inFIRE

**(the international network for
Fire Information and Reference Exchange)**

Conference 4-8 May 1998

Fire Information for the 21st Century

held at the
Metropolitan Fire & Emergency Services
Training & Fire Safety Complex
619 Victoria Street, Abbotsford. Melbourne. Australia

Conference Proceedings

NOTE

The Organising Committee wishes to thank speakers for their contribution in preparing and presenting their papers, and for assisting in the publication of these proceedings by making their papers available prior to the conference. The papers are reproduced in the form in which they were received.

The Conference Proceedings was compiled by Nina McPherson, Metropolitan Fire and Emergency Services, and Rob Fleming, Australian Emergency Management Institute.

inFIRE Conference 1998

INTRODUCING inFIRE

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INTRODUCTION

As we approach the millennium, fire and emergency services and the fire industry around the world are embracing the concept of information as a resource to be managed alongside human, physical and financial resources. The papers to be presented at this conference cover a wide range of information issues: information for risk management, specialised fire research, communication within fire services, information flows between the fire industry, fire services and the public, and the challenges to information professionals providing information services to an extended range of clients.

Day one has a strong risk management flavour, emphasising a changing focus in the provision of fire services from a reactive to a proactive strategy for controlling fire hazards. Day two deals with a number of tactical uses of information in fire services, such as media liaison, training, delivering information to firefighters and fire investigation.

During the second half of the conference the focus shifts to the broader issues of information and knowledge management, information literacy and the use of internet/intranet technology to deliver information in emergency services.

We hope you will enjoy the conference and use it to strengthen the information networks between information professionals working in this field around the world. The 1998 conference will be the first time that inFIRE has visited Australia, and the Australian members of inFIRE are looking forward to returning the hospitality that inFIRE members from other continents have shown at previous conferences. We hope you will be able to take advantage of our tours, and spend some time seeing our unique country. A new continent, a new millennium, the age of information...there should be interesting times ahead!

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Paper 1

Initiatives for Emergency Services Organisations - a National Perspective

Roger Jones, TEM Consultants, Mount Macedon, Victoria

INITIATIVES FOR EMERGENCY SERVICES ORGANISATIONS A NATIONAL PERSPECTIVE

Roger Jones, *Director, TEM Consultants, Mount Macedon – Victoria*

Significant changes have occurred in the 1990s in the political, human and physical environments in which fire and emergency services operate, and in those services themselves. The causes, effects and resulting interactions of major changes are discussed, and some implications of the 'information/communication revolution' considered. It is suggested that there is a need for a common focus for the many and varied activities of the individual fire and emergency services, and that this can best be found in joint commitment to the concept of public safety and in the adoption of community risk management as their core business.

Introduction

The 1990s have seen significant changes in the environment, or more accurately the multiple environments, in which our emergency service organisations operate, and in the organisations themselves. As always, the future of such changes is uncertain – some are likely to continue into the 21st century, while others may turn out to be ephemera and become just footnotes to history.

Would that we could accurately forecast which is which! But I suggest that many of these changes have been so significant that their effects will linger on, whether the influences which appear to drive them today remain or not.

So I would like to offer an examination, from a largely national perspective, of some of what I believe to be the more important of those changes. Out of this I would hope to invite your consideration of the impact of such changes on current organisational developments in the field of emergency management, and what these impacts might mean in the context of the concerns of this conference. Finally, I would like to suggest some opportunities and some challenges for our organisations into the future.

Let me make just one disclaimer – my views will be essentially the product of my own experience in the field of emergency management and of my own understandings. My crystal ball, like yours, reflects that experience and those understandings, and inevitably distorts a picture which is cloudy enough at the best of times. But nothing venture, nothing gained.

Our Multiple Environments

The total environment within which we live and work is itself a compound of many separate elements which interact in complex ways

We would all, I suggest, recognise that the 'three Ps' – politics, people and the physical world – represent the principal environments which shape the total environment within which all our organisations must work

The Politics

Taking first the political environment, there can be no question that the most dramatic change in that environment has occurred as a product of the way in which governments, whatever their political orientation, have increasingly chosen to go about their business. Governments today are about 'steering not rowing', more about facilitating the way things are done within their communities than actually doing them. In the process, governments are increasingly divesting themselves of functions which they no longer see as 'core business' and which they believe the private sector can perform.

There is, of course, often an ideological element in this process and in the apparent belief that, at government level, 'smaller is always better', but there is also a reality in the constant demand which governments face to provide more services at ever-increasing cost, while the sources of revenue open to them are finite and often under challenge. 'Doing more with less' becomes a necessity rather than just a hobby-horse, and yesterday's relative certainties are today's insecurities.

The People

While they might not always wish it, people are inevitably impacted by changes in the political environment, and those impacts fall both on the people who need our services and on the men and women themselves who provide those services.

The people in the communities we serve – our 'stakeholders' and 'clients', if you wish to refer to them in such 'value-free' terms! – have undoubtedly suffered from many of the recent changes in our political environment: statistics on wealth disparities, figures on homelessness, apparently insoluble health problems in parts of those communities are just some of the indicators of adverse political impacts. Dealing on a day-to-day basis with the members of our communities as most of you do, you would be only too aware of the 'down-side' effects of many of these impacts. It pays to remain optimistic that beneficial changes can occur – after all, our 'stakeholders' and 'clients' are first and foremost 'stakeholders' and 'clients' in the political process itself, and can often stimulate needed and positive change through the ballot-box.

Our own services have, of course, had to cope directly with both the products of community change and the imperatives of political direction. Public demands for better and faster services don't sit well with the outcomes of 'down-sizing' and resource limitations, and the resultant anxieties and strains which such conflicting pressures often place on both the service-deliverer at the 'sharp end' and the service-manager in his often-insecure office are too frequently evident. As a positive offset to such problems, and sometimes even in spite of them, it is heartening to recognise the continuing dedication and increasing professionalism shown at all levels of our services.

The Physical World

Even the physical and human environment in which we operate has produced some uncertainties in place of the relatively fixed order of things which we accepted in the confident 1960s and 1970s.

In those days, for example, the *El niño*/Southern Oscillation phenomenon was unknown. However, while today we know that in this country we have faced one of the worst summers in our recent experience by courtesy of an *El niño* event, with its severe drought and bushfire impacts, we don't yet know whether that event falls within the expected range of climate *variability* or whether it is a portent of more threatening climate *change*. 'Global warming' might conceivably be a product of that change, or might indeed be driving it – we don't yet know whether it is even a reality!

As another example, our confidence that we were well on the way to eradicating many of the world's communicable diseases, as we had done with smallpox, has taken a battering with a resurgence of many of such diseases and their appearance in new forms. Childhood diseases which in our community we had thought to be things of the past, such as measles and pertussis, are claiming new headlines; world-wide, diseases like tuberculosis and cholera appear to be rampant.

In a related field, some of the barriers we had confidently assumed were in place to prevent the transfer of animal diseases to humans seem to have been breached, as the link between BSE in cattle and CJD in humans overseas and our own recent experience with equine morbillivirus and bat lyssavirus appear to demonstrate. At least some of this is being attributed to an expanding world population coming into increasing contact with physical environments in which new threats have been hidden or lain dormant until people have, by choice or lack of it, moved into contact with such environments. Our world itself seems suddenly to have become more threatening.

The Information/Communication Revolution as Part of Our Environment

No review of our changing environment and the impact it is having on emergency service organisations and their methods of operation would be complete without some reference to the information/communication revolution. Many aspects of this on-going revolution and its significance for the fire and emergency services will be dealt with during this conference, but I believe you don't have to be a Luddite to agree that:

> *The existence of better communication facilities does not necessarily lead in itself to a better exchange of knowledge and intelligence, and/or a greater understanding of what is occurring.*
>
> (Quarantelli 1997)

Quarantelli's recent article, from which this quotation is taken, should be required reading for emergency service organisation managers. It suggests ten problems for disaster planning, management and research ranging from the new kind of disaster that can result from computer-related system failures through the difficulties which new technologies pose for intra- and inter-organisational communication and coordination to those resulting from information overload and the rapid diffusion of incomplete or potentially-inaccurate information.

The Consequences of Environmental Change

I have touched on just some of the significant changes which have impacted on the environment in which emergency service organisations have had to operate in the 1990s, and we cannot yet measure the full effects of those impacts – imponderables and uncertainties abound. From a national viewpoint, however, we can already discern the direction in which those impacts are moving our organisations, many and varied though those organisations may be.

Indeed, the very diversity of the organisations which identify themselves with fire and emergency service roles is itself worthy of note, and adds its own complexities to those brought about in a changing environment. Consider:

- some are statutory authorities deriving their roles and organisation from government legislation, while others represent private sector interests;
- some have emergency response as their primary role, whether that response is to single incidents or larger-scale emergencies and disasters, while others have such a role as secondary to their principal functions and responsibilities or simply provide support to other agencies in their emergency response role;
- some have a responsibility in only one area of the management of emergencies within the community, be it prevention/mitigation, preparedness and response, or recovery, while others have responsibilities in more than one, while
- some are staffed principally by full-time officers, others primarily by volunteers,

and so the list of differences goes on. The diversity of interests is well represented in the program for this conference, which seeks to offer something for all while recognising how difficult it is to find unifying themes.

In one sense, of course, it is a healthy diversity – it allows for differing viewpoints, encourages a sharing of experience and promotes valuable inter-organisational networks. But in an environment which demands that each organisation focus on its own 'core business', espouses principles such as productivity savings and 'user pays', and enforces budget stringency and rationalisation of services, our organisations can tend to become inward-looking, constantly subject to both internal and external review, locked into a continuing process of 'down-sizing' or 'right-sizing', and inordinately anxious about the future.

Where resources are scarce or tightly rationed, the competition for such resources can become fierce and normally-healthy and basically-friendly interagency rivalries can turn bitter. Jurisdictional conflict can be promoted even at operational levels, feeding on:

> *the state and agency rivalries that exist in any attempt at systematic co-ordination and planning* (in disaster management in Australia).
> (Kouzmin *et al* 1995)

There is, however, a potentially-unifying theme which I would like to offer you as providing a basis for promoting effective coordination while retaining the healthy aspects of diversity – the recognition that all our organisations are in fact working towards the same end, that of ***the promotion and preservation of public safety***.

I would like to define public safety here in the broadest possible terms, as a function which seeks to ensure that all citizens in our communities can live, work and pursue their particular interests and needs in a safe physical and social environment.

And in working together towards such a goal, I believe that we will increasingly find ourselves identifying the 'core business' of our fire and emergency services as the ***effective management of community risk***. A recognised common goal in public safety and a shared methodology in risk management offer both the opportunity for the development of a more cohesive and integrated approach to emergency and disaster management, and some degree of organisational protection from 'divide and conquer' policies.

The Theme of Public Safety

> *The public deserves a truly seamless service when it needs the assistance of public services.*
>
> (Doyle 1996)

John Doyle was commenting on the recent experiences of the fire services in the UK when he wrote these words, and as an aside it is interesting to note that while there are many organisational differences between the UK and Australian fire services he identified many of the same environmental changes and pressures at work there as we can recognise in our experience. His article, which I commend to you, discusses the benefits of active policies of 'benchmarking' and 'teaming' in coping with these changes and pressures.

I suggest, however, that a 'truly seamless service' can only be offered when all emergency service organisations recognise that their common goal of the promotion and preservation of public safety can only be reached by integrated and co-operative effort.

Progress in the Area of Training

In at least one small way, this has already come to be recognised in the area of training. In July last year, the Australian National Training Authority (ANTA) sponsored the formation of the new Public Safety Industry Training Accreditation Board (PSITAB), with representation from a number of emergency service organisations including, interestingly, the Department of Defence. The creation of this new national body is recognition both of the existence of a national 'public safety industry' and of the need to rationalise much of the training which has formerly been planned and conducted on an agency-by-agency basis, with a good deal of overlap and duplication.

The PSITAB's first task has been to identify a range of common training requirements which can be addressed more effectively through the development of competency-based 'training packages'. The immediate benefits can be better training, more consistent training, increased employment flexibility and significant savings in overall 'training dollars', all in the interests of an improved level of public safety for the people of Australia.

Already, the PSITAB has identified a broad range of common and required competencies ranging from operative to management levels within the Australian Qualifications Framework.

Yet even this initiative shows that we are a long way from acknowledging the full range of services and activities which need to be involved in order to achieve our goal of a 'truly seamless service' in furtherance of public safety. The membership of the PSITAB is heavily response-oriented; prevention/mitigation and recovery agencies have not been directly represented to date. Agencies performing functions critical to public safety in its broadest sense, such as those in human health, occupational and industrial health and safety, animal health and environmental protection areas, have been similarly unrepresented.

There can be no question that these and other agencies make a positive contribution to public safety; the threatening changes in our physical and human environment suggested earlier make it clear that their work needs to be more effectively integrated with the work of the more traditional emergency services.

While it might be claimed that the interests of these agencies are safeguarded through other industry training accreditation boards and there appear to be moves to admit some of them as 'corresponding' members of the national PSITAB (a model adopted in some of the equivalent State bodies), it is difficult to avoid the conclusion that we have not been very imaginative in our approach to public safety, even in an area as limited as training.

'Adding Value' to Single-Service Efforts in Public Safety

We should be thinking beyond such developments, in terms of 'adding value' to our present agency-by-agency efforts through the evolution of national and State/Territory public safety policies and practices.

Formulated and publicised public safety policies can provide an envelope within which all our activities, whether directed towards prevention and mitigation, preparedness and response, or recovery, can be seen as working coherently towards the same goal, and should clearly be recognised by both governments and the public as a proper 'community service obligation' – and indeed as a significant part of the 'core business' of government itself. Integrated public safety practices will allow us, the fire and emergency service organisations, to demonstrate that for our part we will provide appropriate, effective, efficient, and cost-benefit-related services in pursuit of public safety policy goals.

All States and Territories in Australia now have an emergency management 'peak body' to ensure effective integration of emergency management activities (an inter-departmental Emergency Management Committee or its equivalent). At national level, their equivalent 'peak body' is the National Emergency Management Committee. I would argue that while they have gone a long way towards ensuring more effective agency coordination, particularly in the coordination of preparedness, response and early recovery activities, they have not yet achieved any sort of 'truly seamless public safety service' to deal comprehensively and in an integrated fashion with risk in our community.

A 'Public Safety Charter'?

I would envisage that the first step in developing such a service would be the establishment of a 'public safety charter', with the respective levels of government and the emergency services themselves making a commitment to the provision of a range of integrated services to ensure the maintenance of the level of public safety which our community has a right to expect.

Such a 'charter' would, as a minimum:

- declare public safety to be a human right and a 'community service obligation' on the part of governments at all levels (and as a recognised responsibility of local government in particular);
- specify public/private sector and citizen roles and responsibilities in public safety;
- define public safety goals, and
- identify public safety agencies and require them to address public safety goals within their corporate plans.

Risk Management as Our Core Business

If the theme of public safety and a 'public safety charter' can provide a much-needed force for integration of the efforts of our emergency service organisations and promotion of their community service role, a recent joint Australian/New Zealand initiative offers an ideal vehicle for establishing a common focus for those efforts.

The Australia/New Zealand Risk Management Standard

In November 1995 the Councils of Standards Australia and Standards New Zealand approved a new joint standard on risk management. Many here would already have made their acquaintance with this standard, but at the risk of preaching to some of the already converted I want to suggest why the principles underlying the new standard and processes derived from them should become core business for all involved in public safety.

Engineers have long been accustomed professionally to dealing with the subject of risk in structures and manufacturing processes, and risk management is increasingly recognised as an integral part of good management practice generally. The new standard, however, extends earlier understandings of risk by placing it clearly in a ***social*** context, by recognising that all human activity occurs in a risk environment and that risk management processes need to be 'applied in any situation where an undesired or unexpected outcome' (AS/NZS 4360, p. 2) in such activity could be significant.

In one sense, the risk management process described in AS/NZS 4360 is hardly revolutionary, but it is this understanding of the social context of risk, the recognition that all forms of risk require the systematic application of policies, procedures and practices to eliminate, reduce and manage that risk, that makes the standard central to our activities in the public safety arena.

The Social Context of Risks to Public Safety

I can best demonstrate this by referring to just one 'step' in the standard's risk management process – that described as 'analyse risks'. Any engineer would be quite happy with the major activities involved in this 'step', *'Determine likelihood'* and *'Determine consequence'*. Combining these activities will lead to the establishment of a level of significance for the particular risk under consideration. However, let's look more closely at what is actually involved in those activities, in a public safety context.

Traditionally, these activities involved detailed examination of the sources of risk, the *hazards*. In the social context of risk, however, the elements at risk, the *vulnerabilities* of the community and of the particular individuals and social groups of which that community is composed, are at least co-equal with the *hazards* in any analysis of the likelihood and consequence of risk. As we all know, it is not simply the piece of machinery, the industrial process, the earthquake or the flood – the *hazard* itself – which describes the risk involved, but the likelihood that the hazard will impact on people or communities and the consequences of that impact.

And clearly, planning to deal with risk in its social context needs to recognise that there are a number of options which must be pursued, including eliminating or modifying the hazard and its impact and reducing the vulnerability of people and communities.

It is this characteristic of the new risk management standard which I believe makes that standard so relevant to our joint activities in the public safety arena, and offers it as an appropriate vehicle for developing a common organisational focus. There is, of course, a rather practical and pressing reason why we should all give the standard our closest attention – as a national standard, it is a 'best practice' formulation which can increasingly be expected to be referred to in any examination or inquiry into how we have planned and operated in our organisational responsibilities for the management of risk.

Applying the Standard to Public Safety Operations

While the standard itself is 'generic and independent of any specific industry or economic sector', it would be incumbent on any organisation, and in particular any organisation with responsibilities in public safety, to develop and implement guidelines for the application of that standard to its operations. I am pleased to note that a set of general guidelines for the application of the principles and processes of the standard within 'national emergency management industry' has recently been prepared under the sponsorship of Emergency Management Australia.

However, it would be appropriate to offer a note of caution in regard to the development and application of such guidelines. The standard is clearly designed for single organisations working in an environment in which hazards are basically industry-specific. In the public safety context, multiple organisations must operate co-operatively in a community-oriented multiple-hazard environment. Each public safety organisation thus has to deal with two sets of risk management responsibilities – managing risk in the performance of its own organisational functions and tasks, and contributing to the management of risk within the community which it serves.

The two sets are not necessarily congruent, and priority given to one area may impact adversely on ability to discharge the organisation's risk management responsibilities effectively in the other. Clearly, public safety organisations need to distinguish between their single-organisation risk management requirements and their broader community risk management responsibilities. They need, therefore to provide appropriate guidelines not only for each area of responsibility but also for the resolution at both operational and management levels of conflict where this could potentially occur in the attempt to satisfy both needs. There are some implications here for in-service organisational education and training which will need to be addressed by each organisation.

This cautionary note aside, I believe the new standard offers our organisations an opportunity to find common ground in our approach to the pro-active management of both organisational and community risk, and give less emphasis to what is often seen by others as an over-riding concern with re-active management to particular hazard events.

Conclusion

At this stage in the development of fire and emergency service organisations in Australia, we face a wide range of opportunities and challenges – opportunities for better service to our clients, and challenges to demonstrate the effectiveness of that service to our stakeholders.

I believe that we can best meet both through a joint commitment to the theme of public safety and through the adoption of community risk management as our core business. We urgently need a common focus for our many and varied activities, as there is no reason to suppose that the rate of change in the environment in which we operate will slow, or that pressures for us to 'do more with less' will slacken. We therefore need to recognise, promote and build upon our joint contribution to the safety of Australians everywhere.

Select Bibliography

Blaikie, P., Cannon, T., Davis I. and Wisner, B., 1994. ***At Risk - Natural Hazards, People's Vulnerability and Disasters***, Routledge, London

Doyle J.C., 1996. Improving performance in Emergency Management. ***Disaster Prevention and Management***, vol. 5 no. 3, pp. 32 - 46

Kouzmin, A., Jarman, A.M.G. and Rosenthal, U., 1995. Inter-organisational Policy Processes in Disaster Management. ***Disaster Prevention and Management***, vol. 4 no. 2, pp. 20 - 37

Institute of Civil Engineers (UK), 1995. ***Megacities: Reducing Vulnerability to Natural Disasters***, Thomas Telford, London

Quarantelli, E. L., 1997. Problematical Aspects on the Information/Communication Revolution for Disaster Planning and Research: ten non-technical issues and questions'. ***Disaster Prevention and Management***, vol. 6 no. 2, pp. 94 - 106

Standards Australia, 1995. ***Australian/New Zealand Standard. Risk Management (AS/NZS 4360:1995***), Standards Australia, Homebush NSW/Standards New Zealand, Wellington

Paper 2

Information Needs for Risk Management Decision Making

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Information Needs for Risk Management Decision Making

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Introduction

Firefighting offers the potential for a range of experiences that are in complete contrast to the 'normality' of everyday public life. As an occupation it is associated with emergent danger, uncertainty and unpredictability. Any of these factors may be seen as anathema to a stereotypically 'risk-averse' public.

