

GENERAL INTRODUCTION

THE POLITICAL APPROACH TO RISK

1. A NEW FIELD OF QUESTIONS ON THE VERY FOUNDATIONS OF OUR INDUSTRIAL CIVILISATION

Major technological risk: three apparently simple words which nevertheless raise incalculable numbers of questions; social questions, challenges to political conscience and action in our time which are quite formidable. Three disruptive words which are promptly abandoned if they are somewhat emphasized: "Life means risk; without risk no activity, no dynamism but certainly famine, epidemics, and at the end of the road: confrontation and devastating war." This solid common sense, which is neither wrong nor quite true, does not, however, succeed in obscuring the issue. It is quite true that risk is a dimension indissolubly linked with life; that man has torn himself away from his primal condition by manufacturing tools, the risk makers; that risk has taken on a large size and new forms since tools have become transformed into machines and the craftsman into the workman: the railway, the spinning mills, the mines have caused a large number of deaths. It is quite correct: risk is nothing new. Let us not forget: on March 10, 1906 - and this is no exception in our industrial countries - an enormous explosion wrecked the French mine of Courrières: 1100 dead, many hundreds made invalids for life; 562 widows, 1133 orphans; hunger and cold; 50000 strikers, troubles. Clémenceau declared martial law in the area; 25000 soldiers criss-crossed the miners dwellings, forbade free traffic; terror, clandestine activity, "conspiracy", arrest of responsible trade unionists; resumption of political life and work. Mourning, misery and bitterness! (1).

Yet, technological risk* poses a new problem today. Since the first third of this century the means of production developed by man have changed scale, there are for instance the large industrial complexes, and the risk has risen quantitatively. For several decades science has also uniquely transformed industrial activities : numerous processes, new

*The term "technological" will be used in a very broad sense: proper development of techniques but also the industrial development associated with the implementation of these techniques. See p. 8

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products, have been introduced. With them risks appeared which had been unknown in the past, and this just when massive support from science was strengthening the pretensions of contemporary homo faber to control more and more, to perfection, it was believed, all dangers incurred. The enthusiasm of conquest, the arrogance which sometimes inflates success, also the painful feeling - after Hiroshima - of necessary redemption in the civilian world after one had "succeeded" so much in the military one, were to leave the risk issues in the dark for a long time. At present, after certain setbacks have appeared, the interest in long term effects has been revived, the global approach to development imposes itself almost side by side with sectoral growth studies, and there is now more decided interest in this issue which has never been far from the minds of the most experienced scientists. The sciences and techniques, perhaps already as such but certainly when regarded as social processes, show their ambivalence more and more clearly in the same measure as they develop, model and transform our life styles and our natural environment.

Certain events have heightened the attention paid to this ambivalence. There is the emergence of social movements or more or less social manifestations of some breadth which call into question the choices made in the name of technical progress. There are also as immediate starters a series of events which have taken up a permanent column in the press: the disasters. These extraordinary phenomena which are always called "extremely rare" but ever more urgent, begin to cause broader reflections on the issue of major technological risk.

We now come to a series of views about the nature of risk. We have the beginnings of an experience in the field of civilian use of nuclear energy which, as a first, has benefited from some attention to the problems of safety. In fact, one finds oneself rather at a loss in the face of our three words: major technological risk. The good thing at the beginning of the 1980s is this: the issue is about to be recognised. How does one approach it? There is an unpleasant surprise in store: the classical measuring sticks appear to be failing. Dividing up the difficulties and tackling them one by one, relying on a law of accumulation is no longer an operable method. The phenomena at issue impose themselves from the outset in their global characteristics. Understanding them requires not only good sectoral, "vertical", knowledge in which the specialists trained since World War II excel but also "horizontal" and "diagonal" measures which permit the updating of general logic. One is reluctant in the face of such perspectives: on the one

hand because of difficulties - due to lack of practical experience - because one has been used to division, to partial, functional logic; on the other hand because of the calling into question what would result from a transgression of the established rules of exclusively localised comprehension. One hesitates because the questions to be put on the analysing table are not soothing. A disaster is not the result of a single technical or human failure; it is the product of a collection of factors which stem from the mechanisms, the management, the development of the area, up to the great technological options and the choice of life style In short, the approach to the issue of major technological risk requires very often that one goes back to the very foundations of our industrial civilisation, its technical trump cards, its highest values. The "burning" nature of the issue puts it beyond begging the question and beyond the rhetoric of good manners. It is not astonishing in such circumstances that the phenomenon still largely escapes intellectual grasp and that the discourse is difficult to link up with reality.

This is from where the strange "perfidy" of our apparently quite innocent words stems. For some years and in a seldom disputed manner they tend to turn seminars that are organised to deal with this topic into a Tower of Babel. The difficulty and the fear of understanding are tall obstacles. From the outset, the speaker has already lost a good part of his audience who are confused by his choice of definitions, by his way of describing the subject or by his approach.

