

# Essays on Science Management

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## **Abstract**

Several recent essays are presented on the difficulties scientific research and science researchers have by now been facing for a number of decades due to what goes by the name of "science management".

## **Gun Fodder for Science Management ?**

### **0. Develop or Die, and the Role of "Type I" Research in Science ...**

It is customary to use the term "Knowledge Society" for describing the present state of humankind. Yet at a cursory view, this term proves to be superficial by failing to point out the true essence of the present state of global human affairs.

"Develop or Die" is in fact a more appropriate term for that state which, briefly, may be characterized by a growing conflict between more and more humans wanting a better and better life, and on the other hand, tighter and tighter physical, ecological and other such constraints on our Planet Earth.

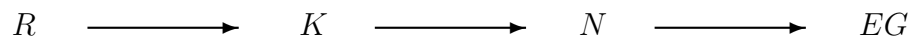
Since the emergence of modern science some three or four centuries ago, "Knowledge" has indeed proved to be an unprecedented power, as claimed by Francis Bacon at the early stages of that era. Schematically, one can see "Knowledge" as the unprecedented "input" in



or more compactly

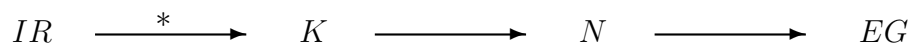


However, in our present stage of "Develop or Die", such a rather static view of "Knowledge" as something existing and given, can only lead to the alternative "Die". Instead, we have to replace the above scheme with the following one



where "R" stands for "Research", and mainly of course, for "Science Research".

Here however, a crucial and critically important point has to be realized. Namely, just as in other realms, the further development of "Knowledge" can - and does - occur in two essentially different ways, one *incremental*, while the other one *discontinuous*, that is, through major *breakthroughs*, such as in more recent times happened with Special and General Relativity, Quantum Mechanics, or Genetics, among others. Here, we shall call that kind of breakthrough science research by the name of "Type I Research", and denote it shortly by "IR". It follows that what is above all in need in our "Develop or Die" times is in fact given by the scheme



where it is precisely the "input" marked by \* which is by far the most crucial and critical novelty we need.

It follows that the name, somewhat awkward as it is, "Breakthrough Science Research Society" is far more appropriate for our days, than mere "Knowledge Society" ...

And regrettably, it is precisely here that modern governments - through their present ways of so called "science management" - are proving themselves utterly inadequate, namely, in an early enough identification, encouragement, support and development of truly important breakthrough science research.

Needless to say, such a task on the level of governments is indeed quite recent, thus there is not, and there cannot be much experience.

The main trouble, however, is in the manifest failure to wake up to the complexity of this newly emerging vitally important task, and then deal with it in ways that are more appropriate to the task itself, than to the habits of governments, including modern ones ...

Modern governments during the last half a century have proved without any exception not to be able to deal in satisfactory ways with complex issues, among others, education, health care and scientific research.

Such a rather sorry record has, of course, a number of reasons. One of them is in the complexity of the respective critically important issues which - as far as governmental concerns - emerged on a large and growing scale during that period. Regarding education and health care a further reason was the political discord inevitable in democracies, a discord often aggravated by the tendency to turn the respective issues into political football. Also, most often, those who were making the ultimate decisions were people with limited, if any at all, knowledge and understanding of the complexities of such issues. And if there may be any doubt about the respective governmental incompetence, let us recall that modern societies have without exception shown their inability in coming up with appropriate policies even with respect to such apparently far simpler issues like prostitution or drug abuse, although any number of ways have been tried, and then abandoned.

What modern governments have done with respect to issues such as

education, health care and scientific research, for instance, is to base themselves on the widely held tacit assumption that usual management methods are the way, and usual managers are capable to apply them to the mentioned issues. However, as seen in subsection 1.2., such an assumption about the rather unlimited ranges of applicability of management methods, as well as about the quite universally applicable competence of managers turns out to be no more than one of the hallucinations modern societies suffer from.

In this regard it should be recalled that civilization is not only about goals, aims, mission statements, and the like, but also, and in fact, in an essential and critically important measure, about what in jurisprudence they so aptly call *due process*.

And the problem with management and managers is not only that, so often, they themselves set themselves those idiosyncratic mission statements, but even more so, that they alone define what they mean by due process, and then implement it with hardly any independent oversight.

No wonder that modern management has mostly attracted a sort of managers whose personality has distinctly less than sociable traits. Indeed, it is too often than managers do not possess any of the qualifications acknowledged to be respectable, valuable and useful. Not to mention that they would not want to work in any such qualification, even if they were able to do so. Instead, managers are supposed to possess - and pride themselves for - that hard to define or specify ability which allows them to dominate people and organizations. Of course, that alleged special ability goes by various respectable names, such as for instance leadership, or talent for organization, etc. Also, it is supposed to be completely unrelated to any of the usual qualifications.

And unrelated it is indeed, as can so clearly be seen in those who emerge as leaders of criminal organizations, and do so even if they have not distinguished themselves in any of the specific activities of such an organization, except for the ability to get to the top of it, and stay there for a while ...

A good amount of violent anti-social personality traits, therefore, can

clearly be identified in typical managers. However, the same happens with revolutionaries, autocrats, tyrants, dictators, terrorists, or all sort of criminals.

The difference with modern managers is that they are far more intelligent by choosing to play their games not against a whole society, but only some rather small sections of it. Also, they play their games more or less within the framework of existing laws, and certainly, would avoid defying them in any more widely noticeable manner.

Needless to say, as in all realms, there are certain remarkable exceptions with managers as well. There are, indeed, managers who are exceptional in one or another respectable, valuable and useful human endeavour, and in fact, have a distinguished corresponding record. And when they take up a management position, it is mostly due to a genuine desire to create certain important organizations, or to improve the functioning of some existing ones.

As it happens, however, one can hardly find such managers, and not even in realms such as education, health care or science.

What one can often find instead are managers in whom the two above very different and fundamentally conflicting traits are present in some sort of coexistence. And of course, by being a manager, it is rather the rule that more of the violent and anti-social behaviour is manifested ...

It is indeed a remarkable statement about human affairs in general to see the personality traits of most of those who end up managing things ...

Why is it that it is so much more tempting to "boss" people around, than to do a honest and qualified job ?

And yet more importantly, why is it that humans in their vast majority do put up with such sort of "bossing", and on top of it let such managers enjoy rewards out of proportion with those who work under them ?

Regarding the failure of modern societies to address the issue of science research adequately, there has however been one less difficulty, since the divergence of views across the political spectrum have so far been less extreme. Yet the failure to grasp in sufficiently relevant depth the unique complexities involved in securing a proper context

for science research has persisted till our days, and during the last half a century one cannot note any significant improvement.

Here, we shall only consider the ongoing failure of modern societies to secure an appropriate context for science research, and we shall point out a number of pervasive negative phenomena in this respect.

The historical background of that failure of modern societies is hardly at all realized nowadays. But then, this need not come as a surprise given the strong ahistoric tendency of modern societies, a tendency which makes them unable to recall more than the last crises faced sometime not so long ago in the past, while regarding the future, it limits their horizon to just about the next general elections ...

In the case of science research the problems we have been facing for about half a century by now can better be seen in the light of *three* major events, namely, WW II, the emergence in the late 1950s of the perception of the so called "missile gap", and the massive firing of scientists in 1969 at NASA.

As for WW II and its many consequences, it had been an event hard to forget completely even nowadays.

The longer term effects - and especially on science research - of the "missile gap" have on the other hand been quite forgotten, as have been those of the massive 1969 firings of scientists and highly qualified technical personnel at NASA, when about a quarter of a million, that is two thirds of the employees were suddenly sent home.

During WW II, the major industrial participant powers had the rather surprising occasion to discover that science research could even in a relatively short time bring about rather extraordinary contributions to warfare, as well as to its supporting economy. And after WW II, that message had not been lost. In fact, science research obtained a considerable attention during the emerging Cold War years. This is illustrated by the 1945 report to the USA President, entitled "Science, The Endless Frontier", by Vannevar Bush, who wrote that basic research was : " ... The pacemaker of technological progress ... and ... new products and new processes do not appear full-grown. They

are founded on new principles and new conceptions, which in turn are painstakingly developed by research in the purest realms of science ...”

Consequently, the report recommended the creation of what would eventually become in 1950 the National Science Foundation, NSF, in an effort to cement the ties between academic science, industry and the military which had been forged during the war, see Wikipedia.

The ”missile gap” led in the USA, starting with 1958, to a totally unprecedented massive and sudden expansion of tertiary education in science and engineering, aimed to compensate for what, after the 1957 launch of the soviet ”sputnik”, was perceived by Americans as the significant advantage on the communist side.

That considerable expansion, however, took place at a time when the generation of top European scientists who had emigrated to the USA prior to WW II, and in fact had put American science research on the map, started to retire or pass away, among them such most remarkable and influential personalities like Albert Einstein or John von Neumann.

The effect of that sudden and massive expansion had been that hardly anyone was prepared to be able to evaluate the fast and ever increasing output in science research. And then, lacking sufficient insight, let alone, wisdom, two most simple and rather brutal methods were introduced, namely, ”publish or perish” and ”blind refereeing”.

As for the first, it soon ended up by obliging science researchers to focus on issues which could in short time lead to publishable results. Regarding the second one, it was from the start a dishonest formulation, since refereeing was blind only one way, namely, the authors of the submitted papers were not able to know who the referees were, while the referees did know the identity of the authors of submitted papers. Anyhow, that sort of refereeing soon degenerated to a ”dog eats dog” level. Indeed, top journals had on their editorial boards leading scientists. However, such journals were receiving far more submitted papers that they had space to publish, or for that matter, the respective leading scientists cared to referee. And then, such refereeing was delegated to junior scientists, with all the imaginable negative consequences. Added to that was the fact that there was not much point

for an author of a rejected paper to approach an editor, since such editors did not have time to care about the vast number of rejected papers, and they could easily afford to pick and choose those relatively few for which there was space for publication.

The massive 1969 NASA firing of scientists seems to be the most forgotten event in the history of science since WW II. Yet it led to a situation in the USA in which one in six PhD physicists, for instance, woke up without having a job appropriate for his or her qualification, and then remained in that situation for a long time to come. Needless to say, other highly qualified scientists were also fired at NASA, thus leading to a situation where to be a "rocket scientist" would mean by then to be so over-qualified as not to have an employment opportunity any longer ...

