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24 May 1991

Dear Mr. Siddhartha,

I read your letter in this week's Nature. Science has reached the topsy-turvy state when it's the un-polluter who pays - that is, it will cost me 53p to try and explain to you that the sciences have been integrated, the fallacies of partial thinking identified ready for the clean sweep - OUT! - and the reasons why certain named individuals manage to perpetrate monstrous follies deduced.

The breakthrough in scientific understanding occurred in January 1973, when a Miss J M Pick, realising that she was probably the only person in the world with the qualifications to do the job, commissioned herself to act as independent consultant to the Board, everybody, of a business, Earth Enterprise, in which everybody is also shareholder, trustee for future generations of shareholder, employee and customer.

Her brief was to define and devise a marketing strategy for the concept of "good management" - otherwise known as "safe and sustainable development", or the "new code of business ethics", or the "level playing field and fair competition rules" for international trade. The Earth was viewed as a business with an energy "income" from the sun, with finite "reserves" in the fossil fuels, and with "fixed assets" of nuclear energy. Throughout the world, businesses and governments were planning on the assumptions that (1) the adequate income is inadequate, (2) the finite reserves can be valued as if they were infinite, and (3) the consequent increased energy demand can be met, and the business run when the reserves run dry, by stripping the fixed assets.

That is "bad management". "Good management" has to be based on the opposite assumptions. That means "assets-stripping", nuclear energy, is out. The whole idea of cheap and limitless energy is a device to make us learn that there can be no such thing. The whole system of nature is designed to make genuine energy efficiency determine the optimum use of its resources, the best practical balance between every aspect of everybody's concern in the survival and prosperity of the Enterprise.

The article roughly typed from Physics Bulletin, October 1976, explains how my research into the idea of "good management" produced the first full working model of the organisational structures and operating systems of the universe. The Relativity Theories were toppled. Economics was fully debunked and transformed into an ecologically-compatible discipline. And the great battle for academic recognition began. It has been going on for 18 years. "Everybody" knows that the breakthrough has occurred. Press suppression is virtually total, and absolutely total at Nature. Pippard is party to it. This week's illustrious FRS to reply to my reminder with a supercilious sop was Lord Zuckerman. The House of Lords debated science policy yesterday. Outdated rot! Utter pollution! And they're paid for attending and throwing it into the aether! While the world's chief scientist slaves at providing the world with a de-polluting service on virtually nothing. You get locked out of everything when you make the breakthrough that puts the rest of the world's scientists in the wrong. Y.s.

Miss J M Pick

J M Pick

MISS JOAN MARGARET PICK

Born 9 December 1940, Barrow-in-Furness. Educated at Barrow-in-Furness County Grammar School for Girls and at Bristol University, graduating in 1962 with a 2b in physics and mathematics.

Joined the editorial staff of "Understanding science", contributing articles to issues 24 to 144 (when we ran out of explicable science), on physics, mathematics, astronomy, meteorology, electronics, technology, famous scientists, new sources of energy.

In 1964, joined Product Planning xLtd, a subsidiary of the Metra consulting group, as an industrial market researcher and corporate planning consultant, joining forces with Metra colleagues in 1967 to form an independent consultancy, Peter Ward Associates (Interplan) Ltd, becoming a director. Responsible for information systems, for guiding newcomers to the business, and for conducting depth studies in the following areas, usually single-handed, invariably from start to finish:

Process plant contracting in Europe	Pressure relief devices
Centrifuges and mixers	Metering pumps
Plant and port locations in Europe	Size reduction machinery
Water and effluent treatment	Waste incineration
Oil and petrochemical products	Organic octane improvers
Price-elasticity of sodium metal	Direct nitrogen fertilizers
Acid resistant bricks and tiles	Catalyst supports
Fused refractories/slagceram	Custom grinding of minerals
Pipeline transportation of minerals	The precast concrete industry
Lightweight and dense aggregates	Building blocks
Building board from waste paper	Double-F beams
Suspended ceilings/light fittings	Bricks in Northern Ireland
Contractors plant/plant hire	Hydraulic ball motors
Vehicular diesel engines/gas turbines	Heavy machine tools
Steel stockholding in East Anglia	Stainless steel tube
Blowmoulding and thermoforming	Shrinkwrapping and labelling
Markets for thin rubber sheet	Iron castings
World markets for printing machinery	Paper converting machinery
Photocopying materials/machines	Colour separation processes
Coated materials in graphic arts	Composite canisters
Radiator level warning devices	Metal bellows
Design of electronic consumer goods	Cast iron cooking pots
Educational electric motors	Egg drycleaning
Visual aids in education	Clay pigeon traps
Scientific instruments in Italy	Oscilloscopes
Instrumentation in Europe	Electron microscopes
Cardiac catheterisation	Ion implantation
Prospects for GENESYS programs	Industrial metrology
Value of meteorological services	Learning systems
Domestic and contract furniture	The carpet industry
The malt industry in UK & Europe	Fruit juices from Brazil
The pigmeat industry in UK & Europe	Food flavours and additives

