Martin Starr final

HENRIQUE CORREA: Hello. My name is Henrique Correa. I am the Steinmetz Professor of Operations Management at the Crummer Graduate School of Business in Rollins College, Winter Park, Florida. And it's really an honor and a privilege for me to have been invited to interview my colleague, my friend, my mentor, Emeritus Professor of Rollins College and Columbia University, one of the pioneers in the field, Professor Martin K. Starr. Thank you very much for being with us, Martin.

MARTIN STARR: It is an honor and a privilege for me to be interviewed by Henrique. He and I have a mutual respect for each other that transcends the 15 or 20 years that we know each other. It is a remarkable opportunity at this point in time to have my admired and respected friend ask me some questions to try and probe what I might remember about why I did different things.

HENRIQUE CORREA: Marty, to start with, if you allow me, I'll just recap a bit how we got to know each other.

MARTIN STARR: I would really like that.

HENRIQUE CORREA: At the end of the '70s, as a young student of production engineering back in Brazil, University of San Paulo, for me the Starr wasn't a person. The Starr was a book, an operations management book, the very first book I studied within the field of operations management. And I think this anecdote is interesting because it sort of illustrates how much influence you had and your works had around the world. I know your books have been translated to many languages.

And your work with-- and we'll discuss more about this later on in the interview-- but your work with the systems approach, I would dare to say that it influenced substantially the whole approach of production engineering in Brazil. The very first time I heard about the systems approach was with your book.

Then, later on, I became an academic, in part, of course, inspired by works of the likes of Dr. Starr. I became an academic, and I started going to POMS meetings. And then we got to know each other, we became friends. And eventually, one more interaction that we had that is absolutely life-changing for me was your invitation for me to apply for a position in Rollins College because you were a Professor Emeritus already at Rollins College. And here I am. So I think this is sort of illustrative of how influential your work has been in many countries.

MARTIN STARR: It's extremely interesting, Henrique. And you might, therefore, be really interested to know that why we kept running into each other at POMS meetings, and would go do things together, was because the way you thought about things appealed to me as an engineer. We have something in common that a lot of people in our field don't have, which is coming out of an engineering background. When you go to engineering, you learn to think about things in a certain way, which does very much emphasize making sure you have all the relevant parts in the picture when you're analyzing something to get the right solution.

I felt that you had a mind that was opening up to the kinds of things that I was thinking about, A lot of our colleagues are wonderful, they're very astute, they're quick thinkers. But they do not have the logical process of thinking about what else must be included. Do we have it all together, and are the interactions properly reflected? It's that which led to my saying, some years later, what a privilege to be able to invite you to come to Rollins College.

The fact is that Rollins College has excelled as a result of your joining the faculty. They certainly owe you many thanks for participating and coming from Brazil to be with us.

HENRIQUE CORREA: So Marty, in your early years, at what point did you find out about this field of operations management, operations research? Was it pre-college, during college, graduate school?

MARTIN STARR: Not a clue about it. I was heading toward an entirely different career. And again, it had an engineering orientation. I liked engineering. At an early age, I really was interested in chemistry-- although I never knew why things went the way they did-- and photography. Very involved in photography.

HENRIQUE CORREA: I actually know some of your work in photography.

MARTIN STARR: Yes, you do. And I thought I would like to become probably some kind of a movie maker. I did make movies. I still have some cans of some of the old films. But there was no real talent there. And nevertheless, it was all logical, building up to this sense of being an engineer.

As an undergraduate, I went to MIT. And I found immediately a class society. There were real opportunities if I went there as a mathematician. And so instead of opting for engineering, I opted to go with math. And I thought that the pecking order was such that if you were in math, you were kind of at the top of the list.

But my education was interrupted by military requirements. And so I was able to get into an officer training school for the US Navy and Maritime. And I went away. I left MIT after one year and went into the military, and I was there for a year and a half. Interestingly enough, I started out again as a deck officer, and changing as I went along to an engineering officer on my training. As soon as I was able to get back to MIT, I did do that, but I no longer saw math as the place to be. And I went into electrical engineering, and as an electrical engineer, I saw really great opportunities to do a cross-fertilization between electrical engineering and business. And so that's where I started getting an inkling about what was going on in the world of business systems.

And so I had no idea of going to graduate school at all. But I thought I'd make a pretty good engineer. So I went to work with companies, and the main experience that I had was with Yale and Towne. Yale and Towne was a lock manufacturer. They made everything from little padlocks to mortise locks that go into doors to huge bank vault systems. And I just loved those bank vault systems with all the intricacies, and the pipes going in and out, and the locking mechanisms and the timing mechanisms.

I served as a method engineer there. And that's where I discovered that my education at MIT had really zero applicability in terms of anything I had learned except the way I thought. And my time at Yale and Towne was very fortunate because I had a boss who said, you have the makings of someone who might know what he's doing. But right now, just understand you don't understand what's going on. And so we'll work with you.

I would go out and try and price jobs. How much would it cost to make this kind of a lock? And as I experienced what was going on there, I realized that these people who knew a lot about things-- they, for example, would design a new lock for a new application-- but they would say, what other parts have we made already that might be incorporated in the lock that we're presently working on?

So we'd go back and look at these walls of drawers filled with blueprints to see if there were some things that might be a way of saving money. And with parts that had already experienced fatigue testing, you didn't have to invest so much. I began to get an inkling about how you design a new product. That's when I decided I might go to graduate school.

HENRIQUE CORREA: Wonderful. Where did you go for graduate school?

