RISK MANAGEMENT*

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AIMS

"If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss
And lose and start again at your beginning
And never breathe a word about your loss"

I fear that we all fail that test of manhood, with a perverse combination in the construction industry of few words breathed about risks in time to save loss, but a gale of words when it is too late. I am adding to the former in the hope of reducing the latter.

I appreciate that the construction industry has survived up to now without advice from me on this subject or any other, and nowhere are there many buildings built by construction lawyers. But it would be no fun to sit on the fence, so despite the well-known humility of my profession I decided to risk speaking on the most delicate and dangerous subject I could find.

Because I claim the revered qualification of mud on the boots I also understand that the value of this kind of discussion depends on the extent (if any) to which it actually benefits projects. I therefore promise in this paper (and in answers to questions, if you ask) to deal with some practical problems on which our bread and few crumbs of cake depend. I begin with theory that I think is crucial to practicalities.

THE RISKS

"In most . . . works . . . the unexpected happens; to be prepared for such eventualities and to forestall their effects is the test of good constructional practice" (Harding, "The Choice of Expedients in Civil Engineering Construction," 1947).

Even a simple list of the main risks in construction is illuminating:

(a) The physical works:
  Physical conditions:
    naturally occurring conditions of the ground water (both sub-surface and from surface flooding) ground gases and vapours
  Artificial conditions causing obstruction:
    pipes and services

*This is the revised text of a paper presented by the author at the International Construction Law Conference organised by the Master Builders Federation of Australia and held in Sydney 19–21 October 1982.

wells, pits, shafts, boreholes, etc.
contaminated ground
quarries—abandoned, existing and re-filled
effects of mining subsidence
fossils and antiquities
Defective materials or workmanship of contractor
Defective materials or workmanship of a domestic or nominated sub-contractor or supplier
Costs of tests and samples

(b) Delay and disputes:
By promoter or Engineer giving late possession of site
Late working drawings, instructions, etc.
Contractor's inefficiency, plant breakdown, etc.
Nominated sub-contractor's inefficiency
Delay outside both parties' control
Labour disputes

(c) Direction and supervision:
Cupidity
Stupidity
Incompetence
Inefficiency
Unreasonableness
Incompatability
Partiality
Lack of communication
Omissions from, and misleading description in, the bill of quantities
Methods of Measurement
Defective design of temporary or permanent works by owner or consultant, contractor or domestic or nominated sub-contractor or supplier

(d) Damage and injury to persons and property:
Due to negligence or breach of warranty of contractor in designing or building temporary works, building permanent works or otherwise
Due to negligence of consultant or owner in design or supervision
Due to nominated sub-contractor's or supplier's negligence or breach of warranty
Due to matters outside the parties' control but which are insurable
Due to uninsurable risks—war, usurped power, etc.
Consequential losses arising from above
Exclusions, gaps and time limits in insurance cover

(e) Shortage of resources:
Shortage of staff, labour, plant, materials, time or finance

(f) Government policy:
Taxes, labour, safety or other laws
Delay or refusal of planning approval for works or temporary works or contractor's arrangement
Financial constraints
Energy and pay restraints

(g) Conflict:
Cost of war, civil commotion, malicious damage, intimidation, etc.

(h) Labour demands and unrest

(i) Payment:
Devaluation
Delay in settling claims and certifying
Delay in paying certificates
Legal limits on recovery of interest
Insolvency of contractor, sub-contractor or promoter
Funding constraints
Shortcomings resulting from the measure and value process

(j) Inflation:
Any element of cost or profit not covered by a price fluctuation clause
Replacement cost of plant and equipment

(k) Arbitration and Law:
Delay in resolving disputes
Injustice
Uncertainty of result due to lack of records, unfair or ambiguous contract, or inefficiency of legal process
Costs of obtaining decision
Enforcement of the decision.

(Based on a list I published in 1974, adapted and revised in the report on "Tunnelling—improved contract procedures" by the Construction Industry Research and Information Authority, 1979, London, and further expanded for this paper.)

What always strikes me from that list is not only the number of classes of risk placed on contractors, but how arbitrary is the division of risk between them and their clients. For example, contractors are usually given some relief from the cost of unforeseeable ground conditions (below) but not of general labour agitation. The historical explanation that contractors were looked on as essentially labour masters at the time when the law and standard forms of contract first developed does not make the result any more rational. A contractor's ability to control his own labour now differs so completely from his control then, and employers (particularly government bodies) often seek to impose their own general policies on labour relations.

The next step therefore must be to consider the theory of—

PLACING THE RISKS

> ". . . whether or not a particular risk should be . . . included in a contractor's price is in essence a question of policy and not of 'fairness', 'morality' or 'justice' " (Ian Duncan Wallace, Q.C. "Price Under Common Law Systems", Friborg, 1982).

> ". . . risk shifting must not violate the principles of good faith and fair dealing" (Professor Justin Sweet, "Defects. A Summary and Analysis of American Law", Friborg, 1982).

I realise the danger of preaching about risk from the comfort of a fairly risk-free profession, and precisely because the question is indeed one of policy a lawyer has no special right in the pulpit. Nevertheless, we must have a starting point. My own efforts at analysis suggest very tentatively that a party should bear a construction risk where:

1. It is in his control, i.e., if it comes about it will be due to wilful misconduct or lack of reasonable efficiency or care; or
2. He can transfer the risk by insurance and allow for the premium in settling his charges to the other party (or to his other customers) or spread it directly in his prices, and it is most economically beneficial and practicable for the risk to be dealt with in that way; or
3. The preponderant economic benefit of running the risk accrues to him; or
4. To place the risk on him is in the interests of efficiency (which includes planning, incentive, innovation) and the long term health of the construction industry on which that depends; or
5. If the risk eventuates, the loss falls on him in the first instance, and it is not practicable or there is no reason under the above four principles to cause expense and uncertainty, and possibly make mistakes, in trying to transfer the loss to another.

The job of balancing these five principles in practice is the hard one, which I will discuss in a moment. But at least it is best to work from declared principles rather than undeclared and perhaps unconscious prejudices.