On the strength of this basic statement and in order to take a further step let us remember for a moment the way in which the issue has arisen in order to help with the approach to it. Three events in particular support the raising of the question. Seveso : the escape of dioxin, a product of extreme toxicity, probably mutagenic and teratogenic. The *Amoco-Cadiz*: the wreck of one of those ocean-going giants on March 16, 1978 which affected large coastal areas. Three Mile island: the nuclear accident which raised the fear of mass evacuation of the population on March 28, 1979 in Pennsylvania, USA.

Basing our thoughts on such events, which in large measure still remain just danger signals and have not been taken as seriously as they should be, we shall subsequently uphold the following central idea which for the sake of clarity we define thus: there is a clear discontinuity between today's major technological risk and the dangers, of the same origin, that were known in the past. On the one hand, the size of the phenomenon has changed: for instance those who had the

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responsibility in July 1976 could ask themselves secretly whether the accident of Seveso, would not force the evacuation of Milan, Italy's economic capital, for an indefinite period of time. On the other hand, the nature of dangers has changed: in the first place because of quantitative growth - not just deaths but collective slaughter - and then the quality of the factors involved which let the danger hang over the heads of not only the present generation but also over those of their descendants: it is now the totality of life that is called into question.

One can no longer hide the truth from oneself: large agglomerations, huge areas are nowadays exposed to the menace of serious destruction, contamination and evacuation. The populations concerned in each case run into hundreds of thousands, in fact into millions. The causes of disasters are certainly multiple even if they are still poorly accounted for and little known.

These exactly are the menaces and their possible translation into catastrophic events which we call here 'major technological risk'. These same risks concern directly the industrial societies, their lives, their territories, their organisations, their option, their future, their reproduction. Examination of the questions linked with this new situation is the objective of the present study. How does such a situation challenge the conscience and the political actions of our time? What are the challenges that must be clarified and dealt with? How can collective reason, freedom and goodwill regain hold of some of the leverage which seems to be slipping away from us? How can the often absent and sometimes totally routed understanding of the phenomena retrieve its place in the decision making process on matters of development: one realises cruelly in times of disaster that all discussions turn on themselves, fatalism and belief in miracles take over! There are so many questions which the body politic can no longer ignore.

The kind of thinking that is required is no doubt new. Until now the accident constituted, in a manner of speaking, part of the labour contract, no matter what the objections to this situation may have been. Regulatory social systems were actually set up to 'manage' the prolongation of the working activity. With the possibility of civilian slaughters, not 'manageable' in the classical sense of the term, a new state of facts appeared on the scene. However it is in another field that it has already become necessary to recognise a solution of analogous continuity. This is the military field, the question

which developed with the arrival of nuclear forces. To be sure: on that occasion too it took a good decade to recognise against all common sense, i.e. against 'experience', because Dresden and Hamburg counted more victims than Hiroshima and Nagasaki, that 'THE' bomb was no longer just 'a' bomb. One had to admit that Clausewitz's principle no longer worked so well: when battle signifies the end of all it is no longer a continuation of politics. The available means have changed the nature of the issue. The same is true here, with industrial activity and its menaces. This is why research such as that by Karl Jaspers in his work *'The Atom Bomb and the Future of Man'* (2) is at least as a point of departure so enlightening for us. In this book he presents us with a reflection which takes up position precisely 'at the limits', at the edge of what had been called 'the unthinkable' and which must provoke thought rather than limit reflection. As far as the key points of this author are concerned let us review the routes to avoid in a similar problematic situation which he has pointed out to us.

In borderline situations all is called into question and not just a marginal element of the system. On account of this, pigeon hole thinking is no longer adequate; 'common sense' leads to escapism inasmuch as the main rules and references are no longer applicable. The 'realists', the "specialists" and the "law-abiding" are always caught short by the events. The big organisations with their concern for regularity and orderliness excel in the management of what is in vogue: they will be the ones to abut borderline situations the most frequently on account of the nature of the latter. In borderline situations the demand for knowledge is imperative. However, they call for more than just a simple examination of symptoms; or, if one takes up Hegel's most quoted statement: truth is allied with reality. The important thing is not just the bomb but war, says Jaspers, which means for us not just the disaster but the organisation and management of economic activity. This type of examination immediately comes up against blackmail: "Shut up, you are causing panic!" Jaspers retorts: "In Germany, in 1933, they said: above all, no civil war!" (p. 656). He continues; "Fear is useful only if it transforms itself into a force of action (p. 656); if panic terror tumbles into unreason, enlightened fear leads to liberation through reason" (p. 658).

In borderline situations the body politic must not give in to the illusion of 'a necessary return to equilibrium: there are situations of real disruption. The ultimate resort must not be taken for granted. There is no natural necessity; the future devolves upon man and his responsibility.

