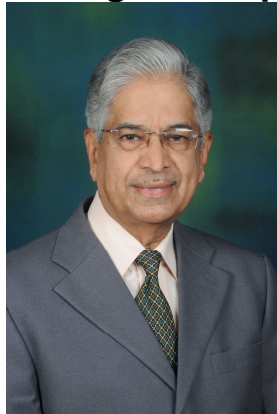


Treating Challenges as Opportunities



BN Suresh

As we move along in our life or in our career we face challenges, which are natural. When we come across such challenges there are two ways of treating them, either from a perspective of helplessness or from a standpoint of one's own belief. But when we choose the latter, we are consciously optimistic and these challenges open up a vista of opportunities. Once we accept a challenge, no doubt we step into the world of the unknown and it has a potential to change us forever, while in search of a solution.

With the right mental attitude one can certainly reframe the way one treats the challenges. To look back and view such challenges, I have faced in my long career of four decades and more at Indian Space Research Organisation (ISRO) and Indian Institute of Space Science and Technology (IIST) at Thiruvananthapuram, are some of the most valuable life experiences for me. Throughout my career I was quite fortunate to come across a number of challenges and knowingly or unknowingly in all such cases I have taken decisions to accept them and find apt solutions. Each of such challenges has transformed into an opportunity and has helped me to learn something new and very valuable in life. As a consequence, it has made me more informed, confident and not to shy away from facing challenges as I go along. I want to share some of the interesting challenges I have faced during my long career at ISRO and narrate to readers how it helped to open up gainful opportunities which have benefitted me immensely.

My entry into ISRO itself was not by design, but it happened. I was one of the ten students who were studying post graduation in mechanical /machine tool design at IIT-Madras, Chennai during 1967-69. In mid 1968, a small advertisement in one of the National papers, drew the attention of some of us in the final phase of our project. It was about a few job openings for engineers with post graduate qualifications at Space Research Organisation at Thumba. The very fact, the advertisement mentioned that they would pay all expenses for the candidates called for interview; it attracted us, as we felt it is a good opportunity to visit the Kanyakumari which is only two hours by bus from Thiruvananthapuram. We did not even remember about our application, till four of us got interview calls on one fine day in November 1968. We presented ourselves before a small selection Board and the interview was smooth. We returned to Chennai after fulfilling our main aim of visiting Kanyakumari. It was only in March 1969, two of us received the news of our selection but it did not excite us, as we felt that this posting is only a springboard for us to look elsewhere shortly.

Nevertheless my friend and me who got the offers joined Space Science and Technology Centre (SSTC) in the month of July 1969. Later on, in 1972 it was named as Vikram Sarabhai Space Centre (VSSC), in memory of the founding father of space programme Dr. Vikram Sarabhai. On joining, I was instructed to report to Dr. SC Gupta, the then Head of Control, Guidance and Instrumentation Division (CGD) who subsequently went on to become Director VSSC and steered the launch vehicle developments very efficiently. I met him the same day and he spent about half an hour explaining the various tasks of the Division and also broadly the goals set for the Organisation. He mentioned that he has a particular assignment waiting for me and stated that it is the development of a control system for the first stage of the proposed SLV-3 launch vehicle. He also gave a broad outline of the development involved. Obviously I did not feel very comfortable with the proposed activity since the task assigned to me was in control system whereas all my studies were in mechanical engineering and design. To accept the development of control system, where I have never studied this subject anywhere, throughout my studies was certainly the first challenge of my career. I spent two days thinking over the same again and again, discussing with my seniors who were already there and spending time in library. At the end of two days I still had a great fear of failing in my first assignment but I decided to accept the challenge as it would open an opportunity to learn a new discipline right in the beginning of my new career.

The difference between the probabilities of success and failure, when we face a challenge is only in our perception. How we represent things to ourselves determines our response to that situation. Our positive response surely gives us the right solution. I spent a lot of my time in the next couple of months, studying the new subject intensely in library and discussing with the control experts in the Division. Deep and deep I started exploring the new subject, it not only became interesting but more and more fascinating. This intense involvement and urge to learn something new led me to build a proto unit of the control system successfully within a span of one and half years, which became a forerunner for today's advanced control systems of launch vehicles.

