

ideas that have worked

# Creating Successful Scientific Institutions

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I appreciate the sentiment behind this lecture series—of presenting projects that have succeeded in our country for people to derive inspiration from. Only by maintaining a positive attitude can we hope to make our mark in an increasingly competitive world. To add to the pool of experience, I will share with you my stories of the creation of two scientific institutions. While I was a bystander in the first case, I was personally involved in the second; what I learnt from the first helped me with the second.

## Scientific institutions: the evolutionary trend

Although science in its present form took off from the times of Isaac Newton more than three centuries ago, organized science—large groups of scientists working under one roof—is largely a phenomenon of the twentieth century. Be they physicists such as Isaac Newton, Christiaan Huygens, Michael Faraday, Heinrich Helmholtz, James Clarke Maxwell or Lord Kelvin, be they chemists such Joseph Priestley, Antoine Lavoisier, Dmitri Mendeleev or Amadeo Avogadro, be they biologists such as Robert Harvey, Edward Jenner or Charles Darwin, they all made pioneering contributions by working under their own personal compulsions, inspired by challenges facing them. Even in the first four decades of this century, although several scientific groups prospered in places like Gottingen in Germany, Paris in France and Cambridge in England, it was the personal charisma of a few scientists of distinction—such as Ernest Rutherford and Marie Curie—that motivated them. One may compare those schools of scientific thought with great musicians collecting under a towering personality to form a *gharana* in Hindustani classical music.

Perhaps a different work culture was introduced to the research field in the 1940s by the Manhattan Project, the mammoth enterprise put together on a war footing by the Allied powers to produce the atomic bomb. In retrospect, it is now realized that the motivation for the project rested on wrong premises, namely the fear, shared by many at the time, that the Germans were close

to making the atomic bomb as they had scientists equally capable in that field. Even Albert Einstein, who had written to the then US President Roosevelt urging him to initiate a project making the bomb for this very reason, later regretted the step. For, very likely, Einstein's letter turned the scales in favour of making the bomb. Had the atomic bomb not been made at that time, would we have been spared the agonizing question we are facing today—of our survival in a future nuclear holocaust? It is hard to answer the question but the answer probably is 'No'. The cold war that followed 1945, coupled with the momentum of scientific research, would inevitably have led us along the path of nuclear weapons.

This may be a debatable issue, which I do not want to belabour here. What is beyond debate, however, is that the success of the Manhattan Project demonstrated that organized, goal-oriented scientific research pays dividends. The post-war era saw a proliferation of research institutes and laboratories, where specific goals brought together scientists, equipped with instruments to support their research. It was also becoming clear that the instrumental back-up for advanced research would become increasingly expensive and complicated. Rutherford's pioneering work demonstrating that the atomic nucleus can be transmuted required a piece of apparatus that he could hold in his hand. It was made by laboratory technicians and cost no more than £100. Today's frontier-level particle physics requires accelerators that cost billions of dollars, occupy several kilometres and need a colony of technical staff for management and maintenance.

This last aspect has become a non-trivial component of any scientific institution today. Infrastructure staff is essential to provide necessary support to enable scientists to work without worrying about the working environment. For example, technical staff is required to maintain and operate complex instruments. This expensive apparatus has to be fabricated or ordered, which requires experts in purchase. Since big budgets are involved, a competent accounts staff is vital. Non-technical staff is also needed to deal with challenges arising from the basic goal of the institution—



the pursuit of scientific research. With the involvement of large humanpower, the personnel department has to work efficiently. Scientists travel to interact with counterparts in other places, so one needs staff to organize travel. Finally, although this is not essential but may be desirable, scientists and support staff may benefit by having staff quarters, preferably close to the institution. Thus, a scientific institution outwardly resembles an industrial establishment, with people, equipment and output coming from a dedicated campus. Of course, there are differences between the two, which are significant enough to be appreciated and allowed for. Similarly, there are significant differences—often not appreciated or allowed for—between a scientific institution and an administrative department of the government. In the course of my talk, I hope to highlight these differences.

## The Institute of Theoretical Astronomy

The first of the two institutions that I mentioned in my introductory remarks is the Institute of Theoretical Astronomy (IOTA), founded in 1966 in the University of Cambridge. In the early 1960s, when I was a research student under the guidance of the distinguished astronomer Fred Hoyle, theoretical work in astronomy at Cambridge was carried out under the faculty of mathematics, a tradition dating back to Isaac Newton. IOTA boasted of greats like John Couch Adams, Arthur Stanley Eddington, Joseph Larmour, Robert Henry Fowler and Subramaniam Chandrasekhar and in the 1960s had such stalwarts as Raymond Lyttleton, Leon Mestel and Hoyle.

