Society for Scientific Values
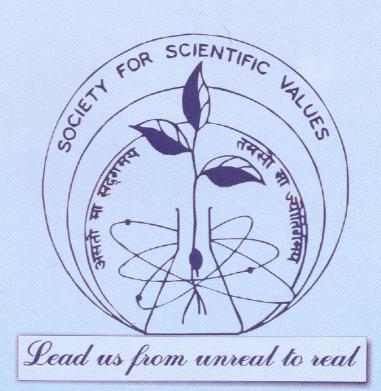
Ethics In Scientific Research
Development And Management
News And Views

Lead us from unreal to real

EDITORIAL

Is Scientific Community Different?

At a conference on "Environment" held at the Indian Agricultural Research Institute, New Delhi, a well known social activist Shri Sundarlal Bahuguna said "I believe in scientists next only to God". Did he say it to please an assembly mostly of scientists or is there any rational basis of saying so? Although the statement is highly exaggerated, its essence is not without any basis. According to a well known principle of psychology, the profession of a person has a strong influence on his character and behaviour. What is the profession of a scientist? Is it not search of unbiased and full truth? A scientist has to be totally honest in thought, while proposing a theory or planning experiments. He has to be fully honest in his speech, while speaking about his work, and in action, while performing experiments and publishing the results. One may argue that this is an ideal and most of the ideals are not fully practiced. While this might be true in other professions but not in science, because the science will not progress even an inch if the scientists are not fully honest in their work. Is it then unreasonable to assume that the scientists are very honest persons?

In fact, there is a striking similarity between the work of the scientists and that of our ancient Rishis. The scientists seek answers to questions like how the universe was created and what are its properties. The Rishis enquired into complementary questions like, who created the universe; what are the attributes of the creator to enable the creation of the univers. Who am I? Is there any relation between I and the creator? The scientists use incisive logic and reason to arrive at an answer which is taken to be true after it is experimentally verified by several scientists. The Rishis also used similar logic and reason to arrive at an answer which was taken to be true after it was experientially verified by several Rishis. But the Rishis were the source and support of moral values in the society. The question is, can the scientific community become similar to Rishis in this aspect also to save the country from rapid moral degradation? The answer is clear yes, provided the scientists become true to their work and weed out different kinds of malpractices that have crept in science teaching, research, publication

and more importantly in administration. This effort will not only create proper environment for doing good science and technology but it will also greatly help raising the national character. This is the hope and ultimate goal of the Society for Scientific Values as has been reflected in the preamble of its constitution.

It is often argued that scientists cannot be expected to remain honest when there is wide spread moral degeneration in the society. Instead of using such arguments to ignore dishonesty in scientific research and management, the scientific community should become more vigilent and critical. Because, pseudo-scientists are known to have caused lasting damage to scientific organisations by getting at the top using such situations by their skill of good writing and good speaking coupled with sycophancy and deception that are alien to science. Unfortunately however, instead of openly disapproving such acts, many scientists, including some very good ones keep quiet either due to fear of different kinds, including the fear of looking less sober or due to greed for undue gains from the wrong person in power. They must reflect on the time tested message of the Mahabharta, the most renowned epic of India. It is an encyclopaedia of ethics, politics, philosophy and Dharma. Gita, the sacred book of most profound spiritual philosophy and Dharma (righteous duty) is a very small part of the Mahabharata. Its author Shri Ved Vyas ends the epic proclaiming "With raised hands, I shout at the top of my voice, but alas! no one hears my words which can give them Supreme Peace, Joy and Eternal Bliss. One can attain wealth and all objects of desire through Dharma (righteous duty). Why do people do not practice Dharma? One should not abandon Dharma at any cost, even at the risk of his life. One should not relinquish Dharma out of passion or fear or covetousness or for the sake of preserving one's life. This is the Bharata Gayatri. Meditate on this daily, O' man. You will attain everything. You will attain glory, fame, prosperity, long life, eternal bliss, everlasting peace and immortality". We must ponder over this whenever fear and greed discourage us from doing our righteous duty. The validity of the message has been proved time and again. The life of Mahatma Gandhi was an example of this in the recent times.

Editorial Note

The Society has been publishing a bulletin titled 'Society for Scientific Values: News and Views'. The title of the bulletin has been changed from this issue to 'ETHICS IN SCIENTIFIC RESEARCH, DEVELOPMENT AND MANAGEMENT', with hope that it will transform into renowned journal in due course of time.

In collaboration with the Indian National Science Academy (INSA), the Society organized a seminar on 'ETHICS IN SCIENCE', at INSA, New Delhi on March 8, 2003. It was convened by Dr. K.L. Chopra, President of the Society and was inagurated by Dr.M.S. Valiathan, President INSA. This issue contains a report on the seminar and the extended summary of the talks delivered at the seminar by Dr. K.L. Chopra, Dr. P.N. Srivastava, Dr. R. Natarajan and Dr. P.N. Tiwari. Dr. Vasantha Muthuswamy, Sr. DDG, ICMR, also gave a talk on "Genetic and genomic research, issues of accountability," which would be published in a subsequent issue.