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In borderline situations first thoughts, common sense, the desire to rub out the fundamental questions evoked by the new situation are not at all helpful. In situations of disruption the foremost task is to retrieve "sense". For this perspication is needed, for instance of the kind that Themistocles had, which means the ability to free oneself from the false 'necessities' of the moment, to retrieve the principles of the intelligence of the whole and to subordinate human activity to a new political direction. Without this ability to take up the issue as it emerges and to respond to it with a project, a policy remains crippled.

In borderline situations it is man's freedom that is challenged. They are therefore not a matter for prediction but rather for preparedness: not to come up with cut and dried thoughts but to construct from the situation what will not bar man from his calling to freedom. When all is at stake freedom cannot be freedom just for some. One must therefore beware of expecting prophets because "then the Fuehrer arrives" (2, p. 646) or to throw into "despair the sages who have always said that man is too foolish to expect anything of him: the enlightened despot has hardly ever been better than his subjects. The means to that searched-for freedom is democracy, as reality or as project, to be equally redefined since the emerging disruption affects it as much as it affects every other part of the situation. Democracy will therefore have to be something other than a collection of formal institutions. Freedom and democracy challenge planning and the body politic directs it. In the face of the borderline event it is neither a .question of drawing up a master plan to create order nor a simple reorganisation of activities but the opening of new possibilities for human activity, knowing that it is impossible to foresee what man will do with an act of freedom. That in the end is possible only at the price of a change of the collective will.

We have to consider two obstacles mentioned by Jaspers which are particularly acute in our field. These are on the one hand the will to ignore and on the other to renunciation. The first attitude manifests itself as a constant one: we shall have to examine it closely in the light of experience and try to understand its fundamental resilience. The second one also occurs frequently. In the military field one hears all the time: "Considering what man is, there is no hope." In our field as well, but in a more moderate fashion, we have been told: "Considering what is nowadays the supreme value in our society, the economy in its narrowest sense, there is no room for manoeuvre. If the choice is between a factory and a large city

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one does not hesitate for a second: one keeps the factory and rebuilds the agglomeration elsewhere if need be and permits expansion".*

If one follows that line one has to visualise the situation as follows: We are on the threshold of the metastable, water is still liquid at 100 and the first disturbance will turn everything to ice on the crest of the wave which is about to break. In that case there is indeed nothing more to be done. There remains meditation on the finite nature, not of humanity (which applies to the military) but more or less of the Western World which draws its strength from its industrial apparatus and its technological abilities. We do not share this evaluation. We maintain that hope remains possible, hope but not certainty; that through research and experimentation new fields for reflection and collective action can be opened up at various levels and thanks to a better knowledge of it all in its totality and also in its local differences.

Obviously all this work requires the delimitation of a particular field of examination. The preceding pages show already a number of choices which we had to make. We now go back to these options in order to make them explicit.

2. PRIORITIES FOR OUR EXAMINATION

Various types of risk could be qualified as 'major'. Here we are interested in technological risk, giving this term a very broad application: the tool as well as its application, the complex, the project which has become possible because of the development in science and technology, as a fruit of human ingenuity. In order to include the British (3) or European (4) application of the term we shall examine the menaces which due to industrial activity weigh down no longer just on persons and assets inside the walls where they work but quite particularly on what is outside those walls, priority being given to the menaces which result in sudden brutal events.

We leave largely outside our field of analysis that which results from the military domain. We therefore do not examine the scenarios which flourish nowadays in the USA where everybody, thanks to a little pocket computer, can know the dangers he faces if that nuclear bomb explodes at such and such a distance from where he is and at such and such an altitude. However, as has already been seen in the preceding pages this military world will not be kept totally in the background. In

*These ideas do not come from someone on the edge of society or someone stretched to the limits of decision.

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fact, there exists a continuum, and if it comes to the crunch the priorities chosen for our work shall decide and not the specific nature of the phenomena. The military domain can suggest interesting reflections for our examination of industrial risks; *in* terms of national defence, civil defence, sometimes *in* the magnitude of events there exists a continuity which must not be ignored; the same is true between demonstrations, riots, acts of foul play, acts of war or again with regard to the 'state of siege' as declared in the wake of the Courrières disaster or because of major internal upheaval. We are quite aware of the dangers to the quality of research threatening from too hastily conclusions. Let us confirm then that those factors linked with the military shall be considered when necessary but they shall not be given priority *in* our reflections. Incidentally, as it has been frequently pointed out, let us make it clear that we reject the idea according to which no risk other than nuclear war may claim attention as long as universal peace is not ascertained: such ideas paralyse and cheaply justify inaction. The terms of the argument have to be reversed: inasmuch as certain advances have been made in fields like ours the approach to the military issue, which on the evidence is much more serious and complex, can be facilitated.

