Why Sustain Fundamental Research ?

There is no way to measuring the pay off of basic research activities, and the reasons that lead countries to spend a part of their R&D budget in this field may appear as ideological rather than bearing the stamp of economic commonsense. Still, in spite of our time of privatisation, libéralisation, less State intervention, there are good reasons for such public investments. However, in spite of the progress achieved by science indicators, economic thinking and the policy-making experience, nobody knows how much should be devoted specifically to this part of the R&D system. As Benoît Godin has said for the R&D statistics, the pattern of policy-making in the support of basic research is both origin and result of « intuitions more or less justified" — one more proof that it is not because policy making deals with science that it is more scientific or more rational than in other fields of political decisions. Still the study of the means to improve the evaluation process of researchers and institutions within Europe deserves urgently to be undertaken.

In order to find a joke, as do American lecturers when they start to speak, I looked at « statistics » through Google.[1] There were but 75 millions and 700 000 pages in French and 702 millions of pages in English. You will understand that I had to give up after running through hundreds of pages without finding any joke nor even any pretext of joking, except the ridiculous idea —ridiculous because I speak before you, I mean a group of eminent statisticians battling now with an excellent dinner — the ridiculous idea that our postmodern society is fed up with figures and data. And I am supposed to speak about R&D statistics in relation to basic research : please forgive me if I will add to your indigestion, even if it is to underline — as Benoît Godin himself concluded his superb *Cent ans de mesure sur les scientifiques* — that they don't help much to enlight the choices to be made in this field.[2]

On one hand, the management of our societies depends more and more upon a greater and greater quantity of statistics ; on the other the quantity is such that one has to question not their usefulness —

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[1] « Indicators on Science, Technology and Innovation. History and New Perspectives », Conference organised by The European Network of Excellence on Policies for Research and Innovation in Europe (PRIME), University of Lugano, 14-17 November 2006.

[2] B. Godin, *La science sous observation : Cent ans de mesure sur les scientifiques*, 1906-2006, Presses de l'Université Laval, 2005, p. 78.

before you, how could I dare to suggest this ? — but the real purpose for which they appear as useful, in other words whom can they possibly benefit, as well as how and why, and in what historical and social context.

To begin with, you will forgive me if I don't deal with the various meanings of the concept of basic science, fondamental or pure research and so on. As Benoît Godin wrote, it is a « fuzzy concept » which before the coming of NSF and OECD definitions, was « a free-floating idea supported only by the rhetoric of scientists». Thanks to the numbers it generated, it was successfully « sold » by the NSF and the OECD and has contributed to a well established scientific not only discourse, but also category,[3]

To avoid a theological debate about what it is and what it is not, where it starts and where it ends, I will simply take, following the Frascasti's definition, that part of the resarch system — or R and D activities — that is « primarily devoted to the advancement of knowledge, without a specific practical application in view. » Of course this does n't avoid the rhetoric claiming that its motive are only the advancement of knowledge, wheras such support stems basically from an instrumental conception of science. It is difficult to dismiss Jacob Schmookler's argument that ever since the beginning of modern science, there has never been any genuinely disinterested state support of research activities. For him, utilitaranism is the driver that determines the State's interest towards science : the possibility, the fantasy or the reality of catastrophies, namely situations of wars and/or of economic competition, have always contributed to favour and accelerate the production of new knowledge.[4]

This being so, in the policy-makers and also the politicians' eyes, the interest of the Pursuit of knowledge lies in its capacity to lead to useful applications — to produce innovations and technologies that will benefit the market, economic growth, well-being and/or military ends. However, the lesson that the United States learned not only from World War II, as it is commonly thought, but also from World War I and the 1929 economic crisis, is that public support is indispensible to the pursuit of knowledge. I insist on this point : such a profession of faith in the US did n't start with Vannevar Bush's famous report, *Science the Endless Frontier*, but much before, as David Hart has

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[3] B. Godin, *Measurement and Statisticvs on Science and Technology, 1920 to the Present*, Routledge, London, 2005, p. 272.

[4] J. Schmookler, « Catastrophe and Utilitarianism in the Development of Basic Science » in R. A. Tybout (edit.), *Economics of Research and Development*, Ohio State University Press, 1965, p. 19-33 ; see my discussion in *Science and Politics*, « Knowledge as the objective of power », MIT Press, 1973, p. 60-68.

well demonstrated.[5] Even figures as republican and liberal as Herbert Hoover, Robert Taft, Karl Compton and Curtis LeMay contributed to the « germination » of the federal policy conception in this field, This led to a kind of pre-war consensus as to the state's role in catalysing and supporting the development of scientific institutions, preferably without owning them, and to timulate industries to be involved in R&D activities, if necessarily even with state support.

