



Oral History of Natarajan Chandrasekaran

Interviewed by:
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Audio Recorded January 15, 2020
Mumbai, India

CHM Reference number: X9236.2020

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Kapoor: On behalf of the Computer History Museum in Mountain View, California, it gives me great pleasure to welcome Mr. Natarajan Chandrasekaran, Chairman of Tata Sons, for his oral history. My name is Uday Kapoor and I am a volunteer in the oral histories program at the museum. Mr. Chandrasekaran was born in 1963 in Mohanur, Tamil Nadu, India. After completing a Master's in computer applications from the Regional Engineering College, Trichy, in Tamil Nadu, he joined Tata Consultancy Services, TCS, in 1987, where, after a successful career, he rose to become CEO in 2009. Under his leadership, TCS generated revenues of \$16.5B in 2015-16 timeframe. With over 353,000 consultants, it became the largest private sector employer in India as well as the most valuable company with a market capitalization of over \$70B. This was at that time. Under Mr. Chandrasekaran's leadership, TCS was rated as the world's most powerful brand in its services in 2015. In October 2016, Mr. Chandrasekaran was appointed as additional director on the Tata Sons board where he is currently the chairman. So, with that, we'll get started with you, Mr. Chandrasekaran. We can start from the beginning of your life. I've already said where you were born, but maybe you can say a few words about your family and you can take it from there.

Chandrasekaran: Thank you. It's a great opportunity and thank you for interviewing me, Mr. Kapoor. I was born in 1963 in a small town called Mohanur. It's in south India. And we were-- we are six children for our parents, three sons and three daughters. I am fifth among the kids. And I went my elementary school and the high school in Mohanur. It's a small town with only one public school. And I started in the Tamil medium there. Though my father studied for law, had to take up the family farm, and was doing agriculture. And, so, in my early years, I got a lot of exposure with agriculture. In fact, I did my sciences degree and then went back to the family farm and then tried my hand at agriculture for six months before I realized that it was not for me and went back to study a master's program in computer applications.

Kapoor: So, how was your experience growing up with the family? And I imagine it was a very supportive family.

Chandrasekaran: Yeah, we are a large family and we grew up together as kids, six of us, looked after each other. And it's a very supportive family and a supportive environment. Even the school is a very collaborative school with all the teachers and everyone helping out. The importance was always in the value system. My parents brought me up with very high standards of value system, how to be caring and the integrity and frugality and the values of hard work, sincerity. Those were the things that were taught to us. From an academic point of view, one thing that was always stressed is you've got to ace in maths. It didn't matter what else you did, whether you studied other subjects, what you scored didn't matter, but you've got to ace in maths.

<laughter>

Kapoor: Very nice. So, in the school, did you have any mentors, certain teachers that you remember that helped form your opinions or life?

Chandrasekaran: Of course. I had excellent teachers. Outstanding teachers. I still remember my math teacher, who was also my class teacher in my seventh grade, who took notes for me when I was hospitalized for a month and away from school. And then when I came back from the hospitalization, the first thing she did was to come home and gave me the notes for all the subjects that she had kept for me.

Kapoor: That's amazing.

Chandrasekaran: So, the early years, and the teachers who taught me, made a very significant impression on me.

Kapoor: So, any other impressions about education? Besides mathematics, were there any other subjects that interested you?

Chandrasekaran: I think I fundamentally believe that as long as you had good teachers, you loved every subject. And, so, I had a great liking for Tamil literature. In fact, at one point in time, I contemplated studying and majoring in Tamil literature, because I had excellent teachers who taught me that subject. So, I think I enjoyed learning science, learning history, learning geography, all those subjects in early years. More of a well-rounded focus in the early years.

Kapoor: Did you have any interest in music at that time? I know that later on you developed a lot more interest in music.

Chandrasekaran: You see, my growing up years in our house, all my sisters were taught Carnatic music formally in a typical south Indian Brahmin household. So, most of my learning and interest in music developed by listening to Carnatic music, not so much by learning or practicing or training by myself.

Kapoor: Right. Thank you. So, as you progressed in your education from school to college, when did you first become interested in computing? I know that mathematics was very much stressed, but can you--?

Chandrasekaran: I think the subject of mathematics and algorithms always fascinated me. I got to do a basic course in microprocessors during my undergraduate degree and started to do some Intel processor programming in the early days. And that kind of got me interested. Then, when I got into master's degree in computer science, I developed a lot of interest towards databases, or discrete math. I'm a lot more interested in subjects like, queuing theory. So, those things really helped me to develop an interest towards a career in computing.

Kapoor: Certainly, mathematics was a good base, too--

Chandrasekaran: Yeah.

Kapoor: --to that. So, how did you select the college that you went to? Did you contemplate going far distance or you stayed within the region?

Chandrasekaran: So, I stayed within the region. It was only about less than 50 miles from my home town. The reason I picked up this course was also because of an accident, because I took six-months break to go back to the family farming business. So, after six months, when they realized that it was not for me, I missed the academic year. And then this course was, at that time, recently introduced. So, I thought that it would be an interesting program, because it was a full three-year program on computing and all the subjects seemed to be to my liking. So, I applied for this course and then got through. And when I got admitted in January '84, I was quite pleased.

Kapoor: Very good. So, can you describe your experience in the college? How did you feel about your subject, how you were doing, your mentors?