Such are some of the more important roots of the present day extreme fragmentation of science research, and the growing flood of papers with minimal incremental contribution in some most narrow sub-sub-field of science ...

One further effect is that it is very hard to find in that growing Biblical Babel of publications those papers one may be interested in, let alone find out whether some desired result has in fact been already obtained. Indeed, as often noted, it may be easier to restart the research process aimed at such a result, than search for it in the increasing number of publications, many of them electronic by now ...

The consequent replication of research may not altogether be a negative phenomenon, given the inevitable variation in perspectives it can offer. However, precisely to the extent that such replications happen due to the considerable difficulties in identifying papers with some specific desired result, each and every such paper is just about as good as being lost, if not in fact, not even being published, and thus, the respective research not being done ...

A thorough and objective history of science research in the 20th century, and especially after WW II, is still waiting to be written. And the aim of the following essays is no more than to try to highlight some of the possible issues of more important concern.

In this regard, it is highly unfortunate that research scientists with



longer memory do not have enough time and/or interest to embark upon such a venture. After all, they may indeed be the only ones capable to bring forth the story which in our Knowledge Societies is among the most important ones, if not in fact, by far the most important one ...

Here it should be noted that it is not much of an exaggeration to consider science research as being by far the most important factor in our Knowledge Societies. Indeed, let us note once again that the very term "Knowledge Society" is in fact a grave and utterly misleading understatement of the essential nature of our times. After all, back in 1945, the report of Vannevar Bush did already stress that " ... The pacemaker of technological progress ... and ... new products and new processes do not appear full-grown. They are founded on new principles and new conceptions, which in turn are painstakingly developed by research in the purest realms of science ..."

Thus without science research - the only engine known so far for the above mentioned "pacemaker" - our societies cannot in any way hope to provide more and more for an increasing population with increasing demands ...

Therefore, as mentioned, a far more appropriate appellation for our modern societies would be that of "Science Research Society", or in fact, of "Breakthrough Science Research Society" ...

Indeed, the term "knowledge" can, and often rather describes a static situation, one which is most definitely not the case with our present times in which we face the stark alternative of *develop or die*. And the only way we know how to - and can so far - face that alternative is not only by transforming more and more of the already existing knowledge into goods for everyday life, but above all, by further developing knowledge. And that further development of knowledge we can, so far, do only by research.

Here however, we face a most important further alternative. Namely, the development of scientific knowledge, as with developments in other realms, happens to have *two* sharply different processes, namely, one incremental or continuous, and the other one, essentially discontinuous, that is, by major and often most surprising breakthroughs.

And as a better look at the process of development of scientific knowledge can show it, it is particularly hard to realize early enough which research is likely to lead to the second kind of development of scientific knowledge, the kind which in this essay we call "Type I Research" in science.

What Francis Bacon advocated about four centuries ago was the inauguration and development of the "input"

*Knowledge*     $\longrightarrow$     *Nature*

and thus the establishment of the process

*Knowledge*     $\longrightarrow$     *Nature*     $\longrightarrow$     *Everyday Goods*

What we need today, in our times of "Develop or Die", is a proper inauguration and subsequent development of the "input"

*IR*     $\xrightarrow{*}$     *K*

in the newly emerged and vitally important process

*IR*     $\xrightarrow{*}$     *K*     $\longrightarrow$     *N*     $\longrightarrow$     *EG*

Makes you think, doesn't it !!??

And the record of the last half a century shows it quite clearly that the so called methods of "science management" are woefully inadequate for such a task, be they used by any kind of organizations, modern governments included ...

# 1. SCIENCE MANAGEMENT = = SCIENCE DAMAGEMENT ???

or

## ABOUT THE ONGOING DIVINE RIGHT OF SCIENCE MANAGERS ...

### 1.0. The ... Divine Right of science managers ...

As a preliminary remark, we may start by pointing out that - so strangely and inappropriately in our times - the management of science has remained mired in some of the oldest authoritarian, if not in fact, totalitarian and tyrannical forms of lack of accountability and transparency.

The reasons for that seem to be obvious, and the following two are quite important :

a. Research scientists still form in their numbers a relatively small political constituency, therefore, they can - and most likely will be - neglected in the general political process.

b. One of the basic paradoxes - as well as vulnerabilities - of modern societies is that, on the one hand, as we go deeper into the Knowledge Society, we depend ever more critically on the development of scientific research of a fundamental nature, while on the other hand, very few among the general population, and therefore, among politicians as well, possess anything which may come more near to a sufficiently adequate understanding of the nature of scientific research, let alone of that of fundamental nature .

The effect has so far been that at a time when the age old ventures of politics, economics, business, military, etc., are becoming more and more subject to the rigors of transparency and accountability, on the other hand, science management can so easily bask in the glory of

being the latest anointed, or even self-anointed beneficiaries of the ancient divine right of kings ...

In this way, we have to put up with the following long ongoing paradoxical situation :

On one hand, by far the most modern and also critically important activity is scientific research.

On the other hand, the management of science is still done according to some of the oldest methods.

To those for whom the medium to longer term major risks involved in that situation are not clear, perhaps, it is not much worth talking about them ...

We can simply let such people get away with the present situation, till the time comes when those risks may materialize to the extent that even they may not be able to disregard them ...

Meanwhile, we can only wonder what additional major new developments in science, and thus in technology, could possibly be obtained, if science management would at last be brought in line with our modern times to the creation of which science research has contributed so essentially ...

In the subsequent sections 1 to 8, several of the more important related aspects will be dealt with in some detail.

### **1.1. The highly questionable personal reasons and qualifications of so many of those who pursue science management as a longer term career**

During the last nearly fifty years, I have visited for shorter or longer periods over one hundred universities and research institutes on five continents, and could not help wondering that rather as a rule, too many of those who manage science on whatever level, including in organizations such as the South African NRF, or the American NSF, have in common many of the following less than commendable fea-

tures :

- They gave up the pursuit of science, and specifically, of research, at an early stage in their careers, without ever having done anything notable in science.
- The higher their managerial status, the less is their training in more fundamental disciplines of hard and exact science.
- They never ever intend - or for that matter, would be able - to return to scientific research.
- At the higher science management levels the salary packages are several times larger than those of the most senior, successful and recognized leading science researchers.
- Too many science managers are relatively young, that is, in their forties or at most fifties, thus lack experience not only in research, but in other essential aspects of human affairs as well.

What is assumed to compensate for all of the above in science managers is the single minded, thoroughly outdated and primitive managerial type adversarial or confrontational approach to issues, and of course, to researchers. This is often complemented by the high individual ambitions and energy of their age group, plus the awareness that they can only try to pursue their management careers, since they return to research in science is not possible.

As a consequence, such science managers do not - and in fact, cannot - benefit from any kind of more genuine respect among research scientists, and can only manage in the most primitive ways of the 'carrot and stick', or of endless, and so often useless, if not in fact, mindless - and thus damaging - schemes of larger or smaller scale reorganizations.

- Science research is by definition a realm of super competence, as well as super credentials, and it is at least as much so as in any other modern human endeavour. Yet, given the above situation, the least one can say is that it is not at all clear what is supposed to be the assumed "super-super" competence and credentials which science man-

agers bring with them, and which credentials are supposed to make them fit to run any number of truly super competent and credentialed research scientists.

Indeed, it is critically important to realize that, it is without absolutely any precedent in modern times that such an immense gap in competence has been the rule of the respective management system, as it is today with the gap in competence between research scientists, and on the other hand, science managers. No wonder that around the world we end up with situations when even Nobel laureate research scientists are subjected to science managers who are either young upstarts who never really tried it in science, let alone science research, or if they tried it, then they did not manage, and by now may only be old "has-never-been"-s ...

- It is rather seldom that a senior, accomplished and still active research scientist agrees to give up for a longer period on actively being involved in scientific research, and instead, take up a science management position. This is a most normal, natural and commendable phenomenon, since the incomparable values - of both individual and social relevance - of doing research in science and being indeed good at it do by far outshine any of the possible attractions of science management. Unfortunately however, this natural, normal and commendable phenomenon creates a vacuum which attracts people of highly questionable motivation and qualification into science management. And even more unfortunately, there appears to be quite a lot of such dubious volunteers eager to fill that vacuum ...

- In view of the above it is not likely that since managers feel about research scientist with sufficient empathy, and are willing to pursue their best interests, and therefore, of science, and society in general as well. Rather, it is quite likely that science managers will keep relating to research scientists in a thoroughly outdated primitive adversarial or confrontational manner, in line with the well known traditional management philosophy established generations ago for the conditions of masses of low skilled workers at large smoke stack industrial units. And needless to say, this manner is very far from being suitable for maintaining the typical and much needed enthusiasm and dedication of better research scientists, enthusiasm and dedication which, as so

well known, are absolutely essential for a truly high quality work. After all, there is no need to stress the immense difference between the way masses of low skilled workers were put to work generations ago in old smoke stack industries, described by the English poet William Blake as "dark, satanic mills", and on the other hand, the conditions under which super skilled and creative research scientists can indeed deliver their optimal contributions.

Yet, too many of the science managers of today, in view of the facts mentioned above, have the attitude, and accordingly are doing their job, as if they were running the same low skilled masses of physical workers in those dark satanic mills of long past times ...

## **1.2. The modern day hallucination, according to which a manager can manage absolutely every sphere of human activity**

Each era in human history seems to be unable to avoid indulging in its specific hallucinations ...

And so is unfortunately with our own times, when the hallucination of the assumed universal operational abilities of managers plays an important role ...

It is certainly hurtful to the general feeling to come up with a statement such as the first one above. And yet, upon a mere cursory review of well known facts, we do not have the choice but to agree, even if we do so with quite some displeasure ...

Indeed, Copernicus (1473 - 1543) chose to publish his book posthumously on the fact that Planet Earth is not immobile at the center of the Universe. And still later, Galileo (1564 - 1642) had, towards the end of his life, a fight with the Church about the fact that our Planet Earth was moving ...

And to really amuse ourselves in this regard, we can recall that Aristotle had nothing short of a clear cut simple proof that Planet Earth was *not* moving at all. Namely, he argued that if one dropped a stone from the top of a high tower, the stone would always fall at the foot of the tower ...

Of course, related to Planet Earth, we have had other hallucinations

as well, for instance, that of flat Earth ...