Of course, thanks — if I may so put it — to World War II, after so many successes obtained by the accelerated passage from basic research to applications such as the atomic bomb, radars, computers, jet planes or operational research and penicillin, Vannevar Bush developped the notion that every thing that defines and determines a country's well-being, strength, competitivness and defence depends upon the capacity of its research system to renew, re-elect and extend knowledge. I will mainly refer to debates and reports that go back to this period, namely the beginnings in the early 60's of the science policy machinery and institutionalisation within the OECD member countries, this just to remind us how little the style and arguments to day in favor of the support of basic research are really new. Since then three arguments have been used to justify the federal intervention in the support of basic science : the two first are obvious, but one cannot prove them in terms of a scientific demonstration, and the third is fully challengeable, indeed wrong.

First, industry has no reason to invest in this field, except in relation to its own objectives, domains of interest and programms for new products and processes (for instance the then ITT via its Bell Laboratories which produced the transistor) This is a sector that we define in French as outside the market or which English-speaking economists designate as market failure, namely that industry has no specific reason to take any risk in the middle or long term. It took some time for the federal government to become officially the patron of science outside the military and voyages of exploration. It was not allowed to interfere nor intervene in the university affairs before the creation of the National Science Foundation, and even that was not enough : the full involvment of the federal government in scientific affairs did really begin until the Eisenhower and Kennedy years, the cold war confrontation leading, after the explosion of the first Soviet H bomb and the success of the spoutnik, to the 1958 National Defence Education Act. Then indeed the State as such could recall the support that the military gave during and after World War II to academic research without direct relation to its military immediate objectives. Obviously this military investment had an enormous pay-off, but no real proof was offered that it would work similarly well in peacetime.

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[5] D. M. Hart, *Forged Consensus : Science, Technology and Economic Policy in the United States*, 1921-1953, Princeton University Press, 1998.

The second argument is as intuitive as the former one : there is no progress of academic research if there are no students to train and pass on what they have learnt, so that the pursuit of knowledge extends its achievements — discoveries, new concepts, new methods — to a broader number of the technical and managerial manpower, some becoming researchers in the universities, but most of them transferring their scientific fresh competences based on the most advanced frontiers of science into industrial and military laboratories, and even in other kind of functions than research as such, from business and management to marketing and design.

The third argument has been attributed mistakenly to Vannevar Bush' report, I say mistakenly since Bushs was not so naive as to write and claim that the process that leads from basic research to industrial innovations is straitghforward, causal, determinist like hammering of a nail, implying no time, no cost, no patience, no trial and errors, no confrontation of theories and experiments, no uncertainties nor failures, and not requiring the intervention of many actors and institutions outside the scientific community. Still this idea that it is but a linear process was taken for granted not only by politicians, but also by many scientists too happy to claim that basic research is good for the State in such a fashion that more you invest in it, the more rapid and numerous will be the applications and benefits.

As you well know, it took many years, indeed decades, for economists, sociologists and historians of science to question and demolish this conventional wisdom, and it is fair to say that R&D statisticians have plaid an important role in helping to show how such a process is not at all linear, but much more complex, winding, uncertain, like a game where one is never sure to win, nor how, where or when it might be won. And worse, the results of basic research are noy only unpredictable, but also they may be and often are exploited outside the country in which they took birth, so much so that several members of Congress seriously believed that by investing in basic research the nation would never get it back its costs.

Even the creation of the National Science Foundation as patron of basic research was not enough to legitimate its support by the federal gouvernment. In December 1963, « the first contract ever entered into by Congress and the National Academy of sciences » dealt precisely with what one may call the political status of basic research. The Congress Committee on Science and Astronomics request meant precisely to « throw into bold relief some of the more serious phases of policy which Government must consider in its decisions to support or otherwise foster research in America ».[6]

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[6] *Basic Research and National Goals, A Report to the Committee on Science and Astronautics,* U.S House of Representatives by the National Academy of Sciences, Washington, March 196, « The purpose of the agreement which evolved into the first contract ever entered into by Congress and the Academy, was the production of a comprehensive study designed to throw into bold relief some of the

Two years later a panel of 15 individuals, 13 scientists and 2 economists, produced a report, *Basic Research and National Goals*, aimed at answering two questions : « first, how should one allocate our resources between science and the other activites of the society ; and how should resources be allocated within science ? » In short, why and how much ? Many papers had, as it is said in the Summary, a philosophical flavor, and all contributors agreed that the purposes of the government are not scientific « as opposed to the techniques of government », and for this reason « must be answered in terms that lie outside science. » I remember that when I read this report just published I immediately thought that it could appear as the new Gospels of our post modern scientific and materialistic societies.

