

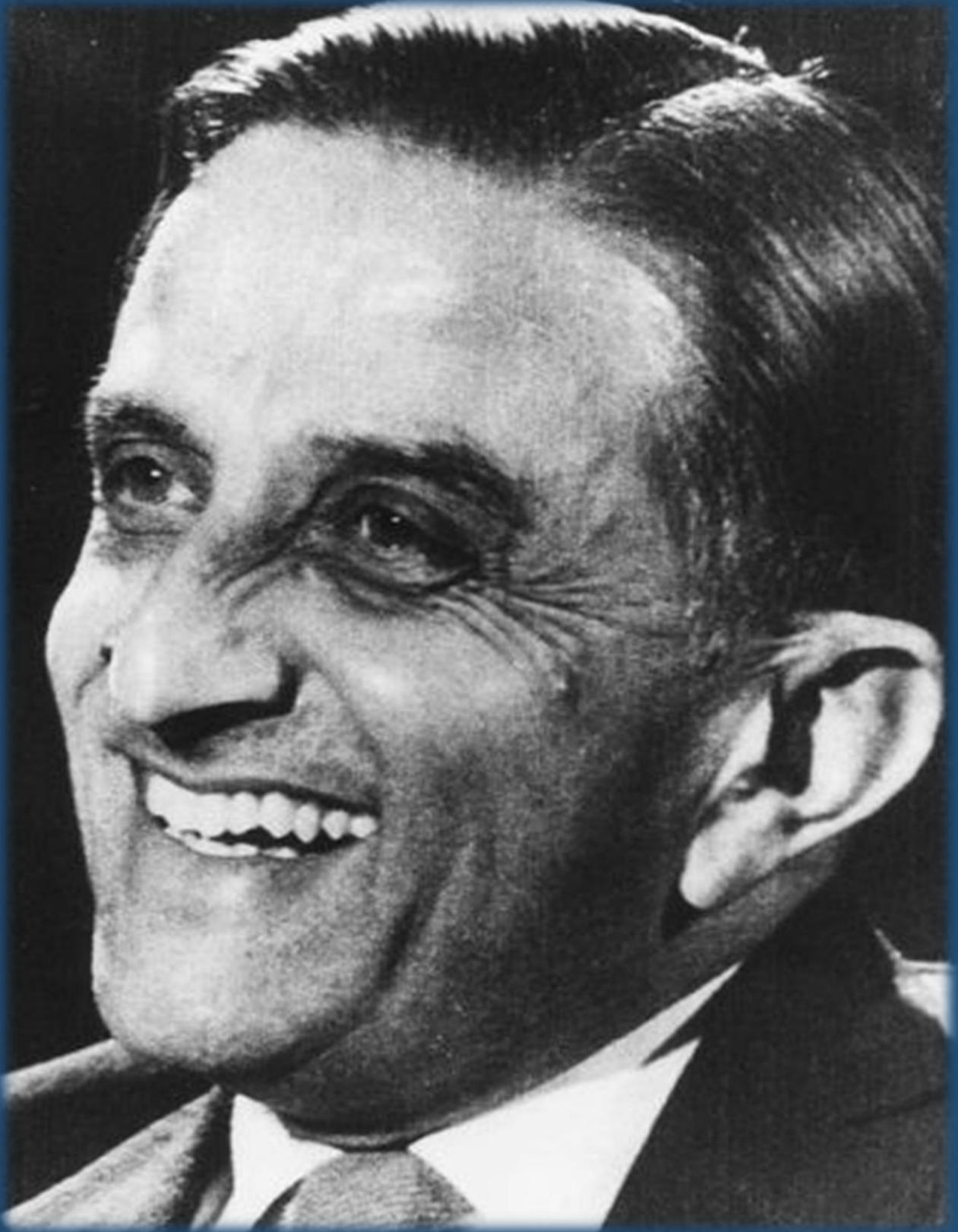


PRL NEWS – THE SPECTRUM

AUGUST 2019

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REMEMBERING SARABHAI

Message from the Director



It gives me immense pleasure to announce the special issue of “PRL News -- The Spectrum” on the joyous occasion of the birth centenary of Late Professor Vikram Ambalal Sarabhai, the Founder of our institute PRL and also the Father of the Indian space program. He was an innovator as well as an institution builder during his short life span from 12 August 1919 to 30 December 1971. He earned his Ph.D. under the supervision of Nobel Laureate Sir C. V. Raman at the Indian Institute of Science, Bangalore, and was awarded doctorate by Cambridge University. His first contribution in the direction of nation building was founding PRL, soon after returning to the newly independent India on 11 November 1947, at M.G. Science Institute, Ahmedabad. The initial focus of research at PRL was on cosmic rays, which gradually spread over to atmospheric science, theoretical physics, radio physics etc. Prof. Sarabhai was associated with several national and international committees and was appointed as Chairman of the Atomic Energy Commission. His scientific contributions were recognized through many awards and honors that include the Shanti Swaroop Bhatnagar Award for Physics in 1962, Padma Bhushan in 1966 and Padma Vibhushan posthumously. Most of the credit for our glory and the respect that PRL has earned today is undoubtedly due to Prof. Sarabhai. As a token of gratitude, we as the members of PRL fraternity would proudly like to dedicate this special issue of e-newsletter to our beloved and great visionary, Prof. Sarabhai!

- Anil Bhardwaj

Message from the Editorial Team

It is a matter of great privilege for us to present this special issue of “PRL News -The Spectrum” in the memory of Prof. Vikram A. Sarabhai on his birth centenary. Prof. Sarabhai, is a personality who could define the course of developments in Indian Science and that of the nation as whole. He initiated the journey of PRL and dreamt big for all of us even at the time when the shadow of British presence in India was not completely diminished. We are all extremely privileged to have the opportunity of working at PRL, one of the most prestigious institutes of excellence. The PRL fraternity remains committed to carry forward the legacy bestowed on us by Prof. Sarabhai and as a token of our humble gratitude each one of us strives to contribute in whatever way possible with the ultimate aim of nation building.

In this *Special Issue* of August, 2019, we put forth a brief history of his life, dedication, determination, and accomplishments. We have tried to cover many specialized articles and we hope that our readers will get motivated from these inspirational real-life stories.

As a mark of utmost respect, we devote this exclusive issue in the fond memory of Prof. Sarabhai, the founder of PRL and the father of Indian Space program.



LEADERSHIP IN SCIENCE - VIKRAM A. SARABHAI (Talk broadcast by All India Radio on 4 August 1965)



understanding. Therefore, a significant number of citizens of every developing country must understand the ways of modern science and of the technology that flows from it.

An ability to question basic assumptions in any situation is fostered by probing the frontiers of science, whatever field one may be engaged in, whether it is Biology, Genetics, Atomic Science or Space Research. It is this ability rather than an empirical hit and miss approach, which proves most effective in tackling the day-to-day problems of the world. It follows from this that countries have to provide facilities for its nationals to do front-rank research within the resources, which are available. It is equally necessary, having produced the men who can do research, to organise task oriented projects for the nation's practical problems.

One of the inevitable consequences of the introduction of modern technology is a gradual erosion of existing values -a drift towards a man-centred world substituting another in which man is only one element in all of nature. What can replace ethics born out of a religion and a faith, which no longer holds us? You may be surprised to hear me talk of faith. It implies on my part primarily a recognition that an individual does not exist in isolation. Almost any action that he takes affects the outside world and he has to be aware of how the outside world is likely to react to his action. In other words, he has to have faith and confidence in the type of reaction, which he may expect before he can take even the smallest action. If he has to cross the street, he must have faith that the driver of a motor car understands the Highway

“An ability to question basic assumptions in any situation is fostered by probing the frontiers of science, whatever field one may be engaged in, whether it is Biology, Genetics, Atomic Science or Space Research...”

Clearly, the development of a nation is intimately linked with the understanding and application of science and technology by its people. It has sometimes been argued that the application of technology by itself can contribute to growth. This is certainly true as an abstract proposition but fails in practice. Witness the state of development and social structure of countries of the Middle East, where for decades resources of oil have been exploited with the most sophisticated technology. History has demonstrated that the real social and economic fruits of technology go to those who apply them through

Code. It seems to me that a broad understanding of the physical and social environment in which man lives is the most urgent task which faces all humanity. When we come to think of it, lack of insight concerning the environment in which man operates has posed a problem at all times. Just as superstition took hold of an unenlightened man who received solace from religion, so can prejudice and a feeling of omnipotence permeate the minds of those who, without bothering to understand science, enjoy the rich rewards flowing from the application of technology. When gimmicks substitute

magic, we have produced no essential change in the enlightenment of the total sociopolitical system. On the other hand, today, the consequences of failure to raise the level of enlightenment are more serious to the security of the world than they were ever before. The task of promoting an understanding of science is of course at the core of the problem of education and becomes increasingly more difficult in the context of a population explosion. Acquisition of technology by itself does not contribute to this understanding. One is forced to the regretful conclusion that no society has tackled this problem effectively.