And this story is quite amusing, indeed, as over the ages there has been a kind of extreme alternation in that view. In several major ancient cultures, Planet Earth was considered to be flat. Then back in the 4th century BC, some ancient Greek philosophers held the view of a spherical Planet Earth. And they even managed to obtain a good estimate of its radius, simply by looking into some deep wells. The first known such determination happened around 240 BC by Eratosthenes who knew that in Syene, Egypt, the Sun was directly overhead at the summer solstice, while he estimated that the angle formed by a shadow cast by the Sun at Alexandria was 1/50th of a circle. He further estimated the distance from Syene to Alexandria, and in this way, he got a remarkable estimate for the circumference of our Planet Earth.

Yet a millennium and half later, and as recently as in the time of Columbus, there was a general belief in the flatness of Planet Earth, and furthermore, in its bounded nature, thus in the existence of a boundary, limit or end, where one could simply fall off into who knows what and where ...

Well, by now, except for the ... distinguished ... members of the "International Flat Earth Research Society", not so many others would hold to such beliefs ...

And then, do we not tend to hold instead to the belief that, at long last nowadays, we humans do no longer have such utterly out of place beliefs ?

But if that would indeed be the case, should we perhaps not ask the following question :

When, if ever, was that most blessed moment in our recent past, when we humans ceased to hold to hallucinations like that of the flat Earth ?

And in view of Copernicus or Galileo, such a moment, if it existed at all, had to be pretty recently !

Now of course, we can be quite sure that, related to geography, for



instance, it is quite likely that we do not have any sort of similar hallucinations ...

But then, is that really all ? Are not there any other number of important human affairs where hallucinations could still arise, spread, and persist for evermore ?

Well, quite likely, the belief in the alleged universal operational abilities of managers is such a ... non-geographic ... hallucination, although it is by now manifest on our Planet Earth beyond all geographical boundaries ...

A typical somewhat recent well known story about this hallucination happened in the 1980s, when Apple Computers was experiencing some hard times. As a solution, they decided to fire the founder of the company, and instead, hire John Scully, at the time the CEO of ... Pepsi Cola ..., in order to put Apple Computers right by properly running it, not in the soft drink business of course, but in the high technology state of the art and cut-throat competition in the PC venture ...

Well, after a couple of years, John Scully proved to be utterly inadequate ... Such an approach has, needless to say, been often enough practiced, based on the widely assumed universal operational abilities of managers ...

And so far no lesson seems to have been learned with respect to the total nonsense of this underlying idea that a ... good manager can manage just about absolutely everything ...

In fact, even President Clinton was glad at the time to have John Scully around himself at various public meetings, in order to demonstrate the ... new type of universal manager ...

Well, various eras in human affairs have had similar hallucinations about a so called universal operational capability.

More than two millennia back, we had the hallucination about the universal managerial capabilities of the so called satraps.

Indeed, Alexander the Great, who conquered much of the world known to him at the time, thought that any of his generals who was good enough to get hold of and occupy a land, would also be good to administer it later, during peace time. And then he appointed as local

satraps in charge of running the newly occupied places such generals. Of course, the results proved to be disastrous, since these satraps instantly started to fight one another, which after all, was the only thing they were good at ...

Some centuries ago, the Catholic church firmly believed that Jesuit monks can run all human affairs. The sorry results of that belief are well known in European history ...

During the just ended 20th century, on the other hand, we had no less than four such hallucinations.

The Communists firmly believed that a political commissar can run absolutely every sort of human endeavour.

The Nazis believed quite the same about their gauleiters.

Then more recently, in Iran, they have thought the same about their mullahs.

Fortunately however, none of these three types of "universally competent managers" has spread or survived for longer ...

On the other hand, the fourth type of manager, which the Americans came up with in the early 1920s, has equally been assumed to possess alone among all other humans that mythical and mysterious universal competence which, all on its own, is supposed to be sufficient to run each and every other possible human endeavour ...

So fortunately, however, this American type of managers have been far less bloody murderous than the previous ones, and also far more efficient economically, when they started their activities, back in the era of the masses of low skilled physical workers of the smoke stack industries ...

The increasingly ridiculous - yet not at all noted in science management - fact with this American view of management when applied to science is the following. During the last decade or so, those big business organizations which back in the 1920s had started the era of adversarial and confrontational multi layered management are by now the very ones which are massively giving up on it. Indeed, lots of middle levels of management have been done away with, and the

respective organization has become far more flat. In addition, the organization is done according to radically new principles, based on specific projects, by creating temporary teams, which are disbanded once their respective projects are completed.

Yet in science, the ever the same good old fashioned primitive adversarial and confrontational management not only survives unchanged, but keeps thriving for evermore ...

Long live modernity, democracy, accountability and transparency in the management of science management ...

### **1.3. Science management as the ... last, or rather, first refuge of scoundrels ... ?**

In the English world of letters it is recorded by Boswell that Samuel Johnson made the famous pronouncement that "Patriotism is the last refuge of a scoundrel" on the evening of April 7, 1775.

Well, since then, it would appear that things have changed somewhat. And by now science management is the last refuge of scoundrels ... Or rather, it is their very first refuge ?

In the present era of increasing liberation, democratization and globalization, managers in the economic and political fields are more and more subjected to the rigors of transparency and accountability.

Unfortunately however, far too many managers in science still ... manage ... to escape any of such latest controls, just as they escape the question of what is after all their real and assumed to be unique qualification for managing science, except for their .. unwillingness and/or inability to do proper scientific research ...

All this is quite likely going on due to the less widely and less well understood nature of science and science research within present human society at large. Indeed, when compared to the masses of people - thus of voters - affected by the usual economic or political type ac-

tivities, the far smaller number of research scientists can simply pass unnoticed and disregarded.

Yet, when it comes to their critically and crucially important role in our modern societies, one can only recall the statement of Winston Churchill about the fighter pilots of Royal Air Force during the Battle of Britain in 1940, namely that "Never in the field of human conflict has so much been owed by so many to so few" ...

Well, nowadays, that role of the RAF fighter pilots has been taken up by research scientists, and it is being pursued day after day, and not only during a campaign of a few months ...

Indeed, it is far from being sufficiently understood that our Knowledge Societies depend so crucially and critically on a relatively tiny number of research scientists. And a reason for such a lack of understanding is in the fact that such a permanently ongoing dependence on such a relatively small number of people is indeed unprecedented in known human history. After all, prior to the Industrial Revolution, human society depended on peasants who, however, formed a vast majority of the population, and on top of it, their training did not require absolutely any kind of organized formal instruction, let alone, education. Then during the earlier stages of the Industrial Revolution, society ended up also depending on large numbers of low skilled masses of physical workers in those dark satanic mills. And again, their training was quite easy to achieve.

Nowadays, on the other hand, without ever ongoing research in science our societies - due to the increasing expectations of ever larger numbers of people - would simply collapse economically and politically ... And yet, the general understanding of the above simple and most obvious facts is still missing just about completely ...

But then, aren't we fortunate to have our science managers !!??

Indeed, people who today could no longer come anywhere near to a management position in any other human venture, do find science as being still open to their old fashioned and primitive managerial ambitions, and of course, with it, to their completely inappropriate adversarial and confrontational methods ...

It appears, therefore, that until the number of science researchers may further increase significantly, so that they can have some more significant economic and/or political clout, for instance, by organizing themselves in special unions, those people with old fashioned and outdated managerial ambitions - rejected by now in any other human venture - would still find a refuge in ... science management ...

And why not, would find science management not as their last, but rather, as their very first refuge ...

And as we go forward into the Knowledge Society, certainly, the number of research scientists will increase significantly, both in absolute terms, as well as relative to the general population. Here, therefore, one may have an early warning of the ... coming "class struggles" of the next "proletariat" of the near future ... to use some thoroughly outdated Marxist terms ...

Indeed, one can already note that in the USA and Canada, for instance, for a number of years by now there have been beginnings of unionization of academic scientists. And this is clearly aimed there at balancing the systematic abuse by science management.

Unfortunately, since the late 1960s, there has been an ever ongoing, and by now rather significant proletarianization of the growing number of research scientists. And this is a global trend which in fact started in the Western world, where so far the majority of research scientists has been concentrated.

Just to give a few figures which may indicate that phenomenon. In the summer of 1995, the Fortune magazine, one of the most highly regarded ones by the American business community, has run two items in which it presented the following two facts.

First, during the 20 years between 1975 and 1995, the buying power of the US Dollar had gone down no less than four times within the USA.

Second, the typical top salaries of American academics have remained quite the same during that period, that is, around US Dollars 68 000/year.

This of course is such a dramatic change for the worse that it is hard to believe as not having had significant negative effects on science.

No doubt therefore that, lately, there is a lot of motivation for people who, when young, did in a way or the other stumble into a science career and then realized that they were not quite good for it, to change their mind and do their best to ... move up into a science management position ...

To be a researcher in science - when at its best - is the consequence of a call and of a vocation, rather than merely of looking for a profession or a career ...

Indeed, science researchers are in more ways than one the present day correspondents of priests and monks of older times ...

After all, from the three classical vows of the latter, namely, chastity, poverty and obedience, we science researchers are by now living with the last two, and do so either we like it or not ...

But then, there is of course always the ... way up into science management ...

#### **1.4. The sickness unto death of sloganeering ...**

Let us now, after shortly dealing above with the scoundrels, turn to those very few science managers whose motivation - even if not also credentials - may be less questionable. And connected with them, let us ask ourselves two questions :

- What is that which makes them believe that they can do a good job ?
- What is that which makes such managers credible in the eyes of the general public ?

Well, it does not take much analysis to realize that the ... trick is simply in ... sloganeering ...

Indeed, it is an inherent basic nature of human language that it is easy to extrapolate it to realms where words will cease to be precise in any way whatsoever, and instead, they will merely take up what amounts to nothing else but more and more instant and strong positive or neg-

ative emotional connotations ...

Just think about it. When we talk about "happiness", for instance, it can certainly have a very clear instant and strong positive emotional meaning to lots and lots of people. However, this in no way means that all those meanings are similar, let alone, precisely the same ...

And clearly, quite the same happens with all such general concepts, like for instance, "freedom", "liberty", "justice", "evil", "beauty", "socialism", "capitalism", etc., ...

One of the most typical examples is that of the word-slogan "best". Indeed, it is only during the last few decades that it has come into the awareness of a somewhat larger number of people that "best" can only be defined if a priori we have chosen certain rather clear criteria. Moreover, in most of real life situations there will inevitably be quite a number of criteria, and typically, these criteria will often conflict quite sharply with one another.

Therefore, what we are faced with is a situation with a Multiple Criteria Decision Making.

