Interview with F. Stan Settles, July 23 2015

MAGED DESSOUKY: Hello. This is Maged Dessouky. I'm a professor in the Daniel J. Epstein Department of Industrial and System Engineering here at the University of Southern California. With me is Professor Stan Settles, also professor in the same department. He recently just retired from the department, in January, 2015. And Stan is actually one the few people in our profession who's held senior level positions in industry, government, and academia. And for the next hour or so we'll have a chance to chat about his experience in the industrial engineering and operations research profession.

And, like most of us, we really didn't learn much about industrial engineering or operations research in our formative years, in high school or even younger than that. And we can begin by seeing if what your experience at that early age, if they had much of an impact of foretelling of your professional career in industrial engineering or operations research.

STAN SETTLES: Yes, they did, in a lot of ways that I didn't anticipate, obviously. I didn't think-- even in high school, I would have never guessed industrial engineering, management science, OR-- whatever labels you want to put it in.

But I was always interested in being an engineer. And it started, really, with automotive kinds of things. As a very young guy growing up in Denver, we had a neighbor that had a '34 Ford roadster with a Ford flathead V8 in it in our garage. It wasn't mine, but I worked with him on it quite a bit.

So by the time I was about 12 years old, I could build that engine. A Ford flathead V8. Very simple. I couldn't build to the standards I would expect today, but I could do that. And it would run, and so on.

So that got me interested in the hands-on and the making things, as a very young person. And a lot of people ask, well, your dad must've been quite handy, and you picked it up from him. Au contraire, we three brothers all got involved in cars and hands-on kind of things like that. My dad was a quite good athlete. He was at the pro level. Actually went to the training camp as a quarterback for the Chicago Bears, and so on.

So he was a great athlete. I never saw him with a tool in his hand. So at a very young age, I was the oldest, so I became the home handyman. And that got me interested in the hands-on thing, but also how things worked. And so electricity, chemistry, and so on, even at a very young age, were interesting to me.

And then, as I got into high school, people say, well, what were your favorite courses there? Well, there were three. They were a kind of unusual combination. Geometry was probably my number one that I liked best. Even better than algebra. For some reason, it caught on.

We had a textbook that we covered about half of it, in the course. I did the whole thing. So it was just getting into those proofs and so on was just fun.

And the drafting course was the one that most of the people who were taking the college-bound kind of courses didn't take the drafting course. I did. And really enjoyed it. I still remember the names of those teachers, and remember incidents with them.

And then chemistry was fun for me. And physics, to a lesser extent. But chemistry, I said that's what I want to do - get involved in chemistry. And that's what I thought I wanted to do.

So I had no idea of our field, as it developed. But I said, well, I want a chemical engineering kind of thing. Well, the elite thing to do in Colorado, at that point, was to get admitted to the Colorado School of Mines, because you had to be at least in the top 5% of your class to even get in.

There were three of us, out of our graduating class of about 180 that went to Mines. And out of the three of us, two ended up with a PhD, eventually. I didn't graduate from Mines. I just went there two years, and then I got into chemistry at that level. And I said "This isn't fun."

It was really petroleum refining, but was as close as they came to chemical engineering it was all mineral engineering at that point. That was before Woolsey was there, and it had more of the kind of flavor that we're talking about, today. But as I got into petroleum engineering, I said this isn't what I want to do.

So, again, the motorsports thing came out. And by that point I had gotten into that myself, and I had a dragster that I could race. Had an Oldsmobile V-8 in it. It didn't go very fast, But I had fun building and driving it.

MAGED DESSOUKY: So these were the two years you were at Colorado School of Mines, majoring in chemistry. And not, at that point, realizing that's not something that really drives you.

STAN SETTLES: This isn't what I want to do. It was really clear to me. As I found out more about what they do, particularly for petroleum refining, and what those places are like. I didn't want to work in that kind of an environment. So I said, well, what do I want to do?

Meanwhile, I got round the race-car kinds of things. And actually there was a guy-- a really unusual mentor, in those days-- a guy by the name of Tommy Thompson. And that's how I got the Bonneville bug. He had a streamliner that raced on the Bonneville Salt Flats. And he built it strictly from ground up, himself, in his basement garage, there, right out of Denver.

And so in ‘58, '59, and '60, I went to Bonneville with him. In 1960 we put the engine from my dragster in there so we could run a different class, and I actually drove it then.

So that kind of stuck in my blood. And meanwhile, I hadn't graduated from college yet. I then went down to LeTourneau, in East Texas. Now LeTourneau University, it didn't have that kind of label, then. It wasn't even an accredited engineering school. But it had had a degree in production technology, a degree in making things. So that's when I said that's what I want to do. I happened to know about it through my mother. She subscribed to their NOW publication.

MAGED DESSOUKY: So is this a degree, as you would think, it's the cross between industrial engineering and mechanical engineering-- a production technology degree?

STAN SETTLES: Yeah, it's really applied-- more mechanical engineering than industrial engineering. It is a blend of them, but it's very applied, to say, OK, how do we make things? They had courses in advanced gear design and design and manufacture-- how do you make gears? How do you run machine tools?

You had shops and really did hands-on things. Some of the guys got into welding, and all. I didn't take the welding engineering class. I should have.

And so that was what I went there for-- was to go for production engineering. I got enthused about making parts. And there was a shop-- a guy by the name of John Bandirmere was a couple blocks from me, there, in Denver. And he was a high school classmate of mine, clear up from first grade up through high school. We were quite close, and we're still close.

But his dad had a neat shop behind their house, a free-standing garage with a lot of machine tools there, and all. And that's when I got around his dad and Tommy Thompson and watched them making parts. That's what drove me to that kind of a degree.

So I go down to LeTourneau and had my dragster along. And this wasn't exactly viewed as a proper way to enter this Christian-oriented, really Southern Baptist very strict orientation. You show up with a dragster behind your pickup, to go to enroll. And boy, I was a suspicious character from day one. You could just read it on their expressions. Like “why did we let this guy in”?

So it was kind of a fun transition. I got into those courses. Did fine. I was getting good grades in those.

But then you had to elective courses. The electives I happened to choose were industrial engineering. And I started taking statistical process control, and these kinds of things. And I wasn't working very hard in those courses, and I kept coming up being the top student. I said, I'm going to look into this.

So I ended up, due to a flaw in the catalog, getting both those degrees-- Production Technology and Industrial Engineering. Because I could count electives for one and trade them off.

MAGED DESSOUKY: So this is kind of like the old adage that you start liking the things that you're really good at.

STAN SETTLES: Yeah.

MAGED DESSOUKY: And so it kind of spins. The better you get at it, the more you like it. And the more you like it-- so it's kind of like this feedback loop.

STAN SETTLES: Yeah. So this was well into my college experience that I even uncovered industrial engineering. And it just naturally drew me into it. But I ended up with both those degrees, as a result. And won't tell you a long story, there.

There was a guy named Charlie Foley who was the primary industrial engineering faculty member there. By the time I graduated, he was the provost for the school. So we got to know each other rather well.

They had a program there where you could actually work in the factory. They made earthmoving equipment, and that kind of thing. Going up offshore drilling rigs. Big, big, heavy equipment, and all.

I was working in that factory in the "alter-day program" as they called it. Monday, Wednesday, Friday, you might work in the factory. Go to school Tuesday, Thursday, and Saturday. And then the next week it'd alter. And it the university and the factory were owned by the same people. So it really worked pretty well for me.