Hinduism has a substratum of philosophy which is fascinating to the modern scientist. The life of the common man reflects many of the values related to this philosophy, unconsciously imbibed through literature, the arts and social traditions. We recognise that perception involves the outside object as well as the observer. We appreciate the subjective character of personal experience. We accept that there are a thousand paths to enlightenment. In relativity, we learn of the importance of the frame of reference of the observer and how the results of observation depend on the relative state of his frame with respect to that which he observes. Absolute right and wrong do not exist in the values of those who have understood the Upanishads or those who have followed the concepts of relativity.

When I talk of the scientist in this vein, it is perhaps necessary to point out that I distinguish between one, who has merely gone through a formalistic training in science, from another, whose scientific experience is reflected in his personal values. I think the discussion is meaningful only in regard to the latter.

I can illustrate my point concerning science and human values by citing an example which is related to the implications of science and technology to modern warfare and how these affect national sovereignty. As soon as hydrogen bombs could be delivered with Inter-Continental Ballistic Missiles, capable of hitting a target to an accuracy of a few miles at a distance of six to eight thousand miles, the implications of a war between adversaries possessing such weapons were too grave for anyone to contemplate armed conflict as a means of solving international disputes. If coexistence between nations formed a part of the "Panch Sheel" adopted by Asians from Buddhism, it was also advocated by Premier Khrushchev from an appraisal of the consequences of the balance of terror that exists between the East and the West.

At all times social change has been related to technological developments and in each era, new constraints, social and political, are imposed on those who partake of the change. Just as an individual who chooses to live in a community voluntarily renounces the right of throwing a stone anywhere he pleases, which he undoubtedly could exercise in the jungle, so in the atomic age, nations are forced to accept a self-discipline where the freedom of settling disputes through the use of force on a grand scale is no longer meaningful. But if there are disputes between nations, how are they to be settled? Recourse to negotiations or, if necessary, arbitration through a third party or reference to an outside tribunal are the only courses open to us. The provisions of the United Nations Charter referring to collective security imply an implicit acceptance of this. The leaders of the nations who founded the world organization appreciated what sovereign states could no longer do. These provisions, like many others, have never been effectively implemented. The security of the world and the political settlement of international disputes would be very much assisted if the common man of all nations understood the constraints of the environment in which he lives. In the context of an otherwise bleak international situation, the recent settlement negotiated by our Government on the Kutch border issue stands out as a most positive contribution to world peace. In the, sniping that has followed from some quarters, we have a remarkable demonstration of the problems of a society which loses faith in Panch Sheel and has not yet accepted the ethics growing from modern science.

Perhaps by now, you have realised that I am beating about the bush that I have not talked about leadership in Science. You are right; but I am afraid this fairly long preamble on the significance of science is necessary before I can come to the point. I suggest that we consider leadership in science to achieve the following: First, to foster creativity and an interest in getting to the core of problems, relegating for the moment an empirical approach.

Secondly, to provide experience on a wide scale, whereby men can understand the back-drop in front of which he operates and can evolve values and ethics consistent with the real constraints imposed by his environment.

Thirdly, to provide the application of science and scientists to the diverse practical tasks of society, that of building the economy, of creating a desirable social

environment and to problems of fields such as national policy, security and defence.

Leadership for the development of creative disciplined individuals, highly motivated to ask basic questions, is not leadership of the type that we normally understand. There is no leader and there are no led. A leader, if one chooses, to identify one, has to be a cultivator rather than a manufacturer.

He has to provide the soil and the overall climate and the environment in which the seed can grow. One wants permissive individuals who do not have a compelling need to reassure themselves that they are leaders through issuing instructions to others; rather they set an example through their own creativity, love of nature and dedication to what one may call the "Scientific method". These are the leaders we need in the field of education and research. It is they who continually challenge existing assumptions on the objectives and methods of education, who concern themselves with providing experiences from which individuals build values and frames of reference, realising the subjective character of

perception. When we come to the application of science to the real tasks of a nation, it is again the inter-active type, of leader, rather than a boss, who is most effective. He is required to relate himself to the work of others, to give as well

as to receive. In our society, scientists encounter a curious difficulty in accomplishing useful tangible results. We place intellectual endeavour on a very high social scale, but believe that those who are engaged in it are unfaithful if they should be interested and concerned with day to day practical affairs including their own standard of life and personal security. We look down on our research scientists in national laboratories or our academics in universities, if they engage themselves in outside consultation or if they choose to augment their income from task-oriented projects of a practical nature. We implicitly promote the ivory tower, the alienation of the persons of insight, from those who do things. As I have said earlier in this talk, I believe that those who can pose

basic questions are the ones who can best do applied work.

For, in most things, locating the real problem goes a long way towards its solution. To create conditions for the application of science and scientists to the real problems of society, we have to encourage scientists to interest themselves in problems outside their fields of specialization. Sure enough, one does not expect to give to the opinion of a scientist special weight in fields other than his own. But a person who has imbibed the ways of science injects into a situation a new way of looking at it, hopefully perhaps, a degree of enlightenment with regard to the approach to problems and thus provides leadership which is very valuable. I am here not talking about getting scientists into diverse committees. We have plenty of it. I do advocate that we make it possible for them to work in their own fields of specialization in addition to undertake or collaborate in specific jobs. There are innumerable situations where this is possible at the doorstep of every individual. These could arise in improving curricula and methods of education, in setting up local industry or promoting the productivity of farms, in local and regional

planning, in implementing programmes for population control or community development. In Ahmedabad, for instance was started two years ago a Group for the Improvement of Science Education. This Group consists of teachers drawn from

"...the most effective development of education can take place only when the teacher, the student, his parents, and the outside environment can interact with one another, in a series of feedback loops, free from regimentation and irrelevant theories and principles preached from the top."

schools, colleges and research institutions and some gifted students from these institutions. What brings them together is a strong personal motivation to improve understanding of science and the standard of education. They are ready to question, to innovate and to share experiences. At each level, wherever they work, they provide the type of leadership which we are considering here.

Through experience, we know that conditions of work in India within our own specialised scientific fields rarely match the facilities available in several other countries. Some of us get frustrated striving against heavy odds. Others leave the country. But those that can apply

their insights to the problems of the community and of the nation discover an exciting area of activity where effort is rewarding even while the results come slowly.

What should we do to provide an opportunity for such leadership? I do not expect attitudes which segregate scientists and intellectuals from the real world to change quickly, I do not believe that in the near future we are likely to provide to scientists and educationists job opportunities and service conditions which are on par

with those enjoyed by administrators. But I have a dream, a fantasy may be, that we can provide encouragement to those who will accept responsibilities for real tasks, big and small, even while they continue to do their own work. Moreover that we can secure acceptance of the notion that such task-oriented activity, seriously undertaken and with a well-defined objective to be realised in a given period, should receive financial reward which will ameliorate the total situation in at least one important aspect. Leadership in science may then arise out of a new climate for growth.

“The biggest obstacle to innovation most often arises from social factors within organizations rather than the absence of technological know-how or equipment.”

LESSONS FROM PAPA - *Mallika Sarabhai*



December 29, 1971, 5am

It is the second last day of the first shooting schedule of my first film, Sonal. We are in Bombay, at Papa’s official residence on Little Gibbs Road. As I rush out, I bump into him, as he is off to catch a flight to Trivandrum (en route to Thumba). I give him a kiss, and

say, “See you tomorrow night.” We have a date—he, Amma and I—to be together and dance at the Ahmedabad Gymkhana on New Year’s Eve. Amma is in Bombay, too, and we are all slated to fly to Ahmedabad on the morning of the 31st. I suddenly remember that he had his annual medical check up the previous day. “What did the doctors say? Is the blood pressure under control?” I ask. “Don’t fuss Malli. I am fine.” He sticks his tongue out at me. I roll my eyes, give him another hug.

December 30, 1971, 11am

We are in the middle of a shoot in a studio in Andheri. At the end of a take, an assistant comes and whispers in the ear of my director, Prabhat Mukerjee. He leaves the set. In a few moments, he is back and walks up to me. “Come, Mallika. I am taking you



home. Amma is unwell,” he says. Amma, unwell? I search his face. He averts his eyes. My heart sinks. We take a taxi. He looks out of the window and periodically says, “Don’t worry.” My world is collapsing inside me. Is she dead? Has there been an accident?

We enter the compound. It is filled with cars. The lobby is full of people in white. People avoid my eyes but make way for me. Some look at me with tears in their eyes. The elevator ride to the top floor is interminable. I am shaking. I want to scream. The door is open. Papa's secretary is at the door and says, "Come to Amma." I look at him, puzzled.