Chandrasekaran: I think we had a class of very bright people. And, so, we learned from each other and, again, we had some exceptional teachers. But I still remember the classes in linear algebra, classes in queuing theory, discrete math. And then the other thing that I distinctly remember is the computing time. Because it was very hard, because the computing resources were very limited and you had to book terminal time. And, often, if you're not careful and if you had too many bugs in your compilation, then you're never be able to finish your assignments. So, we were brought up with a lot of focus on desk checking. So, we used to code and then desk check, desk check, desk check. And then whenever you got the machine time, your focus was always to get it through, get it through quickly. So, I think those were very good disciplines, because when the machine resources became pretty easy, you know, people don't spend so much time in desk checking and thinking through the algorithm.

Kapoor: Right.

Chandrasekaran: So, these were some of the benefits, because of a resource-constrained environment.

Kapoor: What was this time period?

Chandrasekaran: This is '84 to '86.

Kapoor: Okay. Because by then--

Chandrasekaran: And even when I joined TCS, I distinctly remember-- the fundamental formula, I remember, is the cost of a machine was 10 times more than the compensation of the individual per year. And, so, the human resource was not as precious as the machine resource. So, we always had to wait for machine resource. But, actually, it's now flipped. The compensation of human resource is almost 20 times or even 30 times than that of a machine resource. So, now, the situation has changed, but, in those days, the computing resources were very hard to get and very pricey. As a result you were always in preparation mode to get the maximum out of the machine time.

Kapoor: Right. Well, I appreciate that, because I remember when I was in IIT Delhi in the '60s, late '60s, that there were no computers, first of all. So, that's why we had to choose our subjects like, control theory,

which was more mathematical. But, even later, the number of computers in the country were fairly limited. So, I appreciate what you're saying.

Chandrasekaran: Yeah.

Kapoor: So, in terms of your approach towards TCS, could you describe how your education and work experience led you to TCS?

Chandrasekaran: Yeah. As part of my master's program, I needed a six-months sabbatical or an on-the-job project work. That was the last semester academic requirement. So, I applied to TCS in '86 and then I got through to do a six-months program. They gave me two assignments, one was in Burroughs mainframe, which is a Burroughs 5900 machine. Another one was PC-based machine. My job was to learn the whole system in the Burroughs machine, maintain it, but, at the same time, create a futuristic system in the personal computer. So, the Burroughs machine time was always in the night. I also had to work in the PC system in the night. So, I worked through the six months from evening, six or seven o'clock, till morning, six or seven o'clock. And it was a very, very interesting [ph2] experience. Two or three months into the project, TCS gave me an offer. In those days, you took it! <laughs> Because these offers were very hard to come by. I am talking about TCS of about 500- 600 professionals. And they used to hire 20 people or 40 people a year. And, typically, they would go to ITT Bombay or ITT Delhi and they would recruit the whole class. That used to be the norm, those days. So, I consider myself fortunate when I was offered a job and since then I've had a great run.

Kapoor: Great. So, TCS, of course, has a very interesting history. When it first started with Lalit Kanodia and with Mr. F. C. Kohli, then it was a computer center doing different applications for the Tata Companies, database work. And then, over time, it became a consultancy. And even Mr. Ratan Tata worked there, briefly. So, I was very interested to read the history of TCS.

Chandrasekaran: Yeah, TCS, actually, what it did those days, it used to be called Bureau Services, but it was pretty much what we call a platform today. Today's platforms are in the cloud. And, those days, cloud was not there, but it was pretty much one centralized datacenter where you had a specific application, or what you call as a platform. It could be payroll, it could be compensation and benefits, or it could be a banking application. And they used to source work from multiple customers and then process it and give it back. So, I think the whole world, in a manner of speaking, has come a full circle.

Kapoor: Right. You briefly described your experience there already when you first joined and they were about 500 to 600 people. Could you describe how Mr. F. C. Kohli led the firm at that time and Mr. Ramadorai's role, if he was there?

Chandrasekaran: Yeah, TCS was a very small company when you look back. We were 27 crores. That's about \$8M in those days, because I remember the dollar was INR27 or INR30 those days. And then, that year, TCS, placed an order to import the new IBM mainframe machine, which was just called as IBM 3090, a water-cooled machine. The capital expenditure for that machine was higher than the revenue of TCS. So, I think Mr. Kohli made some big bets. He believed that talent in India was very rich and, as long

as we could give the necessary training and inputs in terms of processes, we could excel. I think if I had to describe his style, he recognized the resource-constrained environment. So, he always looked for maximizing the resource utilization. And he made bets. He focused on research. He always believed that we should create our own tools, our own intellectual property. So, he invested whatever he could in terms of creating our own methodologies, processes, intellectual property. A lot of focus was on training. Everybody had to go through training, not only when you're freshly hired, but every professional who is experienced also had to make at least 20 days a year for training. So, there were a lot of specific teams that he was driving. And he built the firm to have a lot of technology competencies, to have a lot of technology competencies. So, that's how we will scale in those days. Then Ramadorai was very closely working with him, along with a couple of other people. And Ram [sic] also came from a hardware background. Ram, basically, travelled as much as required to meet clients. And I would say that his focus was on travelling all the time, meeting with clients, giving them the TCS story, gaining their confidence, because we didn't have so many proof points. So, it had to be nurtured in order to get a seat at the table. It's not like these days. So, I think Ram did a lot of the heavy lifting in terms of globally building relationships with clients.