Then my senior year, the spring semester, I was out working in the factory. And I still remember. The foreman came up, and he says, they contacted me from the "university." And somebody just quit as an instructor. Aare you interested in doing it? They had drafting courses that all needed to be covered, and this person left. A really small school.

I said, I think I'm their guy. I learned important lessons in the factory. I figured out right away that what I wanted to study wasn't doing what I called a "lunch-box mentality," working in a factory. But it was, how do you look at the higher level of it?

I still hadn't graduated, and I taught drafting courses in my senior last semester. That summer I taught there. So that was 1962.

MAGED DESSOUKY: Did that, do you think, was the beginning of your interest in teaching?

STAN SETTLES: Yes.

MAGED DESSOUKY: --did that happen later?

STAN SETTLES: No, that happened right then. Soon as I got into it, I said "I like this." And I look back and chuckle about some of the kinds of things-- now, drafting was fairly straightforward. Because I had to work the summer as a draftsman for Coors Porcelain. So I knew something about that. And I loved it in high school, so it fit rather naturally.

But I was also teaching that summer. I taught an industrial-management course. Well, you can imagine - as this graduating senior, you didn't understand too much of the realities of management. But I got through it. That got me hooked on it.

Well, also in my senior year-- it was in the fall before that-- this Charlie Foley-- he was in a PhD program from Purdue. And I don't think he ever graduated. It was "all but dissertation," as the

old expression goes. But he was really a mentor, at that point. He asked me the question, “have you ever thought about going to graduate school”?

I had a real long answer, and I said no. I'm going to go to work. I'm married, and I need to make some money. He said, well, even though it was an unaccredited school, he had enough connections that I could get into either Purdue or Arizona State University.

So, meanwhile, my folks had moved from Denver to Phoenix. My wife was expecting a child. So where did she want to be? In (LAUGHING) West Lafayette, where it gets really cold? Or in Phoenix where it gets really hot and where parents are and she had some family? So that was a very simple decision. We went there to go to what we thought would be there maybe five years, to finish up, get a PhD, and then go on and teach somewhere.

MAGED DESSOUKY: So you went straight to your graduate school, right after undergraduate?

STAN SETTLES: Yes. I did, but I did it in a different way. It seems typical to my life. I also needed to work. I didn't have any great financial support. So I had to work.

At that time, there were only really two places you wanted to work in Phoenix-- Motorola, and what was then called AiResearch-- Garrett AiResearch. Garrett called first and they said they had an opening as a design draftsman. OK? Hourly design draftsman, starting on a drawing board.

And I had the neat experience there of getting involved in a brand-new product. I started on other things, but a brand-new product came along which was called a jet-fuel starter. Basically a full gas turbine engine about this long, weighed under 100 pounds, put up about 150 horsepower. And it would start the main engine on an aircraft.

So a fighter aircraft, on a very small battery and starter, you could start this up using the same fuel it did. It could be anywhere in the world. Didn't need any other support to start it.

So I got see that from the time it was on the drawing board, to start with. And then there was a group-- as we called them, the project engineering-- to work it. So I went and talked to one of the bosses. I said, well, this is now getting from the design stage into the really the hardware and program management, as we'd call it. Would we consider letting me move over with that? So I did.

So I was still very junior. But I was also going to school. So they knew I wasn't going a dude that was going to sit there on the drawing board for long term.

MAGED DESSOUKY: So, at this time, you worked for Garrett, which, at that time, was a pretty large engine manufacturing company. Would you say it was one of the-- was it a Fortune 500 company, at that time, or--?

STAN SETTLES: It was Garrett corporation. It probably wasn't at quite that level, but it was right below it. It was a big company. Had two main locations. One was in Torrence, and LA-- and then I'll talk about it later, but-- and Phoenix ended up being the larger one.

It ended up going into the engines, had auxiliary power units that were-- like, to provide the power when you're in aircraft. You have air conditioning and that kind of thing. That's usually an auxiliary power unit that does that, at least in the start of it. So we made those.

We also made the starters that start the main engine. They're air-driven. So I was in that group. Then this one product, though, was just really unique. And it gave me an experience I could understand. I couldn't necessarily design the whole thing. But I could understand pretty well everything did in that engine, down to-- you have compressors and turbines, and you do a mapping, down there. You get on a dyno, and you map them so that they'll match right and not surge and all this kind of things.

So I got really involved in the bowels of how an engine works.

MAGED DESSOUKY: So what was your title, at that time? You mentioned "draftsman." Was your title--?

STAN SETTLES: Oh, no-- I'd move from that. I was now in-- I forget what the actual title was-- assistant--

MAGED DESSOUKY: Some kind of production engineering title? On that level?

STAN SETTLES: Project engineering was the label.

MAGED DESSOUKY: Project engineering?

STAN SETTLES: --but yeah, and I-- the titles didn't mean much.

[INTERPOSING VOICES]

STAN SETTLES: One of the fun things. I had IE degrees, and so on as an undergrad. And I was working on a master's in industrial engineering. And I heard two guys, one night, debating. Is he is he an aerospace engineer or a mechanical engineer? Because these are mechanical products-- aerospace.

MAGED DESSOUKY: Space industry.

STAN SETTLES: They were debating which I was. But I never said anything. Because they assumed so and my instincts were always towards mechanical products. And I was really at home in that company. So that was a neat experience.

MAGED DESSOUKY: So, in this stage of your career, you were basically applying industrial-engineering techniques and getting an advanced degree in industrial engineering techniques.

STAN SETTLES: Yes.

MAGED DESSOUKY: Could you elaborate more on some of the IE techniques you were using in your job?

STAN SETTLES: Yeah. You're using the logic of it, more than the actual application of what we'd call our tools. You're using that logic you learned about how you optimize things, and so on. But there was really a disconnect, in a lot of ways.

It really gets into what my experience was at ASU. I had two professors who co-chaired my PhD program. One was Charlie Hoyt, who had graduated from Purdue. And he did his PhD when he was about 51 years old. He had his own screw-machine factory for about 27 before going back to school. So he was really the hands-on, practical, management guy and was enthusiastic.

Another one - you and I have a very common tie, there in Alan Prtisker who was probably the leading researcher in industrial engineering in the country and maybe in the world. So the two of them were an interesting contrast. Trying to satisfy both of them. It turned out really being a blessing. Because it forced me to develop some rigor in the OR kinds of subjects. But at the same time satisfy Charlie, OK, that you can manage things.

And I found myself in a strange world. Because the folks in the industrial setting, particular where I was migrating to, more to the manufacturing side of the world-- I was a great theorist. Well, the academic side, you're-- man, you're really the applied, hands-on guy, here. What are you doing here?

MAGED DESSOUKY: So you were probably in the middle, then.

STAN SETTLES: Well, that's been my life-- that way, exactly. That I could understand a lot of the theoretical material. And yet I was dealing-- by being in the company, I was forced to understand the real problems and not necessarily apply the tools I'd learned. But that way of thinking influenced me a lot.

And, of course, as you know better than I-- I believe you worked for him, before we ever met in the academic circle-- worked for Alan Pritsker. And he was really demanding, very bright, and so on. And at that point he was-- really had invented and was really in the creating stages of GERT networks. These are probabilistic networks, as you recall.

