Jack Nilles

Interviewed by

Tom Abram

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Via Zoom

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Welcome to the Archives of IT. I'm Tom Abram, the director of the Archive. Today is 9th June 2022 and we're on Zoom to talk to Jack Nilles, who is in Los Angeles. Jack is known by many as the father of telecommuting, having led an extensive study of its viability and business case for it in the 1970s, using an insurance company as a practical case study. I guess we're all very familiar with it these days and tend to refer to it as homeworking, which has become common in the pandemic. But in those days, in 1973, it was a rather different proposition and really quite ground-breaking. So Jack did a study on it, but the insurance company didn't go for it, and we can hear a bit about why not later, even though there was a compelling business case. Since then Jack has pursued lifelong the idea of telecommuting, homeworking, remote working, whatever you care to call it, right up to the present day and we'll learn about how things have changed over the years in the approach to it, I'm sure, in the course of discussion.

So Jack, welcome.

Well, it's good to be here.

Thank you. Well, let's start by talking a bit about how you got to the point of studying telecommuting and I guess that started with your birth in 1932 in Evanston, Illinois. So first of all, congratulations, you'll be ninety soon. What was Evanston, Illinois like in those days?

Well, Evanston is the immediate northern suburb of Chicago. It's the home of Northwestern University and when I came into it, basically it's sort of a Norman Rockwell [laughs] town. Everybody was happy and fruitful and so forth and so on. So I had a pretty good life as a kid there. My parents, neither of whom had gone to college, were, I'd say, middle income people who insisted on all of us siblings – my brother, my sister and myself – going to college. And my life there was, I'd say, reasonably unexceptional.

How big was the town in those days?

It's around 75,000 people, about the same as it is today, as a matter of fact.

So you mentioned your parents and you've given me a bit of background on your parents and your grandparents and I see that on your father's side, both your grandfather and father were in business in the supply of coal, oil and building materials.

Yep. That's it.

So that's a kind of entrepreneurial streak in the family, is it?

I guess, yes. It was the Nilles Oil, Coal and Building Materials, was the name of the company and my father ran it with his brother, Roy, until he finally bought Roy out in the late thirties, I think, or thereabouts. But, yeah, he was an entrepreneur, alright. He was also elected an alderman of the city in about, I'd say, 1941 or '42, thereabouts.

Yeah. So he was an important figure in the community then, by the sound of it?

Yeah.

[00:04:46]

And what's happened to the firm today, is it still going in some guise or did it die out?

No, my father went bankrupt when I was in college. I didn't find out about it until the end of my senior year, but he was overwhelmed by the technology of, you know, ready-mix concrete and this sort of thing sort of did away with his business of selling bags of cement and selling them to people.

Yeah. So an evolution of the business environment.

Right.

And on your mother's side, your grandfather was an electrician, which I found intriguing because he was born round about the same time as the first power station came online as a public service.

Yeah.

So he was an early adopter of technology then?

Oh, he was indeed. He… actually, I have never seen either of my grandparents, grandfather on my mother's side or my father's, but he was, he came to the US from Sweden.

Right.

And some point ended up working in Yakima, Washington, and changed his name. His name was Wikstrom and the Yakima Indians with whom he worked quite a bit, could not figure out his name, so he came to Wickham as his name, and his name was Wickham ever since.

So what, I mean what kind of electrician are we talking about? Is that kind of domestic stuff or industrial stuff or was it mixed up in those days?

I think it was mostly domestic. I don't really know for sure, but he was interested in the technology and ran an electrical business in Chicago where he finally ended up.

So, did that influence you at all in your interest in science and technology?

Well, I'd say since I never met him, I don't… I don't know.

Yeah, okay.

I was interested in technology in school.

Yeah. Well, tell us about school then, tell us about the experience of school?

Evanston is still pretty well known for the quality of its schools and the elementary school I went to, called, its name was Haven Elementary School, it was within walking distance of my home, about four or five blocks away, and it was from, you know, kindergarten through eighth grade, which is apparently a rarity these days. But it had a very broad spectrum of teaching, it had music, art, the standard types of education – science, chemistry, biology, the whole works. And so I had a great time going to school there.

So it sounds like you had some quite varied external interests, extracurricular interests, which include a bit of arty stuff, both drawing and music, and it sounds like that's been a theme throughout your life?

That is true. I… this was during World War Two at the time and I became adept at drawing aerial battles, drawing all sorts of airplanes and soldiers, I could draw soldiers with camouflage and so forth and so on. But one of my crayon drawings, which was simply of a toy sailboat and a hand reaching down to push the sailboat along, drew the attention of the school's art teacher and he published it in a book around 19… I'd say, I don't know, '45 or somewhere around there. But the school triggered my interest in all sorts of things. I liked singing and drawing and finally, later on in high school, I got my first camera and that hooked me on photography. The high school, again, was called ETHS, or Evanston Township High School, had also a very broad curriculum. And one of the interesting things is it put on a series of dramatic productions; we had school plays in lunch hours, we ran an annual series of musicals, mostly Gilbert and Sullivan. So it was very- we had a good auditorium, so I got involved in acting and in lighting for the school productions and I discovered much after I had graduated, when I had some dates with a fellow graduate of ETHS in New York, I found out I was considered a wheel, a wheel in the high school, which was a big surprise to me, because I was just interested in, you know, doing my thing. So, great life.