Kapoor: So, these are global clients?

Chandrasekaran: Yeah, he focused a lot on the United States, but, basically, built a strong client network.

Kapoor: So, in 1996, Mr. Ramadorai became the CEO of TCS.

Chandrasekaran: Yeah.

Kapoor: And you became his executive assistant. So, maybe you can talk a little bit about the transition up to that point.

Chandrasekaran: Yeah, I had not worked for Ram directly. In '93, first time I got an assignment in Washington, D.C., which was under Ram. So, I worked for him directly in '93 to '96. So, when he became CEO, he asked me if I would be willing to come over to Bombay and join as his executive assistant, which I did. And I think I got a lot of opportunity, because I got to see the whole spectrum. Again, the company was still very small. We were only \$100M in revenue in '96, but we already had a huge presence. We had, I think, about 45 offices globally, with a lot of presence in the US and Europe and some of the Asian countries. And I got a good spectrum of responsibilities, right, from hosting clients or visiting clients, to doing project reviews, to the whole value chain. So, I think those two years, '96-'97, helped me to develop broader appreciation of the business, probably the best management education ever I got. Because I understood numbers, I understood what does it take to deliver to clients, to make pitches, and I got holistic experience in those two years. And then, in '98, onwards, I went on to run a large delivery organization and, since then, my responsibility significantly grew until 2003 when I pretty much was holding a very large portfolio across the firm, both in terms of market development, client management, as well as delivering solutions to clients.

Kapoor: So, can I ask about the training and skill building of the organization as you hired more people and serviced the clients?

Chandrasekaran: I think we always believed in the importance of training. Because this is a business where the technology keeps changing all the time, unless or otherwise [ph?] you kept pace with it, it was very hard to be able to stay ahead of the curve. So, we had three or four different types of programs. We had what we call as the Initial Training Program [sic, "Initial Learning Program"?], which every recruit who came into the company went through. It's a combination of technical skills, domain skills, soft skills, presentation skills, what is required to be able to operate in a global environment. Sometimes, we also taught specific languages as part of the Initial Training Program. Then, we had what we call as the Continuation Education Program, which is basically for all the people who have spent a couple of years in the company, but everyone had to take 20 days a year to be able to select specific courses in which they needed skills, capability, exposure. Some can be short courses, some can be longer courses, etcetera. Then, over the years, we have digitized most of the learning. And, today, we have a digital learning platform. On any subject, you can learn a quick 20-minutes capsule, which can give you the basics of what that means, as well as you can take a course for two days, three days, five days, depending upon how much deeper you want to go.

Kapoor: So, what would you say was the distinct-- what was distinctive about TCS' approach to software and to management?

Chandrasekaran: I think the first one is industrialization of the whole processes, whether you call it maintenance, whether you call it development, whether you call it agile, whether you-- what have you. At different points in time, we have adopted different paradigms, but we're pretty quick to industrialize it, to be able to think of scale. I think we have thought about scale in anything we do in a significant way. That also meant that we brought in a lot of focus in terms of what are the things that we need to be doing and what are the things we should not be doing. We pretty much practiced the "Don'ts" list as much as the "Do's" list, which helped us to scale. And, in terms of management, I think we built a lot of expertise by giving people opportunities. We always selected people with potential and not necessarily people who have been there already. And we're able to give them the opportunities. So, our management development, internally, encompassed all aspects of the business. As much as it involved technology, it also involved clients, it also involved financials. And, as we went along, after I took over, I divided the company into multiple small units. And the whole idea was to bring a performance culture and a financial focus, even in very small units, so that has also helped in terms of integrating financial performance with quality and delivery and customer satisfaction. So, we kind of-- in our own unique way, have been able to integrate all aspects of success and create a model.

Kapoor: So, I imagine for customer satisfaction, quality of software was key.

Chandrasekaran: So, we call it in two ways: quality of software and quality of experience. We always used to focus on quality of software. Somewhere along the line we said, quality of experience is even more important than the quality of software. It is not to say that you compromise on quality of software, but if you gave a high quality software, but you missed the experience, then you have lost it. So, we

started measuring the quality of experience of clients, which predominately involved them in better communication, involving them early in the process, being very transparent, not only solving the problem, but involving them in the problem-solving and-- you know. So, many things like that.

Kapoor: What were the key factors in the growth of TCS?

Chandrasekaran: I think the main thing would be, one, we fundamentally believe that this is an ever-expanding market, because of three or four things. One, technology, is evolving and will evolve rapidly. And it's going to be like that for a foreseeable future-- certainly, for our lifetime. Second, we believe that the pace at which it is expanding, no individual organization can have people, can train people, can keep people to be able to do their work. They always have to depend on partners and, more so, in a very rapidly changing digital, AI-driven [ph?] world. Third, if these two are very important imperatives, as long as we build scale and we understand the context of a client, then we are likely to be in an ever-expanding market. So, for us, the quality of the experience and delivery and the relationship that we maintain will ensure success as long as we stay one step ahead in terms of practicably [ph?] building the capabilities that are required and the solutions that are required. And, after some time, what happens is that you've got so much scale, you've got knowledge about various industries in different markets, you understand the nuances. You not only understand the financial services industry, but you understand it in the context of Wall Street, in the context of Hong Kong, in the context of Europe. So, same thing is true in every industry. So, as long as you harness that context, then you are in good shape.