A second attempt at restricting our field of investigation will be made on similar principles. The field of natural disasters shall also largely be kept in the background. Thus we shall not for instance deal with such serious phenomena as the earthquake of Tan Shan which has cost 650,000 Chinese lives on July 27, 1976; or the flooding which is considered the worst reported natural disaster in history and which in July/August 1959 caused the death of two million people in northern China (5); or the seismic tidal waves in Pakistan, the earthquakes *in* Central and South America, the volcanic eruptions in South East Asia etc. The very frequent and often confused discussions on connections between so-called 'natural' disasters and disasters of industrial origin justify dwelling on this point for a moment. Here again we have an obvious continuum and that along several lines of analysis. From one extreme to the other one notices three alignment pickets: from the seismic tidal wave which ravages an area in Alaska to the foreseen and expected earthquake which may destroy deposits of gas and hydrocarbon, which in turn may ravage the neighbouring area when passing through a densely populated but poorly protected zone. From one extreme to the other human responsibility increases. Let us dwell on this to avoid all misunderstanding. As Jean-Jacques Salomon reminds us in his foreword to a recent issue of the magazine *Futuribles* which is

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devoted to this topic (6), Rousseau has already called Voltaire to task for the latter's Interpretation of the Lisbon disaster: "It was not nature which assembled 20,000 six and seven story houses; if the inhabitants had spread out and lived in less cramped conditions one would have found them the next day twenty leagues from there and quite as happy as if nothing had happened" (7). Let us finally go back to certain cases in which man showed stupefying irresponsibility in his choices of development, given the menaces of natural origin prevailing at the chosen location. If one follows the specialists of the world's largest reinsurance company, the Muenchner Rueckversicherungs-Gesellschaft, Tokyo stands as a symbol for the whole planet: an extreme earthquake probability in the order of one per cent per year (10⁻²/year); damage valued at two hundred billion us dollars (8); but the bay continues to receive methane carriers, Kawasaki still shelters hydrocarbon depots which cannot withstand an earthquake of any significance (9). What then is our choice? We shall concentrate exclusively on cases where human responsibility is heavily involved. For simplicity's sake and also to facilitate the social learning process on this issue we shall even tend to concentrate primarily on those cases in which man is totally responsible for the situations that have been created so as to avoid the all too tempting flight into the invocation of the scourges of nature. It should be understood that this does not prevent the marginal inclusion of other situations in which man, in order not to be completely responsible for the phenomena, has appropriately managed all that would relieve him of his responsibilities. As in the military domain, the so-called natural disasters are full of lessons to be learned: issues of size of phenomena, prevention, evacuation, rescue plans etc. To repeat: these events will not be ignored but they will not be given priority in the analysis.

A third choice of priority must be explained. The analysis is not directed towards the professional risks with which the industrial worker is familiar; not that he or it are unimportant, there are more than two thousand deaths at work every year in France, but again for the sake of simplification. We concentrate mainly on the phenomena which can affect the population outside factories. We recognise the dangers of such limitation and the comments from the British trade unions for instance who are sometimes surprised at the concern shown" for the citizen (i.e. the voter) when the worker faces considerable dangers every day (1a). Here too we reply in terms of the learning process: inasmuch as even very large scale risks, which are sensitive in terms of electoral impact, remain undealt with or insufficiently taken into account there is little chance for professional risks to be controlled with the

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necessary determination. What conscience and collective action will be able to achieve in the still more sensitive field of collective risk may become an important gain for the worker who (which should not be forgotten) is also a citizen and often lives in very exposed urban areas. There again the connecting links between the 'worker' and the 'citizen' are numerous: between the 'classical accident' and the 'major disaster': a disaster is often nothing but an incident that has found a fatal sound box, nothing but a series of incidents that have amplified each other, nothing but an outcome of minor difficulties etc. We therefore do not neglect the lessons to be learned from the observation of more classical industrial accidents.

A fourth priority has also been observed. Between the two spheres which are usually distinguished nowadays, safety and protection, we have largely chosen the first one. In doing 'so we have adopted the British application of the term 'major hazard': the risk of a sudden brutal event (reaching beyond the perimeter of an installation). Not that the events with which safety deals are more serious: Minamata is no less serious than Feyzin. The same type of pollution of waterways in Canada is no less worrying than the railway accident in Toronto. The six tonnes of cosmetic cream containing lead which are sold in France each year are perhaps no less "dangerous than events of spectacular appearance. The massive release of carbon dioxide into the atmosphere, the continuous release of highly toxic mutagenic products are issues of equal seriousness. In short, it *is* not exclusively the seriousness of the phenomena which has guided our choice but again *in* the first place the concern with the learning process. If some additional steps can be taken under the pressure from shock events as key factors for social change for a better policy on matters of safety we shall have a positive experience which will be useful so as to enter into their multiple aspects of diffuse risks. When, by contrast, one *is* still capable of denying - even when confronted with rigorous analysis - the most formidable evidence as *is* the case today ("Petrol evaporates", "Nothing went wrong at Harrisburg", "Seveso is a pollution of minds") then there is little chance that the delicate questions of slow and diffuse risks will be adequately approached or even just recognised: whence we have chosen our priority. Obviously no tight partition will be drawn artificially between the two types of reality called to mind which again are only extremes within a context that *is*: phenomena which sometimes present problems both of safety and of protection.