MARTIN STARR: So I went to Columbia, which seemed like a really smart place to go. It was very convenient. And I wandered into the industrial-- well, let me start at the beginning. I wandered into the architecture department, and I said, I think I would like to become a designer. I wanted to design buildings and products, and products in buildings, and so forth. The Dean of the School of Architecture said to me, I've heard people talk about things like you are talking about; the systems, that you design inside a building should be reflective of how you design the building. He said, but we don't think like that around here.

And he essentially said, why don't you go over to the industrial engineering department and see some of the people over there? They have a design guru there, a guy who's teaching industrial design.

So I went over there, and I found out that the industrial design people were there, maybe, as adjuncts, and occasionally, say once a week, would show up for an hour to teach a course, had no interest, really, in doing anything else.

I talked to the IE people and said, I want to be a designer. I met Sebastian Littauer. He was my mentor there. And he said, we don't do anything like that here, but this is interesting. Why don't you become a PhD student?

HENRIQUE CORREA: And he was in the Industrial Engineering department?

MARTIN STARR: Really IEOR. He was interested mainly in quality control, statistical quality control. But the department had moved around him and was doing operations research. Is it beginning to get too tedious or boring, or should I continue?

HENRIQUE CORREA: No, no, no, no. I think it's very rich because I can see-- by knowing your work, I can see the seeds of what came later in each of these episodes. It's very interesting.

MARTIN STARR: Well, here's a kind of nice little anecdote. While I was going to school, I decided I really want to become an industrial designer. And so if I'm going to be an industrial designer, the heck with going to school and learning the kinds of things I'm learning here, which were statistics and human relations and things that IE departments were teaching, plus OR.

I said, let me get a job with a company like Raymond Loewy or Henry Dreyfus. So I tried to get into those companies, and they said, you're not an industrial designer. You have no potential for being an industrial designer. The reason was they really wanted artists, people who could sit down and sketch out a beautiful-looking product. I couldnt do that. All I knew was making sketches, doing blueprints, and having very engineering-oriented concepts for it.

So I began to recognize the fact that this was not going to work out. Sebastian Littauer and David Hertz undertook to deal with me. I was a maverick because, here I am, and the only thing I'm interested in is writing a dissertation on design. I did eventually write my dissertation on The Theory of Operational Design, which was how you should design products, and how you should design buildings, and how you should design cities, or anything else.

And it [my dissertation] was filled with things like information theory and stuff I was learning about from the operations research field, or at least they were part of the operations research field. My mentor, Littauer, said, the only way we're going to put you through a PhD with this crazy program that you're building-- because I did take some courses in architecture, and I took some courses in fine arts-- was if I would design a briefcase for him.

He said I have a horrible briefcase. You can't take an eight and 1/2 by 11 piece of paper and put two of them side by side. They have to overlap each other in every one of the briefcases. So I promised him that I would design a briefcase. That, fortunately, I was spared doing because I discovered one briefcase that was designed to fit two pages. But as I went along, I got more and more interested in operations research, and I found it very applicable to design issues. I wrote my dissertation along that line and decided I would consult when I graduated.

I went into consulting and was very fortunate because the people that I met were people who loved consulting, and I joined their firm. This was a firm that was actually formed by C. West Churchman and Sebastian Littauer and David Hertz. Unbelievable. It was called IMCA, International Management Consulting Associates. It took me all over Europe. And wherever I went [in Europe at that time] they didn't know much about operations research.

For example, I spent a couple of weeks with Philips in Eindhoven, except they didn't want me in Eindhoven because I wasn't old enough to be able to be considered someone who should tell someone something in Holland. You know, you have to be older and have more seniority. So they put me in Amsterdam. They would come to meetings in the railroad station, and I would tell them about operations research and how it was developing as a field.

Also I did consulting with Philips and with Monsanto in England and with Pirelli in Italy. All of these through the connections with this International Management Consulting Associates until I decided, I'm doing this consulting. It's great. I'm going to do it on my own. So I formed my own consulting firm, and I started doing. my own thing.

Meanwhile, I wanted to come home because I wanted to get back to Polly. I had been gone quite a while. And when I got back to the states, David Hertz said, what are you doing with your life? You're running around doing consulting. You need to be a teacher. And that was very influential. David Hertz then took me under his wing and helped me teach courses at the School of Industrial Engineering in OR at Columbia, et cetera.

HENRIQUE CORREA: Wonderful. During those years of studying, graduate school, would you mention people who had a strong influence on your thinking besides the fantastic people you already mentioned?

MARTIN STARR: Right.

HENRIQUE CORREA: Like Churchman and Simon. You mentioned to me these people before.

MARTIN STARR: This is the core of these people. At that time they were coalescing. Case Western Reserve was a real center for the development of the OR field. Churchman, Russ Ackoff and Len Arnoff were there. And Columbia was a good, strong second to Case.. They didn't have the strength. But people like David Hertz [were active]. Sebbie Littauer never wanted to be an OR guy. He was quality control from beginning to end.

But we did have people like Merrill Flood who came [to Columbia]. And we had others who would become visiting professors for some period of time, and a core of PhD students like Hal Rubinstein and David Sacks who were all doing PhDs in this new, developing field of OR when it hadn't actually been fully fleshed out as yet. Also, so I met Herb Simon at many of the seminars that we had.

And of course, I was just a student, listening and occasionally having something to say, but mostly not, and learning a great deal at the foot of the original masters of the field. And that was an incredible opportunity. You're lucky if you can get that kind of

HENRIQUE CORREA: Absolutely, yes. And Marty, you described some of your employment history here. Then you went to Columbia. When is it that you became sort of a full-time academic, or did you keep on doing consulting?