In the early 1960s, research in astronomy was moving into higher gear, with the advent of electronic computers, with the influx of data from better optical and radio telescopes, with the promise of space astronomy. Perhaps, no one appreciated the implications of these developments better than Hoyle, who felt that the individualistic approach synonymous with Cambridge needed to be supplemented with an organized approach. For example, along with the need for meetings and discussions of astronomers to

interpret new observations, there emerged the need to access fast computers and attract young talent. These needs could not be met in the easy-going, informal atmosphere prevalent in Cambridge then; they called for a research institute where focused and concentrated action could be taken. This required adequate funding and operational autonomy. Since prevailing rules in Cambridge hardly helped in this respect, Hoyle decided to launch his crusade for a research institute in theoretical astronomy, which would work with reasonable autonomy within the university.

## *Surmounting the obstacles*

Several obstacles inevitably crop up during the establishment of a new institution, regardless of country, place or subject. First, the peer rivalry and feeling of insecurity! The Department of Applied Mathematics and Theoretical Physics, to which Hoyle belonged, feared that IOTA's success would draw away its talent. Other departments grudged the provision of an autonomous institution for astronomy alone. Why should other subjects be left out? Second, the response of the university itself was lukewarm. Where would the funds come from? Would government funding be diverted from the university department to IOTA? For the same reason, the Department of Applied Mathematics and Theoretical Physics, which controlled astronomy teaching and research, felt threatened and was hostile to the idea.

A different consideration weighed with the UK government. There was a growing feeling in the country that because of the long distinction they enjoyed, the universities of Oxford and Cambridge always received special treatment from all quarters, including the government. This called for affirmative action to upgrade other, lesser-known universities rather than provision of additional lustre to Oxbridge. Thus, the government too did not support Hoyle's proposal. In fact, in 1964, Hoyle was offered the headship of a national astronomy centre proposed to be set up in



Sussex, its attraction being its proximity to the Royal Greenwich Observatory (RGO).

Hoyle politely turned this proposal down for he had answers to all these objections. The strong astronomical tradition enjoyed by Cambridge was one reason why astronomy called for special treatment. And the reputation enjoyed by Cambridge attracted the cream of student talent, a strong factor for an advanced research institute to prosper. However, encountering funding constraints from the university and the government, Hoyle approached private foundations for support. He was able to persuade one foundation to provide money for the institute building and another to provide support for running it for the first five years. If IOTA earned international reputation during that period, its survival would not be a problem. If, on the other hand, its performance did not pass muster and had to be wound up, he for one would not shed any tears. This attitude reveals that merit was the prime justification for setting up IOTA as well as the sole criterion for its survival. That Hoyle was able to attract private funding was solely due to his own merit as a world-class scientist.

## *The importance of students*

Another incident holds a moral for most of our own research institutes of excellence. While academics in the university debated the proposal for setting up IOTA, the head of the Department of Applied Maths expressed the view that research scientists at IOTA should not be allowed to teach mathematics undergraduates at the university. As a young post-doctoral fellow, I thought this a great blessing, since the researchers would be spared the burden of teaching and examining. Hoyle, however, interpreted this negatively. He felt that if you lecture to students, you could motivate them towards research and, with luck, attract the bright ones to IOTA. If you are prevented from lecturing, you may find talented students being diverted elsewhere. Indeed, in the early years, it did become hard for

IOTA to attract good graduates coming from Cambridge's prestigious Mathematical Tripos Examination. I should record here that I too was motivated into opting for astrophysics as my career because of Hoyle's inspiring lectures when I was a Tripos student.

*Performance assessment*

IOTA was duly established in 1966 and its buildings inaugurated in 1967. Although Hoyle could not extract as much autonomy for IOTA as he wished, it soon established a name not only for its academic research but also for its smooth administration. Since the university provided the back-up for accounts, purchase and personnel, IOTA itself had a very small support staff. Apart from Hoyle as director, it had a secretary who controlled all administrative matters and two or three stenographers.