MEASURING A RISK

Each risk must also be measured, and we will see that failure to appreciate that different principles apply to different "sizes" of risk has led to confused practice and law. A risk has three dimensions—frequency, probability and severity. Measuring scales have been suggested for two:

"Probability Scale:

Factor:	What the factor signifies:
0	'No Loss' is certain—loss is not possible
0.1	Possibility is very remote
0.2	Remotely possible
0.3	Slight chance of it happening

0.4	A little less than equal chance
0.5	Equal chance of it happening
0.6	Fairly possible
0.7	More than likely to happen

Severity Grading:

Grading	Severity in general terms	Estimated Severity in $Aus.
0	Nuisance, current expense type	Nil to 0.1
1		0.1 to 1
2	Medium losses, within the margin	1 to 10
3	of the company's deductible (or excess)	10 to 20
4	Manageable	20 to 30
5		30 to 50
6	Range of largest previous losses	50 to 100
7	Serious	100 to 500
8		500 to 1,000
9	Most serious	1,000 to 5,000
10	Catastrophic—total loss type	5,000 to 30,000 plus"

(B. W. Haines, "The Measurement and Evaluation of Risk" *Post Magazine* and *Insurance Monitor,* January, 1977.)

LONG TERM

> "Only if the assumption of a risk by a contractor is likely to be self defeating . . . causing increases in tender prices out of all proportion to any corresponding advantage conferred on the employer, is an impartial adviser entitled to counsel that employers should bear that risk" (Ian Duncan Wallace, Q.C., "Price Under Common Law Systems", Friborg, 1982).
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> "This (U.S.) system . . . also seeks to preserve a large pool of competent contractors and obtain low contract bids by absorbing particular risks and seeking to assure the Contractor it will be treated fairly" (Professor Justin Sweet, Defects: A Summary and Analysis of Common Law, Friborg, 1982).

It is tolerable that lawyers and judges treat every contract and dispute as affecting only the parties to it when they are dealing with individual cases, but intolerable when they forget to change their perspective on presuming to advise a whole industry or a section of the public on it's long term interests. This is not the place to examine the work of economists, but (and having argued the toss with him I am sure that Ian Duncan Wallace, Q.C. will not mind my setting him up as a respected adversary on this point) I suggest that it leads to wrong conclusions to ignore the effect on the industry and the public of treating construction as a game of pitch and toss.

It is not in the public interest that gamblers should play pitch and toss but it is that works should be constructed. And a contractor's losses on a contract must be paid for in the long term either by his other customers or by his creditors when he becomes insolvent.

I am also concerned about the effects of undue risk in discouraging the entry of resources into construction—human as well as material.

I can also say from experience that if a public agency puts many

contractors out of business by imposing unpriceable risks, so that it does not have (in Justin Sweet's words) "a large pool of competent contractors" to tender for its schemes, those few that remain will be in a strong position to profit from the misfortunes of their weaker brethren.

However, those are only a few guesses in areas where study of the work of economists and other disciplines must replace the arguments that for some strange reason have been conducted as if such disciplines did not exist.

The most difficult question of the intangible effects of fairness or unfairness on the industry, I shall leave to the finale of this paper.

ADVERSE GROUND CONDITIONS

> "The Contractor shall be deemed to have inspected and examined the Site and its surroundings and to have satisfied himself before submitting his tender as to the nature of the ground and sub-soil . . . the form and nature of the Site . . . and in general to have obtained for himself all necessary information . . . as to risks, contingencies and all other circumstances influencing or affecting his tender."

Out of the subjects allotted to me I have chosen to deal at length with this one, as the classic case that illuminates the problems, and I hope some of the answers.

On their rights and duties in coping with adverse ground conditions contractors need the certain guidance for practical affairs which is said to be one of the glories of our common law system. Consider what they have got instead.

When they first had to construct the law on this subject the judges showed skill in sheltering from reality. Implying into construction contracts the age old litany quoted at the head of this section even when it was not actually written in they held that the owner had no duty to give information to tenderers, and that even if he did and tenderers generally relied on the information that was "a usage of blind confidence" (*Thorn* v. *London Corporation* (1876) 1 App.Cas. 120) and they had no remedy if it was wrong. In that way was launched the long history of major construction projects founded in law on site investigations that were not in fact made (the unlimited investigations which the contractor was told to make during a short tender period) and not on the investigations that were made (by the owner).

The resulting unreality has been mitigated with time, at three levels.

After nearly a hundred years some first level help arrived twice over from the general law. As you know, from 1963 the English courts have developed a general right to compensation for negligent misinformation. At the same time the legislature intervened to improve the remedies in the U.K. for misrepresentation inducing a contract—by the Misrepresentation Act 1967, now modified and amended by the later legislation.

The result is that a successful tenderer who suffers loss by relying on site information supplied to him is normally entitled to full compensation

provided he can prove that the information was written negligently, without reasonable care and skill (a large proviso). He may have a choice of defendants (at least one of whom he hopes will have the money or insurance to pay)—the actual site investigators, the consultant who supervised and issued the report, the owner on whose behalf it was issued. Under the Act the owner has the burden of proving that he had reasonable grounds for believing that the misinformation was true.

In extreme cases, and I have not personally been involved in one where it has been tried, the contractor may be entitled under the Act to throw up the contract because of misleading information, rather than carry on at a loss which he will recover several years later if he is lucky.

I believe that the implications and subtleties for the construction industry of this new general law even now have not been fully appreciated and followed through. For example, to what extent does the employment of "professional" site investigators entitle the owner to say that he has reasonable grounds to believe that their report was true, even when it proves to be quite misleading? Is there a difference between an owner who chooses site investigators of good reputation, supervises their work properly and gives tenderers the full information received from them (or perhaps from a series of site investigations over many years), and an owner who employs the cheapest investigators that can be found, with an inadequate brief, and provides only a part of their conclusions?

Another grey area which is unlikely to remain long unexplored, is the extent (if any) to which the design of the permanent works provided on behalf of the owner may amount to a misrepresentation relevant to the contractors temporary works. For example, soil from a particular area is to be placed in a permanent embankment, and in the belief that if it is suitable for that it is suitable for his haul roads the contractor plans accordingly. What are his rights when it is suitable for neither?

Perhaps the most difficult grey area exists because normally the legal remedies for misstatement are limited to misstatements of fact, not opinions. Generally in law "a representation of fact is much more likely to be intended to have . . . effect than a statement of opinion; so it is much easier to infer that in the former case it was so intended, and more difficult in the latter" (*Esso Petroleum Co. Ltd.* v. *Mardon* [1976] 2 Lloyd's Rep. 305). Unfortunately the division is by no means crystal clear, despite its importance. A statement by a professional "water tester" that water could be found at a certain depth has been construed as a statement of fact (*Pritty* v. *Child* (1902) 71 L.J.K.B. 512). So it is rarely possible to divide a site investigation report neatly into fact and opinion. Conclusions about the site drawn from a few boreholes may be worded as fact, but are based not only on the factual results in the columns of ground that have been bored, but on the opinion that those results are typical of the ground between the bores. And is a mathematical calculation fact or opinion? What about a percentage for saturated moisture content, which involves some calculations?