Kapoor: So, it's been now 20 years since Y2K episode. How did that work for TCS?

Chandrasekaran: I think the early days we needed scale. Two things the Year 2000 opportunity brought to bear: One, it gave us scale, because everyone wanted a solution. And everyone wanted that solution in a very finite time, with a very strict deadline. And, so, that was an opportunity that brought us scale. The second thing that worked for us, is because we developed our own methodology and tools, etcetera, and we were able to execute successfully, we got a lot of client confidence. And with every single client where we could build that confidence, using that opportunity, we kind of fundamentally raised a question in the mind of the client, "Hey, these guys are good. If they can do this, why can't we work with them on this? On that?" And that kind of created a momentum for us.

Kapoor: So, was finance and banking, particularly in the US, the major sector for TCS by 2003?

Chandrasekaran: Probably, yes. But, you know, this question comes all the time from the analyst point of view. But if you really look at the TCS revenue profile, if you take the whole industry, what we call as the technology services industry, and see the pie in terms of industries, in terms of the market, TCS' revenue stream will pretty much mirror that.

Kapoor: I see. Can you talk about the development of the 2003 strategy to make TCS one of the top 10 IT software and services companies by 2010?

Chandrasekaran: So, you know, I think this happened, to some extent, in a flip of a normal [ph?] moment, because we were thinking, sitting around chatting, five- six of us, and we were talking about the need to have something audacious to go after. We were not even a billion-dollar company. We were-- I think it was 2002, we were about 600M- 700M or so. And, so, we came up with this "top 10 by 2010". And, so, it got interpreted in multiple different ways. Some people said, "You should be among the top 10 companies in the IT services industry by 2010." And then somebody interpreted it to say that "10B by 2010". The "10B by 2010" looked very catchy, <laughs> so we went for that.

Kapoor: So, who did you see as your competitors in India and abroad?

Chandrasekaran: I think always two companies which have stood out internationally was always IBM and Accenture. And, in India, I think, at that time, Infosys was doing extremely well, because they went public and they had a lot of public recognition in terms of financial markets. And there were two or three other Indian firms, I think, Wipro was also growing quite fast in those days. So, I think there were many firms to look at, but, fundamentally, we believed that it was a very fragmented industry. So, it's not so much about who is your competition, it is what you can do. So, that became very apparent early days, at least for me. As long as we targeted a certain market and had the discipline to execute, there were plenty of opportunities.

Kapoor: So, you were rising to an important executive role within TCS. How did you formally and informally development your skills as a corporate executive and leader?

Chandrasekaran: I think, you know, you learn from everyone. You learn from clients a lot. You learn from your colleagues. And, you know, what travel does is something phenomenal. I traveled almost 200 days a year. I was visiting clients every week. And I did it for almost 20 years from 1998 until I came here in 2017. Pretty much I was on the road significant amount of time. So, either I was with clients or with our delivery teams and two days a month we did very strong reviews, which focused on where we are and what we need to do, what works, what doesn't work, and so on, so forth.

Kapoor: Takes a toll on the family though.

Chandrasekaran: Yeah, it's been a tough schedule, but that's what it involved. <laughs> That's what it involved. Because India, being where it is, and if client base is in the US and delivery teams are in India, I don't know how we avoid that. You can never build the same kind of relationships. See, it's all about giving comfort to the customer. And that doesn't happen in the services business-- it doesn't happen without a face-to-face meeting.

Kapoor: Could you talk about the experience leading up to the TCS IPO in 2004?

Chandrasekaran: That was a very special moment, because TCS going IPO has always been talked about. But I think I should give a lot of credit to Ratan Tata for making that call, because TCS was a division of Tata Sons and the entire profit of TCS was available to Tata Sons. By spinning off TCS, it was very clear that what Tata Sons will get is only the dividends in terms of a cash flow, though the market

value is something that's very important. But who knew in 2004 what would be the value of TCS today? And the whole IPO process, I enjoyed. But the IPO brought a lot of discipline in the way we ran the company. We got benchmarked by every line item with everyone else and it brought tremendous rigor and it just kept improving year after year.

Kapoor: Could you talk about your impressions of and contacts with Mr. Ratan Tata? You mentioned his leadership.

Chandrasekaran: Yeah. My interaction with him was always through the TCS board. I was part of the board since 2007. So, he was chairman of the board and I used to meet him, definitely, in six board meetings. Apart from that, it would be a few meetings all through the year. I think he empowered a lot. He did not interfere. He wanted to understand what we were doing and where [ph?] we were doing, but never imposed on us to say, "You do this, you do that." He would raise a question. He would always ask "Why you are not number one?" in this parameter, in that parameter. So, he would also-- his questioning will be more towards lifting up your aspiration, but otherwise he empowered us a lot.

Kapoor: Could you talk about the impressions of and contact with the Tata Sons board and with the Tata Group firms?

Chandrasekaran: See, my focus was predominately abroad. If you look at the TCS revenue mix, our market is about 90 percent-plus international. That's because that's the way the tech spend is happening. So, though we work with Tata Group companies, Tata Group companies contributed a very small portion to TCS' overall business. So my involvement with the rest of the firms significantly increased only in the later years and definitely now with the current role I am doing. I'm pretty much aware of what's going on in all the firms, and I think that we can make a lot of difference in each of these companies with a digital transformation, so that is an agenda that I am driving across the group now.