How well did IOTA do in its initial five or six years? This can be judged by several criteria—generic indicators of the success of a scientific institution. I mention the more significant ones, which can be suitably modified for application to any scientific institution.

1. IOTA's research output was published in high-profile journals in the field of astronomy and astrophysics.
2. A number of young scientists on its staff later occupied professorial chairs in the UK and other countries.
3. Much against opposition from university experts, Hoyle bought and established a state-of-the-art computer, which became so successful that eventually university academics began to queue up to use it.
4. As the first five years of IOTA came to an end, the university decided to take charge of its running with some funds coming from the UK government. Not only were the initial sceptics won over, but the university also suggested enlarging the IOTA to include neighbouring observatories. With observational astronomy thus brought into its fold, IOTA dropped its 'T' to become IOA, the Institute of Astronomy.
5. Recall that the UK government had initially suggested that Hoyle set up IOTA in Sussex, close to the venerable RGO. Two decades later, for economic reasons, the government decided to shift the RGO from its palatial settings in Herstmonceaux Castle and place it next to Hoyle's institute in Cambridge, which had by then become a highly reputed international centre for astronomy.



In spite of IOTA's successes, even his close friends will confess that Hoyle was not the best of administrators! He was too much of a scientist and individualist to make a good 'committee man' with the patience and diplomacy to carry others with him. Even today, at the age of 85, he is prolific in generating scientific ideas. However, the skills needed to solve problems at the frontier of science are different from those required to deal with the complex human problems that arise in an institution. Outmanoeuvred in one such committee, Hoyle lost patience and resigned, not only from his directorship but also from his prestigious Plumian Chair at Cambridge. He withdrew from interactions with the academia and went on to live in an isolated but picturesque part of the Lake District in north-east England. It would be hard to find a parallel to his character and career.

## Inter-University Centre for Astronomy and Astrophysics: the motivation

My second example is that of the Inter-University Centre for Astronomy and Astrophysics, now more commonly known by its acronym, IUCAA. I have been associated with its genesis and have seen it grow over the last ten years. In 1972, I left Cambridge and returned to India to join the Tata Institute of Fundamental Research (TIFR). Unlike the IOA, the TIFR was a much larger and relatively older institution and had then just celebrated its silver jubilee. Although its founder, Homi Bhabha, was no more, his stamp was visible in the TIFR's academic functioning, maintenance of premises, streamlining of administrative procedures, etc. I had joined the TIFR with a mandate to nurture its activities in theoretical astrophysics, and over the sixteen years there, I had the satisfaction

of seeing that objective accomplished. Though I was happy with my work, some issues began to weigh on my mind, issues that were to take me on an adventurous journey away from the TIFR. Let me briefly highlight these.

Homi Bhabha set up the TIFR to help create and strengthen the base for fundamental research in India. Scientists trained at the TIFR were expected to contribute to applied research in related fields and also help universities by enriching their faculties. The first goal was met to some extent, through the establishment of major scientific establishments like the Bhabha Atomic Research Centre, the Society for Applied Microwave Electronics Engineering and Research and the National Centre for Software Technology, with talent drawn from the TIFR. However, benefits expected by the university system did not materialize. While in 1946, when the TIFR was set up, the conditions in a typical university were academically reasonable, these declined sharply in the 1960s. For this reason, among many others, there was no significant transfer of faculty from the TIFR to universities. Except with the School of Mathematics, there was no significant collaborative venture between the TIFR and Bombay University, even though both existed in the same city.

The 1980s saw a growing realization that while a large number of research laboratories, scientific institutes or centres of excellence had come up outside the university sector, there was hardly any comparable investment within the sector. The need for centres of excellence within universities was felt by the University Grants Commission (UGC).

## *The initiation*

To address the issue, the UGC decided to create its own centres of excellence—the Inter-University Centres—particularly in subjects where support available to universities was minimal or non-existent. The first centre, set up in the Jawaharlal Nehru University in New Delhi, dealt with the Pelletron accelerator and came to be known



as the Nehru Science Centre. The second centre under consideration was the IUCAA, dealing with the nucleation and growth of teaching, research and developmental activities in astronomy and astrophysics in the university sector. Because a major radio observatory was coming up near Pune under the management of the TIFR, it was suggested that the IUCAA be housed within Pune University.