These factors go a long way towards ensuring that firefighting is probably incapable of being made safe. 'Safe' that is in the sense that a conventional workplace can be made safe by adopting acceptable work practices carried out under defined and certain environmental conditions.

This paper presents details of a Risk Management Decisions Making framework being developed within the Queensland Fire and Rescue Authority (QFRA) designed to address the unique nature of the occupation and the information needs of the organisation. In addition to enhancing safety decision making at the operational and broader corporate levels, the framework aims to promote an effective safety culture within the QFRA and support the timely communication of workplace health and safety information throughout out a very decentralised organisation.

Conceptual Approaches to *Risk*

Before discussing approaches to dealing with Risk Management in the Queensland Fire & Rescue Authority, a discussion about the concept of *Risk* is profitable. Research on risk and especially risk perception, has long dealt with teasing out the nature of beliefs about objective and subjective risk. This may be a spurious pursuit because conceptually, 'risk' as a causal relation between some hazard and a consequence, is by nature intangible. Assumptions of the existence of objective risk is a function of reductionist thinking and is a manifestation of the 'phlogiston theory of risk' which suggests that risk is a unique substance 'given off' by physical processes at rates that can be determined by technical risk assessments (Watson, 1981). Another issue of importance is that expression of risk in numerical terms often creates an illusion of accuracy. While probability is a valid mathematical measure of risk (Ingles, 1991:76) the full dimension of the term cannot be captured solely by the probability of the occurrence of an adverse event because the human element is absent (Covello *et al.*, 1982:53).

Making judgments about risk is obviously more than merely a matter of probabilistic prediction (Smithson 1991a:8). By modelling risk processes mathematically, manipulative and calculation power may be increased, but at the expense of descriptive and contextual meaning. An important point in relation to knowledge about hazards and related harm, is that a *measure* of risk may have little meaning if separated from the social context in which the hazard is experienced.

There is empirical evidence that members of the public do not speak about 'risk' in terms of its probabilistic connotations. De Marchi & Rota (1990:IV) in a major European study of risk information needs for communities near hazardous industrial sites report that the public often think of risk as a 'cause,' as 'evidence' or as 'an effect,' all within a wider context that gives rise to the meaning of the hazardous event.

Like information, risk is not a thing. It's a complex phenomenon that can alter the people who experience it (Rayner, 1988:203). Confusion arises because conventional approaches to risk have combined notions of probability of harm with intuitive (social) cognitions of danger (Sheehy & Chapman, 1986:308). Risk as a theoretical construct, is of prime importance to any examination of human behaviour in dangerous situations. An awareness of the varying approaches to the concept of risk is important not only because of it's widespread use but more importantly because of the 'risky' nature of modern life.

A widespread conceptual approach to risk is found in business and corporate settings defines it as the uncertainty of occurrence of economic loss. Other expressions can relate to: insured objects such as a home or car, a peril such as a fire or earthquake, the probability of an event that might cause loss, the loss itself or a hazardous condition (Greene & Serbein, 1978:28).

The concept of risk as a potential monetary loss derives from early maritime history where trade was not only unreliable but dangerous. During storms, certain goods being transported might be thrown overboard to lighten the ship thus increasing the chances of survival. This caused a subsequent loss of profit to those who sent the goods. Thus, a system was developed so those merchants losing goods overboard could be compensated for their loss from the profits of those whose materials were successfully delivered. This compensation came from a pool of money gathered from all those who were transporting goods on the ship (ie. they spread the 'risk'). Thus as trade via shipping grew so too did maritime insurance (Mazur, 1980:151). Risk as a 'measurable construct' can be traced back to the middle of the 17th century to meet the need for accurate pricing of 'insurance' contracts (Skolbekken, 1995:298).

Quantitative measures of risk may also have little realistic validity if data about the frequency and context of past instances of specific events is absent. This holds especially for the Queensland Fire and Rescue Authority. The QFRA cannot predict with any accuracy when an emergency event will occur. To try and do so may be foolish given the complexity of the causal factors inherent in such situations.

Applying a Risk-based Framework to the QFRA

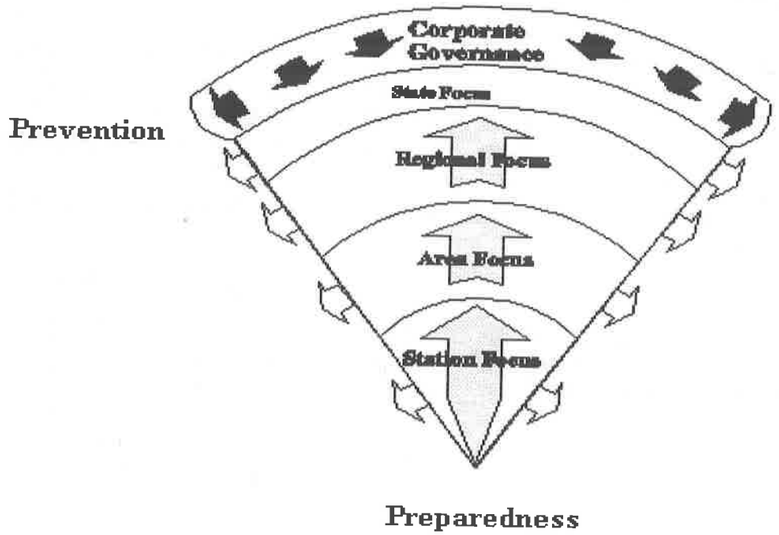
The QFRA is a Statutory Authority governed by a Board with representation from community and business groups from across the State. As in the private sector, this body has full accountability for corporate functioning of the Authority. Overall management responsibility in the Authority is vested in the Chief Commissioner who heads a senior management group comprising eight Commissioners (one per region) and an Executive Director of Business Services. A rural fire division comprising non-urban areas of Queensland is managed by a Commissioner. Each Region is sub-divided into Areas. An 'area' comprises a collection of particular stations and the communities serviced by these resources. Each area is managed by an Area Director.

Communities serviced by the QFRA vary from large urban centres to small remote locations. These settings vary markedly both geographically and demographically often with seasonal climatic extremes. The combination of distance, seasonal variation and geographical differences makes the provision of effective fire and rescue services challenging. Similarly challenging in such a distributed organisation, is the promotion of workplace health and safety.

A primary goal for any fire service is the protection of communities from the impact of fire and other emergency events. In the QFRA this outcome is approached through the optimal use of resources applied to prevention and response activities. This level of efficiency presupposes the existence and implementation of policies defining coherent organisational goals, delimited roles and responsibilities and, clearly stated protocols for decision making. The Risk Management framework described here seeks to explicitly link operational and corporate needs within a holistic framework.[1]

The framework enables this by defining logical levels within the organisation where decisions about risk management should be made. Figure 1 displays the framework.

Figure 1: Risk-based Decision Making Framework



Four specific activity and decision making levels are defined by the framework.

[1] A similar goal was an element of the 'Management of Fire and Other Risks' Project (MOFOR) begun by the New Zealand Fire Service.

These represent the organisational structure of the QFRA (Board, Regions, Areas [within Regions], and individual stations). The model identifies the oversight role of the QFRA Board for all major organisational decisions. Upward pointing arrows indicate an information flow generated at the station level and transferred vertically within the organisation.

A central issue within the framework is the notion that an aggregation and abstraction of information occurs with progression vertically through the decision making levels. Part of this abstraction includes a transformation of risk-related information from operational to corporate level. While the nature of these decisions can be identified, little more can be done practically, without the functionality to capture the data required to 'feed' the decision making processes.
The means to reflect this transformation of information from the 'sharp' operational end of the framework to the more abstracted corporate level resides in the correct mix of strategic information systems. Further work is being carried out to determine how such systems could be positioned for maximal decision support.

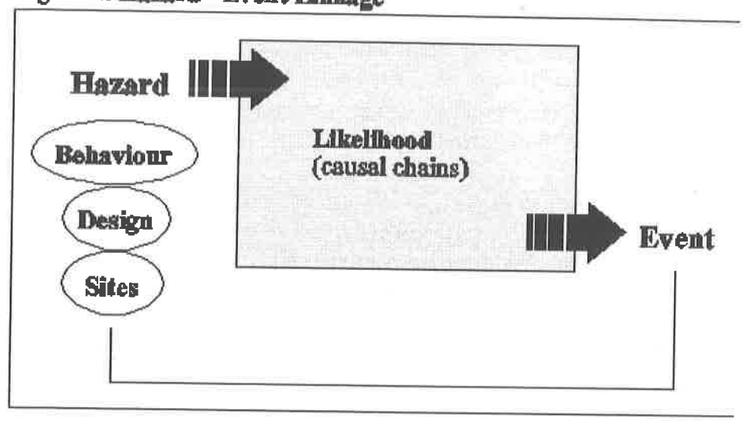
The horizontal arrows at each level relate to designated activities that support the dual processes of prevention and response. Such activities for example, might be officially sanctioned by representation of the QFRA at State or inter-state meetings of emergency management groups (Chief Commissioner and Commissioner), community meetings addressed by an area director, or a fire crew conducting a fire education session for school children. All activities, arguably, contribute to a reduced incidence of emergencies.

An example of the Management of *Risk* Information (Hazard Maps)

The framework definition of 'operational' risk used by QFRA expresses risk as *..' a measure of the likelihood of a some event, of a certain magnitude, occurring.'* However, the likelihood of an adverse event developing from a particular hazard or hazardous situation or by interacting with a chain of adverse effects, may be impossible to predict with accuracy. Such difficulties remain even when local knowledge and historical area knowledge is comprehensive. Often, links between an emergency event and its *causes* can only be determined in retrospect.

The access to the intelligence that might be gleaned from the Australian Incident Reporting System (AIRS) database, the myriad of causal factors that derive from the human element of incident causation alone, will defy any realistic attempt at predicting the likelihood of incidents. It follows from this that the QFRA cannot actually map *risk* but is able to identify and contextualise hazards and analyse the resources needed to match the nature and level of hazards identified in particular areas. QFRA is currently developing enhanced approaches to the way GIS's are used to manipulate information as part of a whole-of-organisation risk management. Figure 2 defines key relationships that underpin this work.

Figure 2: **Hazard - Event Linkage**



Arguably *risk* (as a likelihood), is a black box for most emergency response organisations. The focus of information sought for the hazard maps classified by three generic hazard types. These are *behavioural*, *design* and *site* hazards. A system that combines data about hazards and events allows the closing of a causal 'loop.'

By recognising the links between hazards and events, resources can be applied that enable prevention of hazardous behaviour, unsafe building design and hazardous facilities. Possession of such a linked knowledge base is a precursor of effective preparedness.

Conclusion

The pursuit of effective risk management begins with the recognition that *it* is a process of making appropriate decisions. It follows from this that there needs to be an important emphasis the information needed to support these decisions. The QFRA is seeking to clarify and rationalise the manner in which it collects information and applies it to the prevention of and response to emergencies.

References

Covello, V.T., Menkes, J. & Nehnevajsa, J. (1982) "Risk Analysis, Philosophy, and the Social and Behavioural Sciences: Reflections on the Scope of Risk Analysis Research," in *Risk Analysis*, Vol.2, No.2, pp

Ingles, O. (1991) "A linguistic Approach to Hazard, Risk and Error," in *New Perspectives on Uncertainty and Risk*, in Handmer, J. *et al.* eds.), Centre for Resource and Environmental Studies, Australian National University, and Australian Counter Disaster College Natural Disasters Organisation, pp. 66-78.

Watson, S.R. (1981) "On Risks and Acceptability," in the *Journal of the Society for Radiological Protection*, Vol. 1, No. 4, pp. 41-60.

Smithson, M. (1991a) "Managing in an Age of Ignorance," in Handmer, J. et al. (eds., *New Perspectives on Uncertainty and Risk*, Centre for Resource and Environmental Studies, Australian National University, and Australian Counter Disaster College Natural Disasters Organisation.

De Marchi, B. & Rota, E. (1990) *Risk Information Needs of Communities near Seveso Sites: A pilot study*, Report EUR 12887 EN, Joint Research Centre of the Commission of European Communities, ISPRA.

Sheehy, N. P. & Chapman, A. J. (1986) " Accidents, Perceptions of Danger, and the Social Context: A Conceptual Analysis," in the *Journal of Community Psychology*, Vol. 14, pp. 307-314.

Greene, M.R. & Serbein, O.N. (1978) *Risk Management: Text and Cases*, Reston Pub. Co., Virginia.

Mazur, A. (1980) "Societal and Scientific Causes of the Historical Development of Risk Assessment," in Conrad, J. (ed.), *Society, Technology and Risk Assessment*, Academic Press, London, pp. 151-171.

Skolbekken, J-A. (1995) "The Risk Epidemic in Medical Journals," in *Social Science in Medicine*, Vol. 40, No. 3, pp. 291-305.

Paper 3

People's response during structural fires: an overview of research

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Peoples' response during structural fires: an overview of research

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ABSTRACT

When the human element is included in computer modelling of fires in buildings, accurate data on how people respond during a fire are needed. Fire incident statistics relate to outcome. They indicate who is at risk and the environmental conditions associated with risk and can serve to validate model output. However, they do not provide details of what people actually do during the course of a fire. In modelling human behaviour we need to know how people respond to particular elements within the environment (the fire, the building, warning systems, other people) and in particular the time taken to respond. Relevant but incomplete information comes from diverse (often obscure) sources. Large scale surveys and studies of particular incidents tell us about the types of actions and sequences of actions which people are likely to engage in during an incident but typically do not relate actions to specific conditions. Other field and experimental research provides information on aspects such as the likelihood of recognising cues and the speed of response in simulated emergencies. Research on human response is being undertaken at CESARE to support a risk assessment model being developed for a performance-based approach to fire safety design. An outline of the human behaviour model and of one method for obtaining quantitative data are presented.

Introduction

There are many ways of looking at human response in fires. From the media we might expect a 'heroes and victims' approach, from a counsellor an interest in post-incident reactions, from social researchers an account of risk characteristics. Those involved in preventing injury and loss of life and minimising material loss might focus on the effectiveness of installed safety systems and emergency plans. For those who have been in a fire - an occupant, perhaps, or a firefighter - simply coming to terms with one's behaviour under stress may be a priority. Each approach brings to light different aspects of response in a fire situation.

The development of computer modelling of fires and fire engineering has increased demand for more particular and accurate data on human behaviour in fire emergencies. In this paper I would like to describe the types of information that are sought and the amount and quality of the information available, and indicate where research is being directed. I will not discuss here the many methodological problems associated with obtaining data on human behaviour during fires. Canter (1990b) has described these elsewhere. The references quoted are illustrative rather than complete. Finally I would like to illustrate how the various research strands tie together by presenting an outline of the human behaviour model developed at the Centre for Environmental Safety and Risk Engineering (CESARE) and describing some specific research being undertaken to support it.

Early research

The systematic collection of information on occupant behaviour during fire emergencies dates back to the 1970s when two major surveys were completed by Wood (1972) in the U.K. and

Bryan (1977) in the U.S. Both covered a range of occupancies, the predominant one being one and two family dwellings, and, in describing behaviour, both focussed on identifying who the people were (numbers present, ages, gender, relationships etc) and what they did. Many other studies of behaviour in particular incidents and across a range of incidents followed (eg. Abe, 1976; Scanlon, 1979; Swartz, 1979; Canter, Breaux, & Sime, 1980; Haber, 1980; Bryan, 1982; Bryan, 1983a, 1983b; Sime, 1984; Donald & Canter, 1990). In general these follow a similar pattern in that they describe actions and sequences of actions taken during an incident and take into account demographic and occupancy factors. Few place the actions in real time or link response to specific within-event conditions and even fewer explore the link between actions and the immediate prevailing conditions as perceived by the occupant.

The general purpose of the research was to gather objective accounts of what occurred during fires in the hope that this would indicate measures which might be taken to improve safety. The research evolved as part of research into fire growth and most studies have been made under the auspices of organisations such as the Department of the Environment (Fire Research Station) in the U.K. and the National Fire Protection Association and National Institute of Standards and Technology in the U.S. Disaster research of the fifties and sixties influenced its direction and, indeed, some researchers worked in both areas. Disaster research was instigated with the purpose of exerting control to reduce the impact of a disaster on the population - through prevention, through preparation for the impact period and through action in the post-impact period. Fire research has not attended to the latter as its interest is in design, safety measures and standards.

Using the logic of disaster studies, researchers transferred the concept of temporal phases to fire incidents. While the phases are relatively easy to identify in a disaster (eg. the Powell and Rayner categorisation (Chapman 1962) of warning, threat, impact, inventory taking, help for survivors and recovery), the first three phases are concertinaed in a structural fire because of the short time sequence.

Over 300 distinct actions which can be taken by occupants were identified. Canter, Breaux and Sime (1980) reduced these to 49 'act classes'. In consequence, three phases in occupant behaviour were recognised, all incurring time use: recognising the presence of a fire through interpreting cues, preparing for action, and acting. The latter could be evacuating, fighting the fire, warning others or waiting). This descriptive behavioural model is useful because it acknowledges that significant delay is likely to occur in the early stages of a fire and explains failure to respond instantly. However it has little practical application because a straight progression through the stages is not inevitable, people can engage in more than one act in any phase, and there can be re-cycling through stages as conditions change. Although it is time-based it does not provide a means of pinpointing times.

Nonetheless, the research demonstrated that there are recurring patterns of behaviour which are common to different fires, different buildings and different people. It is this predictability that underlies the modelling of human behaviour.

Computer modelling of response

The early studies give direction to what variables to include in a model and how the variables fit with one another. In other words they provide a basis for outlining response in different occupancies. When the response of occupants is incorporated into computer models of fires in buildings demand for quantitative data on human behaviour in fire emergencies increases. Computer models define events by their physical, quantifiable components. The presence of smoke or flames, an alert or evacuation signal or a public announcement are readily modelled as triggers for movement of a population towards the desired goal of evacuation. However, models no longer simply apply an 'environmental determinist approach' (Sime, 1984), in which the time for escape and the direction of movement is a function of the speed of the fire and

smoke spread, the number of people present and the dimensions of escape routes. They take cognitive and social factors into account. Nevertheless, the luxury of using all the person-related variables which can be identified as influencing response (eg. Bickman, Edelman and McDaniel, 1977) is not available. Models are parsimonious in that key factors have to be selected. Whether the models are used to reconstruct or predict, decisions have to be made about whether, how and when people will respond to signs of a fire, including signs which are often indeterminate. As the models are time-based, the times nominated for response are particularly important.

Of primary interest in computer modelling is the movement of people from one compartment to another eg. from an apartment to the corridor, from the corridor to the fire stairs. This is particularly so in multi-storey buildings or large complex single-storey buildings. The emphasis in models is on evacuation movement - when it starts, the routes selected and time for completion - because the end goal is to describe where people are located in the building at any particular time. Response is viewed in two phases - pre evacuation and evacuation. Variation of behaviour within those phases depends on the complexity of the model.

Consequently the summary model for behaviour applied to most computer models is a modification of that formulated by Canter, Breaux and Sime. Rather than have evacuation as one of a number of actions, evacuation becomes the end action. Adding complexity like having occupants fight the fire is usually avoided. Fire fighting is left to firefighters. Other actions are typically assumed to occur during an interpretation or investigation stage. An example is the FIRECAM™ risk-cost assessment model from the National Research Council of Canada in which perception, interpretation and action are the key features of the model of occupant response (Yung, Hadjisophocleous & Proulx, 1997). The CESARE-Risk model (described later) has recognition/reception, investigation and evacuation phases.

It is difficult to quantify behaviour in the period prior to the actual start of evacuation. Delay at this time increases dramatically the risk of injury and death. Although other risks are present in any fire emergency, occupant exposure to the products of combustion (heat, flames, smoke, gases) is the major immediate concern. Identifying factors influencing occupant time to recognise cues during the early stages of a fire and respond before conditions become untenable is a safety issue as well as an issue for modelling human behaviour in fire. Early recognition of and appropriate response to indications of a threat will reduce potential exposure and help circumvent a potential disaster.

There is a lack of appropriate and reliable statistical data. Some models leave the user to apply a time to respond, some assume immediate response, some estimate response using as input varying proportions of "common knowledge" and hard data. The range of evidence that is required is very broad, the amount of published information comparatively small.

Sources of data

Fire incident statistics provided primarily by fire fighting organisations are the most readily available form of quantitative data. They indicate who is at greater risk of injury or death. Relevant factors include age (being very old or very young), incapacitation (being asleep or affected by drugs), engaging in behaviour which increases the risk of fire (smoking, misusing electrical appliances, leaving young children unsupervised) or failing to take preventive measures which will reduce risk should a fire occur (having operating smoke detectors, leaving keys in deadlocked doors). Even living in the wrong suburb increases risk!

