

My Experiences

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Challenges due to birth place

Being born in a village and studying there a few classes before moving to a nearby town /city is no disadvantage. Actually, it gives an exposure to the entire spectrum of people who have their own wisdom. A fully city based ‘urbanite’ need not be considered as a typical person to ‘know all and do all’. I was fortunate to be born in a village- called Mudikondan in Thanjavoor district, Tamilnadu in 1942 and had my early education in that village upto 8th standard and then moved over to a nearby town called Mayiladuthurai and got my secondary school education in Municipal High School.

My teachers during the primary and Secondary schools gave me a reasonably good education. My higher education was in Madras University, Madras Institute of Technology and University of Florida. This spectrum of places and cultures gave me the realization that that this world is diverse and we have to accept them initially as they are and work towards improvements.

My inspiration

A couple of very good teachers during my early childhood, could inspire in me the importance of education and kindle my interest in studies.

When Soviet Union launched its first satellite (Sputnik) during 1957, newspapers flashed that an artificial moon called SPUTNIK has been launched. I used to go out in the nights with the fond hope of seeing it. But I could not see it with the naked eye. But I was inspired by that effort and I felt that I should also do one day something similar to that.

Fortunately, I could join the courses which I desired to, in reputed institutions and I always had some curiosity to know and thus could do well in studies.

Later after completing my studies , again, I was fortunate to join I.S.R.O during 1972 and work with renowned space science experts like (i) Dr. Abdul Kalam for ISRO’s first satellite launch vehicle (SLV) project by designing and delivering communication systems of ROHINI satellite which it carried, (ii) with Prof. U.R Rao, for the first Indian satellite project ARYABHATA, for design and development of communication system of the satellite and (iii) Dr. Kasturirangan, as his Deputy for first operational Indian Remote Sensing Satellite Project.

All those with whom I worked, whether they were my superiors or subordinates; could motivate me with their approaches to work and desire to succeed. In turn, I also did my best to reciprocate.

My work and technology challenges

After my graduation, initially I worked in L.R.D.E (D.R.D.O) on Radar signal processing projects. Later, I joined Indian Space Research Organization as a Scientist/Engineer and worked on the first Indian- satellite project ARYABHATA as a system engineer for developing communication systems. We took a little help from Russians, as they were advanced in that field in understanding the complexities involved in the design, fabrication and testing of satellites and the technologies involved. This satellite launched during 1975, paved the way for future growth of our space program and many successes. **Always, starting is a problem. Once we start, it grows.**

Space will not forgive us if we make a mistake. As everyone knows that satellite systems flown in space cannot be repaired unlike the earth based systems, the reliability of the space systems over its designed life must be very high close to 100%. A reliable design, analysis, use of right type of materials and components, right type of fabrication processes backed by quality control and full complement of test and evaluation to ensure that the system will withstand the harsh environment of space during its lifetime are all required. The basic satellite technologies were developed during that project in India.

Engineering and management challenges

When we start working in an organization or a company, we meet with some challenges. The area of work can be anything -say, design and development, analysis, fabrication, testing, management or some service. Generally, the objective in terms of outcome of the work may be specific to that organization or company. In order to meet or exceed the objective one has to be creative/innovative. In satellite projects, where I worked, the objective is different for each project. And no two projects are same. Each satellite must be engineered to meet its final objective. Even if two or three satellites are duplicated, some improvements from the previous version of the product is always required making the room for innovative thinking. Many technologies are unavailable in this area. **There could be many impediments for achieving success in one's effort and one should consciously find other options of achieving the goal.** We did exactly the same in I.S.R.O and found alternative workable options to achieve the set goal.

There are management challenges as satellite projects are inter-disciplinary.

A manager's responsibility includes

1. Human resources: It is necessary to put right person on the right job and it starts with the recruitment. And obviously proper incentive and recognition are required to be given for such persons. Then only success is guaranteed.
2. Other resources: The minimum required infrastructure must be provided for carrying out the work.
3. Inputs: To make a product, if raw materials to the required quality are not available to make the final product, due to some reason or other, (sometimes, due to geo-political reasons, sanctions may be imposed and were once placed on India by some countries after Pokaran nuclear test) they were to be faced and alternatives are to be thought of. For example, if it is an important component to be used in a system, either we develop it on our own or find alternative sources or find an alternative route to develop the product by avoiding that component. There are many ways of realizing a product meeting the end user's requirements.

In ISRO, we faced such problems and solved by one of the above methods.

1. While engineering a product, it must be ensured that conscious efforts are put to optimize in every direction without diluting the end goal. This makes the product acceptable and competitive.