At this juncture, I entered the discussions on the proposed centre. Over the years, I was becoming somewhat restless at the TIFR where life as a research scientist was perhaps too smooth to generate challenge. The widening gap between a research institute and a university was disturbing as well. Perhaps it was a symptom of the deliberate isolation of research institutes from universities that the former found it difficult to attract good students. To a large extent, the success of the West's scientific momentum is due to the fact that one generation of motivated research scientists replaces another. Students and post-doctoral fellows of today will share the main load of scientific and technical infrastructure ten years from now and will be the guiding policy-makers ten years further on. In the advanced countries, universities carry out a major part of research and development activities. Trained and nurtured in these very universities, in an atmosphere of flourishing scientific research, the students are motivated towards science. Even at the less exalted level, research can be exciting and intellectually satisfying, and seeing it happen around you can be very inspiring. By isolating research institutes from the mainstream of students, and by insisting that the university dons carry a heavy burden of lectures with research relegated to a negligible level, our higher educational system has ensured that the sciences (for that matter, other educational areas too) hold out no research attractions to students. The result is that research institutes are beginning to find it increasingly harder to attract students to science. This validates Hoyle's concern about IOTA's research scientists not being allowed to teach the university undergraduates.

In the IUCAA I saw a fresh opportunity of rejuvenating at least astronomy and astrophysics within the university sector. Could we

create a centre that acted as a resource not only of material facilities but also of intellectual stimulation for the faculty and students of universities? Though the projected establishment of the Giant Meterwave Radio Telescope near Pune was a reason for IUCAA's genesis, other exciting challenges also existed—challenges that I was missing at the TIFR. When, in January 1988, Prof. Yash Pal, the then Chairman of the UGC, asked me to take on the Founder-Directorship of the IUCAA, I agreed immediately. The reactions to my decision were mixed—the optimists welcomed it as a step in the right direction, the pessimists thought it a grave risk to leave a well-run institute to start up something out of nothing, something that may very well fail.

I had encountered a similar spectrum of opinions in 1972 when I had planned to leave Cambridge and return to India. Some friends had suggested that I set up an institution with sponsorship from the Indian government. Having seen the trials and tribulations of setting up the IOTA and having heard gory tales of government bureaucracy, I had balked at the idea. Also, I have never believed in applying precious national resources to create institutions to boost personal egos. An institution should be created only if a national need is felt for it. Such a need was being felt in 1987–88. For me, it was the chance to create a unique institution to address the needs of university academics while establishing its own standards in the rapidly growing and increasingly competitive research field of astronomy. Like in 1972, I took the plunge.

## *The basic requirements*

The establishment of a scientific institution involves three important aspects.

1. A basic set of rules and bylaws that do justice to the aspirations behind the formation of the institution.
2. A campus that provides the right environment for the fulfilment of these aspirations.
3. The staff or humanpower needed to achieve that fulfilment.



### *Rules and bylaws*

In formulating rules and bylaws, the experience of bureaucrats is certainly essential to provide the basic framework but their visors, with all due respect to their maturity and integrity—are often narrow. If they have been practising a tried-and-trusted framework of rules, they prefer to continue doing so, dreading any innovation. Strong academic directions are needed to emphasize that the world of science is different from that of administration, and that the working environments of scientists must reflect those differences.

Even among scientific institutions in general, differences exist and unless these are reflected in the rules and bylaws, chaos and frustration follows. Bureaucrats warn you that if you are given a special set of rules, others will ask for it, and this will lead to an impossible situation. It requires a strong personality to resist such pressures. In this context, the TIFR pioneered a pattern that engendered what came to be known as 'Autonomous Research Institutes of the Government of India'.

Even earlier, during the British Raj, universities were founded on the principle of academic freedom and autonomy. During the 1942 freedom movement, the Government of India wanted to send security forces into the campus of the Banaras Hindu University (BHU). Dr Sarvepalli Radhakrishnan, the then Vice-Chancellor (VC) of BHU, put his foot down and opposed the move, claiming that universities must manage their own affairs. Respecting that sentiment, the government backed down. I need not elaborate on the ironic contrast between that episode and the conditions today, where the VC is forced to move with an armed escort.