However, these statistics describe the general outcome of fires and are not a sufficient base of support for the models. They too have methodological weaknesses in relation to sampling and reporting techniques. They do not allow us to predict in any other than general terms how occupants in, say, an office, a retail centre, or a residential building will respond. They do not

offer the required detail of how people react to particular events within a fire emergency and do not allow accurate prediction of the numbers who will respond and time delays in responding. They are, however, invaluable for indicating variables which should be considered in any model and for testing the validity of model output.

Accessing most other quantitative evidence is quite difficult. It is held within organisations (perhaps as internal papers, sometimes publicly available) or presented in conferences which may be local or international but which do not receive much publicity. Primarily these are conferences on fire engineering. The number of papers presented and the number of people attending sessions on the human behaviour aspect of fire emergencies increases yearly. Interest has sharpened as elements apart from route selection and travel speed are acknowledged to be central to safety. In my understanding, safety conferences tend to concentrate on solutions (eg. evacuation processes) rather than on understanding the actual experience of being in a fire but this apparent direction may simply reflect lack of research in the area. Psychological literature, if it mentions fire at all, usually refers to the effects of the experience rather than the experience itself and the interest of sociological studies is also in the effect. Human factors papers occasionally deal with relevant aspects. The value of these fields is not in their statistical support for human behaviour aspect of fire engineering models. They do, however, indicate possible theoretical approaches, although often indirectly, and theoretical models have been presented (eg. Withey, 1962; Proulx, 1991). Research into behaviour in fire has been as much the province of health and safety professionals and fire engineers as psychologists or social researchers.

The fact is that though the need for data is large the number of people researching the area is small and the researchers somewhat isolated. Furthermore, it is not easy to cope with the simplification involved in encoding information as qualitative reporting of human responses in fires is in many ways more satisfying - details and idiosyncratic behaviour which can throw light on normal responses can be explored. The forthcoming Human Behaviour in Fire Conference (Belfast, August/September 1998) is the first international symposium to be held on the topic in amny years and should bring researchers together and help to consolidate findings from disparate areas, clarify approaches and spread information. Again, however, it is likely that general findings will be more prominent than exact data.

After fire brigade statistics, perhaps the most accessible data are those relating to evacuation itself. Many of these studies have been presented in conferences. Early interest was shown in assessing time to evacuate and speed of travel under various conditions as this was the prime interest of computer models. More recently, (eg. Proulx, 1994; Proulx and Fahy, 1997) have presented work which looks at the initial delay in leaving apartments during simulated evacautions as well as the time taken to complete egress. Extrapolating from simulated evacuations to real fire events has to be done with caution as occupants are usually aware or quickly become aware that they are participating in a drill and because other features will be present in a fire. Many studies have shown that choice of escape routes can be influenced by familiarity with exit routes and by affiliation to other people.

Models also require data on response to different cues (triggers for a decision to act or not act) that may be present in a fire. General research has indicated which cues are significant: the problem now is to quantify their effect. Alarms are probably the most researched cue. As with all other cues, our interest is in both whether they are recognised in the first place and in how people respond to them. Experimental studies have been made of alarm recognition by sleeping occupants (Nober, 1983; Bruck and Horasan, 1995). Brennan (1997) has looked at the effect in a real fire situation. Proulx also has noted the proportion of people in evacuation drills and in a fire incident who failed to hear corridor alarms. Speed of response is affected by the type of alarm (eg. Keating & Loftus 1977a; Keating & Loftus, 1977b; Canter, Powell & Booker, 1988), training, and the frequency of false alarms. Many studies have demonstrated that a common response to alarms is to misinterpret them in the first instance (eg. Sime, 1984; Scanlon, 1979; Haber, 1980).

The opportunity for experimental research on smoke, a very significant cue in fires, is restricted. Researchers have looked at the preparedness of people to move through smoke (eg. Wood, 1972; Bryan, 1977; Fahy & Proulx, 1995; Proulx and Fahy, 1997; Jin, 1977) and the link between smoke density and ease of evacuation (Canter, 1985). Jin and other Japanese researchers have looked directly at the effect of smoke on behaviour. How people interpret and respond to different types and levels of smoke, what restrictions particulates have on response capabilities, whether people wake to smoke are areas on which there is little information. Medical and physiological studies of the effect of heat (or burns) and the inhalation of toxic gases (particularly CO and CO2) provide a basis for calculating injuries and fatalities in the models.

The presence of others has been cited repeatedly as an important element in response. Again, while features such as the presence of others, role, affiliation, clustering are readily identified hard data is lacking and such features have to be considered with caution. Bryan and Wood, for example, both claimed that males tend to engage in fire-oriented behaviour (eg. fighting fire) while females take on people-oriented (eg. alerting others) and avoidance behaviour. However, when the populations surveyed, categorisation of actions, and the total low number of people who actually fight fires are considered the finding does not have universal application. The role of staff in helping others is complex and affected by issues of status and training as well as by who the non-staff people are. In the Kings' Cross fire people responded faster to transit police than to underground staff (Donald & Canter, 1990). In the Woolworth fire in UK, waiters guided people they were personally serving. However, in other fires staff have been known to use exits known to them without advising others (Sime, 1984). Contrary evidence can always be found: most models take occupancy into consideration and allow flexibility in the numbers responding by applying probabilities.

An experiment by Latane and Darley (1968) to investigate bystander behaviour conveniently combined two cues: smoke and the presence of others. As it demonstrated delayed response, it is a favourite in the literature on behaviour in fires.

Developing and supporting models is demanding. It is not possible to discuss all the areas involved and the above is a selection of the key areas. It is important to remember that the evidence must deal with recognition of cues as well as response to cues.

CESARE-Risk and the Human Behaviour Model

The human behaviour model is a sub-model of the CESARE-Risk model which is a probability- and time-based model. This model is being developed in response to changes in the Building Code of Australia requirements to allow a performance-based approach to fire safety design as an alternative to prescriptive requirements. In essence, CESARE-Risk quantifies the performance of a building fire safety system by calculating the expected risk to life and expected cost through fire over the lifetime of a building. In simple non-engineering terms, it depicts how a building and its occupants will respond to fire by using probabilities and times to depict the growth of fire, and its effect on a building and its occupants.

As presently developed, the sub-model refers to the range of occupancies categorised by Classes 2-4 in the Building Code of Australia, that is, apartment buildings, hotels and motels, boarding houses and similar, hostels for the aged, and other residential accommodation for children and the disabled excluding health-care buildings. To do this, occupant groups (distinguished primarily by age, mobility or state of awareness, and number present) are initially identified and distributed throughout the building according to their representation in the occupancy type under consideration. The model falls into two parts, "response" and "evacuation". These will be described in turn.

The "response" model, one aspect of which is pictured in Figure 1, deals with behaviour up to the time when an occupant leaves their apartment or room intending to evacuate the building.

Probabilities and times for initial recognition of nominated cues are based on many sources as indicated above and involve findings from aspects such as the hearing of alarms by people asleep and awake, responding to smell by people asleep, and the role of alcohol in fire fatalities. Cues modelled in the present version are smoke (different levels), alarms (different types), warnings, instructions from staff, and the sound of glass breaking. Not all cues are available to all occupants. Distinctions are made according to whether the occupant is in the compartment of fire origin, on the level of the fire, on different levels above the fire, or below the fire. Probabilities and times for action (investigating or evacuating after receiving a cue and continuing or discontinuing evacuation in response to smoke in the corridor as seen from the apartment door) have come from a database developed after interviews with people who have had a fire in their building. The basic model is outlined in Figure 1 which indicates the main times and probabilities applied.

In contrast to models which apply a mean time for response, this model uses a three-point realisation to apply times from the database. This is done because the mean time fails to indicate the marked variability in the time taken before people start to evacuate even when cues are the same. Brennan (1997), for example, describes the time taken by sleeping residents to start evacuating in response to an alarm in one apartment building fire as varying from less than one minute to over 20 minutes. In the incident, smoke became an additional cue when occupants opened apartment doors. This external investigation was for many the factor that precipitated the decision to evacuate. The range of times to start evacuation is comparable with the thirty seconds to over twenty-four minutes to start evacuation in waking hours for non-naive subjects in trial evacuations reported by Proulx (1994). Those residents too were responding to similar cues - a building alarm, presence of the fire brigade, warnings from fire brigade personnel, and direct or indirect warnings from others - but not to fire cues.

The "evacuation" model deals with movement once occupants leave the room or apartment and takes into consideration travel speeds, availability of exits, smoke conditions in the corridors and stairs. It calculates how many people are in any section of the building at any one time and how many have evacuated, records the time an occupant spends in different fire conditions and calculates the amount of CO and CO2 inhaled. Incapacitation and death are effected by heat and the intake of CO and CO2.

An associated "fire brigade" model deals with the evacuation of occupants who are still in their rooms or apartments or are incapacitated in the corridors or stairs when the fire brigade arrives.

Research to support the model

One way to support times and probabilities used in the human behaviour model is through persona interviews with occupants who have experienced a fire in their building. A questionnaire is a second-choice alternative. As computer models deal with the response of all occupants in a building every attempt is made to interview occupants above and below the fire floor.

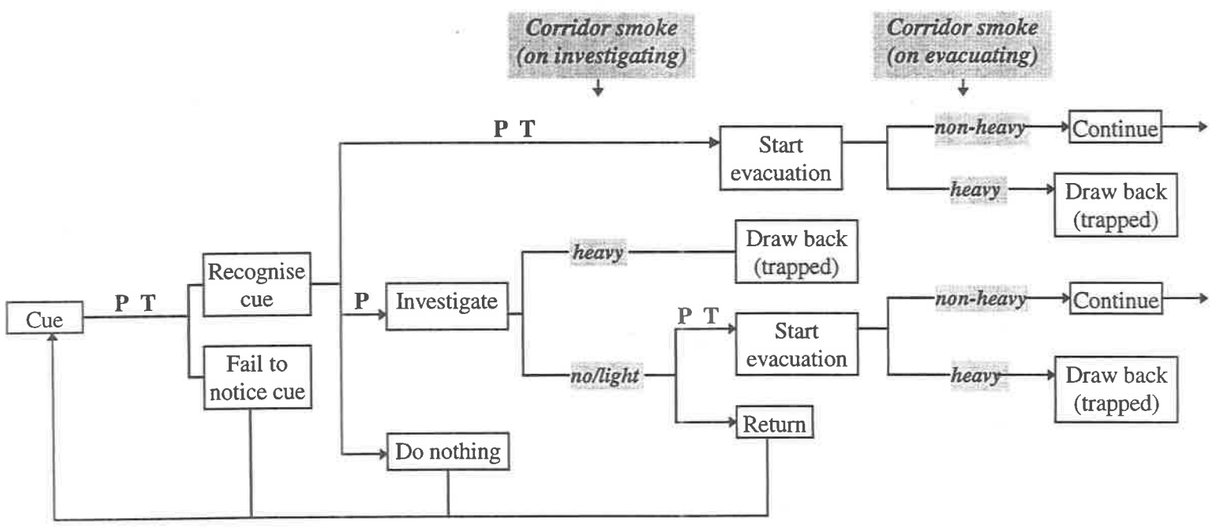

Figure 1 Response in apartments of non-fire origin
(**P** and **T** indicate where times and probabilities from the Response in Fires database are applied)

Canter, D. 1990a. Studying the experience of fires. In D. Canter, (Ed), ***Fires and human behaviour***. 2nd ed. London: David Fulton Publishers, 1-14.

Canter, D. 1990b. An overview of human behaviour in fires In D. Canter (Ed.) ***Fires and human behaviour***. 2nd ed. London: David Fulton Publishers, 205-234.

Canter, D., Breaux, J., & Sime, J. 1980. Domestic, multiple occupancy and hospital fires. In D. Canter (Ed.) ***Fires and Human Behaviour***, Chichester, U.K.: John Wiley and Sons, 117-136.

Canter, D., Powell, J. & Booker, K. 1988. ***Psychological aspects of informative fire warning systems***. BRE Report. Borehamwood, U.K.:Building Research Establishment

Chapman, D.W. 1962. A brief introduction to contemporary disaster research. In ***Man and Society in Disaster*** (Eds G. W. Baker and D. W. Chapman). NY: Basic Books, 3-22.

Donald, I. & Canter, D. (1990). Behavioural aspects of the King's Cross Fire Disaster. In D. Canter (Ed.) ***Fires and human behaviour*** 2nd ed. London: David Fulton, 15-30.

Fahy, R. & Proulx, G. (1995). Collective common sense: A study of human behaviour during the World Trade Center evacuation ***NFPA Journal***, March/April, 59-67.

Haber, G.M. 1980. Human behaviour in fires in total institutions. In D. Canter (Ed.) ***Fires and Human Behaviour***, Chichester, U.K.: John Wiley and Sons, 137-154.

Jin, T. 1997. ***Studies of human behavior and tenability in smoke***. Fire Safety Science: Proceedings of the Fifth International Symposium Ed Y. Hasemi International Association for Fire Safety Science, 3-21.

Keating J. & Loftus E. 1977a. Evaluation of the effectiveness of the vocal alarm system of the Seattle building. In Meisen, W.A. & Reinsel, R.E. 1977b. ***Emergencies in tall buildings: the designers respond to the human response***. Proceedings of the Conference on Human Response to tall Buildings, Chicago, ILL. Stroudsburg, Pa: Dowden, Hutchison & Ross Inc., 302-309.

Keating, J. and Loftus, E. 1977. Vocal alarm systems for high-rise buildings - a case study. ***Mass Emergencies,*** 2(1), 25-34.

Latane, B. & Darley, J.M. 1968. Group inhibition of bystander intervention in emergencies. ***Journal of Personality and Social Psychology***, 10(3), 215-221.

Nober, E.H., Peirce, H. & Well, A. ***Waking effectiveness of household and fire detection devices***. NBS Report No. NBS-GCR-83-439, Washington: National Bureau of Standards.

Proulx G. 1994. ***The time delay to start evacuating upon hearing a fire alarm.*** Proceedings of the Human Factors and Ergonomics Society 38th Annual Meeting, 811-815.

Proulx G. & Fahy, R.F. 1997. ***The time delay to start evacuation: Review of five case studies***. Fire Safety Science: Proceedings of the Fifth International Symposium Ed Y. Hasemi International Association for Fire Safety Science, 783-794

Scanlon, J. 1979. Human behavior in a fatal apartment fire. ***Fire Journal***, 73(3),76-79, 122-123

Sime, J.D. 1984 ***Escape behaviour in fires: 'Panic' or affiliation?*** PhD Thesis U.K.: University of Surrey, Department of Psychology.

Swartz, J.A. 1979. Human behavior in the Beverly Hills fire. ***Fire Journal***, 74(3), 73-74, 108

Withey, S.B. 1962. Reaction to uncertain threat In G. W. Baker and D. W. Chapman (Eds.) ***Man and Society in Disaster***. N.Y: Basic Books

Wood, P.G. 1972. ***The behaviour of people in fires***. (Fire Research Note No. 953). BRE Fire Research Studies, Borehamwood, U.K.: Department of the Environment and Fire Offices Committee Joint Fire Research Organization.

Yung, D, Hadjisophocleous, G, & Proulx, G. 1997. ***Modelling Concepts for the Risk-cost Assessment Model FIRECAM™ and its Application to a Canadian Government Office Building.*** Fire Safety Science: Proceedings of the Fifth International Symposium Ed Y. Hasemi International Association for Fire Safety Science, 619-630.

The interview procedure blends narrative and interrogatory interview techniques. Individuals are first asked to re-tell their version of the incident. This is recorded, transcribed later and used to clarify any gaps in the second account in which the experience is structured in a format which distinguishes the immediate triggers for each action from the action itself and asks for a reason for the action. The method thus tries to elicit not just what people did but what they noticed that made them act the way they did. As well, people may be asked to comment on aspects which they may not spontaneously and to make estimates of how long they took to complete actions. We use times of arrival of fire brigades to substantiate times where possible. Some details of the building (type of occupancy, dimensions, safety systems) and the extent of the fire are also sought.

An apartment fire database which has over 90 variables has been established. The variables cover many aspects related to the building, the fire, the occupant(s), the type and strength of cues noticed (smoke levels, alarm type, type of warning, presence of others, arrival/presence of fire brigade) and the order in which they are noticed, the actions taken in response to different cues and times taken to complete different actions. It is from this database that the probabilities of response to different cues and occupant response times of different occupant groups can be established. The reliability of the output is dependent on the number of cases, and building the database is expensive of time and effort. We are encouraged because outputs from the database agree with predictions made from a study of the literature. As the number of cases increases, so the ability to refine the output will increase.

Summary

If computer models of fire are to include people response, accurate and specific data are needed. Early research significantly increased our understanding of behaviour in fire emergencies and statistical data on deaths and injuries allow risk elements to be identified. General descriptive models which describe the response of people during a fire emergency have been developed. Predictive computer models need data on which people recognise and how different people respond to particular elements within the environment: cues coming from the fire, the building, warning systems and other people. If time-based, they also need reliable and valid information on how long it takes to respond. The information required is diverse and research is being undertaken to fill the demand.

References

Abe, K. 1976. The behaviour of survivors and victims in a Japanese nightclub fire: a descriptive research note. ***Mass Emergencies***, 1, 119-124.

Bickman, L., Edelman, P. & McDaniel, M. 1977. ***A model of human behavior in a fire emergency***. Report No. NBS-GCR-78-120. Washington, DC: National Bureau of Standards, Center for Fire Research..

Bruck, D. & Horasan, M. 1995. Non-arousal and non action with a smoke detector alarm in normal sleepers ***Fire Safety Journal*** 25(2), 125-139.

Bryan, J.L. 1977. ***Smoke as a determinant of human behaviour in fire situations (Project People).*** Report No. NBS-GCR-77-94, Washington, DC: National Bureau of Standards.

Bryan, J.L. 1982. Behaviour in the MGM Grand Hotel fire. ***Fire Journal***, 76(2), 37-48.

Bryan, J.L. 1983a. A review of the examination and analysis of the dynamics of human behaviour in the fire at the MGM Grand Hotel, Clark County, Nevada. ***Fire Safety Journal***, 5(3/4), 233-240.

Bryan, J.L. 1983b. Human behaviour in the Westchase Hilton Hotel fire. ***Fire Journal***, 77(4), 78-85.

Canter, D. 1985. ***Studies of human behaviour in fire: Empirical results and their implications for education and design***. BRE Report. UK: Department of the Environment, Building Research Establishment.

Paper 4

Need for Risk Management by Governments: a Challenge for the 21st Century

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NEED FOR RISK MANAGEMENT BY GOVERNMENTS: A CHALLENGE FOR THE 21ST CENTURY

Tom Wilmot and Tony Paish (*World Fire Statistics Centre*)

Cost and other pressures are increasingly forcing governments to seek more cost-effective solutions in a variety of policy areas. This approach could with advantage be applied to the handling of the major risks faced by the nation , in the same way that leading business corporations operate an active risk management strategy.

A prerequisite for the successful pursuit of such a policy would be the collection and analysis of the costs associated with the range of hazards in question; for fire, the work of the World Fire Statistics Centre provides an example.

To improve cost-effectiveness, some radical re-thinking may be needed, for example:-

(I) Policy
Integrating some risk management activities currently the responsibility of different government departments or other agencies.

(ii) Operations
Greater integration of activities, eg fire and ambulance services, perhaps accompanied by more delegation and, in some cases, by privatisation.

1 Introduction

One of the tasks facing every national government is how to handle the variety of risks to which its citizens, businesses and, indeed, its own operations may be exposed. These risks may range from major natural disasters, through wars, disease epidemics and financial crises, to more everyday hazards such as fire, crime, and accidents on the road and in the workplace.

However, few governments consciously consider risk management as one of their prime functions, let alone set up mechanisms to carry it out on a comprehensive basis. Yet most major business corporations now routinely pursue risk management strategies, often overseen by a risk manager with direct access to the main board of directors (AIRMIC, 1994). Why should not such an approach, based as it is on the tools of risk identification, analysis and assessment, followed by a combination of risk prevention, reduction, transfer and assumption, be applied to the business of government?

The immediate answer is that governments are generally concerned with more urgent priorities, seeking to push forward new policies on the basis of which they fought a preceding election. It does not win many votes, and is much less exciting, to be seen to be concerned about avoiding disasters or minimising losses. Only in the aftermath of a major crisis do politicians and civil servants turn their minds to trying to avoid similar disasters in the future.

Moreover, most of the hazards in question are already within the field of responsibility of individual government departments, which often appear to have in place well-tried mechanisms for dealing with them. Why, then, should one worry about the possible need for radical change, especially if transitional costs are likely to be involved, including the time and effort needed to alter longstanding departmental responsibilities?

The remainder of this paper sets out:

(i) to explain the case for governments to pursue a national risk management strategy,

(ii) to explore some of the means by which such a strategy can be developed, and

(iii) to draw attention to possible ways in which operational cost-effectiveness might as a result be improved.

