people and if you hire good people and manage them and I don't want to manage them. Is that money going to hire a number great people, would that money (1:51:11) that's exactly what happened and they just… they hate it from this because it was a kind of which they exactly have a kind of… because people are kind of used to it of having the executives' salaries being very very large of having other privileges and the idea of having scientific employees who are not chosen by the ranks and they find it very difficult psychologically and they shoot themselves in the foot over and over again

LK: so would you carry that problem of today, the crazy is good

Alan Kay: that's hard. Certainly I think it is really easy to criticize the Tony Thether part of Daper. That was bad and the idea of ways not worth going into right now. That's a whole lot of…march down the line and say this is not absolutely how to get something to happen and this area and that area and they haven't been in failure in every year. They did a funny thing on.. to try and get mojo which was to revive IPTO except none of the processes to do it, they would just revive the name and I believe that it is still there and IPTO from part of the revival of some years ago and some designer jeans rather than.. but we changed it and kind of was there, she got Peter Lee to do something and Peter lee got hired because of the guy and what didn't happen was the PM's was just called after Tony Thether whereas I would have thought would have thought to try to get a whole group of programme in there for computing

LK: and I would characterize

Alan Kay: Well, I don't know because the… at some point, it moves from being abstract criticism like I am doing alright to moving to details and details are what count and actually make something happen and certainly the… in the charter that happen when they put the D-on that they would say explicitly were we gonna fund goal research and the goals are in the proposals and so what happened was they quit thinking of vision and they started allocating money to different places NSF does this also and so top down person is really fantastic, they

might be able to pick a really few goals and it is a while and I think ultimately it looses on something that is larger than others and the computer scientists.

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I think just from having set up.. the recently set up edge of the art research lab for big company, numerically I think there are many more smart people of the type that helped make ARPA famous available today but are harder to find. Like if you are going to set up something like a park today, your problem is not that there aren't people out there but it is nothing like the ARPA community that were growing gradually towards students, already drinking the mother's milk of this dream. So park was a slam dunk. It was never a discussion of what we were there for. I cannot recall a single one because yea, of course we want to finish carelessness project off and we want to get interactive computing for everybody everywhere and a lot of.. because context is so important when you are setting up one of these labs, you have the problem of building the context if there isn't a place you can drop the people from. I view that has the difficulty today if you are doing one of these things because of the.. if you.. we have to have meetings to discuss what they are trying to do. So there as to be some image that the people agree on, allows them to think about what shall we do next? What are we trying to do?

LK: So Alan, is there anything you like to move and discuss in the context?

Alan Kay: Remember when Ghandi was asked what he talked about what of civilization, it would give you an idea, that kind of nails it.

LK: Great

Alan Kay: I mean it is not a bad concluding remark if you think about.. maybe the.. above this thing, I would say back in those days, you were there before I was, I would say we are a bunch of freaking idealist and we were trying to make the world better part of the 60s, what is really good about the 60s, the image of realizing that they just absolutely have to be in every area including area of communication and these kind of thing, I would say the PIs back then, all have them. That was it, it was here for and so they were after something that was far beyond because he can cut it but the one question that you asked me that I didn't say anything about is and I can say it quickly is that while I was there, I would practically have single instant of any kind where monetary goal were part of any kind of planning, choosing, from any kind of thing. That was not what it was about.

LK: Do you believe in influence in some levels up above the Pi level and PM level and directors of ARPA or you were aware of what it was up there?

Alan Kay: I certainly was aware of there was some force above the Licklider level but it wasn't while I was there and I got that from reading the book dream machine and that was also Licklider gave that position for the human gabbage deposition that he gave them, what was really interesting about, it revealed the pressures he was under right from his door from the stand point of its was in the ranking file of… and I just can't recall any instance of that. This was true for places like RAND, BBM and stuff also and everybody was aware that if they did anything good, it was going to helped the military but I cant think of a simple example of any.. that was into the military and that was amplifying the human…

LK: I had a fantastic interview and I think the interview was..

Alan Kay: I came in after you so I am just an observer and some stuff that you help to build.

LK: You build your characters so well and your opening remarks and the context and environment might happen to be full, really revealing.