Gave first and only talk on futurology to the Programmes Analysis Unit, Harwell, in February 1972, and decided from then on to try and put business planning on a firmer and more responsible footing, writing the Earth Enterprise report in early 1973, distributing its pilot study in May, and leaving Interplan's offices on 24 May 1973, to continue the work of implementation, and the struggle for academic recognition, as an independent venture.

JMP/jmp

23 May 1991

The second refreshing approach I have encountered is the direct challenge to the forecasts on which current investment decisions are made which is being mounted by Miss J M Pick, a former director of Interplan and now a market researcher in her own right. She tells me of her view that market analysts, whether consultants or in-house forecasters, have no real alternative but to extrapolate from conventional assumptions of economic growth. Like Mr. Levitt*, she maintains that companies naturally look for larger markets. She also rightly points out that no company can, on its own, plan and invest to criteria which are fundamentally different from everyone else's, although I do not believe that this necessarily entails extrapolation from previous trends (Insight 89).

However, profits are more important than turnover and returns are plagued by uncertainties which make investments hardly worth the risk. It is difficult to quarrel with Miss Pick's view that the key uncertainty is the price and availability of energy. Certainly, if nuclear energy is eliminated from the count on technical, economic and environmental grounds, the pressure on fossil fuels is increased and it becomes all the more important that they be used wisely.

To prove her view that a fundamental change in economic direction could and should take place, given of course the willingness of people to change their views, Miss Pick supposed the Earth to be operated as a business venture with a board responsible for managing its energy income and limited material resources. She commissioned herself to advise its board on corporate planning and undertook a thorough-going analysis of the energy accounts. The first part of her "interim report on a structure for the energy economy", published in draft edition in April 1973, presents the case for conserving fossil fuel reserves in order to buy time so that industry, transport, construction and agriculture can adjust to the ceiling on their operations imposed by the fact that long-term, solar energy will be the only source available to them if they are to continue in business.

This is not such a startling conclusion for it cannot be gainsaid that the sun's expected life is measured in thousands of millions of years. The residual life of the fossil fuel reserves, on the other hand, are measured at least in decades or at the most in centuries; in other words, in dangerously low multiples of the life of the capital plant which relies on them as feedstock. But forecasts of economic growth throughout the world are still being made on the assumptions that oil, coal and gas will fuel the growth, and that nuclear energy will eventually take over when the reserves run dry. I agree with Miss Pick that neither assumption makes sense and that there is an urgent need for forecasters to think again.

Copies of Miss Pick's interim report are available from her at 23 Maybourne Grange, Turnpike Link, Croydon CR0 5NH, for a nominal charge of £5 to cover photocopying and postage.** I hope she succeeds in finding a sponsor for publication of her full report, for it seems to be an eminently worthwhile project and one which would provide the confrontation with the new economic realities referred to by Mr. Shapiro***. However, I sense that sponsorship for such a global study is more likely to come from bodies such as the United Nations, the EEC or the Club of Rome than an individual company.

jmp * Harvard Business Review, Sept/Oct 1975

23 May 1991 ** Chairman of Du Pont

*** This charge is no longer adequate. Loan copies are usually available for photocopying.

IS SCIENCE A BUSINESS ?

(from Physics Bulletin, October 1976)

In a recent paper in Nature (1 July 1976, p13) Spencer R Weart of the American Institute of Physics describes the way in which science has been permeated by business interests. From this side of the Atlantic comes the suggestion that the links between science and business are even stronger, and at a more fundamental level. All the scientific disciplines can be related in an organisational structure analogous to that of a business in which energy plays the role of money.