Amma sits on their bed, her back turned to the door, her head in her hands. A close friend holds her. She looks distraught, not ill. I walk slowly up to her. She looks up. Her face is streaked with tears. "Papa has gone." I can not fathom it. Gone, where? "Darling, papa has gone," she repeats. My mind races. Accident. It has to be. He was fine. I checked only yesterday. "Accident?" I ask, in a whisper. She shakes her head. "No, in his sleep." My world crashes.

There are three events that stand out in my mind from the 17 years I could spend with Papa. Three events that have defined me and who I am. It is my first day in a Montessori school. We are seated in a circle drawing a face. I draw the ears in the wrong place and the boy next to me says, laughingly, "What an ass you are." I am very upset and tell Papa, crying that I will not go back to that school. Papa laughingly picks me up and puts me in his lap. "Malli, who are you?" he asks. "I am a girl," I respond through sobs. He laughs and says, "Malli, you know that you are a girl. He does not know the difference between a girl and an ass. You should feel sorry for him." Learning: Do not let stupid comments or criticism upset you. They come from ignorance or malice.

I am 12. My school has many new students. Gujarati kids are being sent to boarding schools in

India from Uganda and Kenya, as Asians flee Idi Amin. Two boys in my class, several years older, have a fight about whose girlfriend I am. One knifes the other; the injured boy has to go to the hospital to get stitches. My aunt, the principal, calls Papa in the false belief that there can be no smoke without fire.

Papa is amused that the boyfriend business has started so early. I am furious at the injustice of it all. "It is not fair to blame me," I say. "I don't even know them well. I had nothing to do with this." Papa sits me down that evening. "Malli, I didn't think this discussion would happen this early, but we might as well have it," he says. "In society, there are two kinds of people. There are those that unquestioningly follow what others do, what society does. And then there are those who question things, who search for their own truth, make their own rules, and do what they think is right. Amma and I are like that. You must decide what you want to be. If you decide to follow your own truth and stand up against society and people, they will always try and abuse you and hurl stones at you. Each of us must choose." I went away and it gnaws at me for a few days. "Papa, I need to live with what I believe is true," I tell him. Learning: Standing up for what we believe is true, taking on society for what we think is wrong or unjust, is stormy and thorny. Do it only if you are willing to be stoned.

I am 16. Papa has been away. I am running down the stairs in our home when he runs up. We meet at the landing. I see that he is deeply upset. I ask why. "They offered me a bribe to get India to sign an agreement with them. What do they think I am?" he asks, pain, hurt and disbelief in his eyes. Learning: No matter what your own ethics are, people will think you have a price, that nothing is beyond being bought. They are wrong.

I miss him. I believe that a lot could have been different for this nation had he lived. But he lives in his institutions and the people he inspired, and continues to inspire; and in us, his children, and in our endeavours and dreams.

—**Mallika Sarabhai is a classical dancer and actor, and daughter of Vikram Sarabhai**

(This article appeared originally in *The Week* magazine on July 21, 2019 and has been reproduced here with due permission from the publisher and the author.)
<https://www.theweek.in/theweek/cover/2019/07/12/lesons-from-papa.html>



PERSPECTIVE ON MANAGEMENT OF RESEARCH AND EDUCATION – C.V.R.G. Deekshitulu



PRL founded by late Dr. Vikram A Sarabhai embarked itself on initiating of a new major scientific activities in chosen domains besides a flurry of activities in new horizons commemorating the birth centenary of its illustrious founder. The ritualism is not confined to laying foundation stones and inauguration ceremonies but in the traditional and ritualistic ways of PRL, setting up committees, inviting members setting the agenda and other established ways of starting new programs.

The chief proponents of the organization around the man approach to institution building in India were Dr. Homi J Bhabha and Dr. Vikram A Sarabhai. Unlike in more developed countries the first step taken by them was to train the Young. Vikram A Sarabhai when started Ahmedabad Textile Industry's Research Association (ATIRA) he had essentially the same philosophy of institution building. The initial steps consisted of identifying young people with good scientific training and then building the organization around these people. Sarabhai's role in relation to early core group was to permit them to move in directions that made sense to them and help them to get the necessary entry and acceptance with mill owners and technicians of the industry.¹

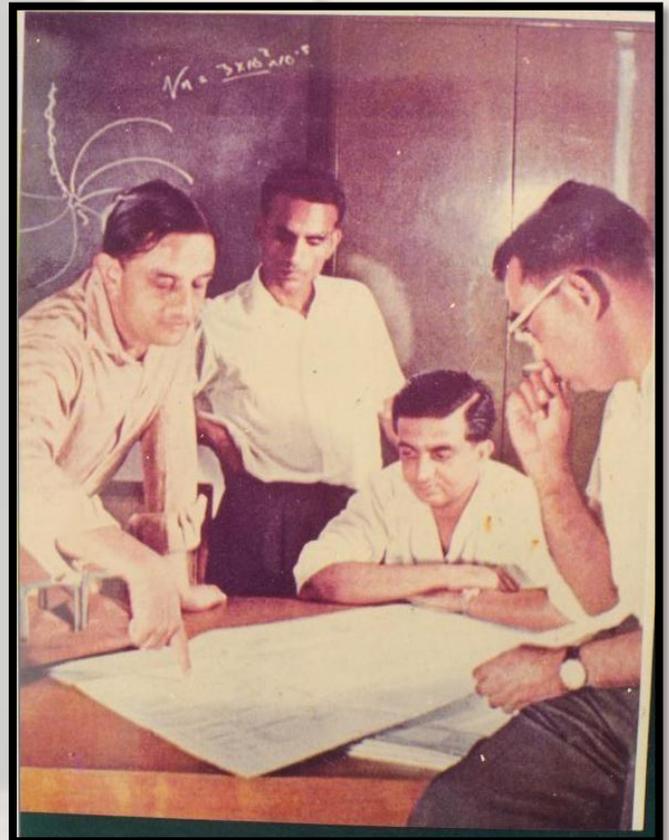
Dr. Sarabhai felt that an educational or a scientific administrator would be sterile and ineffective if he is a preserver rather than an innovator. Most of tasks encountered in the contemporary world call for organizations wherein creative thinking and innovation are essential.

Most of us are familiar with the hierarchical organization structures involving vertical controls which continue to dominate. The three ingredients of a control systems: one must have a feedback loop, which transmits back to the controlling centre information about the system which is being

controlled. Second, the feedback should be transmitted quickly as possible without noise or distortion. Finally, one does not start giving corrective signals of a control system at intervals of time small compared to the inherent time constant of significant response of the system itself.

Electronics Corporation of India Ltd (ECIL) though the policy makers envisaged it as an organization set up akin to the public enterprise, Sarabhai supported the design of structure around the key research persons who were to assume responsibility of its operations. Subsequent growth and events at ECIL justified this approach and produced stalwarts like Dr. A S Rao who laid strong foundations to the field of Electronics.

It is only in the process of building institutions which are coherent and independent, which are responsive and responsible, which have strength to maintain their views when these are contrary to conventional wisdom, that we will build strong



institutions and consequently a strong society – and experience indicates that these are more likely with an organization- around-the- man approach rather than a plan approach, especially in institution building in the fields of education and research.

This working culture, mood and morale is difficult to cultivate in an organization where the approach is predetermined by plan and people had to fit into these plans. The organization-around-the-man approach conveys to the Scientist/Manager/Employee their central role in building the organization. With such an approach, commitment to one’s own as well as to organization goals (goal congruence), becomes feasible.

It is important to clearly define the primary tasks and constraints with which the organization operates. Among constraints one needs to distinguish between those related to general welfare imposed by the environment and management constraints imposed by funding agencies for safeguarding their own rights. Some funding agency constraints like oversee requirements; public procurement policies; induction of manpower and Comptroller and Accountant General (CAG) to perform the audit. The control of the funding agency must largely be through the review of long-range operations and directives effecting strategic decision making, the deficiencies of management at organization level are not made good by more supervision at a higher-level control. The most important aspects of this control system are, typically, financial control and quality control and achieving the stated goals.

Thus, PRL as an organization evolved and structured as a Council of Management, democratic and think innovative and put alternative structure of bringing different types of people together; of having to laid down policy and a Chief Executive in place to execute the said policy transformation. Dr. Sarabhai opined that a horizontal control system is most appropriate to a democratic growth of science and technology.



Prof Blackett: “We must endow ability whenever it is found, and we must guard against subsidizing the mediocrity.” The Government is spending a large amount of funds on supporting scientific research in basic sciences and technical development, and it is in Governments’ interest to study and devise *de novo* the best administrative and financial procedures, devised for an entirely different purpose, to build scientific institutions to get the maximum of return on the money

spent. The studies shall encompass the organization’s personnel and administrative practices for

implementing change and innovations, on the basis of political decisions made by the Government of the day.