The autonomous institutions fare no better. Most prefer to sacrifice autonomy in favour of conformism with the government rules and the 'safety' they bring. The IUCAA rules and bylaws were formulated in 1988–89 and we were fortunate to have enlightened senior bureaucrats to advise us. This is where the senior administrative staff of a scientific institution can show its mettle. The purpose of administration is not 'to rule' but to create an environment in which the scientific pursuits of the institution can be carried out

smoothly. The rules and bylaws are never written in great detail; even the clarifying guidelines are often vague enough to allow some flexibility. The administrative staff has to see how one can operate within the flexibility available, so as to successfully proceed with the proposed scientific project. Rather than dismiss a proposal by saying it cannot be done as per allowed guidelines, the administrator has to find the means of achieving the desired end within the allowed guidelines. Recall that the dictionary meaning of the word 'administer' is to dispense, supply, give etc. Thus, the administrator must be supportive rather than obstructive.

However, ultimately it is the director or head of the institution that must practice full autonomy and take crucial steps to really 'direct' the institution along its proposed path. Often heard complaints of lack of autonomy can actually be traced to unwillingness to practice the autonomy that is already available. Many universities suffer because their VCs have willingly surrendered their powers to bureaucrats in the university or government. The fact that the university registrar often becomes the centre of power is ample indication of the misplaced priorities in the battle between the academic and the administrative. If the university is created to nurture and disseminate knowledge rather than encourage the growth of political power centres, then academics must have priority over administration. The great contribution of Homi Bhabha was to underline this premise in the institutions he created.

*The campus*

Given that the building is within the government sector, all checks and controls required to ensure efficient use of government funds must be enforced. Despite these, one has only to look at the sorry state of government buildings and those in universities to realize that they do not work. The question I faced was whether one could build a beautiful, user-friendly building at a cost considered reasonable in the government sector? The answer was 'yes', coupled with the understanding that the building needed to cross a credibility gap, because while 'poor and shoddy' is often considered



'simple and cost saving', the 'elegant and user-friendly' is considered 'ostentatious and extravagant'.

While initiating the IUCAA's buildings, we were fortunate in having an enlightened UGC chairman—Prof. Yash Pal—and a Governing Board that permitted us to use the services of an internationally acclaimed architect and a construction management consultant of proven integrity, both at half the cost of what government agencies charge for the same services. The result was an elegant set of buildings at a cost no higher than that prevailing for government-built buildings. When you look at the IUCAA buildings you may find this incredible, but figures speak for themselves. One important lesson I had learnt from the examples of Hoyle and Homi Bhabha was that the head of the institution must personally show concern for the construction project and check its progress regularly. This way, the architect, supervising agency and the contractors get the message that their joint effort is considered vital for the well being of the institution.

*The human resource*

At both the academic and non-academic levels, the staff of a scientific institution is the main factor in deciding its reputation. At the academic level, its very credibility is at stake. For the IUCAA to be effective as the nodal resource centre for universities, its academic staff had to command an impeccable global reputation for research and creativity. The scientific staff had to be manifestly competent in maintaining its facilities—computer centre, data centre, instrumentation laboratory and library—at high levels of efficiency. Of course, the administrative and support staff had to fully complement the academic programmes.

None of these purposes could be met by overstaffing the centre: small is beautiful. Though the IUCAA projected twenty research scientists working as core academic members, we did not rush in to fill up the twenty slots. Following the Bhabha approach, we looked around for suitable scientists with demonstrated creativity and reputation, and then created an appropriate slot. At this stage,

we have around 60% of the total projected core strength. With this cautious approach it may take a few years to complete the quota but we will be sure of quality, the hallmark of a centre of excellence.

Scientific facilities require continual upgradation as technology advances. Persons with fossilized ideas, howsoever experienced in present-day techniques, will be inadequate if they are unable to imbibe new ideas from new technologies. Likewise, the administrative and support staff has to carry the 'service' motto rather than see themselves as hierarchy-minded rule enforcers. For keeping such staff motivated, the institution must have a merit-based promotion policy. In a small organization, a staff member should be encouraged to take on different duties under rotation, and the promotion policy should reward exceptionally gifted and dedicated individuals.

Unfortunately, the government has not recognized the difference between the big and the small, insisting upon using its vacancy-based, 'tried and trusted' promotion policy. A person is promoted only if a vacant slot exists for that person to move into. In small organizations, vacancies are rare and this slows down promotions, adding to frustrations. I do hope that better sense will prevail eventually, so that small organizations will have a more satisfactory route for advancement of their support staff.