The readers are invited to contribute articles and letters to Editor on any aspect of ethics in science, technology, development and administration including the role of scientists in society especially in India and the relation between science and spirituality. The manuscripts may preferably be sent by e-mail to both the Associate Editors. The typed and printed manuscripts should be sent to the Editor. The Society would also consider publishing a gist of some very good articles in its area of interest published elsewhere or reproduce full article if there is no restriction on its reproduction. The readers are welcome to send a copy of such articles to the Editor.

Acknowledgement

Report on INSA- SSV Seminar on Ethics in Science*

Jointly organized by the Indian National Science Academy (INSA) and the Society for Scientific Values (SSV), a Seminar on "Ethics in Science" was held at INSA premises for half a day on March 8, 2003. In his inaugural remarks, Prof M. S Valiathan, President INSA, underlined the ethical concerns which have taken a central place in global societies particularly after the second world-war due to ever increasing role of science and technology in our lives. With rapid advances in life sciences, issues of medical, genetic and ecological sciences are riddled with ethical problems which are of concern to government departments, social organizations, NGOs, academies and learned societies. The dilemma of ethics for a scientist is epitomized by what Duryodhana of Mahabharat said : " I know what I ought to do but I cannot do it; I know what I ought not do but I cannot help doing it".

Prof Valiathan stated that several Indian and international agencies such as WHO, UNESCO, ICSU, ICMR and DBT have dealt with ethical issues in the pursuit of S &T in various documents. However, the problems and concern of developing societies have not been addressed to in these documents. INSA has, therefore, taken an initiative to set up an inter-academy committee of all Indian scientific academies under the chairmanship of Prof. M.G.K. Menon to prepare a document to take care of the concern and response of developing nations. Representing Prof. Menon, Prof. P.N Tandon elaborated on the task of this inter-academy committee and on how the Academies can provide moral and ethical leadership to the scientific establishments of the country.

In his introduction to the Seminar, Prof. Chopra stated that whereas science by itself is neutral to ethics, its pursuit and the scientist are not. Because of the multidimensional and functional aspects of ethics, neither a universal definition nor a universal code of ethics can be formulated. The foundation of ethics lies in values within a civilized society. So, why has ethics in science and technology assumed global concern today? Ethics is central to the process of creation of knowledge. And, today, knowledge is the engine which drives globalised free market economies in the world. Knowledge is the new currency of wealth of a nation. International organizations have been set up to ensure universal acceptance of some sort of ethics. Listing a number of examples of unethical and corrupt practices for the scientific bodies to ponder over, Prof Chopra stated that it would be naïve to think that a nation where

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corruption exists in all its governance systems would have an island of ethical practices in our S &T establishments.

He also mentioned that the practice of claiming co-authorship in a research paper by a supervisor or sectional head without contributing much continues to be a common practice in our national laboratories. Fake degrees and honours are available by mail and on internet. Appointments to senior posts of Directors/ Vice Chancellors are being increasingly made on the basis of political understanding or pliability. Appointments and transfers of faculty in state controlled institutions call for bribes. Bribes and kick-backs are creeping in our national funding agencies and departments. Questionable claims of achievements are being made by government departments through lavish advertisements. Plagiarism and other academically unethical practices are not at all uncommon even in our many institutes of excellence. The SSV has examined some of the cases of unethical practices brought to its attention. A popular national magazine has listed a number of Vice Chancellors as Chancellors of Vice and yet they continue to do business with knowledge. Not many Heads of Institutions are prepared even to acknowledge the existence of such a problem, leave alone take any action. The soft peddling of cases of plagiarism, and multiple publications of essentially the same paper hurts the image of Indian science. Despite a clear evidence of plagiarism being given by peers in India, no action is taken. This point was later elaborated further by Dr Indira Nath who was a member of the enquiry committee in one case.

Prof R Natarajan, Chairman AICTE, spoke on professional ethics, values, and accountability of engineers and engineering teachers. While engineers have a special responsibility in the profession, the engineering teacher has responsibilities towards teaching, guidance, consultancy and Research and Development. He discussed the principles of professional engineering ethics and the virtues and academic integrity of a professional engineer. With rampant corruption around, Prof Natarajan said, we must correct prevalent unethical practices with a top–down approach and then at grass roots.

Dr Vasantha Muthuswamy, Sr. DDG, ICMR spoke on genetic and genomic research and the ensuing issues of accountability. Genetic engineering, cloning, embryo and stem cell research, genetically modified organisms, gene therapy, transplantation etc have opened a pandora's box as far as societal and global concerns with ethical, legal and social issues are concerned. The need of the hour, according to Dr Muthuswamy, is to develop appropriate scientific and ethical review procedures and regulatory systems. And, it should be our long term strategy to sensitize researchers and to teach principles and policies of research ethics in academic institutions.

Prof P N Srivastava discussed the role of scientific societies and academies in creating awareness on ethical issues, in monitoring unethical practices and in applying moral pressure on concerned authorities for punitive action. He highlighted the activities of the SSV, in particular the conduct of four national seminars on various aspects of Ethics by the Society in the last decade or so (Note: the Proceedings of these Seminars are available with the SSV), its efforts in enquiring into a no of plagiarism cases brought to the attention of the Society, and its sensitization programs. Prof Srivastava queried if we need an Office of Research Integrity (as in USA), or if INSA could perform a proactive role. He also made several suggestions for ensuring ethical practices. One that needs our whole hearted support to improve accountability is that an approved and final copy of the PhD thesis of a student should list the names of the examiners of the Thesis so that it is a public knowledge.