Finally, as a last element *in* our grading system, we have conducted our research mainly *in* the developed countries

of western Europe and North America. But even though these areas are the most representative, the other industrialised countries are also part of our research. As elsewhere, and this is of some importance, the countries of the Third World import western technology. Let us consider this point. The poor countries are already those most affected by natural calamities; but now there are the additional risks of technological origin and of large scale. During summer 1979 a dam burst northwest of Bombay: it is estimated that there were more than 25,000 victims. The concentration of people, which is typical for these countries, makes the menace that lies in wait for them even more serious; the context into which our high technologies are transferred will make the menaces linked with the use of these tools grow still further. This is a very important field for research to cover at a time when 'redeployment', the 'North-South Dialogue' are being discussed.

In this field which is thus differentially illuminated : what have been the particular perspectives of our undertaking ? We shall present them in the following pages.

3. RESEARCH PERSPECTIVES: MAJOR TECHNOLOGICAL RISK AND THE EXERCISE OF COLLECTIVE CHOICE

Being interested in the issue of risk the journalist collects events, reports on debates and reports and, always in search of the facts which emerge from the usual 'noise', pays general attention to disastrous events and willingly devotes his headlines to them. The technician with the aid of the mathematician (probabilist) and the statistician tests his tools, studies his control circuits and safety mechanisms. The administrator asks himself about the vulnerability of his establishments. The economist evaluates the cost of prevention, of damage, the insurance markets and, far removed from this world, the historian tries to put the present time and the experience of the past in perspective which is a bit more deeply rooted; equally, the sociologist undertakes to examine how a particular way of social functioning can be the cause of the phenomena observed, giving the events their depth, their social reality which the rapid readings that are the proper domain of the exact sciences are incapable of demonstrating. The examining magistrate must be mentioned here as well as the enquiry commission whose function it is to unearth a bit more of the truth about what has happened. In these events the thickest veils are always drawn over what might cast a shadow on the image of a brand name, a corporation, vested interests, local or national pride. The social psychologist may in the same manner examine the various psychological mechanisms to which individuals or groups resort when suddenly plunged

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into a frightening situation on account of some information or event. "

Why then take up the more global aspect outlined previously, a political aspect, when according to some a few good technical studies would take care of the issue perfectly. Why, as one also hears all the time that the problem of major risk is no business of the body politic inasmuch as there is quite simply no room for manoeuvre in terms of techno-economic development, and the less fuss made of these issues the better society will be served?

Two thoughts have nevertheless determined our decision. One is general: the incessant quest, particularly noticeable in the countries from which we have information, for power in matters of development policy. For about fifteen years a number of voices including some from the highest ranks in the state have been raised to wish, request, insist on a kind of development planning that would work on a very much enlarged basis: enlarged in space, time, choice of variables and ultimate goals - and be under closer control of citizens or their representatives.*

Can one imagine that this aspiration should have died by now, an aspiration which has induced the French parliament to vote unanimously for a law that provides for the implementation of and a certain publicity for studies of the impact of large development projects, which has also pledged us to change existing legislation on listed installations. Even if one wants to fight against it with all one's energy, that is still better than to turn away in horror and obscure the issue. This aspiration finds a perfect field of projection in the issue of major technological risk. What kind of risk? Risk for what purpose? Risk for whose benefit? Risk suffered mainly by whom? Risks started, chosen, legitimised by whom? How? Even if not all these questions are as yet acute in their explicit form nothing forbids, but rather the contrary, the asking of questions before we reach situations in which they might be experimentally blocked in our industrial societies because the events occur like lightning in matters of major risk, and its effects can be quick and formidable. Let us not forget: Clémenceau declared martial law in a disaster situation which, while serious, had nothing in common with present day menaces. Can the body politic afford to remain indifferent to this?

*For instance G. Pompidou: "In a field on which the everyday life of man depends directly, control by the citizens and their effective participation in the appointment of their framework of existence is required more than anywhere else ... A kind of environmental ethics must be created and spread which imposes some elementary rules without which it will become impossible to breathe in this world." (Speech made by the Président de la République in Chicago, February 28, 1970 (12, p. 25)).

