THE IMPACT OF INTERNATIONAL SAFETY REGULATION ON THE DELIVERY OF MILITARY CAPABILITY

A COMPARISON OF REGIONAL MODELS

BY

COMMODORE A.L. MCFARLANE OBE, BSC, CENG, MIMECHE, RN

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ABSTRACT

The impact of safety regulation on the Armed Services is examined by considering the nature of risk and of society (considering a number of academic models), and by analysing the risk regulation regime applied to the Armed Services (particularly the approaches taken to standard setting). A number of different international approaches are compared, identifying the role of transnational bodies. It is concluded that while an increase in safety legislation is an inevitable consequence of modernity and globalization, the UK system is particularly constraining on the Armed Services. An improved academic model is needed for the safety regulation of the Armed Services to underpin the strategy for development of the legislative framework.

Introduction

In recent years, in the United Kingdom, there has been rising concern among the Defence Staff over the increasing constraint that safety regulation may be imposing on the efficacy of the delivery of military capability.[*] This has a number of potential deleterious effects. In some military capabilities, notably but not exclusively those associated with potentially high consequence hazards, such as nuclear munitions, nuclear propulsion and explosive munitions, the effect may be to drive up the cost of development, procurement and maintenance to a point where the affordability of the capability becomes marginal. In other areas, the need to comply with safety regulation in the training environment may become so

[*] Ministry of Defence, *Annual Report to the Defence Environment and Safety Board 2001/2002* (http://www.mod.uk 14 Jun 03), for example, reports that,

> "An audit had been conducted in response to senior level concerns that Safety, Health, Environment and Fire (SHEF) requirements might be placing restrictions on operational activities. The audit report concluded that the concerns were largely unfounded, with the following findings:
>
> - There was no evidence that operational effectiveness was impeded or that commanders were becoming risk averse as result of the requirements of SHEF management systems.
> - The manner in which SHEF management support is provided to commanders on operations should be reviewed.
> - Risk management measures should concentrate primarily on the hazards associated with operations and the location and environment in which they are undertaken, leaving routine safety measures as a low priority.
> - Wholesale application of UK SHEF management standards is not always practicable and commanders should be given assistance in implementing solutions that are pragmatic whilst recognizing the needs of operations."

Elsewhere the report identifies that,

> "The drive to align the Royal Navy with civil statutory requirements is increasingly leading to difficulties in maintaining an efficient regulatory regime and there remains a risk of inappropriate legislation being made applicable to MoD shipping activities in the future."

constraining that it becomes impossible to train in a sufficiently realistic manner to maintain the capability.

There are a number of apparent reasons for this increasing constraint. In part it may originate from the increasingly litigious culture in the United Kingdom, which seems to be following, albeit lagging, this trend in the United States of America. In part it may originate from the seemingly inexorable rise of safety regulations on the UK Statute Book, the vast majority of which emanate from European Union Directives. And it may simply originate from the increasing clarity of the safety policy of the Ministry of Defence. This arose from an apparently innocuous written answer to a 1982 Parliamentary Question, which by 2000 had developed into the Safety and Environmental Policy of the current Secretary of State,[1] summarized as follows:

- Within the UK, comply with all relevant legislation unless exempt.
- Overseas, apply UK standards where reasonably practicable, and in addition, comply with host nations' standards.
- Where specifically exempted, disapplied or derogated from legislation, international treaties or protocols, introduce standards and arrangements which are, so far as is reasonably practicable, at least as good as those required by relevant legislation.
- The Secretary of State will only invoke his powers to disapply legislation on the grounds of national security when such action is absolutely essential for the maintenance of operational capability.
- Where no relevant legislation exists, internal standards are to aim to optimize the balance between risks and the benefits.

Safety can never be the primary objective of a military commander. If it was, it would be readily achieved by never exercising soldiers, never placing ammunition in a warship, and never permitting an aircraft to become airborne. Safety is nonetheless a key critical success factor for the effective delivery of military capability. The military commander has a moral, as well as legal, responsibility for the safety of his people, and must honour this if their confidence is to be retained. Furthermore he must be perceived to be operating in a safe manner by his key stakeholders. This includes members of the public living in the vicinity of military training or support operations, who may be affected by unsafe activities; and increasingly by parents and friends concerned for the safety of young members of the armed forces. While this is universally accepted, there remains a tension between the full compliance with the safety policy outlined above, and the effective and efficient deployment of military power.

Aim

The aim of this article is to analyse the reasons behind the increase in the breadth and depth of UK Safety Legislation and Regulation. It will compare the safety policy and approach adopted by the United Kingdom with that adopted by other nations. And it will consider options available for the future strategic management of the impact of international safety regulation on the delivery of military capability.

The Nature of Risk

Before starting to analyse safety regulation, a small digression into the nature of risk is appropriate. Colloquially, safety is:

'Freedom from danger, hurt and injury.'

While risk is:

'Exposure to injury, hazard and danger.'[2]

An objective definition of risk is:

'The potential to cause harm.'

This can be quantified as the product of the probability and the consequence of that harm. Lord KELVIN once said,

> "Anything that exists, exists in some quantity and can therefore be measured."[3]

Drawing from this the Kelvinist view of risk is that there is a distinction to be made between real, actual, objective, measurable risk that obeys the formal laws of statistical theory; and subjective risk inaccurately perceived by non-experts.[4] But Social Scientists emphasise that risk taking decisions are conditional, with individuals compensating for their expectations of the behaviour of others and of the potential consequences. ADAMS, for example, contrasts the approach of children and of elderly people to sliding or slipping on an icy road:[5]

> "For children it is sought as fun, while for the elderly it is avoided as hazardous."

He develops this into a theory of Risk Compensation illustrated in (FIG.1).

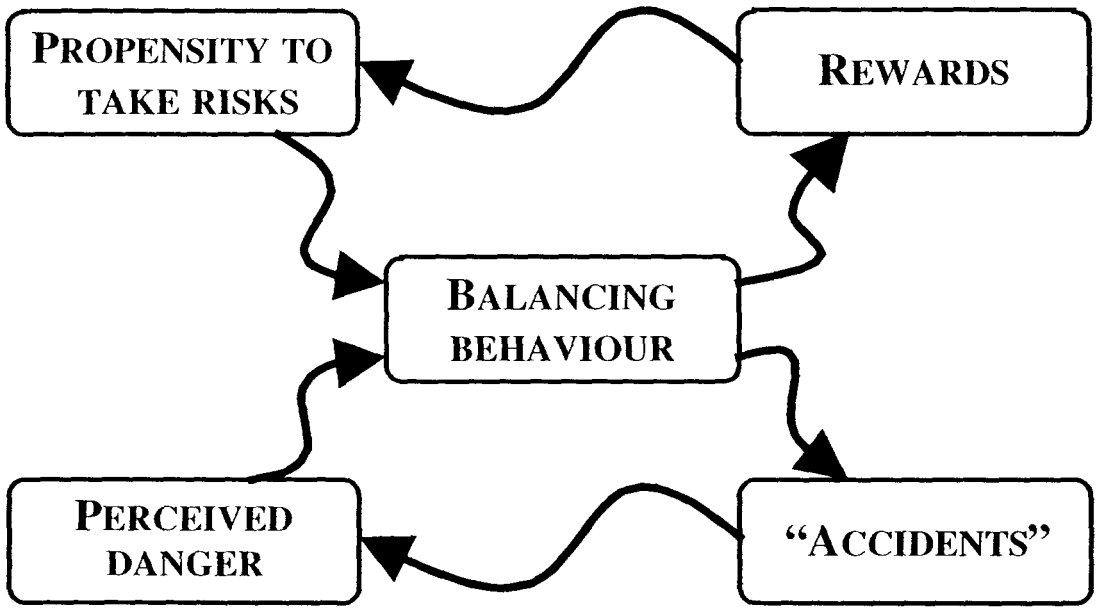

FIG.1 – ADAMS' THEORY OF RISK COMPENSATION

This postulates that:

- Everyone has a propensity to take risks.
- That this propensity is influenced by the potential rewards of risk-taking.
- That the perceptions of risk are influenced by the experience of accident losses.