[00:12:05]

Yeah. So what was your first camera?

It was an Argus C3. Thirty-five-millimetre camera.

Right, yeah.

You know, a fixed fifty-millimetre lens. And remember film?

Yeah, I remember it well, yes. Not that particular model, but yeah, I had something similar as a young person, fixed lens, thirty-five-millimetre camera in those days. So on to university at what's now Lawrence University, is that right? Lawrence College, now University, in Appleton.

Yeah.

Where you studied physics. What drove you to physics?

Well actually, I wanted, when I was in high school, I wanted to go to Brooks Institute of Photography in Santa Barbara, California, but my parents insisted that I go to a regular university and would not fund me to go to Brooks Institute. And I did well in the sciences in high school. I spent several summers when I was in high school as an unpaid intern at the Field Museum of Natural History. I became interested in biology and got involved in all the backroom operations of the Field Museum. So I was into some form of science and biology wasn't exciting enough at the time when I went to college, so I picked physics, because it seemed to have more interesting things, specially after the atomic bomb had been exploded. And I said well, there's things going on there, so I went into physics.

Yeah. But later on, some years later, you also did a Masters, didn't you, which was in electrical, electronic engineering?

Yes.

Was that kind of a consequence of your early career?

All it was, when I graduated from Lawrence I was in the Reserve Officers' Training Corps, run by the Air Force at Lawrence when I was there, so I graduated as a second lieutenant in the Air Force. And about three months after my graduation I was inducted into active duty, into the Air Force, and went for basic training in San Bernardino, California. And I, having grown up in a flat midwestern town in, you know, the centre of America, was just knocked over by the mountains and the fantastic scenery and so forth in southern California and I just said I've got to get back here some way or another after this. But I was, since my degree was in physics, the Air Force did not send me to some Air Force base someplace or other, but sent me to Wright-Patterson Air Force Base near Dayton, Ohio where I was given a job of supervising several electronic intelligence research projects at the Aerial Reconnaissance Laboratory at the Wright Air Development Center in Wright-Patterson Air Force Base, it's the hierarchy, in Dayton, Ohio. And so instead of being the usual kind of military operation, here I was, I was back into doing research, the same things that I'd been doing in college, only switching from physics related research to electronics and, you know, electronic engineering. So I got switched to, I went to, in the Air Force hoping to become a nuclear engineer of some sort, and that basically went away the first day I got up at Wright-Patterson and they made me in charge of electronic intelligence, you know, projects detecting radars and other forms of radiation for the Air Force, airborne kinds of things. I mean ultimately some of the equipment I worked on was in the U-2…

Oh yeah, right, yeah, yeah.

… which was shot down, the Soviet Union…

[00:18:04]

How interesting, yes. Just as a digression, I've been to Wright-Patterson Air Force Base in Dayton, Ohio.

Ah.

I used to work for the Ministry of Defence in the UK and my particular, my first job there was concerned with Electronic Countermeasures, rather than the ELINT collection, but I know about some of this stuff. So we probably shouldn't go into that too much. But the thing that struck me looking at your projects there was that lots of them were about space, and that must have been quite early in the exploitation of space technology at the time?

One of the projects I was working on when I was there was called weapons system 117L, which was basically the Air Force's first space programme. And I was involved in designing electronic intelligence equipment that would fit into a spacecraft of some form or another. I never found out what happened because after two years my active duty tour was over and as the usual sequence of things in the defence industry, I was hired by one of the companies that I had been overseeing in my job in the Air Force, and fortunately was in California. I had a couple of good offers. One was in Pennsylvania, the other in Santa Barbara, California, and I immediately highly biased towards California. And I moved there in 1956 after I left the Air Force, left active duty. And so I was a, you know, electrical engineer for Raytheon Manufacturing Company in Santa Barbara in their Santa Barbara laboratories, and strangely enough, while I was still in the Air Force I went there on a visit to check, you know, the work they were doing was for, we were looking at millimetre wave receiver, which was really new stuff then because nobody had been able to even generate the things and, you know, it's basic, a part of the G5 telecommunications businesses in the world. But anyway, on one of these visits I was invited over for dinner to – from one of the engineers there – and I met this young lady who was the sister of the guy who had invited me there, his wife's sister, and we hit it off quite nicely and it turns out that she and I both lived about five miles from each other. She in north Chicago and I in Evanston, but here we are and we met for the first time in Santa Barbara. Things went on, I ended up marrying her.

[00:22:15]

Oh wow. What a stroke of luck.

She was a flutist, a concert… she was a flutist. Had her own chamber music trio, so I love music, plus the electrical engineering got me into this situation.

What a nice story. That's lovely.

We were married fifty-nine years until her smoking habit did her in.

Yeah. Well, I've also visited Raytheon in Santa Barbara in the course of my defence career, which was some years after you were there, but I must have visited there in about 1980. And they were still there. Anyway, let's move on. And to kind of cut a long story short, after this quite long period of working in and around military and intelligence and space and so on, this takes us up to about 1972 when you made a move to the University of Southern California to do something a bit different.