The second and highest level of relief for the contractor is where the starting point of the English law is reversed by the conditions of contract. The F.I.D.I.C. International Civil Engineering Conditions in clause 11 appear to require the owner to tell all and positively to guarantee what he tells. Again, some consultants very fairly specify that factual information provided is guaranteed, although adding the usual disclaimer about the rest of the site information supplied. Such guarantees entitle the contractor to compensation, and in some cases to end the contract, simply on proof that they have not been fulfilled, without proving negligence or fault by the owner.

The third level is in the middle of the other two, where most of these subtleties have been ignored in the "committee" drafting of clauses specifically giving the contractor some vague relief for adverse ground conditions. Clause 12 of the I.C.E. and the F.I.D.I.C. International Civil Engineering Conditions is typical in giving the contractor a right to extra time and money—

> "If during the execution of the Works . . . (he) shall encounter physical conditions . . . or artificial obstructions . . . which could not reasonably have been foreseen by an experienced contractor."

I have often put to technical arbitrators and consultants the simple question relevant to these first and third levels—is a tenderer entitled to give rein to the optimism, without which no one would become a contractor, in evaluating the information supplied by the owner (if any) or in guessing about site conditions where there is no real information supplied, or is he bound to be pessimistic except so far as he has reasonably proved the actual conditions by his own pre-tender investigations? They have not answered coherently.

Judges have not done much better. On the one hand—

> "Stated that because the works were great in quantity and tenderers had only a fortnight in which to tender "it was certain that, as regards all calculations as to cutting work, they could not inform themselves by any inspection of their own, or conduct any boring works to make their own tests as to the nature of the material to be taken out and removed . . ." (*Boyd & Forrest* v. *Glasgow & S.W. Ry. Co.*, [1914] S.C. 472, 482).
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> "The basic information in the site information document appears to have been the result of much highly technical effort on the part of the (employer). It was information which the (contractors) had neither the time nor the opportunity to obtain for themselves. It might even be doubted whether they could be expected to obtain it by their own efforts as a potential or actual tenderer" (*Morrison-Knudsen Int.* v. *Commonwealth of Australia* (1972) 46 A.L.J.R. 265, *per* Barwick C.J. at p. 267).
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> Said that "only Humpty Dumpty would have fallen for the . . . argument" that a clause nullified a misrepresentation in information supplied by saying that the information (about property being sold, not a construction contract) was not guaranteed and that the other party must satisfy himself about the facts by inspection (*Cremdean* (1977) 22 E.G. 547, C.A., in effect followed in *South Western General Property Co. Ltd.* v. *Merton* (1982) E.G. 1090).

On the other hand—

> "It was a clause . . . familiar in . . . construction and engineering contracts; see for instance *S. Pearson & Son Ltd.* v. *Dublin Corporation* and the useful observations in *Hudson on Building*

> *Contracts*. It is specially applicable in cases where the contractor has the opportunity of checking the position for himself. It tells him that he should do so; and he should not rely on any information given beforehand, for it may be inaccurate" (*Howard Marine and Dredging Co. Ltd.* v. *A. Ogden & Sons (Excavations) Ltd.* [1978] 1 Lloyd's Rep. 334, *per* Lord Denning).

I risk the prediction that despite that confusion the U.K. law does, or eventually will, accept the former view. I say that because:

1. The Acts to which I have referred invalidate unreasonable attempts to deprive a party of the remedies for misrepresentation, and the tendency in all such "consumer protection" legislation is to invalidate unreasonable clauses. I think it is unreasonable to give information for the purpose of reducing tenders while at the same time adding the traditional Irish rider "mind you I've said nothing".

2. Some of the standard forms are trying to deal with this issue. For example the I.C.E. form says that the tenderer is bound to inspect the sub-soil only "so far as is practicable and having taken into account any information" supplied by the owner.

3. Reality must eventually break in and in my experience has already done so with arbitrators. At least in most cases the reality is that—

> "The premise that tenderers have means of access or the time to carry out any meaningful additional below ground investigations during the tender period is false and should be abandoned" (C.I.R.I.A. report 79, of 1978, on tunnelling, para. 3.2.5.).

4. Lord Denning has retired.

5. Ian Duncan Wallace, Q.C. has, very fairly, changed his mind:

> ". . . it should be said that . . . (the contractors) position when tendering . . . may often not be satisfactory, since they themselves will only be given a relatively short period of time in which to make investigations before being required to tender, while on the other hand the employer's advisers may have been considering the geological and other implications of the site over a period of months if not years. This has undoubtedly been the basis of a more liberal attitude in the U.S. and may justify a re-examination of the English law on the subject in the future" (Ian Duncan Wallace in "The I.C.E. Conditions of Contract Fifth Edition", pp. 40–41, published in 1978 just after Lord Denning had relied on his previous opinion).

Turning to consider what the brilliantly ambiguous words of clause 12 and similar clauses actually mean, I have heard the argument put forward both as a general theory and by counsel in arguing on behalf of a public authority owner in an arbitration, that clause 12 protects the contractor only if the risk of the conditions was totally and completely unforeseeable. In the arbitration it was even said that the conditions must actually appear impossible on the information at the time of tender. For the "possible" risk—and the argument was put with this precision—in each of 10 successful tenders a tenderer will have allowed a contingency of 10 per cent. of the extra cost and therefore will be protected when it does occur in one of the 10.

I think it is not unfair to say that those interpretations are based more on ideology than analysis. Indeed they are given an appearance of logic only by

failing to consider the above scales for measurement of risk in even the most rudimentary way, and instead assuming that all risks in the construction industry are what I would call Lloyd's risks. By that I mean risks that can be spread in the way that insurers spread risks by their premium structure. But that is only possible in the case of risks that are low down on our Severity Grading. Even the largest contractors do not have the number of contracts comparable to the number of policies issued by insurance companies, and therefore have only a very limited possibility of spreading risk when tendering competitively with limited assets.

In particular to calculate after the event the contingency which the contractor should have included for risk by reference only to the risk that has actually occurred is to use the benefit of hindsight, a luxury that estimators do not have. When he is tendering the contractor does not know that it is this risk only that is relevant and therefore should prudently include a contingency for every risk on our list. (Nor does he know which tenders are for jobs that will go wrong, so we are talking about the expense tenderers should incur for a system of pre-tender investigation for all tenders to enable them to guard against all "possible" risks.)

The perpetrators of these arguments have also confused risk management and Russian roulette. If the risk is of fatality—it will put the contractor out of business if it occurs and he does not get extra payment—then logically he must add the full cost to every tender if the contract does not protect him. For if the risk occurs on the first of the 10 contracts in which the contractor has included a contingency, unhappily he will not be able to take advantage of the neat equation because he will not be able to stay in business long enough to recover his loss from the other nine.