Dr. Vikram Sarabhai who was guiding the space activities in the very initial period of space programme, used to visit SSTC frequently those days. During all such visits, he used to find time to visit some of the laboratories where interesting development works have been carried out. On one such visit in the last quarter of 1970, our laboratory was included in his itinerary. I was thrilled to demonstrate the successful functioning of the proto unit of the first stage control system to him. He spent fairly a long time showing keen interest in the system, asking a number of questions and probing my understanding in the area. I still vividly remember his open appreciation of this development work in the presence of several officials and visitors. We ultimately flight tested the control system successfully in all our SLV-3 flights.

This experience helped me to expand my expertise in the new area of aerospace control system. During 1975 when I applied for the commonwealth scholarship for doctoral studies at United Kingdom, they were looking for scientists working in the area of cutting edge technologies in India. Certainly my experience and learning in this specialised field of aerospace control systems for five years facilitated my selection. I am happy that the challenge accepted in the very beginning of my career helped me to open up an opportunity to do doctorate in my area of interest in one of the premier Institutions of U.K. Also my experience of building hardware and software in control systems at VSSC greatly assisted me to complete my doctorate in just two and half years. After my return from studies, I continued to work in the same area of navigation, guidance and control and my long experience in the control and avionics areas enabled me to head Avionics Group at VSSC, although I had my education all

along only in mechanical engineering. Even now many of my colleagues do not know that I did specialisation only in mechanical area during all my studies. Learning and mastering control and avionics in my career coupled with my core area of mechanical engineering during studies helped me immensely to understand, develop and manage many of the complex aerospace systems needed for our launch vehicles.

Another interesting experience of facing a challenge was in the late nineties. While I was at VSSC, I got an opportunity to participate in the reviews of a major National Project of defence being developed at Bangalore. I was inducted as one of the review members from ISRO for the test readiness review board to clear the vehicle for flight. Several meetings of the board were conducted to review various aspects of the vehicle. During the course of this review period, the Country carried out the second thermo-nuclear test at Pokhran in Rajasthan desert. As a consequence, sudden embargo was imposed for very many critical elements. This resulted into denial of many high end technology elements for some of the National programmes. This National Project also came under embargo and the result is no doubt, inordinate delays in its development. In one of the test readiness review meetings this aspect was discussed and some of us felt that we should undertake the indigenous development of all denied items in the Country and replace all imported elements one by one in a progressive manner. Threat of embargo was a blessing in disguise, which created the indigenisation opportunities. We firmly believed that we have the needed capabilities too in the Country.

One of the critical elements denied for this programme was quadruple redundant electro hydraulic actuator. At that time there was only one company in the globe, located at USA who had the capability to supply this item to our specifications. Without understanding the full complexity of this subsystem I took up the challenge of undertaking the development of this critical system at VSSC, based on our experience of successfully developing a range of actuators for our launch vehicle programmes. Although there was some reluctance initially, to accept this development at ISRO we got the needed approval from our management. The interesting part is that some of the senior officials who have been closely associated with the National Project called me and cautioned me that I am making a grave mistake in accepting this challenge. Their perception is that it is impossible to develop the same successfully in the Country due to sheer complexity of several subsystems in the actuator and also due to non availability of sophisticated facilities for their testing.

In all our careers, challenges are the real stuff of life. They certainly create an opportunity, make us stronger and smarter and provide us the way forward. The task of actuator development involved, among other things, networking with several agencies in the Country, building a number of facilities at different Organisations, facing a few failures as we move along with development and finding the right solutions. I knew that it was a very rough road and the development took more than 14 years before the system was accepted by the flight certification agencies. Self discovery is the outcome of this challenge and today we ourselves wonder how we could accomplish such a complex job, after travelling through the very rough terrain of development with several setbacks. It gave me and also to the entire development team tremendous confidence to undertake such complex jobs in future and realise them successfully. It would not be wrong, if I mention that we became the second country to master this technology, next only to the Country which supplied the system earlier. Although this development was for a National Project, it created an excellent opportunity for us at ISRO, to master some of the complex technologies needed for the human space programme well ahead of our requirement. Many of the critical facilities have already been established in the Country and are now available for our

developmental activities. No doubt we at ISRO are immensely benefitted by this technology development since some of the new technology elements are already being implemented in the ongoing programmes of ISRO for improving the performance and reliability of the existing systems.

Important lessons I learnt from undertaking this challenge is that until we jump into challenges we won't get any opportunities. It is one of the most empowering things we can do for ourselves. We chalked out well planned development route looking into all aspects of development, testing and qualification. We started controlling our steps from the very first step, systematically and cautiously, so that we are in the right direction. This kind of planning and execution made it much easier for us to maintain the right direction and reach the set goals. In my opinion it not only paved the way for success but also provided an excellent opportunity to learn many new and exciting technologies.