Kapoor: In 2009 TCS achieved \$6 billion in revenue and became one of the top ten global IT software and services companies. What do you attribute to achieving that in hindsight?

Chandrasekaran: I think it's fundamentally the market was there, and we did not shy away from investing. In fact, after the financial crisis I distinctly remember everyone was talking about gloom and doom, and we thought that it would be a big opportunity, so we didn't pull back any investments. We didn't close any office. We in fact increased our sales force, so I think we fundamentally built it in the team that technology is going to be the biggest growth enhancer in every market, in every industry, in every client, so we continued to stay the course. I think that will be the single most important reason for our growth in 2009 and beyond.

Kapoor: And in that year Mr. Ramadorai retired as CEO, and you became the CEO. What were the essential strategy and approach to, as CEO at that time?

Chandrasekaran: So I basically thought about two or three fundamental themes. One, I felt that we were 160,000 people already, so I felt what got us there will not get us further. In fact, Ram told me, "I'm glad I

am stepping off because it's already 160,000 people. How we are going to scale from here?" Was joking with me, so I kind of decided to split the firm into 24 units, one corporate unit and 23 business units, and each business unit having anywhere from 3, 4,000 people to 6,000 people and a business of 400, 500 million or less, and we developed aspiration for each of those businesses, and each unit was focused on an industry with a set of clients, as we were a very client-centric organization. So that kind of built a team of 24 into three or four people on each team, and that empowerment really helped, and that's one fundamental factor where we were able to unleash the power of the organization. The second thing is we believed that continuing to invest in terms of what became apparent later as digital technologies, the cloud, the AI, the machine learning, holistically, not only in terms of training people but in terms of developing tools, developing our own IP [ph?], etc. will help, so we created platforms. We believed that the services industry will move towards platforms in the sense that it won't be the current model. The whole sector will have hundreds of platforms, each vertical. If it's financial services there'll be a set of platforms in financial services, a set of platforms in life sciences, and so on and so forth, so we started creating those platforms. We already have multiple platforms, and those platforms provide the services in terms of outcomes, and that's the model in which the industry will evolve, and we started making those investments, and those are all paying off.

Kapoor: So you mentioned the 24 business units. Was that essential in achieving the growth? Because you doubled in revenue and also in the number of people until 2017.

Chandrasekaran: Yes, we went from \$6 billion to \$16 and a half billion, and we were able to improve our margin. All financial metrics we were able to significantly improve because of a combination of these things, because each of these units had higher aspirations, higher, what do you call, better opportunity, and nobody was getting lost. Everyone had a play, and then they went about it in a systematic way. There was a lot of collaboration but also a friendly competition.

Kapoor: Friendly competition. Yeah, that causes a lot of growth and appreciate that. So what were the discussions that took place between you and Mr. Ratan Tata and others that led you to take the helm of Tata Sons? Let's talk about.

Chandrasekaran: That was a moment in 2016 which was a rather unpleasant moment, so they're looking for a new chairman, and I was interviewed by a committee of five people, and their, I think, biggest question, one of the questions was whether I had a succession team at TCS if I took this job, and TCS has a lot of talent, so it became apparent in our discussions that TCS will not suffer. Then all the other things are about my management style, and they've all observed me there. I'm quite well known in terms of the group and whether I will enjoy working on old age businesses.

Kapoor: A lot of challenges.

Chandrasekaran: Yeah, but a business is a business. You can't always expect that every business will be the same. You have a portfolio. We have a lot of history. Anytime you take a job it comes with certain pluses and certain challenges, and you've got to leverage the pluses and address the challenges, so I'm quite enjoying.

Kapoor: Yeah, I saw the poster outside where “How to Stop the Bleeding” with you in “Financial Times” I think you spoke about that. So, the Tata Group is inextricably tied to Indian industrialization and advance. Did you feel a weight of responsibility as the first non-Parsi and non-Tata chairman?

Chandrasekaran: Not so much as a non-Parsi or a non-Tata person, but I think this group has such a history. You have to keep that in mind because the trust that the brand enjoys is just impeccable. Everybody wants you to succeed, and there’s a lot of expectation in terms of what the Tata Group will do in any situation, so anything that you do, you have to keep that context in mind. That is not to say that you don’t move fast. You’ve got to calibrate, and there’s a lot of history, but with history comes complexity, so we are complex in every dimension you think about, the number of companies, the number of industries, the number of people, the number of markets, the huge variance in performance, the huge variance in size, so you have the whole spectrum, so that vast way in the way you go about structuring the group, I have thought about it, so we have a very strong culture, which is based on integrity and honesty and careful society and so on, but we are enriching the culture by bringing a lot of performance focus, a lot of financial focus, both of which are very important, and we are trying to also bring agility because speed is going to be extremely critical. In order to do all of that, we announced a three-point program, what we call a simplification, synergy and scale, so we want to simplify the whole group in every dimension, and we want to do more synergistic things together, and then anything that we do has to have a scale impact, so we’re trying to apply these principles, and we are all moving in that direction, but it’s a multi-year journey. At some stage we will add the fourth tier. It’s called speed.