Well, in the, around the 1960s, you know, I left Raytheon in 1958 to move to Los Angeles, partly because my wife's trio was mostly in LA and we were commuting between Santa Barbara and LA and that gets kind of tiring after a while. So I got a job in the defence industry, or rather in the aerospace industry there, and ultimately through various things I spent a lot of time working with a number of highly classified space programmes, switching careers again back to photography, I was in charge of advanced design for several photographic spy satellites, okay? And so I spent a lot of time commuting between Los Angeles and the Pentagon. On one such occasion I had a quick order to brief the Under-Secretary of the Air Force the following morning. So I had to get on the midnight plane from Los Angeles to Washington, got there at, you know, 6 o'clock in the morning or something like that, went to the Pentagon to give the briefing and told by the secretary, no, this has been postponed till 10 o'clock. And so I wandered around, did nothing for a while and then had lunch, got to the secretary again. She said, well, no actually, the meeting has been cancelled. So here I had spent all night on the red eye, which I cannot sleep on that thing, I was, you know, sort of bushed, all ready to brief the Under-Secretary. So I got on the 5 o'clock plane and flew back to Los Angeles and at that point started the thought in the back of my head, because in the building in which I was working, on the floor above me were the generals in charge of the aerospace effort, our reconnaissance, space reconnaissance stuff, had a video conference room encrypted, direct line to the Pentagon, which I

could have gone to the previous day, except I wasn't a general, so I wasn't allowed to do it. So this idea, I could have given the briefing without all this nonsense, but didn't, so that festered. Anyway, wrap forward to 1972 when I was engaged for some other things figuring out how technology developing in the aerospace industry could be help for, you know, the real world instead of outer space. And I talked to an urban planner who happened to be in Santa Barbara, I took a trip there just to ask, you know, what can we do for you guys. And he said to me, well, you people can put man on the moon. And I said, yeah, I was involved partially in a parallel programme helping them pick the cameras they used to pick the landing sites on the moon. He says, why can't you do something about traffic? And, you know, the proverbial light went off in my head – traffic! That's it. Travel! Get rid of all this travel. And I got really excited about this, went back to my bosses at the Aerospace Corporation – I was secretary of the corporate planning committee – and said hey, why don't we do some research on substituting telecommunications for transportation to reduce commuting? So they asked me, what would it take to do that? And I said, well, this isn't entirely a technological issue, we'd have to find out how this fits with the sociology of the time, we need probably some lawyers and sociologists and so forth to hire to work on this. And they said, forget about it, we're metal benders, we don't deal with this touchy-feely stuff. So I was pissed off about this and I was complaining to a friend of mine who used to run the laboratories at the Aerospace Corporation who had moved to USC to start their interactive television programme for graduate engineering students. And I said, here's what I want to do, is put some research on the feasibility of substituting telecommunications for transportation to get people out of their cars, because a lot of the time they're just talking to each other over some form of telecommunications, so why do they have to go someplace to do this? And he tried this on a couple of faculty members in USC and they said, he couldn't really get anybody interested, so I kept complaining. He said, okay, why don't you come here and do it. And so I had a meeting with the executive vice-president of the university and explained what I wanted to do and said, you know, here's the problem, what I want to do requires the input from several different disciplines, my company will not hire people of those disciplines, they want to just stick to science and engineering. You have the disciplines and it's clear to me that universities are not that, really not great at organising anything, and I'm good at organising in multiple and diverse companies, so why don't I come there and I'll be your director of interdisciplinary

programme development. So I invented this job. They said okay, and I moved to USC. Well, offices in the School of Engineering at first and then finally in the university main building. And my job was to put together programmes involving multiple schools of the university, one of which was my main topic there, which I finally got a grant from the National Science Foundation to study this. It's called Development of Policy on the Telecommunications/Transportation Trade-Off. Yay, we got the money. I should also back up and tell you, I had also as part of my job while I was at Aerospace, was helping the National Science Foundation get their programme started, called Research Applied to National Needs, the RANN programme. And the grant I got after I left Aerospace and moved to USC was from that programme. For whatever reasons, anyway, I had to figure out how to get this to happen. I hired, I attracted people from the engineering schools, computer types, from the business school who had business contacts, from the Annenberg School of Communication who had dealings with the psychology of people working with each other. We attracted an insurance company, a national insurance company to work with us, because I wanted to set up a project that was real. I didn't want to say, you know, we'd done this with a bunch of students and it was okay with them, so it must be good. No, I wanted to get to the basics, if this has to, if it's going to work nationwide, it's got to work for a business company. And so we got the insurance company to sign up with us, because their problem was nothing to do with what we were trying to sell, their problem was turnover. They had a large clerical staff, mostly of recent high school graduates and the like, they'd come and work for the company in their downtown headquarters, and the turnover rate was about one-third of them would leave every year. And so this is an expense to them, first they had to pay them higher to work downtown because most of them lived, you know, somewhere ten or fifteen miles away and had to find some form of transportation to get there, their own cars or something else. The public transportation system wasn't that terrific in Los Angeles then, and it still is not terrific today. So it's still, you know, between eighty and ninety-something per cent of people still drive to work when they're commuting in a car by themselves. And so we told the insurance company, look, let's set up a project and we'll let your people work at a centre located near where they live so they can walk or bicycle and preferably not even drive their car to this place and get to work.