MARTIN STARR: I did. Consulting had the wonderful characteristics of being real problems needing honest solutions that were testable, and interactions with people and a variety of circumstances. I wanted to apply the knowledge that I had been developing from the industrial engineering, from the ORMS point of view. And so I continued consulting, [only] teaching when I would return to the states. I did this mostly in Europe. My consulting business really began to develop.

And then, actually, in 1959, I guess it was, IMCA got a contract, a very large contract with Yacimientos Petroliferos Fiscales in Argentina. And that is when David Miller and I went to Argentina as part of a great group of people who were redoing the basic systems of the Argentine oil company. And out of that interesting experience, meeting David, whose brilliance--

HENRIQUE CORREA: He eventually became your co-author in a couple of books.

MARTIN STARR: Well, the experience, actually, it started earlier because I didn't go into the fact that David Hertz eventually left Columbia and became the operations research manager of a company called Popular Merchandise Company, which was a mail order company that worked on a mail order club basis. David really was using OR in a very applied fashion. And David Miller was hired by David Hertz, as well as myself. I met David at that time. David Miller and I, eventually, both of us went to Argentina and worked for the Argentine oil company, YPF.

HENRIQUE CORREA: What was a typical project that you would do in Argentina in these experiences?

MARTIN STARR: We were given the task of redoing the entire inventory management function for this oil company, which prior to that, had been based on pressure to buy more of this or more of that with little side bribes of money and one thing or another. For example, they had warehouses filled with tires which were rotting because they only lasted so long.

We were given the scope of doing everything about inventory for this huge company. And out of that grew our book of inventory management.

HENRIQUE CORREA: Inventory management?.

MARTIN STARR: Yes, our inventory management book [was called]: Inventory Control: Theory and Practice. That was Starr and Miller.

HENRIQUE CORREA: I'm sure many people will find it interesting and fascinating, as I do, that you worked for Young & Rubicam at a certain time, which is an advertisement company. Can you talk to us about this incursion in the marketing side, in the advertisement side?

MARTIN STARR: OK. I'll get to this in one sec because I was consulting in Argentina. And Courtney Brown, who was the dean of the business school at Columbia, reached out to me and said, we would like you to join our faculty to develop an operations management program for us. We are right now using the IE department to do that for us, and your knowledge of inventory and things like that means that we could build it into our own business school, you and David Miller. So he hired both of us.

When we started, in, and that was when I actually decided that I could not, in all fairness, do inventory studies without understanding demand functions. And that's where the systems point of view began to emerge in reality, and I decided I would become aware of what goes on in market research.

All of a sudden, I got a phone call from Young and & Rubicam. Peter Langhoff, head of market research, called and said, C. West Churchman tells me that he has no time to consult with us on our mundane problems from day to day. But he said that youre a recent PhD and youll be able to do everything we need. He said, could you come by and talk?

So I did. I came by, and he said, I don't know what OR is all about, but I'm sure that it's something we need. And I said you've got the right guy, but you're going to have to teach me all about market research. Also, I've got to be involved in your decisions, and you could be involved in the OR models. I began to work with Y&R on the development of media models and consumer purchase models.

And I met a fabulous guy who was second in command to Peter Langhoff, and that was Bill Moran. Bill Moran was a market research genius. He and I really hit it off. He said to me, get to work on building models for things like how does a consumer work? So we built the Consumanoid model, which was a model that simulated the way in which people would make decisions about purchases. And of course, the quality of the product counted, for example, different levels of taste, saltiness in food products, etc. Or soap, how it felt and how it was shaped. All of these had to do with how you made it.

And I began to see production and marketing as being totally bedfellows where production needed market research to tell them what kinds of things would get them larger demand systems, and the dynamics of all of this, how it evolved over time, and how it interacted with price. Wow. That's how I got to Y&R. And Y&R and I had a long history together. I learned much.

HENRIQUE CORREA: Wonderful. Going back to Columbia, as you sort of described it. OR and OM were a bit split. Like the industrial engineering was more in charge of OR and the business school was more in charge of OM with your introduction of the OM discipline.

MARTIN STARR: Correct. Core courses. In the core, you would teach OR. You'd have about six months of decision theory and six months of probabilistic modeling of some kind or another, risk analysis, and so on. And in the business school, OR was considered a luxury which mostly you had to have in order to please some corporate people who were very influential. But they didn't really think you were going to be using it. Management was, at its heart, also marketing, finance. And really it was always that way. OR eventually got more and more into the picture as probability and risk analysis--

HENRIQUE CORREA: Optimization and that type of stuff. Interesting. Marty, let's transition and talk a bit about your contributions. People like myself, and many of the viewers, know your many contributions to the systems thinking and to modularity. But I would like to hear from your viewpoint how these came about, and who were your partners in crime developing these ideas, starting with, for example, modular production. Your seminal work is incredibly important and foundational for many developments.

MARTIN STARR: Thank you for saying that.

HENRIQUE CORREA: Absolutely. Like what we talk about, postponement. What we talk about the power of platforms that is increasingly important for even sustainability. The modular consortium that I studied so much in Brazil. Always sort of based on the idea of modularity. So can you talk to us about how this came about, and your partners in crime?

MARTIN STARR: A good example of the modularity issue that I became involved with was the understanding that I had of how both from the producer's point of view, you could save a lot, not only in terms of the cost of being able to say, look, we use that particular part in a lock, and we could now transfer it to the new lock that we're building. Or we could start from scratch and redesign the entire lock.