Establishing the Indian Institute of Space Science and Technology (IIST), an academic centre of excellence, under Department of Space at Thiruvananthapuram in a very short span of time was a very exciting experience. This is the period I faced series of challenges which were quite demanding, at times impossible targets to achieve and in some instances most frustrating too. The genesis for starting an educational Institute under ISRO itself was very interesting. We at ISRO had a practice of briefing the Prime Minister of India, invariably after the successful launch of a major mission like PSLV or GSLV. The presentation team invariably consisted of 10 or 12 members, mostly key functionaries of ISRO, who were directly responsible for the execution of the project and the team was led by Chairman ISRO. In the middle of 2005, after one of our successful launches of PSLV, some of us had an opportunity to meet the Prime Minister and brief on salient aspects of the launch and also on the satellite. Immediately after the meeting tea was arranged and PM was gracious enough to join us, in spite of his very busy schedules and spent some time. During the informal discussions, he raised a pertinent question on the availability of bright and young scientists/engineers for our future ambitious programmes. In response to our answer that we are having difficulty in getting the bright candidates, as they are lured by the attractive salaries being offered by IT and other knowledge based MNC's / private companies, he seeded the idea of initiating a well structured system or mechanism within the Department to overcome this problem.

This was the genesis for us to initiate our proposal for starting a Space Institute of our own. I was asked to prepare a Project proposal by the then Chairman ISRO and the same was prepared in consultation with some of our colleagues at VSSC and ISRO HQ and submitted the same after all internal reviews. The name for the Institute was also decided as Indian Institute of Space Science and Technology (IIST) and be located at Thiruvananthapuram, under the control of Department of Space. We submitted the proposal to the Government in January 2007 and got the approval in April 2007 within a short span of four months. In the month of May, the then Chairman, ISRO called me and informed me that I should take over as Director, IIST and establish the Institute within a short time. I was quite surprised by this proposal. He further stated that we should start the first batch in the year 2007 itself. It is just four months to put in everything needed for the Institute whereas we had nothing with us on that date. I was very shocked, as it is an impossible task to set up an Institute within such a short span just four months.

It was indeed a very big challenge, because as already stated, we did not have any infrastructure in place, like the building or space for Institute, laboratories, faculty, syllabus, how to source the students so on so forth. This challenge was certainly a frightening experience for me but I felt that it is also an opportunity to test my abilities

to meet such a daunting task. This feeling suddenly brought a positive spin in my thinking and with that positive energy I started working out the ways and means of meeting such demands. I was fortunate enough to have good colleagues at VSSC and important functionaries at ISRO head quarters including Chairman ISRO, who extended the full support in providing the solutions to many of our complex problems.

Identification of the temporary building was an important decision. We decided that we would utilise the new training facilities being built for the training programme of VSSC personnel, as temporary and alternate venue for IIST. Since I was also holding the post of Director VSSC it was easy to discuss with the Head, training programme and convince her to spare the new facilities to IIST and continue her training activities in the buildings already existing at VSSC for some more time. We made some alterations to the new training complex building and created three nice class rooms to cater to three streams which we were planning to start. We had also constructed a community hall in the same complex which became very handy for us to house the IIST library and a few indoor sports facilities. We also got permission to have access for our faculty and students to use VSSC library, which is one of the excellent libraries.

We decided that in the Institute we will run three undergraduate courses in aerospace engineering, avionics and physicals sciences, needed for space programme with more emphasis to the space activities. Framing of syllabus for all three streams selected in such a short span was indeed a very daunting task. We took a quick decision to constitute a National level Committee with members drawn from all prominent Institutions in the Country including IISc, IIT's, R&D laboratories and experts from ISRO. Prof R. Natarajan, an eminent academician, former Director IIT Madras, and former Chairman AICTE accepted our request to Chair this Committee. After a number of sittings, reviews and discussions we were able to put in place a very good syllabus for all three streams by August 2007, with a good option for electives, which was a good balance between the technical requirements of ISRO and mandatory requirements of regulatory bodies like AICTE.

With all these activities we had already stepped into the month of May 2007. We need to initiate the classes for this academic year by the month of August or latest by September 2007. Neither we had any faculty members to start the classes with us nor we had finalised the mechanism to source the bright students for the Institute.

