

# Nurturing Professionalism



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## Introduction

My generation has witnessed enormous changes around it in almost every field: vehicles, travel time, communication, entertainment, healthcare, consumer goods, housing and so on. I feel proud that I had the privilege to contribute a tiny part of that. Engineering is a vast endeavour today, encompassing every walk of human activity. Looking back, I feel happy to share a few things from my fifty years of association with engineering. Many great personalities steered my course on this journey. Great indeed, not because they influence many, but because they visualize, plan, think, act, and lead, and always think of the society before everything else. Unfolding the journey not only helped one in introspection but also to share thought on what I consider are the traits that a good engineer should have at the back of his mind to guide him through his professional journey. In a way, some past events will come forth, some views, though personal, can be shared, some take-away and reflections that can make us think further.

## Ignition

‘Engineers are like Brahma, The Creator. They create things that did not exist before’ - one of my favourite professors used to tell us when I was studying engineering. I vividly remember him telling this very often, with full conviction. Coming from a typical middle class family with semi-urban background, I thought I had studied enough and started looking for a suitable job after my graduation. We visited a few factories as part of our graduation program. Those jobs didn’t impress me.

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Became they involved supervising workers, fighting with union leaders, running after production schedules and repetitive assignments. Not much scope for creativity, I thought. Back in the college, I asked my professor, where do I find that kind of environment. 'Go for higher studies, get into R&D' was the prompt advice. I took that seriously, and decided to pursue post-graduation studies. There was news about boosting up the defence expenditure and the R&D budget. An Indigenous fighter aircraft (HF 24) project was undertaken at HAL on war footing. HAL itself was a creation of Walchand Seth. The Walchand College of Engineering, Sangli, where I was studying was a result of his foresight. And the Walchandnagar Industry, which I visited on our industrial tour, was established by him. Moving from sugar plant they started making sugar plant machinery and boilers, reaching all over India. Later in my life, I had an occasion to visit that plant again to witness our thick rocket case being rolled. Sethji's foresight in acquiring such a huge land (the longest airstrip in India, until recently, was the one inside this factory) and setting up an aero factory when the world war was still on, still fascinates me. Taking right inspiration from that, I joined IISc for further studies in the Department of Aeronautics (now known as department of aerospace) in August 1965. That was the first major turning point in my life.

## **Focusing**

The aero course was quite stimulating. Well learned faculty, good laboratories, many experimental project going around, weekly seminars and impressive inter departmental activities. What impressed me the most was art of analytical treatment of many engineering problems to the extent they appeared deceptively simple. This training of visualising the key phenomena helped me a lot later when dealing with complex problems. I owe this vision to Prof. C. V. Joga Rao and Prof. A. K. Rao. Soon, with our newly acquired wisdom, my first sorties with Prof Damania, one month's summer training at wind tunnel at NAL and two month's industrial training at HAL, I was raring to get into aero-arena. The sixties were full of hopes for aeronautics in India. The 1962 war followed by 1965 debacle forced government to fund many new activities supersonic wind-tunnel at NAL, MIG project at HAL, Air force wanting a better strike power, IIT's starting the aero course. Luckily, computers and IT industry was yet to appear on scene and the aero students those days were looking for opportunities in aero industry itself. However, the main beneficiary, from the point of view of getting the aero manpower, was the United State of America. Because President Kennedy had promised 'Man on Moon', before the end of the decade thereby pushing The Apollo programme to the top gear, resulting in flooding of grants at many US universities. So, the scholarships were easy to come for aero students, and many of my batch mates vanished. I decided to continue, and never regretted that, till today. Then came the second turning point in my life.

## Fine-Tuning

Dr. Homi Bhabha died in Air India air crash of Boeing 707 in January 1966. He was the chairman of the Atomic Energy Commission, and the Secretary to the Department. Being a physicist, he had established a small rocket launching station, TERLS, at Thumba, near Thiruvananthapuram with international cooperation, for the purpose of space physics. Under UN agreements, sounding rockets for these missions were coming from USSR, France and USA. Dr. Vikram Sarabhai accepted to take over and became the new chairman of the Atomic Energy Commission. Both Dr. Bhabha and Dr. Sarabhai had worked at IISc with Sir C V Raman in the early forties. So, the student community at IISc was watching these developments with keen interest. I was deeply impressed by Dr. Sarabhai's declaration, soon after taking over, regarding establishing a research centre to develop indigenous rockets, and use the technology for Indian masses. The world had just then seen the marvel of satellite TV transmission, live relay of 1964 Olympics from Tokyo to US via a geostationary satellite Syncom 3. a miracle indeed, for many people at that time, in terms of technology, watching the 100-m sprint real time, taking place on the other side of the globe and to see result even before it was announced. I decided and in spite of stiff opposition from my parents, moved to Thiruvananthapuram to join ISRO.