1. Institution building two approaches in Contrast:
Dr.Kamala Chowdhry.

“One way to advance our understanding of the growth of institutions is through a wider sharing of knowledge gained from meaningful experience.”

MEMOIRS OF VIKRAM SARABHAI — *Pramod Kale*

I certainly feel honored to have been requested by Dr. Anil Bhardwaj, Director, PRL to write about Dr. Vikram Sarabhai, the great visionary scientist from our country. He was not just a great scientist but he was also a great institution builder. I was very fortunate to have come in contact with him, relatively for a short span of just over eleven years. I had completed my B.Sc. in M.S. University in Vadodara in May 1960 and was looking forward to continue further studies in areas of Physics, Space Science and Electronics. I was very keenly interested in Physics since I had the opportunity to listen to the lecture given by Sir C. V. Raman on the subject of 'Diamonds' at the M. S. University. My Physics professor, Dr. N. S. Pandya, knowing my interest in Space had suggested to me that I should meet Dr. Vikram Sarabhai; who had established the Physical Research Laboratory - PRL, in Ahmedabad. I had requested for a meeting and he was fortunately in Ahmedabad at that time. I met him in his office at the Calico Mills. As a young student at the age of 19, I was very apprehensive about meeting a very well known scientist. I was pleasantly surprised as he very patiently listened to my ideas and desire to take up research. He actually spent two hours with me then. He guided me to continue my studies for M. Sc. Physics at the Gujarat University and also start work at the Physical Research Laboratory to get the practical experience. I had immediately accepted that and I had started my work. As I started my work there at PRL, I started learning more and more about the work of Dr. Vikram Sarabhai. As a person he was always cheerful and smiling. He was married to Smt. Mrinalini Sarabhai, a highly acclaimed exponent of Bharat Natyam and founder of the 'Darpana' dance academy. Dr. Sarabhai himself was keenly interested in music and dance as art forms. He was a multifaceted person.

While working many a times in the night for tracking a satellite, we used to be surprised by unannounced visits by Dr. Sarabhai. We used to wonder as to how Dr. Sarabhai was working at all odd hours in the day and night. Even when he used to travel,

he used to keep on working on his correspondence and discussions with the colleagues. I know that many of his students used to travel with him from Ahmedabad to Vadodara when he used to go to Mumbai by train so that they could get time with him. He used to take keen personal interest in our work. The leadership provided by Dr. Vikram Sarabhai and Dr. H. J. Bhabha resulted in our establishing the Space Science and Technology



(Dr. F. W. Sarles of MIT, Mr. Majaver of Fairchild, Dr. Sarabhai, Pramod Kale and Shri Sahadev of Indian Embassy after completion of INSAT study at MIT in 1970)

Centre -SSTC on the Veli hill nearby. Both had a great vision for the development of Science and Technology for contributing to the development of our country. Dr. Sarabhai had very clearly understood the importance and scope of Applications of the Space Technology in improving our day to day life. In the years 1962 to 1964 it had become clear that Satellite based Meteorological Earth Observations and Space Communications will be immensely helpful for not only developed nations but also for the developing countries and Dr. Sarabhai was concentrating on those applications of space technology. He had wanted that we should develop the technology for satellites and launch vehicles indigenously. There were many people in our country as well as other countries who were doubtful about efforts being undertaken in our country in the area of Space Technology.

This is what Dr. Sarabhai had said at that time –

“There are some who question the relevance of space activities in a developing nation. To us there is no ambiguity of purpose. We do not have the fantasy of competing with the economically advanced nations in exploration of the moon or planets or manned spaceflight. But we are convinced that if we are to play a meaningful role nationally and in the community of nations, we must be second to none in the applications of advanced technologies to the real problems of man and society.”

Dr. Sarabhai was very concerned about Education at all levels. He was convinced that Television should be utilized for instructional and educational purpose. He had visualized that TV could be effectively used to bring the latest information from our Agricultural Research institutions and Universities for the benefit of our farmers. He took the lead in starting the television program ‘Krishidarshan’ on the

Delhi TV station, the only TV station operating in our country in 1968.

He was convinced that Satellites will play very crucial role in bringing Television in our country since we did not have extensive Microwave Communication network in country. He used to consider the unavailability of a national telecommunication network as an opportunity for use of satellite communications. In 1969, Dr. Sarabhai was able to introduce in Definitive Arrangements for INTESAT, a very valuable enabling provision. As per this provision INTELSAT could develop and get satellites launched for nations requiring domestic satellites for telecommunications. Dr. Sarabhai had set up the Physical Research Laboratory in 1947 which later played crucial role in the establishment of the Indian Space Research Organization. He was responsible for setting up many more institutions which have attained national importance now. These include Ahmedabad

Textile Industries Research Association, Indian Institute of Management, Ahmedabad and the Community Science Center to name a few. The Community Science Center set up in Ahmedabad is a very important centre for educating children and general public about various branches of science. It has played an important role in ‘Science Teacher’ education also. The foundation stone of Community Science Center was laid by Sir C. V. Raman. On that occasion Sir C. V. Raman gave his famous lecture; ‘Why the sky is blue’. Today when we remember Dr. Sarabhai, we don’t remember him as only a scientist but we remember him as a person with varied interests. He was an exceptional teacher, guide, leader and visionary institution builder. His writings give us inspiration even today. He was a highly optimistic and a positive person. He had great confidence in his colleagues and their abilities. He had given freedom to them and that brought what is termed as the ISRO work culture. In the formative years; Professor E. V. Chitnis and Dr. Upendra Desai immensely helped him to carry out the work at TERLS and SSTC. He used to stress

‘Self-reliance’ in all of our work. He used to tell us, ‘Don’t look at problems as

hindrances but look at them as opportunities to solve them’. For all of us working with him ‘Make in India’ was not just slogan but it was way of life.

Today when I look back, I find that most of the goals set by him in 1969 document have been achieved by ISRO and we have gone well beyond what was spelt out by him then. Chandrayaan 2 has been successfully launched on 22nd July 2019 and it will hopefully achieve the goal of soft landing on the Moon. The lander is aptly named ‘Vikram’ to honour Dr. Vikram Sarabhai. As we look forward to newer areas in Space Technology and Space Applications, we realize that our progress in Space Technology has become possible because of the strong foundation laid by him.

(Some excerpts taken from the reminisces contributed by Dr. Pramod Kale, Former Director, Space Applications Centre, ISRO and Vikram Sarabhai Space Centre, ISRO)

PRESS INFORMATION BUREAU
GOVERNMENT OF INDIA

THUMBA-VELI COMPLEX RENAMED AS
VIKRAM SARABHAI SPACE CENTRE

New Delhi, ~~Asadha 19, 1972~~
July 10, 1972

In recognition of Dr. Vikram Sarabhai's outstanding contributions to the Indian Space Programme, the Space Commission decided at its first meeting here today that the complex of activities relating to space in the Thumba-Veli area near Trivandrum be constituted as one single complex and that the complex be named the Vikram Sarabhai Space Centre. Dr. Brahm Prakash, Director, Space Science & Technology Centre and member Space Commission will be Director of the Vikram Sarabhai Space Centre.

The Commission placed on record its recognition of the pioneering work of Dr. Vikram Sarabhai in the field of Space activities in this country. Dr. Sarabhai initiated the Indian Space Programme a decade ago, first as head of the Indian National Committee for Space Research and later as Chairman of the Atomic Energy Commission and Chairman of the Indian Space Research Organisation he headed the entire space activity in India.

The meeting was attended by Prof. S. Dhawan, Chairman, Dr. Brahm Prakash, Director, Space Science & Technology Centre, Trivandrum, Shri P.N. Haksar, Principal Secretary to the Prime Minister, Prof. M.G.K. Menon, Chairman, Electronics Commission and Dr. I.G. Patel, Member for Finance.

BRB/SGL/MLG

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VIKRAM SARABHAI – SCIENTIST AND VISIONARY – *Janardhan, P.*



Dr. Vikram Sarabhai was born on 12th August 1919, and sadly for this country, this great son of India, Padma Bhushan (1966) passed away at a relatively young age of 51 years, on 30th December 1971. He was awarded the Padma Vibhushan (Posthumous) in 1972. Having completed his early education in Ahmedabad, he went to Cambridge, UK for his undergraduate studies and was recommended to Cambridge University by none other than Gurudev Rabindranath Tagore who, having spotted the spark of genius in the young boy of 16 years, wrote a letter of recommendation to the authorities of Cambridge University, dated 01 November 1935 that read –

“It is with great pleasure that I recommend the application for admission of Mr. Vikram Sarabhai. He is a young boy with a keen interest in Science and I am sure a course of study in Cambridge will be of immense value to him. I know him personally and his people. He comes from a wealthy and cultured family in the Bombay Presidency and he has a brother and a sister studying at Oxford at the moment. In my judgement, he is a fit and proper person for admission to the University” – Rabrindranath Tagore.