Or so says Joan Pick, physicist, ex-writer for Understanding Science, and management consultant, who has put forward a "business model" of the universe. The model was initially developed as a means of analysing the world's energy accounts, and is based on the notion that all options of "energy expenditure and investment" can be accounted for under six headings: (1) finance (2) materials and production facilities (3) distribution (4) premises (5) workers (and consumers) and (6) management. The corresponding terms used to describe the world as a business are (1) energy (2) matter (3) environment (4) territory (5) plant (animal) life and (6) mind.

The "business model" is related to conventional concepts in physics and the life sciences by a set of three formal axioms:

- (1) energy exists and fulfils the business functions of finance (that is, exchange, investment and change);
- (2) matter exists and fulfils the business functions of materials and production facilities, consisting of an energy-equivalent component, mass, plus an operator, charge;
- (3) there exists an absolute framework of reference for the interaction of energy and matter. This consists, in part, of the space-time framework, in which the dimensions of space and time are allocated to two operating divisions, distribution ($= f(L, T)$) and premises ($= f(L)^2$). The framework is developed through a set of unit functions, partly balanced, in life, by a reverse set, consumers, and maintained in number by means of reproduction. The framework is directed, organised and planned by a general function, management.

Thus the model contains all the components which, according to Miss Pick, are necessary to construct and operate the universe - energy, mass, charge, space, time, units, means of reproduction, balance, direction and pattern of organisation, and some sense of objective or purpose.

Despite their current preoccupation with financial exigencies, and with commercial applications for research, the business concepts may not ring familiar in the ears of physicists used to thinking of fundamental frameworks in terms of quarks, charm and abstract mathematics. Miss Pick's business theory is also likely to raise scientific hackles by the directness of its challenge to special relativity, which is based on only two axioms, when work in set theory indicates that three axioms are an absolute minimum for theoretical systems which contain discrete objects.

The challenge to the ideas and terms of conventional economics is equally direct and fundamental. Concepts such as GNP are swept aside, and complex computer simulations of economic behaviour replaced by the simple, six-divisional "business model", analysed in terms of a single (and usually quantifiable) variable, energy.

Miss Pick's extrapolation of the "business model" takes the form of a rigorous, first principle, analysis of the state of the energy accounts of a business called Earth Enterprise. Her "interim Report on a Structure for the Energy Economy" is available from the British Library Lending Division at Boston Spa.

The economic remedy she recommends to the "Board of Earth Enterprise" is a change in economic direction and values, to a new system called the Energy Economy. This takes the conservation debate on from ideas such as E F Schumacher's "Small is Beautiful", past the Department of Energy's "Energy sense is ~~business~~ common-sense", to "Energy sense is business sense", for it transpires that the adoption of the common business objective of operating on and within the solar energy "income" provides the economic stability and new markets which will enable businesses to operate profitably, and to conform to the highest standards of social responsibility.

The rules for the conduct of business in the Energy Economy have been drafted in a "business convention of energy accounting", which differs from other conventions in distinguishing clearly between renewable and non-renewable energy resources. Briefly, Miss Pick's version starts with the basic physical point that energy is associated with (1) nuclear states (2) electron states, or (3) is "in transit" as radiation. The equivalent business terms are (1) fixed assets, (2) reserves, and (3) income or expenditure.

Looked at from a point on the surface of the Earth, solar energy is income. Fossil fuels are one main source of available reserves, the other being the reserves formed as a result of current and recent photosynthesis. The fixed assets which can, theoretically, be stripped, are to be found in fissionable and fusionable elements. The convention can be expected to cover other energy resources - geothermal, wind, waves, and tide - but the central issue remains the distinction between income and reserves plus fixed assets.

The rules for good management are similar to those of ordinary business, and consist, broadly speaking, of optimising the utilisation of the income, maintaining adequate short and long-term reserves, and making wise decisions on investment and expenditure. Wisdom is guided by the need to keep energy consumption (expenditure plus investment) per capita well within available per capita income.

This Micawberish good sense is in contrast to the view of the Department of Energy, that energy consumption from reserves and assets can be expected to double by the end of the century, and that the contribution from the solar income will be almost negligible. Hence the passage of Miss Pick's report through the Department and its advisory committees has not been an easy one.