As to the first question, all contributors underlined — except one — that in a market economy it is the responsibility of the state to support basic science, and such public investiment corresponds in a way to the development of the overheads of society at large, its nature being so diffuse and taking such devious routes that only the goverrnment can bear its cost. As my old friend Harvey Brooks wrote, « Basic science *per se*, contributes to culture, it contribues to our social well-being, including national defence, and public health ; to our economic well-being, and it is an essential element of the education not only of scientists, but also of the population as a whole ».[7] And these four goals of society suffice to justify State intervention in view of the relevance of science to them.

All the essayists were in full agreement, except the Canadian economist Harry Johnson who cast serious doubts on the inevitable links between pure science and society : « Clearly, if the public is convinced that a sientific culture is desirable, it is perfectly appropriate for the taxpayers' money to be used to support scientists and scientific research. But to the extent that scientific activity is not of a character of a consumption good […] its claim for public support needs to be weighed against other pressing claims on the social surplus, such as the relief of poverty, the mitigation of social problems, the needs of the less-developed countries. » This was a radical argument that all other panelists could'nt accept, they prefered Harvety Brooks's statement — one might call it aesthetic rather than ideological, and still : : « Basic scientific research is recognised as one of the characteristic expression of the highest aspirations of modern man. It bears much the same relationship to contemporary civilisation as the great artistic and philosophical creations of the Greeks did to theirs or as the great cathedrals did to the medieval Europe. »

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more serious phases of policy which Government must consider in its decisions to support or otherwise foster research in America." (Preface by George P. Miller, chaiman of the Committee on Science and Astronomics, p. v).

[7] *Ibid.*, Summary. P.5

In *Science and Politics*, I raised the nasty question : cannot art, music, litterature and the dance also be said to be equally characteristic expressions of modern man ? and why give the responsibilitry to the natural sciences rather than to the humanities ? However big the army of researchers, it is still smaller than that of music-lovers and art-lovers. Harvey's answer has no scientific basis, it is but an opinion that may or may not be convincing. In his mind, science is a cultural activity that is believed to transcend private value-systems : « The nature of science as a system of acquiring and validating knowledge— especially the natural sciences — has a public character that is still lacking in other forms of knowledge » ; in brief, it is less « dependent on the vagaries of private tastes and value-systems. » This simply implies that science is as good for the State as the State is for science, or as I put it long ago, « *the scientific society is not only the society which wills science as one of its ends, but also the society in which scientists desire their own ends to coincide with those of society.*[8]

However, I could n't avoid to quote Harry Johnson's severe reservation : « Insistence on the obligation of society to support the pursuit of scientific knowledge for its own stake differs little from the historically earlier insistence on the obligation of society to support the pursuit of religious truth, an obligation recompensed by a similiarly unspecified and problematic pay-off in the distant future. »[9] Johnson went so far as to add : « To an important extent, indeed, scientific research has become the secular religion of materialistic society ; and it is somewhat paradoxical that a country whose constitution enforces the strict separation of church and state should have contributed so much public money to the establihment and propagation of scientific messianism. » I wonder what Johnson would say of the current George Bush administration that tends both to ignore the separation between state and church and treat scientists as obedient servants of its political fantasises. But this is an other story.

As to the question : how much ?, it is revealing that none of the contributers was in a position to propose any precise figure for the allocation of resources within science. Most of them suggested of course that more money would be welcome, if not indispensible, and once again Harvey Brooks's argument was the most explicit : a 15 per cent annual increase is minimal in order to cope with the forecast population of graduates students and faculty. Obviously there is no fixed ratio between the amount of resources to which basic research can aspire and those devoted to other research activities. There is indeed a custom or a non-written law that leads to devote about one tenth of the total R and D effort to basic science ; more than 15% would be a loss, less than 10% not sufficient, and Derek de

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[8] J.-J. Salomon, *Science and Politics*, MIT Press, Cambridge, 1973, p. 64 (italics in the text).

[9] He certainlky has been inspired by the reading of Don K. Price regarding scientists as « an establishment in the old and proper sense of that word ; a set of institutions supported by tax funds, but largely on faith. » (*The Scientific Estate*, The Belknap Press of Harvard University, Cambridge, 1965,p. 12.)