And they became a way of thinking, for me, that-- OK, they really characterized, in a lot of ways, my career. I can identify with these decision nodes, where you have alternatives with probabilities. And you take some, and you don't take others.

And really a career that I've characterized, in a light-hearted way, as kind of a lily-pad approach to finding your career. And I know the Harvard Business School and all the results say, well, if you know exactly what you're going to do and have written goals and so on, that's how you come out on top.

That was never the case. You can tell from the background that I didn't have that in mind. But I had a number of opportunities that came along my way.

So, in the company-- again, I was going to graduate school to get a PhD, go teach somewhere. And my intent was to be in Phoenix. It's hot there, in the summer, and--

MAGED DESSOUKY: So you start off as a masters, and then you continue--

[INTERPOSING VOICES]

STAN SETTLES: Master's and PhD and-- yeah. The intent was to get the PhD, all along. And I wanted to teach.

MAGED DESSOUKY: So you went straight to thinking about PhD with an academic career in mind?

STAN SETTLES: Yep. Exactly.

MAGED DESSOUKY: And, in the meantime, pick up some practical experience at Garrett.

STAN SETTLES: Well, and make some money!

[BOTH LAUGH] So, yeah. And it ended up being an interesting experience. One day, Alan Pritsker calls me. And I was a full-time employees there. He says, have you ever consider coming to school full-time for a while?

And my response was, I think you're calling the wrong person. I'm the guy that's married -- got a couple kids at home, now, and need to feed them. He says, no I know exactly who I'm calling, (LAUGHING) as you would expect. And what he actually had in mind was various financial deals to where I could afford to go to school full-time for a couple years.

What I worked out with the company was something that wasn't in any of the policies, and that was to work 10 hours a week, keep my seniority and benefits intact, and then be a full-time student, and was a busy, busy, busy time. But it really worked out, again, to be a neat blend of activities. That's when moved from engineering to more of the manufacturing side of the world. And so I--

That's where I developed some real mentors in the company. Early on, a fellow by the name of Fred Litterman was temporarily the manager of manufacturing. But, he was a financial guy, by background.

So in that, I got to understand the finances of that division. How the accounting system worked, and what it meant. And very few people outside of Accounting really understood it.

You say this part costs $77.39. And you say, how did you get that? Well, you had rates that you applied, and all this.

Most people say, well, that's absolute, as a number. It's not. It's the number you want to be. And you have an accounting system that really is based on cost recovery. And cost recovery-- we had

military and commercial customers, so it's based on what the military does. And you want to maximize that.

So I came to understand exactly the nature of the business from a strange source. And I was one of the very few guys outside of Accounting and Quotations that ever really got to understand that. Because i kept probing at those kind of questions. This Fred Litterman was asking me to do things.

And they finally said-- I won't use their direct language, but-- well, darn it. You're going to keep probing and put the pieces together. Why don't we just take you through and tell you (LAUGHING) exactly how it works? And far as I know, I was the only person outside of Accounting and Quotations that ever got that introduction. And boy, that served me well.

MAGED DESSOUKY: So you went into the manufacturing role actually being involved with the numbers - financial numbers. Which kind of distinguishes yourself from probably most other manufacturing engineers in the company. Where they really didn't have any experience or background in some of the financial background that most industrial engineers, operations researchers get involved in.

STAN SETTLES: Yeah. And a very, very simple tool we've talked about many times. The engineering economy. I remember one of your quotes. I won't use it in this interview, but I loved that course. And I took it from Alan Pritsker.

So, needless to say, I had a rigorous course in Engineering Economy. And what I could do, in those days, was a very simple thing. I had an IBM punched card deck. I think it was about 22 punch cards. And I could consistently put in some data, and I'd get the rate of return calculation and get the same answer every time.

And at that point, most people were doing that by hand. And they were doing some of the darnedest thing. So management didn't trust their numbers.

So here I was, I was in my upper 20s, and all these people probably paid about four times what I was paid, had to come to me to get their numbers blessed.

[BOTH LAUGH]

So that became kind of funny. And one time, someone came in and referred to me as the guru of Engineering Economy. I said there's no such thing. [LAUGH]

But that became a tool that served me well. A very simple tool. Quantitative, certainly. You had to understand it. But it's basically high school algebra that you're involved in. And, yeah, the way we do it theoretically, in a course, we'd get a little calculus involved in it. But it's not necessary in the factory.

So that served me extremely well, to get known in there. So then I got into this-- I was in this part-time role, then.

MAGED DESSOUKY: And you're doing this 10 hours a week, if I remember.

STAN SETTLES: Yes, 10 hours a week.

MAGED DESSOUKY: --the special deal you had with the company?

STAN SETTLES: Oh, yeah. And there was nothing in the book said you could do that. The one mentor up in Engineering, Bob Von Flue, understood what I was telling him. He said, well, he's a guy we'd like to keep in the company. So he did the blocking and tackling to get it done.

And I did my 10 hours a week for almost two years. A little short of that, as it worked out.

MAGED DESSOUKY: At the end of your dissertation, working on your thesis, during that period--

STAN SETTLES: Yeah.

MAGED DESSOUKY: --I'm assuming.

STAN SETTLES: That was the main thing.

MAGED DESSOUKY: So you were working--

STAN SETTLES: I was also teaching, part-time

MAGED DESSOUKY: Oh, so you were teaching part-time, writing your dissertation, and working 10 hours a week, while raising a family.

STAN SETTLES: Yeah. So I gave up golf and TV.

MAGED DESSOUKY: And everything else--

[INTERPOSING VOICES]

STAN SETTLES: I have not gotten back to gold. TV, a little bit, now-- now that I'm emeritus, which is my favorite part of the label.

STAN SETTLES: But anyway, during that time, I finished my PhD And obviously the reason for that was to go into academe full-time in an academic position. I went around the country and interviewed a number of places. I think I interviewed at six different places and had five offers.

Interestingly enough, the one I didn't get-- because I was really not a match for what he was looking for - was Wisconsin, where Gerry Nadler was. So this was '69. That's when he and I first met. And we'll talk a bit more about him. He's certainly one of the nodes in that-- when I draw the GERT network of my career.

So I had these offers. And the highest offer was way above what I was making in the company. Because you hire on at a bachelor's degree, and there's just a normal progression. You don't keep up. The old rule of thumb. Every five years and every degree, you should change companies. People did that, and it served them well.

So I went into-- there was a guy named Roy Ekrom, who was probably my prime mentor in that company. He was the-- they called it "director," then, of manufacture and operations, but later they called it vice president of operations. But anyway, he was running that. I went in to him and said "Well, Roy, I'm here to tell you I'm resigning. I'm going to accept an offer from a university. "Why would you do that?" I said "Well, that's why did I did the PhD But, as an incidental, here's what they'll pay me." "Oh."

Next day, he came back. And he says if we pay you this much, will you consider staying? In one day, it was a 42% raise. Which I've never heard of before or since. But it said-- it said ha. Maybe I'll look into this. And I said yeah, I'm your guy.

MAGED DESSOUKY: Did they, in that time, change your nature of your job? Or was it going to be different?

STAN SETTLES: Well, yeah, I really came back in-- my role-- most effective role, in a lot of ways-- was to be an advisor to management. And to develop some rules, there, for how you run a group like that. At that point, there were all kinds of groups that were doing OR, MS kind of things that were advising. But they'd have to go out-- sell their services, and so on.