And to add to the troubles, it is well known among specialists that in such a framework, there simply cannot be a natural or canonical unique solution concept. In other words, in addition to the specific criteria we must choose in order to try to define properly what is "best" for us, we also have to choose a certain specific solution concept which is able to handle the conflict between our chosen criteria ...

In this way the word-slogan "best" ends up depending on too many things, among them, the criteria and the solution concept used, see arXiv:math/0506619 : "PIIPTI, or the Principle of Increasing Irrelevance of Preference Type Information".

It follows that, when one builds one's arguments on the instant, unquestioned and strong emotional aspects of a language extrapolated far beyond its realms of precise meaning, one does nothing else but ... sloganeering ...

And it is quite clear how much we humans are ready to fall for various forms of such sloganeering, and not only in the case of extreme

political, economic, religious, ethnic, racial, cultural, sexual, etc., situations.

After all, the whole of the advertising industry is also built on the emotional impact of words, images, etc., ...

Yet we should not forget so easily how in the just passed 20th century, various forms of highly popular sloganeering have led us to two world wars, many other smaller wars, as well as a variety of mass concentration and extermination camps ...

Now, the mentioned American and 20th century originated hallucination about managers is just another example of our falling for yet another type of sloganeering ...

And when this sloganeering is in the realms of present day science management, well, it becomes so ridiculously out of place, that it can only survive because of two reasons :

- research scientists have by now unfortunately resigned themselves to this sort of nonsensical abuse,

- nonscientists, like for instance, so many politicians who oversee science managers, are themselves great consumers and/or producers of sloganeering.

And if anybody needs some examples, let us cite here just a few of the slogans whose precise meaning no one can ever define, let alone implement and verify, yet they are thrown around as the ultimate weapons in the management of scientific research, namely :

- excellence, international competitiveness, relevance, quality promotion, collaboration, etc., etc., ...

Of course, no science manager could ever give a clear, precise and comprehensive enough definition for any of the above ...

But then, so luckily for them - and owing to the very nature of sloganeering - they are never ever asked to do so, since most of us when we are told such slogans, will instantly react with strong and unquestioned emotions and accept to go along with them ...



Not to mention that criticizing them will simply make one look ridiculous ...

And once such and similar slogans are accepted, the science managers are given large funds and a free hand, and down we go on the road of endless campaigns of reorganizations, which are of course, but the ... battle fields ... where our old fashioned primitive adversarial and confrontational science managers can hope to make their ... glorious careers ...

And by the time, when later, anyone would care to ask - what actually nobody ever does - what was the real outcome of all that sloganeering and reorganizations, well, it just happens that some other ... slogans ... are presented once more, and the whole circus simply starts all over again, with its yet one more latest and newest iteration ...

In this way, so much of science management is but hijacking through mere sloganeering ...

Or in managerial parlance, through ... mission statements ...

Except that we - the whole of our societies - are silly enough not to notice that we have been - and keep being for evermore - hijacked ... And we do not notice either that there is no genuine and longer term performance check on science managers, a check which would evaluate the real outcome of each and every earlier undertaken sloganeering based reorganization campaign ...

Well, with the end of the 20th century, we just came out of the unprecedented world of crimes of communist, nazi, and other mass masters of political sloganeering ...

And we came out of it, just so that we can now fall unreservedly and with the whole of our freshly liberated pristine condition for the very same sort of sloganeering, this time performed by science managers ... Amusingly however, there is lately some sudden competition to all of that : certain varieties of fundamentalist Islam are able to attain what no usual manager managed so far, namely, to train suicidal terrorists ...

Whenever instant and strong emotions are induced in us, like for in-

stance, with slogans, threats, terror, or for that matter, advertising, we are to a significant extent hijacked away from our freedom of rational choices.

Traditionally, this method of instant and strong emotions has been used by various leaderships in order to subdue and lead their respective subjects.

Unfortunately, so much of present day science management is still mired in the same old method ...

Long live, therefore, the ... holy marriage between hallucination and sloganeering ...

A marriage which gives us, the science researchers, those ... foster homes ... built by much of science management, and called universities, research institutes, and the like ...

### **1.5. Who is reviewing the reviewers, or evaluating the evaluators ?**

Peer reviewing is by far the main, and in fact, just about the only way the work of research scientists is supposed to be published or evaluated. And in our days, this is quite inevitable in view of the large number of researchers and specialties, which implies the fact that senior scientist can only be familiar to a satisfactory extent with the work of a limited number of researchers.

Yet the case can - and should - be made about some of the equally inevitable, and rather important failings of the peer review system. Suffice it here to mention only the problem of "paradigms" in science, brought to our attention for the first time back in 1962, by the recently deceased American philosopher of science Thomas Kuhn, in his celebrated book "The Structure of Scientific Revolutions". A few related aspects are mentioned next, in section 1.6.

One of the major problems with peer reviewing, however, is not related to the mentioned issue of paradigms, but it is about the way science managers use and/or misuse it.

Indeed, when applying for research grants, positions, promotions, or various sorts of classifications, a science researcher is ... processed ...

in the following manner :

- First, a reviewing panel or committee of science managers is set up to consider the respective application.
- Then various peer reviews of the applicant are collected.
- Finally, the panel or committee decides based - allegedly - on these peer reviews.

However, there are two obvious questionable aspects in this process, aspects which can seriously vitiate the outcome :

- Who is appointing the reviewing panel or committee ?
- Who is, if ever ... reviewing ... the work of the reviewing panel or committee ?

After all, it was not for nothing that George Orwell asked the famous question : "Who is controlling the controllers ?"

Well, all what we are told is that for the sake of impartiality and fairness, we should not ask such questions, when we are the applicants involved, so as to avoid unduly influencing the process.

Fine. But right now, for instance, you, the reader, or for that matter, I myself am not such an applicant. So that, may we, please, be allowed to ask the above two questions ?

And I am afraid that, precisely in the case of organizations such as the NRF in South Africa, or the NSF in the USA, among many other similar ones, the fact remains that, although research scientists are subjected to peer review, those review panels or committees of science managers who review research scientists are not only self appointed, but are hardly ever, if at all, subjected to any kind of review of their own.

So much for transparency and accountability ...

Here we are, therefore, with the situation that, even in the oldest major democracy in the world, namely, the USA, one is nevertheless subjected to totally undemocratic, nontransparent and unaccountable procedures, and that goes on when dealing with by far the most important cutting edge of modern social and economic activity, namely, scientific research ...

Also, one should note that there are not any market forces involved, in view of the monopoly position of the respective organizations such as NRF, or NSF, which rule over the whole science establishments in their respective countries.

The Americans, however, being aware of that situation, have tried to ... meta-manage ... the problem by frequent rotation of the science management establishment, a rotation frequent enough to be able to bring in for short terms a few genuine and top level research scientists as well, thus diminishing at least potentially the unchecked power of the lifetime career science managers. Yet it is quite clear that, in spite of such and other ... meta-management ... tricks, the system continues for evermore to be far from satisfactory ...

Back in South Africa, our respective problems can only be more serious, since we have far too few top level research scientists to rotate around in panels or committees of reviewing ...

In fact, here, as shown by the NRF as well, the tendency is heavily in favour of lifetime career science managers, who will run things with very little regard for the possible outside enquiry about the quality of their activities, enquiry coming above all from science researchers.

After all, this is what adversarial and confrontational management is all about, isn't it ?

Well, just about two centuries ago, Napoleon crowned himself emperor of France, by simply breaking two traditions. Namely, until then, the pope was supposed to crown kings and emperors. Furthermore, while Napoleon was placing the emperor's crown upon his own head, the pope of the time was obliged to witness, being reduced to silence, and

devoid of any power whatsoever ...

Long live, therefore, the ... divine right ... of present day self appointed reviewing panels and committees of science managers, who similar to Napoleon, force us into the position of silent and powerless witnesses, and so often, victims as well ...

### **1.6. The reactionary consequences of established scientific paradigms and their aggravation by science management**

Further about the work of reviewing panels or committees of science managers at funding organizations such as the South African NRF, or the American NSF, we can note that they face two radically different types of research scientists, and they are woefully incompetent in identifying, let alone, in dealing properly with one of them, namely, those who are bringing forth the fundamental breakthroughs in modern science.

And in order to be more precise, let us use the present day terms of ranking of science researchers by the South African NRF. In these terms, the two radically different types of research scientists correspond to :

Type I : those with ranking A, or in certain few cases, even B.

Type II : those with ranking C, and the rest.

Now, with the Type II researchers, just a simple "bean counting" is most often sufficient in order to identify and evaluate them. And such "bean counting" can simply be reduced to :

- counting of research publications and of their number of pages,
- counting the accepted and known ranking of the scientific refereed journals where the research is published,
- reading of the letters containing the peer reviews.

And it is clear that such a "bean counting" is in fact so utterly simple and trivial that absolutely anybody who can read in English - including the janitors at the respective science management organizations - could quite equally do the job. Indeed, it is hard to see what other qualifications than reading in English is actually needed by anybody, when doing such sort of "bean counting". Yet this being by far the bulk of activity of the respective science managers, they nevertheless get pay packages far above those of the janitors who could equally well do that part of their jobs ...

So much for a proper ... management ... of science managers, and by science managers ...

The conclusion, so far, is that science management organizations can be very good at dealing with the rather trivial issue of evaluating Type II researchers, however, that hardly says anything at all about their better capabilities. Plus, they are extravagantly overpaid for that part of their activity, which - time-wise - is in fact by far the major part of their alleged management activities.

Let us now turn to the Type I researchers, that is, to those who come up with fundamentally new and important breakthrough type ideas, and then start to develop them in their research. And needless to say that, unlike in earlier times, say, until WW II, this can now - hopefully - happen more often in our days, in view of the significantly larger number of both research scientists and fields and subfields of research.

Not to mention that so many of the dramatic progresses in technology, health care, etc., do - and can only - come in our days from such breakthroughs in scientific research.

Unfortunately however, the evaluators, reviewers, etc., in science management, as well the the peer-reviewers chosen by such science managers from among research scientists, will rather as a rule fail here quite abysmally, and do so on the following three counts :

- not much unlike the janitors at their organizations, the present day

evaluators, reviewers, etc., in science management, as well the the peer-reviewers chosen by such science managers from among research scientists, are - and of course not only in South Africa - essentially incapable to identify those research contributions, and thus authors which do actually belong to the above Type I,

- and to further aggravate things, such reviewers, evaluators, etc., are utterly unaware of their above failure, and therefore, they could not care less about it, let alone, about their extreme negative consequences,

- and as if to add to all of the above, they can hardly ever be made aware of their respective failures, due to any possible mix they happen to suffer from of arrogance and ignorance.