Dr. Sarabhai obtained a Tripos in Physics and Mathematics from St. Johns College, Cambridge in 1940 and returned the same year to join the Indian Institute of Science, Bangalore, where he continued his post-graduate research in cosmic ray studies under the guidance of Nobel Laureate Professor C.V. Raman. In 1942 he married Mrinalini Swaminathan, who herself was a well-known exponent several Indian Classical Dance forms and who was later honoured, by the Government of



With, among others, Sitar Maestro Pandit Ravishankar, Prof. and Mrs. D. Lal and Prof. M.G. K. Menon.

India, for her extraordinary contribution to Indian dance by the award of the Padma Shree in 1965 and the Padma Bhushan in 1992. In 1945 Sarabhai returned to Cambridge and was awarded a PhD in 1947 for his work in Cosmic Ray Physics.

It is a tribute to the man that his vision and ideas are still a cornerstone of India’s space policy and continues to provide a guiding light to the Indian Space Research Organization (ISRO) a century later. At the time of his untimely demise, he was Chairman of ISRO, the Chairman, of the Atomic Energy Commission and Secretary to Government of India. He was a leading scientist who had also been responsible for establishing a large number of institutions across the length and breadth of our country. Some of the prominent ones he established are the Physical Research Laboratory (PRL), Ahmedabad; Ahmedabad Textile Industry’s Research Association (ATIRA); Indian Institute of Management (IIM), Ahmedabad; The Darpana Academy for Performing Arts, Ahmedabad; Nehru Foundation for Development (NFD), Ahmedabad; Ahmedabad Management Association (AMA); Sarabhai Chemicals, Baroda; Fast Breeder Reactors (FBR), Kalpakkam; Variable Energy Cyclotron Project (VECP), Calcutta; Electronics Corporation of India Limited (ECIL), Hyderabad; Uranium Corporation of India Limited (UCIL), Bihar.

So, it is indeed appropriate, in this centenary year of his birth, to remember, honour and celebrate the memory of Prof. Vikram Sarabhai, who was not just a great scientist but also one of the greatest visionaries that this country has ever produced. I have often found that the word visionary is used rather lightly, like an interesting word to bandy about to add a certain flourish to ones speech or writing. To therefore put this word in the proper perspective I would like to recount a story concerning the great inventor and contemporary of Vikram Sarabhai, - Igor Ivanovich Sikorsky, a Russian-American aviation

pioneer who, in 1940 designed and built the world's first successful helicopter and who famously once said - *"I constructed the helicopter without knowing how to build it, but knowing one thing firmly — that I would have to build it and pilot it."* - **Igor Ivanovich Sikorsky.**

I quote this here to show the mindset of a certain class of people like Sikorsky and Sarabhai who set what normal mortals would consider as impossible targets for themselves and are so intensely focussed on what they want that they eventually achieve their goals. When Sikorsky demonstrated his invention to the chief of the U.S. army, a Colonel Gregory Franklin, he was asked, at the end of an extremely noisy partially successful demonstration, of what use is your invention? Igor answered this question by asking another. He asked, of what use is a new born baby?

So just as a new born baby needs to be nurtured, instilled with confidence and a set of values and slowly brought into adulthood, so too a vision or idea needs to be nurtured over many, many years before it can yield anything useful. Prof. Vikram

Sarabhai was not just a man who had a vision for this nation and its scientific progress. He also had in him the ability to nurture his vision and to infuse in the people around him a sense of excitement and achievement, to a point where they began to share his enthusiasm and ideas and believe that his ideas were achievable. Thus, his vision could be carried forward by a large group of people, with varied backgrounds, experience and skills, all working together towards a common goal. This as we all know is no mean feat for one man to achieve and this ability is what makes a person a true visionary.

Prof. Sarabhai was involved in institution building, was passionate about the pursuit of science, was a connoisseur of art and music and so many other things that it is difficult to know where to start from when trying to build a mental picture of the person. One way is to look at how he expressed his views on diverse

matters like religion, faith, technology and leadership in science and the way forward for humanity as a whole and I quote from a talk by Prof. Sarabhai himself, aired by All India Radio in August 1965.

"One of the inevitable consequences of the introduction of modern technology is a gradual erosion of existing values - a drift towards a man-centred world substituting another in which man is only one element in all of nature. What can replace ethics born out of a religion and a faith which no longer holds us? You may be surprised to hear me talk of faith. It implies on my part primarily a recognition that an individual does not exist in isolation. Almost any action that he takes affects the outside world and he has to be aware of how the outside world is likely to react to his action. In other words, he has to have faith and confidence in the type of reaction which he may expect before he can take even the smallest action. If he has to cross the street, he must have faith that the driver of a motor car understands the highway code.



Vikram A Sarabhai and C.V. Raman

It seems to me that a broad understanding of the physical and social environment in which man lives is the most urgent task which faces all humanity. When we come to think of it, a lack of insight concerning the environment in which man operates has posed a problem at all times. Just as superstition took hold of an unenlightened man who received solace from religion, so can prejudice and a feeling of omnipotence permeate the minds of those who, without bothering to understand science, enjoy the rich rewards flowing from the application of technology. When gimmicks substitute magic, we have produced no essential change in the enlightenment of the total socio political system. On the other hand, today, the

consequences of failure to raise the level of enlightenment are more serious to the security of the world than they were ever before. The task of promoting an understanding of science is of course at the core of the problem of education and becomes increasingly more difficult in the context of a population explosion. Acquisition of technology by itself does not contribute to this understanding. One is forced to the regretful conclusion that no society has tackled this problem effectively.”



Prof. Vikram A. Sarabhai addressing the United Nations Conference on the Exploration and Peaceful uses of Outer Space, Austria, Vienna, 14 August 1968.

Half a century after this was aired; everything he has said is as relevant today as it was then. His perception on ethics imbibed through ones upbringing in a certain and faith and the conflicts that it creates with progress and modern technology or his perception of India's population explosion, which in the early to mid-60's was less than 500 million are so very apt today, world population day (11 July 2019), that these words could be repeated verbatim in any platform today. In fact, if you looked at any one of his collection of quotes (available in PRL as a book), anyone reading them now would think they have been written in recent times. The deep insights, reading between the lines, one gets from the above quote is that values and ethics imbibed through an upbringing in a certain Faith are fine as long as it leads to progressive thought or the fact that all technological advancements are based on a

solid foundation of science and any country that neglects science has no real future. That is precisely why he created an organization like PRL and why ISRO had to be nucleated in PRL and then become an independent organization to meet the space related technological needs of the country, while the science drivers for this was based on fundamental research carried out at PRL.

Today, the world is dominated by and fully dependent on space-based technology, where communications, navigation and internet services are primarily carried out via man made satellites orbiting the earth. Under these circumstances, researchers are trying to understand the sun, the solar wind and its interaction with the earth's magnetosphere, a field of research broadly referred to as space weather. A constellation of scientific satellites are currently exploring all facets of space weather and the most technologically advanced satellite yet, the Solar Probe Plus, humanity's first visit to our nearest stellar neighbour the Sun, was launched in August 2018. During its seven-year mission, the Solar Probe Plus will use seven Venus gravity assist (VGA) manoeuvres to approach the sun at a distance less than 10 solar radii, the closest any spacecraft has come to the Sun. In this context, it is interesting to see what Prof. Sarabhai said in his address at the United Nations Conference on the Exploration and Peaceful Uses of Outer Space in August 1968 on exploiting the newly available space technology to study and understand the sun and the solar wind. I again quote from his UN speech:

“The natural scientist looking for the subtle links through which the sun affects the earth and our lives has at last acquired in the exploration of space a dramatic new capability for study. He has discovered that in the solar system, the space separating the sun and the planets is filled with extremely rarefied matter constantly flowing outwards from the sun with a velocity of about 300 to 500 kilometres per second. The solar wind as it is called carries with it the sun's magnetic field, and the regime around planets is broadly analogous to what happens when a big boulder sticks out in the middle of a swiftly flowing stream of water. The sun itself is not placid, and the surface is not, uniform. Apart

from beauty spots showing up every now and then,

*It throbs like a boiling cauldron and it experiences storms of great violence. There is another major interest in exploring space. The earth's crust and the lower atmosphere have temperatures and densities such that electromagnetic and hydrodynamic phenomenon function largely independently of each other. But this state is rather special and does not commonly occur in the universe. Even on earth it does not occur in the molten core or if we go upwards beyond 80 or 100 kilometres. In the sun and the stars as well as in inter-stellar and interplanetary space, electromagnetic and hydrodynamic behaviour are intimately linked. In consequence fluids behave in a manner unfamiliar to us and there are many open questions for which laboratory experiments are of limited use since they do not simulate what happens on a cosmic scale. Space research has at last made direct experimentation possible in the magnetosphere of the earth and in interplanetary space.”- **Vikram Sarabhai.***

So, for me personally and more so because I am a researcher of the sun, the solar wind and space weather, it is an honour to have the opportunity to write about Prof. Sarabhai. It also infuses in me a sense of pride because as a member of the Physical Research Laboratory for over three decades, I feel that in some small way I am also a part of this fantastic vision of Prof. Vikram Sarabhai, which, through the now mature space program in India, which is on the verge of launching a manned space mission, is reaching out, touching and changing for the better, in one way or the other, the lives of nearly 1.4 billion people in this country, nearly a fifth of the world's population! This is certainly something to reflect upon every time that we think about Prof. Vikram Sarabhai as a visionary and a scientist.