Here we have a further thought which must induce us to maintain our analytical point of view. Maurice Strong, while Secretary General of the UN Environment Programme, gave a warning in August 1974 which must not be ignored: "Pollution will engender intolerable social and political tensions which will express themselves in outbreaks of violence and acts of desperate individuals and groups of the population" (13). What is true of pollution is true, to a much higher degree, of risk. Within hours there will be a rush, disarray, panic, an unmanageable situation on a regional level and consequently the danger of large scale uprisings, emergency legislation and all that may ensue from it. Can this be ignored? The body politic, challenged by technology and its application, in such brutal and pointed fashion cannot lag decades behind the times and debate things in the manner of sophists with nothing more to feed on than some evasive and grandiloquent references to the competence of the experts. Political reflection has not got the measure of present dangers, of the ignorance of our industrial society of what significant breakdowns may mean or have in store for it from one moment to the next, being more or less forewarned by alarms of sorts but incapable of carrying the burden of enlightenment: so, it remains only to play the game of hide and seek, with possible bitter surprises in the case of serious events, if the mechanism of semblance comes to an end; radical reactions on the part of citizens when, after a disaster, they find a scapegoat (which might be just that technology but equally science in general, the form of government, labour ...) and make it pay for the fault of having won their approval. Can this be ignored by the body politic?

The reasons for the reluctance to take an interest in this field of investigation must be well understood, and we therefore come back to them. Let us mention here only the following: the intuitive fear that there might be no solution; the feeling that existing scientific education is not sufficient to tackle such a problem; the confused idea that our mental schemes, which are unrivalled when it comes to getting the maximum out functional-partial logic, are invalidated when it becomes necessary to in terms of a totality and still there can be no question of returning 'primitive thinking'. Part of the difficulty arises from the crucial economic pressures attached to the argument and the resistance of all powerful organisations. To put this difficulty into perspective with the urgency and seriousness of the dangers makes the rigorous and elaborate investigation of our fundamental search still more necessary. Faced with these realities, already existent or in suspense, how can a political approach be construed? How can that fundamental quest of communities in all times: the mastery

of life and reproduction, still be exercised?

This is the line of our research. Before we outline the way the present paper is constructed, which can only be an indicator in this vast research, it will be useful to present the itinerary which has permitted us to reach this platform.

4. ITINERARY

The study of great risk appears as a scientific discipline of rather broad scope. The first stage of the paper was therefore devoted to gathering the largest number possible of texts which have been circulating among specialists, mainly from large organisations that work on energy issues. These 'papers' abound. They deal with specific risks: radiation, certainly, but also with asbestos, pesticides, genetic engineering, gases, dangerous products of all sorts etc. They try to define the methodologies which would permit identification of policies. They measure behaviour, psychological attitudes. They study the reaction of the masses in cases of disaster. They examine insurance problems etc. What has been missing most of the time was what we are researching: an account of the fundamental choices when investment decisions are made; a statement on the general circumstances that have lead to such and such a disaster: the levers by means of which choice can still be exercised; the margins of freedom that remain; the dangers that exist in a more general way etc. All this needed to be brought up to date or rather to be structured into an interpretation that would permit a clarification of all that remained obscure because of disinterest or, in addition, on account of interests to the contrary or on account of still deeper ineptitude. The political approach demanded that one did not accept as satisfactory the reasoning along the lines of: the calculations show what is 'acceptable'; there is no other solution; there has only been a banal incident ... Only a series of rigorous confrontations between observers, texts, debates and experiences permitted us to get beyond the commonly accepted evidence which very quickly blocks all reflection of which the object is collective choice, the ability of a society to conduct its development and its own transformations in a clear and open manner.

There was a specially suitable way of tackling this task: the study of cases that had been very precisely reported in well explained contexts. Such study permits the most rigorous cross-referencing and the tightest comparisons. This methodological programme had to make possible a reflection born of a 'battle' with reality which never asserts itself from just the evidence offered. This examination of multiple facets of

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reality could lead to better founded questions; it could provide better safeguards against the ease with which intellectual speculation, which avoids continuous confrontation with the concrete data, may be tempted to yield.

We have undertaken our research in several countries, and the organisational and cultural differences were always stimulating and a source of very valuable investigation. Our attention was immediately attracted to Great Britain, a country that has devoted itself to the study of industrial risk for a decade and which has established a Committee of Enquiry for this purpose presided over by Lord Robens (1970-1972) and which has recently given itself legislation and apparatus conceived on completely new schemes of thinking. The situation in Italy appeared equally interesting for study because of its opposite scenario: nothing new has been forthcoming there for rather a long time that would truly have helped in facing major risk. We thus had two contrasting scenarios to examine and we have done this taking into account in each case the law and regulations in force.