2 The Case for a National Risk Management Strategy

In nearly all industrialised countries there has been a strong trend, starting well before the First World War and lasting until the 1980s, for national governments to assume one additional responsibility after another, with ministries expanding and proliferating in consequence, and civil servants, government agencies and variegated "quangos" multiplying. Only by continually delegating, dividing and then sub-dividing, tasks and responsibilities could the business of government be carried on at all. However, this has meant that only at the very centre of power, ie the President/ Prime Minister/ Chancellor supported by his cabinet, was it possible - or required - to see the whole picture, and then obviously in rather broad relief. Inevitably, this has led to curious administrative anomalies, which politicians are usually too busy with other preoccupations to address. Moreover, individual departments become attached to their own ways of doing things and tend to resist change introduced from outside. Thus it is not altogether surprising that no one person or unit is charged with the overall risk management function, which requires a detailed knowledge of the ways in which all aspects of government business are handled and the hazards to which they are exposed.

Meanwhile, in the private sector risk management coverage and techniques have been gradually developed during the postwar period, receiving particular impetus in the 1980s. A detailed study of UK corporate risk management in 1992 (Bannock, 1992) showed that among the companies sampled:-

- There was a high level of concern about non-entrepreneurial risks facing UK companies.
- These risks were perceived to be changing rapidly.
- A large-scale withdrawal of government from risk-bearing activities was perceived to be taking place (owing to privatisations, reduction in subsidies and other industrial aid, etc).
- The factors giving rise to the increased risks were seen to be embedded in the structure of the world economy, and would continue to grow.

The emphasis on risk being related to change is interesting, as it bears out a contention of one of the earlier academic studies of risk management (Crockford, 1976):

> "Risk can be considered as a function of change and risk management may thus be described as a technique for coping with the effects of change."

In the past two decades, governments have also been confronted by the need for far-reaching policy changes, as "big government" tax-and-spend policies have become discredited, as competition on a global basis has intensified, and as rapidly developing information and communications technology has offered the opportunity of trying new solutions.

Government responses have generally included major drives to hold down public expenditure and reduce budget deficits, often assisted by the privatisation of some activities and by partially offloading to the private sector responsibilities in other areas, eg pensions. As part of the drive to restrain public expenditure, many governments have been looking closely at the expenses of the remaining public services. In the UK, for example, local authorities' expenditure has been increasingly tightly constrained by Central Government for over two decades, leading to cuts in many services, from which the Fire Service has not been remained immune..

Unfortunately, cost savings produced merely in order to meet budgetary targets may prove counter-productive in the longer-run if they lead to an increased risk of accidental losses. This is what some businesses have learned the hard way, and explains the growing acceptance of the need for well planned and implemented corporate risk management strategies. Moreover, even where the private sector has assumed a greater risk-bearing role and has prime responsibility for dealing with certain hazards, government often has an essential supplementary role, via regulation and monitoring, in trying to assure citizens' safety and to avoid seriously damaging material losses.

Risk management therefore has a vital contribution to make in the pursuit of the overall cost-effectiveness of government policies. Furthermore, even at a political level there is much to be said for a greater and more consistent effort to minimise the potential damage arising from future crises, as the electorate is apt to punish governing parties which fail to put in hand necessary preventive measures or mishandle critical situations (as in the case of BSE/CJD mentioned below).

To take some examples from UK experience of extremely serious accidents which might have been avoided, or at least their effects much reduced, through the application of good risk management practices:-

Piper Alpha Explosion and Fire, 1988

The inquiry into the total loss of this North Sea oil production platform, which cost 167 lives and £2.1 billion in insured losses, brought to light numerous failings in safety procedures and equipment. It was noteworthy that at that time offshore oil and gas platforms were outside the jurisdiction of the Health & Safety Executive (responsible for regulating workplace health and safety on the UK mainland); regulation and supervision were the responsibility of the Department of Trade & Industry, which was also the sponsoring ministry for the oil and gas industry. As a result of the inquiry, the Health & Safety Executive's remit was extended to cover UK offshore installations.

BSE/CJD Outbreak,1984-

The incidence of the wasting and invariably fatal disease bovine spongiform encephalopathy (BSE) in British cattle was noted as early as 1984 and positively identified in 1986. Relying on expert advice that there was no evidence that this posed a risk to humans, the Ministry of Agriculture, at that time both the industry sponsor and responsible for food safety, did not put in hand immediately the drastic measures which from 1989 began to be introduced in a piecemeal way to safeguard the public from consuming contaminated beef. By early 1998 there had been 23 confirmed UK deaths from new variant Creutzfeld-Jakob disease (CJD), the human form of BSE, 2.2 million cattle had been slaughtered and their carcasses burnt, the EU had banned all UK beef exports, and the UK beef industry was undergoing its worst recession this century. The responsibility for food safety is now being transferred to an independent Food Standards Agency.

Windsor Castle Fire, 1992

An official report (National Audit Office, 1992) pointed to various failings with regard to the certification, inspection and enforcement of fire safety measures in Crown premises. In the 1980s the Home Office, which is responsible for fire safety in most Crown properties, had allowed its certification staff numbers to run down to a serious extent. By 1990 nearly half of the 9,000 Crown premises requiring fire certificates were waiting for their applications to be processed, and some had been outstanding for over ten years. It was only after a seriously damaging fire in late 1992 in the State Apartments of Windsor Castle, costing some £40 million and much adverse publicity, that ministerial minds were concentrated on the need to improve an obviously failing system. As one result, the refurbished Apartments are equipped with state-of-the-art active fire protection systems. More importantly, with the help of the secondment of officers from the regular Fire Services, the backlog of certification applications in respect of Crown premises has now been largely eliminated.

3 How to Develop a National Risk Management Strategy?

There are now a considerable number of treatises available on how to develop a corporate risk management policy. One of the best recent ones comes in fact from Australasia, where a joint Standard As/NZs 4360 1995 "Risk Management" has been introduced (Danaher, 1996) to provide a generic outline of the risk management process. Another, which draws on the results of a survey of 12 major UK companies, goes into more detail on the practical steps needed to apply the risk management concept, particularly emphasising the need for embedding the risk management function in the whole organisational structure, rather than leaving it mainly to a specialised unit (Stalvies, 1997).

While much of the guidance available from such sources is likely to be useful to any one seeking to set up a government risk management strategy, parts of the process recommended for corporations may well be more difficult to apply in the public sector. For example, for most companies the insurance of certain financial risks forms an essential component of the overall process. For governments such financial protection is seldom likely to be obtainable for many of the risks with which they are confronted. In addition, companies can generally express their risk exposure and the costs and benefits of risk management in money terms more easily than governments, whose concerns are focused more on protecting lives than property. Furthermore, most private sector organisations have a single over-riding goal, to earn money for shareholders, while governments have much more disparate objectives.

This is not to say that the concept of risk management in the public sector is completely unknown. In fact, there is evidence that it is being increasingly applied in UK local authorities (Hood,1996). Furthermore, in the Netherlands the Government has set up an organisation to deal with at least part of the overall problem: the handling of crises (Polman, Sourbag, 1994). While a number of other counties have set up units responsible for emergency planning, the Netherlands goes further than most in the nature and detail of its preparations, particularly emphasising the need for :"policy-makers and organisations concerned [to] train themselves to anticipate potential crises and to manage them effectively." (Ibid, p.18), and for departments to develop their own scenarios of possible future crises in order to gain insight into vulnerabilities and dependencies and the best ways of tackling them.

This is an important development, and could well serve as a useful example to other countries, but obviously covers only part of the total risk management problem, since it is not concerned with every-day risks and hazards. The handling of these is generally likely to absorb far larger resources than the cost of dealing with occasional crises.

Another approach to handling catastrophic risks that is concerned primarily with the role of insurance (Kunreuther, 1997) points also to the need for government involvement in the risk control process, particularly with regard to the setting and enforcement of appropriate building codes and of inspection requirements for engineering plant and industrial processes. Failures in these respects can lead to greatly increased material damage. For example, a substantial part of the $14 billion insured losses arising from Hurricane Andrew could have been prevented through better building code compliance and enforcement (Insurance Research Council & Insurance Institute for Property Loss Reduction, 1995).

In order to develop a rational risk management strategy for Government, it is clearly necessary to look not merely at the risks associated with public sector property and personnel.. Although many private sector assets may be covered by insurance, unless there is an appropriate framework of legislation and regulation, effectively monitored and enforced, insurance is liable to become prohibitively expensive and, in the ultimate, unavailable. In any case, not all risks are commercially insurable. Government will therefore have a risk handling commitment across the whole range of economic activity, even though in many fields it will need to act in concert with, or as a supplement to, the private sector.

For this reason, as a prerequisite for establishing a national risk management policy, Government will first need to identify all the main hazards to which individual citizens as well as public and private sector organisations are exposed. Then it will need to obtain and analyse both the costs arising from the incidence of losses and the expenditure on loss prevention and reduction activities. Such information will not of itself provide immediate answers on how best to handle all the various risks in question, but should provide a starting point, and at least

- assist Government in asking itself the right questions, and
- serve as an essential source of data for monitoring progress in implementing the strategy, once adopted.

As an example of the sort of information envisaged, one can look at the specific field of fire, where the World Fire Statistics Centre has been collecting and publishing a range of international fire cost statistics for over 15 years.

The World Fire Statistics Project

Fire losses take three main forms:-

- human losses (deaths and injuries),
- direct material losses (cost of replacing/repairing property destroyed/damaged),
- indirect losses (business interruption costs),.

In principle, the danger of incurring these losses may be tackled in a number of different ways (which are indeed often complementary), through:-

(i) training of all those who may be called on to handle a fire situation, and suitable publicity addressed to the public at large,
(ii) appropriate building design and construction,
(iii) specifying proper standards of fire resistance, and avoidance of toxic fumes, in products and materials used,
(iv) installation of appropriate active fire protection systems (smoke alarms, sprinklers, etc),
(v) maintaining effective fire-fighting arrangements, and
(vi) fire insurance, aimed at enabling funds for replacement to be rapidly mobilised, and business interruption insurance, aimed at protecting businesses against potentially damaging loss of profits.

A national risk management strategy would involve deciding (a) how much effort to devote to tackling the fire risk overall, and (b) how best to allocate resources among the various different forms of prevention and loss reduction expenditure. There are no easy general answers to these questions; each country has its own particular characteristics, related to climate, geography, history, institutions, social attitudes, national income and wealth, which are likely to affect the optimum balance of measures.

However, in an attempt to assist policy-makers, researchers and practitioners, the World Fire Statistics Centre has since the early 1980s been collecting and collating fire cost statistics on as internationally comparable a basis as possible from a number of leading countries, mainly from Western Europe but also including the USA, Japan, New Zealand and, more recently, Australia. These are submitted in annual reports to the United Nations, with a summary published in the Centre's annual Bulletin (copies available from the speaker on request). These statistics are collected and presented under seven main headings:

(a) Cost of direct fire losses to property.
(b) Cost of indirect fire losses (business interruption).
(c) Human losses (deaths and injuries).
(d) Fire brigade costs (excluding non-fire operations).
(e) Cost of fire insurance administration.
(f) Cost of fire protection to buildings.
(g) Cost of fire research, training and publicity.

Although this list is more comprehensive than ever before attempted on an international basis, it is still not all-embracing, omitting for example one important item - the cost of fire protection to products, which is extremely difficult to estimate, owing to a lack of reliable data sources. Even so, most contributing countries have been unable to return data under all the specified headings, and the resulting statistics need to be interpreted and used with care. Nevertheless, for all their limitations, the figures can still yield interesting insights into the effects of differing policy emphases between different countries, as indicated in the attached Appendix, which includes a summary table of figures extracted from the latest Centre Bulletin.

Once similar information is available to national policy-makers for all the major risks, they should be in a better position to start allocating resources in a more rational manner. At present in many countries spending in different areas is largely determined by pre-existing institutional arrangements, but perhaps influenced by short-term political considerations (for example, reflecting the need to be seen to be addressing the causes of the latest publicised disaster).

Theoretically, such a process should aim in the longer run for a pattern of spending in which the benefit of each additional unit of expenditure was roughly equalised across all areas of risk. However, politicians are liable to respond to differing public perceptions of the dangers of different risks, however illfounded on scientific evidence these perception may be. (For example, people tend to be more worried about the risk of being involved in a flying accident than in a motoring accident, because they believe that they have more control over the latter occurrence.) These perceptions "reflect a complex set of individual world views and social reference points", but are influenced by the availability of relevant information seen to be objective and reliable, preferably from sources independent of Government (Marris & Langford, 1997). In these circumstances, it seems desirable for Government to develop its risk management strategy in an open manner, making publicly available the full information on the basis of which any major changes in policy, on resource allocation or elsewhere, are proposed.

4 Risk Management as a Means of Improving Operational Cost-Effectiveness

While the question of resource allocation among different areas of risk is certainly an important facet of risk management, it is not the only way in which the application of the concept can benefit the national economy. Once national policy-makers come to take an overall view of their risk-handling responsibilities, various new possibilities for improving operational cost-effectiveness may appear. On the one hand, the establishment of a top-level body dedicated to the national risk management responsibility should enable a mass of bureaucratic red tape to be cut through. On the other, a detailed analysis of all the various organisations concerned with handling different risks should suggest ways in which cost savings and/or improved services might be secured.

Top-Level Organisation

Apart from the **Netherlands**, whose new crisis management organization, centred on the Ministry of the Interior (which is also responsible for the fire service), was mentioned in Section 3, a number of other countries have top-level organisations responsible for the integrated control of some, at least, of the various emergency services, for example:-

- **Belgium** has a General Directorate of Civil Protection,
- **Denmark** has an Emergency Management Agency,
- in **Finland** there is a central organization for all rescue services,
- in **France**, **Spain** and **Sweden** the fire brigades are ultimately responsible to the Ministry of Defence,
- in **Germany** the civil protection departments in the individual States come under the Federal Defence Ministry,
- **Norway** has a Civil Defence (Emergency Planning) Group,
- **Spain** has a Civil Protection Directorate, and
- in the **UK** the fire and civil defence services and emergency planning all come under the Home Office.

While such arrangements may prove helpful in handling emergencies, particularly through directing or co-ordinating the activities of the various emergency services, they are seldom concerned with the full range of risk management issues, including resource allocation and cost-effectiveness.

The European country which has probably gone furthest in the integrated control of disaster and emergency planning and operations is **Slovenia,** where the Ministry of Defence is responsible not only for handling natural disasters and other emergencies, but for the fire and civil protection services (including a number of voluntary formations such as the Red Cross and Boy Scouts) and for accident prevention and reduction. However, Slovenia has only been an independent nation since 1991, and the fire service was made responsible to the Defence Ministry only in 1994, so it is too early to judge the success of the new organisation. (There is a feeling in the fire service that their military masters are primarily interested in civil defence and handling natural disasters, whereas the fire brigades' day-to-day concerns are centred more on urban fires.)

Not even Slovenia closely approac s in its integrated risk-handling organisaton coverage of the full range of risks which should des bly come within the remit of a national risk management body, which besides fire and natura isasters should also be concerned inter alia with:

- crime,
- industrial safety,
- safety in the home,
- road, rail and air travel safety, and
- public health.

Even though many disparate hazards come under these various headings, a study of experience across the board suggests a useful general lesson: that when a significant change from past practice is occurring, it is even more necessary than usual to monitor closely what is going on and to act swiftly if mistakes become apparent. This is essentially a responsibility for operational management, among whom the risk management message needs to be spread and taken to heart, but subject to the oversight of a central unit. This unit's job will be to monitor progress within the overall agreed strategy, to provide professional advice, on occasion to require answers to pertinent questions, and to report to the Cabinet if anything appears to be going seriously wrong.

Improving Operational Cost-Effectiveness

The structure of most countries' risk control and emergency services tends to reflect historical factors underlying the development of its various institutions and of social and cultural attitudes, whereas if one were starting from scratch quite a different structure might appear logical. Because the effort and cost of any major reforms are perceived to be large, change tends to be gradual and incremental. Nevertheless, during the past twenty years a sea-change in political attitudes has occurred, and privatisation and competition are now seen to be the way to lower the cost and improve the efficiency of many services previously regarded as firmly in the public sector.

In Denmark, the **Falck** Group constitutes an interesting example of the way in which a private enterprise body, which began as a one-man firm in 1906, can develop so effectively as to become a formidable competitor in the provision of several different safety and security services. In fact, it is because it operates in a number of related fields simultaneously that it can secure significant cost savings compared with its competitors. In brief, Falck offers: fire, rescue, ambulance, security guard and vehicle breakdown services, and fire and burglary detection and alarm systems. It provides fire services under contract to over 60% of Danish municipalities outside the capital, and ambulance services to all 14 of Denmark's counties. It also has over 50% of the Danish market in security and guard services, in which it has many private sector competitors, and some 900,000 individual subscribers, mainly to its vehicle breakdown and rescue services. Finally, it has begun to manufacture and sell fire fighting and security equipment, and to extend its safety and security operations to other countries, particularly in Scandinavia. In 1995 Falck acquired a listing on the Copenhagen Stock Exchange, thus facilitating any future capital raising operations. (The information in this paragraph is obtained from the Falck Group's Annual Report for 1996.)

Falck thus serves as a possible model in three different respects:

- in the way in which it can exploit the possibilities of integrating the operations of many of its services so as to obtain significant cost savings,
- as an apparently efficient provider of certain services (fire fighting, ambulances) more often regarded as the natural preserve of the public sector, and
- in the way in which it obtains business from local authorities by bidding against actual or potential competition from internally provided services.

However, although Falck can offer instructive lessons to other countries, because of differing circumstances - particularly the way in which Falck's operations were built up gradually over many years - its experience would be difficult to transfer elsewhere in its entirety. In one respect, however, Falck represents only a more extreme example of what is already going on elsewhere: the integration of services in order to improve operational efficiency and lower costs.

Integration of Services

It is already commonplace for fire services in many countries routinely to provide a range of services little connected with fire prevention or fire fighting, including cutting free road accident victims, pumping out water from flooded buildings, dealing with hazardous chemical spills and rescuing stranded cats from trees. In some countries, for example Japan, Germany and Hong Kong, the fire services also provide emergency medical services via their own ambulance fleets and, in the case of Germany, helicopters. However, in all these countries the fire services' EMS ambulances do not replace but supplement the main ambulance service, based on hospitals.

Because there appear to be significant economies to be gained, coupled with improvements in response times, in the UK suggestions have started appearing for the fire and ambulance services to share buildings, including control rooms. A pilot scheme has now started in Derbyshire, involving fire and ambulance crews sharing three stations. If successful, this precedent could well be followed on a wide scale, both in Derbyshire and elsewhere.

However, as long as these services remain in the public sector it will be difficult to match the range of economies obtained by Falck, from whose integrated control centres motor breakdown and security guard services are for example also provided.

Tentative Moves towards Privatisation

Partly because of growing pressure on public sector finances and partly because of the swing of political opinion in favour of competitive private enterprise as the desirable way of providing most goods and services, governments in a number of countries are beginning to allow the private sector to assume a larger role in the provision of emergency services. While nearly everywhere the mainstream fire, police, ambulance and most rescue services remain largely in the hands of a range of public sector institutions, often supplemented by volunteers and charitable organisations such as the Red Cross and the St John's Ambulance Corps, for-profit enterprises are starting to nibble at the edges. For example::

> While the **police** are struggling to contain rising crime, everywhere private security guards are assuming a greater role, not only in safeguarding industrial and commercial property, bank cash, etc but also in protecting major building complexes open to the public (ports, airports, shopping malls, etc). In many countries these "private policemen" now outnumber their public counterparts (whose efforts are in any case often supplemented by those of "civilians", responsible for paperwork and computer operations). Private security operations are usually intended to deter crime through enhanced surveillance, leaving the ordinary police to try to clear up crimes once committed (The Economist, 1997).
>
> In the UK, the **fire services** formerly owned by the nationalised British Rail have now been offered for sale to the public, as part of BR's piecemeal privatisation process. In the USA, a private security firm recently won a 3-year contract from a district fire commission in Florida to replace the district's firefighters (Fire International, 1997).
>
> The growth of private hospitals and nursing homes in the UK and some other West European countries has led to a corresponding expansion in private **ambulance** services.

Alternative Models of Privatisation

In Britain, it has for some years been Government policy to require **local authorities to invite competitive tenders** for a growing range of their services, with in-house staff only able to keep the work if successful in the bidding. Most refuse collection, traffic warden and building maintenance services have, for example, now been contracted out. It has not been suggested that this process should be extended to the fire service (and in any case local fire authorities do not correspond precisely in their coverage with the local authorities whose areas they serve), but the precedent and framework are there should a future government wish to do so. Moreover, an instance of local authority sub-contracting has now actually occurred in the USA (see above). However, given the lack of private sector experience in managing fire services, this model may perhaps in most countries be easier to apply in the short-run to ambulances than to fire brigades.