There's one large one-- I won't name the company, but-- in Phoenix that had over 30 people in an OR group. And the only conversation they would have with me is what tools are you using? Are you using quadratic programming? I said, for what?

So my orientation was always, what is the problem to solve? And then I look for the right tool, which-- obviously an analogy to working on cars and such. You say-- well, if it was a bolt, I don't need a screwdriver, I need a ratchet wrench, or whatever. And so the same thing I find that analogy there. Is that we were oriented to what the problem was.

And we developed a rather neat deal. Again, Roy created the neatest group we had, it was only a handful of us-- five of us. Four of us were PhDs. One was-- the smartest one out of the whole group just had a Master's. All out of ASU, and people I knew. Well, they weren't all out of ASU. Debbie Seifert, as you know, and think you remember her – Nightingale now. Anyway, they were around me.

And we basically got to control and change the way they thought about manufacturing there. They had about 450 industrial engineers and manufacturing engineers. To my knowledge, there wasn't a single degreed engineer out of that whole bunch, when I came in. So I never was introduced as Dr. Settles. I was always "Stan," in those days. But fundamentally what we did is we controlled how you used the mainframe computer for manufacturing. Again, the tool that drove everything you did. So we changed the way they thought about that.

And during that time-- Debbie was particularly good at it-- we got into using simulation. So Debbie and Tom Hill and so on, we used simulation and in those days wasn't what it is today. We'd go in with an 8 inch stack of paper. We never had to turn a page of it. Because we could tell them, well, here's what this says. And so they developed a trust in people like us. That's when they realized they didn't have that technology. We had it. And they'd listen, and we changed what happened, as a result.

Roy was a very bright guy. And he loved being the leader. So he was an interesting character, because he was so definite. And we called him "Big Roy." That's because he stood about 6' 6" and he was a former basketball player-- University of Washington, and so on. Just really fit kind of guy. And he always wore this pinstripe suits, so he looked about 7' tall. But he was only, as I say, about 6' 5", 6' 6"-- whatever-- "only."

He had such a dominant personality, that most people would never question him. And I was able to develop a relationship with him where I could do so - always one on one. Typically late at night, when things kind of calmed down. On several occasions, I talked to him. I said here's something we're doing. Doesn't make any sense to me.

And we'd get into a serious discussion, he'd really argue the opposite and whatever. And I said, well, you're the boss. But I said, that's what I think. And he never, ever agreed that I was right and it should change, but it changed.

MAGED DESSOUKY: So you were using the results of these simulation models?

STAN SETTLES: We were doing that.

MAGED DESSOUKY: --as a basis to make change?

STAN SETTLES: Yeah, we are using that to make change. But we're also using something that's unusual in OR, MS kind of application. That is common sense. To say, OK, how does this balance with what we're really doing?

So that whole experience of being in the university and getting into the theoretical things-- at that time, you couldn't get the data to satisfy the models. And I had some people from another part of the university come out, when I was in those kind of roles. And they wanted to optimize-- they wanted us to support them for research.

There were going to optimize the two-machine, three-job, job-shop scheduling thing. And I said, well, how about the 100-machine, 600 open orders that you have to schedule every day? Oh, well, that's not even possible, they said. Let's go walk.

I could learn to walk them about 300 feet, out there. We're in the middle of a factory. Here's people-- high school education, maybe, doing that, every day. So give me the connection of how we get there. And, of course, in those times, there was no way you could do that. Nowadays, you say, OK, that's a piece of cake.

MAGED DESSOUKY: Well, back then, scalability-- and it's still, today-- scalability's always an issue.

STAN SETTLES: Oh, yeah. Clearly is. And we'll get to some of that later on. But it gave me kind of a unique existence of-- and I characterize-- I'm always in Never Never Land. The industry people thought, boy, he's a real theoretician. Academics? "Why is this applied guy here?" It was kind of a trade-off. But a real blessing to have that kind of background, along with the reality of the company.

And Roy became my mentor all along. And another guy worked-- [INAUDIBLE].

MAGED DESSOUKY: [SNEEZE] Excuse me.

STAN SETTLES: The interesting thing is, at a very young age, they were trying to push me into management jobs. In some of the strangest conversations they weren't ready for, they were talking to me about being a department head when I was 29 years old. Would have been the youngest ever in the history of the company.

MAGED DESSOUKY: This is right after your PhD?

STAN SETTLES: Yeah! And I said-- I said I'm doing things that-- you don't have anybody else that can do them. Meanwhile, here are people that have been in that materiel department for years-- particularly Les Wills. I said he's way better at that job than I am. And so they weren't used to an answer like that. People were usually clawing to be in that.

So Les went into that, and he became another of my mentors, really. Non-degreed fellow from Oklahoma. Grew up on a farm out there. He had the common sense that was just amazing. And had people skills-- you learn a lot from. So those two were mentors all along in the company.

And later on, they did-- I didn't get a choice. I was pushed into various management roles. And the big one came. I was running industrial and manufacturing engineering in Phoenix. All these engineers in the development shops and so on reporting to me.

That's how I got to Southern California. You mentioned earlier, I got over here somehow. Torrance, California. Garrett then had two major divisions. There was Garrett AiResearch in Phoenix and Garrett AiResearch over in Torrance.

They got into a bit of a quality system problem, over there. This was 1985. And the corporation had been in there fixing things for about a year. And it wasn't getting any better.

The quality of the products was never in question. But they had a mentality that said engineering can make one of something, and that's success. And then we'll buy all of them on exception. So they'll make a judgment call on these units and say, yeah, that one's good; that one's not.

Well, the rules by the DCAS military say if you buy the exception three times, you have to change the blueprint. They weren't doing that. And that, along with several other things was the fundamental problem.

And the crowning blow was a funny one. We have DCAS, which was the military buyoff. So as long as you have some military, you have them in control of what you do in the shop.

So after we were already under a lot of surveillance, one of their representatives stopped in our penetrant inspection booth. He comes in. There's a nice, big sign posted in there, saying "no food or drink in this area." So he walks in.

Here's a guy with a doughnut and a coffee, sitting over on his side bench. Well, you can imagine what an inspector mentality does with that. He says, this is your sign. Why is this here?

The guy didn't give the best answer. And I'll quote it directly. I'm sorry. He says "None of your damned business."

MAGED DESSOUKY: [CHUCKLE] Rules don't apply to me, is what he's basically saying.

STAN SETTLES: Yeah. Got to be the dumbest answer ever given.

MAGED DESSOUKY: Right.

STAN SETTLES: Well, you can imagine what happened then, because everything escalated. So when I got there, to solve any kind of a quality problem it was being solved at the level of the division president. The company, at that point, had about 5,000 people in that division. So the president was meeting with an Army general downtown from the DCAS to solve things.

And he was down there several times a week. He'd drive from Torrance downtown to meet with a general who was based at the LA air base.

MAGED DESSOUKY: So really, from the airport to downtown LA.?

STAN SETTLES: Yeah. But the division was actually headquartered down in Torrance, at this point. We still had the manufacturing by LAX. I'll get to that in a minute. But anyway that's what they were doing.

So my role was very quickly to get to know a major who represented them on the same quality. We had a quality manager whom I happened to know - he'd moved over from Phoenix some years before. I'd just come over from Phoenix. I didn't know the products or anything, at that point.

I got the three of us together. I said, every time they go down to LA to meet, we failed. And they said “what”? I said - If we can't deal with it here, at our level, we've failed. Hmm.