In the unlikely event of a contractor taking any notice of the stricter view of his responsibility he will not get many contracts. Owners and their advisers may say that is the fault of imprudent contractors who take contracts away from the prudent. But that is only possible because most owners blindly accept the lowest tenderer. And on their argument tender prices would increase greatly if all contractors were prudent. It is hardly consistent for owners to encourage and benefit in practice from what they object to in theory.

The other extreme interpretation of clause 12, which has been described as the "best scenario" result, is that of some contractors who in practice claim extra payment if ground conditions are worse than the best that could have been hoped for at the time of tender by deaf, dumb and blind estimating staff and advisers. Or as it has been put more elegantly (and I quote the C.I.R.I.A. report again to counterbalance the previous quotation from it):

> "It has been suggested that certain tenderers may, to some extent, have allowed the concentration of their skills to shift too far into the managerial functions of their organisations and so leave the technical and engineering matters to insufficiently experienced staff. This imputation is related to a view also expressed that site investigation reports are not adequately studied and applied at the tender stage and only seriously

> brought into use in order to sustain claims for extra costs when things have gone wrong."

The problems are made worse by the "cover" and "harrassment" elements in claims, if you will excuse my bad tatse in mentioning them. I refer to claims for money or extension of time by the false pretence that it was lost due to ground conditions (or some other valid right of claim) so as to cover a loss or delay actually due to some risk that was clearly accepted by the contractor in his contract and on which in effect he is now trying to welsh (such as his own underestimating or mismanagement). That ploy may be supported by the right belief that the owner can be harassed into making a payment because he will not want the nuisance, cost in time and resources and uncertainty (below) of arbitration or litigation on a claim however bad it is. (Sometimes, it also must be said, consultants paid by a percentage of the building cost so that they lose money by spending time refuting claims, are mismatched against the enthusiasm of contractors, claims consultants—and lawyers—who make money by establishing them.)

A client on a limited budget should not have to play Russian roulette either, often unknowingly. He should not even have to play the variety known in my country as Vatican roulette, where the risk is not of disaster but of an event (in this case an uneconomic building) which if it had been foreseen would have put the owner off the exercise completely, attractive as it seemed at the time, or caused him to take special precautions.

Where risks are placed on the owner, it is best to do so clearly and openly, so that all tenderers will take advantage of it. The industry and its public would benefit from the reduction in "loophole engineering" that would follow if a touch of reality could be applied to the remarkable system of bills of quantities and methods of measurement that we have at home.

I have in the past suggested a compromise solution between the extremes:

> "Is a claim excluded only if an experienced contractor could have foreseen that the conditions or obstruction must occur, or is it sufficient that he could have foreseen that there was a possibility, however remote, that the conditions might occur? The mere fact that some risk of meeting the conditions was foreseeable can hardly be enough, since an experienced contractor will know that anything can happen, particularly in work underground. It is suggested that a claim is barred only if an experienced contractor could have foreseen a substantial risk" (*Engineering Law* (4th ed.), pp. 65–66).

That "solution" is a poor thing, because it is no more than a form of words. I will try now to do better by deducing some practical guidance from the theories I have bored you with at the start of this paper.

1. Normally the preponderant economic benefit of obtaining construction works on a site despite the ground difficulties in it accrues to the owner.

2. In addition it may be the owner who can best spread the risk and benefit by doing so. The Government in all its branches particularly may benefit by taking liability for "unforeseeable" ground conditions, over the years causing tenderers to reduce contingencies to an extent that will more than balance the claims it has to pay. That is particularly so as the Government budget is so

large that for it there are no risks in the "catastrophic" grade and therefore no Russian roulette (although it must not be forgotten that the Vatican version may be harmful even to public authorities).

3. However, the owner with a one-off project and only a strictly limited amount of money to spend is a different case. He cannot gamble with money he cannot afford, and therefore if the construction industry chooses to offer to serve his needs and to obtain the economic benefit of more construction projects, it must be prepared to contract as insurer against ground risks. I have seen great injustices and hardship where the owner thinks that a promise to do so has been made, until he receives the final account. And it does not help the industry to expand when the disappointed owner proclaims widely that he will never agains risk building.

4. Much of the money fought over in ground condition claims is wasted money—wasted while the investigations and plans which should have been made contingently before the project started are being argued about while the contractor's plant and labour are standing idle. Bad conditions seldom improve with age or job momentum with delay. The waste is then compounded by diversion of personnel from construction in which they are expensively trained to argument and arbitration. Therefore so far as it is economical to do so, the aim should be to have the maximum combined knowledge about the site before the project starts. The owner should give to the contractor, and the contractor be entitled within the limits of sense (below) to rely on, the information which the owner is in the best position economically and practically to find out (particularly by avoiding the costs, which someone has to pay sooner or later, of duplicated investigations by many tenderers). The contractor should be caused to discover the information which he can best find out for himself, for example special information needed for his particular methods of construction.

5. Many problems are caused by failure of the owner in respect of matters within his control, bringing into play the first of my suggested principles for placing risk. Notional investigations and use of unqualified investigators to save cost, and boring in one place and building in another, are not unknown. That will be discouraged if control and responsibility are joined together.

6. Although much site investigation is skimped to well below a cost effective level, it is rarely economic to remove uncertainty completely, since that might involve opening up every metre of site. The remaining ground risks should be dealt with as far as possible by giving tenderers an opportunity to price them on a provisional basis, in competition. In building, particularly, the risks that constantly lead to claims are relatively few in number—running sand and rock are prime examples. The site information gathered as advocated above may clarify the risks that should be priced for the particular project. To give tenderers a fair opportunity to price those conditions, specifically including in their prices for all delay and disruption to other operations, it is necessary to set out items by steps for different quantities.

Obviously that system cannot supersede all other solutions; we all know of extraordinary problems that have occurred. But it could do much, so it is strange that it is resisted from all sides. Some contractors seem to prefer the possibility of claiming extra cost to a chance to price a contingency (I am not satisfied, subject to proof of the contrary from this audience, that the practical pricing difficulties sometimes alleged do exist). On the other hand some owners and their advisers prefer to refer to risks generally or as obliquely as possible, presumably in the hope of catching a tenderer who does not know his business and does not allow for them (those who engage contractors who do not know their business deserve what they get). I have pointed out that it is a sorry start to a project when these two attitudes meet each other.