We finalised the minimum number of faculty members required for running the first year for all three streams and took a quick decision to release the advertisement with full schedule of interviews and joining date. The advertisement was released in June 2007. The interviews dates were fixed during 1st and 3rd weeks of August 2007 and decided to organise the interviews at Bangalore. Fortunately we had good response for the interviews and during the course of the interview one of the external examiners from a premiere academic Institution asked me casually when we are going to start the courses. I mentioned that we are planning to start the classes on 20th September, just a month away from the date of interviews. He stared at me and reacted sharply, stating that he asked a serious question and not to cut jokes. It took a lot of my energy to convince him that I was not joking.

In order to meet the very tight targets, I took an important decision of releasing the appointment order, with the necessary approvals from the Department, to all selected candidates, at the end of interviews every day. We also made an earnest request to all selected candidates to join the Institute on or before 10th September positively so that we can start the classes on 20th September. We also requested all the candidates appeared, to stay till the end of the day, to know the results and take their appointment letters same day in the event of their selection. No doubt that under such challenging situations making this kind of crucial decision was very vital. This

one decision enabled us to position the entire needed faculty at IIST by 10th September.

Since the whole process got delayed and also we were very firm to start the classes within a few months, an onerous task, we were in dilemma about the method of sourcing the bright students for IIST. We decided that we will have an intake of about 150 for all three streams. We also took a decision to join the IIT entrance process and consulted concerned IIT authorities to allow us to source the students from their list. With great reluctance they agreed, but with a condition that we can do it only after their selection process is fully completed. We did not have any choice but to accept it. We inserted a separate advertisement inviting the students who had appeared for the IIT entrance to apply separately for IIST. We had an overwhelming response, running into thousands of applications and we were quite pleased.

Meanwhile we worked on development of entire procedure for counselling and selection in a professional manner within the short time available and declared that we would conduct the counselling in one of the prominent hotels in Bangalore. Since IIST was a new Institute and we did not have any infrastructure with us at that point of time, we were very nervous about the response on the day of counselling. But by 10.00 hrs we were quite thrilled to see a big rush of students with their parents seeking the admission into the Institute. I presume that this overwhelming response was entirely due to excellent performance of ISRO as an Organisation. We arranged an open session to explain about our grandiose plan for setting up all activities including the infrastructure for the Institute and also on ISRO's activities. Excellent presentations were arranged, followed by the long session of questions and answers clarifying all their doubts. I was very nervous that some of the parents might demand to show our facilities at Thiruvanthapuram since at that time there was none, although we had our own plans to set up the needed facilities in a short time. Fortunately none of them insisted on this and it could be that all of them believed in the capability of ISRO in setting up the best facilities based on our earlier track records.

By 16.00 hrs, entire counselling process was over and all of us were filled with joy because not only we had filled up all 156 seats but we also had a long list of waitlisted candidates. The overall ranking of the students who opted for IIST was reasonably good, considering that we are a new Institution and yet to test the waters. Finally 136 students stayed in the first batch and I am happy to mention that all these students did very well not only in academics but also in all other extracurricular activities. Most of them are presently with ISRO making excellent contributions. Even today I admire the parents of students for their bold decision to admit their wards in this new Institute where we did not have anything at that time. I guess that their decision must be purely based on the ISRO reputation and now I have full satisfaction that we did not let them down and instead created tremendous opportunities for their all round growth.

We were under tremendous pressure to declare the date for starting the session. But we did not have any accommodation for the students in the campus. We had no clue as to how to organise the same. I requested our VSSC administration headed by Shri KM Nair who was our efficient Controller to hunt for suitable accommodation in the city and hire. After hectic search for couple of days we were able to identify two or three places for the boy's hostel. One of the buildings was well suited for the purpose and other accommodation was carved out of the regular houses. We had a few girls in the first batch and we finally took a decision to accommodate them in our guest house located in city, since it has all facilities and importantly the needed security. Once these things are finalised, we announced the date of joining as 20th September. We had the inauguration in the morning of the same day and the classes were

conducted in the afternoon. After a long time I was able to breathe easily and go home with some sort of satisfaction of overcoming the almost impossible challenges.