So we made a point of being seen together all the time. We'd walk the shop together. And that's something I picked up from Les Wills, one of my mentors. Walk the floor. They'd never seen a vice president on the shop floor.

I was the vice president of operations, at that point. Came over to consult about how to fix it, to start with. And then they said, no, you stay and be a vice president.

Again, one of the funniest conversations ever. No, I've got a good job in Phoenix. I don't want to do that. I'm an analyst. I'm not ready to kick tail and take numbers, and so on. That's not my style.

It finally became clear to me that what I wanted to do didn't matter. They'd decided I was the guy to do it. And I look back. My estimate was that that little quality fiasco, those two years, cost the company something like $200 million, in 1985 dollars.

MAGED DESSOUKY: We're talking real dollars.

STAN SETTLES: Yeah. And those are real. And so you look at that and say, well, what I did-- if you felt I could make some difference in that, you say, OK, I'll go with that. But a strange conversation, again. I said that's not what drives me. I'm more of the analyst. I prefer that to advising people. But I say, OK, I'm a vice president of operations, at that point.

MAGED DESSOUKY: Did you think at a vice president of operations level you were able to get into the details of solving those quality problems? Or were you able to hire the right people, at that time, to make that change?

STAN SETTLES: Well, clearly you have to do both. I look back. I would have been more effective if I had not worked long hours. My family my family was in Phoenix. And my wife and I got together each weekend in either in Torrance or in Arizona.

That's when I first learned how to live in two places. Because I had a place in Redondo Beach, there, right on the beach. So I was over here alone and would spend - short days were about 12 hours. A lot of the time, it was 15, 16 hours. I'd have been better off if I'd stuck to about eight or 10 hours or something like and forced more of it to be delegated-- when I look back.

But again, my OR and MS, IE background did help in understanding the nature of the problems.

MAGED DESSOUKY: Problem-solving nature, that kind of thing. Yeah?

STAN SETTLES: I still remember a conversation I had that I'm sure went through that company real quickly. A guy came in and says, well, it looks like you used to be an engineer. I said, no, I <u>am</u> an engineer. This is my job, now, but I am an engineer. Ooh.

And when you're a vice president, everything just goes boom. You can say something, and they just immediately pass the message along. Because they weren't used to seeing a vice president walk the floor over there.

And it was a strange feeling. Because that wasn't my nature, either. But I knew from Les Wills that that was the thing to do. One incident in all that was, at that point our factory was right next to terminal 1 at LAX-- right across what's now a ramp there nowadays is Park 1 parking lot.

Ever since I was in the company, they were determined to close that and sell the property for a hotel or some other use. And I got into there, and we literally had a factory that would not make the parts. It had been created in the '40s and hadn't been kept up. And so we were saying, gee, we have a quality problem. Well, we have a quality system problem. And most manufacturing quality problems start in engineering. They didn't like those words, because they thought they were wonderful in engineering.

But anyway, we got into that. Again, I met Roy. Roy, at this point, was the corporate vice president and Sector President for Aerospace. So all the Phoenix and LA operations and so on reported to him. But he was still the same guy. And I could talk to him.

And he was my boss's boss's boss, or somewhere in there. There were several people in between. So I shouldn't even have been talking to him, in the normal structure. But I knew him.

Still remember one night I was in his office up there by LAX. I went in and said, well, Roy, you taught me in Phoenix how we can do things. If you're vice president of operations, you can work on a modernization plan of the factory.

I said, in this place we can't make the parts. There's two answers. One is to really close this down, make use of the land we have down at Western Avenue, and make a deal on this property. I can't do that as manufacturing vice president. But what I can is set about modernizing the factory. So that's what I intend to do. Again, one of those classic deals where he never agreed that that was right. But you could actually trace from that day forward, that factory was gone and was sold. Turned out to be a parking lot.

The thing that we were concerned with was environmental impact. When you build a factory in the '40s, you didn't have the same concerns.

MAGED DESSOUKY: Sure.

STAN SETTLES: And now I can talk about it. I couldn't talk about it then. Right across from terminal 1, probably 200 feet from where--

MAGED DESSOUKY: Which is the Southwest terminal, at LAX.

STAN SETTLES: Yeah, and US Air, as we now call it. But anyway. And I could actually part in my reserved spot there at the factory and walk into terminal 1.

But anyway, right across there was what we called the Boom Boom Room. So we had all kinds of things that were literally explosive that was right in that area. And how that existed at that time, I have no idea. But things that were really very dangerous, but we never had an incident.

And then the whole environmental cleanup ended up not being near the problem everybody anticipated. So it was a win-win. But it set that whole thing in motion, again, by that conversation.

So kind of some fundamental rules that came up in how a group like that worked. And I served well. Again, Roy, as we established the group, he said, you guys-- here's what I want you to do. You're kind of the think tank-- do things, and all.

He says, one rule is you can't go out and sell your services. Lot of these groups, that's what they spend their time doing. They'd spend the majority of their time selling. OK, we can do this for you. He says, you can't do that. Well-- he says, I'll do the selling. I said "Perfect."

And rules I developed along with that is we can't take credit for what we do. You and I know what PhD engineers are like. The bulk of them, particularly in academe, that's the primary result. OK, we get credit for it, and we get tenure for publishing this, and that's what it's about.

And if we did that with anything we did, we owned it, rather than the operating people. So operating people got credit for doing things that they didn't even know happened, at the time. [LAUGH] And yeah, yeah, Max, good move. Well, Max didn't even know it was happening.

But again, you had to have a boss that was that way. And there were some fundamental rules. We always had that kind of backing and the OR kind of background in our set of tools. Simulations, as I commented before, is the only one we've used directly.

MAGED DESSOUKY: So now may be a good segway to discuss kind of the contributions that an OR person can do. Clearly, our profession has a list of pioneers who I would say have made fundamental contributions. As you mentioned, Alan Pritsker in the field of simulation, George Dantzig in the field of linear programming. What would you say have been your fundamental contributions to the operations research industrial engineering profession?

STAN SETTLES: My fundamental contribution came in the application domains. I did the research and could have gone on-- got into an academic position. I think done well in the traditional way. But a better mix was this kind of in-between role that's hard to characterize. But by applying it, letting people see the results from what we do, rather than developing the tools themselves.

I have a deep respect for the people that do develop the tools-- the Alan Pritsker, and you talk about Dantzig-- some of these kind of people. And it's an interesting-- again, it characterizes what I was. The in-between kind of role of being a theorist in one group and an applied person in the others. But being able to bridge those, I think, was the main contribution.

And that's what-- I was very fortunate, while I was still in industry. I got elected to the National Academy of Engineering. I said, how in the world did that happen? Well, it's about 2,000 members nationwide that are US members of it. You have to be elected by them.

It's partly a competence deal. But it's really also very much political process. You have to know the right people. So the blend was interesting. I didn't know it at the time. And I didn't campaign for it at all. I hardly knew what it was. Industry people didn't know what it was.

But I later pretty much deduced who the players were behind it. But it was a combination of academic folks that knew me professionally, through particularly industrial engineering profession. And also people in the company that were members of the NAE. And I think I've got it figured out, who they were. Some names that you and I would both recognize. But I wouldn't say that I'm not supposed to know, but I deduced some of that.