Dr. P.N. Tiwari suggested that the scientific societies should devote a session in their symposia and seminars to create awareness about the need to remain vigilant in following ethics of science in research and administration. For curbing unethical acts in research and publication, he suggested that every scientific Institution must have an 'Ethics Committee' which should follow transparent method as being followed by the Society for Scientific Values for investigating into the allegations of misconduct in scientific research and publication, and take action as outlined by the Society. Dr. Tiwari emphasised the pressing need to curb unethical acts in the management and administration of scientific organisations and suggested the steps to be taken jointly by INSA and SSV in this direction.

Several interventions by participants made suggestions on code of conduct for ethical practices and its implementation. Dr A R Verma suggested that those who may have done something unethical inadvertently should be given an opportunity to confess and clear their conscience. And, some felt that we must take action against senior scientists for their unethical actions to set a good example.

It was, generally agreed that unethical practices in the pursuit of S&T in our country are a matter of serious concern. Spreading awareness of the importance of ethical conduct throughout the scientific community should be one of the major goals of scientific societies and leading scientists. And, like charity, ethics should begin at home, with our scientific leaders and administrators as role models.

State of Ethics in Scientific Research and Management

Dr. K.L. Chopra*

Science by itself is neutral to ethics but the scientist and pursuit of science are not. Being a multidimensional concept, ethics cannot be defined in a universal way though the lack of ethics is easily discernable. The simplest generic definition may be: Ethics is a Set of Principles and a set of Purposes, or Ethics is being honest to self and accountable to others. The foundation of Ethics lies in cultured and nurtured values. However, we must keep in mind that ethical values are not absolute and indeed consist of some fundamentals and some function specific values. Consequently, a universal model of ethical behaviour does not exist and is as elusive as an alchemist's dream. In fact, Ethics cannot be taught but have to be discovered and imbibed through experience, reflections and introspection.

Why are Ethical concerns at the centre stage of developments in science and technology today? After all, Ethical values have always been a part and parcel of civilizational transformations world over from time immemorial. With a Knowledge Era being ushered in by globalized, free market, knowledge –based economies in the world, knowledge now is a marketable, bankable and saleable commodity. And, Ethics has been starkly recognized to be central to the creation of Knowledge. International organizations have been set up to ensure the protection of intellectual property rights of the creators of Knowledge. International collaboration in research and development, manufacturing and trading by conventional processes as well as through E-media are becoming common place. This new era can flourish only if basic ethical values are universally accepted and practiced. Therefore, any society which wishes to be a part of the global knowledge society, will have to be concerned about ethics today.

Frailty thy name is Mankind! Indeed, human frailties have created deviations from ethical behaviour in all societies and in all countries, though with varying degrees. Where corruption in many spheres of governance is rampant, it would be naïve to expect an island of ethical values in its knowledge centres. Recognizing that such a problem exists and it has serious implications for the development of science and technology in our country is by itself a major step toward facing the gigantic problem. Some examples of unethical values and behaviour in our S & T and academic spheres are given in the following to bring home the seriousness of the situation.

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1. Many Heads, Managers, Supervisors in the National Laboratories of CSIR, DRDO, DOE, ICAR, ICMR continue, despite being alerted, to impose their name as co-author of research papers of their colleagues even when they have contributed very little scientifically. To a lesser extent, the problem of "silent supervisors" also exists in many academic institutions.

2. Ghost writers are available for writing PhD theses plagiarised from elsewhere in small universities. Fake degrees and fake honours are available on internet from a variety of international sources.

3. With a plethora of scientific journals in various fields and various countries, multiple and rehashed publications of research results has become easier, particularly in journals which are week in refereeing standards. In the recent infamous case of Prof Rajput, Vice Chancellor of Kumaon University, he and his colleagues have published 12 papers in IJAP of CSIR which have also appeared elsewhere.

4. Appointments at senior leadership positions in major academic and national R &D labs are being increasingly made on considerations other than academic and managerial achievements. This is a serious problem in a cadre based environment of governance.

5. In some states, a candidate may have to pay money or some other favours to be appointed as Vice Chancellor. Appointments and transfer of faculty in some state controlled academic institutions are controlled by bribes.

6. Poor management is prevalent in our academic institutions and this leads to corrupt practices, both academic and non-academic. Recently, a well-known news magazine exposed corrupt practices in a no of academic institutions. The magazine listed the Vice Chancellors of these institutions and portrayed them on its front cover as Chancellors of Vice. And, lo and behold! the same VCs continue to do even more "knowledge business".

7. In the last three years or so, some 50 private deemed-to-be/ de Novo universities have been approved. Most of these universities do not have even minimal infrastructure and faculty. We will soon churn out a large no of unemployable engineers out of such institutions.

8. The ten scientific departments of GOI spend over 100 crores listing some half baked and virtual achievements. Such practices erode the credibility of scientific enterprise as also scientific temper.