Unfortunately, here we face a very deep human phenomenon, one that had plagued science for long ages ...

However, as is to be expected, the science management establishment will immediately deny all that, and roll out their so called well researched and detailed procedures, which they have elaborated and allegedly also tested over a considerable period of time, procedures which - supposedly - are specifically meant to identify early enough and without failure the Type I researchers ...

Yet, let us for once be serious about such claims, and note their totally unfounded and thus ridiculous nature. Suffice it here in this respect to mention the following.

The history of science, including during our own more recent times, is full of well known cases when research results which would later prove to be absolutely fundamental, were for quite some time rejected for publication by some of the very best refereed scientific journals. The mentioned 1962 book of Kuhn illustrates this unfortunate phenomenon with rather dramatic examples across ages.

More recently, one of the more scandalous such cases happened in the 1970s to M J Feigenbaum, the originator of the modern quantitative theory of chaos. Indeed, over a period of about half a decade, he

found it impossible to have any of his papers accepted for publication in better scientific refereed journals ...

Yet research in chaos and in its applications was to become a major breakthrough in the 1980s and 1990s. And ever since, they present a new understanding of large classes of nonlinear phenomena along truly surprising vistas.

Now, the relevant facts regarding that deeply seated and long ongoing failure to identify Type I researchers are as follows.

First, unlike with the reviewers, evaluators, etc., in the science management, the better scientific refereed journals have a far higher calibre refereeing process, yet they can often fail to identify the Type I researchers.

Second, such failure is quite unavoidable even on the highest levels of research scientists, in view of the negative and potentially reactionary effect of the paradigms in science which happen to be established at the given time, as pointed out nearly five decades ago in his mentioned book by Thomas Kuhn.

Therefore, the vast majority of those in science management who nowadays are typically so very far from belonging to the highest levels of research scientists, will inevitably be even more helpless when faced with identifying - and doing so with possibly minimal failure - the Type I researchers.

Yet, as also mentioned, hardly anybody in science management really cares, or for that matter, would ever be able to care about any of that ...

In fact, they simply and systematically refuse even to listen, let alone consider the issues mentioned above ...

With regard to these paradigms in science it is quite amusing to note the following.

For a few decades by now, many among the academic philosophers of science have declared the ideas of Thomas Kuhn, and specifically, his description of the role of paradigms in science, as being outdated, and by now of marginal relevance only ...

After all, no self-respecting academic philosopher can ever allow him-



self or herself willingly to reduce all of his or her career merely to being a follower and developer of the ideas of some celebrity, even if a contemporary one. Instead, any academic philosopher, even one with a minimal ambition, must of course come up with at least one new idea. And then, what better way to do so, and have some chance to hope for being noticed in the process, than claiming that the basic idea of some contemporary celebrity is, well, outdated ?

After all, quite likely, that celebrity himself or herself may enter the fray and start some discussion, thus implicitly drawing attention to his or her young would be upstart denigrator ...

Well, we could indeed not wish much better for ourselves humans, than to have Kuhn's idea on the dramatic role of paradigms wrong, provably wrong, or at least, outdated ...

Yet it is quite easy to understand that, as it happens, and rather unfortunately, basic aspects of human nature, aspects which have been with us for long long ages, and most likely will remain so for a considerable time to come, are those which impel us to establish paradigms in science, and of course, not only in science ...

Indeed, we humans have a particularly strong need to attain a more comprehensive, stable, coherent and consistent view of various given realms of human endeavour, realms in which we happen to be involved more seriously. And in the specific case of a given scientific discipline, this will lead to what Thomas Kuhn calls a paradigm, whose role is to allow us to legitimize and clearly understand approaches with respect to both the methods of pursuing research, and of interpreting its results, be they experimental, practical, or theoretic.

And clearly, to approach reality through a given and accepted paradigm can considerably ease one's life, even if in such fast moving and changing realms as those of modern science, a longer term adherence to any specific paradigm can carry considerable individual and social risks.

And yet, our tendency towards as steadfast hold to a certain paradigm, and the consequent no less strong hold that paradigm thus acquires on us, comes from very deeply set essential human traits. One of them, quite obviously, is the following. Take a top rated player in, say, chess, bridge, or any other similarly complex game, and change the rules of the game by one single new rule, or by the setting aside of one single

existing rule. Well, what one notes rather without any exception is that the proficiency of that top player instantly collapses to a surprisingly low level. And it may take him or her a considerable time and effort to recover his or her previous level in the modified game.

Consequently, we humans may be good at becoming proficient in a given paradigm, although it may take a significant time and effort. However, where none of us seems to be any good at all is in having even a minimally relevant *flexibility* around that paradigm. On the contrary, instead of any such flexibility, what we exhibit is a dramatic instant *instability* which makes us have our competence, no matter how high, collapse to truly low levels, and then stay there, unless much effort and time is invested by us in recovering our competence in the new situation.

In this way, whatever some may say to the contrary, we have for long, and will for long live with paradigms in science ...

And needless to say, in times of fast changes and developments like in our days, established paradigms cannot help but become conservative, if not in fact, reactionary, in a rather short time ...

Not to mention the strictly individual human aspects involved. Indeed, it takes one nowadays 10 to 15 years of university level study, until one may, in his or her 30s, become proficient enough for good enough original research within the realms of one single particular scientific paradigm. Consequently, it is very hard to re-qualify in another paradigm. Not to mention the risk involved when investing one's time and effort in a new and emerging one ...

And so unfortunately, through their only capability to do reviewing, evaluating, etc., by the simple and trivial ways of "bean counting", the present day science management is significantly adding to this conservative and reactionary effect of paradigms in science, by being typically utterly incapable to identify early and with minimal omissions the Type I researchers.

Long live, therefore, the reviewers, evaluators, etc., who themselves are never ever to be ... reviewed, evaluated, etc., ...

### **1.7. Is the performance of science managers ever seriously evaluated, reviewed ?**

Lately, managers in nearly all fields of human activity start to have it harder, since a variety of major new trends and requirements, such as globalization, transparency, accountability, etc., are subjecting them to increasingly rigorous and frequent performance evaluations.

Not so, however, in science management ...

And the reasons for that are rather obvious. Some of the more important are as follows.

The political structures which are supposed to oversee science managers do not consider that there may be any kind of major problems with the management of science. Most certainly, they are not able to become aware of the

- fundamental difference between the evaluation of researchers of types I and II,
- triviality of evaluation of researchers of type I,
- utter incapability of science managers in recognizing researchers of type I.

And this is not at all surprising, given that hardly any of the more important politicians around the world have any direct and better knowledge about the true nature of science research. And then, the interaction between politicians and science managers remains mostly arrested on the levels of reciprocal sloganeering ...

Moreover, this sort of interaction can go on for longer periods, since science managers - unlike those in economy, who are exposed daily to the market, or politicians in democratic countries, who are exposed to elections once in several years - can always explain that their activities have their most important results only in the longer term, while in the

short to medium terms they can exhibit on some more spectacular and alleged to be promising results ...

Meanwhile, endless, and often mindless, and thus harmful campaigns of smaller and larger reorganizations are initiated and implemented, as a sign of significant activity on the part of science managers. However, by the time one would like to enquire about the results of such reorganizations, it just happens that a new set of slogans was meanwhile launched, and a corresponding new campaign of reorganizations was started, which of course once again pushes further into the future the issue of the evaluation of the performance of science managers ...

On the other hand, the poor research scientists, who are under science managers, ended up in the developed world being possibly the group of workers most deprived of rights in their given situation of employment ...

In this way, they most certainly cannot stand up and ask for the evaluation of the performance of science managers ...

### **1.8. The so called Knowledge Society ...**

Let us present a few further remarks about the considerable inadequacy of the term "Knowledge Society" when applied in our times of "Develop or Die" ...

One of the latest more important state of the art slogans is that, across the globe, we are fast entering the era of the "Knowledge Society". Well, perhaps we can stop once again for a moment and reflect on what is more precisely involved in that ... fascinating slogan ...

A main concern of human economic, and in general, social activity has always been to bring things from nature into the realms of our use.

In earlier times we did that mostly as hunter-gatherers. Then we had the incredible idea to put some of our best seeds into the ground, risking them to rot there for nothing, and wait for weeks

or for months, hoping for a multiplied harvest ...

Still later, we even dug much deeper in the ground, and at much greater cost and effort, and took out ore, which only after being further laboriously and expensively processed gave us useful materials ...

Today, we are more and more into the business of ... digging into the ... Great Infinite Unknown, and thus trying to bring up Useful New Knowledge.

Yet, in any more systematic and successful way, we are only doing that for no longer than two or three centuries at most.

And until WW II, that venture was pursued by very small numbers of highly dedicated and often isolated individuals, without any special larger organizations being involved, be they governments, private corporations, or university administrations and research institutions.

The picture changed radically during WW II, and then got further massively extended and entrenched, starting with the late 1950s, when tertiary education exploded in numbers in what was then the First and the Second Worlds, and when because of a number of well known socio-political reasons the respective governments got massively involved.

Yet, compared to other far longer pursued human endeavours, what is today called research, development, knowledge, and consequently, knowledge society, are not widely or clearly enough understood, mainly due to the novelty of the phenomenon. And this relative novelty of modern science is indeed a fact, when compared with many other important and established human ventures, even if we only consider the three and a half centuries since Newton, as the age of modern science. Also, the number of those who are thoroughly involved in science research is still relatively very small even in the more developed societies.

Let us therefore try to bring here into the picture a few of the aspects which appear to be fundamental with respect to what we call today the Knowledge Society :

- NEW KNOWLEDGE comes, and can only come, from the UNKNOWN.

- Today, more and more, instead of placing seeds or digging into the

ground, we try to "dig" into the unknown, in order to bring back new knowledge.

- We face the unknown mostly ON THE TERMS OF THE UNKNOWN ITSELF. Indeed, both the unknown and most of the terms of our engagement with it are NOT KNOWN to us a priori. And the only thing which we know a priori are our already existing body of knowledge.

- In this way, RESEARCH is precisely the activity of FACING THE UNKNOWN and doing so MOSTLY ON THE TERMS OF THE UNKNOWN ITSELF.

- Any other of our activities which are less on the terms of the unknown and more on our own terms can rather be called DEVELOPMENT.