Again, the combination is what led to that. I had the advantage of being from industry, at that point. So it's easier to get elected there, very simply. Because they seek pretty much a 50-50 balance between academe and industry. And there's all kinds rewards in academe for being elected to that, as you and I know.

Industry doesn't even know what it is. So literally I didn't know what it was when I got the letter. I can still remember exactly where I was standing in my house in Tempe. I got this letter. Hmm! I think I know what this-- I think I can figure this out. That's pretty neat.

MAGED DESSOUKY: What was the reaction-- did you bring it back to Garrett? What was their reaction when you said, I just got elected as the National Academy of Engineering for my contributions here at the company, applying operations research and industrial engineering?

STAN SETTLES: Well, I could get their attention a little bit, because there were significant people in the company that were NAE members. Mary Good was from the chemical side of it. And normally somebody in the turbo business wouldn't even know her. But they had these technology meetings. And for some strange reason she and I became pretty good friends out of that. Because she was really neat.

She was particular into ceramics, at that point. And so everyone was saying how ceramics wouldn't work in turbo machinery because they were fragile and they'd break, and all. And she could just-- there'd be a meeting of 200, 300 people-- this technology meeting. She'd speak up and say, well, you have a paradigm of designing for metals. And does that need to change? And so you could just hear a pin drop in the whole thing.

I was one that-- for some reason, we became pretty good friends. John Mason was a member, and he was the chief engineer for Garrett. And again, he and I became friends through various roles.

And so for people like that it was meaningful. My boss at the time was Mal Craig, who's one of the really neat guys I worked for. He was a West Point graduate. And really a marketing kind of guy.

And I had a role. I was director of planning for that division. Which nobody knew what a director of planning did. They created it to that point, but the corporate structure said, we need

one of those in each of these major divisions. I said, well, what do they do? And they said, we don't know.

MAGED DESSOUKY: Just do it.

STAN SETTLES: Meanwhile, in Torrance-- Mal was back in Phoenix-- I said I'm coming there. This was after we became a part of what now is Honeywell-- was Allied Signal, headquartered in Morristown, New Jersey. So, again, Big Roy had me lined up to go interview back there as what would have been a corporate either vice president or director for planning at what's now Honeywell.

And I visited New Jersey for a couple days. [LAUGH] And I said "Not for me." And again, the corporate life at that level is just so remote. I just said, nah-- it was a whole new setting.

I'd just come back from that trip. And that's when Mal Craig called me, over in Torrance, and he said, well, here's what we're doing. We don't know what it does, but each of us have to have one. So I said, I'm your guy, Mal.

That's when I went back to Phoenix, then. And ended up in really an interesting role. Because he was a salesman. He was the boss. He was the president of this division. At that point, about 6,000 or 7,000 people-- something like that. Big business.

And he needed this director of planning. But I was a manufacturing guy, doing that. And I got into things-- talking about mergers and things like that, with him, because I had that manufacturing background. And I was the only guy cleared--

At that time, we were talking about merging the businesses of the small engine business with-- well, I can say it now-- GE. We were secretly meeting with the people from Lynn, Massachusetts, and so on. Our vice president of operations didn't even know it was going on. He wasn't cleared.

Again, you develop the trust, and you develop the way of logic. Did that involve OR? No, it involved forecasting quantitative things, but not that.

MAGED DESSOUKY: So it seems that your fundamental contributions at the company which led to the NAE was this application of the tools into this advanced manufacturing setting. So I'd kind of like to have your views, now, at this time, between the trade-off between tool development and the application of such tools, and what's your viewpoint on that.

STAN SETTLES: Well, again, I commented before, I have a very deep respect for the people who develop the tools. Some people think, well, as an applied guy, you don't-- I have a deep respect for that. I think the tools need to continually improve. But you need the common sense that also says as they're improving, how could I use them?

Again, back to the quadratic programming deal that that group was talking about. And they were just enthralled with the tools. They were gone within a little over a year.

But understanding what you can use and can't use and where you can get the data. It's a balancing act that you can't always quantify it. But you need to have the understanding of what's coming along with the tools. And the tools, of course, since those days have gotten way better.

MAGED DESSOUKY: This might be a good time to talk, because we've been using the term "industrial engineering" and "operations research" kind of interchangeably. But they're are quite distinct professions. I mean, there are operations researchers in IE departments, and there's operations researchers in, say, business--

STAN SETTLES: Business schools.

MAGED DESSOUKY: business departments, schools. Even math departments. And what's your viewpoint-- could you see a clear distinction between these two fields?

STAN SETTLES: No, I really see them blurring. They're clearly the specialty the-- OR-- one person's definition of OR is not always consistent with others. Some of them think it's strictly the very theoretical development. Other people would say, well, OK, linear program-- that's OR. And I'd say all of that depends on your setting.

That's not. I find that those definitions aren't necessarily helpful to me. And I find industrial engineering, management science, OR, and even systems engineering-- that there's a blurring there. And you somehow have to-- whatever you call it-- make it make sense for the setting you're in.

STAN SETTLES: My transition, after I'd been in the company 30 years, and got an opportunity to retire early, back in 1992. I was going to retire when I turned 55. Couple of years later, anyway, there was a big slowdown. So there was a good opportunity to get out with the same financial package as if I stayed two years later. I said, well, goodbye!

That's when I went to Washington. I was officially on the faculty at ASU. And simultaneously I was involved with the National Science Foundation and the White House OSTP-- Office of Science and Technology Policy.

MAGED DESSOUKY: And who was the president, at that time?

STAN SETTLES: I was in at the end of the Bush administration and the first couple months of the Clinton administration. So I was there when they "transitioned"-- so-called. Which is not a transition at all. It's close one set of books and throw it all away. And you people have been fouling up for 12 years. We don't care what you did. That was a direct quote. The guy who said that lasted as a presidential appointee, who succeeded Gene Wong, who's the guy I worked for in OSTP. He lasted barely over a year, because he just didn't measure up.

But it was a fantastic opportunity, again. And whether you characterize it in OR or not, I think the background that way really did fit in. But I was unique-- again, we had all these various committees studying cross-cutting activity there. And they were doing things that had to do with

industry. Again, interestingly enough, automotive kind of things. Next generation auto program was going on.

And here was these committees that were people within the beltway. And out of all of them there, I was the only guy that had ever worked a day in industry. So it was just really a phenomenal existence.

MAGED DESSOUKY: And they were coming from either full-time government jobs or full time academic jobs?

STAN SETTLES: Both. Most of them were full-time government jobs. And so they were in the beltway, and they were used to the mentality that we're in the beltway; we know the answer, and we'll specify it.

And when I got there, the plan on that was to actually specify the next generation motor vehicle in Washington. And it was going to be lead-acid batteries, electric motors of the 1992 generation. Again, the systems thinking, as I call it-- you can call it OR. But we didn't have the tools, at that point.

I started asking. I was there only two weeks. And meeting with this committee, I asked the question, has anybody thought about the whole system? The obvious question-- lead-acid batteries, and you're recycling all this, and you have to generate the power somewhere. You've got the emissions, there. Has anybody thought about the whole system?

And this room was about 35 people in that room. And they didn't know. I was brand-new there, so they didn't know-- they knew I was from the White House, but they weren't sure exactly where I fit in. Room went absolutely silent.