9. Cases of unethical academic practices, in particular plagiarism, are known to occur even in the best of our, also world over, academic institutions such as IITs, Central Universities, etc. These observations are based on the personal experience of some members of SSV. The tragedy, however, is that even if firm evidence is provided, the Heads of these institutions do not have the courage to acknowledge the disease, leave alone to take any action. Little do these persons appreciate that ethical practices are essential to create excellence and only excellence can breed further excellence. Ironically, when some foreign scientists raise the same issue, all concerned get into action for damage control. The case of Prof Rajput illustrates it well. Despite numerous well known persons and organisations, including SSV, writing strong letters to the President of India, the State and Central Governments, no action was taken by any body until hell came loose with a letter from some prominent scientists from USA. How this matter has been closed is another sad story of expedience over ethical values.

The examples given here are only a small part of a very long list. The SSV has investigated a no. of cases of plagiarism and other unethical practices and has put a lot of moral pressure on the persons concerned. Results are not good enough to be reckoned with. The SSV has held four national seminars on various aspects of ethical values. We feel that all of us must continue the struggle to make more scientists and science administrators aware of the ethical problems and sensitize, particularly the younger generation, to the need for imbibing ethical values. Senior scientists have a responsibility to be role models. After all, like charity, Ethics must begin at home, with our scientific leaders and administrators.

Ethics In Science: Role Of Science Academies, Societies And The Government

Prof. P. N. Srivastava*

I am very happy that the Indian National Science Academy and the Society for Scientific Values have jointly organized this seminar on "Ethics in Science" today. When I was asked by Prof. Chopra to speak on this, first of all, I was reluctant. My reluctance was because I have spoken so many times on this that I did not know what new was I going to say. However, later on, I decided to speak because it is worthwhile to talk about it as many times as possible since, if nothing good comes out of it, nothing worse would happen. I feel happy that the President of our academy, Dr. M. S. Valiathan, who has also been concerned about it and had also spoken on Accountability in Scientific Agencies a few years back, has taken initiative to organize this seminar.

Ethics in science is a very difficult and complex problem. The whole world is concerned about it. In India we have not felt concerned about it. Broad and Wade in their book "Betrayers of Truth" published in London in 1983 had made a statement that from a few authenticated cases of fraud they could say that about 10,000 frauds are missed for every one which is found. The only point that I would like to add is that just like corruption, India would perhaps also be one of the countries at the bottom as far ethics in science is concerned. However, wisdom lies in talking about it and dealing with it rather than putting it under the carpet, in which we are very adept or behaving like an ostrich that the problem does not exist.

The whole world is concerned about it and many organizations, including governmental ones like 'The Office of Research Integrity' in United States, have taken numerous precautions and safeguards against aberrations and frauds. They regularly come out with publications such as "Ethical Guidelines" or "On Being a Scientist – Responsible Conduct in Research' published by the National Academy of Sciences in USA. Further, in countries like United States, Europe and Japan, once a person has been exposed, the punishment given is exemplary. Unfortunately, nothing like that happens in India. Misconduct in science has been editorially and

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otherwise commented upon in Current Science many a times but they have never been taken seriously. None of our scientific academies has taken note of it or felt concerned about it. I do not have to give examples of fraud and plagiarism which are so well known. The Society for Scientific Values has brought to our attention so many cases but nothing has happened. What happened in the blatant case of Gupta of Chandigarh? Very recently, B. S. Rajput has resigned from the Vice-Chancelolorship of Kumaun University. We only have to wait for a few months and after the matter cools down, one would not be surprised if he may be offered another important assignment.

N. Vittal, in one of his talks some time back on "Do We Need A Code Of Conduct In Science" had described that misconduct in science can be of two types. The first category is classified as scientific negligence. For this category, we will need to include those instances where scientists have provided erroneous information but have not set out from the beginning with the intent to defraud. This category is itself serious but much worse is the second category which involves deliberate attempt by a scientist to be dishonest including premeditated acts of fraud that may include forced or fabricated data, falsified or invented results, plagiarism, piracy, hoaxes and such malicious acts. There are many examples of this category in India where also nothing has happened. I would urge that a responsible academy like the Indian National Science Academy should not keep quiet in such instances and should take it upon itself to see that exemplary punishment is given in all such cases. I am absolutely sure that if such issues are taken by the academy in all its seriousness, no government agency would be able to sidetrack it.

I would like to talk about what is happening in many universities. An unfortunate thing happened in 1973. A recommendation in good faith was made that for university appointments, the minimum qualification should be a Ph.D. This was faithfully implemented by the U.G.C. The result was disastrous. Production, or should I say, manufacturing of Ph. D. started galore. The mistake was corrected in mid-eighties but to no useful purpose. The process goes on without any check. Pure passion for knowledge, rooted in ethics is far from the dominant factor in research programmes today. Another good step has been taken by the U.G.C. and that is about qualifying in a NET examination for appointment in universities and colleges. This step had to be taken since the credibility of Ph.D. degrees had been lost. The Chairman of the U.G.C. knows about the problem that he faces and how people wish to bypass this because they have received a Ph. D. degree. Of course, there

would be many obvious cases where qualifying a NET test may not be necessary, but a clear case should be made for this.