Another possibility would be for **insurance companies**, perhaps operating in conjunction in particular areas, to take over the provision of fire (and/or ambulance) services. This would enable significant economies to be obtained as regards fire inspections of commercial and industrial premises, and would enable underwriting of risks to be more closely related to the emplacement of appropriate safety measures. Moreover, insurers (who were heavily involved in fire brigade operation in the 19th century) have a strong commercial interest in maintaining an efficient fire fighting service so as to help restrict the amount of insured fire losses.

A third idea is related to the possibility of **delegating** to the private sector certain of the public services' current tasks which could be detached from their mainstream responsibilities. A particular example of this already exists in the field of industrial safety, where UK insurance companies (or their specialised subsidiaries) carry out regular statutory inspections of lifts, boilers and a wide range of other engineering plant, under powers delegated by the Health & Safety Commission. It has been suggested that these inspections could be extended to cover fire risks, with a view to cost-saving benefits and efficiency improvements (at present fire insurers have periodically to carry out their own separate surveys, for underwriting and risk control purposes).

Consequences of Privatisation

Perhaps the natural first reaction, by the public at large as well as the personnel concerned, to the idea of privatising part or all of the public services provided by bodies such as the fire brigades will be one of alarm. Disruption of a system that has worked well for a long time could only be justified if there were reasonable confidence that drastic reform of the kind discussed would bring worthwhile improvements. So, looking at the fire service, what potential benefits could be envisaged?

(i) For **Government**, the immediate attraction would be the significant reduction in public expenditure at a time when most countries are seeking budget cuts.

Another attraction would be the opportunity to avoid making unpopular political decisions. In Britain, for example, Government-imposed spending constraints have led to the closure of a number of fire stations, despite strong local opposition to the lowering of fire cover.

In the longer-term would be the prospect of improved cost-effectiveness, leading to greater national prosperity. Fire costs around 1% of GDP in most countries, and any reduction in this drain on the national economy would enable more money to be provided for underfunded institutions such as schools and hospitals.

(ii) For the **public**, a great attraction would be that the money available to the fire service would no longer be dictated by a rigid Government policy, concerned with reducing public spending.

A privatised system would offer the benefits of greater flexibility, both in enabling annual budgets to be replaced by constructive long-term planning and by providing a coordinated range of activities (eg fire, ambulance and breakdown services) in response to market demand.

Moreover, privatisation would open up the prospect of additional funding, resulting in improved levels of service,.

(iii) For the **staff,** the current situation of Government cost-cutting, involving staff reductions, would be replaced by the prospect of more capital being invested in expansion. Highly trained staff could look forward to a new era of wider responsibilities, promotion and increased pay.

APPENDIX

Fire Cost Statistics: an International Comparison

The figures in the following table are derived from the 1996 and 1997 statistical reports for the United Nations produced by the World Fire Statistics Centre. In looking at the statistics, it should be recalled that the data submitted by the participating countries (often taken from published sources) have usually been adjusted so as to make the resulting figures as comparable as possible with those of other participants on the basis of a common international standard. For example, most initial estimates for direct fire losses and for fire deaths have been adjusted upward to allow (inter alia) for unreported losses and deaths.

The table is based on returns from those participating countries which provide data on direct fire losses and on fire deaths, as well as on one or both of fire brigade expenses and costs of fire protection for buildings. These four items represent respectively the two most important kinds of loss and the two largest costs of fire loss prevention/reduction, Except where otherwise indicated, the figures are presented as (i) three-year averages 1992-94, so as to help overcome the effect of year-to-year fluctuations, and (ii) percentages of gross domestic product (GDP) - apart from fire deaths, for which the yardstick used is population -so as to assist international comparisons.

	1992-94 Statistics			
Country	**Direct Losses (% of GDP)**	**Fire Deaths (per 100,000 population)**	**Fire Brigade Costs (% of GDP)**	**Fire Protection Costs for Buildings (% of GDP)**
Austria	0.19	0.82	0.09[1]	
Canada	0.23	1.52	0.35[2]	0.31
Finland	0.16[3]	2.46[3]	0.29[3]	
France	0.25	1.19[4]		0.16
Japan	0.09	1.52 *	0.31	0.25
Netherlands	0.20	0.60	0.16	0.31
New Zealand	0.18	1.01	0.17	0.14
Norway	0.24	1.59	0.11	0.35[5]
Poland	0.13	1.59	0.19[3]	
Sweden	0.24	1.32	0.20	0.13
UK	0.16	1.41	0.26	0.13
USA	0.13	1.91	0.28	0.28
Unweighted average	0.18	1.41	0.22	0.23

1 1994
2 1991
3 1993-94
4 1992-93
5 1992, 1994

* Reported fire deaths in Japan are artificially swelled by a significant number of ritual suicides by fire.

The interpretation of the figures shown above is by no means straightforward, for a number of reasons. In particular:

- Direct losses tend to be higher in countries with long cold winters, because of the increased risk of fire from heating appliances (eg Canada, Norway, Sweden).
- Fire deaths and fire brigade expenditure tend to be lower in countries such as Austria where there are large numbers of volunteer firemen, who not only tackle fires but also spread the fire safety message among the general population.
- Fire brigade expenditure is often above average in countries where the population is widely dispersed (eg Canada, Finland, USA) and below average where it is highly concentrated (eg the Netherlands).
- Periods of recession in the construction industry can lead to reduced levels of spending on fire protection for buildings (eg France, Sweden and the UK in 1992-94).

Even after taking account of special factors such as these, and accepting that the circumstances of the countries in the table are so disparate as to make it risky to draw firm conclusions, it will nevertheless be observed that there is a certain tendency for above average expenditure on fire brigades to be associated with below-average fire losses, but not necessarily with below-average fire deaths. This is interesting, given that national fire services are almost invariably given the prime objective of protecting lives, with the protection of property a secondary objective (if specified at all). This could possibly be because the majority of deaths occur in residential property, often within a very few minutes of a fire taking hold, meaning that the fire service - with the best will in the world - is liable to arrive too late to save all those at risk. To save more lives, perhaps greater weight should therefore be given to increased spending on fire protection in buildings?

Unfortunately, these figures cannot really suggest an answer to this question. Even were several countries' 1992-94 returns not influenced by building industry recessions, it would still be unsafe to take expenditure on fire safety measures over a period as short as three years as indicative of the general level of fire safety in a country's building stock, which will have been constructed according to varying building codes over many decades. However, as these statistics are accumulated over the years, hopefully with increasing coverage and reliability, pointers may start to emerge.

Leaving fire deaths and injuries out of account, given the special difficulty of attaching monetary amounts to them, what is reasonably clear is that most countries suffer a somewhat similar burden in carrying the other three main fire cost elements. Of the eight countries in the table for which information is available under all three cost headings, six have totals falling within the range 0.55% to 0.70% of GDP. Moreover, there are special factors affecting each of the outliers:-

- New Zealand (O.49% of GDP) has the advantage of a small population and plentiful supplies of cheap land, meaning that most buildings are of single storey construction, reducing the risk of the occupants being trapped inside by fire and thus requiring minimal built-in fire safety measures. Moreover, the main industry is agriculture, for which fire risks are well below-average.

- Canada (0.89% of GDP) has recently undertaken a detailed study of the total cost of fire to the economy*, which has led to more reliable, and usually higher, estimates being returned under most of the Centre's statistical questionnaire headings. Were other countries to carry out similarly detailed research, there is the possibility that many of their figures might also show an increase.

For the majority, however, the implication seems to be that even if the total economic cost of fire may not vary a great deal from country to country, it may still be quite possible by different risk management policies to distribute the cost burden in very different ways.

* Schaenman, P. and others, 1994. ***The Total Cost of Fire in Canada: an Initial Estimate.*** TriData Corporation, Arlington, Virginia for the National Research Council of Canada.

5 Conclusion

For governments, the current concentration on cutting public expenditure makes it timely to formulate a national risk management strategy. This should aim not merely at the avoidance of disasters but also at improving the cost-effectiveness of risk-handling services. An essential first step in the formation of such a strategy should be the collection and analysis of detailed information on the losses incurred, and the associated costs of risk prevention and risk reduction, in respect of each of the main risk area under study.

The example of Denmark's Falck Group suggests a number of possible ways of improving cost-effectiveness in risk-handling, including the adoption of an integrated approach to the provision of emergency services and the privatisation of some of those activities currently provided as public services.

For the fire service, the trend for budgets to be reduced under government cost-cutting policies is unhealthy. One possible change, privatisation, needs to be considered, as the advantages might outweigh the disadvantages.

References

Graham Bannock & Partners, 1992. ***Risk Management: a Boardroom Issue for the 1990s.*** Report on a research study for Sedgwick.

Crockford, G.N., 1976. The Changing Face of Risk Management. ***The Geneva Papers on Risk and Insurance.*** 1(2) p.10-15.

Danaher, V.J., 1996. ***Joint Australia/New Zealand Standard on Risk Management: the Next ISO Standard.*** Institute of Risk Management 1996 Annual Conference Papers.

Economist, 1997. ***Policing for Profit: Welcome to the New World of Private Security***. 19.4.97 p. 23-26.

Fire International, 1997. ***Firemen Replaced by Private Firm.*** March 1997 p. 7.

Hood, J., 1996. The Management of Risks in the Public Sector. ***Journal of the Society of Fellows.*** (Chartered Insurance Institute) 11(1) p. 21-29.

Insurance Research Council & Insurance Institute for Property Loss Reduction, 1995. ***Coastal Exposure and Community Protection: Hurricane Andrew's Legacy.*** Wheaton, Ill. and Boston.

Kunreuther, H., 1997. Rethinking Society's Management of Catastrophic Risks. ***The Geneva Papers on Risk and Insurance.*** 83 p.151-176.

Marris, C., Langford, I., 1997. No Cause for Alarm. ***Risk and Human Behaviour Newsletter***.1 p. 6-8.

National Audit Office, 1992. ***Fire Prevention in England and Wales.*** HMSO, London.

Polman, J.M.M., Sourbag, M.B.M., 1994. ***Crisis Management.*** Netherlands Directorate-General for Public Order and Safety.

Stalvies, C., 1997. Continuity by Design: Embedding Operational Risk Management Functions in the Organisational Structure. ***Journal of the Society of Fellows*** . 12(1) p. 104-130.

TOM WILMOT was Chief Executive of the British Insurance Association (BIA), the main trade association for UK insurance companies, 1946-71. From 1971 to 1978 he was a Research Fellow at Sussex University, publishing *European Fire Costs: the Wasteful Statistical Gap* (Geneva Papers in Risk and Insurance) in 1979. In 1980 he founded the World Fire Statistics Centre (WFSC), of which he has since been the Director.

TONY PAISH worked as an economist for Prudential Assurance 1955-66, before moving to the BIA, where he became an Assistant Secretary in 1970. When the BIA was merged with five other insurance company trade associations in 1985 to form the Association of British Insurers (ABI), he transferred to the new organisation, retiring as Chief Economist in 1993. He joined the WFSC in 1994 as Deputy Director.

Paper 5

Fire Fatalities in Australia

Judy Newton, Department of Emergency Services, Queensland

FIRE FATALITIES IN AUSTRALIA

by Judy Newton, Policy Officer,
Department of Emergency Services, Queensland.

1. INTRODUCTION

The "Fire at Risk Groups" project is a research initiative of the Department of Emergency Services' Policy Unit in co-operation with the Queensland Fire and Rescue Authority (QFRA). The project was conducted with the co-operation of the Australasian Fire Authorities Council (AFAC) and other Australian State and Territories Fire Services.

The "Fire at Risk Groups" project represents a critical step in the development of enhanced strategies to reduce the number of fire fatalities in Australia and hence the overall cost to the community of fires.

2. BACKGROUND

Over the past five years, the QFRA (formerly the Queensland Fire Service) has placed an increased emphasis on preventative strategies as a means of further reducing the loss of life, level of injury and loss of property due to fires. Recent community surveys (1995 and 1997) in Queensland have indicated that a considerable majority of householders believe that early warning of smoke and fire is the most critical factor affecting their safety in the event of a fire. The community is therefore receptive to an increased emphasis on service delivery strategies.

The need for an increased emphasis to be placed on prevention strategies is further strengthened by anecdotal evidence from operational firefighters which suggests that people who have died in fires were often dead before the fire brigade was notified. The "Fire at Risk Groups" project was initiated to address the lack of quantitative research in this area, with the results of this project providing a basis for improving current Fire Service prevention service delivery strategies.

3. PROJECT OVERVIEW

The 'Fire at Risk Groups" project aimed to:

- *assess any possible relationship between the estimated time of death of fire victims and the time the Fire Services were notified*
- *examine any common contributing factors to fire fatalities*
- *collect demographic and socio-economic characteristics of the fire victims in order to assist Fire Services with the targeting of fire education campaigns to groups in the community who were most at risk of fire*
- *make recommendations with the aim of reducing the incidence of deaths in*

structural fires.

The research project derived fire fatality data relating to all structural fires including mobile properties such as mobile homes, caravans, campervans and transportable buildings that have occurred in both urban and rural areas of Australia between 1 July 1991 and 30 June 1996. Fire occurring in selected water transport vessels, as identified in the Australian Assembly of Fire Authorities Incident Reporting System, Block J1 Division 4 Codes 41 and 42 were also examined. In terms of fire categories, all fatal structural fires either, deliberate, accidental/preventable or undetermined, were examined and incorporated in the analysis. However, when examining cause of death in fatal fires, deaths not directly attributed to the fire such as heart attacks, self inflicted wounds or suicide were not incorporated directly into the analysis.

The following Australian Fire Services participated in this research project; Queensland Fire and Rescue Authority, New South Wales Fire Brigades, Australian Capital Territory Fire Brigade, Melbourne Metropolitan Fire Brigade, Victorian Country Fire Authority, Tasmanian Fire Service, South Australian Metropolitan Fire Service, Western Australian Fire and Rescue Service and the Northern Territory Fire Service. Data analysis was initially performed on a state by state basis in order to determine the unique characteristics of fatal fire incidents in each State and Territory. The data were then combined and analysed collectively in order to achieve a national perspective on fire fatalities. This paper concentrates on the collective analysis of the Australian data.

4. AUSTRALIA

The findings of this investigation into fire fatalities in structures across Australia during the 5 year period include:

- *an estimate that most fire death victims die before the fire brigade is notified,*
- *that the elderly, the very young and adults affected by alcohol are at a greater risk of dying in the event of a fire,*
- *that residential properties were the most frequently cited property in which fatal fires occurred (in particular rental properties)*
- *that the major cause of death was smoke inhalation; and*
- *that the absence of smoke alarms appear to contribute to the increased risk of death in the event of a fire.*

5. CONCLUSION

The 'Fire at Risk Group' project detailed findings on both a national and a State by State basis. The combined effect of these findings adds significant weight to the need for an increased emphasis on fire safety and prevention strategies and to carefully target those groups identified as most 'at risk' from fire deaths.

6. BIOGRAPHY - JUDY NEWTON

Judy completed her Bachelor of Business degree majoring in Marketing at the Queensland

University of Technology in 1995. Whilst at University, Judy's academic achievements included winning a bursary from Castlemaine Perkins for market planning for specialised target groups, graduating with Distinction and a Dean's Award for Excellence in Marketing.

Judy joined the Queensland Government in 1996 as a participant in the Graduate Development Program. She worked on several major projects with the Department of Primary Industries and the Office of Women's Affairs before commencing employment with the Department of Emergency Services in October 1996. To date, Judy's achievements as a Policy Officer with the Department of Emergency Services include the project management of the 'Fire at Risk Groups' project, the co-ordination of the departmental International Women's Day activities and representing the department on whole-of-government transport issues.

Paper 6

Real Time Information in a Decentralised Fire Service

Stephen Walls, Country Fire Authority, Victoria

Real time information in a decentralised fire service.

Stephen Walls, Country Fire Authority of Victoria

South Eastern Australia is recognised as one of the most bush fire prone areas of the world. The Country Fire Authority of Victoria (CFA) protects over 2.5 million people spread over an area the size of Great Britain. The distances involved make communication difficult, however when a wildfire is burning, it is essential that information about the fire is as accurate as possible.

To overcome the information flow problems inherent in a decentralised fire service, the Country Fire Authority developed a unique computerised information system. The Operations Management System (or OMS) runs on a client - server computer system and provides information on predicted and actual weather, fire spread, resources in use and fire control strategies. Integrated into the system are fuel curing information from satellites and real time weather information from a network of remote automatic weather stations.

The CFA won an award from the Smithsonian Institution for its innovative use of computer technology in developing the Operations Management System.

The development of this system has been based on the need for real time operational information from the fires to be available across the state to assist with planning and resource allocation needs, and so that information about a fire can be made available to media, the public and other emergency personnel when it is needed,

1 Wildfires in South Eastern Australia

South Eastern Australia is recognised as one of the most bushfire prone areas in the world. The experiences of the Western District fires (1977), Ash Wednesday (1983), and the major fires and incidents that have occurred since, have brought significant changes to CFA's approach to community safety, fire operations management and information systems.

Major fires usually occur on days when Victoria is buffeted by strong, gusty, northerly winds coming from the hot, dry interior of the continent. The high temperatures and low relative humilities associated with these winds dry out the grass and the loose ground fuel of forests. Once a fire is burning, the wind's strength becomes the most important weather factor. The stronger the wind, the faster the fire spreads.

The flames tilt over the unburnt fuel ahead of the fire, drying it out. Sparks, embers and long burning strings of bark are blown ahead of the main front and start spot fires.

A feature of Victoria's most destructive fires has been the south-westerly wind change associated with a cool change. This tends to occur late in the day so that any fires which have not been controlled by the time the change arrives can become much larger as a result of the SW wind.

2 The Country Fire Authority

Victoria is the smallest of Australia's mainland states, covering an area slightly smaller than Great Britain.

Following the major fires of 1939 and 1944, a Royal Commission was held which recommended the formation of a body to be responsible for firefighting outside the Metropolitan Fire District.

The Country Fire Authority (CFA) is a Public Statutory Authority, formed in 1944 *"for the more effective control of the prevention and suppression of fires in the country area of Victoria..."*. Prior to the formation of the CFA, the Country Fire Brigades Board was responsible for Urban Fire Brigades in country towns, whilst Bush Fire Brigades were loosely co-ordinated by the Bush Fire Committee, and some funding was provided by the Forests Commission.

The CFA is a diverse community-based emergency service organisation committed to creating a safer community. It does this by providing a range of risk reduction and suppression services to reduce the exposure of the community to risks that arise from a wide range of emergencies.

The organisation is distinguished by its long history of service excellence and community leadership, and shares responsibility for the safety of communities across a large geographic area. It has built up a strong reputation over fifty years and is now

recognised as a leader in the provision of a wide range of emergency services and support in times of community hardship.

CFA serves the country area of Victoria, which is defined as *"that part of Victoria... outside the Metropolitan Fire District, but does not include any forest, National Park or protected public land."*

The Country Area of Victoria totals 148,746 km^2.

The other fire services in the state with statutory responsibility are the Metropolitan Fireand Emergency Services Board (MFESB) and the Department of Natural Resources and Environment (NRE). By comparison, the Metropolitan Fire District comprises 1,094 km^2, and the area of public land that the Department of Natural Resources and Environment is responsible for totals 77,673 km^2.

The CFA comprises of a mix of personnel, consisting of approximately 74,000 volunteers and 820 full time staff. These people are dispersed throughout Victoria, coming together from all walks of life under CFA's banner.

The area serviced by the CFA has a population of slightly under 2.5 million people, or 59% of the Victorian total. This increased by 259,000 between 1986 and 1991. The CFA annual budget is around $94 Million.

The average number of fire and emergency calls is around 23,000 per year.

2.1 Decentralised organisation

The CFA consists of a total 1226 fire brigades, organised into 140 Groups of Brigades. Only twenty three of the brigades have full time operational staff attached.

The state is divided into 20 Regions for operational purposes. Since 1995, regions have been organised into 12 Areas for administrative purposes.

Operations are managed on a local basis. When significant fires occur, support is arranged from surrounding areas irrespective of the service, or region involved.

A centralised dispatch system operates for the CFA areas in outer metropolitan Melbourne, however most CFA brigades are alerted and controlled on a local basis.

The central Computer Aided Dispatch System will provide dispatch and communications functions, however control is exercised from the incident or an Incident Control Centre, not the dispatch centre.

Because of the fact that all 20 regions report directly to the Chief Officer for operational matters, an information handling system needs to be able to function well even when there are significant fires in a number of regions.

3 Operational Information Requirements

The distances involved make communication difficult, however when a wildfire is burning, it is essential that information about the fire is as accurate as possible. The development of the Operations Management System has been based on the need for real time operational information from the fires to be available across the state to assist with planning and resource allocation needs, and so that information about a fire can be made available to media, the public and other emergency personnel when it is needed,

Information flow must be both up and down the chain of command, and indeed sideways.