- That individual risk-taking decisions thus represent a balancing act in which perceptions of risk are weighed against a propensity to take risk.
- That the consequences of taking risks are rewards as well as losses resulting from 'accidents'.

Drawing from this he contrasts *Homo Prudens* (zero risk man) with *Homo Aleatorius* (dice man, gambling man, risk taking man). Both are aspects of the human character, and in many ways society glorifies *Homo Aleatorius.* As will be seen later, at the heart of this article is the challenge that while the delivery of Military Power relies on *Homo Aleatorius*, safety regulation is largely based on *Homo Prudens.*

The technological advancement of society is dependent on risk taking. Lord Robert MAY, the President of the Royal Society, recently made this point:

> "There are problems . . . when possible – even remotely conceivable – adverse consequences cannot be accurately assessed. This is an issue in the present Genetically Modified (GM) debate, with some opposed to GM crops arguing that you should not proceed with a new technology unless you can identify and quantify all potential risks. Some even argue that such a stricture should cover both known and unknown consequences. Since, by definition, unknown consequences are difficult to identify and quantify, this . . . is a recipe for paralysis. On this basis, no new technology could advance."[6]

Unfortunately, while 'accidents' are measurable, as are the potential rewards, there is no easy metric for either the propensity to take risks, nor for the perception of danger. Therefore a simplistic objective approach is often used, with the quantified assessment of the risk of 'accident' compared with the reward, using quantitative or intuitive Cost Benefit Analysis techniques, without taking account of the balancing behaviour.

THE NATURE OF SOCIETY

Turning to the nature of society, 3 academic models will be considered.

Risk Society

Ulrich BECK classically documented the concept of the *Risk Society.*[7] His thesis is that as a society moves through 'modernization', its focus changes from concentrating on the distribution of wealth to concentrating on the distribution of risk. In this context he identifies,

> Modernization means surges of technological rationalization and changes in work and organization, but beyond that it includes much more: the change in societal characteristics and normal biographies, changes in lifestyle and forms of love, change in the structures of power and influence, in the forms of political repression and participation, in views of reality and in norms of knowledge. In social science's understanding of modernity, the plough, the steam locomotive and the microchip are visible indicators of a much deeper process, which comprises and reshapes the entire social structure. Ultimately, the sources of certainty on which life feeds are changed.[8]

He notes that in pre-modernized or modernizing states, including much of the developing world, the 'dictatorship of scarcity' rules the thought and action of people. The goal of modernization is perceived to be emancipation from undeserved poverty and dependence, by using scientific and technological development to "open the gates to hidden sources of social wealth".[9] By contrast

in advanced modernity, this ceases to be the driving force. When problems of 'overweight' become more significant than hunger, inequality of wealth distribution becomes less important to society. But, he argues, at the same time the knowledge that the sources of wealth are 'polluted' by hazardous side effects becomes more significant to society. This knowledge is not new, but in pre-modernity is overlooked in contrast to the greater imperative to overcome poverty. Recognizing this, BECK proposes a new paradigm of a *risk society*. Rather than seeking to create or distribute wealth, this society is characterized by use of technology to identify how the risks and hazards systematically produced as part of modernization can be prevented, minimized and distributed, so that they do not hamper the modernization process, nor exceed limits of 'tolerability' – ecologically, medically, psychologically and socially.

Audit Society

Another approach is taken by Michael POWER who sees the development of an *Audit Society* in the UK and other states, which responds to risk and regulatory failure by 'greater investment in formal systems of control rather than by developing non-standard capabilities for acting on formal sources of intelligence'.[10] Financial audit has a very long history, with the earliest mention of government audit in the UK being the appointment of the Auditor of the Exchequer in 1314. But the use of audit has spread to almost every area of society, with an entire profession based on safety, environmental and quality auditing. Just as financial audit systems are made more robust after every financial failure, so too other audit systems become progressively more intrusive. Today the UK Government's National Audit Office alone employs 750 people, and has recently published reports on such diverse subjects as the Ministry of Defence Exercise SAIF SAREEA II, the work of Victim Support, protecting the public from waste, and encouraging the elderly to use government e-services.[11] Similarly the US General Accounting Office, which 'aims to support the Congress in meeting its Constitutional responsibilities and to help improve the performance and accountability of the federal government for the benefit of the American people', employs over 3,000 people and issues over 1,000 reports per year.[12]

Regulatory State

Giandomenico MAJONE analyses the 'stupendous growth' of the *regulatory state* in Europe.[13] He quotes a US definition that,

> "Regulation refers to sustained and focussed control exercised by a public agency over activities that are socially valued."[14]

He explains that in the US, the tradition of regulation by means of independent agencies dates back to the Interstate Commerce Act of 1887, while at that time in Europe (including the UK) the tendency was to treat regulatory issues as either administrative (by government ministries) or judicial (for determination by courts or tribunals). By the 1930s, in Britain, the weakness of this approach was recognized, but like most countries in Europe the alternative approach was later taken of nationalizing key industries, in order to protect the public against powerful private interests. In this respect nationalization was the functional equivalent of American-style regulation. In the 1970s, there was greater recognition of the American view that,

> "The market works well under normal circumstances and should be interfered with only when it does not function properly."

This resulted in a move across Europe to privatization of many nationalized industries. This was accompanied by the establishment of a diverse range of quasi-independent regulatory bodies, such as (in the UK), the:

- Independent Broadcasting Authority (1972).
- Civil Aviation Authority (1972).
- Health and Safety Commission (1974).
- Commission for Racial Equality (1976).

Particularly in emerging economies,

> "The absence of an efficient regulatory framework is increasingly seen as a major obstacle to modernization."

MAJONE analyses the immense increase in the role of the European Union (EU) as a regulator. The European Commission has developed vast numbers of directives,

> "Well beyond, or in advance of, its legal mandate in the European Treaties".

He postulates that because the financial resources of the EU are mainly directed to the Common Agricultural Policy and a handful of distributive programmes, they are insufficient for other large-scale initiatives, and thus the only way for the Commission to increase its role was to expand the scope of its regulatory activities.

THE NATURE OF RISK REGULATION

PROFESSOR HOOD defines risk regulation as:

> "Governmental interference with market or social processes to control potential adverse consequences to health".[15]

Barbara HUTTER, giving a lawyer's perspective on regulation and compliance, states,

> "Regulation is a complex and complicated process".[16]

She sets out the context for regulation:

> "Regulation refers to the use of laws to constrain and organize the activities of business and industry. It is State activity and as such is contentious, most especially because it is at the heart of debates about the extent to which governments should adopt a *laissez-faire* approach to markets and their activities and the extent to which they should intervene to protect particular groups."[17]

HOOD considers that there are 3 principle forces shaping risk regulation systems as illustrated in (FIG.2), and described below.