I was interviewed by the correspondent of the journal 'Science' of USA in 1995 and was asked if I was concerned by the large number of Ph. Ds produced in science in this country. My reply was that the number of Ph.Ds produced in a large country like India is not that disturbing but what is really alarming is the very poor quality of work on which the degree is awarded in majority of cases. Being an Indian and being ashamed of the fact in respect of fraud that had been taking place, I had to keep quiet about it since neither could I deny this nor could I defend it. I know it was not correct but I had to swallow it at that time. I may accept poor quality of work for the Ph.D. degree to some extent but not the fraud which is taking place in the award of the Ph. D. degree. This is calamitous.

I have referred to the Office of Research Integrity above. It continues to tackle misconduct with all the hardships and problems that it faces. I would like you to read an article published in Nature only a few months (Vol. 419, 332-333, 2002). The administrators have sensibly concluded that its mission will be accomplished not through investigation but by spreading awareness of the importance of ethical conduct throughout the scientific community. Many scientific communities and organizations have bitterly criticised the Office of Research Integrity on their survey (www.fasceb.org) for daring to seek out information on the pervasiveness of low-key unethical behaviour. They complain that the survey falls outside the scope of the tight 'fabrication and plagiarism' definition of scientific misconduct.

The Society for Scientific Values had been raising these issues in India for discussion and anyone who talks about these issues is labelled as pessimist or a person with negative outlook or anti-science or as one who degrades Indian Science. The Society has been facing these charges from many senior scientists and has been side-lined because of this. The Society had been working with extremely limited resources at its disposal. It has neither an office of its own nor secretarial assistance. It is working purely on voluntary basis. T.N. Seshan, in one of his talks in the Society had rightly remarked that "If the scientific community will not enable the country to recognize conduct and misconduct and put it down with firmness after due process and impartiality who else can do it. If there is one group which because of its training and its adherence to truth can probably bring back the character to this country, it is the scientists".

The Society for Scientific Values has organised a number of seminars in the past such as (1) Scientific Values and Excellence in Science; (2) Accountability in Scientific Research; (3) Scientific Misconduct: Disciplinary Action; and the last one (4) Ethics in the Administration of Science. It is rather most unfortunate that whenever issues of ethics and accountability are raised, a good number of us feel and express that we are pessimistic and that we unnecessarily denigrate Indian Science or we have a negative outlook. If any thing, these are farthest from the truth. I would like to enumerate some of the recommendations and I would like any one of you to tell us as to which one of them are not worth considering for implementation. Recommendations have been that Scientific academies/Societies; Organizations; Government establishments should take the following actions against guilty scientists.

Scientific academies and societies should withdraw fellowships/memberships granted to such scientists.

Academic degrees, awards, prizes based on fraudulent work should be withdrawn.

Scientific community should boycott an institution which does not take required action against its staff found guilty of misconduct in science.

In case of Ph. D., D. Phil., D. Sc. degrees awarded, it should be mandatory for the universities to attach a certificate with each thesis approved for the degree indicating the names of the examiners who had approved the award of the degree. After all, once the degree is awarded the names of the examiners need not be confidential.

Various government funding agencies and University Grants Commission responsible for giving grants should ensure that the organization being given the grant has a transparent mechanism to look into and for investigating cases of scientific misconduct and the investigators may be clearly told that "This grant is released to you on the clear understanding that no scientific misconduct will be committed by you or your collaborators. Should an allegation of scientific misconduct be made against you and established after proper inquiry, the grant shall stand terminated and proper action which may include even termination of services of the scientists concerned be taken."

There must be transparency in appointments, assessments, rewards and punishments. Reasonable, well-defined criteria and procedures should be set up in each case and the assessment made against them must be documented.

A transparent mechanism for identifying and nurturing special talent must exist.

It must be recognized that science is an elitist activity and democracy in science is not synonymous with political and social democracy.

I will not like to go into the details and one who wishes to know more may look into the publications of the Society for Scientific Values.

I would like to conclude that our academy, the Indian National Science Academy, would be doing a great service if it takes upon itself to get an office like Office of Research Integrity like USA established in India as a first step to tackle the problem of misconduct in science. The step taken by the Indian National Science Academy should be followed sincerely and seriously by all the academies.

Professional Ethics, Values and Accountability of Engineers and Engineering Teachers

Prof. R. Natarajan*

1. What is a Profession ?

"A Profession is a calling requiring specialized knowledge, and often long and intensive preparation, including instruction in skills and methods, as well as in the scientific, historical, or scholarly principles underlying such skills and methods, maintaining by force of organization or concerted opinion, high standards of achievement and conduct, and committing its members to continued study and to a kind of work which has for its prime purpose the rendering of public service" (Webster's Third New International Dictionary)

In response to a question "What engineering professionalism meant to them?", the three most frequent responses given by a group of engineers in the US were: (a) Technical competence and skill; high standards of learning and ability, (b) Prestige for the profession: stature, dignity, respect, and (c) Become more like lawyers and doctors: raise standards as in law and medicine. In response to the same question, engineer-managers identified the following points as the most important: (i) Technical competence, (ii) A high standard of ethics, and (iii) An attitude of individual responsibility.

In the US, the title "Professional Engineer" is protected by law in all states but three. The definition of a "professional employee" is given by the Taft-Hartley law. It includes, among other things, the following features:

- Any employee engaged in work.