KP/JMP/jmp
22 May 1991

PART TWO: THE MANAGEMENT REACTION

8. Introduction to the Presentation Meeting Structure of Man-Management: Preparing the Conference Room: Notice of Meeting: Preparing for a Group decision.
9. Questions from the Ad-Hoc Board $\frac{1}{2}$ Qualified adoption of the Interim Report: Conservation as a joint venture: Chairman's reaction: Divisional reactions from Energy:...Matter:...Territorial/Property:....Life/AGriculture and Food:.... Environment/Distribution: Reaction from Consumer Groups: Other business.
10. The Reaction from ManMoney Economics of the joint venture: Devaluation of ManMoney: Revaluation of ManMoney: Need for time to react: Consultant returns to base.

PART THREE : THE ATTITUDE OF THE CONSUMER

11. Introduction to Market Research Sales and Marketing: Options of Research: Practicalities of Research.
12. Designing the Consumer Attitude Questionnaire Part A - Man the Consumer: Part B - Man and Nature: Part C - Man + Nature.
13. A Progress Meeting with Marketing and Media Revised Agenda: Introducing the multi-level market: Opinion of non-voters: Opinion of the working-shareholder: Situation of the creative worker: problem of the self-employed: Dependent shareholders: Advisory bodies: Marketing Department become Trustees: Proliferation of the Printed Word: Organising networks of the Telephone: Broadcast Media: Advertising the Conservation Package: Extra business: Meeting closes, with Thanks.
14. An appendix on Media Foundations of Media: Face-to-face Medium: Face-to-face Class: Feedback message: Message looks for long-term stability: Written word diversifies into imagination: Reasoning behind the message: Media tune in to like minds: Media tune in to everybody.

PART FOUR : A DISCOURSE ON THE THEORY OF OPTIONS AND CONSTRAINTS

15. The Plane of Sex The Plane definition: The Plane history: Natural boundaries of the Plane: Ups and downs: Controlling planar oscillations: Conserving oscillations for other planes of option
16. Objectives and the Sense Options Long-term objectives of the Sex Business: Attitudes to the Plane of Sex: Common sense of Feeling: Development of Smell: Development of Hearing: Constraining the range of sensory perception.
17. The Options and Constraints of Sight and Taste , The Option of Sight: Development of Insight: Sex and the imagination: Individuality of Taste: Stabilising factor of Food: Imaginary diversification of Taste.
18. Is there a Stable Angle? The Age of Innocence: The Period of Blind Passion: Ancillary angles of the Plane: Mountain of Option; Spheres of Coincidence: Eras of Correspondence: The Eternal Triangle.

PART ONE : AN INTERIM REPORT ON A STRUCTURE FOR THE ENERGY ECONOMY

1. The History and Structure of Earth Enterprise Foundations of the Business Model: Brief history of Earth Enterprise: Divisional structure: Stability and Opportunity: Objectives of the Interim Report: Working Method.
2. Energy Division - Earth Finances Fundamental nature of Energy: Sources of income and energy reserves: Financing of business diversity: Energy accounts: Day-to-day income accounts: Day-to-day expenditure accounts: Diminishing usable energy return: Pressure of increasing sales: Fission and fusion ventures; Towards Divisional Economies: Energy Division looks up again: Price and income: Price factor in supply and demand: The Conservation Aim.
3. Matter Division - Production Department History of Matter Division: Material loans to Life Division: Matter Division diversifies into Banking: Forming and unlocking the vaults of Matter: Man transfers the Life Reserves to Energy Division: New diversification of Matter: Present structure of Man-Managed Matter Division: Mutual benefits of Matter Division: Matter Division goes hot and cold: High pressures - and low pressures: Energy cost of industrial education: Time for a strategic review? Recycling the Durable-Consumable: History of stable diversity: Stability in diverse directions: Man explores the stresses and strains of diversity: Discovering and meeting the corporate aim: Man-Management problem goes deeper: Could Man be a Calculated gain? Energy accounts of Matter: Time for a Product Review?
4. Environment - Distribution Systems New markets for Energy and Matter: via Environment to Territory: Distribution and diversity: via Environment to Life: Environment and the Life Reserves: Man starts to distribute goods through Environment: Man augments the utilities of Life: Man goes deeper into diversity: Ultimate non-return of diversity: Physicist admits defeat: Energy versus the Distribution vehicle: Environment motivates the consumer: Origins of affluent: Pollution reacts on Man: Demand for less waste? Dumping the Durable-Consumable: Applying the brake on mobility: while Man is on the accelerator: Man moves up: Man moves down: Consultant attempts to stop the option spiral:.....and suggests despiralling alternatives: Back from the point of maximum confusion.
5. Territorial Division - Property Department Shell structure of Territorial Division: Developing the solar energy potential:while Man develops a demand for the Life Reserves: Market grows in terms of specific energy demand:....and in total energy demand: Value of territorial property: New valuation of Land: Energy devaluation of Land: Spirals of anti-resource: Formation of consumer groups: Territorial takeover bids: Energy demand of the takeover bid: New opportunities from takeover bidding: Polarisation of the Enterprise: The Energy competition: Pressurising the Consumer Group economy: Pressures of interdivisional trade: Paradox of resource control: Is there a solution to the paradox? Man-Management learns to operate with hypothetical resources:....and develops the hypotheses of exchange.
6. Summary of the Interim Report Starting Objectives.
7. An Appendix on Number Theory in Life The One-plus-One Harmonic Unit: The directed (or spirited) Workforce: The ranging (and also spirited) Consumers: Man, the competitive consumer: Man, the more energetic consumer: The Numbers integrate and differentiate: Woman, the material user: The family becomes mobile: A new look at Number Theory: Applying the model to Food Division: Applying the model to Life Division: The Opportunity Factor in Man-Management.