Just as--this is a good example-- HP, in the printer business, had a real hold on that business to begin with. People liked them. They thought they were really very good. But each HP printer, when it would come out, would have new components, including new ink cartridges, a new power plug, and a new transformer, different ratings and so forth, so that ultimately you could only scrap your old one, and you could choose any brand of printer that was available.

Rather than saying, gee, I have right now a whole bunch of ink cartridges that could be used. I think I'll stick with HP. As an example, I have an HP printer that just recently broke down. And so I called up and spoke to the people at Hewlett Packard and said, what can I do about fixing this printer? And they said nothing. We have no parts for anything. We don't make parts to replace anything. You throw it out.

HENRIQUE CORREA: Buy a new one.

MARTIN STARR: Right. But there goes this sense of continuity and of loyalty, which, incidentally, Apple has used so successfully with its iTunes store and the infrastructure of its ecosystem to make people want to stay with an iPhone rather than to shift to some other phone because they've already invested in some of the products that you could get that would work on the iPhone. Compatibility and usability of these components is all involved in this modularity issue.

So it works in all respects. It works from the point of view of saving money as a producer, removing risk as a producer, building loyalty as a producer and as a competitor. And then from a consumer's point of view, ease of transferability and knowledge of the system.

HENRIQUE CORREA: You dissociate the variety of products from the variety of services. Variety of processes.

MARTIN STARR: Right. Yeah. And you can then see, though, that modularity really started to grow in my mind when I started understanding market research because I found people being so upset with the fact that they had to throw something out because there was no way of maintaining that loyalty, let's say, to a brand name.

And in many ways, I began to recognize that marketing and production were interrelated in a modular system, and that's where much of this grew from. Now who did I get encouragement

from? Marketing people. Not from production people. And on the whole, even in the OR community, very little support for modularity.

Right now companies are using modularity in great amounts. The new garage that's being built [at Rollins College] has modular slabs that are built in a factory to certain specifications very easily replicated in the factory. And then they're brought on big trucks and mounted in place. That [method] is used by producers and practitioners. But the community of business schools, and of people who study, have no real command of that subject.

HENRIQUE CORREA: You know, Marty, when I started studying operations management, that was in the fourth year of the engineering program. The production engineering course is a five-year, full-time course in Brazil. The three first years is basically mechanical engineering with a lot of analysis. And then it sort of blew my mind when I transitioned into operations because from an excessive, I think, emphasis on analysis, I started getting in touch with materials from you that emphasized the synthesis of the thing.

And I find this very fascinating because when you think about modularity, you think about slicing up and creating modules and so on. But the whole idea is the transition between the analytical approach and the systems approach. So that's the next thing I would like you to talk about, your synthesis approach and the seminal work that you produced in terms of the integration of operations within the business-- within the strategy of the business, with other functions like marketing and so on-- in a time that was even before the Harvard group ended up, like Professor Skinner, producing the missing link article.

Before that you were part of this movement, advocating, so to say, the better integration. So I think this transition or this navigation between analysis and synthesis is something that is very important in your work, and it influenced me a lot. Can you talk to us about this?

MARTIN STARR: Yes, I can. And let me see if I can put a little historical perspective there because Harvard, under the guidance of people like Wick Skinner and Bob Hayes, the whole group, developed theories of management of the production system that were way in advance of anything that was going on in places like Columbia, where operations was just a core option. You could choose it. Mostly, at the first, the very beginning, engineers would choose it. Eventually fewer and fewer people would choose it. And it became a subject that you might take a course in.

But the number of people who were choosing finance or marketing were just huge in comparison, and the number of engineers who would participate in the business school as operations managers decreased. Operations and production became low level in the class warfare system. Like math had been the high point in MIT. At the bottom was Sloan at MIT. Probably still is. But at the top of the ranking at Columbia was finance. Marketing was a close second.

You could put any other kinds of things in there, and operations management would be at the bottom. People would say, why should I choose that? It's a dirty, factory kind of thing. So the operations people said, well, no, we're really services now. And so look, we're purer than that. But marketing said, when it comes to services, we're the people that really decide the services.

You people in operations, you are the back room. You tell us how to process the checks. That's all. You don't tell us how the checks should look or any of the real marketing influences.

And so in the business school, I think that the importance of the concept of synthesis disappeared. I think that if you look at it carefully, you'll see that OR today, OR and MS-- and I really need to touch on something here. OR and MS now, from a marketing standpoint, tries to push analytics. Notice it stands by itself as analytical and not synthetic. Not the synthesis of putting things together.

And so OR still misses the point, which is: if you can't understand how it comes apart, you can't put it back together again, but you have to put it back together again. And therein lies the reason why I guess I went to operations management so much more than staying with the OR field. And that was when management science, the Institute of Management Sciences, became an integral part of the operations research field in INFORMS, for which this tape is being produced.

And so I really owe it to everyone to say, look, I never was in favor of that [merger] because the management sciences had the opportunity to really understand the importance of modularity, and the importance of the integration of concepts, and of the human side of every one of the equations. The OR field had been primarily analytical in military, and synthetic in terms of military systems, or in terms of very analytic things such as inventory analysis. Whether they were applicable in real life or not, they were interesting because they had properties, mathematical properties that was so fascinating.

And so really, the issue of joining these two societies lost the opportunity of bringing together the softer side of the management sciences, sort of fuzzier side, which, by the way, it's very interesting that Lotfi Zadeh, who was the master and creator of fuzzy systems, was actually on my dissertation committee. And he wanted fuzziness introduced in terms of my theory of operational design. And he was very influential in demanding that some of the things that were gray areas, where you can't say this is x squared plus y squared and so on, needed to be represented in some fashion. And so Zadeh's influence was really important.