- Predominantly intellectual, and varied in character, as distinct from routine mental, mechanical or physical work.

- Involving the consistent exercise of discretion and judgement in its performance.\

- Of such character that the output produced or the result accomplished can not be standardized in relation to a given period of time.

- Requiring a knowledge of an advanced type in a field of science or learning, customarily acquired by a prolonged course of specialized intellectual instruc-

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tion and study in an institution of higher learning or a hospital, as distinguished from a general academic education or from an apprenticeship, or from training in the performance of routine mental, manual or physical processes.

Engineers have a heavy responsibility for human safety, in matters, for example, of location and construction of dams, nuclear power plants, bridges, etc. In all these cases, the public have to rely for safety and protection solely upon expert engineering opinion, because no other segment of the population possesses the relevant specialized knowledge. Engineers play a significant role in improving the quality of human living. It has been said that "Engineering profession is the channel by which science can greatly improve our way of life, provided it assumes the initiative of leadership, rather than the passive role of the hired consultant".

2. Faculty Accountability for Teaching

While one of the principal roles of a faculty member is as a Teacher, the perceptions of the student, teacher and administrator towards this activity are fraught with uneasiness, mis-understanding, ambiguity, dissatisfaction frustration, etc. Even after millions of hours of teaching have occurred in thousands of classrooms all over the world, it has not yet been possible to come up with an optimal prescription for maximum effectiveness.

3. On Ethics

The Concise Oxford Dictionary, VII Edition, 1984 defines 'Ethics' as the 'Science of morals, moral principles, rules of conduct, whole field of moral science.'

The Reader's Digest Great Encyclopaedic Dictionary defines 'Ethics' as the 'Science of morals, study of principles of human duty, moral principles, rules of conduct'.

The Concise Oxford Dictionary, VII Edition, 1984, defines "morals" as being "concerned with goodness or badness of character or disposition, or with distinction between right and wrong, dealing with regulation of conduct, concerned with rules of morality, virtuous in general conduct, founded on moral law".

'Ethics' is a semantically loaded word. It is, in general, concerned with concepts of right and wrong. A majority of people (especially young people) believe that any act or event can be measured against some absolute standard, with a complete determination of its intrinsic rightness or wrongness. More "experienced" people often are not so sure!

Some ethical questions have religious connotations. However, it is not necessary to include religious aspects in order to accept the social desirability of ethical rules. Ethics constitute the basic code of civilized behavior. Such roles constitute the basic constraints each of us agrees to practise in our relationship with others. We consent to these constraints so that our own existence may be free of confrontation, quarrel, tension, stress, etc. The philosopher Hans Reichenbach has said: "The fundamental ethical rules...... are adhered to merely because human beings want theses rules and want other persons to follow the same rules".

4. Fundamental Principles of Professional Engineering Ethics

The Engineer, to uphold and advance the honour and dignity of the engineering profession and in keeping with high standards of ethical conduct: (a) will be honest and impartial, and will serve with devotion his employer, his clients, and the public, (b) will strive to increase the competence and prestige of the engineering profession, and (c) will use his knowledge and skill for the advancement of human welfare. There are more detailed statements under (a) Relations with the public, (b) Relations with employers and clients, and (c) Relations with engineers.

A new umbrella organization has been formed in the U. S called the American Association of Engineering Societies (AAES) in 1980, which is seeking to establish the AAES Model Guide for Professional Conduct (AAES 1984) as a profession - wide code of ethics. The significance of the AAES with respect to social responsibility issues, however, lies in the relationship between the engineering profession and the public.

5. On Values

When we say that a person " has values', we imply that he has certain fundamental beliefs about what is desirable or good, and that he attempts to use these in directing of his life. For beliefs of this kind to be called values, two condition are generally held to apply: (i) Values are formed as a result of reflection and judgment; thus they are different from desires, and (ii) A person's values are beliefs which he sees as applicable not only to himself, but others; essential to the idea of value is the function of commending.

6. Professionalism and The Virtues of A Professional Engineer

Reference 2 postulates that "Professionalism" refers to a cluster of inter-related virtues (good character traits) that ought to be possessed by "Professionals". A

professional is one who belongs to a "Profession". The suggested definition of a "Profession" is: An <u>occupation</u> that is intended to serve some <u>social good,</u> that requires <u>specialized expertise</u> to perform, and whose members are (usually) <u>organized</u> into a unified body that determines <u>membership</u> and <u>codes of conduct</u>. The Membership criteria are: (a) Legalistic: possessing a degree or licence, (b) Functional: carrying out the activities of the profession above some threshold of accomplishment, and (c) Normative: living up to the moral obligations of the profession.

The dimension of service is that professions come to exist when achieving a desired social good demands <u>specialized training</u>, and hence a <u>division of labour.</u> Those with the special training serve whose without it. The consequent results are (a) <u>Dependence</u>: employers, clients, and public <u>depend</u> on the professional to achieve the social good, (b) <u>Trust</u>: employers, clients and public <u>place their</u> <u>trust</u> in the professional, and (c) <u>Agency</u>: the professional is entrusted to do what others cannot do for themselves, serving as their <u>agent.</u>

6.1 The Nature of Virtue (Aristotle)

- <u>Definition:</u> A Virtue is defined as a <u>state of character</u>, or <u>habit of character</u> that <u>disposes</u> one to do <u>effectively</u> what one ought to do, either in the context of some role or practice, or simply as a human being.