7. There are some elementary precautions that can be taken by the owner if by supplying information he does not wish to provide a stick with which a contractor so minded may beat him:

(a) Site investigators should be asked to make a clear division between factual information and comment in their reports. They should be discouraged from imaginative additions that are none of their business, and from the type of diagrammatic representation and other artistic adornment which gives gratification to some tenderers (and ultimately to the lawyers who deal with the resulting proceedings in which the architects and engineers who supervised or distributed the reports for the owner may be joined).

(b) The owner should ensure that the information he supplies is only one item entered in a balance sheet of likely ground conditions. Other information should be entered from the tenderer's knowledge of local conditions, knowledge of the inherent limitation of site investigation information (which I think it is fair to say is not small and does not justify reliance on a microscopic examination of every word in a report). The balance sheet should also include the information available to tenderers from a wide-wake investigation of the site and neighbouring excavations; consideration of published geological data; sometimes use of geologists and soils experts by the tenderer; and I think occasionally some bore holes and trial pits particularly to check a tenderer's special method of construction.

(c) The owner can ensure that the balance sheet is complete and correct only by specifying (in the invitation to tender, a document much neglected, particularly by lawyers) that tenderers, or at least the leading contenders, answer questions and give information and possibly meet for discussion on the conclusions drawn and the use made of the information supplied. That exercise must be carried out with much skill on the part of the owner's advisers; it has been said that some of the most misleading information is proffered in tender negotiations. The owner will then have no excuse for choosing an irresponsible lowest tenderer who does not complete the balance sheet, to the detriment of responsible bidders.

The result of that kind of monitoring may as often be a reduced starting price because risks have been eliminated as an increase in contingency for risks that would not otherwise have been appreciated, and there should be a

likelihood of decrease in arguments about finishing price to the benefit of contractors as well as owners.

The ambiguity of the English language makes that monitoring particularly essential to make sure that information prepared with one purpose in mind—the design of the permanent work—is not unknown to the owner and his advisers misinterpreted for another purpose such as the choice of a tunnelling machine.

8. Under the last section I have sidestepped questions of degree—for example when does a contract become large and complex enough to require a tenderer to be advised by geologists? It may be time for the industry to prepare a code of practice dealing with questions of that kind, containing a practical system for passage of information by the owner to tenderers and vice versa.

9. Even with those precautions the range of possibilities in transmission of site information to tenderers runs from giving of factual borehole data only, with no reports or recommendations, to the definition in the contract documents of reference conditions describing the ground and with provision for an addition or deduction to the price if the actual conditions are different (the latter possibility is not often allowed for in conditions of contract).

Some believe that the abuse of adverse ground condition clauses by "cover" and "harassment" claims is so great in practice that my principle of risk placing so as to promote efficiency in the wide sense is the overriding one; that at most the owner should be responsible for negligent factual data such as incorrect borehole logs, with no special clauses in relief of the contractor. The belief is that those clauses merely encourage wilful misconduct or negligence in estimating, and inefficiency in dealing with site difficulties because the contractor seeks to maximise the difficulties so that they provide the largest possible cover for other losses, or at best has no incentive to minimise them because the owner is paying. I have made the few suggestions I can to deal with tendering problems. I propose to deal with post-tendering problems under the next topic, because they are critical in relation to delay due to other causes as well as to adverse ground conditions.

TIME

The consequence of risk most commonly fought about in the construction industry nowadays is the cost of delay. An owner may be bitterly disappointed—and sometimes financially ruined—by delay in receiving his project from the contractor, and seek to deprive the contractor of an agreed bonus and/or recover liquidated or common law damages. The contractor may be equally disappointed or ruined by delay that was due to the owner and his advisers or to peculiarities of the owner's site, and claim compensation for disruption. Each party believes that the other is adding insult to injury by making his claim.

The legal principles that apply to time claims are no problem at all:

1. If the contractor is late, unless the delay is the fault of the owner or his advisers or within an applicable extension of time clause, he is liable for common law damages unless there is provision for liquidated damages in the contract and the provision is completed by insertion of a rate of damages.

2. Liquidated damages are binding if they were a reasonable estimate of the owner's likely loss judged at the time when the contract was made and not when it was broken, even though in the event he suffers less loss or none at all. Peculiar as that rule is, any different rule would defeat the purpose of liquidated damages since the owner would always have to prove his actual loss before being able to recover them.

3. It is not necessary to include an equivalent bonus in order to make liquidated damages enforceable, Where a bonus is included, it is a matter of interpretation whether the date upon which the bonus is payable is a fixed date or is subject to the extension of time clause in whole or in part. Even if it is a fixed date not subject to extension, if the contractor loses his bonus because of delay for which the owner is responsible, he may be entitled to recover an equivalent amount as damages for that delay. An owner tends not to be happy about both receiving his works late and having to pay a bonus.

4. A fixed time for completion and liquidated (which must run from a fixed date) may cease to apply if delay is caused for which the owner is responsible (a topic on which there is some controversy). Even then the contractor cannot take as long as he likes, although his position is much eased: the burden shifts to the owner to prove that the contractor took longer than a reasonable time in which to complete. The common law damages for failure to do so may be larger than the liquidated damages which often are a (frequently dangerous) limitation on the compensation recoverable and are effective as such. However, it seems that if the liquidated damages cease to apply because of default of the owner, he cannot recover greater damages than the figure to which he originally agreed.

5. The contractor is entitled to recover losses as damages for breach of contract under an implied or expressed term in virtually all construction contracts, for delay caused by the owner or the contract architect or engineer or other direct contractors of the owner. But delay and an extension of time does not carry a right to extension of preliminaries or any other compensation if it is caused by sub-contractors (whether nominated or not), the weather, or other delay not the responsibility of the owner.

6. Because (unless changed or restricted by the contract) the contractor's right is to recover his actual losses, preliminaries or method related charges entered by the contractor into his tender are irrelevant in calculating the compensation, unless the delay is paid for as part of the valuation of a variation.

7. Taking up that last point, in valuing variations the value of consequential delay or acceleration (below) to the new work or any other part

of the works should be included in the valuation; no separate claim is necessary.

8. Under most contract forms the owner and his advisers have no right to order the contractor to accelerate to make up for lost time. But where the time is lost due to the contractor's default he has a duty to mitigate the delay by all reasonable measures and is not entitled simply to choose to be late and pay damages.

9. The contractor may be entitled to an acceleration claim if the contract architect or engineer does not administer the contract terms about extension of time in good faith, on proper principles and in due time (see particularly *Panamena Europa etc.* v. *Leyland and Co. Ltd.* [1947] A.C. 428 and *Perini Pacific* v. *Greater Vancouver District* (1966) 57 D.L.R. (12d) 307). But in my opinion he has no such claim merely because later on after the contractor has incurred expense in acceleration to avoid the danger of having to pay damages the architect or engineer changes his mind about refusal of an extension or an arbitrator does it for him. So far the doctrine of constructive acceleration does not apply outside the U.S.A. Should it?