It follows that instead of the term "Knowledge Society" we should rather use a term which highlights OUR FACING THE UNKNOWN, AND FACING IT MOSTLY ON UNKNOWN TERMS.

Any suggestions for a new slogan ???

### **1.9. A few conclusions**

The problematic issues with present day science management appear to have a number of general social and objective causes which may stay with us for quite some time in the future.

For instance, research scientists still form a tiny fraction of the general population anywhere around the globe. Then, there is very little understanding of the essential nature of science research, when one goes outside of that small fraction. As a consequence, research scientists form a constituency which can easily be neglected by the usual democratic political process. Furthermore, the negative effects of such a neglect - or in general, of the mismanagement of science - do not manifest themselves immediately, unless some rather rare major catastrophe, like the loss of the space shuttles happens.

And even if such negatives effects get manifested, they would still not be noted by the vast majority of people for what they really are, including of course politicians, except for their most trivial public relations or emotional aspects.

Also, it is very hard to press the better, let alone, the top science researchers into science management positions, and keep them there for any longer period of time.

It follows therefore that science management will have to be left in the foreseeable future to some of those who happen to be eager to volunteer for it ...

And needless to say, especially in the case of those who take science management as a lifetime career, this will mean that they will be very very far from the better, let alone, the top research scientists ...

Thus science management will most likely remain the last, if not in fact, the first refuge of the scoundrels ...

And then, what could be done ?

Well, the first thing is quite clear : abolish the ... divine right of science managers ...

In other words, make them transparent and accountable, and not only to their usual political overseers, but to certain special bodies of top research scientists as well. And in the case of smaller countries with fewer research scientists, like for instance, South Africa, such bodies may include foreign top research scientists as well, in order to be able to constitute those bodies more properly, as well as rotate them periodically.

Needless to say, the setting up of such overseeing bodies of top research scientists should not be influenced by science management, but should rather be left in the hands of science researchers. Also, the members of such bodies should be rotated at reasonable periods of time.

Second, cut as much as possible from the hopeless sloganeering which is running so much of science management.

After all, with the recent fall and/or fading away of a variety of social systems based on sloganeering political ideologies, it is high time that we put and end to that sickness onto death of sloganeering in various

other human endeavours as well.

And it is even more imperative to do so in a realm of human endeavour of such a critical importance in modern times as science management.

Third, set up proper performance criteria for science managers, and of course, do not employ science managers to do so.

Fourth, give far more say in fundamental matters of science management to larger groups of better science researchers.

Suggestions for other proposals are of course most welcome ...

Finally, it is important to note the following.

The period since WW II, and even more so since the 1990s, has been characterized by an ongoing process of significant changes in nearly all known structures, institutions, etc., in which humans are involved. Strangely enough, however, science management has ... managed ... to avoid any and all of that, and has ... gloriously kept holding to ... good old fashioned adversarial and confrontational management approaches ... befitting of course anyone claiming to have a ... divine right ...

In this regard, one can note that even the Catholic church and its Vatican - some of the oldest and most conservative entities around, and which are still standing - were subjected since WW II to more significant changes, than is the case with science management ...

And yet, science management - with its at most half a century history - is rather a newcomer in human affairs, so that it cannot credibly claim to have already managed to work out its proper, let alone, optimal ways of functioning.

Not to mention that the ways science management was set up about half a century ago were, unfortunately, deeply influenced by the extreme and most urgent pressures felt during WW II, and later, the Cold War. Thus quite likely, they have been ways far from the optimal ...

Now, in view of the above, it should be clear that dealing with the



mentioned problems of science management cannot be seen as merely yet another "do good" action which tries to make some wrong right ...

Indeed, modern society depends on science research in far too critical ways, in order to allow the continuation of the highly questionable practices of science management.

Therefore, by dealing with the long festering problems of science management, one will unleash the shackles imposed upon science research. And this will certainly bring into the realms of the public good remarkable potentials so far unutilized, discouraged, and in fact, prevented and sabotaged in science research by science management.

Anybody who may have doubts about these potentials should only look into the records of those special occasions when, in situations of grave urgency during the last half a century or more, in particular, during the years of WW II, private or public organizations have allowed science research to move ahead in conditions other than those imposed by the usual science management.

Needles to say, the above text is but an individual attempt, or essay, and as such it may have its limitations and errors. The only expertise I can bring to the issues debated here are the more than fifty years which I spent as a science researcher at more than a hundred universities and research institutes on five continents, starting with my student days back in 1954, if not in fact even somewhat earlier as a young amateur ...

Looking forward to equally ... outspoken ... approaches to all issues relevant to the title of this essay, or for that matter, in general which may be relevant to a proper pursuit of the management of science research.

## **Big Science, or Is Science Done Scientifically ... ?**

We humans tend not to do love lovingly ...  
Also, kindness we do not always do kindly ...  
Not to mention that art we hardly ever do artistically ...

But then, violence we certainly like to do it violently ...  
Crime, also, we do criminally ...

So that, does it not come as a ... pleasant surprise that, at the level of human societies as a whole, well, we do not much seem to do science scientifically !!??

In this regard, two things may come to mind before all the many many other ones.

First, we science researchers are highly individualistic and intelligent, and therefore, we have a very strong, and in fact, nearly exclusive tendency to try to deal with our personal problems in ways which are looking for strictly individual solutions.

Second, Big Science, which employs us, is at most a six decades old phenomenon, and therefore, both on our side, as well as on that of the adversarial and confrontational science management, a management with divine rights, there has not been enough time to work out a more or less well balanced and efficient approach. Not to mention that Big Science emerged during the tough years of WW II, and then functioned for the better part of the next five decades during the troubled times of the Cold War. And clearly, those were not exactly the years in which our frustrations could be dealt with in more wise and institutionalized ways ...

But then, many things have changed around the world during the last one or two decades ...

Plus, due to my age and a few other things, I myself have got in a position where, rightly or wrongly, I happen to believe that I am significantly less vulnerable, if I try to bring to the general attention situations in Big Science which simply make a mockery of the very spirit of science.

These are in main the reasons why, lately, I decided to try to air some of such issues.

And then, it is quite clear that not so many others among us researchers, especially those who happen to be young and/or do not yet have a strong enough and internationally recognized position in science, would be quite safe to do the same ...

Yet, no one can stop anybody from becoming slowly slowly aware of certain highly undesirable and damaging aspects of modern Big Science. And even if such situations are far from being limited to South Africa, and even if South Africa is far from being one of the major scientific nations, it nevertheless need not necessarily mean that we should simply sit back, keep quiet, and forget all about it, till some other big league players around the world would finally decide to do something at all ...

So much for our own frustrations ...

But then, let me please cite here the ending part of the Foreword to my 1990 research monograph on nonlinear partial differential equations, published by North-Holland, Amsterdam, New York :

"... In our era, when 'Big Science' so often tries to dwarf us into negligible and disposable entities, subjecting us to the 'Big Industry', conveyor belt type management by 'Publish or Perish', one should perhaps better not think about how the world may look without editors like Prof. L. Nachbin, who are still ready to offer us a most outstanding encouragement and support.

And what may in fact be wrong with 'Big Science' ?

Well, was it Henry Ford, of the 'History is bunk' fame, who found it necessary to insist that :

'Big Organizations' can never be humane ?

Yet, after WW II, to the more traditional 'Big Organizations' of Army, Priesthood, Bureaucracy and Industry, we have been so busy adding that of 'Big Science' ..."

Note. Prof. L. Nachbin, a well known Brazilian and American mathematician, passed away in 1994.

## **ARE YOU NOTHING BUT A ... HUMAN RESOURCE ... ?**

In a variety of recent official documents, and according to the latest managerial-Orwellian "newspeak", together with lots of other human beings, we, academics and researchers are called ... mere "HR", or "Human Resources" ...

Well, first, and before everything else, it may perhaps be the case that we owe a deep "thanks" for that, in view of the fact that, after all, capitalized letters were used.

Not to mention that, quite often, and in official documents of governments which fervently claim and believe to be of the "left" - whatever that may have been left to mean nowadays - we are called a mere "human capital" ...

But then, let us not stop here with such a remark, and instead, let us consider the situation in some more detail.

One of the things which through a rather inevitable natural resonance pop immediately in mind when we hear that we are, well, mere "Human Resources", are the following terms :

"Mineral Resources", "Financial Resources", or if you do not mind, "Animal Resources", "Vegetal Resources", "Marine Resources", and so on and on ...

Well, not such a long time ago we were called "labor force", "manpower", "human capital", etc., ... These terms however went away,

partly due to the pressures of Political Correctness, as well as to various other possible reasons ...

For instance, the word "capital" has lately been less of a darling. On the other hand, any reference to terms such as "force" or "power" associated with the ... masses ..., may make the managerial class feel less than completely safe about their ... divine rights ...

Also, in the world of academia and research organizations or institutes, the word "labor" does not sound ... educated and intellectual enough ...

And then, fortunately, there is the term ... "Human Resources" ...

Not to mention that the respective words are getting now, can you believe it ?, even capitalized ... !

Hopefully, no association with "capital" will follow from here, so that we would then be taken away even that minimal and newly acquired ... privilege ...

But now, let us go somewhat further, if you - my dear and mere ... Human Resource ... fellow researcher - do not mind ...

The fact which inevitably shocks is that the term "resource" is by definition nothing else than "a means for an end". And a rather passive, docile sort of "means". The sort of "means" which can be used in rather arbitrary ways, with not much qualms, if any at all ...

And then the equally inevitable questions arise :

Whose "means" are we the mere "Human Resources" ?

What and whose "ends" we mere "Human Resources" are fated to serve ?

Well, in a state like one with South Africa's present significantly liberal constitution, no human individual is supposed to come anywhere near to being a mere "resource". On the contrary, human individuals, as citizens, are the supreme end of the state, and they are supposed to enjoy a wide and generous range of human rights.

Equally, it is not the government of the day which turned us into mere "resources", since the government is subject to the constitution, and also to periodic elections. Thus for a government, we citizens can at worst be but "voters at the next election", which of course is very far from being mere "resources" and "means" ...

And then, who are those shadowy entities whose "means" we, the mere "Human Resources", ended up to be ?  
And what are the "ends" pursued by these most shadowy entities ?

Not to mention the question : how all this rather obscene situation can go on unnoticed, and above all, unchallenged in a modern democracy ?

Well, let us just try a most simple and first step enquiry into the above questions, and do so in the specific and limited scope of academics and science researchers.

Let us take, for instance, any university, and ask :

Who are supposed to be there the, well, mere ... Human Resources ... ?