Kapoor: Would you describe the importance of technology in the One Tata strategy you have for the Tata Group?

Chandrasekaran: Absolutely. I think whatever be the industry variant, why industry, even societal projects that you are doing, everything is going to be impacted by technology. To be very frank, AI is going to play an integral part. Machine learning is going to play an integral part. IoT is going to play an integral part. So we are in that part of transforming every company, the whole value chain. If you take Tata Steel. What does AI and IoT mean in the context of steel-making, right from mining to steel-making to maintaining a steel plant to marketing, sales, customer service, entire value chain, safety, employee safety, so AI plays a part in all of that, so that’s the kind of adoption that is required in every industry, and we are in varying levels of adoption in each company, but that’s what we’ll go through.

Kapoor: Yeah, in fact you’ve already answered my question because I was going to ask is this helping the Tata Group navigate the next wave of competing revolutions like AI and cloud as TCS is helping many other firms make these transformations, so I think that’s what you--

Chandrasekaran: Yeah, we’re doing that, and we’re doing it in all our consumer businesses. We have so many different businesses in the consumer space. We have airlines. We have hotels. We have every single retail format from electronics to apparel to quick service to food and grocery. Then we have Power distribution. We have entertainment. We have multiple businesses. We are trying to get a single consumer view and with that single consumer view, how we can apply machine learning to get insights

into the consumer behavior so that we can position our products better and offer a better experience for customers.

Kapoor: Yeah, you are not unique in this challenge. In the U.S. it's a huge challenge.

Chandrasekaran: Yeah, yeah, no, no. It's the same thing. We have worked with many firms globally, so I'm, in a manner, of speaking enjoying the opportunity to do the same thing to our own firms.

Kapoor: In fact, there are a lot of people like me that were trained in certain engineering skills of designing chips and software, but all those skills are not needed. It's now AI and cloud and deep learning and all of that, so even new chip designs, they need that kind of skill.

Chandrasekaran: No, you're absolutely right. I think AI and machine learning is not for the elite. It's for everyone. That's in fact the theme of the book that we just launched.

Kapoor: Yes, I was coming to that next. You recently co-authored the book, "Bridgital Nation." Could you describe the notion of bridgital as a uniquely Indian digital transformation or is it universal?

Chandrasekaran: So I think it's universal, but we have written the book in the context of India, but if you take India, we have lots of challenges, but they all can be grouped into two major challenges. One is the challenge of access. Other one is challenge of jobs. We have a shortage of everything. You take doctors. You take teachers. You take infrastructure. You take judiciary. You take any specific area, we have a shortage, and we can quantify it in terms of doctors. More than 500,000 doctors are short today, and even if you take the doctor-to-patient ratio, it's one of the lowest in the world, and also if you take rural versus urban, there is a lot of discrepancy, so there is a shortage of everything, so access is a problem, and also jobs is a problem because we have a lot of talent, and we have almost a million people coming in to work for us every month, so given that, we should be able to somehow manage the supply and the demand, but we are not doing that because we're trying to solve our problems in a different way, so bridgital is all about bringing technology like AI, like machine learning to the low-skilled and no-skilled people so that technology becomes a bridge between jobs and access, so we kind of create jobs on the one hand and solve the access problem on the other hand. That's the theme of the book.

Kapoor: So reconfiguring government and business services based on technology-augmented workers.

Chandrasekaran: Yes, absolutely.

Kapoor: So, are there challenges on the private sector and public sector?

Chandrasekaran: But I think it's the same thing. Even in the private sector because of successful adoption of bridgital, we will dramatically increase productivity, and if you increase productivity wages go up, so it's a double win, and India has a unique problem of a missing middle, so we have a lot of experts at the top, and we have a lot of low-skilled or no-skilled workers in the bottom, so the middle is absent. So most often than not, almost certainly in all cases the missing middle is being substituted by the people at

the top coming down, so as a result, their productivity is substantially reduced. By empowering the people at the bottom, we can come up to fill the middle. Then automatically you increase the skill at the top because you are not going to be able to produce a million doctors in five years. It's not going to happen.

Kapoor: So in the U.S. and in the world there's a lot of discussion about unemployment because of people adopting AI and other machine-oriented infrastructure. Would you comment on that?

Chandrasekaran: I think if AI is deployed in a deliberate manner, it can create jobs. It can create new kind of jobs, which will substantially increase the quality of service. For example, U.S. health care. U.S. health care is as much ripe for disruption as Indian health care is. Okay. The whole service delivery in U.S. health care, and the health care costs are so high. It can be dramatically changed as long as we adopt a bridgital approach to U.S. health care.

Kapoor: Could you talk about the importance of Indian workers to the global future of work in the next decade?

Chandrasekaran: India is going to be the talent capital of the world. It's the real talent-rich nation. We have 70 million people today with less than 30 years of age-- 700 million people less than 30 years of age. It's going to become 900 million by 2030, so I think India is going to have a lot of talent, and we can see it as a challenge or we can see it as an opportunity. To my mind we've got to focus on both education and skills. Just focusing on education is not enough. Just focusing on skills is not enough because you need both. Everybody is not going to do higher and higher levels of tertiary degree, so a lot of people have to develop skills, and skills have to be 21st century focused. It's not about the basic skill sets which we learned all these years. It has to be 21st century skills, digital skills, creative skills, collaboration skills in addition to modern-day manufacturing skills for example for the manufacturing industry like what is digital manufacturing mean? What does adaptive manufacturing mean? And what is the technology IoT interplay with manufacturing? I think these are skills that we've got to teach. As long as we equip the people with the right kind of skills and promote education across the board and universally ensure that every kid has access to skills and education at the same level as any other kid irrespective of where they come from. I think we not only will solve our problem, but we'll produce a lot of talent for the rest of the world.