- Scope: Virtues attach to emotions, desires, and behavior patterns.

- <u>Development of Virtue</u>: Virtue is "acquired through like activities", that is, through a process of habituation.

6.2 The Virtues of a Professional

The Virtues arising from the <u>dependence</u> of others include competence, reliability, due care and organization. The Virtues arising from the <u>trust</u> of others are trustworthiness and truthfulness. The Virtues arising from the role of agent include loyalty.

6.3 Critique of John Ladd

John Ladd has provided a critique of Professional Ethics Codes. His thesis is: "The whole notion of an organized professional ethics is an absurdity - intellectual and moral". He postulates that Ethics <u>cannot</u> be codified: Ethics is "essentially problematic and controversial"-an on-going intellectual activity characterized by critical reflection and debate. Ethical principles cannot be "settled by fiat". Ethical behaviour is

autonomous, not heteronomous. Codes are legal, not ethical. "Professional ethics" is an artificial category: "There are no experts in ethics". Professionals do not have any special rights. Micro-ethical problems involve ordinary moral norms—codes of ethics are needless. Macro-ethical problems are about how to use professional power- codes of ethics are useless.

The purposes of professional codes are dubious: (a) Disciplinary function: ethics codes are not suited to combating malpractice, (b) Guidance: codes are either needless or useless, (c) Support: codes are not meant for the profession at all, and (d) Public Image, Monopoly Protection, Status Symbol: not especially salutary goals. Mischievous side- effects of codes are Complacency, "Cover -ups", Divert attention away from macro-issues, and Tyranny of the majority / establishment.

6.4 Introduction to Ethical Theory

Ethical theory is defined as the branch of ethics that studies theoretical problems pertaining to morality, in an effort to develop sound general principles of (i) Theories of Value: theories about the nature and origin of good and bad, and (ii) Theories of Obligation: theories about the nature and origin of right and wrong. The Central Question in Ethical Theory is: What "makes" things right/wrong/good/evil ?

6.5 Professional Ethics

While some of the "rules of the game" relating to Professional Ethics may be obvious to most, some are surprising due to cultural differences. The purpose of ethical standards is to provide an implicit foundation upon which human interactions can proceed smoothly. They provide answers for such questions as: (i) "How much credit do I need to give previous authors whose words or ideas I have utilized"? (ii) "How much help can I get as a homework assignment without cheating?" (iii) "Can I use the computers at school or work to earn extra money?"

6.6 Intellectual Property

Taking another person's work and presenting it as one's own, whether it involves music, ideas, or words is "plagiarism". Since ideas and words represent creative effort and possess intellectual value, a well-defined system of property rights exists.

6.7 Academic Integrity

The university system of Education is built on a high level of trust that students and faculty will be honest in their dealings with each other. The University of Maryland's

"Student Guide to Academic Integrity" defines such things as: "Cheating", "Fabrication", "Plagiarism", etc. Many other Universities have similar codes.

6.8 Use of Computer Facilities

Many Universities have "electronic policies" which define the ethics involved in the use of computer facilities; often published as formal documents defining acceptable and unacceptable use. The issues to balance include: Free speech, Communication of research without unnecessary obstacles, and Responsible attention to law.

6.9 Human Relations

Two basic principles appear to exist, which may be employed as guidance: (i) "It is wrong to use authority to coerce favors. You also can not appear to be using your authority this way". (ii) "You must treat colleagues, supervisors, and students with respect".

6.10 Professional Integrity

Encompasses a wide range of responsibilities: (i) Honesty in professional dealings, (ii) Treating colleagues with respect, (iii) Non-use of Institution's resources (computers, copying machines, postage, telephone, etc) for non-business purposes without permission, and (iv) Respect for confidentially of information.

6.11 Values

What one does at work must contribute to making the world better. There is a host of values which contribute to the organization's credibility and reputation.

7. The Unwritten Laws of Engineering: By W.J. King

King is very much impressed with the fact that "the chief obstacles to the success of individual engineers or of the group comprising a unit were of a personal and administrative, rather than a technical nature". He considers these "unwritten laws" or a set of "house rules" to be of value to both younger men starting their careers as well as to older men who know these things perfectly well but fail to apply them in practice. Their repeated violation is often responsible for "much of the frustration and embarrassment to which engineers everywhere are liable. According to him, for a successful engineering career, the complete list of essential components

includes: (i) The written laws (of sciences), (ii) The unwritten laws, such as provided by him, (iii) Native endowments, such as intelligence, imagination, health, energy, and (iv) Luck, Chance, Opportunities ("the breaks").

8. Some Excerpts and Quotations

8.1 **National Policy on Education (1986):** "The growing concern over the erosion of essential values and an increasing cynicism in society has brought to focus the need for readjustments in the curriculum in order to make education a forceful tool for the cultivation of social and moral values".

8.2 **Programme of Action NPE (1992):** "The framework emphasizes value education as an integral part of school curriculum. It highlights the values drawn from national goals, universal perceptions, ethical considerations and character building. It stresses the role of education in combating obscurantism, religious fanaticism, exploitation and injustice as well as the inculcation of values".