Rather than making a listing of reports it seemed more fruitful to us to grasp the dynamics of the ongoing processes with regard to major risk in the two countries. These were easily accessible in the case of England where the arrangements in this field had been in full swing for some years. In this case the thing to do was to look at the progress, the results, the slant between objectives and results achieved, the pressures exercised by the various social forces taking part in the debate. As for Italy, nothing of the kind existed. Another way of approaching, in a dynamic fashion, the social and institutional responses to the challenge presented by risk was to examine, with a magnifying glass, what happened in crisis situations, in great disasters. This is what we have done.

In Italy a disaster came up for analysis: Seveso. The disaster as it has sometimes been called mainly because of the special nature of the dioxin, its stability, which reduces the rescue services largely to impotence. In Great Britain the great incident was Flixborough. In this disaster in 1974, a factory was wiped out by the combustion of a gas cloud. These two cases have been examined in depth, and in order to systematize the analysis a series of other accidents were studied in each of the two countries. This work has already permitted the sketching out of a possible scenario (which will be submitted for criticism): the British one; and a scenario which must be called unacceptable: the Italian one. France was studied, but for the time being has been left to one side so that the commenced investigation and the learning process

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should not be encumbered or even blocked by the evident proximity to the reported data. In the same spirit we have approached the nuclear issues with the greatest caution as they have become taboo in the very sense of this term.

On this first basis we have broadened our reflection thanks to a series of meetings both abroad and in France in order better to mark out the big stakes, better to clarify the possible progress in this complex field of great industrial risk. It was found useful always to observe a hierarchy of concerns, the pecking order of information, the grid of analyses, the disciplines called upon to throw light on the situation because the major difficulty for this reflection is perhaps to be found at source, i.e. on the level of proper thought organisation. If it were too strongly focused on a specific experience, on a particular line of activity, it would drift and mistake means for the end, restoring again a functional-partial logic where the question is decidedly global, directed at the whole and not only at its parts. How many times has it been suggested to us to stick to a specific question: D.D.T., transport ... and to avoid a multiple topic of enquiry~ This would certainly have been easier but would have made us bypass the essential: the challenge of major risk presents itself to our industrial society in a global fashion, in the actual state of science, the techniques and their use.

Alternatively being too widely distributed to treat the differences between the constituent parts of the whole with finesse our thinking would run the risk of getting lost in hasty and vain generalisations that might be tempting (in the guise of facile but hardly honest appearance) to have recourse to excessive theorising, to a globalising discourse or too accommodating an ideology. We have therefore worked on two fronts to try and avoid the snags just mentioned. There was on the one hand the sharp confrontation of ideas, issues, practices of others in this field: the proving of results submitted to specialists in other fields but broken off at the examination of complex social questions. This should permit a better focusing on the basic hypothesis, the deduction, the grids of reading, the points of entry into the analysis of the phenomena etc; in short: to get hold of a tool for general reflection that would be operative and not blinding; to take a few steps towards a theory and not just to theorise a practice from a few observations which one may always be tempted to hold up as "facts".*

*Let us remember a word from Goethe : "Every fact is already a theory" (2, p. 85-86). Along the same line the *Vocabulaire de la Philosophie* precise has : "Fact : That which is or which happens inasmuch as it is held to be a real datum of experience on which thinking can depend". "The notion of fact when datum of experience on which thinking can depend". "The notion of fact when defined comes to an affirmative judgment of exterior reality" (Seignobos and Langlois, *Introduction aux études historiques*, 156). This term has therefore essentially the character of a value judgment (14, p. 337).

On the other front we have continued our work 'on site' with new case studies: the aftermath of some disasters and particularly the study of risks presented by large industrial agglomerations, Canvey Island specifically, a high risk zone in the Thames estuary. In this case we have met the parties concerned, studied the reports, the clashes in parliament between the local MP and the successive governments since the start of the public discussion on the 'acceptability' of the situation.

These efforts have permitted us to approach more easily the French problems and the nuclear issues; there again a number of meetings and the study of the accident at Three Mile Island were essential departure points.

Among other problems there remained the task of putting this information and this reflection in a historical perspective. We have therefore investigated the past in order to clarify the continuities and disruptions which exist in the matter of major risk and this again in order to avoid all complacency which has by generalisations or plain common sense might suggest.

This itinerary is thus at the basis of the present attempt. We shall now present its general layout.

5. LAYOUT OF THE THESIS

1. Part One: the record, approached under the aspect of responsibility

As we have stressed, reflection and political action can only be exercised within the narrow reference of effective reality. It was therefore important, for the first part, to present the 'record' of technological risk.

In Chapter 1 we enter immediately into the core of the concrete difficulty: we shall present a series of cases of serious accidents that are well known in their outlines but much less in their essential structures and their complexity which in order to be understood require a large detour by means of scrupulous examination.