Kapoor: Could you talk about why women are so critical to the kind of transformation you envision?

Chandrasekaran: See, I think sadly the participation of women in the workforce in India has been on the decline. Hardly 23% of the women who could be gainfully employed are employed for a variety of reasons. This requires a lot of policy intervention, and if we shift this to a global average [ph?], we are talking about additional \$400 billion to India's GDP.

Kapoor: That is amazing. That is very important. Could you talk about why the notion of entrepreneurship everywhere is so important?

Chandrasekaran: See, I think India being what it is, there are a lot of clusters that we can create, but we have not been able to do that either because the right funding infrastructure is not there. I think there's a lot we can learn from the software venture capital ecosystem, so we call it Bengaluru everywhere in the book. How the startups have been nurtured in the software world can be replicated both in terms of mentorships and in terms of financial help and also simplification of the regulations. We vividly describe some of the journeys of the small and medium entrepreneurs in rural parts of India because the basic idea is there, and the hunger is there, and wanting to create a business and succeed in that business, that whole desire is very deep, and there are lots of opportunities in different parts of India, but the ecosystem is not there. So how do you learn from the whole software world of creating unicorns? How do you bring those to the entrepreneur ecosystem in every other sphere in different parts of India because the jobs will come from small and medium businesses. It's not going to come from big corporations, and there's plenty of opportunity for small and medium businesses, so we need to do that if we have to really create a very vibrant economic India in this country, so it's a combination of skills on the one side, on the other side an entrepreneur ecosystem from financing to mentorship.

Kapoor: So if the digital transformation comes to pass, how do you see India's place in the world?

Chandrasekaran: So I think India has huge potential. I think it's very well known what the opportunity is because if you have so much talent and such a large market with a per capita which is only \$2000 today, which by a conservative estimate will go to \$5000 the next 10 years, can grow larger. The economic environment and the market that India alone offers for its own products and services is huge, so as long as we address the public delivery system and ensure that access is available for everybody whether it is in terms of education, health care, or any other essential service like quality of water, all the things that are essentially required so that people can focus on creating value, I think we have an enormous opportunity, so I am very bullish on India. I think these things can be done. We just need to work together to make this happen.

Kapoor: So how do you see the digital being applied outside India?

Chandrasekaran: First I think our focus is to take a few projects here, thinking through what is it that we want to do, and once we are able to do it here, we can replicate it in other markets. I am going out and sharing the thoughts in different forums, and, as I said, it has got relevance both in developing world and in developed world. It's not for us to do everything. Okay? Whatever we can apply we'll apply. I think fundamentally digital is all about bringing the power of AI to everyone. Okay? So how do you do that? So how do you unpack the job? So digital is all about unpacking the specialist's job. It's about removing the myth or removing the halo, if you will, so that things can be unpacked, so whatever can get automated will get automated. Whatever cannot get automated can be done by people with lesser skills with augmentation of technology as opposed to requiring some very, very special person to do it.

Kapoor: It can also help with the barriers that women feel they have.

Chandrasekaran: Yeah. Absolutely.

Kapoor: What trends do you see as most critical for the future of technology?

Chandrasekaran: In general or in India?

Kapoor: In general.

Chandrasekaran: I think it fundamentally comes from the data. It's in the power of cloud, data, and analytics through machine learning and AI. It is going to dominate the world. We have just seen only the surface now. I think it's going to dominate in every segment both in business and in society. I think it can have a tremendous impact in terms of quality of life, in terms of productivity, in terms of huge economic growth, and everyone will agree that any such technological disruption eventually ends up creating a large number of additional jobs. It's just that those jobs will be very different from the jobs that we do today. It's all about the transition, what happens in the transition, so how do you calibrate the transition so that there is no fear factor.

Kapoor: For technology and business to serve the public good basically. That's very important. The transition. So what advice would you give to a young person interested in technology or entrepreneurship?

Chandrasekaran: Learn, learn, learn, the only advice I can give because people's lifespan is increasing, and people will work longer, and there are so many exciting things happening in the world, and the pace of technological advancement is only increasing, and there is a lot of interdisciplinary things that are coming to play, for example health care and computer science, brain and computer science, law and computer science. Computing and AI will have relevance in every industry, so many of these cross-linkages are very important, so learning both by doing and by getting into different fields are very important. I think--

Kapoor: And learning forever.

Chandrasekaran: Learning forever. Yeah, yeah. It's going to be a fundamental requirement for the future.