Finally one guy at the back of the room said yeah, we've thought about it. We don't know how to answer it. Again, I'd only been there a couple of weeks. And interesting that if you ask the right question, you don't have to answer. If I'd have been there a little longer-- and particularly with we know now-- if we're a White House committee, and we can't either answer it ourselves or can't figure out how to fund somebody to get us an answer, who can?

But all these alternatives started bubbling up. Things that had been squashed because that was the answer. All of a sudden, clean diesel. Well, we know we have clean diesels now that are-- and all kinds of things. And inadvertently it led to hybrids. I think my role in it got us in that direction at least a year earlier. And maybe more.

MAGED DESSOUKY: This is in the role of being in the office of the Science Technology--

[INTERPOSING VOICES]

STAN SETTLES: OSTP. Yeah. At the same time, I was also an NSF program officer, so I knew the director of NSF well. And, of course, the assistant director for engineering, Joe Bordogna.

Knew him real well. And Gene Wong. And the combination of those two, plus being a member of the National Academy, really-- it was a neat role.

I didn't actually pursue that enough, from an OR standpoint. I look back-- and there's always regrets. Any of these branches you take-- to say, what would have happened if I've had done others? But that was one where, if we, particularly with the tools we know now of modeling, you'd say, gee, we can do better. It's still a really hard problem to deal with.

The latest one, I can't verify the research on. But if you take a Prius and a Hummer and say, which one is overall friendlier to the environment, turns out to be the Hummer. One study did. I can't-- I've never gotten to the core of it.

MAGED DESSOUKY: That's a very interesting finding.

STAN SETTLES: Well, again, when you think of a Prius, or-- I now own a-- I shouldn't say "I own"-- my dear wife of 54 years owns a Lexus hybrid. And when you start looking at what all is involved with that lithium ion battery, and all that system, the overall environmental impact is different than just the gas mileage.

MAGED DESSOUKY: Sure.

STAN SETTLES: Yeah, it gets phenomenal gas mileage, but whatever it is may not offset the other impacts.

Anyway, the thinking in that domain was kind of funny. But it was a neat opportunity. I was only there two years. But at one point, I counted up-- I was wearing about nine different hats, because I was so unique. Out of 1,000 program officer kind of people at NSF, I was the only one with industry experience that I know of.

Same thing with the OSTP part. We'd sit on the PCAST, which is the President's Advisors on Science and Technology. And sit in those meetings. We weren't participants, but some of them I knew-- Mary Good that was from the company was a member of that. So it was a continuum.

Really interesting role, for two years. And I could have stayed there. Particularly the NSF program office. Once the Clinton administration was there, I was-- as I say, about two months, because it nobody ever said you're gone, it just wasn't as interesting. So I just started going to the other office. And it basically was the most fun part of it.

Gordon Moore and the semiconductor industry people came to visit the White House. I was their host during that time. Spent half a day with him and didn't know that much about him. Just a neat experience to have seen somebody like that firsthand and realize that he seemed just like your neighbor. He's just a neat guy. Worth all these billions of dollars and one of the great creative minds of that industry. Because you'd have never guessed it in that meeting. Just a neat guy.

So that was a fun tour of duty.

MAGED DESSOUKY: So that's how, in some ways, now, you finished career one-- captain of industry, vice president at Garrett. Two years at phase two, which is basically in a high-level position in the Office of Science and Technology. And also your NSF program. Now you're beginning your phase three, which obviously-- [INTERPOSING VOICES]

STAN SETTLES: Then I was wrapping up there. I could have stayed-- particular at NSF, I could have stayed on there longer-- whatever. I was just a rotator from ASU, there, when I was there. So that's how you get paid more. But I could have stayed, either in that role, or become a federal employee.

And I really enjoyed that. I wasn't a researcher, but I got to understand the research community pretty well. And gave a flavor to it that I think was unique. But at that point, I said, eh, family's out west. I want to go back.

And I had-- there were probably 15 different universities that expressed interested me, most of them in the southeast. And I didn't even consider them. I didn't want-- it really came down to two-- ASU and USC.

And Jerry Nadler had first contacted me when I was in the company, back in 1985. I had written correspondence from him. He was trying to get me to consider coming to come here, to be on the faculty. And I didn't do that, obviously. That's what I was in the role down in Torrance.

And so then, when I was getting ready to leave, it came down to really those two. And again, Gerry Nadler was behind it, Gerry Fleischer, who was a faculty member contacted me. So then my wife, in her usual manner, says, those people have been talking to you for about 10 years. Why don't you make up a decision-- either do it or not. OK?

So I explored it and came out and looked at. And again, it was sort of like when I got the vice president job (LAUGHING) down in Torrance. They didn't tell you everything up front. That, down there, they had fired the purchasing manager the week before I came in as vice president. And said, oh, by the way, we fired him. And we had to fire 19 other people for conflict of interest.

But anyway, when I got here-- oh! We're down to three full-time faculty-- which I knew that was about the case. But I also found-- I was being interviewed by people all over the campus. Why is it?

Well, it turns out, as you know, there was a committee studying whether we do away with the department. It was down to three. It'd been up to around 10 faculty and come down to three. One was right here and had observed all of it, Behrokh Khoshnevis, who's still here. And Gerry Fleischer. And Gerry's of course, retired since then.

But the memo said if in fact me by name didn't accept the job, it would go to be folded into mechanical engineering. They didn't tell me that up front, that here's what's going on. But I go in and finally ended up with a copy of that.

MAGED DESSOUKY: Surprise, surprise, right?

STAN SETTLES: Yeah. Yeah. Again, it was similar-- you know, OK-- I said hmm. So then Len Silverman was the dean then. So it was kind of funny that-- ASU-- what they now have is a polytechnic campus, they call it. It's out east. It's more of the hands-on kind of things that in a lot ways fit me better than a research university. But it was just starting, and I would have been--

The guy that was the dean of that, at the point, was a guy I knew quite well. He happened to go to the same church in Tempe, and all. And really, really smart guy-- a guy you could trust.

But there'd been one guy in between us. And I couldn't see how that would work. And it was not a tenure-track position, either. So then I start talking over here. Strange conversations.

Leonard offered me a job-- if I'd agree to be here at least five years. But initially offered it without tenure. Tenure for its own sake doesn't matter to me. My simple question is, how you deal with making tenure appointments and recommendations and so on without having tenure yourself? Hmm.

I still remember, about a week later, David D'Argenio gives me a call, and he says, well, would you accept the same offer with tenure? I said I think I'll do that.

But times were different, obviously. Because at that point I was coming in - I was granted tenure, coming in. I was a department chair, because of the need. And I had zero refereed publications. Yeah. Today, you'd say, say what? At a university of this stature.

And I didn't know that much about USC, to be honest. I knew it was respected, mainly as a football power, like everyone still does. And I didn't even realize it was a private institution, which a lot of people don't.

I characterized it to kind of peeling the onion. You come back and say wow! What a neat opportunity. So then I signed up to be there five years. I was here 21. And that ended up-- obviously it said with my feet when it was important. It was a neat opportunity.

MAGED DESSOUKY: So what do you think some of the things you brought, unique-- you mentioned that you had zero publications. But there was obviously something about your background that made USC to make the decision to hire you as department chair. What do you think was unique about your perspective that you brought to the department--

STAN SETTLES: Well, I was really brought in for the leadership. To try and help be the leader to bring it back. As you know, we were threatened for accreditation. Before that, we'd had to show cause, even. Never had a full accreditation.