From the Fuel & Nationalized Industries Policy Division, DTI, 21 June 1973

Dear Miss Pick,

EARTH ENTERPRISE : PILOT STUDY

Thank you for sending me a copy of your pilot study following our telephone conversation some weeks ago. I am afraid it has taken me until now to go right through the document.

As I understood it and as you say in your opening summary, you are at the stage of presenting the first part of a much larger project so that "its implications can be tested on a wider audience". The following comments - very much my own opinion - are therefore offered in a spirit of constructive criticism, and I hope you will not feel that I am in any way underestimating the effort you have invested in what is already an ~~unusually~~ unusually comprehensive analysis.

First, I readily agree with your comment during our conversation that you thought you had hit upon an original approach. As you may imagine I read a wide range of publications on energy matters in the course of my work, and I can recall none which use the business model in the way that your pilot study does. This is not to deny, of course, that others may have reached the same conclusions as yourself by different routes. There are also a number of individual passages where I believe you have expressed important but difficult concepts with great clarity, for example, the paragraphs on the price factor on page 19, and some of the section on resource costings on page 35.

It seems to me, however, that while your business analogy is very helpful in many places, its complexity sometimes causes difficulty. Perhaps I am mistaken, and a businessman will find it easy to "read across" between your detailed analogs and the "real world" to which they refer. Even if this is so, however, the lay reader might lose track there and there. In a sense this is a question of how wide an audience you are really aiming for.

My second point is one that I am sure you have already recognised. Your exclusion of any attempt to quantify energy stocks and flows sets a considerable constraint on the sort of conclusions you can draw. From the point of view of public policies, for example, the difficult decisions are often those of a "how much?" or "how far?" nature rather than a simple "what to do?". I appreciate, however, that a heavily quantified paper would be both more difficult to write and probably of narrower appeal.

Finally a few more specific points: Page 1, paragraph 3 The statement "Manyx has not the resources to judge the monetary value of profit in the future" is perhaps a little bald. Do not discounting techniques enable one to find a value for anyx income stream over time, dependent upon what view one takes of the appropriate time preference rate? Page 2, paragraph 3 The preferred definition of the "corporate objective" is not an operational one until "good" is also defined. You tackle this problem on pages 8 and 33, but without coming to a very firm or precise conclusion. Page 16 The penultimate word in the fifth complete paragraph appears to have been mistyped - should it not be "supernoval"? Page 41 In the first line of the second paragraph should "cloudes" be "clouds"?

I hope these comments are of help to you in your continuing work on energy.

Yours sincerely,

C J POLETT

jmp/9 May 1991

From Sir Alan Cottrell

Jesus College Cambridge

Dear Miss Pick

12 August 1974

Thank you so much for your letter (8 August). It was very kind of you to lend me a copy of your pilot study. Since this is your last spare copy, I thought I had better read it and return it quickly, so that I am sending it back here.