8.3 **The Seven Sins – Mahatma Gandhi**

Politics without Principle	Commerce without Morality
Wealth without Work	Science without Humanity
Pleasure without Conscience	Worship without Sacrifice
Knowledge without Character	

9. Concluding Emarks

The engineering faculty appears to be on the defensive most of the time. This is in part due to the falling standards resulting from the mushrooming of institutions without planning and provision of infrastructure facilities, and also due to the lack of proper direction and goals for technical education to suit the country's character and needs. Another important point to be kept in mind is that the technical education system is only a subsystem in the overall national system, with multifarious linkages and interactions. Its performance will naturally depend on the character and goals of the national system. Attempts to fault the engineering education system, in general, and the faculty, in particular, without looking at the overall system are unreasonable. To expect the faculty to have a sense of public service and selflessness and spartan way of life, when all round him he sees moral decay, is again highly unrealistic. Both grass root and top-down strategies will be necessary to correct the situation.

Improving the State of Ethics in Scientific Research and Administration

Dr. P.N. Tiwari*

Society for Scientific Values has so far organized five seminars on different aspects of ethics in scientific research, publication and administration. The first four seminars were organized by it alone. The present seminar, which is the fifth in the series has been organized in collaboration with INSA. This is a very significant development because, the work of promoting ethics of science is not the business of only one society. It should be the business of all the scientists and all the societies of science because the organization of science, unlike other human activities, is founded mainly on the ethics of its members. However, at present there is hardly any talk of ethics on the forums of most of the societies. The situation must change. All the professional societies in science should keep at least one session in their seminars and symposia that should be devoted to deliberations on ethics of research, publication and administration. The funding agencies should be requested to impress upon these societies to implement this suggestion.

My next suggestion is about allegations of misconduct in scientific research and publications like, fabrication of data, plagiarism, omission of authorship and wrong authorship. There should be an "Ethics Committee" in every scientific institution to inquire into such allegations. The Committee should adopt a transparent procedure of inquiry. The Society for Scientific Values has developed such a procedure and has been inquiring into such allegations with high level of credibility. The Society has also made specific recommendations about what kind of action should be taken and by whom against the person found guilty of misconduct in scientific research and publication. This information has been published in the November, 2002 issue of the "News and Views" bulletin of the Society. It is also available on its website: 'www.scientifvalues.org'.

My last suggestion is much more important than the previous two suggestions. But it is also much more complex and difficult to implement. It is about frequent and

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apparently true allegations of wrong appointments, wrong scientific awards and recognitions and large project findings to wrong persons and for wrong reasons. The appointment of a wrong person on high position in a scientific organization causes much more damage to the growth of science than the misconduct in research and publication by a scientist at a relatively lower position. Such a person is enemy of ethics. He encourages sycophancy and suppresses originality and is dead against any kind of dissent. With such person in power, ethics can be followed only with great risk and bravery.

It is because of these reasons that many scientists say that nothing can be done to prevent different kinds of unethical practices in appointments, awards and project fundings. Even the Society for Scientific Values has not done much to tackle this problem. No doubt, the problem is difficult. It would need a very thoughtful, determined and consistent effort to solve this problem. As a first step, I suggest that the Society for Scientific Values and INSA jointly hold a one or two days meeting of 20 to 25 scientists and administrators including a few legal experts who are known for their professional integrity and competence to answer the questions like, (1) What kind of allegations in these areas should be investigated, (2) What should be the method of investigation, (3) Who should investigate, (4) What kind of action should be taken by whom and against whom, if the allegations are found correct. Even the news of such sincere efforts will have discouraging effect on wrong doers.

Ethics is the voice of our conscience. Let us follow it because it is the cement of science. It keeps the scientific organisations intact and coherent.

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Membership of the Society for scientific Values

Scientists who wish to join the efforts of the Society to promote ethics (support right and oppose wrong) in scientific research, development and administration and, who meets the following requirements are welcome to become the member of the society:

1.   He (or she wherever applicable) should have allowed his name to appear as an author in only those publications in which he was actively involved, e.g. in data collection, theoretical formulation, design and construction of apparatus, field trips, mathematical derivation and calculations, statistical analysis and interpretation of results, as destinct from administrative support and providing funds or facilities.

2.   He should have never plagiarized or made false claims or indulged in or supported and encouraged any kind of unethical activity in science.

The members of the society who are listed on its website "www.scientificvalues.org" are requestes to send the nomination with a brief bio-data of such scientists to the Secretary for the membership. The scientists may themselves also send their bio-data to the secretary of the society for membership. Non-scientists who have made significant contribution in promoting ethics in their profession can also become the member of the society.

The nominations as well as direct requests for the membership are considered by the Executive Council of the Society. On the approval of the Executive Council the person is invited to become the member of the Society. The annual membership fee is Rs 50/- and life membership fee Rs. 500/. The members are entitled to receive all the publications of the Society free of cost. They are also entitled to attend the General Body and other meetings including, seminars, symposia and conferences of the Society. Above all, they collectivety participate in the nation building by promoting ethics in pursuit of science, thereby creating healthy environment for the effective development of science and technology in the country.