It has been said that there are only two ways to become immortal viz. do something that people can write about or write something that people can read! In the unfolding of Prof. Sarabhai's relatively short life he

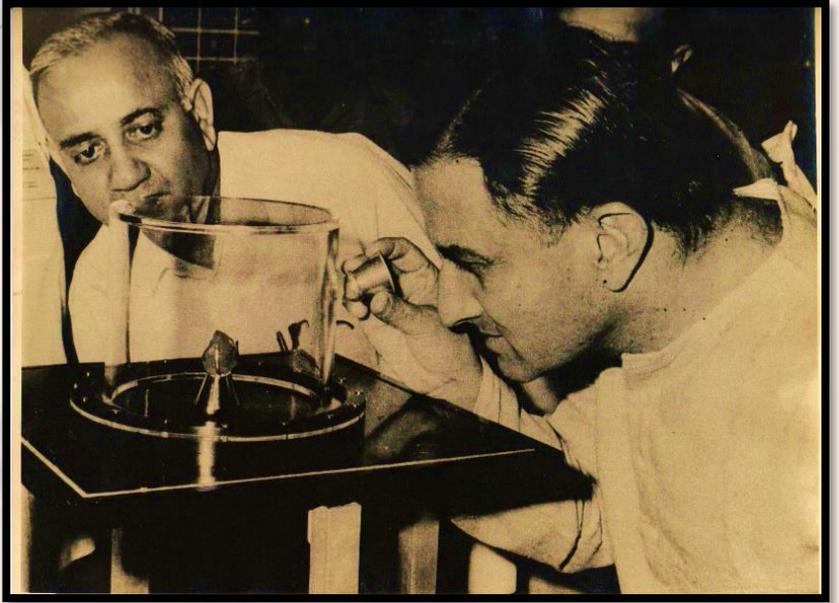
has done both and left behind a legacy, in terms of his writings and sayings and in the remarkable things he has done and achieved that we, mere mortals, can only strive to emulate. A final quote regarding Sarabhai and PRL - In the words of Late Prof. S.P. Pandya, former director, PRL- *“He has provided to the scientists at PRL, a gentle yet dynamic leadership, nurtured them and enabled them to move forward so that this institution today remains a living monument to his scientific endeavours”.*

All that I can say in the end is that people like Sarabhai deserve a special place in the scientific history of India. They should not just be admired but revered for they like true saints are leading us into the light!



Vikram Sarabhai

“Man is a part of the apparatus of the physicist and problems of epistemology assume great importance for the progress of science.”



DR. VIKRAM A. SARABHAI – THE PIONEER - *Bhushit G. Vaishnav*



“If you think in terms of a year, plant a seed; if in terms of ten years, plant trees; if in terms of 100 years, teach the people.” -Confucius

“There is no leader and no led. A leader, if one chooses to identify one, has to be a cultivator rather than a manufacturer. He has to provide the soil and the overall climate and environment in which the seed can grow.”

- *Dr. Vikram A. Sarabhai (talk on 'Leadership in Science', All India Radio, August 1965)*

Dr. Vikram A. Sarabhai, when we hear this name so many adjectives comes to one's mind like, visionary, leader with pleasant demeanour, institution builder, great administrator of science and technology, a realistic dreamer, a multifaceted person, a great teacher and motivator, scientist par excellence, orator and a great human being.

There are certain dates, which are historic, and such dates have given immortal souls and legendary personalities to the country we live in, yes India. Having said this there are many names comes to mind but this year is special and is a centenary year of Dr. Vikram A. Sarabhai who was born on 12th August 1919. Before we glimpse on the life and works of Dr. Sarabhai, let us try to see some of the events in flash back and the era of India around the young age of Dr. Sarabhai. The year 1919 in science and technology involved some significant events, listed below.

Global View

Einstein's theory of general relativity is tested by Arthur Eddington's observation of the "bending of light" during the total solar eclipse on this day observed in Principe, and by Andrew Crommelin in Sobral, Ceará, Brazil, (confirmed November 6), Arnold Sommerfeld and Walther Kossel publish their displacement law, James Jeans discovers that the dynamical constants of motion determine the distribution function for a system of particles, Betz's

law is published by German physicist Albert Betz, indicating the maximum power that can be extracted from the wind, independent of the design of a wind turbine in open flow.

Indian Scenario

The British education system, aimed at producing able civil and administrative services candidates, exposed a number of Indians to foreign institutions. Jagadis Chandra Bose (1858–1937), Prafulla Chandra Ray (1861–1944), Satyendra Nath Bose (1894–1974), Meghnad Saha (1893–1956), P. C. Mahalanobis (1893–1972), C. V. Raman (1888–1970), Subrahmanyam Chandrasekhar (1910–1995), Homi Bhabha (1909–1966), Srinivasa Ramanujan (1887–1920), Vikram Sarabhai (1919–1971), Har Gobind Khorana (1922–2011), Harish Chandra (1923–1983), and Abdus Salam (1926–1996) were among the notable scholars of this period.



Extensive interaction between colonial and native sciences was seen during most of the colonial era. Western science came to be associated with the requirements of nation building rather than being viewed entirely as a colonial entity, especially as it continued to fuel necessities from agriculture to commerce. Scientists from India also appeared throughout Europe. Of course, the decades of 30s and



40s were time of national and social revolution across the globe and India as well. In the midst of such challenging and difficult time, a young boy could think out of the box about doing a nation service through science and research.

Dr. Vikram Sarabhai began his three careers

simultaneously as; 1. Scientist, 2. Institution Builder and 3 Industrialist. Dr. Vikram Sarabhai's scientific contribution can be classified in five major areas of national and international fields.

1. Creation of PRL as the centre for scientific research and training for creation of a second-generation scientists.
2. Envisaging Indian Space Programme.
3. Continuation of the pace-setting programme of Atomic Energy Commission started by Dr. Bhabha.
4. Implementing Electronics Committee's Report and subsequently creation of Electronics Commission,
5. Active participation in Atomic Energy and Space programme at the international level sponsored by the United Nations.

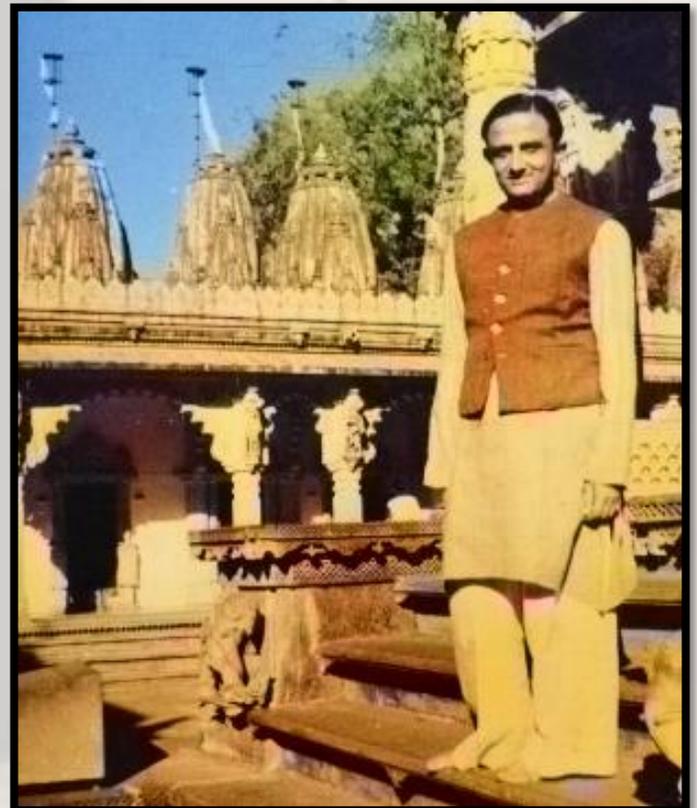
Physical Research Laboratory is the brainchild of Dr. Vikram A. Sarabhai where he designed and nurtured the space science programme of India and hence the laboratory is known as the 'Cradle of Space Science' in India. The laboratory grew out of a quest and a dream of Dr. Sarabhai. The quest was to know more about the then mysterious particles of very high energy, known as the 'Cosmic Radiation' that have been known to bombard the earth's surface. Hence, on the centenary celebration of Dr. Vikram A. Sarabhai PRL has privilege to say that, "it's all started on this soil way back in 1947", which no other institute in India has.