Information about the fire or incident is required to be transmitted from the fire to the local Group HQ, then to the Region HQ, and then to CFA Headquarters.

This information comprises many factors, but primarily :

Fire size and Status
Resources deployed to the fire
Additional Resources required
Incident Management structure in place
Potential fire spread and potential damage estimates
Strategies in place
Actual losses

Information required to travel down the chain of command to the Incident Management Team would include:

Actual and forecast weather
Availability and estimated time of arrival for additional resources
Any information about factors likely to impact on fire behaviour

Crossflow information provided to regions would include general information about the size and status of fires occurring in other regions, resource deployments and weather patterns.

This presents a complex picture of information requirements, bearing in mind that this information must be available when required, without leading to information overload.

The solution to these information requirements has been developed using the computer technology to provide a real time information flow that enables more effective control of fires and incidents.

4 CFA Computing Environment

As a large decentralised organisation, the CFA uses a range of management systems.

Like many companies, the Information Technology systems of the CFA are being updated. An example of this updating is client/server technology replace mainframes. The CFA uses 22 Sun Sparc systems running UNIX and Sybase DBMS as the server, networked to normal desktop personal computers running DOS and Windows as the clients.

The CFA Information Technology Infrastructure is designed to complement the decentralised organisational structure with a decentralised computing environment that provides an expected stable computer applications platform for the next 10 to 15 years.

The Distributed Database offers:

Modularity
Standardisation
Low cost expansion
Capacity
Performance
Functionality
Ease of support
Ease of adaptability to requirements of other Emergency services
Ideal price/performance

4.1 Use of Networking

The computing infrastructure implemented in late 1992 is based on a distributed database, local area networks (LANs) and a wide area network (WAN). The networks link central and regional computer systems. All systems are capable of operating fully autonomously.

The environment is extremely modular. Whenever a new application is commissioned, another low-cost Unix data server can be added to the IT Infrastructure.

The high degree of standardisation and modularity makes the environment easy to use and thus helps to reduce the costs of running the infrastructure.

For these reasons the IT Department selected SUN as the prime supplier for the database server computers. The servers proved easy to install and needed little configuration or ongoing maintenance. To avoid costly integration problems the LAN between the PC workstations and the database servers was also supplied by SUN.

At present, the IT infrastructure comprises a central LAN at Headquarters at Burwood East with 200 Personal Computers connected to a SUN SPARC 20 server and 20 Regions subsystems with 4 to 12 PC workstations.

At the Regional level, the SUN server solution was chosen over a PC network because of significantly reduced support requirements and, more importantly, lower costs.

All LANs are linked through Telecom's Austpac Public Network, running line speeds of up to 9600 bps. The speed of the leased line has proven more than adequate to update the databases across the state. Two locations are served by 64K ISDN links. The system currently handles 40,000 transactions a day with data transmitted to any sub-system from any other sub-system.

4.2 Redundancy

The CFA runs a redundant site for its Headquarters Emergency Operations Centre. This is located at its Dandenong Regional Headquarters. A redundant site is a computer site which runs in parallel with a main site.

It works as a backup system and is capable of taking over all functions immediately in case of malfunction. It is vital in coordinating an emergency that such a backup is available.

5 Operations Management System (OMS)

To overcome the information flow problems inherent in a decentralised fire service, the Country Fire Authority developed a unique computerised information system. The Operations Management System (or OMS) provides information on predicted and actual weather, fire spread, resources in use and fire control strategies. Integrated into the system are fuel curing information from satellites and real time weather information from a network of remote automatic weather stations.

The CFA has won an award from the Smithsonian Institution for its innovative use of computer technology in developing the Operations Management System.

The Operational Management System (OMS) consists of various databases and projects which provide tools for operational personnel to carry out their work in the field. It consists of:

Weather Display Program
Incident Management System
Fire Danger Display
Fire and Incident Plotter
Weather Forecast system
Resource Management System
Fire and Incident Reporting System

In order to provide an insight into the overall system, we will only examine a small part of this.

5.1 Weather

The Operational Management System enables the CFA to monitor weather patterns and fronts as they occur across the State. Significant changes in weather patterns, such as the passage of a front before a cool change in summer, can have a dramatic effect on the direction and size of a wild fire as the wind changes direction.

It is crucial to know exactly when a wind change associated with a cold front will arrive, so that firefighters and others are not caught in the path of a fire which has changed direction. It is also vitally important to know where to deploy fire trucks, firefighting resources, and to provide early warning to residents who may be in danger.

The information must be delivered as it occurs and must be instantly available to those making decisions in the field. A real time information is therefore essential. The previous system involved a time lag due to 3 hourly manual readings which had to be received and interpreted and disseminated manually.

5.2 Data Collection Equipment

To collect and interpret the data, the CFA uses a Wide Area Network of Sun File-servers and Personal Computers on local area networks running Microsoft Windows. The server computers are linked through the Telecom public network.

There are over 50 Remote Automatic Weather Stations(RAWS) across Victoria alone. Of these, The CFA owns 11, the Bureau of Meteorology controls most of the remainder.

The weather stations measure temperature, relative humidity, wind speed and wind direction. Some also measure barometric pressure and rainfall.

The CFA RAWS have miniature air conditioners built in to protect the recording and transmitting hardware from extremes of temperature.

As the name implies, no person is required at the weather station site to either gather the information or to transmit it.

At present the CFA has most of its RAWS in the West of the state where they are able to pick up wind changes associated with cold fronts coming in from the West.

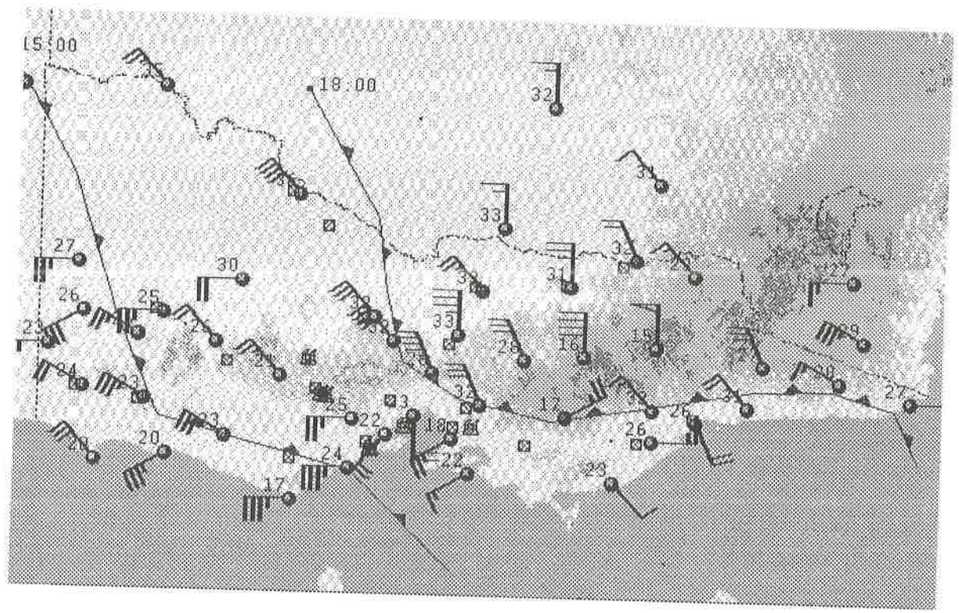
All of the CFA RAWS are solar powered and transmit data by U.H.F. radio to Regional Headquarters. The information is transmitted by digital data stream, and is updated every 10 minutes. The radio signal only travels over distances of tens of kilometres, so some RAWS have a repeater station in order to get the signal to reach the Regional Office.

Signals from the Remote Automatic Weather Stations are received at the Regional Headquarters via radio and modem and are transferred to a PC which decodes the digital signals. As each observation is received, the PC transfers the data to the

Headquarters database via the Austpac X25 Network. Austpac is a packet switching network through Telecom, which links the Regions with Headquarters. Using Austpac X25 network, all computers connected to the network form a closed user group, a special service provided by Telecom to enhance the security of the system. There is a network guarantee of continuity of delivery of service.

A computer at CFA Headquarters connects to the Metropolitan Bureau of Meteorology using a dedicated line. All the CFA RAWS data is sent to the Bureau of Meteorology computer and the CFA receives observations from approximately 35 Bureau of Meteorology RAWS.

The resulting combined information is broadcast via the Wide Area Network and a distributed relational database to all CFA Regions. The PCS at the Regional Offices access the data display on the screen.



In addition to directly connected PCs at Regional Offices, notebook computers provide access to field officers via modems over standard telephone lines or mobile phones.

This software was developed by an integrated team of operational staff and IT professionals at the CFA. It enables the information to be presented as a spatial display on the screen over a basic colour topographic map of Victoria. This is far more useful than trying to use the data in the standard spreadsheet approach.

The display gives an overview of the weather in the whole State and has built-in colour and audible prompts to alert an officer to a noticeable change. The location of each weather station is marked. Wind barbs attached to each location indicate wind speed and direction. The location markers show up as different colours as temperatures rise and fall, and wind speed, wind direction and humidity change.

Complete weather details and weather history will be displayed by clicking on the weather station location. This will appear in graph form.

Other features which are added to the map include cold fronts, "going" fires (represented as flame icons) and CFA spotter aircraft (represented as place icons).

All this material is available to firefighters in the field as long as they have a phone line, a modem and a PC to be linked to the system. Information about changes in wind direction and strength, rapid rises in temperature and the progress of cold fronts are available virtually as they occur enabling informed decisions about deployment of firefighting resources. Most importantly the prediction of the progress of the frontal position may be added to the display by the Bureau of Meteorology Fire Weather Forecaster.

5.3 Grassland Dryness Imagery

Another feature of the OMS is the ability to display curing across the State and to predict a Fire Danger Index for any place in Victoria.

About two thirds of Victoria is essentially grassland and grassy woodlands. Most pasture species possess an annual life cycle in which the plant either dies or becomes dormant and loses moisture. This drying process in called "curing". During Spring, pasture species undergo a period of growth which would normally be completed in late spring or early summer - dependant upon seasonal variables such as rain and temperature.

As the period of growth is completed, crops and pastures lose their ability to draw moisture from the soil and consequently begin to dry out. By high summer the plants have almost no moisture left and are said to be completely cured. Grasslands would be tinder dry at this point and would be extremely vulnerable to the rapid spread of wildfire.

The CFA draws on satellite imagery to obtain information on the rate of curing across Victoria. As summer progresses, light-absorbing chlorophyll begins to break down and consequently pasture and crop vegetation absorbs less and reflects more light.

By monitoring the amount of reflectance in the visible and infra-red wavelengths over an entire summer, it is possible to compute a dryness index and generate images which depict grassland dryness in different regions of Victoria.

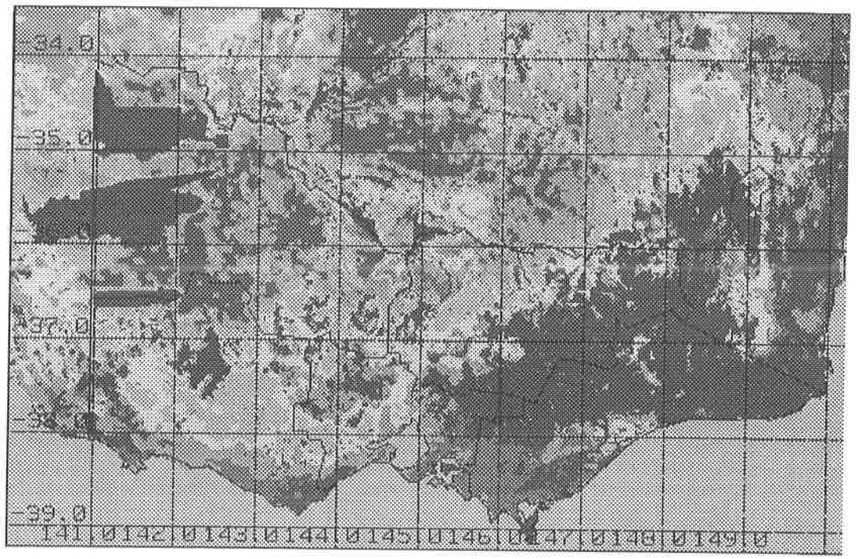
Output from National Oceanographic Aeronautical Association (NOAA) satellite imagery consists of a colour map of Victoria which identifies the drying pattern in pastures and crops. The imagery is received and manipulated at the CSIRO Division of Atmospheric Research, and then distributed via modem to CFA Headquarters in Burwood East where it is manipulated further. This is then transferred to all CFA Regional Headquarters through the Wide Area Network. Officers in the field have the imagery within 24 hours of it being received at Headquarters.

The CFA has developed software which allows weather to be integrated with the curing index. The software uses a mouse to move the cursor onto particular pixels and is able to show on screen the value of curing of the particular pixel and also its latitude and longitude. By clicking on a particular area in Victoria, the weather forecast for the next day will be displayed, and the fire danger rating of the area given, taking into account the curing index for the area.

The OMS can use this Grassland Imagery information to calculate a Fire Danger Index for any place in Victoria.

5.4 Operational information subsystem

The OMS Entry System is a program written specifically for the real time reporting of



incidents. The reporting system is a windows based program using client server technology.

The information is put into the system as the incident is taking place. This might be a dangerous goods spillage, or a rescue. The details recorded include time, place, which fire appliances are attending, what equipment is being used and details of the current situation. Also included are losses, damage, control, strategies and action plans.

The information is entered from the Region where the incident has occurred, and is updated regularly. If this is an incident of significance or there has been loss of life, Headquarters will immediately inform the CFA Chief Officer and approach the media with the most up-to-date information.

The Chief can then maintain an overview of appliance deployment and monitor and

direct statewide priorities. CFA Headquarters will contact the relevant Regions to respond additional resources.

6 Conclusion

The Operations Management System has evolved significantly over the last nine years or so.

The system has been developed to meet the needs of a decentralised volunteer based fire service and has proved to be effective under a wide range of conditions.

Improvements will be made to ensure that the system remains at the forefront of technology well into the next century.

7 The Author

Stephen Walls joined the permanent staff of the Country Fire Authority in 1983 after five years service as a volunteer firefighter. He was based in Sale from 1985 until 1995 as District Officer in Region 10. He is currently the Senior Instructor at the CFA Training Complex at Fiskville . He has also spent time as the Manager of Structural Fire Safety and Manager of Operations Training Delivery.

For most of 1997 he was seconded to CFA Headquarters to manage the introduction of the State Operations Management Plan.

During the 1997-98 fire season he was heavily involved in fire fighting operations as an Air Attack Supervisor, and at CFA Headquarters as the State Strike Team Co-ordinator.

His background is as an Industrial Physicist, and he holds a Bachelor of Applied Science, is a Graduate of the Institution of Fire Engineers and has recently completed a Graduate Diploma of Management.

His professional interests include the survival of houses in Bushfires, Aerial Suppression of fires and Command and Control systems.

Stephen and his wife Cathy live in Invermay near Ballarat and have two children, a son and a daughter.

When he's not working, Stephen would prefer to be building a model railway or playing soccer, but is more likely to be painting the house or picking up after the kids.

Paper 7

European Legislation and European Standards

Jeanine Driessens, ANPI-NVBB, Belgium

EUROPEAN LEGISLATION AND EUROPEAN STANDARDS

Jeanine DRIESSENS
ANPI-NVBB

INTRODUCTION

Belgium and the other European countries undergo continue modifications in the legislation and standards concerning fire protection. Within a short period of 5 years, some of our national laws have been modified by European directives, a lot of national NBN-standards were abolished and replaced by European standards and some important modifications also affected the technical approvals. The public and in our particular field, risk managers, fire prevention officers, architects, insurers or suppliers are facing a world in continuous movement.
Being librarian of the Belgian fire protection association, I receive each day questions about the Belgian legislation which is very complex. Of course I do not give interpretation or technical advice but I try to put the text back in his context. Therefore I have frequently to refer to European texts.

I will now give a short explanation to non-European people of the history of these modifications and an overview the structure of the European legislation.

HISTORY

The idea of a European Union dates from the second war, when the resistance movements tried to find a better solution to the national antagonism, because traditional diplomatic and military solutions proved to be helpless in the past. They imagined a economic solution with the creation of a common market.
The first step was the creation in 1951 of the European Coal and Steel Community with 6 countries. These six countries were in alphabetical order : Belgium, France, Germany, Italy, Luxembourg and The Netherlands.
The same six countries signed in 1957 the Treaty of Rome who created the European Economic Community.
Later, they were joined by 9 other countries to form the actual union of the 15.
In 1986 the signature of the Single Act dismantled the internal borders to establish a single market. In 1992 the Treaty of Maastricht marked the evolution from a Common Market to an Economic and Monetary Union with more intergovernmental cooperations on other subjects such as the safety and the security of the population.

Actually, the European Union counts 15 members.

THE EUROPEAN INSTITUTIONS

The Councils

The European Council is formed by the 15 Heads of Government.
The different Councils of ministers are formed by the national ministers of agriculture, finances, defence, health… of the 15 Member States… The Councils determine the

main objectives and the political evolution that the European administration will have to fulfil.
The presidency of these Councils is given each six months to another Member State.
Their headquarters are located in Brussels.

The European Parliament
Formed by elected representatives from each country, located in Strasbourg.

The Court of Justice in Luxembourg.

The Commission
The Commission is probably the best known of all the European institutions.
The Commission plays the real executive power.
The 20 commissioners and their president form a kind of government, the commissioners and the president are proposed by the Member States but have to be agreed by the Parliament.
They are in charge for 5 years.
The commission works with a large and important civil administration divided in 26 general divisions.
The headquarters are located in Brussels, but some divisions such as the DG XXIII (publication and information market) are located in Luxembourg.

The Commission has the duty to propose European tools which fulfil the objectives and the requirements given by the Councils and by the Parliament.
To apply the Single Act, the Commission has to publish European laws that replace or harmonise the national texts to avoid any obstacle to the free exchange of people and goods.
The Commission also assumes a minimum safety for the workers and the consumers.
To satisfy its obligations, the Commission has legislative instruments and publishes hundreds of legal texts each year.

THE EUROPEAN LAWS

European laws replace or adapt national laws.
They are applicable to the Member States and not directly to the national people. Of course, the public is concerned once its own national laws are modified. Not all the European laws have the same power and importance. We speak of legislative measures and administrative measures.

LEGISLATIVE DOCUMENTS
TREATY :

REGULATIONS :

Regulations are community laws published with the objective of uniformity between all the Members States. Regulations replace the national laws, they are directly and fully applicable to the 15 Member States without any publication in their national legislations.

In the field of fire protection, I know only one exemple :

Regulation 3093/94 about the depletion of the ozone layer.

DIRECTIVES

Directives are the most important in quantities of all the legislative instruments. A directive has to harmonise national requirements.

The States have the choice of the method and the way to adapt within a certain delay their national legislation. As a consequence, the requirements of directive have to be published in the national laws to be effective.

SEVESO directive 82/501/EEC concerning the technological risks

The Member States can also take account of special domestic circonstances. For example, between the different directives concerning the safety of the workers, one is recently published in the Belgian Codes and illustrates easily this evolution.

The directive 92/58/EEC about safety signalisation was published in 1992, had to get into application in June 1994 but was transposed into a Belgian Royal Decree of 17 June 1997! Belgium also added 2 pictograms to the European propositions. These two pictograms were used since 1975 to indicate an exit (RGPT, art. 54quinquies).

The directives are most of the time published as partial modifications to an existing text. This can lead to make the text difficult to read or to understand. Sometimes, the national authorities may prefer the fully edition of a new code.

Directives of the "new approach" are technical documents that modified the national technical requirements concerning equipments or products. These technical directives are mostly completed by harmonised European standards.

In fact, the technical points are not developed in a directive. The Commission orders the development of the technical requirements to the "Comité européen de Normalisation" which has to propose commun standards. When these standards are bounded to a directive they are called harmonised standards. In this case they have to be published with the directive into the Official Journal.

Building products Directive 89/106/EC already applies the principles to the new approach (single act) but as a result of the development of new technical standards, the directive is not yet effective. The building products directive will harmonise all the technical specifications of the building products and equipments used in Europe. As a consequence, new European standards will very soon replace the national standards of fire reaction tests and fire resistance tests, and of course their classifications.

Actually, each country works with different tests and classifications and recognises only its own classification. There is no official concordance between Danish, British or Italian results for example.

Others standards will be developed for automatic fire systems (fire detection, fire extinguishing…)

Directive 89/336/EEC on electromagnetic compatibility and *Directive 73/23/EEC* concerning electric low voltage are already effective and the list of the harmonised standards are updated in the Official Journal. You may think that these two directives do not concern the fire protection field, but they are applicable to the electric or electronic fire protection systems.

ADMINISTRATIVE DOCUMENTS

Other documents are more "administrative measures" and give a politic or moral point of view of the European authorities. These texts are non binding for the Member States.