HENRIQUE CORREA: It's fascinating.

MARTIN STARR: And he and Talbot Hamlin, from the School of Architecture, who was on my dissertation committee, would have lengthy discussions about how the abstract things must be included in the theory of operational design. And so I learned a great deal from this incredible group of people who were working for me. They were my committee. Their critiques were brilliant. And I never was able to match everything they wanted, but their influence was significant.

HENRIQUE CORREA: Fascinating.

MARTIN STARR: Now back to why synthesis? Basically, I say analytics is taking things apart. Say you have a complex watch, old mechanical type, and you take it apart. That's easy to do. You have all the little gears and all the things sitting out there. Not so easy in the electronic form. But you would have to be a genius to put it back together again. And so the roadmap of how you

get back to putting things together so they work is really amazingly important and led me to appreciate Deming, who was a friend of minemet through Young & Rubicam. I met Edwards Deming at Y&R. And he and I really had so many things in common which we shared.

And one of the things that really epitomizes this is his statement or story, an anecdote, about how Yamaha had taken the Steinway piano apart and said, we can reproduce this and make a Yamaha piano that will be identical. So they made every one of the parts identical. It was like reassembling. But when they put this Yamaha together, it didn't sound like the Steinway.

So [critical for synthesis] when they then put the Steinway together, it didn't sound like the [original] Steinway. And he [Deming] said, how you put these things back together is the management of the system. And if you don't have a manager who watches everything as to why it was the way it was when it was disassembled, you'll never repackage it. That, to me, was the essence of why synthesis was so important.

HENRIQUE CORREA: Very interesting. Marty, you have seminal work in inventory management as well. You published your book with Miller, Dave Miller. Why did you decide to put that book together? Was it one of the first books?

MARTIN STARR: Second book.

HENRIQUE CORREA: The second book in inventory management?

MARTIN STARR: No, it was the second book that David and I wrote. We wrote Executive Decisions and Operations Research.

HENRIQUE CORREA: Right. That was before.

MARTIN STARR: That was the first book. And we wrote that in Argentina. The reason we wrote that book was because interactions with the YPF management, with our inventory analyses, were such that if you didn't look at it from an executive management point of view, and say, well, what did they need to understand about this utilization of modeling and of mathematical types of thinking or logical kinds of thinking-- what are the parts that they have to see in order to say, I accept that. That's part of what I would like to have been reasoning.

Out of that grew what we did, which was executive decisions and marketing, executive decisions and production, executive decisions. In that book, it's divided by the whole functional area, looking at the way in which managers would look at it. But that book was very successful. It really hit a nerve in a lot of places. And it got used not by business schools, but by schools that were teaching management in an applied form.

HENRIQUE CORREA: You also published a paper, Management Science and Marketing Science. And I think it's a sort of a spinoff, probably.

MARTIN STARR: It is.

HENRIQUE CORREA: Have they embraced-- the marketing profession, the marketing area-- have they embraced the marketing science?

MARTIN STARR: They haven't changed. These fields are fundamentally the same as they were when they were first developed. If marketing could avoid market research, they would like to do that, too. But they realize how that kind of input is vital to understanding the consumer's mind, the Consumanoid concept that Bill Moran and I had tried to develop, which incidentally, we presented at a meeting of the American Psychological Association because the American Marketing Association said you can't build a model of a consumer that's going to make any sense to marketing people. But the psychologists thought that was kind of interesting.

HENRIQUE CORREA: They accepted the model of a person's behavior.

MARTIN STARR: And it actually had a lot of things that worked. It was fundamentally based on entropy considerations. And lo and behold, we discovered there was a marketing system, which the Hendry Corporation, run by Ben Butler and his sons, all of whom were physicists, had developed, which was a model that you might think developed out of thermodynamics. Entropy [equilibrium] was fundamental to the way in which it operated.

To explain this, I need to just point out that when Bill Moran suggested we build Consumanoid, he used as his model the fact that little kids, when they go to the beach, build a sand castle, build something up, and then when they see something built up, they break it down. And there are two fundamental principles that are at work in every consumer's mind. One is, if it's built, destroy it. If it's not built, build it. And so these are waging a war in the minds of the consumer.

And as the consumer becomes more and more loyal to something, they become more and more uneasy with the fact--

HENRIQUE CORREA: Destructive about it.

MARTIN STARR: Right. And so they want to try something different, whereas when they're in terms of searching for information, they're trying to build something up. The Consumanoid started working on that, but didn't even touch the level of intricacy that the Hendry model developed. I-- and Bill, as a result-- formed a company called the Eddington Corporation-- probably nobody knows anything much about it-- E Group, it was, which did consulting on the Hendry Corporation. They did it in the US, so we did it in Europe and in Asia.

And we had any number of customers who thought it was fascinating. But when it got down to it, it was always the market research people, the fringe of the market research people, the ones who were more model-oriented and model-mathematical, and they loved Hendry. Ultimately, companies like General Foods, where the head of the company was an engineer, loved it. But the marketing people said forget it.

HENRIQUE CORREA: Yeah. It's hard to adopt when you don't understand, right?

MARTIN STARR: And yet the model today still has within it a framework of understanding that dissects the market in a way that no marketing people apply. [Based on] the partitions that are necessary in order to watch the way in which consumers switch between brands, or are loyal to a brand, that you see the structure, the fundamentals of the whole system. It becomes a stochastic process within that, and entropy is fundamentally at work. Remarkable things. It's sitting there waiting for someone someday to reengage it.