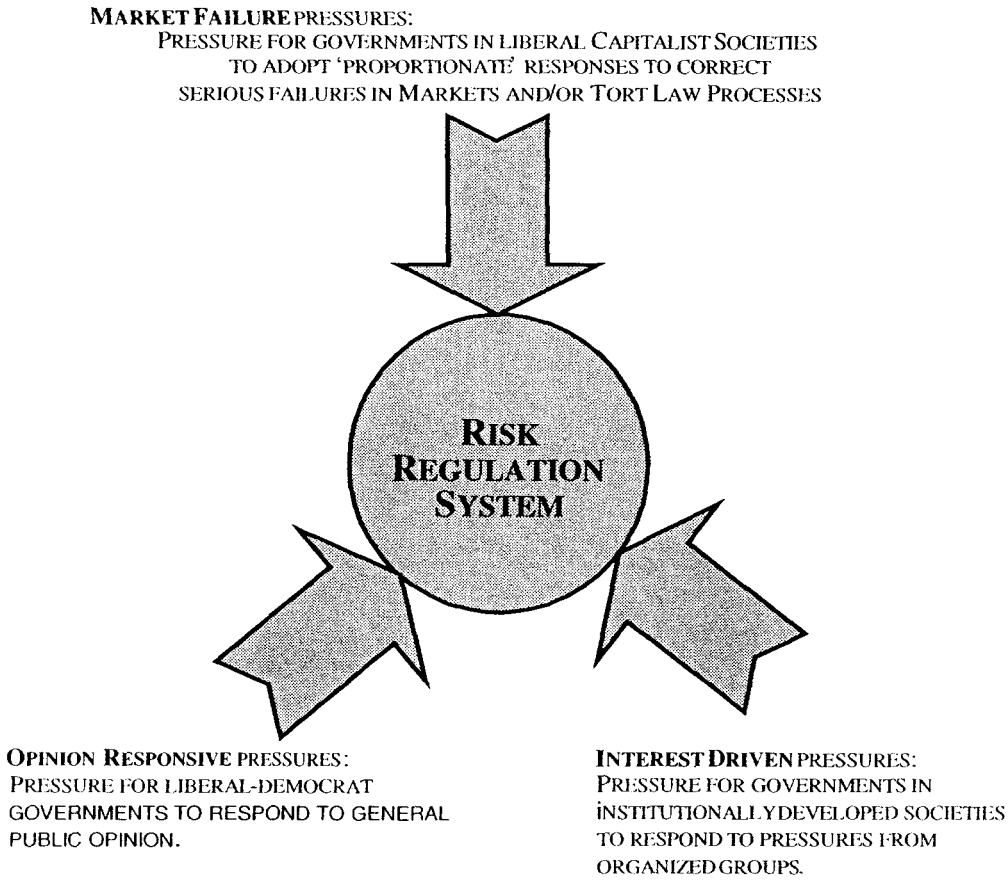

FIG.2 – RISK REGULATION FORCES

Market Failure

From the earlier description of the Regulatory State, it would appear that the principle shaper of risk regulation should be Market Failure:

> "Public regulation of economic activity is justified only when the market is incapable of producing a social optimum."[19]

This has been the ostensible reason for the proactive role of the European Commission in safety regulation. The market will not in itself set standards for safety performance, these are set by balancing their cost against the values of the society in which the activity is conducted.

Recognizing that these values may vary throughout the European Union, in order for business to compete in a Common Market, it is considered essential that common standards of required safety performance are set. Indeed today while encouraging trade with countries outside the community, the European Commission is keen to ensure that appropriate minimum standards of safety are adhered to in these countries as well.

Opinion Responsive

This builds on the idea that public policy follows public opinion and preferences. Britain's Health and Safety Executive (HSE) who seek to be opinion responsive, published a document setting out the basis for its decision making process, which states that,

> "There is nowadays a better understanding of how people view risks . . . within a generation there have been some marked shifts in the preferences, values and expectations of our society."[21]

Differentiation must be made between individual concerns and societal concerns. Public opinion is influenced by a number of factors, including the degree of control available to the individual, how well the process giving rise to the hazard is understood, and the 'social amplification' of the risk, influenced particularly by the media. It is difficult and expensive to establish true public opinion, and much easier to be influenced by pressure groups. LORD MAY explains that,

> "Distrust of 'the new' is not new" (citing examples of the automobile and vaccination).

And that,

> "Better public understanding of science leads to more, not fewer, questions".[21]

Interest Driven

This recognizes that the regulatory system reflects the interplay and lobbying of organized interests. Such interests are often in conflict, typified perhaps by business interests on the one hand, and trade unions or environmental NGOs on the other hand. While the previous two forces are based on *normative* theories, that is on how people should behave, this is a *positive* theory, recognizing the way in which people actually behave. While the EU's role in safety regulation is in many respects market based, the Commission sees it today as part of its Social Policy. The Charter of Fundamental Rights in the draft European Constitution identifies that every worker has the right to working conditions, which respect his or her health, safety and dignity.[22] The existing treaties state:

> The Community and the Member States, having in mind fundamental social rights such as those set out in the European Social Charter and the Community Charter of the Fundamental Social Rights of Workers, shall have as their objectives the promotion of . . . improved working conditions, so as to make possible their harmonization while the improvement is being maintained . . . . The Community shall support and complement the activities of the Member States in . . . the improvement in particular of the working environment to protect workers' health and safety.[23]

There are at least 2 European Institutions seeking to respond to this treaty obligation:

1. The European foundation for the improvement of living and working conditions (the Dublin foundation).
2. The European agency for safety and health at work (the Bilbao agency).

Their institutional interests, influenced by other international bodies, are a powerful driver shaping the UK risk regulation system.

Cultural Environment

Risk regulation is also shaped by the cultural environment. DOUGLAS and WILDAVSKY address the question of why some cultures select certain dangers to worry about, while other cultures see no cause for concern. They identify that the origins of belief about nature guide risk-taking decisions. Drawing from anthropological theory, they examine the 4 types of human nature, which are illustrated in (FIG.3). The horizontal axis contrasts the individualistic or

collectivist nature, while the vertical axis identifies whether behaviour is prescribed or prescribing.[24]