And who - owing to the fact that they claim for themselves to be above that status - are not supposed to be the mere Human Resources ?

For instance, are the janitors assumed to ... enjoy ... that special, non mere human resource privilege ?

Or, does it only start from above the secretaries and other similar administrative staff ?

But perhaps, it is reserved exclusively to those who are involved in a proper academic type activity ...

Perhaps, it is the mass of the students who are the mere ... Human Resources ... ?

Or rather, it also includes the usual academics, no matter how distinguished some of them may be ?

Finally - and God forbid ! - does the top university and/or science management also belong to mere ... Human Resources ... ?

Or if not, then are the lower levels of academic and/or science managers nevertheless such ... Human Resources ... ?

Well, such and similar questions can obviously be raised ...  
And I suppose, it would be quite amusing to hear - if that may ever come to pass - a more or less official answer ...

However, the question which keeps bothering me, a question which clearly is of a yet more crucial importance is the following. And quite honestly, I am afraid that I am not able to find to it the appropriate answer. Namely :

Do you think that thousands of years back, that is, much before capitalism and feudalism, and right in the middle of the dark eras of human slavery, any slave owner would find disagreeable the term "Human Resources" applied to his slaves ?

Well, what happens to bother me is that, as far as I understand, the answer to the above question is quite obviously "NO" !

Yet we are in the New South Africa, with arguably one of the most enlightened constitutions, and nevertheless it is still found to be perfectly possible to be called - and above all, treated as - mere ... Human Resources ...

So sorry for reminding you of that ...

## **A Note in the Notices of the AMS**

In the "Forum" section of your Notices of the AMS, vol. 45, no. 7, the item "Possible Trends in Mathematics in the Coming Decades", by M Gromov, was published.

In view of the less than easy times mathematics research has been going through lately - especially owing to budgetary problems - it is indeed most appropriate to further develop our own internal debates

related, among others, to the possible future trends in our discipline. After all, our inner clarity on a variety of relevant issues may indeed be a necessary condition for our successful development in the given times. Furthermore, such a debate can be done without any dependence on, or interference from outside. In this sense I find the mentioned contribution of M Gromov particularly welcome.

Here however, I would like to draw the attention upon two weaknesses we should try to avoid, when presenting such contributions.

First, since mathematics is by now such a wide and diversely specialized conglomerate of fields, and since by far most, if not in fact, all of mathematicians - including those at the top - are rather narrowly focused relative to that wide diversity of our discipline, there is the inevitable danger of falling into the trap of special interest pleading, when any particular mathematician tries to talk about the possible trends in the near or less near future of the whole of our discipline.

Second, since we in mathematics are so much dependent on outside funding, the arguments about the major utilitarian aspects of our discipline have to be developed and presented not only in a forceful and persuasive manner, but also in such a way as to avoid harming the inner life of mathematics research, a life which cannot be too much subjected to outside utilitarian criteria and imperatives. This is indeed a most important point, since many of the basic sciences today - and among them certainly mathematics - are already at a stage, where their depth and complexity is such that their successful pursuit depends essentially on following, among others, their own inner logic. A logic which is not, and cannot be well understood by outsiders, a logic which even the insiders tend to misunderstand.

One possible way to deal with these two issues is to focus deeper than the views originating from any particular set of fields of mathematics, or from any recent select list of major scientific and technological breakthroughs in which mathematics happened to play a critical role. And if indeed we try to go deeper, then ever since Galileo and Newton, the more general modus operandi of science and technology can offer us a rather trenchant picture, one that can also be easier understood



by the wide, non-mathematician type public. In Galileo's words, for instance, it says that the book of Nature is written in the language of mathematics. Or in some more detail, we may say that starting with the seventeenth century, and till the emergence of the electronic digital computers, we witnessed the interaction pattern :

*Laws of Nature*  $\longrightarrow$  *Mathematics*  $\longrightarrow$  *Humans*

or compactly

*LN*  $\longrightarrow$  *M*  $\longrightarrow$  *H*

in which we humans have used and developed mathematics as a main tool in our formulation, dealing with, and as well discovery of the laws of nature.

More recently, this interactive pattern has enjoyed two major developments.

First, with the advent of electronic digital computers ever since the 1940s, it got more complex, namely, it can now be presented as :

*LN*  $\longrightarrow$  *M*  $\longrightarrow$  *C*  $\longrightarrow$  *FDM*  $\longrightarrow$  *H*

where "C" and "FDM" stand, respectively, for *Computers* and *Discrete or Finite Mathematics*.

And second, the NONLINEAR aspects of mathematics are more and more coming to the fore. The origin of this phenomenon is in the fact that, from the very beginning of modern science, that is, starting with Newton, most of the laws of nature were formulated in nonlinear mathematical terms. One of the first and simple ones is, for instance, Newton's law of universal gravitation which in its simplest form leads not only to a nonlinear ordinary differential equation, but also to one which is singular as well.

However, lately, due to the availability of electronic digital computers and the sufficient development of mathematics itself, as well as due

to outside utilitarian pressures, among others from state of the art technologies, we can now start to deal more and more seriously and without undue linearizing simplifications with this fundamental non-linearity of most of the laws of nature.

Needless to say, this venture into the nonlinear performed by present day mathematics is not going to be reversed in the foreseeable future, and in fact, it is one of the greatest fortunes mathematics has ever experienced.

Finite or discrete mathematics, on the other hand, is not so much about our direct unmediated interface with nature, but mainly about our interface with the phenomena of fast and massive information processing which are going on in our electronic digital computers. And as such, it is, and it is going to be for quite some time to come, a most important venture in mathematics. Needless to say, just like with mathematics in general, so with finite or discrete mathematics there is an essential need for the freedom of an inner life of research.

The above can offer an illustration about one possible way we could avoid both our endless inner squabbles of special interest pleading, as well as an undue interference from our external budget supporters who, rather naturally, and yet, not quite wisely as well, may have merely utilitarian, and also often short term concerns uppermost on their minds.

And in order to further try to tend to such utilitarian concerns, and do so in a more appropriate manner for the purposes of mathematics itself, we may also mention to our potential external budget supporters the following ... short history ... of humankind's economic evolution :

A main concern of economic activity is to bring things from nature into the realm of our use.

In earlier times, we could only do that as hunter-gatherers.

Then, we had the rather incredibly new idea to put our best seeds into the Earth to rot, wait weeks or months, and hope for a much multiplied harvest, all this being called agriculture.

Still later, we even started to dig much deeper, and at much greater effort and cost into the Earth, and took out ore, which only after be-

ing processed in most difficult ways, gave us very useful materials, like metals, for instance.

Well, during our own times, we all keep talking about a yet more new economic phase, when the knowledge added value is so important in our products. And of course, we do rather desperately need NEW KNOWLEDGE to add, unless we are ready, willing and capable to resign to ever living in the same, or even in diminishing ways, ways which anyhow are far from abundant for all of us.

But then, the question must arise :

Which are the ultimate, most subtle and critical - and thus quite likely, less than commonly familiar and well understood - borders, if not in fact, front lines across which we humans do in our times bring into our realm of use the much needed new resources, that is, the new knowledge ?

Well, quite clearly, the new knowledge is new, precisely because just earlier it has not yet been known. Therefore, new knowledge comes - and can only come - from the UNKNOWN. And it is precisely this unknown where today we go out and dare it to yield some more to us, and thus, give our new knowledge. Also, it is precisely this interface between the known and the unknown which is so fast becoming a main new source of input of our economic activities.

However, much unlike with the ranges of action of our forefathers, this unknown is far less familiar a territory than a hunting-gathering space, an agricultural field, or the prospecting and mining of ore. In other words, quite often, we have to face the unknown not on our own known terms, but on terms which themselves are not yet known to us. This kind of situation is well illustrated in the history of science, and in particular of modern science. Let us just recall the ways quantum theory was constituted, or modern genetics has emerged.

Therefore, the more competent, or rather, the least incompetent among us to venture to face the unknown and make it yield some new knowledge are those who have already done that, and have had some success. Furthermore, it also follows that by trying to bring some of the unknown into the known, and having to do so on terms often not yet

know to us, one has to allow for a certain inner micro-type logic of this process, a logic which although not quite clearly known even to the very best of the qualified participants, cannot be too much disturbed by the outer macro-type utilitarian considerations.

In conclusion, it is important to remember that scientific research is in some ways only "one part" situated within the already known, while it is at least "two parts" in the realms of the unknown ...

Namely, the one part, the part which is known, is the earlier knowledge of the researchers involved, while on the other hand, the two unknown parts are imposed on us by the unknown itself which the researchers face, added to which come the often unknown terms researchers are presented with in their respective engagement with the unknown. This "one part known - two parts unknown" aspect of scientific research is important to be kept in mind both by those who may venture into postulating about future trends in research, as well as by those who try to judge science by utilitarian measures.

Finally, we should not forget that what more properly can be seen as modern science, as well as modern technology, is merely three or so centuries old. And contrary to what we may often like to believe, during this short period, we humans - both as individuals and societies - have not yet managed to understand to a satisfactory extent the ways scientific research may really happen and work.

It may indeed turn out that, when studying the history of science during this period, one may easily get the feeling that, well, ... science is not done scientifically ...

Such a feeling may be even stronger among those of us who happen to be older, and thus may have pursued modern science for about one sixth, if not even one fifth of the mentioned relatively short three or so century period ...

With respect to mathematics, for instance, this feeling can only get reinforced when reading a survey such as the 1972 paper of Freeman Dyson, entitled Missed Opportunities, and published in the Bulletin of the AMS.

As far as science in general is concerned, the 1962 book of Thomas

Kuhn on The Structure of Scientific Revolutions contains, unfortunately, a wealth of examples from the history of modern science which will also strengthen the mentioned feeling.

All this should further serve as a warning to those who are involved in forecasting the trends of science, or in funding it, and intend to do so in a responsible manner.

## **ACADEMIC FREEDOM = ELITE**

### **LUXURY ?**

Two items on academic freedom were published in your paper recently\*, and I am amused to see how certain ... elements ... in a section of the ... progressive camp ... are at an obvious sufferance with it, just about as much as similar elements are with the constitution, the constitutional court, etc., ...

Indeed, related to the latter two, just days ago, we heard again about most firm ... positions ... on the extreme eagerness to change the constitution, or that the constitution only serves the privileged and not the poor, while the constitutional court mostly vegetates ...