DECISIONS (general concerns)
I choose the decision *86/655/EEC about fire safety in hotels.* Some countries such as Belgium follow their own fire protection measures which are often more restricting than the European one.

Other non-binding documents are : Recommendations and Reglementations (individual concern) and Opinions.

PUBLICATIONS

All these official European texts are published in the Official Journal of the European Communities which is available in 11 languages.
But the main problem is to find the reference of a European document.
Therefore, since years, the European Commission has been developing her own legal database CELEX. In an early stage, it was only available by a on-line connection to European supplier depending of the commission EUROBASE.
EUROBASE was applying a complex and difficult query language. It was also expensive.
Today, CELEX is available on CD-ROM and on internet.
As far as I am concerned, I prefer the EUDOR WEB site, operational since 1997 with a quick and high performance search tool
You can find the full text of the European laws in 11 languages, but also other European documents such as parliamentary questions, some preparatory documents and judgements of the Court of Justice. CELEX also provides the references to the implementation in the different national legislations.
Unfortunately, the WEB site is not free of charge. You need a subscription and you have to pay each research.

You can find more informations about the European Union, the European Commission and their publications on the WEB sites of the European Commission.

STANDARDS

CEN (Comité européen de Normalisation) and CENELEC (Comité européen de normalisation électrotechnique) are two independent standardisation bodies. They gathered the institutes of standardisation of the members of the EFTA (European Free Trade Association). Countries like Switzerland, Norway, Iceland or Slovenia are members of the CEN.
Each national institute has to confer the status of a national standard to each approved EN standard and has to withdraw conflicting national standards.

The 2 letters EN codified the European standards (also ENV or HD); once registrated, the country added its own codification.
BS EN 54, NF EN 54, NBN EN 54, DIN EN 54.... are the national registered standard of the same European document : EN 54
A codification to recognise harmonised standards does not exist. You have to consult the official list published by the EC, which is on the European WEB site and on the CEN catalogue.
For librarians, the finding of informations from CEN CENELEC constitutes sometimes a real problem.
CEN and CENELEC, both located in Brussels, have not developed services to the European public. They do not have an real helpdesk or a delivery service for example.
If you want some informations concerning EN standards, you have to address the national institutes.
European standards developed by CEN CENELEC are only available in 3 languages : French, English and German. Other translations have to be done by the national institutes. They do not have always the structure to do it !

Another problem is the catalogue that only exists in a CD-ROM version.
It provides informations on EN standards and on the implementation by each national institute.

We can imagine a solution to this lack of information from CEN CENELEC, by the use of the electronical catalogues of national institutes such as BSI, AFNOR or DIN, with reference to the registered EN standards.
You can also choose for "commercial tools" such as the CD-ROMs "PERINORM" or "ILI" but in both cases you only find the references of registered standards.
I have not yet found a solution for the draft and the non-registrated standards.

CONCLUSIONS

Some people may imagine that the publication of new directives or new standards leads to immediate changes in the fire protection market.
The application of the building products directive is a good example of the long delay necessary to make a directive effective.
1/ Will the new fire tests standards become harmonised standards? If not, they will only be considered as a "code of practice"
2/ All the national building and fire codes in the 15 European countries have to be adapted to the new classifications. It will be a long and exacting task.
3/ Is the market ready to propose enough products and equipments responding to the new classification?

I suppose that during a long transitional period the old and new fire classifications will coexist, with products responding to the European or to one of the national classifications. Actually, in Belgium, two official laboratories may give an official advice on the concordance between the foreign classifications and the Belgian one.

The European integration is on the move, with very soon the implementation of the EURO. Those days, the European authorities will fix the new European money.

But behind this very mediatic event , the application of new technical requirements will have an impact on laws, standards, certification, tests and even private technical rules.
Their applications and the way they will change our habits will take time.
In French, we often say "Rome ne s'est pas construite en un jour". The same applies to the European integration … but it is on the move.

BIBLIOGRAPHY

BORCHARDT Klaus-Dieter
L'ABC du droit communautaire
Luxembourg : Office for Official Publications of the European Communities, 1994 – 69 pp

CEN
Catalogue of European standards and their national implementations = Catalogue des normes européennes et leur mise en application nationale = Katalog von Europaïschen Normen und ihre nationale Übernahme CD ROM
Brussels : CEN, 1997

CENELEC
Information on the links between products, directives and standards in the electrotechnical field
Brussels : CENELEC, 1996 – pm

EUROPEAN COMMISSION
The institutions of the European union
Luxembourg : Office for Official Publications of the European Communities, 1995 – 15 pp

FONTAINE Pascal
Europe in ten points
Luxembourg : Office for Official Publications of the European Communities, 1995 - 46 pp

ENCLOSURES:

1. European Commission – addresses
2. Extract CEN catalogue
3. CEN address
4. CENELEC address
5. EN STANDARDS ON THE WEB
6. EU ON THE WEB

ANNEX 1

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ANNEX 4

AFNOR : http://www.afnor.fr
BSI : http://www.bsi.org.uk
DIN : http: //www.din.de

ANNEX 5

CELEX : http://europa.eu.int/celex
OFFICE FOR OFFICIAL PUBLICATIONS : http://eur-op.eu.int
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TED NEW ACCESS (opening March 1998)
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TED CPV http ://WWW2.echo.lu/echo/databases/ted/en/cpvhome.html
TED USER GUIDE ftp://ftp.echo.lu/pub/ted
ECHO NEWSLETTER http://www.echo.lu/echo/ffu/en/echoffu.html
RAPID http ://europa.eu.int/en/comm/spp/rapid.html
SCADPLUS http ://europa.eu.int/comm/sg/scadplus

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ANNEX 6

DG III's Reference to harmonised standards in the context of the New Approach" Directives

List of standards published in the O.J. of the E.C. on 1998-01-26

Directive73/23/EEC	Low Voltage
Directive 87/404/EEC, 90/488/EC	Simple Pressure Vessels
Directive 88/378/EEC	Safety of toys
Directive 89/106/EEC	Construction products
Directive 89/336/EEC, 92/31/EC	Electromagnetic compatibility (EMC)
Directive 89/392/EEC, 91/368/EC,93/44/EEC	Machinery
Directive 89/686/EEC, 93/95/EEC	Personal protective equipment (PPE)
Directive 90/384/EEC	Non-automatic weighing
Directive 90/385/EEC	Active implantable medical devices
Directive 90/396/EE	Appliances burning gaseous fuels
Directive 91/263/EEC, 93/97/EEC	Telecommunications terminal equipment
Directive 92/42/EEC	New hot-water boilers fired BOILERS FIRED with liquid or gaseous fuels (*)
Directive 93/15/EEC	Explosives for civil uses
Directive 93/42/EEC	Medical devices
Directive 93/68/EEC	Global directive amending directive 1-12
Directive 94/9/EEC	Equipment explosive atmosphere (ATEX)
Directive 94/25/EEC	Recreational craft
Directive 95/16/EEC	Lifts

Should you require more information regarding the updates, please contact the following:
Unit responsible : DGIII/B/2 Head of Unit : Mr. R. Büscher
European Commission
Rue de la Loi 200
B-1049 Brussels
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Directive 89/686/EEC

COUNCIL DIRECTIVE OF 21 DECEMBER 1989 ON THE APPROXIMATION OF THE LAWS OF THE MEMBER STATES RELATING TO PERSONAL PROTECTIVE EQUIPMENT (89/686/EEC)

(30.12.89 OJ No L 399/18)

Short name:	**[PERSONAL PROTECTIVE EQUIPMENT - PPE]**
Base:	**Directive 89/686/EEC**
Modification:	**Directive 93/68/EEC** [CE Marking] **Directive 93/95/EEC** [1993-11-09 OJ No L 276/11]

Application Guide: **Directive 96/58/EC** [1996-09-18 OJ No L 236/44]

[-]

EC contact point: **DG III - D/1 (Mr. Van Gheluwe, Tel. +32.2.296.09.64, Fax. +32.2.296.62.73)**

Personal protective equipment - PPE

European Standardization Bodies	Standard Reference	Titles	Ratification	Publication O. J.
CEN	EN 132	Respiratory protective devices - Definitions	1990	C 180 of 1997-06-14
CEN	EN 133	Respiratory protective devices - Classification	1990	C 180 of 1997-06-14
CEN	EN 134	Respiratory protective devices - Nomenclature of components	1990	C 180 of 1997-06-14
CEN	EN 135	Respiratory protective devices - List of equivalent terms	1990	C 180 of 1997-06-14
CEN	EN 136	Respiratory protective devices - Full-face masks: requirements, testing, marking	1989	C 180 of 1997-06-14
CEN	EN 136-10	Respiratory protective devices - Full face masks for special use - Requirements, testing, marking	1992	C 180 of 1997-06-14
CEN	EN 137	Respiratory protective devices - Self contained open circuit compressed-air breathing apparatus - Requirements, testing, marking	1993	C 180 of 1997-06-14
CEN	EN 138	Respiratory protective devices - Fresh air hose breathing apparatus for use with full face mask, half mask or mouthpiece assembly - Requirements, testing, marking	1994	C 180 of 1997-06-14
CEN	EN 139	Respiratory protective devices - Compressed air line breathing apparatus for use with full face mask, half mask or mouthpiece assembly -	1994	C 180 of 1997-

		Requirements, testing, marking		06-14
CEN	EN 140	Respiratory protective devices - Half-masks and quarter-masks - Requirements, testing, marking	1989	C 180 of 1997-06-14
CEN	EN 141	Respiratory protective devices - Gas filters and combinets filters - Requirements testing, marking	1990	C 180 of 1997-06-14
CEN	EN 142	Respiratory protective devices - Mouthpieces assemblies - Requirements, testing, marking	1989	C 180 of 1997-06-14
CEN	EN 143	Respiratory protective devices - Particle filters - Requirements, testing, marking	1990	C 180 of 1997-06-14
CEN	EN 144-1	Respiratory protective devices - Gas cylinder valves - Thread connection for insert connector	1991	C 180 of 1997-06-14
CEN	EN 145	Respiratory protective devices - Self-contained closed-circuit breathing apparatus, compressed oxygen type - Requirements, testing, marking	1988	C 180 of 1997-06-14
CEN	EN 145-2	Respiratory protective devices - Self-contained closed circuit compressed oxygen breathing apparatus for special use - Part 2: requirements, testing, marking	1992	C 180 of 1997-06-14
CEN	EN 146	Respiratory protective devices - Powered particle filtering devices incorporating helmets or hoods - Requirements, testing, marking	1991	C 180 of 1997-06-14
CEN	EN 147	Respiratory protective devices - Power assisted particle filtering devices incorporating full face masks, half masks or quarter masks - Requirements, testing, marking	1991	C 180 of 1997-06-14
CEN	EN 148-1	Respiratory protective devices - Threads for facepieces - Part 1: standard thread connection	1987	C 180 of 1997-06-14
CEN	EN 148-2	Respiratory protective devices - Threads for facepieces - Part 2: centre thread connection	1987	C 180 of 1997-06-14

CEN	EN 148-3	Respiratory protective devices - Threads for face-pieces - Part 3: thread connection M 45 X 3	1992	C 180 of 1997-06-14
CEN	EN 149	Respiratory protective devices - Filtering half masks to protect against particles - Requirement, testing, marking	1991	C 180 of 1997-06-14
CEN	EN 165	Personal eye-protection - Vocabulary	1995	C 180 of 1997-06-14
CEN	EN 166	Personal eye protection - Specifications	1995	C 180 of 1997-06-14
CEN	EN 167	Personal eye protection - Optical test methods	1995	C 180 of 1997-06-14
CEN	EN 168	Personal eye protection - Non-optical test methods	1995	C 180 of 1997-06-14
CEN	EN 169	Personal eye-protection - filters for welding and related techniques - transmittance requirements and recommended utilization	1992	C 180 of 1997-06-14
CEN	EN 170	Personal eye-protection - ultraviolet filters - transmittance requirements and recommended use	1992	C 180 of 1997-06-14
CEN	EN 171	Personal eye-protection - infrared filters - transmittance requirements and recommended use	1992	C 180 of 1997-06-14
CEN	EN 172	Personal eye-protection - sunglare filters for industrial use	1994	C 180 of 1997-06-14
CEN	EN 174	Personal eye protection - Ski goggles for downhill skiing	1996	C 180 of 1997-06-14
CEN	EN 207	Personal eye-protection - Filters and eye-protection against laser radiation	1993	C 180 of

				1997-06-14
CEN	EN 208	Personal eye-protection - Eye-protectors for adjustment work on lasers and laser systems (laser adjustment eye-protectors)	1993	C 180 of 1997-06-14
CEN	EN 250	Respiratory equipment - Open circuit, self-contained, compressed-air diving apparatus - Requirements, testing, marking	1993	C 180 of 1997-06-14
CEN	EN 269	Respiratory protective devices - Powered fresh air hose breathing apparatus incorporating a hood - Requirements, testing, marking	1994	C 180 of 1997-06-14
CEN	EN 270	Respiratory protective devices - Compressed air line breathing apparatus incorporating a hood - Requirements, testing, marking	1994	C 180 of 1997-06-14
CEN	EN 271	Respiratory protective devices - Compressed air line or powered fresh air hose breathing apparatus incorporating a hood for use in abrasive blasting operations - Requirements, testing, marking	1995	C 180 of 1997-06-14
CEN	EN 340	Protective clothing - General requirements	1993	C 180 of 1997-06-14
CEN	EN 341	Personal protective equipment against falls from a height - Descender devices	1992	C 180 of 1997-06-14
CEN	EN 344	Requirements and test methods for safety, protective and occupational footwear for professional use	1992	C 180 of 1997-06-14
CEN	EN 344-2	Safety, protective and occupational footwear for professional use - Part 2: Additional requirements and test methods	1996	C 180 of 1997-06-14
CEN	EN 345	Specification for safety footwear for professional use	1992	C 180 of 1997-06-14
CEN	EN 345-2	Safety footwear for professional use - Part 2: Additional specifications	1996	C 180 of 1997-06-14

CEN	EN 346	Specification for protective footwear for professional use	1992	C 180 of 1997-06-14
CEN	EN 346-2	Protective footwear for professional use - Part 2: Additional specifications	1996	C 180 of 1997-06-14
CEN	EN 347	Specification for occupational footwear for professional use	1992	C 180 of 1997-06-14
CEN	EN 347-2	Occupational footwear for professional use - Part 2: Additional specifications	1996	C 180 of 1997-06-14
CEN	EN 348	Protective clothing - Test method: determination of behaviour of materials on impact of small splashed of molten metal	1992	C 180 of 1997-06-14
CEN	EN 352-1	Hearing protectors - safety requirements and testing Part 1: Ear muffs	1993	C 180 of 1997-06-14
CEN	EN 352-2	Hearing protectors - safety requirements and testing Part 2: Ear plugs	1993	C 180 of 1997-06-14
CEN	EN 352-3	Hearing protectors - Safety requirements and testing - Part 3 : Ear-muffs attached to an industrial safety helmet	1996	C 180 of 1997-06-14
CEN	EN 353-1	Personal protective equipment against falls from a height - Guided-type fall arresters Part 1: Guided-type fall arresters on a rigid anchorage line	1992	C 180 of 1997-06-14
CEN	EN 353-2	Personal protective equipment against falls from a height - guided-type fall arresters Part 2: Guided-type fall arresters on a flexible anchorage line	1992	C 180 of 1997-06-14
CEN	EN 354	Personal protective equipment against falls from a height - Lanyards	1992	C 180 of 1997-06-14
CEN	EN 355	Personal protective equipment against falls from a height - Energy absorbers	1992	C 180 of

				1997-06-14
CEN	EN 358	Personal equipment for work positioning and prevention of falls from a height - Work positioning systems	1992	C 180 of 1997-06-14
CEN	EN 360	Personal protective equipment against falls from a height - Retractable type fall arresters	1992	C 180 of 1997-06-14
CEN	EN 361	Personal protective equipment against falls from a height - Full body harnesses	1992	C 180 of 1997-06-143
CEN	EN 362	Personal protective equipment against falls from a height - Connectors	1992	C 180 of 1997-06-14
CEN	EN 363	Personal protective equipment against falls from a height - Fall arrest systems	1992	C 180 of 1997-06-14
CEN	EN 364	Personal protective equipment against fall from a height - Test methods	1992	C 180 of 1997-06-14
CEN	EN 365	Personal protective equipment against falls from a height - general requirements for instructions for use and for marking	1992	C 180 of 1997-06-14
CEN	EN 366	Protective clothing - Protection against heat and fire - Method of test: evaluation of materials and material assemblies when exposed to a source of radiant heat	1993	C 180 of 1997-06-14
CEN	EN 367	Protective clothing - Protection against heat and fire - Method of determining heat transmission on exposure to flame	1992	C 180 of 1997-06-14
CEN	EN 368	Protective clothing - protection against liquid chemicals - Test method: resistance of materials to penetration by liquids	1992	C 180 of 1997-06-14
CEN	EN 369	Protective clothing - protection against liquid chemicals - Test method: resistance of materials to permeation by liquids	1993	C 180 of 1997-06-14

CEN	EN 371	Respiratory protective devices - AX gas filters and combined filters against low-boiling point organic compounds - Requirements, testing, marking	1992	C 180 of 1997-06-14
CEN	EN 372	Respiratory protective devices - SX gas filters and combined filters against specific named compounds - Requirements, testing, marking	1992	C 180 of 1997-06-14
CEN	EN 373	Protective clothing - Assessment of resistance of materials to molten metal splash	1993	C 180 of 1997-06-14
CEN	EN 374-1	Protective gloves against chemicals and micro-organisms - Part 1: Terminology and performance requirements	1994	C 180 of 1997-06-14
CEN	EN 374-2	Protective gloves against chemicals and micro-organisms - Part 2: Determination of resistance to penetration	1994	C 180 of 1997-06-14
CEN	EN 374-3	Protective gloves against chemicals and micro-organisms - Part 3: Determination of resistance to permeation by chemicals	1994	C 180 of 1997-06-14
CEN	EN 379	Specifications for welding filters with switchable luminous transmittance and welding filters with dual luminous transmittance	1994	C 180 of 1997-06-14
CEN	EN 381-1	Protective clothing for users of hand-held chainsaws Part 1: Test rig for testing resistance to cutting by a chainsaw	1993	C 180 of 1997-06-14
CEN	EN 381-2	Protective clothing for users of hand-held chainsaws Part 2: Test methods for leg protectors	1995	C 180 of 1997-06-14
CEN	EN 381-3	Protective clothing for users of hand-held chain-saws - Part 3: Test methods for footwear	1996	C 180 of 1997-06-14
CEN	EN 381-5	Protective clothing for users of hand-held chainsaws Part 5: requirements for leg protectors	1995	C 180 of 1997-06-14
CEN	EN 381-	Protective clothing for users of hand-held chainsaws Part 8: Test methods for chain saw protective gaiters	1997	C 317 of

	8			1997-10-18
CEN	EN 381-9	Protective clothing for users of hand-held chainsaws Part 9: Requirements for chain saw protective gaiters	1997	C 317 of 1997-10-18
CEN	EN 388	Protective gloves against mechanical risks	1994	C 180 of 1997-06-14
CEN	EN 393	Life-jackets and personal buoyancy aids - Buoyancy aids - 50 N	1993	C 180 of 1997-06-14
CEN	EN 394	Life-jackets and personal buoyancy aids - Additional items	1993	C 180 of 1997-06-14
CEN	EN 395	Life-jackets and personal buoyancy aids - Life-jackets - 100 N	1993	C 180 of 1997-06-14
CEN	EN 396	Life-jackets and personal buoyancy aids - Life-jackets - 150 N	1993	C 180 of 1997-06-14
CEN	EN 397	Industrial safety helmets	1995	C 180 of 1997-06-14
CEN	EN 399	Life-jackets and personal buoyancy aids - Life-jackets - 275 N	1993	C 180 of 1997-06-14
CEN	EN 400	Respiratory protective devices for self-rescue - Self-contained closed-circuit breathing apparatus - Compressed oxygen escape apparatus - Requirements, testing, marking	1993	C 180 of 1997-06-14
CEN	EN 401	Respiratory protective devices for self-rescue - Self-contained closed-circuit breathing apparatus - Chemical oxygen (KO2) escape apparatus - Requirements, testing, marking	1993	C 180 of 1997-06-14
CEN	EN 402	Respiratory protective devices for escape - Self-contained open-circuit compressed air breathing apparatus with full face mask or mouthpiece assembly - Requirements, testing, marking	1993	C 180 of 1997-06-14