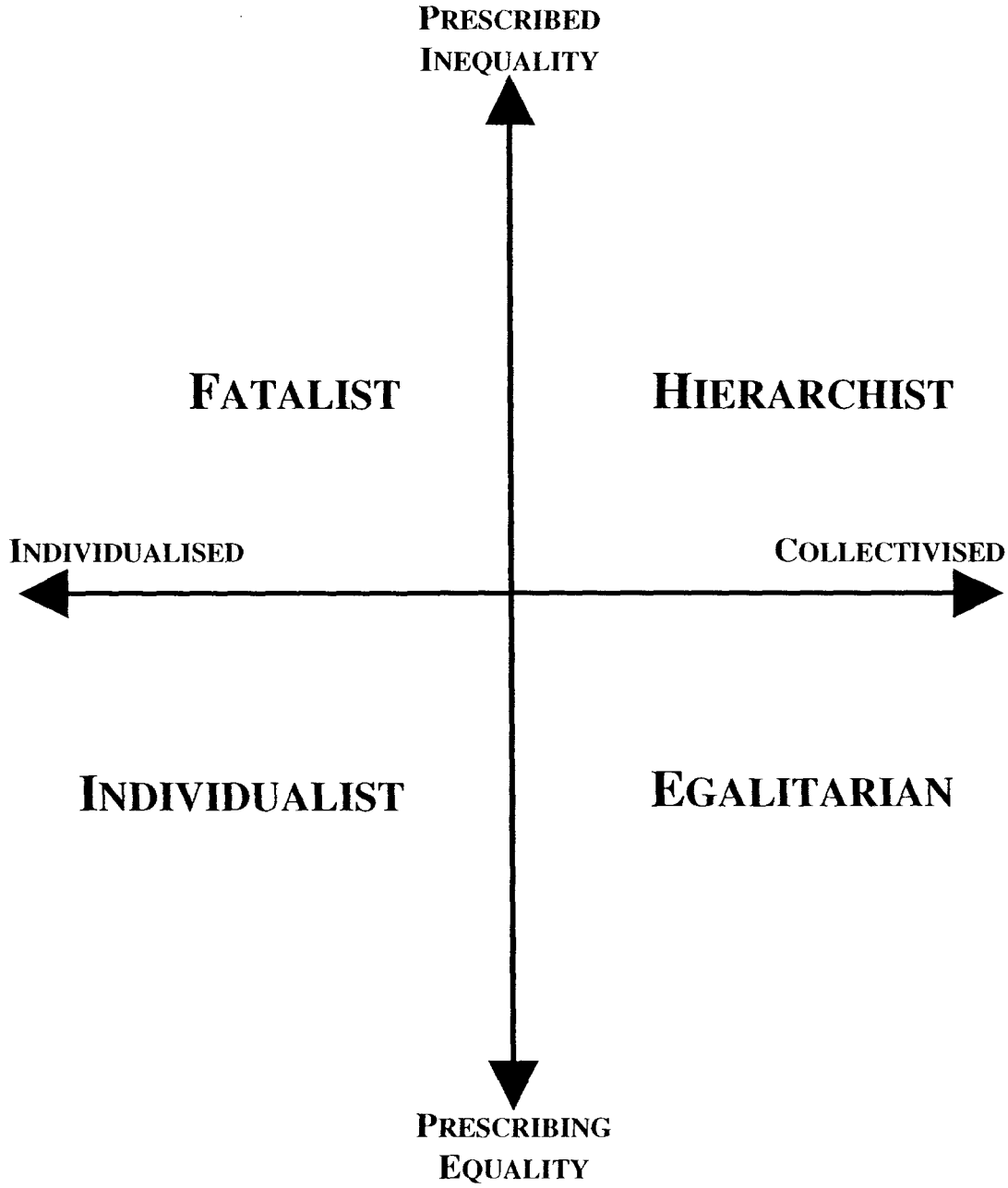

FIG.3 – THE INFLUENCE OF HUMAN NATURE

ADAMS explains the way in which these 4 types seek to shape regulation:

Individualists

> Tend to view nature as stable, robust and benign, capable of shrugging off the insults of man, and rarely retaliating. They are believers in market forces and individual responsibility and are hostile to the regulators of the 'nanny state'. Where evidence is inconclusive, they place the onus of proof on those who would interfere. They tend to an optimistic view of history, pointing to rising GDP and lengthening life expectancy.

Egalitarians

Cling to the view of nature as fragile and precarious. They would have everyone tread lightly on the Earth and in cases of scientific doubt invoke the precautionary principle. Inconclusive evidence cries out for the application of the precautionary principle. They incline to an anxious view of history.

Hierarchists

Believe that nature will be good to them, if properly managed. They are members of big business, big government, big bureaucracy. They are respecters of authority; those at the top demand respect and obedience, those at the bottom give it, and those in between do some of each. They believe in research to establish the facts and in regulation for the common good. They take a balanced view of history.

Fatalists

Believe nature to be capricious and unreliable. They hope for the best and fear for the worst; life is a lottery over which they have no control. They don't get involved in arguments about regulation, because they see not point. They do not study history.

ANALYSIS OF RISK REGULATION

HOOD has developed a rational analysis of why in some cases the UK state sanctions what seems to be remarkably high levels of risk tolerance (such as the cancer risk from radon in the home), while in others regulation sets extreme risk-aversion (such as pesticide residue risks in drinking water). To do this, he identifies risk regulation domains as regimes, defined as,

> "The complex of institutional geography, rules, practice, and animating ideas that are associated with the regulation of a particular risk or hazard."[25]

He then uses control theory to identify a two dimensional matrix model. One dimension addresses 3 control elements of the regime: *Information gathering, Standard Setting, and Behaviour modification;* while the other dimension is the *context* and the *content* of the regime. This results in a matrix similar to that in Table 1 below. Successive paragraphs will briefly examine the context, content and control components of the regulatory regime applied to the UK Armed Services.

TABLE.1 - *Elements of regime context and content*

		Control Components		
		Information gathering	**Standard setting**	**Behaviour modification**
Regime context	**Type of risk**			
	Public preferences and attitudes			
	Organized interests			
Regime content	**Size**			
	Structure			
	Style			

CONTEXT

Type of Risk

In his foreword to the Annual Report to the Ministry of Defence Environment and Safety Board, DR Geoff HOOPER states that:

> "MOD is a complex organization, faced by a multiplicity of commitments at home and overseas, which present major challenges to the scientific, technological and managerial skills of both Service and civilian staff. In particular, mounting operations, training realistically, buying and maintaining ships tanks and aircraft, as well as running dockyards and nuclear facilities, all demand the very highest standards of safety in its broadest sense."[26]

In analysing this a little further, it is important to differentiate between the nature of individual risk, and of societal concern posed by military activity.

Individual Risk.

The unique characteristic of the Armed Services is that their purpose includes, under appropriate circumstances, the deliberate creation of harm. Typically this involves the placing of personnel and potentially extremely hazardous materials in very close proximity, and in this manner deploying into an unusually demanding environment for an extended period. Furthermore, the Services must train personnel for this task, as realistically as possible, when there is no immediate threat, and this training can often only be undertaken in relatively close proximity to the general public. That said, the overall greatest risk faced by most members of the Armed Services is similar to other environments:

> The greatest number of fatalities are caused by road traffic accidents, mostly on social/recreational travel or while travelling to or from their place of duty; and the greatest risk of injury is from slips, trips or falls or from back injuries while conducting manual lifting operations.

But the number of fatalities arising from training activity is nonetheless significant. The same Ministry of Defence report refers to 16 fatalities arising during training activities.[27]

Societal Concern.

The HSE defines societal concern:

> Threats from hazards which impact on society and which, if realised, could have adverse repercussions for the institutions responsible for putting place the provisions and arrangements for protecting people, e.g. parliament or the government of the day. This type of concern is often associated with hazards that give rise to risks which, were they to materialise, could provoke a socio-political response, e.g. risk of events causing widespread or large scale detriment or the occurrence of multiple fatalities in a single event.[28]

Against this definition, Military Activity gives rise to 2 distinct types of societal concern. The first is that if operational or training activity gives rise to a large number of individual casualties, this could be judged to be intolerable by the public, influenced by opinion formers. LEVITE and SHERWOOD-RANDALL assert that this tolerability continues to reduce:

> "Publics in Western democracies have grown less willing to tolerate casualties and destruction, even on their adversary's side. This is partially a result of a change in Western social values that has dramatically diminished public tolerance for casualties and destruction,

> especially among non-combatants. But this is also the result of a combination of higher expectations and better access to information. Thanks to the revolution in imagery and telecommunications, the battlefield is now increasingly transparent to the media and to the general public. . . . With every successful performance, the bar is raised even higher."[29]

The second type of societal risk is the risk posed by the presence, storage, transport, development or maintenance of military high energy materials and equipment, such as explosives, nuclear weapons or nuclear reactors in the vicinity of centres of population, and which if incorrectly handled could cause multiple casualties to members of the public. This risk is similar to that posed by the presence of chemical works, nuclear power stations, airports etc.

Public Preference and Attitudes

Hood notes that this second element of regime content can overlap to some extent with the type of risk,[30] and indeed public attitudes were necessarily discussed under the previous element. There can be intense media interest in the first type of societal risk described above (that of multiple casualties) while the second type of societal risk (risk to the public) is rarely of national media interest, but may at times have a very high level of local media focus.[++] Public attitudes are influenced by the 'perceived danger' in the national or international situation, but are rarely benign. There can often be strong divergence in the uniformity of opinion. In the run up to the second Gulf War this year, those opposed to military intervention focussed on the risk of casualties (to both sides), while those who supported military action, were more tolerant of such casualties.

Organized Interests

One of the requirements of Britain's Health and Safety at Work Act[31] is a statutory responsibility for employers to consult either Trade Union appointed, or elected employee representatives, on the measures taken to promote their safety. In considering the individual risk to members of the Armed Services, they are unique in not having an organized group to promote their safety. But there is no appetite among members of the Armed Services for such a body. By contrast there are a large number of very vocal pressure groups seeking to generate public opinion against the deployment of military capability. At the national level these groups use a very wide range of different arguments, including drawing attention to the societal risks associated with military capability.[32] Such groups seek to mobilize public opinion to the societal risks associated with military power, generally using unsubstantiated arguments. From the cultural perspective described earlier, these groups attract individualists and egalitarians, by contrast to the hierarchists dominating the Armed Services and Government.