Dr. Sarabhai had accepted the offer on his own term. He was a man with exceptional ability. Coming from a business community with lot of family heritage, it is rare to have interest in fundamental science. He simultaneously worked on chemicals, pharma, textiles, management, atomic energy and space physics. Noble at heart, his interest also extended to art and culture. Dr. Sarabhai picked a few key experts with some related experience to accelerate his plan. One of them, who left lasting impression on me, was Dr. Vasant Gowarikar. Expert in his own field of polymer chemistry, with decade of experience at UK, he soon built an all-round team and developed the powerful solid fuel that a good rocket programme needs. The successful PLSV, going all the way to Moon and Mars, uses this fuel and all chemicals needed for the stages developed using indigenous technology. He was an excellent team builder, and had admirable ability to judge and motivate people. He was a very assuring person, full of confidence and human touch. He taught people to take pride in what they do. Watching and following him was a kind of internship for me to migrate to technology management. Funding was no problem, neither then nor now, though one had to make a good case for that. Dr. Sarabhai shielded the new organization from bureaucratic processes and delay. Many call Sarabhai a visionary. I feel he was more than that. He knew how to convert the dreams into reality with clear goal setting, freedom of approach, intense interactions, transparency and data sharing, clear division of work, regular reviews and mid-course corrections, analysing failures, ownership of responsibility, personal touch with the team mates, external support in key areas, involvement of related R&D groups/academics, he, in effect, laid a solid foundation for the road ahead and success of ISRO's missions. To me, these were lessons in management, key to achieve something as a team. There were

many broad and subtle aspects to learn and practice, and I tried them to the best of my capacity.

ISRO was full of opportunities. Not many engineers are fortunate to find a job which meets their aspirations. I wanted creative assignments and opportunities to master the engineering that was provided by indigenous rocket programme, launcher for India's first satellite launch vehicle SLV, Rohoni Satellite for SLV, Aryabhata-India's first Satellite putting India on world-space map, a dozen imaging satellites for resource mapping, planning and monitoring, another dozen for metrology- gathering  $24 \times 7$  weather data over large sub continental region including oceans, communication satellites for domestic and international use, and satellites providing hundreds of TV channels. Working on so many projects for the nation was a very satisfying feeling indeed. In the process, I was a gainer too, promotions, international travel, awards, rewards, fellowships, recognitions, status and respect. And also, the Newtonian realization, that what I have studied and acquired was a pebble in this ocean of technology. Continuous learning is essential when you wants to reach the state of art technology. Broader understanding of allied fields also becomes a prerequisite. At a higher level of engineering and technology one can't be far from basic sciences. With this realization, I spent some time at IITB and IISc as a visiting professor. It was great help to update my engineering and narrow the technology gaps that get generated with time. Interaction with faculty from different domains who work in frontier areas was very gratifying experience indeed.

## **Sharing the Lessons**

My career of fifty years brought me in contact with a variety of people attached to different groups, suppliers, sub-contractors, fabrication agencies, R&D institutions, academics, students, user departments, government agencies. Many of them were not as lucky as me, to get a dream assignment. As a matter of fact, most of them were not looking for one. For bulk of them it was just a job and not a career. Actually, engineers are quite high on the social ladder in our country. but a good job essentially means a good package for them, a tool to meet their ever-growing needs. For an overgrown country, the majority of learned people turning into self centric lot, showing no concern, for the rest of the society, is a serious cause of concern. Further, even when a job is not to one liking, one needs to take pride in doing that. Even in routine jobs, one notice lack of honesty, commitment, ownership and absence of professionalism. Society would suffer seriously if this situation continues. This lack of value system needs to be amended.

## The Second Innings

Post retirement, I got into an IT major, to boost their ITES. That was the third turning point in my life. Moving from a protected environment to a corporate sector was a real challenge. Relatively young and inexperienced team, high attrition and movements, ever growing business targets, demanding customers, deadlines with penalty clauses, no R&D were tests of my adaptability and effectiveness, notwithstanding my technical standing and engineering skills. But, my earlier learning and not-tested skills surfaced to the brink. My second innings was also satisfying,- developing teams to do engineering on screen, working on hundreds of short term projects with minimum resources, dealing with 60 odd overseas customers, developing new areas of expertise in tune with the market, pushing the business and the resources to over five times in six years. This success was also reflected in my personal balance sheet as well. A glaring reflection on a society, where lucky ones, working with relatively low technology are much better off financially, while serious research workers have to struggle throughout their lives. Nevertheless, there is lot to learn for the older and traditional sectors from this new wave corporates. There are several practices that contribute to the productivity and efficiency such as trimmed manpower, less paper work, quick decision process, no frills or subsidies, less leaves, use of cell phone, e-mails, computers, and video-conferencing, networking and information base, less travel, less meetings, cost consciousness, eye on return on investment, quick filling the resource gaps, mechanism for fixing the responsibility and speedy court marshals.

## Conclusion

### *And the Take Away*

Now in the third innings there no races are to be run, no proving yourself, no working for money. It is time to think and share what one learned and practiced. People often used to ask us, after our Satellite launches and Vehicle flights, 'how far we are from US or Russia in the race'? Dr. Sarabhai would have disliked the question, I guess. He was not for race. He wanted us to do what the country needs. While doing so, we were often handicapped on many fronts due to by lack of technology and quality products was available in India. For hundreds of items, starting from simple rivets onwards, we had to run to get import licences and foreign exchange. The liberalisation has done away with these procedures now, but the status of engineering goods has not changed much. Indian industry is unable to take advantage of the enormously growing consumer market. In fact, the goods produced here have to compete with international products now. So, with the protection gone, customer—the importing. We import aircraft, warships, fighter jets, gliders, guns, medical equipment, instruments and simple looking spectacle glass. We also import food items, clothes and toys such as balloons and tops. The bulk of industry is happy getting into 'licence production'

of international brands. The so called 'big domestic market' has fallen for foreign brands and goods. In the absence of strong liability laws, the majority of industry does not produce quality products. Lack of good R&D pushes even a good product out of market in competition. Products are no longer domain specific now. Importance of multidisciplinary research is not realised. Modernization and up gradation in terms of materials, instrumentation, automation are needed. The goods sold in the days of captive market now need to be tuned to the 'voice of customer' in terms of improved performance and standards. All this may sound tough, but it is a matter of survival if not a matter of national pride.