Solla Price considered that below 7% is a score characteristic of a under-developped country. I was glad to find that such a custom was advocated long before the institutionalisation of national science policies : so Condorcet in his *Fragment sur l'Atlantide* had alrady made the use of the resources available to « the society of savants » subject to the condition that « one tenth of the subscription, let us say, shall always be set aside to serve the general views of the association, in order to ensure that its utility extends to the whole of human knwoledge ».[10]

This is beautiful, and especially how the formula « let us say » illustrates the impossibility of measuring what is good or too good or not good for basic science. Some of the contributors to this NAS report proposed more and better statistics, others explained that one part of the difficulty stems precisely from the statistics. I quote — and once again you will forgive me : « Statistics on research and development in the Federal Government are complex, and sometimes misleading, not because the dedicated statisticians and analysts who amass these figures are incompetent, but rather because the situation is inherently so complicated. »[11] I am sure that your discussions will help to make the situation less complicated.

Overall the notion that basic research is good for the state, like GuiNess is good for you, became a strong political profession of faith in the United States. From one majority to another, the Congress always refused to reduce the resources devoted by contract to the universities, and following each period of crises (Corea, Cuba, Berlin, etc.) it tended rather to increase them, all the more so after September 11. In the field of health, in particular, when a President proposed to reduce the budget of he NIH, the National Institutes of Health, Congress always has reacted by imposing a significant increase (especially when one of its members had died fro illness or cancer). And with any pretext of a threat from nuclear deterrence to the Stars War project to anti-terrorists measures decided after September 11, Congress increased the resources of the best university laboratories. This year the President tried to reduce the budget of the NIH and NSF, and you know how George Bush's team does n' t hesitate to contradict and enven censor some of the NAS reports dealing especially with environment issues. But with the new majority he has no chance at all to succeed in reducing the resources of basic research. In other words, if the State does not support basic research for the beauties of science or for the scientists's motivations, it feels obliged to do so in order to meet the challenges of the catastrophies to come : utilitarism always has the edge on philanthropy and the defense of the pursuit of knowledge as such is only insurance for the future.

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[10] Condorcet, *Œuvres complètes*, Garat-Cabanis, Paris, 1804, p. 595.

[11] *Basic Research and National Goals*, Summary, p.22.

If you look in the long term at the R and D statistics, you see at once that Europe and my country in particular — and so many others except UK, Sweden and Switzerland — far from following this United States experience, have witnessed during the same period switchbacks budgets. This may suggest a paradoxical or nasty lesson, I hope I will be forgiven for underlining the observation, in a conference which is organised under the auspices of the European Commission and its Member countries, that it is the country whose constitutional doctrine strongly implies that the less there is of State intervention, the better it is for its citizens, institutions and enterprises, that has developped the most constant partnership between government and private interests, and this all the more so in science policy-making. As Don K.Price wrote, the federal government intervenes directly in this field to such an extent that the Founding Fathers, if they came back to earth, would imagine that the constitutional system had been overthrown. As he said, research activities have taught the US Federal government to « socialize without assuming ownership » — ironically, a reverse compliment to marxism.[12]

In most European countries, the US conception has been misunderstood leading to the disengagement of the State and to decreasing the investsments in university research. In short, they kept Mrs Thatcher'idea as the representation of the US model. Actually, already in the 70's — with oil crisis, the end of the dollar convertibility, raising unemployment and the first beginnings of the diffusion in the economy of the information revolution — the emphasis of policy moved from the support of science as such to the support of technology and innovation, and one began to speak more of new competitive conditions in the context of growing globalisation and the decisive role of the new technologies — information, and communication, biotechnologies, new materials, to-morrow nanotechnologies — than of the support of basic research and the importance of the universities.