10. Where the owner has no right to order acceleration the contractor may refuse to accelerate to meet the owner's wishes or demand his own terms for doing so. Clauses in contracts attempting to alter the position and agreements with the owner, which wise contractors will insist on before accelerating (particularly as the architect has no implied authority to commit the owner to pay acceleration payments), I find are in practice rarely drafted clearly enough to achieve their purposes and avoid undesirable side effects.

11. There are still some puzzles about delay.

> ". . . it is a truism that cases of cumulative causation of damage can present problems of great complexity . . . when the lawyer uses the conception of causation, he is not bound to use it in the same way as a philosopher, or a scientist, or an ordinary man. The concept can be moulded by considerations of policy" (*Jobling* v. *Associated Dairies Ltd.* (1981) 2 All E.R. 752, 759); [1982] A.C. 794, 808).

You may wish to try to solve the puzzles illustrated by the following imaginary case, which are of much practical importance:

> The contract for a jetty includes a drawing schedule. The schedule says that the detailed drawings for the superstructure will be issued by the Engineer to the main contractor on or before 1 January 1981. The completion date for the whole works is 1 September 1981. The superstructure drawings are not issued until 1 March 1981 due to a strike of engineering draughtsmen. The main contractor did not in fact complete the sub-structure so as to be able to start the superstructure until 21 March 1981, due to the inefficiency of his sub-contractor A.
>
> The contractor had sub-contracted the surfacing to sub-contractor B, and the sub-contract gave the commencement date for surfacing as 1 July 1981. The jetty is not ready for surfacing until 1 September 1981.
>
> The whole works are not completed until 1 November 1981.
>
> The owner claims two months' liquidated damages from the contractor. The main contractor claims two months' extension of time and compensation for delay from the owner and claims the same compensation alternatively from sub-contractor A.
>
> The surfacing sub-contractor B claims compensation for delay from the main contractor.

The trouble is that extension of time, delay, disruption and acceleration claims are as difficult in practice as they are easy in theory. The practical problem is to reconstruct, measure and allot blame for usually many causes of delay throughout complex construction. That is particularly difficult where the reconstruction is carried out in arbitration or litigation several years after the project has finished. The cost of trying to do so is horrendous (below), and the success rate is not high.

The difficulties are compounded by the "ripple" effect of delay, on which much emphasis can fairly be laid by contractors (see *Neodox Ltd.* v. *Swinton and Pendlebury B.L.* (1958) 5 B.L.R. 34). Unfortunately the difficulties are also compounded by "opportunistic behaviour" on both sides. It is not unknown for the owner's representatives after the project is all over to tell the contractor how he could and should have avoided the delay, although such help was noticeably missing when the decisions actually had to be made. The contractor's site operations cannot be conducted with the benefit of hindsight although arbitrations often are. On the other hand I have had to contest one or two contractor's disruption claims worthy of entry for the Maugham prize, awarded annually for an outstanding work of fiction.

Delay claims and defences to them in my experience fall into two categories—the ones that get better the more they are skilfully probed by reference to recorded facts, and the ones that get worse. The latter will succeed only if the maximum confusion can be created in arbitration, leading either to injustice to the contractor because he receives typically half only of a claim that is substantially good in total, or injustice to the owner because the contractor receives as much as half of a totally bad claim.

I am trying some (very imperfect) ways to improve management of delay:

1. I have assembled notes on preventative records for those who may find them useful.

2. Use of a management manual in the belief that there will be an improvement if it is recognised that time in construction is a "management" and not "legal" problem, which must be tackled as such. So in a system I am drafting the procedures for delay are put where they belong in a manual written in constructive "management" language (see below) which it is hoped the parties will therefore be more likely to consult in time because they find it helpful. The manual is given contractual force by simple references in the conditions of contract used with it. Apart from the contractual penalties for non-compliance by loss of rights, the manual also provides a powerful tool for cross-examining a party who disregards the, I hope, sensible procedures in it.

Other aids are:

1. The likelihood of such injustice is increased if the parties start fighting amongst themselves as soon as delay occurs or is threatened. It is better management for the parties and their advisers to exercise their skills by co-operating in trying constructively and flexibly to avoid or reduce the cost of delay for which someone has to pay (usually the contractor, at least for several years until he succeeds with a claim) and in recording the facts as they occur

by "real" records, rather than confusing and strident correspondence by which each party concentrates more on building his file than on building the works.

2. Early payment to the contractor of any compensation for delay to which he is entitled, made possible because the system enables his right to be determined quickly. There may be provision for incentive and bonus payments for co-operation.

3. If there is a dispute about delay, early settlement will be promoted by common sense. In the interests of that desirable result, and also to avoid losing credibility, before submitting a claim or defence a party should test the involved calculations (with their often unique brand of mathematics and logic) that are now almost standard. He should stand back from the details and consider whether there is a sensible relationship between the overall size of the delay and the size of the claim being made by the contractor or the payment offered on behalf of the owner.

3. Each party will be subject to detailed questioning and disclosure of documents if the dispute goes to arbitration or court. But the earlier such probing is done the better if legal and administrative costs are to be avoided, and the threat of using those legal procedures should be sufficient to induce each party to answer questions and disclose documents during negotiations. May I mention that I often find most revealing information obtained by asking questions ostensibly for one purpose but intended for another.

4. There is the possible use of a reverse liquidated damages, settling in the contract in advance a daily or weekly figure for delay caused to the contractor. It may be that the practical difficulties of such a system can be solved. Certainly the contractor should be required to disclose in advance information, e.g. on his plant costs. In deference to my hosts, although I am sure you do not use similar lists here, I shall say nothing more about the alternative of using the U.K. published lists of plant charges to assess compensation.

Finally, I notice in your standard forms some intriguing ideas about delay particularly. However, a visitor should not trespass into your private territory, no doubt with its private wars, unless specifically invited.

INSURANCE

"Nearly everyone in our society, either as an individual or as an operating manager or professional, has experienced frustration in dealing with the complexity of risk options. A rising fraction of the consumer dollar has been consumed by insurance of various types. Yet, few people really understand their exposures, coverage or the entire insurance program" (U.S. Dept. of Commerce, National Technical Information Service, "Insurance for Urban Transportion Construction", June 1977).

". . . an all embracing 'wrap-up' policy . . . is superficially attractive . . . but fraught with practical difficulties" (leading insurance brokers, reported in *New Civil Engineer*, 3 May 1979, p. 34).