As the nation sat glued to their TV sets watching Chandrayaan 2 launch towards the moon - the vapour trail of this dream leads back to the year 1962. It was then that the rocket dreams were first conjured up in meetings of the National Committee for Space Research (NCSR) at Ahmedabad PRL, under the leadership of Dr. Vikram A. Sarabhai. Back then, it was a proposal to fly American made Nike-Apache

sounding rockets for upper atmospheric studies. Dr. Sarabhai had sought help from the United Nations and NASA to help set up the Thumba rocket launching station at Trivandrum. By 1963, Prof Bhavsar and Dr G S Moorthy were in-charge of launching the country's first rocket, the 725kg Nike-Apache sounding rocket on November 21, 1963. The rocket had travelled at 3,800km per hour.

By 1950, most discussions at PRL centred around rockets and satellites. So, it was on November 20, 1967, that India first launched its indigenously made Rohini RH-75 sounding rocket from Thumba. Along with this launch was a Judy-dart rocket with an indigenous payload. The first Rohini sounding rocket did not carry a payload and was just to see whether India had the capability to launch its own rockets and "We came out triumphant in the very first attempt," and hence was the beginning of space era in India of which Dr. Vikram A. Sarabhai was the creator.

As the year 2019 marks the centenary year of Dr. Sarabhai's birth let us recall a legend through some of the legendary personalities with whom he worked or motivated them. With this, the reminiscences from his family are also shared to complete the overview of his persona, though it is impossible task to do.



The Indian space programme was envisaged by Dr. Vikram Sarabhai, who believed,

“There are some who question the relevance of space activities in developing nations. To us, there is no ambiguity of purpose... But we are convinced that if we are to play a meaningful role nationally, and in the community of nations, we must be second to none in the application of advanced technologies to the real problems of man and society”.

Prof. Sarabhai’s vision for the space programme in 1970 states:

“India with her mighty scientific knowledge and power house of young, should build her own huge rocket systems (satellite launch vehicles) and also build her own communication, remote sensing and meteorological spacecrafts and launch from her own soil to enrich the Indian life in satellite communication, remote sensing and meteorology. Space programme will transform our developing society into a developed society”.

It was this vision, which put India on a global map in space science and technology research.

Looking back after 50 years, we are overwhelmed to see the results of this statement. Today, India builds numerous types of satellite launch vehicles, satellite payloads, and spacecrafts and launches them from Indian soil. Societal aspects such as communication, resource mapping, disaster prediction, disaster management and entertainment have substantive inputs of space technology.

In early 1960s’, Prof. Vikram Sarabhai located a place technically most suited for space research. This was Thumba, near the magnetic equator and was ideally suited for ionospheric and electro-jet research in upper atmosphere. The major challenge then was to get this specific area for space activities. Initial reaction for the designated land was negative as this will affect the lives of fishing folks who lived there and affect an ancient St. Mary Magdalene Church, Bishop's House and a school. "Rev. Father Peter Bernard Pereira" the

Bishop of the region when approached by Prof. Vikram Sarabhai, met with the statement, *"Oh Vikram, you are asking my children’s abode, my abode and God’s abode. How is it possible?"* However, he invited Sarabhai to a prayer meeting and introduced him as, *"Dear children, here is a scientist, Prof. Vikram Sarabhai. What do sciences do? All of us experience, including this church, the light from electricity. I am able to talk to you through the mike, which is made possible by technology. The treatment to patients by doctors comes from medical sciences. Science through technology enhances the comfort and quality of human life. What do I do, as a preacher? I pray for you, for your well-being, for your peace. In short, what Vikram is doing and what I am doing are the same-both science and spirituality seek the Almighty’s blessings for human prosperity in body and mind. Dear Children, Prof. Vikram Sarabhai says, he would build within a year, near the sea-coast, alternative facilities to what we are having. Now dear children, can we give your abode, can we give my abode, can we give the God’s abode for a great scientific mission?"* There was a total silence, a pin drop silence. Then all of them got up and said ‘Amen’ which made the whole church reverberate. This church was the first design centre for space technology where India started rocket assembly. The Bishop’s house was the scientists’ working place. Later, the Thumba Equatorial Rocket Launching Station (TERLS) led to the establishment of Vikram Sarabhai Space Centre (VSSC) and, the space activities grew into multiple space centres throughout the country. Dr. Kalam summarizes thus, *“When I think of this event, I can see how enlightened spiritual and scientific leaders can converge towards giving reverence to the human life.”*

“Vikram Sarabhai died young. But, in his short tenure in this world, he lit several lamp in the form of institutions that cover textile research institutions to management institution and space science laboratories to theatres of art and culture. These institutions stand testimony to the contributions of a scientist, administrator, industrialist, a true admirer of art and culture, and above all a human, concerned deeply about his fellow beings and always thinking of their upliftment. The powerful light that was personified in Sarabhai attracted several to his fold, and each one of them was lovingly tended by him so that they could grow up to become his torchbearers.”

-Dr. K. Kasturirangan, Former Chairman, ISRO (Source: Resonance, December 2001)

“He was a man of deep cultural interests - music, photography, archaeology, fine arts, etc. He was instrumental in founding "Darpana", an institution of performing arts to propagate the ancient culture of India and to create an environment where artists could study and work in an atmosphere of freedom, giving full scope for new experiments in dance and drama. He was convinced that a scientist should never shut himself up in an ivory tower or ignore the problems of society in a mere academic pursuit of 'pure' science though 'pure science' was after his heart. It was this acute awareness of the scientists' obligation to the community that urged him to float project after project for the utilisation of communication, audio-visual activity and television as aids to agricultural expansion, family planning and spread of education in rural areas. Vikram Sarabhai lived the life of a practical Karma Yogi - doing his self-allotted duties (Swadharma) with selfless (Anasakta) and tireless devotion till the moment of his final sleep.”

-Late Mrs. Mrinalini Sarabhai, (Source: Resonance, December 2001)



“Dr. Sarabhai’s scientific contributions can be summarized by a favorite phrase of his: ‘If only one listens to the music in the (apparent) noise the work become very rewarding indeed’. He had the skill, the bold imagination, and great originality of mind which characterized all his scientific work. He provided to the scientists at PRL a gentle yet dynamic leadership, nurtured them and enabled them to advance forward to that this institution today remains a living monument to his scientific endeavors”.

-Late Prof. S.P. Pandya, Former Director, PRL

“Sarabhai’s scientific contribution cannot be judged only by the quantum of scientific research papers he wrote - rather by the impact of his ideas and the enormous influence he had in shaping not only his students but also institutions, programmes and thoughts with which he was associated. The dynamism and purposefulness he infused, contagious enthusiasm and inspiration he transmitted and the deep concern and love for people he showed made a strong impact on his close colleagues and the institutions he built.

Bruno Rossi, the celebrated scientist from MIT with whom Sarabhai collaborated, very aptly summed up Sarabhai’s contribution to science at the special session of the cosmic ray conference held at Denver in 1972 as “I believe that the stature of Vikram Sarabhai as a scientist depends not so much on any specific achievement as on the unique character of his scientific personality. For him scientific research was an act of love towards nature. He had an almost uncanny capability to absorb and store in his mind a vast amount of experimental and theoretical data. Having done that and guided by what I am tempted to call an artistic intuition, he would then proceed to arrange these data into a self-consistent picture bringing out hidden regularities and relationships; a picture which, through the years, would progressively evolve and become more precise. This is why his death dealt such a hard blow not only to the personal feelings of his fellow scientists, but to science itself”.

- Late Prof. U R Rao, Former Chairman, ISRO (Source: Resonance, December 2001)

Let the inspirations be keep coming from the beacon of Space Science and a great human being Dr. Vikram A Sarabhai and keep motivating generations to come.

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Important Visitors at PRL

Handwritten notes listing visitors: Sydney Chapeau, G.N. Sarabhai, N. Chandrabekhar, M. Srinivasan, Vijaya Lakshmi Pandit, Jawaharlal Nehru, and others with dates.

To day I had the opportunity to attend the Golden Jubilee celebration of Physical Research Laboratory. The service rendered by the Institute for the progress of the country in space technology is unique. The distinguished and veteran scientists who have worked in the architecture of this Institute in fullness of his success (Scientist) and today his legacy has achieved international reputation in the space technology. My good wishes are to the Institute and its members.