Kapoor: Philanthropy is a very important part of Tata legacy and culture. Would you like to comment on how--

Chandrasekaran: See, our group was built on the principle of philanthropy. Our founders gave away two-thirds of their wealth to foundation, and the family hardly owns anything. It's all in the foundation, so it is embedded in our culture, and even the best employee practices were introduced by Tata Group companies in the 1910s and 1915s. Early in the 1916, eight-hour working days was introduced, and health care was provided to employees, and insurance was provided to employees. These were done in very, very early days. Most of the policies that the Tata Group introduced later on became law, so I think care and giving back to the community is very deeply ingrained in the DNA of the company, and today it's getting recognized everywhere, and also today's young people also want to be associated with

companies who are not only creating value in the stock market, but they also want to see that the companies are creating value in some purpose, so I think it's a good sign, and we just try to keep that heritage going. And you can be equally successful in delivering a great financial performance by being socially responsible, so it is not either or. It is not either or. We have seen that in our history.

Kapoor: So going back to on the lighter side, your personal side, I read that you're a marathon runner, and you have interest in music and photography. Would you like to talk a little bit about the personal--

Chandrasekaran: Well, I think running has become a passion for me. I picked up running only 12 years ago when I was 44 in 2007 when I was detected to be diabetic, so I thought I'd take up some cardio activity, but then I realized that I enjoy running, so since then I've been running more and more, so it's become a big passion for me. I at least do a couple of marathons a year, and it helps me to stay-- in fact, that determines the cadence of your daily life. I like that, and I picked up photography for a long time. I'm a nature photographer. Most of my vacations whenever I take, it's always in the mountains. We like to hike, me and my wife, so we usually go on treks in the Himalayas, so that's the time I enjoy my photography. Otherwise, normal days I don't get to do, and music is something-- it just keeps you going, so I'm not very specific about what I like. I can equally enjoy Carnatic classical or a jazz or a blues or a Bollywood song, so I just like the idea of music.

Kapoor: So, going back to the family. I know I've seen pictures of you with your two brothers and how you bonded during the early days. Any general comments about the extended family?

Chandrasekaran: I think we are very close. We are a tight-knit family. We don't have to meet every day, but we are very tight knit. I think my siblings have equally contributed like my parents in shaping my life basically to be a good person, a caring person, so these are skills or traits that you develop as a kid. It shapes your life. You don't change suddenly when you are 25 or when you're 45. So many of these things are ingrained in you without your own knowledge, so I think I'm grateful.

Kapoor: So in terms of some of the problems that the country is facing-- one thing I noticed is coming over the years that the pollution levels have gone up, and people are struggling to find solutions, and I know Tatas have always played a big role in addressing various health issues. Is there any suggestion you have about how to address the pollution level?

Chandrasekaran: I think for the 21st century my one view is that there are five things which are fundamentally important. A large-scale adoption of digital and AI, and every leader has to play a very important, influential role in absorption and adoption of technologies in the right way, which essentially not only means in terms of bringing technology to business but promoting the culture of technology in every walk of life. Second to me is sustainability. Sustainability has to get deeply embedded in everything that you do. You can't design a business and then later on come back and then say how I'm going to meet the sustainability norms. Sustainability has to be at the core of the business.

Kapoor: The DNA.

Chandrasekaran: And one of the challenges we as a group have is to embed sustainability in our businesses. To me the third thing is every business has to find its place in the ecosystem. It is not like the past where you developed a unique product and that product had traction. I call it a left-to-right way of designing business. You designed a product, then took it to the market, but now, and the future is always about right to left, so it's all about customer and customer aspirations, customer experience, and what does the consumers and customers want, and ecosystems are developing which will deliver those things to the consumers and customers. You as a firm, what role you play, either in creating that ecosystem, shaping that ecosystem, or participating in that ecosystem. That's the third requirement. And the fourth is about talent. Talent of the future is everywhere, so hierarchical design of organizations have to go. It is going to be the hardest thing to do because we all think that we have capability inside, and then we will go and borrow capability for every small thing whenever we need. That concept has to go because the world is becoming talent rich, and you have access to talent, and it is very visible. So how do you design an organization which will harness that talent continuously and be open to be able to absorb that talent in a constant manner as opposed to creating boundaries? That is going to be the hardest thing to do. And the fifth one is how do you balance a business in this current geopolitical environment? The geopolitical environment is going to be tough. You are going to see more and more stuff where nations are, you can call it getting protectionist or nations are--

Kapoor: Putting barriers.

Chandrasekaran: Conflict. So how do you build a balance? I think these five skills are extremely important, and leaders have to become aware of and become adept at not only embracing this but also influencing each one of these dimensions in a positive way. In this context sustainability is very important. We are doing a number of steps. We are going to go whole hog on the electric movement in India. We believe that the question is not whether electrics have got a market. We have no choice. And similarly we are going to look at renewables as a big theme and not only in terms of very large power plants but also in terms of smaller power plants or smaller household solutions or village-level solutions, micro village. We are looking at many such solutions, so we are looking at not only things like health but also things like energy, things like mobility in every aspect that we can make a difference to sustainability, water. All these ideas will play.

Kapoor: So for example, just recently California has mandated that all new homes have to have solar roofs as of January of 2020.

Chandrasekaran: We've got to take a leadership role in driving some of these initiatives in this country.

Kapoor: So, Mr. Chandrasekaran, thank you very much. It was a pleasure to talk to you, and please come to visit the museum. You will not be disappointed.

Chandrasekaran: Thank you, Mr. Kapoor.

Kapoor: Thank you.

Chandrasekaran: I enjoyed talking to you.

Kapoor: Thank you.

END OF THE INTERVIEW