HENRIQUE CORREA: Interesting. Another area, Marty, that I know you dedicated yourself to before it became sort of mainstream is risk management. Now it's mainstream. And you keep working in risk management and catastrophe avoidance. But you started much before. Can you talk to us about your interest in risk management when it started, and where you are now?

MARTIN STARR: I guess I became really interested in risk management when I became aware of the fact that I couldn't understand probability theory. I did not understand what it was all about. And I didn't readily get into the feeling of the way in which combinatorial statistics functioned.

As I kept trying to understand it, I began to change my perception of it. And I saw that risk management was something which you could do in an actual sense, like an actuary, looking at what the probabilities are based on actual data and things. Or you could look at it in terms of influencing the risk curve, and the way in which you would become aware of things that you could do that would modify the functions.

Now that's still something that I think is underdeveloped, really. I mentioned that I went to work for a company called Popular Merchandise. David Hertz was the Head of Operations Research for it. The head of that company was a young man named Arthur Cinader. And Arthur Cinader made a point one day when he told the marketing-- we were all together in a business meeting-- and he said to the head of the marketing department, I don't want your forecasts of what we're going to do next year. I want the plans for how we will make what I want happen, not what you are going to tell me is going to happen. And he said, I don't care for forecasts of that.

And I thought, bang, this is it. There's where risk management becomes so significant. And so then you start saying-- just as an example, David Miller and I went with Polly and Renee Miller to Springfield, Massachusetts to study the way in which our customers lived. And we spent a week going around looking at their homes and trying to understand what they had in their yards, and watching the way in which these census zone numbers were functioning and how they differed from each other.

But we didn't just do that. We had gotten an anthropologist that David Hertz had said, you speak to Connie Arensberg and ask him for the cultural makeup of these different zones, the different zip code numbers. And before you go up there, integrate that with what he tells you about the characteristics of what these people value. There were different zip code zones, and they represented different groups from different countries and so forth which had different value systems operating. And Connie Arensberg had said to us, look for these things.

So when we came back, we had a plan for how to increase the loyalty of each of these different zip code zones. It worked. It was really remarkable.

HENRIQUE CORREA: It's wonderful.

MARTIN STARR: Yeah. But look at the integration of information there. We had an applied anthropologist, an operations researcher, a marketing person, and all of these pieces going together to make this all happen.

HENRIQUE CORREA: Synthetically. Marty, can we transition a bit in terms of your remarkable influence in a number of organizations, professional organizations like POMS and INFORMS. Can you talk to us about what you believe were your most influential, most impactful activities in helping create and make grow these institutions.

MARTIN STARR: Probably you'll be surprised that I don't think I've had any influence at all, except in the editorial area. I still feel that the publication of good research [counts] and Im not talking about trivial operational pivot points or any [such] kinds of mathematical analysis, but things that have relevance in research - that really gets to the heart of new matters and opens up vistas of vision.

That has been the way in which I was Editor-in-Chief of Management Science for 15 years. I began to understand how crucial a role that was. People like Russ Ackoff would write and say, you're publishing junk. And why don't you get some papers that are really relevant to what people in management want?

And I said, I will try, Russ, but how do I do it? And he said, well, the first thing is, get these papers and tell people that they're rejected until they write them in half as many pages. Then you'll begin to understand what they're trying to say and whether there's a kernel of wisdom in any of it. If so, then develop the areas that look like they're really opening up new visions of what can be done. And don't publish stuff that is simply polishing the brass and just doing the same thing over and over again in a slightly different way.

Russ was very influential, but so were many other people, [like] Bill Cooper. And I can't tell you how many people would get on the phone and say, this article had much more potential than you got out of it. Did you see what was in the last three pages? And you had six pages that preceded it. Junk, stuff not valuable. Get to the heart.

Over time I've become better and better at this now. And so what happened was I got very interested-- after years of ignoring the field of disaster management-- I got really interested in the humanitarian operations field that Luk van Wassenhove had been developing. And I began to see that something happens here where the humanitarian college within POMS, and the humanitarian field, always looks at what you can do to help people when there's a disaster or catastrophe of some kind. Never looks to the engineering problem of could that disaster have been mitigated, made less severe? Could it have been avoided altogether?

I began to say, why can't we take this field and develop research along all of these lines, how to help people when the disaster strikes. A hurricane hits in Florida, and Polly and I were down in the Keys. The prognosis for the forecast, the cone of trajectory, said it was going to hit in Marathon, where we had a place. And everyone was told to leave. So we did, along with mostly everyone. A lot of people still stayed there.

Mostly everyone went north right to the place where the Hurricane called Andrew hit centrally. So migrants had gone from Marathon, which is the middle Keys, right up to north of Key Largo, [Homestead] and that's where the hurricane eventually did landfall, did the most damage because people didn't know what they were doing. [The forecasters] were saying, go somewhere [else].

Polly and I went all the way up to Orlando, since we had a place in Orlando. So we didn't get affected by [Andrew]. But so many people had gone right into the heart of the thing. And it's because there is no real way to track some of these kinds of things. And the ones who stayed did much better.

OK. The big picture is you have to know a lot more about forecasting the trajectory of these kinds of systems. And then-- I know this is a little oddball-- you have to start talking about the fact that if you're in a zone where these kinds of things are going to hit, build for that eventuality and shelter for that eventuality. And you can mitigate the severity of that storm significantly.