[++] At times the local interest may attract national attention. A particular international example of this was the concern of the Government of Gibraltar to the repairs carried out to the nuclear submarine HMS *Tireless*.

CONTENT

Turning now from the regime context to the regime content, this can again be broken down into 3 elements: size, structure and style. Even concentrating exclusively on the UK Armed Services, there are, in reality, a number of overlapping regulatory regimes, which vary in their degree of policy aggression. For simplicity, this article will consider only the regulatory regimes associated with the Health and Safety at Work Act (HSWA) 1974, the Nuclear Installations Act (NIA) 1965 and the Explosives Act 1875.

Size

HOOD suggests that the 'size' of a regime can be characterized by the scale of overall regulatory investment and the degree of policy aggression.[33] The HSWA contains no general exemption for the Armed Services, and the regime for regulating the Armed Services is therefore a sub-set of the general regime for regulating Health and Safety at Work in the UK. The degree of active regulation by the HSE of the Armed Services varies considerably, but it is generally considered to be consistently increasing. The NIA contains disapplications associated with reactors comprised in a means of transport, and with activities under the direct control of the crown, both of which are internally 'regulated' on behalf of the Secretary of State for Defence, but it does apply to defence related activity not under the direct control of the crown. As this Act sets a non-prescriptive permissioning regime,[***] there is a proactive regulatory role for the Nuclear Installations Inspectorate – now part of the HSE. The scale of this regulation towards defence related activity, and the resource required to respond to it has also increased significantly in recent years. The Explosives Act contains exemptions associated with military explosives. While this is also internally 'regulated', there is increasing pressure to demonstrate that this is at least as good as the requirements of the legislation. Overall therefore, in general terms, the size of the regulatory regime content for the safety regulation of the Armed Services is characterized by increasing regulatory investment.

Structure

The structure of a regulatory regime can be characterized by the manner in which regulatory costs are distributed between the state and regulatees, the number and density of regulatory organizations, and the degree of jurisdictional overlap and system complexity.[34] To some extent costs are less relevant where the regulatee is itself a body entirely managed and funded by a Department of State. In general, the HSE itself bears the direct costs of regulation, and does not communicate these costs to the MoD. But in most cases, the direct costs of regulation are insignificant in comparison to the costs of compliance. The level of compliance costs can be very high. While this paper is concentrating on the external regulation of the Armed Services, where disapplied from legislation the costs of response to internal regulation can also be considerable. The regulatory structure is extremely complex for several reasons. Firstly, where the Armed Services have disapplications from legislation, an internal regulatory structure is established, with a complex interface and potential overlap between the internal and external

[***] Within the UK, a prescriptive permissioning regime is currently unique to nuclear installations. But,

> "The Health and Safety Commission has recently announced its policy on regulating other high hazard industries through the use of permissioning regimes. Permissioning will be considered where the work activities involve significant hazard, risk or public concern, such as where there are risks of multiple fatalities from a single or linked series of events and or there are widespread and significant adverse effects on human health."

Nuclear Energy, Volume 42 No 3 (June 2003) page128.

regulation. Secondly, as the Armed Services deal with a uniquely wide range of hazard, external regulation involves a number of different HSE divisions with complex internal interfaces. Thirdly, were the scope of this article extended to include environmental regulation, the interface between environmental and safety regulatory bodies, would be seen to be more complex.

Style

Style can be characterized by the extent to which regulation is governed by rules, the density of those rules, and the degree to which they are followed; and by the extent to which regulators are 'zealots' for policy positions rather than neutral and detached in their approach.[35] In 1972 the ROBENS committee concluded that:

> "We need a more self-regulating system of provision for safety and health at work. The traditional approach is outdated, over-complex and inadequate. Reform should be aimed at creating the conditions for more effective self-regulation by employers and workpeople jointly. . . . Much greater use should be made of agreed voluntary standards and codes of practice to promote progressively better conditions. . . . This broader and more flexible framework would enable the statutory inspection services to be used more constructively in advising and assisting employers and workpeople . . . [and] to be concentrated more effectively on serious problems where tighter monitoring and control might be needed."[36]

This was achieved under the HSWA, but over the subsequent 30 years the inexorable growth of regulations and associated statutory codes of practice have inevitably reverted regulatory style towards a rule based approach. The sheer volume of these regulations makes it increasingly difficult for regulatees, including the Armed Services, to follow them all in detail. The regulatory style remains one of monitoring self-regulation, and of rigorously applying the 'rules' only where self-regulation is failing. Similarly under the NIA, the prescriptive permissioning regime is not ostensibly a rule-based culture, as it places the onus on regulatees to demonstrate compliance with generic licence conditions. But by publishing the principles and criteria against which this demonstration will be assessed, the HSE is *de facto* moving in the direction of a rule-based culture. Overall, however, the regulatory style towards the UK Armed Services remains one of monitoring self-regulation. There is no evidence that external regulators are 'zealots for policy positions'. Rather, they are seeking to respond to their statutory responsibilities.

CONTROL ELEMENTS

Turning now to the other axis of the matrix in Table 1, the control elements of the regime will be considered.

Information Gathering

Regulation was defined earlier as a means of constraining the activities of business and industry in order to control potential adverse consequences to health. Clearly if this control is to be beneficial, it must be based on sound information. HOOD comments that there can often be argument over the quality of the information used to assess risk.[37] HSE regulation of the UK Armed Services involves a mixture of active, reactive and interactive methods. But the impression is of a somewhat *ad hoc* approach to information gathering.

Standard Setting

This is at the heart of a regulatory regime, as the approach taken to setting standards is a fundamental determinant of the cost of compliance. Given the earlier discussion on the nature of risk, it is far from straightforward. HOOD, drawing on Andrew DUNSIRE's cybernetic analysis, identifies that there are 2 basic approaches.

The homeostatic approach

> Specifies an acceptable level of risk in quantitative or qualitative terms (often based on a no observable adverse effect level) with the intention of keeping the state of the system at or below that level.

The collibration approach

> Is a process in which rival and contradictory desiderata (such as risk against benefits) are maintained in tension and balance.[38]

The US approach to standard setting is a rule-based approach: standards are issued, and private sector standards adopted, with punishment for breaching the 'rules'.

In the UK, the Tolerability of Risk (TOR) approach was developed by the HSE in the 1980s.[39] Initially focussed on the specific risks associated with nuclear power, the methodology is now applied widely. Risks in the tolerable region are typical of those that people are prepared to tolerate in order to secure benefits, with the expectation that the nature and level of the risks are properly assessed (based on the best available scientific evidence) and the results used to determine and implement control measures. More recently the HSE have identified that standard setting is based on 3 criteria:

Equity-based

> The premise that all individuals have unconditional rights to certain levels of protection.

Utility-based

> Compares the benefits of measures to prevent the risk of injury or detriment with the cost of the measures.

Technology-based

> Reflects the idea that a satisfactory level of risk is attained when 'state of the art' control measures are employed to control risks, independent of the circumstances.