Chapter 2 responds to the necessity of placing this experience of major risk in a historical perspective. To raise the question of what is new today it is necessary to ask oneself about the continuities and disruptions in this field; it is also necessary to place industrial risk in the more general context of multiple risks with which our industrial

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societies are familiar. This has been done in three subchapters:

.the first one examines the rise of technological risk during the period of the industrial revolution and until the second world war;

.the second studies the continuities and the innovations observed during the post-war period in connection with large-scale industry;

.the third investigates the threats which exist at present and about which the cases examined in the previous chapters represent so many warnings.

We have tried, for each period, as we have said, to locate the general context in which the problem of major technological risk presents itself. This effort leads, of course, to supplementary developments which, however, have seemed indispensable to us: reflections on technological risk have a very strong tendency to refer to undefined 'others' (natural disasters, wars, famine ...); it was necessary to reintegrate these references which are all too often used to beg the question.

This first part involves a number of cases for illustration. The barrenness of synthetic documentation on this matter has lead us not to neglect this initial contribution. These elements have been presented *in* a spirit which is rather different from that of other papers on which we were able to draw; it will hardly be a question of 'spinning out' the scenes of disasters in detail. What we are concerned with are the great lines which determine the action, the exercise of responsibility: how has such and such a disaster been analysed, foreseen, remedied?

This factual examination is therefore not a simple compilation of data but already a political reflection. What interests us, then, for example in the case of the wreck of the *Titanic*~ is not the highlife on board the liner or the piercing cries of the passengers in the night ... but mainly the fact that no notice had been taken of the series of warnings that had been received. In the same way we should hardly have given our attention to the deaths in the fire at the Opéra Comique in 1887 if there had not been a debate in parliament thirteen days before the disaster and if the minister had not on this occasion admitted the fact that there had to be a fire at the Opéra (some time); that there would then be hundreds *of* victims

and that one could only hope that this event would not happen soon ... while he was waiting for a response from his colleague at the Ministry of Finance. This kind of behaviour, brought to light with examples from the past, could not be ignored; because if reality has changed, and today's risks are no longer those of yesteryear, the organisational, social and cultural attitudes doubtless take longer to change.

2. Part Two: The technical management of major risk

The layout of this second part is easily explained. The industrial societies have established a considerable number of institutional, administrative and legal measures to cope with - prevent, combat and remedy industrial risk. We shall examine these three points in Chapter 3 which will also include a study of what has already brought about the recourse to science and to advanced techniques in the field of safety.

Meanwhile, technical management of technological risk faces difficulties. In Chapter 4 the limitations of this management will be studied in outlines; this will be done in two parts since we shall see first a series of difficulties which we consider to be only relative: adjustments will permit them to be removed; then there are some much more serious limitations, some of them quasi-absolute, about which earnest questions are asked of the body politic.

3. Part Three: Social regulations concerning major risk

If the utensils are insufficient, are they at least being used? Do sound social regulations permit the mitigation of the difficulties encountered on the level of management? Chapter 5 examines by turns the practices of the three *main* 'actors' involved: the operator, the authorities, the *citizen*. The serious imperfections brought to light by these examinations are, however, not yet a complete account.

In Chapter 6 we shall go beyond an analysis that has been centred around a specific 'actor'. We shall *examine* the network of 'actors' who shape 'situations' that seem also pregnant with a disagreeable aftertaste in the matter of major risk.

4. Part Four: politics

Throughout this factual, technical and social examination the more immediately political reflection which must bear upon two interrelated aspects will be articulated: the practice of rationality, which is necessary for the conduct of a coherent action, and the practice of democracy, which is necessary at

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least up to a point, as even the most reticent will admit, so that the projects can take shape, live and let a community live. This political reflection is the object of the fourth and last part of this thesis. What are the interactions between risk, politics and the process of development? We have devoted three chapters to their study.

The political approach to risk. In Chapter 7 we examine the scenario within which the body politic, anxious to maintain existing practices and projects, tries to brush the difficulties presented by major risk. The latter is referred to a technical commission. The experts will find the answers, good ones obviously, and the citizen will have to accept, or more or less tolerate, the choices made.

A second scenario will be studied in Chapter 8. Here the body politic agrees to take major technological risk into account. On the one hand, on the level of rationality, it agrees to change the rules of action rather substantially; on the other hand, on the level of democracy, it agrees to open up the decision making process considerably.

We thus have two types of response, but they remain just immediate ones. Major risk brings up a more serious question. Major technological risk subverts the body politic: it calls into question reason and democracy at the same time and also the relationship between reason and democracy, the social power relationships which have developed on the basis of a certain link between reason and democracy. It will be seen that this raises deeper questions than those examined in the two preceding chapters: they will be dealt with at last in Chapter 9.

We shall therefore see, in a word, the Western World shaken in its very foundations. There remains: not to despair; not to sing the praises of the upright, not to brush the question aside or leave it to others but to undertake the real task: to examine the elements of reflection which must be brought together in order to face the unprecedented.

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