Places like the Keys are so vulnerable. Even though they put the houses on stilts, if a hurricane comes across there, stilts go, everything goes, road goes. You know, they're not building for what has to happen right now. Mind you, I'm a bit of [an] eccentric. I still think that it's possible to redirect these storms and to control them. And I think that there's really good evidence of the fact that at one time, companies like General Electric had a hurricane department that was looking into this kind of thing, which was closed down by the lawyers because if you redirect a hurricane--

HENRIQUE CORREA: It goes somewhere else.

MARTIN STARR: Goes somewhere else, and then you are liable for where it went. And so the lawyers at General Electric said, you are putting yourself into jeopardy because if you start controlling storms, you will be liable for all the damage.

HENRIQUE CORREA: If the energy is there, you cannot dissipate it. It goes somewhere.

MARTIN STARR: Right. But even saying that-- I step back and say, OK, it's eccentric to say, well, you could do something to maybe redirect the way in which a storm travels such as put it back out to sea. No liability. Well, there's no real effort being channeled in that direction. Instead, it's what happens-- what kind of inventory should we keep stock in Homestead because Andrew hit in Homestead. That's where everyone had gone. What kind of inventory should be kept where, just in case it hits in Marathon or it hits at Homestead, and so on and so forth. Much of the humanitarian effort is spent on things like that.

HENRIQUE CORREA: Marty, can you tell us your take on how this field has evolved from the inception. I mean, OR postwar or prewar, during war, Second World War.

MARTIN STARR: Which field?

HENRIQUE CORREA: OR. And if you want to extend it to OM, it's great, too. But from the inception, from it taking shape-- and you helped it take shape-- how do you see it evolving? And how relevant do you think it is now, and where do you think it's going to?

MARTIN STARR: I think that its analytical basis now is promulgated on the fact that you have huge computers which can do big data. That's the only real difference between small data and statistical analysis that was used by market researchers, if they were good, in seeing the whole picture, the system of what counts.

Therefore, I think that it's evolving into an IT area where IT and mathematical modeling work together to do analyses that are incredible because many times they unpack things that you would not have noticed before. And being a good forensic person, a person that's aware of the nature of forensic studies, you are able to track who did what, the Sherlock Holmes of the world.

I see, really, OR turning into that kind of Sherlock Holmes of great use. No synthesis is involved, no understanding of the mind of the manager, the mind of the consumer, the consumer's behavior pattern. No understanding, really, of game theory and of the competition and how the competitor works. None of the concepts of negotiations, where you do this and you do that, or whatever happens is a very human drama.

We're missing all of the parts that make it exciting. POM is evolving very much in the same way. It's turning into modeling what we know about, not putting in the kinds of fuzzy uncertainties that make it something that would capture the real drama of what goes on. And in every one of these cases, missing the dynamics that these systems are evolving, and that as technology comes along, newer things occur, and they influence the way in which the consumer thinks, and god knows, probably the way in which the next generations will view the world.

So it's missing the marriage of psychological understanding of customers, workers, of all-- and competitors. I think it's missing that.

HENRIQUE CORREA: Marty, if you look back, which would you mention as the greatest accomplishments of the field of OR and OM?

MARTIN STARR: Well, probably in the health care field. We have more things that have happened that are really useful and are saving lives. I think humanitarian studies have done a lot, too. I think they've saved a lot of people's misery and done a lot of good. I just don't think they're complete. And I do think that technology overrides the modeling. It's the engineering models that really matter, things that fly.

You know, it's the kind of things that-- Elon Musk is a very interesting example. He's kind of an eccentric person with strong engineering. His boring tunnels, you know, the Boring Company

that's going to build fast transportation systems under Los Angeles, and his SpaceX, landing the shuttle back on a platform and all. These are engineering feats of great technology capabilities, and the vision to see them and to be able to accomplish them.

But he himself doesn't understand the frailty of the management of these systems. And so it really creates a very interesting picture of a manager gone awry, and yet brilliant.

HENRIQUE CORREA: No doubt about it. Marty, again, looking back, what's your main criticism of how this field has evolved, where it is now, and how would you suggest the field responds to the criticism made?

MARTIN STARR: I guess the first thing that I would really love to see is someone to take economics apart. I really think that we have too many places where we anchor ourselves with some kind of a belief in the system. These economists who give people guidance are a bunch of witch doctors who, no matter how bad they are, people keep coming to see them. And they keep writing their articles and books. And they are responsible for a huge amount of major decision making that is incorrect.

So I think that the field of OR should infiltrate economics and do something with risk management, as well as some of the more fuzzier human aspects of the field. These things can still happen. But [not] as long as we anchor ourselves with the knowledge that we rely on in terms of things like economics and game theory-- which is not valuable because it's a toy. But really gaming and understanding-- which is negotiation [-- matter].

People seem to have the art of it. They teach courses on it. But they never have modeled it to a point where the great computer systems can negotiate with you. They can play Jeopardy or chess, but they don't simulate the elements that come into play when you're dealing with human systems.

So that's the big step that needs to be taken. I'm not sure who's going to do it. I don't think OR is because the things I read show more and more data analysis and this marriage with IT and big data. I think that POM is subject to the same problem, where the dissertations are getting written on more and more things that don't really reflect reality. And I worry about that.

I'd love to see a field within the field open up to the questions [raised by] the people who founded the OR society-- and that goes back to Churchman and Ackoff and Arnoff and people like that, [Herb] Simon, and so on. When they first talked about it, they said the day will come-- I know they did say this because I was there when they said it-- the day will come when we will know how to put behavioral variables into play as part of these models, and that's where we're heading. But it's not where we did head. And that, I think, is the problem.