2. A proper guidance and a Review system must be in place. Regular reviews and need based reviews of work must be conducted frequently and concluded for possible action.
3. Reliability and Quality assurance: This world is a competitive one. Only companies that provide quality products or service at competitive price can survive.

What I learnt

I retired as Program Director of Indian Remote Sensing Satellite Program looking after the satellite developments. We achieved many successes. In all these projects, maximum have been achieved with minimum budget compared to advanced countries in the world. For achieving success, the points learned by me in ISRO at individual level are

1. Meticulous planning of activities required before implementation.
2. Preventive steps are to be taken so that no problems arise later.
3. Such steps are to be taken well in time; not at a late stage, where implementing solutions become extremely difficult.
4. Mid-course corrections are also sometimes required .
5. Coordinated team effort is very important for success. All the team members require to work for the same purpose and goal.
6. Pro-active work culture leads to success. (It does not mean there should not be any difference of opinion. Differences in opinions help in discussing merits and demerits of different approaches/options. With proper discussions, the final decision on the approach to be taken will automatically emerge and the leader of the team can easily take the decision. (This approach was well emphasized by Prof. S.Dhawan, who was a former Chairman, ISRO.)
7. Proper informal and formal communication between team members is a must.

Why not first?

Why we should be always 2nd, 3rd in the world in anything we do? Why not first? This is the question asked by Dr. Abdul Kalam also. Such an effort was taken by building the **world's first** twin satellites (IRS-1C/1D) in terms of their capability in providing best resolution pictures from space during 1996 in the civilian world. . And nationally and internationally, their successes were applauded and appreciated. The mind must get tuned to strive for the first place.

Role models in my life

It is always good to look for a role model in one's life. I remember even now a couple of teachers who taught me well. In fact, I feel that even if you come across a couple of persons who have created an impression during some part of your life that is enough to change your life. I did not fall back on a single role model, but gathered the good traits from various persons, whom I have come across in my life. I have learnt from my superiors, colleagues and sub-ordinates. To mention a few, my mentors were Prof. U.R.Rao and Dr. Kasturi Rangan, who were Chairmen, ISRO during successive periods. Similarly, I learnt many other traits from my colleagues. Those traits include dynamism, sincerity and seriousness in what we do. I found many of my friends in ISRO possessed those great qualities.

What is required from every individual ?

Responsibility: To have a responsible society, every person must be responsible. This can be achieved only by educating and training all citizens during their school/college days by parents and teachers and using different media and make them aware of individual's responsibility in a society.

Commitment to work: This ensures individual success and also collective success.

Commitment to excel: This is a must in all professions. We get satisfaction when we complete a task with this type of commitment.

To help others : Not everyone is equally capable. Others may require some help to achieve or complete the task to satisfaction. Wherever we can offer help, why not? We also derive good satisfaction by helping others.

Sincerity: We must be sincere and serious about anything we undertake or do. Automatically, success will follow. Additionally, others respect only such persons who are sincere to the purpose in what they are doing.

Contribution to society: Through our work, we contribute to the society in some way or the other. Youth is the time when our contribution can be maximum. There is also a question in my mind regarding the usually prevailing 'retirement' concept at the age of 60. There is no such thing as complete retirement during one's life. I feel, if one lives in this world, one must make contributions to the country / society (local or larger society) consistent with one's age and capability. The concept must be – we have no right to consume unless we produce or do service. Money should not be criterion to work after retirement but it should be based on providing some service to the society. One must work all through the life to one's capability or liking. Mahatma Gandhi used to spin the wheel to help Khadi industry in addition to his voluntarily taken responsibility of being a moral teacher to the nation backed by his practice. Following the footsteps of our father of the nation, in a humble way, I started working as a teacher in an educational institution after my formal 'retirement' to share my experiences and knowledge with the students. I found it was liked by the students also as they were of the view that they get first hand knowledge from a person who has worked on what he teaches.

How the Government or NGO's or Educational Institutions can help

The future of any country lies in its right population demography and capability of the population. To ensure this, a proper program is a must to get quality education and quality training for all citizens in the country which pave the way to result in quality products/service. Every educational institution must be accredited. Automatically, this results in economic growth and better standard of living. Each person is capable/talented in something which must be identified and improved. Investment in improving the quality of human resources goes a long way to make the country better. Major responsibility for this lies with the Government (with the support of NGOs wherever required), as it has the power and financial resources to embark on such programs.

Opportunities galore:

In this present world, opportunities are more. With the knowledge explosion, there are so many new avenues opened up for progress. So many types of goods and services are required in this world. What is required is only that a person must be good at least in his/her chosen field. He/She can log on to that and try to excel. Excellence thrives while mediocrity can only just survive. Let us work for a prosperous India of the future.