By the same token statististical comparisons, in particular OECD's, in shifting this emphasis to a conceptual framework that is concerned mainly with the success of innovations in the market, tend to marginalise basic research and to suggest that training in and by science is less important that training in management and business at large. In this transition, it is clear that the presupposition of less State intervention and greater privatisation and liberalisation of the market has given science policy thinking with an ideological bias. There is no better illustration of this bias than Terence Kealey. Against all that has been learnt from Edwin Mansfield, Nathan Rosenberg, Paul David, Christopher Freeman or Richard Nelson, one has seen this biochemist clinician, vice-chancelor of the University of Buckingham, proclaiming that the State support of basic research is pointless, that State intervention in this sector is but counterproductive. In his mind, all research activities should answer to commercial

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[12] Don K. Price, *The Scientific Estate*, pp. 5 and 43.

pressures and carried on within and by the private sector : for instance, cancer research should be supported by the tobacco industry, environmental research by the oil industry, ecologival research and food safety by the food and pesticides industry and so on. [13]

This author, whom his publisher presented without jocking as the XXth Century's Adam Smith, wanted to appear as iconoclast by attacking — often not without some sense of humour and good reasons — the bureaucratic heaviness of public research institutions and their evaluation procedures that do not favour the emergence of new domains nor welcome dissident ideas and talents. And the success of his book in England may be explained by the existence of a post-Thatcherian context in which Tony Blair's efforts have tried to make up for the lateness and damages in relation to British education. Still such a neo-liberal argumentation ignores three simple and obvious reasons why a modern State cannot and should not lose interest in the support of basic research and universities. Kealey'seconomic laws of scientific research are neither laws nor even good reasoning.

To begin with, it is not for philantropic reasons that a greater and greater number of entreprises multiply research contracts with universities and even develop partnerships in their programms that associate closely their researchers with those of public laboratories — even to the extent that it leads to the subordination of such laboratories to the needs and pressures of industry. Secondly, Kealey's reasoning ignores totally the role that basic research plays in the training of scientists not only future future Nobel prizes winners, but also those who contributed to the most advanced scientific developments and also, in much greater number, those who became acquainted with them and were able to transfer such new kowledge in their professional activities. University and State supported research is not only the route of access for industry to such developments, it is also if not mainly the means by which enterprises are provided with the best expertise. Conversely, a university system that is stricly privatised may limit its research to questions dictated by the short term. As for this, one has difficulty in imagining the tobacco, the oil and the food industry ready to carry out research and publish results that would go against their interests.

Finally and mostly, if there is no way to measuring the profitability of basic research, we know if only by intuition and experience — but much better by looking at statistics at large — that our economies are more than ever deep-rooted in the production, distribution and use of new knowledge. If one cannot quantify exactly how such new knowledge affects and changes the overall technical, economic and social environment of our societies, there is no need of scientific demonstration to show

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[13] See T. Kealey, *The Economic Laws of Scientific Research*, Macmillan Press, Londres, 1996 ; and the highly critical review by Paul A. David, « From Market Magic to Calypso Science Policy », *Research Policy*, 1997, n°26, pp. 229-255, and by Keith Pavitt, *New Scientist*, 3 août 1996, pp. 32-35.

that the world in which we have to live — for the best as well the worst — would not be what it has become without the contributions and impuslsion of basic research.

Forty years ago, the US Department of Defense in assessing the contributions of science to the new weapons systems, saw that the primary impact of science « may be brought to bear not so much through the recent random scraps of new knowledge, as it is through the organised 'packed-down ', thouroughly understood and carefully taught, *old* science ». None of « the scientific and technological events » which led to these weapons systems, the Department noted, « could have occurred without the use of one or more of the great systematic theories — classical mechanics, thermodynamics, electricity and magnetism, relativity and quantum mechanics ». And thus « when we debate the utility of sience, the real issue is not the value, but rather the time to utilisation. »[14]

All the theoretical and experimental work that sent the first man to the Moon, cannot be understood unless one pays tribute to Newton's laws. But this does n't show up in the *Citations Index*, the counting of references provided by the specialists in the best international journals. The role of Newton has no hope of appearing in bibliometric measurements, and probably no any private institution would have been brave enough to undertake and support such a project as Apollo's. Thus the conclusion that follows from bibliographic measurement is that the man on the Moon remains a poetic fantasy. After all, a billion of Chineses under Mao Tse Toung believed that no man ever walked on the Moon. Of course the Moon landing was n't a demonstration of basic research. But it would have been impossible without its many contributions going back to Galileo, if not Copernic.

Of such a criterion which is beyond any quantification, Gerald Holton, physicist and historian of science, has given another very simple example — one which should cause all managers, policy makers and politicians to consider when they are uneasy with the short term costs of basic research, and cause to weigh the « futility » of its support. If the laws of intellectual property would require that the photoelectric devices in everyday use throughout the world must show a label describing their source (a kind of certificate of tracktability), it would be necessary to mention as the leading source: « Einstein, *Annalen der Physik*,17 (1905), pp. 132-148 » .[15] This paper was the first of a series of five

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[14] C. W. Sherwin *et alii*., *First Interim Report on Project Hindsight*, Office of the director of Defense Research and Engineering, Clearing House for Federal Scientific and Technical Information, Washington, June 1966 ; R. S. Isenson, *Final Report*, National Technical Information Service, Department of Commerce, Washington, October 1969 ; and same authors, « Projecrt Hindsight - A Defense Department study of the utility of research », *Science*, 156, 23 June 1967.