[00:34:53]

The company tried it, we worked it for like nine months, took very careful measurements of what was happening, what worked, what didn't work. And at the end the project was a success and wonderful that we'd figured they'd save four to five million dollars a year in, you know, either savings or direct benefits in terms of improved productivity if they kept doing this. They said, it's great, but we're not going to do it. So I said, why not? I mean this is a bottom line benefit to you guys. Well, you see, we're not unionised and we don't want to be unionised, and so we feel that if we set up workplaces in the suburbs and sort of scattered around the Los Angeles area, it would be so much easier for the union to come in and organise these places one little place at a time, before you know it we'd be unionised, so forget about it. That's it. A few months later I was at a conference in San Francisco with the planning director for AFL-CIO and I explained to him what telecommuting was about. Oh, I should back up once more again – telecommuting. The name of our project was Development of Policy and a Telecommunications/Transportation Trade-Off. When I explained that to people I'd get a glazed look, I'd think I had to have a more marketable term for this. So I said, well, let's see, we're using telecommunications technology, computers to replace commuting, why don't we call it telecommuting? And that works, it works great for employees because they want to get rid of the commute. Then an alternative name we picked was teleworking. That attracts the employers because they want to be sure the people are actually working, not down at the beach when they're not in the office. Anyway, back to the conference in San Francisco. I explained this to the guy, the AFL-CIO planner and he said, that's a terrible idea. And I said, why? He says, well, if you've got these people scattered all over the city like that, how the hell will we ever get 'em organised? So the company hated it because it was too easy to organise, the unions hated it because it was too hard to organise. So this was basically the theme that went through my life for the next ten or fifteen years as I tried to, you know, get companies one after another to get interested in this, to try it long enough to see that it worked for them, that there's bottom line benefits and so forth and so on.

Can I just drill down a bit into the insurance company, but before I do that, you mentioned the AFL-ICO, is it?

CIO.

What's that stand for?

It's the American Federation of Labor, Congress of Industrial Organisations.

Oh right, okay. Like what our Trade Union Congress in this country, yeah. So the thing that intrigues me about this trial you did in 1973, I mean when I first heard about this, I thought, you know, well, why not. I know it's fifty years ago, but the same principles apply as they do now to us working on Zoom. But then when I started reading your book I mean it became apparent to me – should have been obvious to me to start with – but I mean there were huge challenges then that we don't have now, like for example, the communications infrastructure was very different and the real, you know, the really big issue I thought might be that of course everything was on paper then and you didn't have the kind of scanning capability that we've got now to turn paper into electronics. So I mean can you give us a flavour of what the technology was that you were applying to this solution in 1973?

[00:40:15]

The people working in the local offices – we called them satellite centres – clearly you could not have people working at home at the time where they, for example, had a dumb terminal connected to a phone line by a modem that linked to the mainframe downtown, simply because the phone charges would… you know, the modem would run, you know, 300 baud, woo! You know, thirty characters per second, wow! [laughs]

Yeah.

This isn't going to work, you know. So we had 'em work at a centre in which there was a minicomputer which collected all the stuff people were typing in on their dumb computers in the centre every day and they would upload all the data to the mainframe

at night. So we still were using, you know, the advanced technology, we had to do it in little concentrated bunches instead of distributing it among all the employees.

So the hub was connected to the centre by a leased line or something, was it?

Yeah, with a T1 line to run all this stuff to the mainframe overnight. And, you know, the way the work flowed, this was not a big problem, you didn't need to have data, you know, instantly for everything, they could stand, you know, overnight kind of transmission of things. There were, you know, even in 1973/74 there were lots of jobs that could be set up this way. I mean the technology was simple, you need a broadband, reasonably broadband line to a centre that people could go to and they could still use computers. And in the worst case, if, you know, all you need is a telephone to talk to somebody somewhere else and a pencil and pad of paper to get a good part of information work at that time accomplished. Now, as time went on, you know, bandwidth got larger and larger, but still, it was still we had to have people in centres connected by a broadband line to the mainframe. The, when the personal computer showed up in the early eighties, everything was, you know, potentially solved, the office was now embodied in the PC, all the stuff people worked with ordinarily was in the PC, you didn't need to have a constant connection to the mainframe, you could store it up on the PC and dump it over a- you could, well, I'd say you could concentrate what you're doing into a relatively small package and then, again, send that over a phone line, instead of being on the line, on a phone line all day, it could have gone on a phone line for, you know, twenty minutes a day instead of eight hours. So the economics worked out that way. And, you know, during this I was interested in a lot of other aspects of business as well, how do you get people to do this, what are the impacts on energy, my main consideration for telecommuting was, you know, get cars off the road because cars use an enormous amount of energy, especially you've got a, you know, 4,000 pound automobile with one person in it driving on an average of fifteen, sixteen miles each way every day, that's a lot of energy used.