HENRIQUE CORREA: What, in your view, [is] the state of research now, what's been published and so on, in OR, OM, are we still relevant?

MARTIN STARR: They're relevant to the community that loves it. But I don't think it's being more and more bought by management of their corporate systems, business, government

systems. Terrible. Knowledge is not being increased in the places of power. And it seems a terrible shame because that knowledge is all being funneled into something that has minuscule impact.

I think what's missing here is they don't know how to do synthesis. They do know how to do analysis. So we're getting more and more analytic, but the systems that we're taking apart, we don't know how to put back together again, and they're flying off in all directions. That's really not a good prognosis. But maybe something can happen that will bring it back. People are not functioning the way the models described.

HENRIQUE CORREA: Interesting. Marty, on top of being very influential in the research area and in the development of the field, you are also known as a fantastic instructor, a good teacher. Do you have any hints in terms of pedagogy for professors in the field?

MARTIN STARR: Yeah, I do. Make consulting crucial. If the business school wants relevance, it's got to get out there and work with practitioners. It's not just to work alongside of them or take their money, or to do some kind of research. They've got to get involved in the entire mental process of what is going on. Teaching becomes really exciting when you have stories to tell, even little anecdotes. They play a huge role in my thinking.

I've given you a few of them that from time to time, would be [useful] I mean, Demings piano. I dont know how many times I even went to Harry Steinway, who was a student of mine, and I told him about that. And he said, yeah, you know, sometimes when we take a Steinway apart, we can't put it back together again. And he said, we don't know why, but it's got to do with the original assembly process. And he said, if you get the original people who put that piano together, they can do it. But its not just a Tinker toy. It isnt an erector set.

HENRIQUE CORREA: So putting consulting together, or adding consulting to the teaching.

MARTIN STARR: Right. Bring up the level of reality in the teaching of this, and then the students respect it. Involve the students more and more. I think we're doing that. I see these contests that you're involved with being hugely important because you're empowering students to come up with good ideas, and then to carry them into reality and to make money from them, which is maybe a kind of crass way of putting the fact that that's the criterion if you understand how consumers think and what demand functions are. So making it available to students to do that, doing real projects, I think helps a huge amount. But you have to have the funds to support that.

HENRIQUE CORREA: Absolutely. Another thing that is important for a field is to be able to attract good students, attract smart students. Do you have any suggestions for departments to attract these students?

MARTIN STARR: Well, students, I guess, are two different kinds to me. One is the student who wants a degree as a certificate for hiring. And the other is the PhD student who is at an early stage of being molded into someone probably capable of doing something.

And that's why, when I said the way in which I've influenced the field in my own opinion is by reading articles that I am responsible for editing and rejecting or accepting as an editor, with say, major revision. Here are some guidelines, here are some thoughts. Not just mine, but others. Getting a good team of people, and opening the opportunity to young minds to find new things to think about and new ways to think about new things. All of that is part of this tremendous potential that we have.

How do you get good students? I think you need to not use IQ. You've got to use innovative capability and ability to deal in more than one thing at a time. I still think that most of the work in this world, including in companies, is with two variables and the influence of x on y, not x and y and z and d, and maybe sometimes f could be brought into it if you found a way.

And that's why when I said being able to influence risk management is [like] I know how to change the probability of the sales of a product. So don't tell me what that product is going to sell if I leave it all alone. Tell me how to influence what it can be and what the parameters are, and so forth, [including] the sensitivity.

OK. Those are all the issues that need a different kind of student than one who just wants a job, or certainly at the PhD level. I'm not looking for brilliance. I'm looking for creative capability before brilliance. I want them to be smart, but I just wanted them to be able to think-- I know they can think outside the box, but that's minor. I mean in the universe. I don't want to know just [minor ideas] a bounded box. I want to think [bigger than that], OK?

But just think of how our schools work. We admit students on the basis of their scores, their test scores. And if you're maybe getting away from that to an extent, you don't have a comparable way to measure their dissatisfaction with the way things are, their ability to disrupt the way a system is functioning, their ability to critique what's wrong with what everyone else is saying is right. OK? That's what I'm looking for.

HENRIQUE CORREA: Marty, just to wrap it up, using your synthetic powers, what do you see as-- looking back-- your legacy being, or what would you like your legacy to be for future generations?

MARTIN STARR: My legacy was just established sitting here with you and going through these things which I really haven't thought about a lot. I gave you the top of the head answers. Sometimes I traveled off. I was peripheral and I became tangential. I know that. But basically, I've really expressed dissatisfaction with the way things are going. That's not bad. I'm not being disgruntled, and I'm not saying it's been a waste of time.

On the contrary, this is the path I've traveled, and I've traveled with some remarkably wonderful people and a huge number of incredible traveling distances of thought and mind. But I go back to the days when Herb Simon was sitting at a table, and he would say things that would make your mouth drop because wow, I hadn't thought about that. I'm looking for those kind of eureka moments. I want more eureka people around me.

And my dissatisfaction is only in the hope that the legacy I'm saying is, come on, guys. Come up with some more real disruptive ways of doing it not just technology, but in our field. Disrupt our field.

HENRIQUE CORREA: Wonderful. Marty, thank you so much for your time here. I hope our viewers learned as much as I did and had as much pleasure as I had being here. Thank you so much.

MARTIN STARR: I enjoyed it. And I hope someday you have the ability to have some fun like this, too. Thank you all.

HENRIQUE CORREA: Thank you.