On this basis, the TOR framework implies an equity-based criterion for risks falling in the upper region, and a utility-based criterion for the middle and lower regions, with the technology-based criterion complementing the other criteria in all 3 regions.[40]

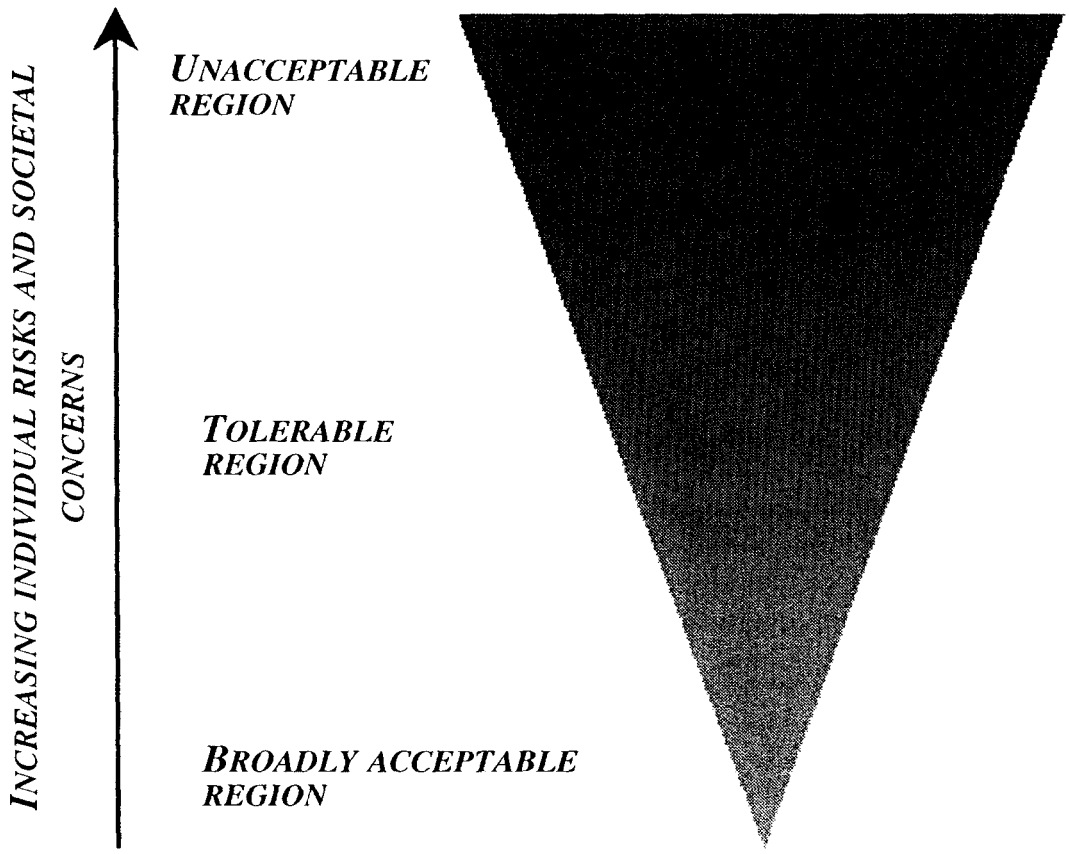

FIG.4 – HSE FRAMEWORK FOR THE TOLERABILITY OF RISK

In 1996 an interdepartmental group, sponsored by the Treasury, considered the directions in which the general procedure and methodology of setting safety standards offered most scope for development. They identified:

> "There is . . . only limited consensus among regulators and their expert advisers, and in public opinion, about how standards should be set, and in particular about the scope for formal analysis. The most important and substantial technical inputs to safety regulation are physical scientific data, about the potential harms and probabilities of their occurrence. The policy application of this data will always entail political judgement, about what ideally should be done, about what can be done and about presentation. A fully 'rule-based' approach to safety regulation, where all regulations were set according to universal formulae quantifying and valuing costs and benefits, would be unrealistic. It is however often presumed that there is little if any scope for analysis in administrative judgement about what regulation if any there should be. People's values and preferences are sometimes seen as issues for such judgement alone, or for the experienced judgement of the expert scientist or engineer . . . with little systematic information to help these judgements. The costs of regulation are also sometimes given little or no weight."[41]

They acknowledged the benefit of the TOR framework, and agreed that in the normal course of life, risks of serious harm, beyond some high level, should not be imposed on unwilling subjects, even in exchange for very high material gains for others. But they note that the TOR framework confines these ethically determined limits to upper bounds, leaving most regulation to be developed in terms of a cost-benefit approach, which leaves the regulator with a great deal to do, in setting

tolerability limits and the appraisal of costs and benefits. They then consider the influence of the quality of risk, stating:

> "Better information is needed . . . of why some risks evoke so much stronger concern than others, and hence of how these risks and concerns might best be handled. It is also needed to help the valuation of people's willingness to pay for reductions in the risk of death and injury in different circumstances. Sometimes public attitudes and perceptions are seriously misinformed. In this case it is reasonable for governments to act on the basis of good data, accepting popular opinion as a constraint rather than a guide. But this is a side issue. The central issue about quality of risk is that, even when fully informed and after careful consideration, people do have fairly systematically different attitudes to different kinds of hazard. As a pragmatic necessity, and some would argue as a principle of good regulation, this has to be reflected in public policy."[42]

They attempted to analyse the quality of risk using a number of qualitative dimensions. Hazards were compared against the concepts of *dread* and of *knowledge* as shown in Table 2.

TABLE 2 – *Comparison of dread and knowledge*

	LOW DREAD ACCEPTABLE	HIGH DREAD BAD
UNKNOWN RISKS BAD	**AB** Cosmetics Asprin Food Colouring	**BB** Nuclear Power Herbicides Liquid Natural Gas
KNOWN RISKS ACCEPTABLE	**AA** Alcohol Boxing Motor Vehicles Rail Travel Surgery	**BA** Warfare Crime Dynamite

Dread was considered to be influenced by accident size, involuntariness, unfairness, fatality and unaccountability. Public trust in government's willingness and ability, not only to control risks, but also to communicate open-mindedly and impartially with those who are or might be at risk, was also seen as very important. Trying to analyse dread a little further, hazards were also compared by using controllability and voluntariness as illustrated in Table 3.

TABLE.3 – *Comparison of controllability and voluntariness*

	CONTRLLABLE BY THOSE AT RISK acceptable	NOT CONTRLLABLE BY THOSE AT RISK bad
INVOLUNTARY Exposure to the hazard bad	**ab** Natural Radon in existing buildings Sunlight *Some of Box AA From Table 2*	**bb** Sea or river flooding Dangerous buildings *Most of Boxes BA and BB from Table 2*
VOLUNTARY Exposure to the hazard acceptable	**aa** Smoking DIY Rock climbing *Much of Box AA From Table 2*	**ba** Rail, air or coach travel Equipment for DIY or Rock climbing Surgery *Most of Box AB and some of Box AA from Table 2*

This analysis, however, has not yet resulted in developing an objective standard-setting approach taking account of the quality of risk. The Treasury group concluded that common frameworks should be developed for all safety regulations, despite the wide differences in attitudes towards different kinds of risks, so providing a common basis for policy judgement and standard setting; to help make this possible further measures are needed to develop a common and consistent terminology for safety regulation. Some 5 years later, disappointingly the HSE when setting out indicative criteria for the boundaries of the regions in the TOR framework, simply states that:

> "They may need to be adjusted to take account of societal concerns or preferences."[43]

It is notable that the Treasury analysis indicates a high public dread of warfare and of nuclear power. While the risks of warfare were considered to be 'known' 5 years ago, public perception today might well place them in the 'unknown' category. It is generally accepted both by members of the Armed Services and by society, that they will be exposed to a higher level of risk, while engaged in military operations. Increasingly, however, society will not tolerate a higher level of risk to members of the Armed Services while not engaged in operations, nor to members of the public arising from the presence of military activities or equipment. The tolerance of a higher level of risk has, at times, been acknowledged by increasing the magnitude of the boundaries surrounding the tolerable region on the TOR triangle by one order of magnitude for servicemen. But this has no basis in law.