The problems of human relations are not confined to the infrastructure staff alone. The academic staff—the key component of a scientific institution—also contributes to the director's headache! The issues can be traced to the human ego, especially so where one is dealing with a set of creative persons with original minds. Is the institution recognizing these very virtues? Is it giving academic freedom to its staff members? I recall that we once invited a scientist to deliver a colloquium, and that she had to take permission from her director to accept it! Scientists, howsoever objective they may claim to be in their perception of the science they practice, are after all humans and subject to the same feelings and emotions as others. So there may be rivalry, jealously or a holier-than-thou attitude among colleagues and, more often than not, the director has to act as the buffer in petty squabbles. This can be the most taxing thorn in the director's crown.



## *A word of caution!*

While I have described the requirements for a successful scientific institution, as discovered while setting up the IUCAA, I cannot help voicing anxiety about some recent trends. As I have been at pain to emphasize, a scientific institution and a government department are as different as cricket and football. Imagine the cricket board issuing a directive ordering cricket to be played as per rules of football. That would penalize Sachin Tendulkar for hitting the ball with a bat for the new rules would require him to kick the ball! Ridiculous as this example may sound, this is what we may be up against. For, after the V Pay Commission pay revision was carried out, the Government of India has been insisting that the terms and conditions of service of scientists at a scientific institution shall be exactly the same as those for officers of the government. If this directive is interpreted literally (as some bureaucrats tend to do), it will spell the end of the autonomy of scientific institutions, which was introduced by such luminaries as Homi Bhabha and Shanti Swarup Bhatnagar, with the blessings of Jawaharlal Nehru. It may take massive effort to set up a scientific institution but it is quite easy to destroy it.

## *Time management*

Many people complain that the administration or management of an institution take up so much time that one cannot do anything creative. My experience proves otherwise. By letting your colleagues share the burden through delegation of responsibilities, you can find more time for your cherished activities of research, teaching or writing. Even so, it is important how one manages the twenty-four hours that each of us is allotted every day and night.

Once a teacher brought to class a jar, stones, pebbles, sand and water. He filled the jar with the larger stones. When he could put in no more, he asked if the jar were full. 'Yes', said the class. 'Wrong', said the teacher, proceeding to put in the smaller pebbles, which fitted into the many interstices. When he could put in no more pebbles, he repeated his question. 'No', roared the class, this time aware that there was still some space left for the grains of sand. After filling as much sand as he could, the teacher asked again: 'Is the jar full?' Again the class answered, 'No'. 'Correct', said the teacher as he filled the remaining space with water and asked, 'What do you learn about time management from this experiment?' The class answered: 'In between your major tasks there is always time available to carry out your many minor duties.' 'Excellent! But there is more to it', said the teacher and performed another experiment, this time filling the jar in the reverse order, first with sand and then pebbles. However, when he came to the stones, there was no room left! The moral? 'If you spend more time on your smaller tasks, you may have none left for the bigger and important activities!' So it all boils down to getting your priorities right and then fitting all things, big and small, in the right order within the limited time available.

## A sense of satisfaction

Hoyle resigned and left Cambridge when the first six years of his institute were over. The institute, combined with the adjacent optical observatory, re-emerged in a larger form. Homi Bhabha spent two decades at the helm of the TIFR, during which it grew in strength and moved to its present premises on the shores of the Arabian Sea. I am sure that both these founders had a sense of satisfaction at achieving something of lasting value, something which generations of scientists and students would benefit from. A founder-director of a successful institution has this enviable sense of satisfaction.

In the formative years of the IUCAA, I was fortunate in receiving



help and guidance from many different quarters, facilitating my job of setting it up. With Prof. Yash Pal heading the UGC, I had a motivated and experienced chairman who was always willing to help. Prime Minister Rajiv Gandhi had announced the setting up of the IUCAA in the 1987 Science Congress at Pune. Mr B.G. Deshmukh, his Principal Secretary, and the Maharashtra government helped us in getting land in the Pune University campus. Mr Anil Bordia, Secretary (Education) in the Ministry of Human Resource Development, swiftly got approval for setting it up. Officials in Pune, proud to welcome this budding centre in their city known for its patronage of education and science, accorded us help at every stage. And, with the imaginative architecture of Charles Correa, the centre has acquired landmark status.

However, my real sense of satisfaction came recently, when our scientific advisory committee (with three of its eight scientists coming from overseas) ranked the IUCAA in the top bracket of astronomy institutions in the world. Indeed, in the last analysis, an institution is successful and justifies its existence only if it is seen to have achieved what it was set up for.