I thought your idea of the analogy between the natural processes of the Earth and the operation of a business enterprise very attractive and was struck by how well it works out in detail. It was not immediately obvious to me what new methods this would suggest for dealing with our problems of conservation of resources, economic progress, environmental improvement, etc. However, perhaps all this will become clear in your final report.

It seemed to me you had taken the analogy between the earth and a business perhaps about as far as it will go in purely qualitative terms and I wondered whether it might be possible to pick out one aspect of it and try to make it more rigorous and exact. In particular, I thought you might want to draw the comparison between energy and money much more precisely, perhaps even to the extent of finding and relating common concepts in thermodynamics and economics. It would be necessary, for example, to identify clear economic analogs to free energy and bound energy, since the Earth transmits out into space just as much energy as it receives from the sun, but of course at a much lower level of quality. It may be someone has already pursued this particular analogy, although I am not aware of it. I do not know of any scientist who has gone in this particular direction, although it may be that someone has approached it from the economic side. Yours sincerely,

Alan Cottrell, Master

From Professor Eric Laithwaite

Imperial College

Dear Miss Pick

29 April 1975

I return herewith your Interim Report, which I have read with great interest. Now I know what you are truly attempting. I myself have a reputation for the use of analogies. I think of magnetic circuits like water flow in a pipe. I think of gyroscopes as being like electric motors and generators, but you have gone the whole way and taken the earth itself as a business analogue.

My problem is how to help you best. The scientific world, the business world, the political world, should all know of your ideas. Yet your first report is already too long for any of the Learned Society Proceedings. I could probably find you a book publisher, but publication would take too long. You need a Government commission, no less, to handle something as far reaching and far sighted as this.


I do have contacts. I shall try, if this be your wish. If so, can you let me have a copy to keep and to lend out. I have copied the first 20 pages as a sample to work on now, but to copy the whole on an engineering grant would raise eyebrows (I do have my "opposition"!)

Who are your "clients"? Tell me what you need from me. Like yourself, I will do "my human best"

Yours sincerely,

E R Laithwaite

jam/9 May 1991

From: Dr. V. Siddhartha Officer on Special Duty Sectt. of SA to RM, Ministry of Defence Room No. 134, 'B' Wing, Sena Bhavan DHQ PO New Delhi 110 011, INDIA Phone: (00 91 11) 301 0744 Telex: (031) 61016; 62430 & 66645 Telefax: (00 91 11) 301 9859 & 301 8216		Date: 1991.04.19:1100
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To

The Editor
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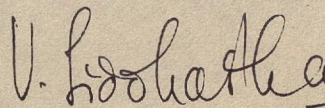
REVISED herewith.

Reference properly cited.

Typos corrected.

Sir - In his review of Frank Close's book: *Too Hot to Handle: The Race for Cold Fusion*, (*Nature*, 350, 29; 1991), Sir Brian Pippard ends: "The book should be read as an exemplary tale by all who are concerned about the conflicting demands of scientific integrity, personal ambition and public interest." Other professional groups have faced such conflicting demands by laying-out enforceable codes of conduct for their members, e.g. the medical profession. I suggest the following scheme will go a fair way towards balancing Sir Brian's conflicting demands.

- (a) Scientists must be licensed to practice, on the lines that medical practitioners are, by professional watch-dog bodies. Scientists against whom cases of scientific mal-practice and/or fraud have been proven should have their practicing licenses withdrawn for varying periods of time [depending on the severity of the proven mal-practice] including, in extreme cases, permanent cancellation. No doubt a mal-practice insurance market for scientists will develop - no harm in that.
- (b) Analogous to the "polluter pays" principle, scientists who wilfully and malfeasantly pollute the scientific environment should be made to pay the costs of "clean-up" i.e. the costs of all the cross-checking, experimentation, conferences and theoretical wild-goose chases that other scientists are induced to engage in, only to discover a near-hoax. Only a fraction of the costs of such "clean-up" can be borne by the "polluting" scientists themselves; the major costs will have to be borne by public- and private-sector employers, who will, therefore, have a strong incentive to enforce high standards of integrity and validation on the scientific output of their employees.


 Dr. V. Siddhartha