[15] G. Holton, *Einstein, History and Other Passions : The Rebellion Against Science and the End of the Twentieth Century*, Addison-Wesley, Reading, 1996, p. 250 (quoted by Paul. A. David, paper mentioned,).

papers published in that « Annus *mirabilis* » culminating with the theory of relativity. Put simply it proposed the notion of a quantum of light.

And many more other devices can be traced back to what was but an hypothesis, was « seminal » in all meanings of the word : it was not only a schooling event, it was not only « rich and original » as would say the dictionaries and the specialists of bibliometry whom you know so well would say, it was the effective source of the middle and long term innovations with immense commercial repercussions that have changed our environment. For instance, the laser machine that printed this talk could not exist without Einstein's idea of a quantum of light or the Planck's constant . — and thus you would have fortunately completed your dinner much earlier.

Of course, a neo-liberal observer could still argue that when he wrote this paper Einstein was working discretely in the Berne Patent Office, and had no State support. For his research Einstein is obviously an exceptional case, and his kind of research did n't need special support. Moreover, the great majority of the scientists of his time belonged to an academic institution which were starved of research resources. 1905 is still far away from 1939, the date of Desmond Bernal's publication of *The Social Function of Science* in which appealling for a science policy implied a strong State involvment in and support of basic science. At that time, Britain and France were alone among the liberal democracies to have since a minister responsible for scientific affairs and a State institution precisely conceived of for the deliberate support of science, the DSIR in UK and that which will become the CNRS in France, the National Center for Scientifc Research. Well before you had the Kaiser Wilhem Society in Germany and by the time the CNRS came along fascist Spain and communist USSR also had ministers for science. It was Word War II and its aftermath which generalize in all industrialised countries the notion that scientific activities are a matter of definite State intervention and control.

As you know, Bernal was close to the communists and the CNRS was the creation of the socialist government under the Front populaire. Ironically, the notion that the State is destined to be the patron of science — a reality clearly understood by Colbert in France and Charles II in England — became a tribute paid to marxism, since it was orthodox marxism to profess that if scientists follow their own ends to coincide with those of society, the best society is also that which wills science as one of its more important objectives. Soon after the Second World war, all liberal democracies followed this notion, whose demonstration resided and still resides to day beyond the scope of science, but remains a matter of faith or, as Benoït Godin says, of « intuitions more or less justified » which do n't need to appear as scientific argument. And from now on the empire of R&D statistics did start if only to help each country to become aware of the « gaps » it had to catch up. It just proves once more that it is not because policy-making deals here with science that it is more scientific or simply more rational than in other fields of political decisions. Since then, after all, so many discoveries have been made in State supported universities and laboratoriues that one can wonder what may happen if we come to have a

science system that is solely in the hands of the private sector. Who knows, may be the world would be better off ? I leave the question to your night thoughts.

But before concluding, let me just expose a wish in relation to your forthcoming discussions and in particular to the theme of the final session. I have carefully read the two documents which will constitute the basis for this final session : they both are full of pertinent lessons from the past and wise proposals for the future. Still it seems to me that something is lacking which of course you may think is beyond the scope of PRIME and its network of indicators designers — beyond the scope, the frontiers or the legacy of R&D statistics, I mean a common European understanding and policy of what is or should be involved in the definition, practices and uses of procedures for research evaluation, and this within each country as much as between them in the European Union and Commission framework. It is common knowledge that the system in relation to basic research does n't give enough satisfaction so as to support the best, youngest and most innovative minds and laboratories. Much should be done in order to improve within Europe the evaluation process of researchers as well as of institutions, since the differerences and even discrepancies of practices and procedures are notably so high that one can question often the quality or the wisdom or simply the bureaucratic mystery and lost time of the decisions concerning the selection and allocation of resources.

It may be of course that the new European Research Council will be in a position to contribute to such improvement, but since any progress in this policy-making process will depend in part upon the quality of the R&D indicators, I wonder whether such a study should not become a part and a responsibility of the « plaform » the documents for your final session are seeking at. Leaving you with this suggestion which some, I guess, may find too ambitious and certainly controversial, I hope that you will forgive me for having taken so long.

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