While these things were being solved with hectic follow ups, we had yet another problem of providing the laboratory facilities. We did not want to cut the corners here, since it would make the students suffer. I set up a team of experts headed by Dr. KN Ninan, the then Deputy Director, Chemicals and Propellants systems at VSSC to survey in and around Thiruvananthapuram and enter into Memorandum of Understanding with the Institutions which are having the best of the facilities. The team identified Government Engineering College for engineering and Mar Ivanios College, Thiruvananthapuram for science. But to convince them to support us took a lot of our efforts because they had their own genuine difficulties to accommodate our students suiting the requirements of their students and also our students. With all these efforts which we thought one time impossible, we could conduct the practical classes for all our students very efficiently, although most of the times our students attended the practical classes in the evening.

The greatest challenge we faced was to identify a suitable location and land for the new campus in and around the city of Thiruvananthapuram. We had estimated that we require about 100 acres of land to establish the Institute. Initially we requested the Government of Kerala to provide the needed land but they expressed their inability to do so since they have no vacant land of 100 acres Government land in the vicinity of the city. Immediately we took a decision to float a public tender for the same and the advertisement was released in all Kerala newspapers. We had a good response and after the due process of evaluation, we bought the land in Ponmudi from one of the bidders which was the lowest in cost and more suitable for the Institute. In order to complete the civil constructions in time we had parallelly floated a separate tender giving all our requirements seeking the proposals for undertaking the turn key contract for realising the entire infrastructure including the architectural features. Here too we had good response from the reputed builders all over India. Soon after the land was bought we requested them to provide the full design tailoring the same to the land we had bought. We set up an expert team to evaluate the bids and recommend one party which met all our technical and financial requirements.

While we were quite happy with the overall progress, we were shocked to hear one day that the Government of Kerala notified that the land we had bought is essentially ecologically fragile forest land and the matter went to court. All our efforts carried out in a hectic manner came to nought. I was terribly disturbed and had no clue on how to meet the demand for the new campus. After a great deal of deliberations on the matter and search for alternate land we did not see any sign of getting one in the near future. This realisation brought us many sleepless nights as it was mandatory to create a new campus as quickly as possible otherwise, it was impossible to manage the Institute in the temporary campus for long. The time was running out and new batch of students were joining every year. We needed many of other infrastructure facilities in place to manage the efficient running of the Institute. When we are working towards an important goal, the last thing one wants is to face big and unexpected challenge or obstacle. When that happens, it means a major delay, mind stops working and that brings in unimaginable complications. This is precisely what happened to us with this unexpected turn of events.

This situation created a kind of panic in us and both myself and the then Chairman ISRO who was also Chairman, Board of Management, IIST were forced to do a lot of brainstorming with all concerned officials at ISRO. Finally we had to take a very difficult and crucial decision of carving out 50 acres space in the ISRO facilities already established in Valiamala. It also became necessary to convince our contractor to remap the entire architectural design and buildings they had worked out

for Ponmudi to this new geographical location. Although they had a lot of reservation and reluctant to do so, I was able to persuade and make them accept our proposal. I started spending a lot of my time with the contractor, and the architects on a continuous basis. In the process it would not be wrong if I say that I almost started functioning like a civil engineer. Finally the foundation stone for the entire civil works was laid in December 2008 and with our continuous concerted efforts we completed the one large academic building, five hostels, two canteens, basic sports facilities and all other civil and electrical amenities associated with it in a record time of 20 months after the laying of the foundation stone. We shifted the entire Institute to the new campus in the middle of August 2010. On Independence Day I hoisted the flag in the campus and during the address I stated that my feeling is almost similar to Neil Armstrong when he landed on the moon and hoisted his National flag.

The question that comes to my mind is what is the take away for me from all these challenges I experienced. There were instances which made me very nervous during the setting up of the Institute, since if I fail in any of these ventures, it was beyond one's imagination to guess the consequences. In many instances we would have ended up with the point of no return, but in the midst of difficulties I learnt to respond with the right mental attitude and to completely reframe my way to overcome the challenges. All the challenges are definitely my most valuable life experiences. In each of these experiences it has helped me to see most challenges as opportunities and to harness my own personal abilities to an even greater degree. One important lesson I learnt in the whole process is to treat the challenge as a game and enjoy it as a fun. If we fear, in taking a tough decision it prevents us from facing the challenge and seeing it as an opportunity. It is always necessary to step out of our comfort zone and all actions we undertake need much more attention than any one normally thinks. Debate and discussions amongst our colleagues to arrive at possible solutions are highly beneficial. Before I conclude I am reminded of the two important quotes on this topic, one by Albert Einstein; "In the middle of difficulty lies opportunities" and another by Winston Churchill; "The pessimist sees difficulty in every opportunity, the optimist sees opportunity in every difficulty". How true they are!