Reverting to the principles for dealing with risk which I suggested at the beginning of this paper, may I make some comments about the aim to pass on risk as far as reasonably possible to insurers whose business it is:—

1. The great issue at the moment in my part of the world is whether the client or the contractor should insure. That decision, like all decisions on insurance, must be dictated by the value that will be obtained for a premium £ in protection against loss and in peace of mind. The correct solution may vary from time to time and from project to project, depending particularly on the state of the insurance market.

2. The name "wrap-up" cover, is a trade misdescription. Project insurance by the owner may have considerable advantages, but the simplistic approach that has been common in advocating this cover and in amending the standard conditions of contract to allow for it has not helped to solve the many practical problems.

3. Those practical problems include:

— Limits on the length of cover: for example, it is impossible to obtain professional indemnity cover on an "occurrence" basis so as to cover all occurrences during the currency of the policy whenever the claim is made, yet design failure may of course take years to reveal itself.
— Claims due to the contractors' fault will appear on the owner's insurance record instead of on the contractors.
— Safety.

4. The last is a crucial issue. There are some statistics that suggest that more claims are made when the owner takes out project insurance than when the contractors are insuring themselves. That may be because contractors are less concerned for safety, a suggestion I like to believe is a slander on them, or because they are more zealous in making claims on someone else's cover. Whatever the cause one would expect the increased level of claims to be reflected in higher premium costs. At the moment I understand that in many countries the insurance market is so hungry for turnover that this is not the case provided the owner can offer a large packet of insurance—Public Liability and preferably Employer's Liability as well as All Risks.

5. That last consideration has several practical results:

— The option to which owners commonly incline of taking out the All Risks cover and leaving the rest to the contractor may lead to higher total premiums.
— The scales I set out at the start for measuring risk may be very relevant to deciding who should insure.
— I usually write in provisions for safety precautions and supervision to satisfy insurers, and include high deductibles (which I understand in some countries are compulsory and by the general law or the terms of the contract the contractor may be prohibited from insuring against them).

6. There is much to be said for the owner analysing the risks on the scales I have quoted above, and being his own insurer for those below a chosen level of severity. In that way he saves the not inconsiderable proportion of the

premium that insurers include for their administrative costs and profit on top of the payouts they expect to have to make. Even if he does have to spend on damage the full amount he would have had to pay on premiums, those payments will usually be later than the date for paying the premiums so that his cash flow will benefit. If he has to pay more but has chosen sensibly the limit on severity of risk he will carry, the result will not be catastrophic.

7. It has been suggested that owners should allow contractors to be their own insurers—that the standard contracts tend to require contractors to insure to an extent that is not necessary in the interests of the owner, or where the owner can be more cheaply protected by a bond. Again, I think our scales for measuring risks are relevant—obviously all parties must be protected against a risk that would be "catastrophic" both for the contractor, who would not have the money to deal with it, and consequently for the owner also. But there may be many less severe risks which the contractor could be allowed to bear out of his own pocket, with a reduction in prices, because it is the contractor this time who would be saving the administrative costs and profits included by insurers in their premiums. I would however suggest that unless bonding companies are more charitable than I have found them, they will increase their premiums for the increased likelihood of failure if the extent of insurance by their contractor clients is reduced.

8. Package-deal contractors particularly should be aware that they may unwittingly give an absolute guarantee that the works they are building will be suitable for the owner's purpose, by implication of law. In that case or where the warranty is specified in their contract, they will be taking liability which is not included in the normal "professional indemnity insurance" held by such contractors. That liability will arise if there is a failure not due to their negligence, or where their negligence cannot be proved but nevertheless they are held liable on the absolute warranty (as in the celebrated *London Borough of Newham* v. *Taylor Woodrow-Anglian Limited* (1981) 19 B.L.R. 99—the Ronan Point high-rise flat collapse). If the contractors have employed consultants to advise them on design they may find that in law the consultants are only liable for professional negligence, so the contractors cannot pass on their liability to the consultants or the consultants' insurers. Alternatively the consultants may find themselves in a vulnerable position because they have given an absolute warranty to their package dealer clients either specifically or even possibly by implication of law (*Greaves* v. *Baynham Meikle and Partners* [1975] 2 Lloyd's Rep. 325) for which, again, they are not insured.

9. Thanks to the vagaries of the insurance industry, arranging insurance is a fascinating activity comparable to assembling a jigsaw puzzle with some of the pieces always missing. May I add some examples of the care that has to be taken as a result, whether the insurance is traditional or project:—

— It is common for All Risks cover to extend specifically to damage to the works caused by the contractor in the maintenance period while making good defects, etc. But if one looks at most of the standard forms, the contractor's maintenance or defects liability duties include making good

defects on a list furnished within, say, 14 days after the end of the period. It is quite common for the contractor to be on site making good defects long after the period has ended, on foot of his liability under the clause or at common law. On the wording I have referred to, the All Risks insurance does not cover any damage he may do to the works, and such damage may also be excluded from his public liability policy.

— Insurers rights of subrogation. Unlike most of us insurers are able to have their cake and eat it: to obtain premiums for bearing a loss, but if they have to pay up on the loss they then recover the amount paid from some third party liable to the insured. It is therefore always necessary to ask not only whether someone is insured against a risk but also whether all are covered who are vulnerable—for example, the most difficult problem of professional advisers, sub-contractors of any tier, and what about suppliers (the line between sub-contractors and suppliers may be fine)?

— Incredibly, one still receives contractor's policies to vet in which "liability undertaken by agreement that would not attach in the absence of the agreement" is excluded, despite the fact that the contractor does undertake such liability by most standard conditions of contract.

— The common exclusion from cover of the cost of making good defective workmanship or design but not damage caused by it is more serious than many seem to realise.

— Try calculating the cover necessary to safeguard against inflation at 15% per annum on a four year building contract if the works burn down when almost complete and take another four years to reconstruct.

I have tried in this section to illustrate that management of risk by insurance is a creative and difficult activity, which if well performed can save hardship and nowadays much money. Greater co-operation is needed between lawyers who can perform the analysis of legal principle and contract conditions on which all insurance must be based if it is to work, and the brokers who know the insurance market.

BIG GAME

It is good to escape from all those areas of dispute to the one place where there is near unanimity in the construction industry—in hunting that endangered species, the impartial and independent Architect or Engineer named in the contract. Contractors say the species hardly exists at all now, some construction lawyers say it never did exist, and the species itself appears to be suicidal. It may not be coincidental that as the predators grew bolder adversarial relationships between contractor and owner became the norm.