[00:44:57]

And was that a big concern in those days at government level or amongst the public?

It was a big concern because coincidentally we had the great oil crisis in 1973 in which we discovered that gasoline was not available and the people, it wasn't a question of is it too expensive, you just couldn't get any. So that got people's attention finally, so I tried to make people aware of this, even you know, business managers, but it still was very hard and difficult to convince the CEO of a big corporation that he or she – well, at that time it was he – didn't need all these people in the office every day so he could keep an eye on them. That was the big impediment from then on until COVID.

I guess everything resurfaced when COVID came along, but just going back to 1973, I mean what about the paper? I mean I see there was a lot of thinking done about paper flows, and how did that work with, you know, people making applications for insurance policies on paper and making claims on paper and paying by cheque rather than by electronic transfer and so on. There must have been a hugely complex workflow challenge to manage all of that paper communication?

Well, two things. One is couriers. The other is computers. Even in '73 the paper flowed to specific collection points, you know, the downtown offices of the company, or to the satellite offices, but it was batch processed, you know, batch collected, the paper, you sent them by a courier to the place and then the people work on individual pieces. The [incomp] office was one of these, the others we just, the companies that had large quantities of paper went around, they just packed it all together and shipped it off.

Yeah, okay. And I mean things like decision making, you know, these days with electronic workflow and so on, you want to get an authorisation for underwriting a new proposal or something, I'm sure there's some electronic message that goes from the agent at the call centre to the underwriter and he just presses a button and the authorisation happens. But in those days presumably somebody telephoned somebody else and had a conversation about it and then wrote down the answer or something like that, is that how it worked?

That's how it worked.

Yeah.

You don't have to go to the guy's office to make this happen, just call him. He recognises your voice and the transaction's completed. You don't need the transportation with so many things that we just automatically do with transportation because we're used to it. The big problem was changing people's attitudes towards where do you have to be in order to make this happen.

[00:49:18]

So was it a big thing in those days, as it still seems to be in some organisations, that certainly early on in the COVID experience in lockdown, there was a bit of distrust of people who were working, who said they were working from home, there was a kind of underlying suspicion that they weren't really working at all.

Absolutely. Absolutely. When we did our larger project with the companies and ultimately with government organisations, we spent a good part of time training both the telecommuters and their colleagues as to how to co-exist in this. I used to have an overhead slide, was a photograph taken somewhere in the early tens or twenties of here's this fella in the middle sort of backed up against a wall surrounded by a whole bunch of people, you know, bearing spears all pointed toward him. And I said, okay, this is what it's going to look like when you come back to the office, so get used, figure this out.   In fact, one training session, I remember some woman got up and said, wait a minute, wait a minute, you mean to say that you put me home to do work and I actually have to do the work? I said, yes. She left, that was it, I'm out of this programme. Whereas my advice to the telecommuters is, look, when you do come into the office, you know, just bring in the stack of papers that you've completed and gotten through in the last day or two or however long you've had it, and say okay, here's what I've done, what have you done, when one of her colleagues – his or her colleague – complains about this. And because the productivity of, you know, home-based workers invariably – every once in a while you get a dud – but invariably it is significantly higher than that of their colleagues. I'd say it went up by significantly, you know, five or ten per cent to double. And one of the main reasons for this is the

lack of interruptions when you're working at home. You actually get to concentrate for more than twelve minutes, you know, to get some of your work done. But one of my training questions to people is look, here you are, you're working, you've finally gotten into the groove, you've recovered from getting to work, the stress from traffic getting here, it's finally worn off, you know, it takes about half an hour, you have a lot of [inaudible] activity, you're finally getting down to work and you've got this great idea of something to solve the company's problem and some guy comes in and says, hey, what about that ballgame last night, and *peugh…* your idea that was just getting formed in your head, gone. I used to ask them, how long does it take to get back to where you were before this guy came in and interrupted. Some people said, well, five, ten minutes and some people would say, never. Okay, how many times a day does this happen? Twenty, thirty. Most offices are dysfunctional because people want to talk to other people at completely inopportune times. So working at home or in some other cloistered situation gets you away from that. Your productivity goes up, your stress level goes down, your feelings of creativity increase. And we've very carefully measured all this for hundreds and hundreds of people.

That's very interesting. I mean there is a counter argument, isn't there, there's an argument that people sometimes put to counter that, whether it's valid or not, you know, which is kind of the water cooler effect which is, isn't it great to stop and chat to your colleagues at the water cooler and solve problems, you know, by talking to people.

The great serendipity effect. I claim it does not exist, that if you're talking to your colleagues who work at the same place over anything, all you're going to get is 'group think'. If you want fresh ideas you have to go somewhere else, alright? The fresh ideas come from outside, not from in the bunch you work with. And so I have no faith in this walking down the hall and meeting someone, hey, how about this, this great new idea. I just said, no, I have never in my entire life had it happen to me, and I've had many years of experience in my life, I've had a chance for these occasions frequently.