Recently a trial collapsed of the Metropolitan Police Commissioners for breaches of safety law when 2 officers suffered fatal falls while chasing suspects. The HSE said,

> "If we had decided not to prosecute it would have discriminated unfairly and unjustifiably in favour of a public body; the fact that the employer was the Metropolitan Police doesn't mean they should be treated any differently from any other employer."[44]

The succinct police view was,

> "If this case had proceeded it would have started the paralysis of the British Police."[45]

Behaviour Modification

The final control component for the regulatory regime is behaviour modification, which is the objective of any regulatory regime. HUTTER states,

> "The advantages and disadvantages of different enforcement strategies are a controversial matter which causes much debate among enforcement authorities, politicians and academics."[46]

AYRES and BRAITHWAITE have made extensive study of the relative effectiveness of compliance and deterrence based approaches.[47] A compliance system, based on persuasive techniques is more effective for regulatees who are morally concerned about regulatory requirements, while a deterrence system, based on sanctions, may be necessary in certain situations. The potential for a regulator to deploy sanctions when required, is also a powerful incentive for regulatees to co-operate with a persuasive approach. For the UK Armed Services, the HSE generally adopts a persuasive approach, but a small number of Crown Censures and Crown Improvement notices are nonetheless served when deemed appropriate. The more challenging question is whether the regulatory regime applied to the UK Armed Services is effective, recognizing that the measurement of the effectiveness of regulation is an immature art. HUTTER states,

> "Assessing the social benefits and economic inefficiencies of regulation is fraught with difficulties; the costs of rules are often easier to estimate than the benefits; indeed cost-benefit analyses may be manipulated to produce desired outcomes."

There is no doubt that safety regulation of the UK Armed Services has resulted, over the last 20 years in behavioural modification. The balance between the benefit in reduced individual risk and societal concern, and the constraint on military effectiveness is a matter for judgement.

COMPARISON OF INTERNATIONAL MODELS

It is now appropriate to briefly consider national models, and the role of international bodies in setting the framework for risk regulation.

The United Kingdom

The history of occupational safety legislation in the UK is largely associated with legislative control over manufacturing industry. The industrial revolution resulted in appalling conditions, leading to the first Factory Act in 1802, which was largely ineffective as the provisions for enforcement were inadequate. Following various further statutes, the 1833 Act introduced the appointment by Government of Factory Inspectors. The Factories Acts and related legislation continued to be extended until 1963, largely by developing rules for protecting employees from specific hazards. In parallel with this separate legislation was introduced for major hazards for general safeguarding, notably the Explosives Act 1875, the Petroleum Act 1928 and the Nuclear Installations Act 1959 & 1965. In 1970 the ROBENS Committee were appointed to review comprehensively the provision made for the safety and health of people at work.[48] Their analysis concluded that over-reliance on prescriptive legislation can, in itself, become the main obstacle to creating safe systems of work. Their report made no mention of the unique situation of the Armed Services, although the possible need for exclusions for transport workers, hospital and educational establishments, and educational research laboratories are discussed. While the MoD did provide written evidence, it is not included in the

published report.[49] The result was the Health and Safety at Work Act, with its emphasis on self-regulation, consultation between employer and employee, and establishment of the Health and Safety Commission/Executive,**** as the 'guardian of occupational health, safety and welfare', with a number of regulatory instruments available to it.[50] It is an enabling Act, permitting the establishment of sets of specific regulations, with the objective that the prescription inherent in these regulations should reinforce risk management in a self-regulatory framework. Unlike the Factories Acts, the HSWA has no general exemption for members of the Armed Services.

The United States of America

In the US, safety regulation of workplaces remained a state responsibility until the enactment of the federal Occupational Safety and Health Act 1970.[51] This act is distinctively different from the UK HSWA. It requires employers to provide a workplace free from recognized hazards; and both employers and employees to comply with occupational health and safety standards promulgated under the Act. It established the Occupational Safety and Health Agency with a deterrence based enforcement role. By the early 1990's Occupational Safety and Health Agency (OSHA) was seen as an organization driven by numbers, burdensome rules, overzealous enforcement and enmeshed in red tape. Their strategy changed under the CLINTON administration to one of 'partnership' with businesses with a strong safety programme, but traditional enforcement for others. Significantly, while, "Nearly every working man and woman in the nation comes under OHSA's jurisdiction,"[52] the Armed Forces are among the small list of Federal Agencies that are excluded from this jurisdiction.[53] The Secretary of Defense has been responsible for Safety Policy in the US Armed Services since the inception of the post of in 1947. The formation of OSHA resulted in safety being given a more prominent focus in the Department of Defense and the creation of the post of Assistant Secretary of Defense Health and Environment.[54] The Department of Defense (DoD) safety policy is as follows.

> "It is DoD policy to display environmental security leadership within DoD activities worldwide and support the national defense mission by . . . complying with applicable US statutes, regulations, executive orders, binding international agreements, other legal requirements, and US environmental, safety, occupational health, explosives safety, fire and emergency services, and pest management policies . . . [and by] developing comprehensive safety . . . programs that protect DoD personnel from accidental death, injury or occupational illness, and the public from risk of death, injury, illness or property damage as a result of DoD activities."[55]

Before moving on to consider the significance of the EU and other transnational bodies, a comparison of the US and UK is instructive. A joint OSHA/EU conference in 2001 recognized that the US legislation still approaches health and safety as a means of controlling specific hazards, while the UK has a goal setting approach. They concluded that the US has a culture with little or no employee involvement, in which individual options are paramount, while in the UK there is a general acceptance of the need to work for the good of the whole. They recognized that there is a need for the US to develop a culture of prevention and a systematic approach to health and safety management as against the current ad hoc approach.[56] Turning to Defence, the US Armed Forces have greater exemptions

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**** The Health & Safety Commission comprises 10 Commissioners, who appoint an Executive of 4 senior officials: this Executive employs some 4,000 staff, who are collectively referred to as the HSE.

from statutory requirements, and no equivalent of the UK policy that where exempt, defence standards should be so far as is reasonably practicable, at least as good as those required by relevant legislation.*****

The European Union

In 1972 when the UK joined the then European Economic Community, now the European Union, the UK Government agreed to be bound by the various laws adopted by the Council of the European Communities. Under the European Treaties member states have conferred on the Council the power to issue sovereign acts which have the same force as laws in individual states, but this power is not used for safety legislation; rather the Council adopts Directives which must then be brought into law by the member states. Once adopted they have immediate applicability on the government and its employees but do not apply to the private sector until national laws implementing the content of the directive have been passed by parliament. Originally the Treaty of Rome required unanimous assent for a matter to be adopted, but in 1987 the Single European Act brought in qualified majority voting on issues aimed at the establishment of the internal market, including health and safety, and called for harmonization of working conditions across all member states. In recent years, most UK legislation has been introduced to implement European Directives – mainly directly promoting minimum standards for the health and safety of workers but also to complete and maintain the single market. Safety and Health at Work is now considered by the Commission to,

> "Constitute one of the EU's most concentrated and important social policy sectors, with a substantial corpus of legislation aimed at raising standards of health and safety developed since the Single European Act was adopted."[57]

A key element is the 1989 Framework Directive,[58] which established broadly based obligations for employers to establish preventive measures to evaluate, avoid and reduce workplace risk. This was translated in the UK firstly in the form of a guidance document[59] and then in 1993 in the Management of Health and Safety at Work Regulations. It is very interesting to note that the Framework Directive specifically states that:

> "It shall not be applicable where characteristics peculiar to certain specified public service activities, such as the armed forces . . . inevitably conflict with it."[60]

The UK Regulations, however, do not contain this general exemption, merely giving the Secretary of State for Defence powers to disapply the regulations when essential. The Commission has recently set out a new Community Strategy on Health and Safety, with the objective of bringing about a continuing improvement in well-being at work, which includes not only physical, but also moral and social dimensions. It aims to further strengthen the prevention culture, including anticipation of risk, and a more rigorous approach to ensuring that its directives are properly transposed into national law, and the law properly applied.[61]

Other International Bodies

There are a large number of other international bodies, which exert varying degrees of influence on national safety regulation. There are many formal and informal links between them, and considerable degrees of overlap. Space permits only a brief description of some of them.

***** The UK policy was summarized in the introduction to this article.

KOFI ANNAN, UN General Secretary said:

> "Safety and health of workers is a part and parcel of human security; as the lead UN agency for the protection of workers rights, the International Labour Organisation (ILO) has been at the forefront of advocacy and activism in promoting safety and health at work."[62]

ILO's strategy is set out international standards for occupational safety,[63] and to work for a more effective implementation by UN member states, particularly establishing a national framework for the promotion of these systems.