It would be beneficial if those who denigrate the system knew the purpose which led to it in the first place and had something constructive to offer in its place. The purpose is very simply that a contractor does work on credit and, in the jargon of economists, sinks costs in the works.

No sane person does that without some protection against the whims of the payer, which is what the contract supervisor was intended to provide. At the present time owners are issuing cheques in the form of conditions of contract that promise that their supervisors will act independently and impartially in making decisions, when they have already stopped the cheques by making it clear to the supervisors (and sometimes binding them by a contract to this effect) that they must do what they are told. One normally would not care to do business with a person who behaved in that way.

Thus in recent years a new risk has been created for contractors. And I am satisfied there is a risk for owners too, because sooner or later they and their advisers will learn how dangerous their behaviour is in law (in ways that do not seem to have occurred to many of them).

The professional bodies in the U.K. have suddenly found a new interest in this topic, having done nothing in the past 20 years to try to stop the rot, as only they and not individuals have a chance of doing. After many years talking on this subject without having the slightest effect I recently decided that preaching to the unconvertible is as great a waste of time as preaching to the converted. If you wish me to break my vow of silence, please let me know.

RISKS OF INJUSTICE

> "Their ambush here relentless ruffians lay, and here the fell attorney prowls for prey" (Johnson, London, 1747).
>
> "Experience has shown that established procedures are generally the most efficient" (Memo from the Lord Chancellor's Office on Commercial Court Procedure, 7 February 1979).
>
> "The trouble at the root of our legal system is that we have allowed it to grow in an atmosphere in which, where justice is concerned, money is hardly an object but money must be an object for those who believe in justice, for if the system is too expensive, it will not be used and so injustice will go without redress" (JUSTICE report on "Going to Law", foreword by Lord Devlin).
>
> "A parties' representative in arbitration may not be a solicitor or barrister or other qualified advocate wholly or principally engaged in private practice" (GAFTA Arbitration Rules).

Out of the risks on our list that are created by lawyers and law, there is no better one to start with than legal language. Lawyers are lawyers, and the lawyer/draughtsman and the lawyer/interpreter between them should make it possible to obtain satisfactory forms of construction contract with reasonable effort. The construction industry may take the view that lawyers as technicians have a job to do producing contracts which, as interpreted by the courts, will be satisfactory in construction matters (complicated as they are by their nature and not merely because the parties make them complicated to annoy the judges) and that they are not doing this job very well. Rules of interpretation are maintained which requires the draughtsman of standard forms to do the impossible—to visualise all conceivable

eventualities for many thousands of contracts and spell out terms to deal with them in language which is so clear that it cannot be distored even by a party who finds himself with an interest in distortion, and without making the document so cumbersome as to be useless to those for whose benefit it is presumably intended. When a case comes before the courts many days may be spend in analysing one sentence in a conditions of contract or specification or bill of quantities without allowing for the fact that the draughtsman had to do his work with reasonable speed. The courts also must find the game more fun when it is played in the dark, since they restrict the information that may be used to clarify the meaning of the words used. One must wonder precisely what function the courts are fulfilling by interpreting in a legalistic way a standard form document of great importance to a complex industry.

The result is that when a standard form or a special term for a contract has to be drafted much time and money is spent employing lawyers to translate it into legal language, and then employing other lawyers to translate it back again when the users want to known what it means. The serious risk, often realised, is that much is lost, distorted or overlooked in the process of translation and retranslation. Modesty prevents me from dwelling on a project that is in hand to reduce that risk by drafting a simple and short standard form of building contract for some kinds of works.

The second quotation above is delightful. I wonder how the present procedures became established, since at some time they must have replaced older, perfect, established procedures.

May I end this section by altruistically giving the following practical advice to help you avoid losing on lawyers' roulette (the best kind—we gamble with your money):

1. Never go to law on a matter of principle, only hard cash.
2. If you are going to settle, settle early.
3. Don't bet in legal proceedings unless in advance the stake and the odds are estimated for you.
4. Employ the best experts money cannot buy.
5. Cases are won by advancing the good points and protecting the flank of weak points. Make sure your lawyer knows which is which in your case well before the hearing starts.
6. If you wish for an improvement in the legal paraphernalia that affects the construction industry, and given the contribution you make to the coffers of the legal industry you are entitled to it, do not rely on any quest for self improvement amongst lawyers—they never have had any. Instead, as with all past legal reforms, improvement will depend on concerted and self confident pressure from consumers.

I cannot speak about the last quotation at the top of this section without taking the risk of breaking down completely. Would the problems of the industry be removed simply by banning lawyers from arbitration and elsewhere? I await your views with fear and trembling.

CONCLUSION

"If you have them by the [obscenity deleted] their hearts and minds will follow" (attributed to a resigned U.S.President).

It is necessary for an owner and his advisers to steer a course in the contract terms and negotiations between dissipating goodwill by showing mistrust and unreasonableness (a fault to which lawyers are particularly prone) and placing trust where none is justified or offering reasonableness to which unreasonableness will be returned. I can think of many select lists where I have had no hesitation in advising clients to supply full information to tenderers, to agree fair and reasonable conditions of contract placing risks on the lines I have suggested, and to extend full co-operation during the course of the works. I can think of other cases where included in the tender lists have been contractors to whom I would feel bound to try to apply the elegant philosophy quoted at the head of this section, and others where I have drafted reasonable clauses only to suffer the very painful process of having that philosophy applied to me by the contractor. Yet I know that what I may call the testicular view of the construction industry is not working and cannot work, because the anatomy of construction is so varied that it is impossible to obtain a secure grasp.

The plain fact is that there is a severe limit on what contracts can achieve by way of economy, speed and quality of construction. What the "adversarial" approach gains in one of those ingredients it is liable to lose in the others, or to defeat all there at the same time. It is only honest of a lawyer to tell you that if you live by the contract you are likely to die, or at least become extremely sick, by it.

So my final conclusion—even more obvious than my others—is that the proper long term risk management of the industry depends on responsibility on all sides and that I cannot offer a substitute. If any section of the industry is not prepared to promise responsibility, or unable to deliver on its promise, then it has no title to promote any contractual change in its favour that it or its clients may then abuse.

But if any of us has a choice between responsibility and survival, of course it is survival that usually will win. That is why, for all its faults, a legal framework is necessary. Perhaps the industry could promote research and investigation with regular communication between all those involved in it, so that the framework can be checked and improved regularly. The effort would be worthwhile if the result were that although individual contractors, owners and consultants would continue to suffer from time to time from the effects of risk, it would be certain that their loss was unavoidable and necessary in the long term interests of a system that overall is "just" (I apologise for using the word that begs all the questions I have been discussing).