Well, at least these elements have not yet reached the level of Cosas, which in fact demands nothing short of the return to the ... good old apartheid days ... of grossly and brutally separate education ...

So much for the rather steep learning curve - to use a term of comrade Sheryl Carolus - which awaits such elements, a curve however they do not appear to be so eager to take at present ...

But as an academic myself, let me try to return to the issue of academic freedom, and leave the other ... elite institutions ... mentioned to the care of those better suited ...

Strangely enough, academic freedom can be traced back as far as the ...

Dark Middle Ages, and in particular, starting with the 13-th century, when European universities, such as those in Bologna, Cambridge, Oxford or Paris were founded. And according to the understanding of those so called dark times, the idea of bestowing upon them academic freedom was not seen so much as an elitist privilege, but rather as an essential necessary aspect of their *modus operandi*. After all, during that time of rather total supremacy of kings and church, a number of cities were also given, or allowed their freedom, like for instance Geneva or Strasbourg, and that was not seen so much as a concession made by kings or church, but as a necessary way to promote useful communities of artisans and merchants.

In other words, unless one suffers from a negative - in particular, frustrated or insecure - extremism, one can easily understand that certain structures will require specific conditions in order to be able to exist and perform their intended functions. And to the extent that one decides to set up or keep such structures, one would only defeat one's own ends by refusing to provide and maintain the respective needed specific conditions.

By the way, ever since their introduction in the Dark Middle Ages, among those few who had abolished academic freedom were, of course, the totalitarian systems of the 20-th century, namely, fascists, nazis, communists, and the like ...

Unfortunately however, the attitude of the mentioned sort of ... elements ... is only one of the troubles facing academic freedom, a trouble which may be seen as political immaturity. The other - more recent source of troubles - mentioned in the item of Stephen Watson, are the so called academic managers.

Well, instead of going deeper and at some length into that matter, with your permission, I would rather make a few short observations which may help us better place the mentioned managerial issue in perspective.

Each age seems to have its own hallucination about a special class of ... miracle makers who can run and fix everything.

Alexander the Great, after he conquered most of the world known to

him at the time, appointed some of his generals - as satraps - to run the newly acquired places. And his thinking was simple : he who can conquer a land, can also run it in peace time ...

More recently, the Jesuits also believed that : he who can run a secretive elite religious order, can also run the secular realm.

By the way, the present day mullahs in Iran do have the same sort of understanding of society ...

Well, the nazis saw their political gauleiters as having the same universal abilities to run all human affairs, while in the case of communists, we had the equivalent ... elite ... class of commissars ...

But the most funny thing is with the Americans of the 20-th century, who developed the capitalist version of satraps, Jesuits, mullahs, commissars or gauleiters, namely, the managers !

Yes, the managers who, just like their earlier counterparts, are supposed to be endowed with the universally valid and applicable gift of running just about any sort of conceivable human venture ...

And if you do not believe it, just remember how about a decade ago, when the Apple PC computer maker was going down the drain, they decided to employ the successful managing director of ... Pepsi Cola ..., to save and then restart Apple Computers. And obviously, the thinking behind it was that a successful manager can manage absolutely everything, be it low tech soft drinks, or high tech computers ... And when, after just a few years, the respective manager failed to deliver, well, nobody learned any lesson of a more general relevance as to the limitations of management and miracle making managers.

As far as academic managers are concerned, a first question, perhaps, is as follows : if one's heart is so much into management, why choose a protected and relatively poorly paid mongrel sort of managerial job, and why not be the top manager of a world class free market company, and make many millions of US Dollars per year ?

But more important than that mongrel manager issue is that universities, and in particular, academic teaching and research, are some of the most sophisticated human endeavors of our days. Therefore, one would expect that those who run them are specially chosen, so as to

satisfy as much as possible criteria such as : long time experience in the academic field, distinguished teaching and research record, managerial abilities, willingness to give up on proper academic activities and turn to management, and finally, decent reasons for giving up on proper academic activities.

Unfortunately, there are not many enough academics who would satisfy all of these criteria. And then, academic managers are chosen among those who are ready to take the job and be managers, but are not good enough in order to make it in the really big league of multinational corporations, and on the free market.

Now, it appears to be a given of the present day human condition that the ideal type of academic manager is indeed a very rare bird. However, this need by no means lead to a situation where we forget or disregard the mongrel level of nearly all of those who end up being academic managers ...

In conclusion : how about trying to better understand what academic freedom is indeed all about, who have during history been its enemies, and why so, before ever thinking about curtailing or abolishing it ?

\*) It refers to one of the South African newspapers.



# **SCIENCE MANAGEMENT = THE LAST, OR RATHER, THE FIRST REFUGE OF THE SCOUNDRELS**

**OR**

## **SCIENCE MANAGEMENT = SCIENCE DAMAGEMENT ?**

This is a follow up to a number of essays I have circulated during recent times among several scientist both in South Africa and overseas. And it is mainly aimed at those, unlikely to exist, science managers who happen to be :

- honest
- competent, and
- not lost in complacency, let alone, arrogance.

The three questions raised here are the following :

- DO SCIENCE MANAGERS ADD TO THE DEVELOPMENT OF SCIENCE ?
- ARE SCIENCE MANAGERS ABLE TO ADD TO THE DEVELOPMENT OF SCIENCE ?
- WHAT IS THAT WHICH SCIENCE MANAGERS, AND THEY ALONE, CAN, AND DO ADD, TO THE DEVELOPMENT OF SCIENCE ?

Here, we shall address these three questions from the point of view of how science managers mismanage the rating of better researchers.

- 1 ) There is no further need to stress that in our globalized fast chang-

ing times of highly competitive "knowledge societies" science is by far the most important source and resource for evermore bringing to us new opportunities for increasing the GNP, GDP, as well as general employment.

As a consequence of that situation, science has in the last half a century been transformed into "Big Science". Therefore, it is by now inevitable that governments subsidize a considerable part of the science venture. The link between governments and science is however given into the hands of "middle men", that is, the so called "science managers". In the USA, for instance, it is the NSF, or National Science Foundation, while in South Africa it is the NRF, or the National Research Foundation, which is the statutory body of such "science management" on national level.

2 ) A first customary division in science is that of " R & D ", that is, Research and Development. Needless to say, both these aspects have their own importance. However, it is equally obvious - and of fundamental importance - that it is the research component which brings in the truly important new opportunities.

3 ) Research itself can - and must be - divided according to its strategic importance. And from that point of view the priority goes to basic or fundamental research from which a variety of subsequent research may emerge. It follows that basic or fundamental research is the opportunity creator in the realms of research itself.

4 ) Researchers are usually rated according to a system which is supposed to place a higher value on their involvement in basic or fundamental research. The NRF rating distinguishes between several such levels, denoted "A", "B", "C", and so on.

5 ) Here there is an essential, critically important, so far unrecognized - and in fact, thoroughly denied by science managers - difference between the way rating must be done at the levels "A" and "B", and on the other hand, on the other lower levels. Indeed, by far the most important and difficult task is the proper identification of researchers on the levels "A" and "B", researchers who typically are involved in

basic or fundamental research. As for the rest of the researchers, their evaluation is a mere "bean counting" which can be performed by absolutely anybody who can read, even if such a person may not be able to write. In particular, office secretaries and office janitors could perfectly well perform such a "bean counting" procedure.

In view of the above, let us call

"QUALITY RATING"

the proper way to identify "A" and "B" level researchers, while we call

"ROUTINE RATING"

the mere "bean counting" needed for evaluation of "C" and other level researchers.

6 ) Since ROUTINE RATING only requires the ability to read, we only make the remark that considerable amounts of money could be saved by not using science managers for such a task.

7 ) Let us therefore focus only on QUALITY RATING.

A standard argument of science managers who try to "pass the buck" of responsibility in this regard is that, essentially, all rating is done based on "peer evaluation". In case this is indeed true, then the three questions listed at the start can only have one single answer, namely :

SCIENCE MANAGERS DO NOT ADD ANYTHING TO THE ESSENTIAL AND CRITICALLY IMPORTANT PROCESS OF EVALUATION OF RESEARCHERS ON LEVELS "A" AND "B".

Consequently, the argument at 6 ) above regarding the uselessness of science managers again applies, this time to QUALITY RATING as well.

On the other hand, as we all know, science managers do not in fact allow peer evaluation to be the only base for the evaluation of researchers "A" and "B".

8 ) And now we come to the main point :

Is QUALITY RATING done actually properly by science managers ?

It is obvious that for such a purpose, the "peer evaluation" employed should guarantee both honesty and competence on the part of the peers consulted.

Furthermore, the peers used in evaluating "A" and "B" level researchers should be at least on the same level with those whom they evaluate.

However, the fact is that none of these essential conditions are checked, let alone, guaranteed by science managers.

Further, to the extent that, as a rule, science managers interfere in the QUALITY RATING, and to the extent that, with hardly any exception such science managers have absolutely no scientific competence whatsoever on levels anywhere near to "A" or "B", they should at least be thoroughly familiar with the history and philosophy of science.

Indeed, the truly original research ventures do, rather as a rule, evoke for a while at the beginning a negative reaction on the part of the science establishment. This is thoroughly documented in the history and philosophy of science.

Consequently, it is extremely difficult to produce a proper evaluation of researchers at the levels "A" and "B" by using usual peer evaluation.

And the resulting damages done to science, and thus to society at large, are enormous, inestimable, and often also irreparable.

Needless to say, therefore, that the incompetence, complacency, let alone, arrogance typically manifested by science managers regarding this issue are, either by omission, or by commission, bordering on the criminally irresponsible.

9 ) Even in the more advanced industrialized countries, science man-

agers are at best failed ex-scientists. Otherwise they are merely people with management ambitions, and without absolutely any understanding of the essential ways science functions.

And of course, this situation can go on endlessly since science managers - involved among others in the rating of researchers - are

- far from being properly accountable,
- far from having their actions properly scrutinized,
- in no ways democratically exposed to voters, competitors, or the market forces.

As a consequence, in modern societies, it is only in science management where such kind of utterly unqualified people who nevertheless have managerial ambitions can find a last chance for a career in management ...

No wonder that such sort of science management has turned into the proverbial ... last refuge of the scoundrels ...

Or is in fact their very first refuge ... !?!!

10 ) And what are the effects which we can already notice ?

It is well known by now that in many modern societies the brightest of the young do no longer pursue careers in science, and even less so in hard sciences, such as mathematics, physics, chemistry, and so on.

Long live, therefore, science management as the last and/or first refuge of the scoundrels ...