[00:55:38]

Fair enough. I can relate to that, yes. So just to look at the big picture of how telecommuting or teleworking has developed then. I mean from that initial starting point in 1973, it seems like there's been, well, there's obviously been an evolution in technology and an evolution in thinking about telecommuting and teleworking up to the present day where, you know, well, it's become prevalent and people are saying it's the way of the future. But I mean you've been involved in this for fifty years, so how have you seen the evolution of the concept moving over that time?

Well, there's two parts of this: the technology part is technology has improved at a pace that, such that there's no possible explanation for most jobs that technology won't support them if they're doing this from a distance, okay? Even in the seventies, I could say we always had sufficient technology to allow at least thousands, if not hundreds of thousands of people, or millions of people to work remotely. Now, basically anybody can do it, unless they have a job that's specifically location dependent, if in order to do their job they had to be in a particular place, okay, they're not among our potential telecommuters.

But was there a point somewhere along that line like, I don't know, when the, when access to the internet became common in the nineties or something, was there a point somewhere along the line where it all became much easier and there was a big take-up of it?

Yeah. I mean the first innovation that was a big step function was the personal computer. The next was connecting the personal computer to a network of some size from, you know, the company to the world. And those, again, greatly made it easier, but the problem was between the ears of the management. I have never had any difficulty getting people to become telecommuters, no problem finding volunteers for this. The problem is getting their management to buy into this, and my usual story is look, how do you become a manager? It's because you're really good at something else. You're a good accountant, you're a good chemist, you're a good statistician, something like that, but in order to pay you more, the way our culture works, you have to be a manager. So now we make sure you are now in charge - in charge - of

several people and have to keep an eye on what they're doing. Okay, that's the way it's been historically. I'm saying, no. What you need is a system in which you ensure that the people know how to do their jobs, that they have the technology enabled to make them do it and that you and they have agreed on what it is they're supposed to do, what the results of that work are supposed to be and when it's supposed to happen, then go away, let 'em do it. Wherever they are. Now that is a very difficult thing to learn. Particularly if you've been brought up in the usual hierarchical organisation, that's tough. And what it takes is not small pilot projects, as we discovered over the decades, like a pandemic, all of a sudden there was no alternative to letting people work from home.

[01:00:22]

So where were we up to before the pandemic? I mean I get the impression from looking at some of your publications that there was kind of a trend, a rising trend of telecommuting, but it wasn't dramatic. Where were we up to by the start of 2020?

I'd say in the United States there was probably ten to fifteen million telecommuters reasonably frequently, you know. There's a spectrum even there. We did a national survey in the year 2000 of telecommuters and about eight per cent of them were fulltime, which was a surprise to me, I expected, my forecasts put the fulltime workers at about four per cent, and it was double, so that was better. And the rest varied, so the average was about two and a half days a week, people would be either in the office or working from home. And that is the way I think it will happen now because when the pandemic started all of a sudden everybody had to do it who had an office job, and now the bosses, the traditionally educated bosses are saying no, no, you have to come back to the office now.   And they are getting outnumbered by the people saying no, if I have to come to the office, I'm out of here, I'm going to work for somebody else who'll let me work from home. And when this is talented people you really need to have with you, you have to start paying attention. So even Apple is starting to say well, maybe you don't all have to be here every day. And Microsoft. But it's funny, the hardest companies to get involved through the ages since [incomp] was high technology companies, they all had to have people there all the time. Companies who are involved in, not high tech, no problem, you know, we know how

to work this out. But the technology was the big people, computer- you can't have computer programmers work at home, are you crazy! I said yeah, that's where they work best, you know. All of the culture, the culture shift has always been the biggest problem. Culture shock.

So how prevalent is it now in the USA? I mean how many people in the USA now are doing some of their work from home?

I'd say probably forty million or so are doing at least some of this at home. And the question is, over the next year or two, this is still coalescing. You know, absent some other pandemic, there'll be some trickle back to the office some of the time, but in every case what we've had in the past, we've had a disaster, we start instant telecommuting for earthquakes in California, were our best sources of disasters, so I've been through a couple of those and you get immediate telecommuting right after the disaster and then when the roads get fixed and you can get back to work again, you know, months later, then the people – but not all of them – start trickling back. So there's always, every time you have something like this go away, there's some portion of the troops say no, I'm going to stay at home fulltime. And that has gone- now the pandemic was the big disaster and people will start trickling back in the offices. You do need offices, you know, I can't say the office is obsolete, you need places to congregate, to talk to each other in situations of uncertainty. You have to get organised somehow, you need to quickly shift ideas back and forth and figure out where, you know, what do we do with this threat we're faced with, how do we get around it, what are ways to adapt to it, to organise ourselves to meet it, you know, who has to do what and to whom for all that's happened. For that you need typically a meeting place somewhere.

[01:05:52]

So that's the pattern you see for the future?

Yeah. Yeah, but you know, as even, even as we get really high-definition television, the need even for that starts to go away. And in terms of, you know, what are the social effects? Well, you can, you have to intersperse, you know, social gatherings of

one sort or another, formal or informal, throughout the work life to get people, they do need to have some social contact with their colleagues. Okay, fine. There are various ways we can fix to do this without dragging them into the office every day.

So do you think there will be a kind of growth of this hybrid working pattern in the future to the point where, you know, maybe a majority of people are doing some of their work at home and some face-to-face with colleagues?