Deve Gowda to inaugurate PRL function. By A Staff Reporter. AHMEDABAD Prime Minister H. D. Deve Gowda will inaugurate a four-day 'Open House' organised by the Physical Research Laboratory as part of its golden jubilee celebrations on Tuesday.

JANSHINAGAR PRL scientists urged to uphold tradition. By A Staff Reporter. JANSINAGAR Scientists at the Physical Research Laboratory (PRL) are urging the government to uphold the tradition of the Institute.



आज पदाप्रधान पी.आर.अल.न. वैज्ञानिक प्रदर्शननुं उद्घाटन करेइ

वैज्ञानिक प्रदर्शननुं उद्घाटन करेइ. आज पदाप्रधान पी.आर.अल.न. वैज्ञानिक प्रदर्शननुं उद्घाटन करेइ. आज पदाप्रधान पी.आर.अल.न. वैज्ञानिक प्रदर्शननुं उद्घाटन करेइ.



Sky is the limit for research at PRL

It remembers members' contribution in its 50th year. EXPRESS NEWS SERVICE AHMEDABAD, NOV 19. FIVE decades and still young. Life for the scientists at Physical Research Laboratory (PRL), Ahmedabad, the mother institution of research programmes in space and planetary sciences, is always agile.

He says several pioneers in the field of space research would take active part in the celebrations. 'Actually, the objective of our programme is to bring all such persons to a single platform.' Being a premier research institution of the country, the laboratory started research in astronomy and astrophysics and played a seminal role in initiating a space science activity in the country by giving shape to Indian Space Research Organisation (ISRO) and is producing a highly motivated cadre of space scientists and technologists of the highest international calibre.



Then (above) and now: the institute expanding horizons day by day

Govt committed to support fundamental science: PM. By A Staff Reporter. The government is committed to support fundamental science, Prime Minister H. D. Deve Gowda said today.



Govt committed to support fundamental science: PM

सरकार विज्ञान के क्षेत्र में अनुसंधान को बढ़ावा देने के लिए कृतसंकल्प - देवगौड़ा

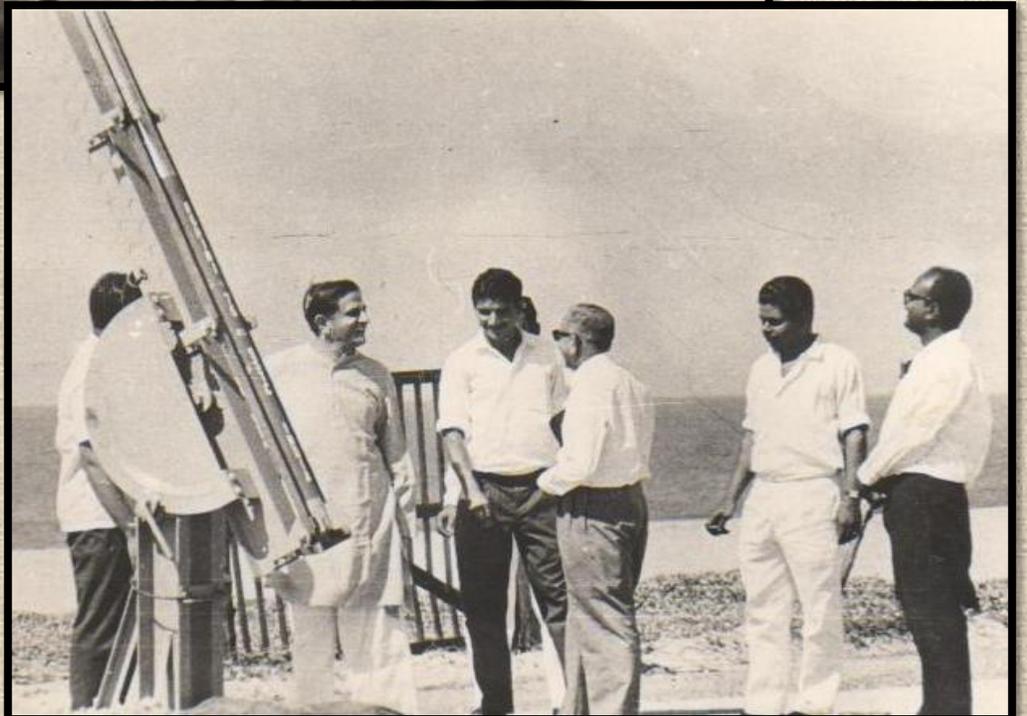


भारत सरकार के प्रधानमंत्री श्री देवगौड़ा जी के साथ विज्ञान क्षेत्र में अनुसंधान को बढ़ावा देने के लिए कृतसंकल्प

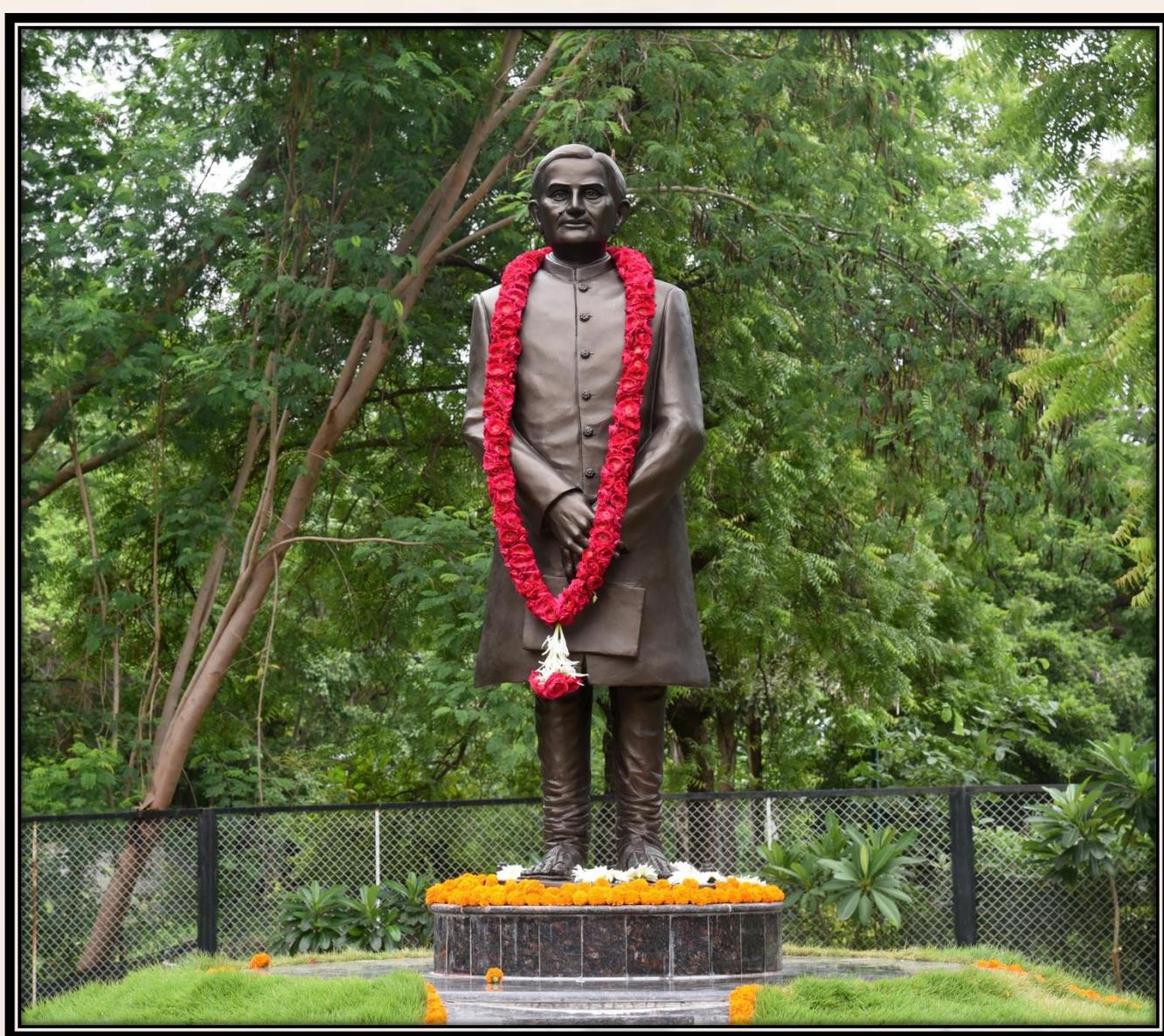
Participating in the international geosphere biosphere programme (IGBP), world ionosphere system (WITS), solar energy programme (joint global ocean flux observing experiment a, Germany and France) celebrations will be inaugurated on November 27, 28 and 29, besides world scientific meetings at PRL.



विज्ञान क्षेत्र में अनुसंधान को बढ़ावा देने के लिए कृतसंकल्प







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