The UN World Health Organization (WHO) developed a 'Global Strategy on Occupational Health for All' to better address the occupational injuries and diseases that make a major contribution to the 'Global Burden of Disease,' and to reach the majority of the world's workers who have no access to occupational health services. The Strategy, approved by the World Health Assembly in 1996 sets out 8 priority areas including the strengthening of international and national policies for health at work.[64]

An Association of South East Asian Nations (ASEAN) Occupational Safety and Health Network was established in 1996, inspired by the UN ILO Programme for the Improvement of Working Conditions and Environment. Its objectives include the gathering and distribution of information on the prevention and control of occupational hazards, and the development, production and exchange of occupational safety standards and guidelines.[65]

International Cooperation

The EU Community Strategy on health and safety at work recognizes that the community policy must link up with work being done by the international organizations. It states that,

> "The Commission will continue its active collaboration with the agencies of the United Nations – the WHO and the ILO – which have a similar role to play in improving the level of protection of worker's health and safety, and with whom the Commission has long enjoyed a fruitful cooperation."

It recognizes the essentiality of closer cooperation with 3rd World countries to ensure that while encouraging trade with the EU, appropriate minimum standards of occupational safety are adhered to, suggesting that the EU legislative framework could serve as the basis for exchanges. And it proposes the strengthening of the cooperation and exchanges of experience with the USA under the Transatlantic Pact.[67]

THE IMPORTANCE OF PUBLIC TRUST

Before drawing conclusions from this analysis of risk regulation in a military and international context, it is notable that the issue of public trust has been a recurring theme. Leslie MITCHELL poses the question:

> "Does a good safety record, an effective regulator and a responsible industry generate public confidence, and if not, why not?"[67]

He answers the question by recognizing that the public do not trust a TOR approach for 3 reasons:

- They do not understand the semantics used.
- They do not understand the nature of statistical functions.
- They question the values used.

MITCHELL concludes that the need for public acceptance of the risks must be a design consideration, that is the design of hazardous systems and equipment should be built on concepts readily understandable by the public, only making reliability claims consistent with public expectations. The traditional approach was based on trust of the decision maker, but (FIG.5) illustrates some of the stakeholder interests in this. Interestingly a 2001 opinion poll shows that public trust in scientists is relatively high, while that in journalists and politicians is extremely low.[68]

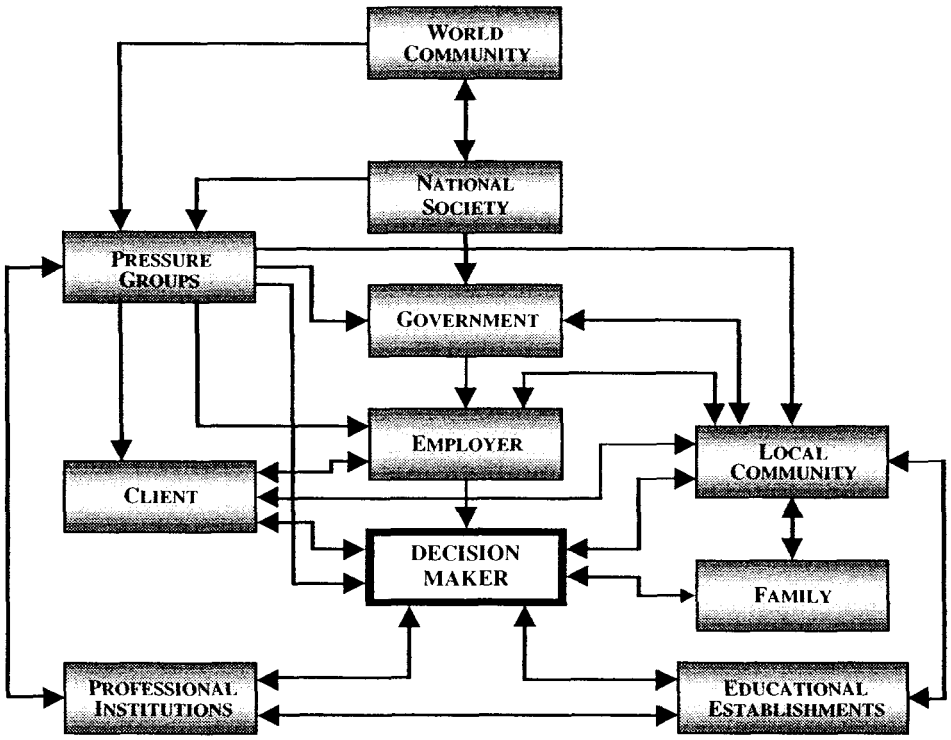

FIG.5 – STAKEHOLDER INTERESTS

SCHWARZ and THOMPSON analysed this from an anthropological perspective.[69] They consider that the aim of the risk assessor is unattainable i.e.

> "To find out what the consequences of various technologies really are and to discover what risks they do and do not bring with them."

They recognize that,

> "Risk is often opportunity: something to be actively courted not negatively avoided."[70]

Recognizing that risk assessment aims to quantify the dangers of technology, to compare them, and to devise rational policies for dealing with them, they suggest that a number of questions should be asked. These include:

> "Can risk assessment tell us what the risks in technology really are?
>
> Is the comparison with other risks valid and meaningful?
>
> If we cannot find out the odds does it follow that we cannot act rationally?"

Questioning the implicit assumption that all risk is nasty, they assert that,

> "Since risk assessment has only existed for [20] years or so, we know that social choices can be arrived at without this ruthless direct comparison of risks, but we do not know whether the reverse is true; that is we do not know whether social choice is possible *with* total comparability; or more simply are risk assessment and democracy inimical?"

CONCLUSIONS

The increase in the breadth and depth of Safety Legislation is ultimately an unavoidable symptom of modernity and globalisation. Evidence from around the world shows that as states modernize, they pay greater attention to both occupational and public safety, resulting in an increase in safety legislation. Furthermore, as the international community seeks to remove barriers to trade, modernized states have an incentive to encourage higher standards of occupational safety in emerging economies, to avoid trade disadvantage. This process has been particularly marked in the EU, partly as a means of the Commission increasing its role, partly as a tool in the establishment of the common market, but notably as a method of implementing the zealous social agenda of the union. While there is a serious implementation gap existing in some member states, the UK is conscientious in bringing EU directives into law, in some cases exceeding the requirements of the directive. Thus the increase in safety legislation has been more significant in the UK than in many other states, to the extent that it now challenges the principle of self-regulation enshrined in the ROBENS inspired Health and Safety at Work Act.

The application of the majority of this legislation to the UK Armed Services is unusual, and contrasts with exemptions given to Armed Services in other countries. Even where EU Directives recognize their incompatibility with Armed Forces activities, this has not been enshrined in the associated UK regulations.

The impact of this on the UK Armed Services is difficult to measure. While another effect of modernity is a reduced tolerance to military casualties, as in many other fields, Military Success is dependent upon appropriate risk taking. But as safety legislation and regulation is based on a zero risk approach there is inevitably an impact: probably greater in the UK than in other states. Tolerance of risk is ultimately determined by public perception. UK safety regulation is based on an objective view of risk, while more attention must be paid to the quality of risk, thus identifying an appropriate metric for the tolerability of military risk. Public trust is essential.

Perhaps the most striking conclusion from this research concerns the nature of regulation itself. The concept of regulation being the use of laws to constrain and organise the activities of *business and industry* is significant. It is not axiomatic that the state should use the same system to constrain the activities of its Armed Services, as it does for private business, as seems to be recognized not only by the US Government but also the European Commission. There is a need for an improved academic model for the nature of safety 'regulation' of the Armed Services, informed by further research by expert social scientists.******

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    - 2 from a CHALLENGER tank overturning.
    - 1 electrocution from overhead power cables on a railway.
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