Yeah. Yeah, absolutely. I mean hybrid is what we're doing from the beginning. Most of these people, other than our satellite offices, were working from home maybe a day or two or three a week, so hybrid was the mode. It still will be the mode. In United States it's easier because homes in the United States are larger than they are for the most part in the rest of the world. There's room for an office, somehow clawed out, whatever is going on, you have a spare bedroom or something like this. In Europe, home sizes are a lot smaller. In the United States it's typically, we're finding 2,000 to 2500 square feet, 100 or 250 square metres. In Europe, not so much. So…

Okay. There's a couple of other things I want to pick up on, but we probably ought to just explore, we've talked about the technology and everybody else, but you personally have kind of made this a mission in your career, haven't you, to the point that you have this organisation, do you call it JALA, or J-L-A?

JALA, yeah.

JALA. So you set up this organisation in what, 1981 to pursue and promote…

Yeah, '83 we incorporated. JALA is simply the first two names of me and my wife – Jack and Laila [sp?].

Oh right.

And unfortunately Laila's [sp?] no longer with us, but Laila [sp?] switched from being a flutist in chamber music to running a record company and to doing mostly administrative work for JALA. So she was a many talented person herself.

And JALA is still active?

Well, I disincorporated. I got tired of the, you know, of the State of California requiring us to pay, you know, 800 or 900 dollars a year even if we didn't make any money. But basically it's down to me now. We spent a lot of time in the nineties sort of commuting to Europe to spread the word via the European Commission to various European countries, and…

[01:10:26]

And what reaction did you get in Europe, was it different from the USA?

No, same thing. This is the way we've always done it and this is the way we're going to continue to do it. Same thing in Australia, in Japan. Japan is even worse than the United States in terms of, you know, the cultural issues. But I found my, I have universal disapproval of what I'm trying to say among executives. Really convincing.

So I'll come back in a moment, if I may, and ask you some really difficult questions about the future and about achievements and so on, but I was struck in your book – the first book, the trade-off book – there's a chapter in there about other applications of remote working, which I thought was fascinating. You were talking in 1973 about things like healthcare, education, government services, retail and the replacement of much of our routine travel by this remote working approach, which is visionary because, you know, I mean we're still talking about doing this stuff, especially healthcare, for example. So…

Right here, another thing is, in my chest I have a monitor that keeps track of my heart rhythms all day and night and it's reported in the evening to somebody somewhere who analyses all this stuff, you know. So that's part of telemedicine. I have conversations with my doctor, not face to face, over the phone, and if I can talk him

into it, you know, over Zoom maybe now and then. But technology is replacing lots of stuff where we had to go someplace to do it.

What did you think might be possible in 1973? Let's focus on the healthcare, because you were envisaging then things like a, you know, a remote consultation in which a doctor might look at your X-rays, for example, that have been done. Now I mean we only seem to have just managed that in this country a few years ago.

When I was working in aerospace at the Aerospace Corporation we had a project of examining X-rays from coalminers to pick up, you know, the degree of black lung disease that they had. This was in 1969/1970, thereabouts. We were able to detect black lung disease easier or more accurately than the pros in the business could do it in 1970, okay? Telemedicine was just starting to be practised and we had remote diagnosis where we had a set-up between Los Angeles and San Bernardino which is, you know, eighty miles from here. The patient's in San Bernardino with a nurse assistant, the doctor's in Los Angeles, the blood pressure, etc, etc, can be taken by the nurse and the discussion about what else was going on, you know, how does the patient look, any palpitations or palpation, which is the doctor engaged in, how do you feel. That can all be done remotely, it could all be done in 1970, okay? So everything that could be done was possible, even in a primitive form even then. Now, it's just so much easier and less expensive than it used to be.

[01:15:38]

And how much was it done in the 1970s? Was it common?

No, no, it was experiments.

Right, okay. Yeah.

I have a nephew, now retired [laughs], whatever that is, who got his Masters degree in engineering at USC over the interactive instructional TV system that I helped develop as part of my… I was director of interdisciplinary program development. So we had lots of people, engineers, getting their Masters degree. Their end of the programme

was in the company where they worked, you know, Hughes Aircraft, Aerospace, big type technology companies would have a centre within their company that their employees could come and, you know, get their education without leaving work.

And this was when?

This started 1972.

So this was based on what, cable TV or terrestrial broadcast or…?

It was broadcast TV and there were specific channels for broadcast TV set aside by the government. We were, Stanford was the first university really trying this and I think USC was the second. But we had our programme going in '72.

Yeah. Because I've heard it said that, by… I've heard it said that, you know, the kind of cable TV set-up that you had in the USA was regarded by some as the forerunner of how we use the internet now, that you know, there was a vision that cable TV might provide real two-way, interactive communications for all kinds of things. Is that a concept that you recognise from those days?

Erm… we didn't look at it so much… well, let me back up. The internet was mostly conducted by dedicated lines that had nothing to do with cable TV, okay? So that's what was concentrated on that. Back to my military days we were looking for a system that was relatively invulnerable to nuclear attack. And that's the whole point of the ARPANET, so you could distribute telecommunications so that if one link gets broken another can take over from it. So that's the way the internet works. Cable TV does not work like that.