And so the dean was looking-- how do we get the leadership in the department? He wasn't looking for me to be the leader in the research domain. Because that wasn't what I'd demonstrated. So it, again, fit my background-- to say, I don't need the publications. I don't need the funding for summers that just messes up my time.

But as long as I was-- as you recall, when I was the department chair, I was there-- I was used to-- a job was full-time. You were there five days a week. That's what I was doing, in those years.

And again, we got the right people. We had a neat opportunity. We had Randy Hall, Diane Bailey, and myself, all at the same time. Two of us stayed-- Randy-- clearly very successful. Vice president of research, and all.

And so we had a core, now, that grew to-- I don't know. The present count is something like 15 to 18 full-time equivalent. That's a rather neat story, to say, well, we started from that base and grew.

And not just the numbers, but I think the quality has come along. We've added-- again, very heavily in the OR side. I like to get the balance that says you need all these kinds of things. Including human factors, which was never my particular area of expertise. I had a sensitivity to it. Do you need more of the management kind of focus? Do you need the OR, MS, whatever you want to call it? I think, to be a great department. And I think that's a struggle.

MAGED DESSOUKY: What do you think you brought in the first two years to really make the fundamental shift to get the department where it was a three to what you say now-- to 15 to 18 people? What do you think were some of the things that you did the first few years to make and drive that change?

STAN SETTLES: Well, I always go back to the basics. I can't fully describe my approach. I had one guy that worked for me in industry. And he was down a couple levels from me. But he says, I've been watching you and how you manage. He says, I don't understand your approach to management, but you seem to muck around in things and they get better. [LAUGH]

And then-- that's kind of what it characterized is a common-sense thing, again, that you get back to. And you take it a step at a time. And some of those steps-- it sound so easy, now, if you look back. But you and I know rather well, it wasn't easy. We absorbed people from ISSM. Well, those first few years I spent a great deal of time on that, because they initially wanted to put about a dozen people in our department. We were about six people, and they wanted to put all of them into our department.

Well, as one of our former colleagues said, he says, that's insane. We're going to vote to bring in a new majority to our department? And that simple line I used with the Vice Provost-- at that time was coordinating it all. So I got to know the provost, vice provost, all these people, as a result of that-- trying to figure out what they do with ISSM.

And it wasn't an academic thing. It was an economic thing. It had gotten to where it wasn't profitable. So it was a logical link to engineering or management. And the business school. And neither of them wanted it, because it wasn't making money. And so that's what really destroyed it.

There was a pretty neat operation to what they did. And I still run into people who were quite proud of that background. But rather than absorb all of them, we ended up with some that did

come over. Some of them were part-time. That's where we had Ralph Keeney part-time. One of the real scholars in the country, in that domain.

So that-- taking those a step at a time and dealing with them. And we had to deal with-- and they were compromises. They sound easy now. You go back to the discussions we had at the time-- who would you accept, what offers would you make, and you're making deals.

And I recall very much - Len was the dean. He'd give me orders-- you've got to go do this with the faculty. Faculty would say you've got to do this with the dean. And I'd have to sort that out.

You have to sort-- well, what do I go forward with, and what do I pass on down? And there were things he told me go do that I just didn't do them. And the faculty would have just rebelled if we tried to, in my opinion. So that's a risk you take. But also developed a relationship with Len that was really unique.

MAGED DESSOUKY: So it sounds like, in all these roles that you played, from industry to government to academic, is that job one was getting to know the people and getting to know what motivates them and gets them to do and work as a team, to get to a common goal. And at the same time having good judgment and instincts to know when to do what you're supposed to be doing and what you're supposed to--

STAN SETTLES: I think that's a good characterization of it. And obviously I've had things that weren't the right answer. And there were paths that I could have taken. I have no idea what they would have led to.

But yeah, I'd characterize, by and large, that somehow the collection of those decisions worked that direction and served me well in all those directions. In all three arenas. Industry, government, and academe. Kind of fun.

MAGED DESSOUKY: So it sounds like a very exciting and rewarding career. Do you have any last thoughts or suggestions you could give to brand-new operations research and industrial engineers as they embark on their career?

STAN SETTLES: Yeah, I mean, I kind of fell into it. But I think one of the key things is sort out, if you can, the right mentors in whatever organization you're in. Faculty, we have various mentoring things that sometimes are token deals. Others become very serious ones. You're associated with the right senior professor that helps guide your research as an assistant prof, and that alliance helps a lot.

In industry, the same kind of thing. But I fell into it. I didn't necessarily pick them. They picked me. And again - in this context, the OR, MS, IE kind of skills singled me out, that I could do some things that nobody else in that operations could do.

And so that's what led to-- really, the whole time I was in the company, had three primary mentors, as I mentioned. Roy Ekrom, Les Wills, and Mal Craig. Two of them have since passed away. I'm still in contact with Mal Craig.

I happened into those. I didn't go seeking them. But the situation just really led there. So if you can do that, if you can find the right students to work with in the academic setting that you get the bright students that can do the kinds of things that-- where it's a win-win and they go and it's successful, I think that's the most fun in the academic career. What do those people do?

And I even see that-- we're still involved, through the church, tutoring people. I tutor algebra. I've done everything from high school juniors to college people. I still do that. Because very few people can dealing with algebra. We think, you know, that's-- basic building block. And so that's some of the most fun, is you look back.

And a kid I tutored, in our program, there, in Long Beach, in a whole setting where people rarely graduated high school, he just graduated from college. But he was a kid I worked with way back when he was in elementary school. And you planted seeds. You're college material. And he was, and he did well.

MAGED DESSOUKY: So, in some sense, you've changed from these-- as you mentioned, these three people that were mentors. Now you're basically at this stage, playing the role of mentor to people, not just in the professional world but also in your everyday life that you get in your church organizations or whatever organization you are part of.

STAN SETTLES: Yeah. We found that is really true. And I look back, I never thought of myself as a mentor. But those kind of words were used as I was retiring here. And particularly with our church, there, in Long Beach, and activities there. There's, in a lot of ways, more attachment there than at the university. Because we got so deeply involved in that. These kids and what you're-- making a difference in their lives. And so that's kind of fun.

MAGED DESSOUKY: So it sounds like developing unique skill sets. And I think the key thing is you're right. One doesn't go out grabbing a mentor but grabbing that opportunity when it's there for you, right? When you see someone who's willing to be your mentor, grab it. Seize it. And use it in your career as you progress.

STAN SETTLES: I think that's well said.

MAGED DESSOUKY: And it seems like you've done very well, following those simple principles in your career.

STAN SETTLES: Yeah, I was truly blessed and blessed with a good family. A wife of 54 years, and four kids, 14 grandchildren, one great-grandchild, now. So we're having fun. And it's a neat stage of life.

MAGED DESSOUKY: Well, in that case, I will thank you for spending some time chatting with us.

STAN SETTLES: OK, well, I thank you for taking your time to do this.

MAGED DESSOUKY: Oh, no, it was our pleasure.

I. POSTSCRIPT (Settles' addition, not included in video.)

Since 2007 I have returned to landspeed racing on The Bonneville Salt Flats and driven as fast as 263 MPH. This experience led me to create a course entitled "Systems Engineering through Motorsports" where I used motorsports as a metaphor to teach students serious lessons in an enjoyable way. It was my way of reversing the usual learning experience. I led it 10 times before retiring in early 2015.