No, I understand that, but before the days of the internet, before there was a, you know, global packet switch network and so on, the mechanism that was available for two-way interactive communications with a central point, for example to support retail or data sharing or whatever was things like video text and cable-based services.

Yeah. But it was still fairly unwieldy. The problem there was unless everyone was connected to it, it worked only with the network that you were cabled to.

Yeah, yeah, yeah.

And that's [incomp]. You know, one of the oil companies downtown set up their great teleconferencing system, they could talk to their people and it only cost about 20,000 dollars to put out the conference centre for the CEO and couldn't afford to put it for any of the people at remote sites, so they couldn't really actually see this except once or twice when they'd meet in the cafeteria, so it was not an efficient means of communication.

[01:20:31]

Yeah, okay. I mean I'm just, I'm interested in the idea that having talked to a number of people like yourselves who were doing this stuff, you know, fifty years ago, sixty years ago, one of the conclusions you come to is that there is no new idea in this business, that it's all been done before, it's just got easier as time's gone by.

Well, yeah, I mean I am talking to you over a connection through a cable company.

Oh right.

And the cable company's connected to the internet.

Yeah, yeah, yeah.

So, no.

Okay. Sorry, go on?

Cable model works as long as you don't have to switch to somebody else, you know. When you put switching in, then you've got a problem.

Yeah. So, we're nearly out of time, I just wanted to ask you some of these difficult questions, you know, that are very general, like in this career of yours that's lasted – oh gosh, how many years is it? – seventy years of working on technology, what out of all of that are you most proud of, or has given you the biggest satisfaction?

Erm, actually I think, you know, coming up with telecommuting, you know, just a new way to look at it, how to use the technology was the best one and in fact, I keep trying to escape telecommuting and work on other stuff related to global warming, but I keep getting back into that one way or another.

Yeah. They're closely related anyway, aren't they and explain…

Yeah. One of the satellites I worked on that may have helped the Iron Curtain come down, but I really can't say much about those legally.

Okay. Yeah, understood. So what, you know, you've had a long and important career, would you encourage young people to follow the kind of career path that you did?

Sure, it's great fun. I mean if you're in some boring job and think of ways to get out of it, because I hate being bored.   And there is always interesting things to be done and as in the current world there is going to be lots more interesting things that need people to work on them. You need innovation, we need some great ideas and the more people we can get on alternative ways of doing things than the same old thing, the better off we are.

And you'd put it like that in general, it's innovation rather than just tech, you know, computing or communications or whatever, it's the thinking outside the box about new solutions?

Right.

And what, you sent me an excellent paper on the future, which, forecasting the future, so…

I'm about to rewrite it, as a matter of fact. I sent it to my nieces and nephews who say you've got to update this!

I thought it was fascinating, 'A Brief Introduction to the Future'. So what's your prediction for the next ten years then, in terms of, are there going to be some discontinuities or is it going to be a steady evolution, and what's going to be the impact of it?

[01:25:07]

Okay. One, I do not do predictions, alright? Because they will never happen. I do, I mean the crux of futures research is that you look at potential alternatives, you know, looking at all these things that are happening, you know, which way, what are the trends, alright? I mean if do the thing you saw last week and now they're this week, what are they going to be like next week, and then you can draw things like that. Now that you can figure these potential paths, what can change them. So there's something I talk about, about cost impact analysis, it's one of the things I work on a lot, is that you have ways things go by inertia, you know, they do what they do, pretty much what they did yesterday they'll do tomorrow, but you will get discontinuities and it will push on them and change their path one way or another. And the idea is to try and figure that out in sufficient detail so that you can figure out what to do about it if you don't like the way they're going, or how can you help it if you do like the way they're going. And that's how you develop strategy.

Yeah.

And so the future is going to be, I don't know what the future looks like any more than anybody else does, I just know how to think about the future and how to react when something happens that you didn't really like. So I reacted with glee when I said here's COVID and all these people are going to have to work from home. That was thought one, thought two, oh my God, most of them have no idea about how to do this.

Well, we've all learnt a lot then, haven't we?

Yes. How are they… and survived much better than I thought they would.

Yeah. There are people doing this who wouldn't have thought of doing it before. And in fact we used to do all of our interviews face to face and we stopped when COVID came and it took us a year to think, well, it might work over Zoom, why don't we give it a try and see how it works over Zoom. And it works just as well, if not better in some ways, than face to face.

Yeah.

Anyway.

Now you've hit on, the secret is in order to do something that's going to last, you have to be doing it for at least a year and possibly two or three before it finally, you know, sets, the cement will set after this long a period, but you have to have a long enough continuity of doing it a different way before it can really stick.

Anyway, I've taken up a lot of your day so far, a lot of your morning, most of your morning, my evening. So thanks ever so much for that, it's been delightful to talk to you and really interesting to hear about all the factors that you have taken into account in this telecommuting – sorry – this telecommunications and transport trade-off, and thank you very much for taking the time to chat.

It was a great pleasure, I enjoyed it.

[01:29:05 – end of recording]