CEN	EN 403	Respiratory protective devices for self-rescue - Filtering devices with hood for self-rescue from fire - Requirements, testing, marking	1993	C 180 of 1997-06-14
CEN	EN 404	Respiratory protective devices for self-rescue - Filter self-rescuer - Requirements, testing, marking	1993	C 180 of 1997-06-14
CEN	EN 405	Respiratory protective devices - Valved filtering half masks to protect against gases or gases and particles - Requirements, testing, marking	1992	C 180 of 1997-06-14
CEN	EN 407	Protective gloves against thermal risks (heat and/or fire)	1994	C 180 of 1997-06-14
CEN	EN 412	Protective aprons for use with hand-knifes	1993	C 180 of 1997-06-14
CEN	EN 420	General requirements for gloves	1994	C 180 of 1997-06-14
CEN	EN 421	Protective gloves against ionizing radiation and radioactive contamination	1994	C 180 of 1997-06-14
CEN	EN 458	Hearing protectors - Recommendation for selection, use, care and maintenance - Guidance document	1993	C 180 of 1997-06-14
CEN	EN 463	Protective clothing for use against liquid chemicals - Test method: Determination of resistance to penetration by a jet of liquid (jet test)	1994	C 180 of 1997-06-14
CEN	EN 464	Protective clothing for use against liquid and gaseous chemicals including aerosols and solid particles - Test method: Determination of leaktightness of gas-tight suits (internal pressure test)	1994	C 180 of 1997-06-14
CEN	EN 465	Protective clothing - protection against liquid chemicals - Performance requirements for chemical protective clothing with spray-tight connections between different parts of the clothing (Type 4 equipment)	1995	C 180 of 1997-06-14
CEN	EN 466	Protective clothing - protection against liquid chemicals - Performance requirements for chemical protective clothing with	1995	C 180 of

		liquid-tight connections between different parts of the clothing (Type 3 equipment)		1997-06-14
CEN	EN 467	Protective clothing - protection against liquid chemicals - Performance requirements for garments providing protection to parts of the body	1995	C 180 of 1997-06-14
CEN	EN 468	Protective clothing for use against liquid chemicals - Test method: Determination of resistance to penetration by spray (spray test)	1994	C 180 of 1997-06-14
CEN	EN 469	Protective clothing for fire-fighters - Requirements and test methods for protective clothing for fire-fighting	1995	C 180 of 1997-06-14
CEN	EN 470-1	Protective clothing for use in welding and allied processes - Part 1: General requirements	1995	C 180 of 1997-06-14
CEN	EN 471	High-visibility warning clothing	1994	C 180 of 1997-06-14
CEN	EN 510	Specification for protective clothing for use where there is a risk of entanglement with moving parts	1993	C 180 of 1997-06-14
CEN	EN 530	Abrasion resistance of protective clothing material - Test methods	1994	C 180 of 1997-06-14
CEN	EN 532	Protective clothing - protection against heat and flame - Test method for limited flame spread	1994	C 180 of 1997-06-14
CEN	EN 533	Protective clothing - Protection against heat and flame - Limited flame spread materials and material assemblies	1997	C 180 of 1997-06-14
CEN	EN 568	Mountaineering equipment - Ice anchors - Safety requirements and test methods	1997	C 180 of 1997-06-14
CEN	EN 659	Protective gloves for firefighters	1996	C 180 of 1997-06-14

CEN	EN 702	Protective clothing - Protection against heat and flame - Test method: Determination of the contact heat transmission through protective clothing or its materials	1994	C 180 of 1997-06-14
CEN	EN 813	Personal protective equipment for prevention of falls from a height - Sit harnesses	1997	C 180 of 1997-06-14
CEN	EN 863	Protective clothing - Mechanical properties - Test method: Puncture resistance	1995	C 180 of 1997-06-14
CEN	EN 892	Mountaineering equipment - Dynamic mountaineering ropes - Safety requirements and test methods	1996	C 180 of 1997-06-14
CEN	EN 958	Mountaineering equipment - Energy absorbing systems for use in klettersteig (via ferrata) climbing - Safety requirements and test methods	1996	C 180 of 1997-06-14
CEN	EN 959	Mountaineering equipment - Rock anchors - Safety requirements and test methods	1996	C 180 of 1997-06-14
CEN	EN 960	Headforms for the use in the testing of protective helmets	1994	C 180 of 1997-06-14
CEN	EN 966	Helmets for airborne sports	1996	C 180 of 1997-06-14
CEN	EN 967	Head protectors for ice hockey players	1996	C 180 of 1997-06-14
CEN	EN 1061	Respiratory protective devices for escape - Self-contained closed-circuit breathing apparatus - Chemical oxigen ($NaClO_3$) escape apparatus - Requirements, testing, marking	1996	C 180 of 1997-06-14
CEN	EN 1077	Helmets for alpine skiers	1996	C 180 of 1997-06-14
CEN	EN 1078	Helmets for pedal cyclists and for users of skateboards and roller skates	1997	C 180 of

				1997-06-14
CEN	EN 1080	Impact protection helmets for young children	1997	C 180 of 1997-06-14
CEN	EN 1082-1	Protective clothing - Gloves and arm guards protection against cuts and stabs by hand knives - Part 1: Chain mail gloves and arm guards	1996	C 180 of 1997-06-14
CEN	EN 1146	Respiratory protective devices for self-rescue - Self-contained open-circuit compressed air breathing apparatus incorporating a hood (compressed air escape apparatus with hood) - Requirements, testing, marking	1997	C 180 of 1997-06-14
CEN	EN 1149-1	Protective clothing - Electrostatic properties - Part 1: Surface resistivity (Test methods and requirements)	1995	C 180 of 1997-06-14
CEN	EN 1384	Helmets for equestrian activities	1996	C 180 of 1997-06-14
CEN	EN 1486	Protective clothing for firefighters - Test methods and requirements for reflective clothing for specialized fire fighting	1996	C 180 of 1997-06-14
CEN	EN 1731	Mesh type eye and face protectors for industrial and non-industrial use against mechanical hazards and/or heat	1997	C 180 of 1997-06-14
CEN	EN 1836	Personal eye protection - Sunglasses and sunglare filters for general use	1996	C 180 of 1997-06-14
CEN	EN 1868	Personal protective equipment against falls from a height - List of equivalent terms	1997	C 317 of 1997-10-18
CEN	EN ISO 4869-2	Acoustics - Hearing protectors - Part 2 : Estimation of effective A-weighted sound pressure levels when hearing protectors are worn (ISO 4869-2:1994)	1995	C 180 of 1997-06-14
CEN	EN ISO 10819	Mechanical vibration and shock - Hand-arm vibration - Method for the measurement and evaluation of the vibration transmissibility of gloves at the palm of the hand (ISO 10819:1996)	1996	C 180 of 1997-06-14

CEN	EN 24869-1	Acoustics - Hearing protectors - Part 1: Subjective method for the measurement of sound attenuation (ISO 4869-1: 1990)	1992	C 180 of 1997-06-14
CEN	EN 24869-3	Acoustics - Hearing protectors - Part 3: Simplified method for the measurement of insertion loss of earmuff type protectors for quality inspection purposes (ISO/TR 4869-3: 1989)	1993	C 180 of 1997-06-14

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Paper 8

Assessing the Impact of Fire Risk Communication

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Assessing the Impact of Fire Risk Communication

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Abstract

Wherever people are exposed to the risk of fires, hazard prevention becomes a very important task. Risk information/communication/education *about fire hazards in the workplace or in homes and about bushfires near residential settings is a crucial and indispensable part of that. However, are the efforts of fire authorities successful? Do they enhance community safety? And what are the preconditions of effective programs? To answer such questions, evaluation research is required.*

Firstly, methodological *considerations are elaborated, dealing with evaluation approaches, assessment criteria and study designs. Secondly, a* theoretical *model of the fire risk communication process is presented, focussing on the socio-psychological factors which influence the outcomes of a campaign. Thirdly,* empirical *data from an evaluation study currently conducted in Melbourne/Australia will be reported. In this project, participants in a novel program of the Victorian CFA, "Community Fireguard", were surveyed, based on a Pre/Post design. For comparisons, a control group not exposed to the campaign was included. In addition the perspectives and experiences of fire officers were investigated; a special sample dealt with people who recently experienced a major fire. The results available so far are very encouraging for CFA's new approach to bushfire preparedness of residents.*

Finally, conclusions for the design of risk communication campaigns and suggestions for further research are outlined.

1 THE PROBLEM: ENHANCING RESIDENTS' FIRE PREPAREDNESS

Wherever humans face the risk of fires, hazard management becomes a very important task. The risk may result from house fires, fires in industrial or transport facilities, and wildfires. Natural fire hazards are particularly salient in Australia which is more prone to bushfires than most other countries in the world (PYNE 1991). Fires can be seen as a genuine part of the Australian ecology, yet bushfire disasters have claimed hundreds of lives and assets worth billions of dollars. As recent events (e.g., the 1994 fires in N.S.W. and QLD, or the fires in Melbourne and Victoria in 1997 and 1998) have shown, the risk of disasters is still very present - in spite of major advances in bushfire control.

Consequently, fire prevention, fire risk information/communication/education and fire emergency management are crucial tasks of the relevant public authorities. They need to be addressed from both an organizational and socio-

psychological perspective. People who might be exposed to fires need to be optimally informed about the hazard characteristics, preventive measures and appropriate behaviors during the onset of a fire event, and they must understand their own responsibility. Authorities have to compose pertinent emergency planning, prepare coping strategies and communicate the relevant information to residents and communities as a whole effectively (BARHAM 1996, CHASE 1993 ROBERTSON 1989). Such tasks go far beyond the 'classic' firefighting missions of fire authorities; a shift in the general orientation of fire risk management seems obvious (see, e.g., SMITH et al. 1996). In recent years the Country Fire Authority of Victoria has introduced a novel approach to fire safety, the "Community Fireguard" program, which is based on community involvement and aims at enhancing individual responsibility for fire safety and survival strategies (cf. e.g., CFA 1995, BECKINGSALE 1994, BECKINGSALE & PETRIS 1994, JONES 1987, WHELAN 1987).

However, are the efforts of fire authorities successful? Do they enhance community safety? Is fire preparedness of people at risk improved? Do the employed strategies 'work' with respect to the target group, and what are the preconditions of effective programs? To answer such questions, empirical evaluation research is indispensable (GAULL 1997, ROHRMANN 1992, 1998).

2 EVALUATING RISK COMMUNICATION: METHODOLOGY

2.1 *The risk communication process*

Within hazard management, providing and utilizing pertinent information in an interactive manner is a core process. In this context, risk communication research is a most relevant area of expertise. This young but rapidly growing field comprises hazard perception, risk information strategies and interactive problem-solving approaches (cf., e.g., COVELLO et al. 1989, FISCHHOFF et al. 1993, HANDMER et al. 1991, KASPERSON & STALLEN 1990, KRIMSKY & PLOUGH 1988, LUNDGREN 1994, ROHRMANN 1995 and the bibliography in ROHRMANN et al. 1991). In *Box 1*, an overview of main risk communication aims as well as typical means and 'channels' is provided.

Box 1:

TASKS AND MEANS OF THE RISK COMMUNICATION PROCESS

Primary types of risk communication aims

- Advancing/changing knowledge and attitudes regarding risks
- Modifying risk-related behavior of exposed people
- Promoting community participation in hazard mitigation
- Facilitating cooperation & joint risk conflict resolution
- Developing disaster preparedness and emergency management

Communication means & channels

- Brochures etc., distributed by institutions/agencies
- Product information, machine operating instructions, etc
- Public information services, 'hot lines', etc
- Educational video/film/computer products
- Info presented via broadcasting, TV, newspapers, journals
- Expert presentations (at meetings, trainings, drills etc)
- Warning sirens (or messages through mobile loudspeakers)

A large body of knowledge has been produced with respect to quite different hazards, both technology-induced (e.g., risks from industrial facilities) and natural ones (e.g., earthquakes), as well as health-risking behavior (e.g. smoking) and diseases (e.g., AIDS). However, the areas of risk communication and fire emergency preparedness have not much been correlated in Australia.

2.2 *Evaluation research: criteria and designs*

All risk communication is conducted with respect to relevant objectives, and the value of the principal aim is hardly in question. However, systematic empirical investigations are required in order to prove the effectiveness of a campaign - simple experience is not sufficient. *"Evaluation"* means the scientific assessment of the content, process and effects (consequences, outcomes, impacts) of an intervention (measure, strategy, program) and their assessment according to defined criteria (goals, objectives) (FINK 1993, PATTON 1986, ROSSI & FREEMAN 1993; see ROHRMANN 1992 with respect to risk communication).

Once the objectives of a particular risk communication have been stated by those responsible for the program, an evaluator needs to operationalize them and investigate whether or not they have been achieved. "Effectiveness" as the overall criterion has to be explicated by characteristics of the content, process and outcomes of the risk communication program employed. A list of respective criteria is presented in *Box 2*.

Box 2:

CRITERIA FOR RISK COMMUNICATION EFFECTIVENESS

Evaluation aspects (category and examples)	Info source
G o a l - r e l a t e d c r i t e r i a	
Content evaluation	
■ Correctness and completeness of the information	A E
■ Comprehensibility of the message	E R
■ Ethical considerations	E
Process evaluation	
■ Difficulties/failures in running the program	A
■ Inclusion of relevant actors/societal groups	A E
■ Feedback and confirmation possibilities	E R
Outcome evaluation	
■ Degree of information distribution	E R
■ Increased/improved problem awareness and knowledge	R
■ Reduction of accident rates or mortality rates	A E
P r o c e d u r a l c r i t e r i a	
■ Financial efficiency (material costs, personnel)	A
■ Training needs for the personnel involved	A E
■ Flexibility & adaptability	E

Note:
"A" stands for RC agency (or author of the RC program),
"E" for risk expert or RC expert (independent researchers),
"R" for information receiver or participant of the RC program

The first set of criteria refers to the question whether the *content* of the message and its presentation is valid for the communication goals; the second set of criteria is related to the *process* of conducting risk communication programs; the third set deals with the actual *outcomes* of campaigns; in each case, three examples are given (full list in ROHRMANN 1992). In addition to substantial (goal-related) criteria, organizational and procedural aspects are to be included in the evaluation of risk communication programs (cf. bottom table 3). Such 'secondary' (economic) criteria are vital for any agency, and data on costs are needed for cost/benefit or cost/effectiveness analyses.

Evaluation studies differ considerably in their approach; the main options for a researcher are listed in *Box 3*. In each case advanced research designs are required. Studies lacking "before" measurements and control groups of not-exposed people are unlikely to yield valid results. Evaluations may be designed 'in-house' or (preferably) conducted by external researchers. The critical "valuation" of the obtained data is the crucial step in an evaluation study. The stated (normative) goal is the principal, but not the only reference for assessing evaluation results. Comparisons with alternative interventions (other hazard information/communication/education strategies) are important as well.

Box 3:

EVALUATION OF RISK COMMUNICATION: BASIC REQUIREMENTS

Study design: longitudinal before/after study <2+ times>
control group (not exposed to the intervention)

Focus: content-oriented (substantive correctness) and/or
process-oriented (formative/developmental view) and/or
outcome-oriented (summative effectiveness)

Information sources: risk information/communication targets
sender/author/agency

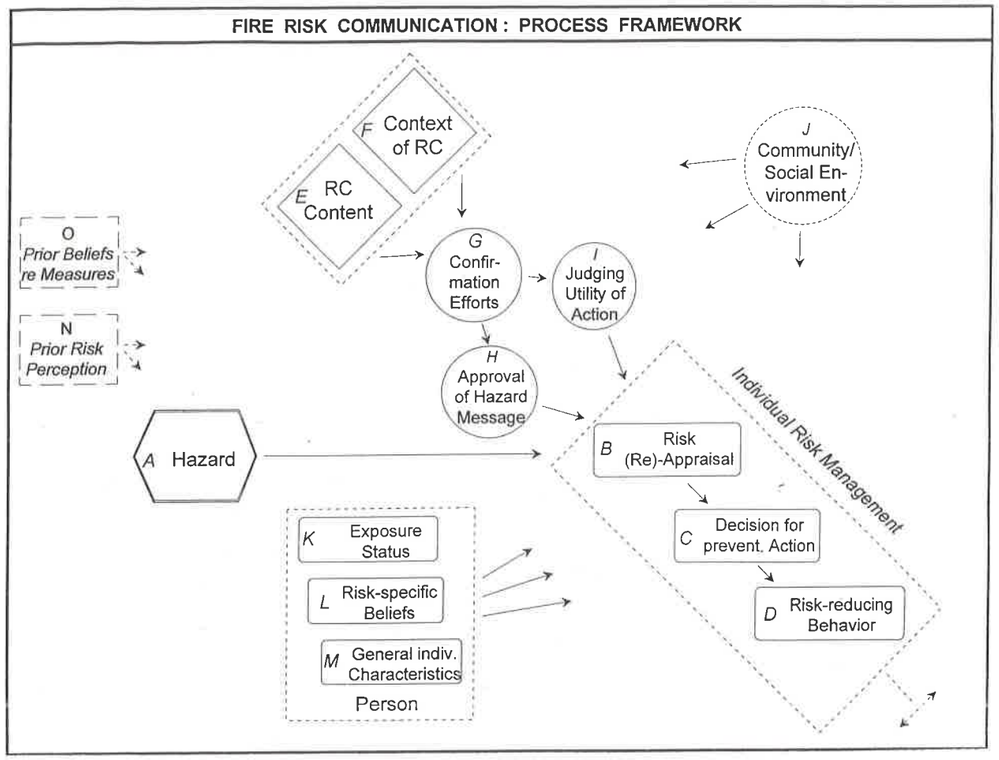
Reference for comparisons: normative program goals
previous situation
alternative RC strategies

Evaluation results can demonstrate not only whether but also *why* a program works (or success is lacking) and thus guide the further development and improvement of on-going risk communication.

3 A CONCEPTUAL FRAMEWORK FOR FIRE RISK COMMUNICATION

In order to analyze the process and outcome of fire hazard information and education efforts, a comprehensive framework is indispensable. Concepts and findings from five relevant research fields were integrated to develop a theoretical model of fire risk communication and its impact on community preparedness: Risk communication research (cf. e.g. COVELLO et al. 1989, JUNGERMANN et al. 1991); the social psychology of attitude change (e.g., AJZEN 1993, EAGLEY & CHAIKEN 1993); studies on human behavior in fire (e.g. CANTER 1985, 1990, KRUSEL & PETRIS 1992); disaster impact management (e.g. DRABEK 1990, RAPHAEL 1986), social science theory and research on participation processes (e.g. MUNRO-CLARK 1992, WEBLER & RENN 1995); for a review see ROHRMANN 1995. A graphic presentation is shown in *Box 4* below.

Box 4:



Fifteen constructs (or variable sets) are identified <A to O> as relevant aspects of the fire risk communication process, and the assumed causal links are indicated on a global level. The model expresses that the final outcome variable, risk-reducing behavior <D> regarding a hazard <A>, is determined not just by the communicated messages of the information/education program <E> but the result of a complex evaluation process <B, C and G, H, I>, and influenced by personal characteristics <K, L, M> and manifold context factors, e.g., attributes of the information source and 'channel' features <F> as well as family/friends and the community one belongs to <I>. Also, a longitudinal perspective is implied, as any risk communication has to deal with pre-existing attitudes and behaviors <N, O>.

This conceptual framework guided the specification of evaluative criteria, the explication of substantive hypotheses and the design of measurement instruments for empirical investigations of risk communication impacts.

4 A LONGITUDINAL STUDY ON A BUSHFIRE PREPAREDNESS PROGRAM

4.1 *Research objectives*

In 1996, the project "*Evaluation of community-based approaches to bushfire preparedness*" (Project EBP) was begun; it focuses on the "Community Fireuard" (C/F) program of the Country Fire Authority of Victoria (CFA). The principal objectives are: A critical analysis of the content and design of bushfire preparedness programs, based on a socio-psychological perspective; surveying

the reception, understanding, acceptance and implementation of measures by both residents and officials from authorities; and a comprehensive assessment of program outcomes on which enhancements of Australian fire safety initiatives can be based. The main research questions for the empirical stages are summarized in *Box 5*.

Box 5:

PROJECT EBP: MAIN RESEARCH QUESTIONS

> What are the genuine information needs of residents in fire-prone areas (as they see it)?

> What knowledge do people have re bushfire preparedness?

> Which expectations about fire authorities (vs personal responsibilities) exist?

> To what degree do residents search for, study, comprehend, accept, keep in mind and utilize fire hazard information?

> How are information materials, activities and involved CFA staff in C/F groups evaluated by participants?

> Which changes in emergency preparedness and protective risk reduction result from participating in C/F?

> How do CFA officers involved in C/F activities assess the utility of C/F?

> Are the impacts of community-based bushfire management strategies stable over time?

The project is conducted in collaboration with the CFA and will be completed in (late) 1998.

4.2 *Project design*

The research plan was comprised of theoretical work and both quantitative and qualitative empirical studies, i.e.: surveys with residents exposed to CFA activities and various comparison samples, and interviews and focus groups with CFA personnel and risk research experts. The central part is a "before/after" sub-study with participants in the "Community Fireguard" (C/F) program.

In *Box 6* the design and sampling for the sub-studies of the project is outlined. Sub-study <E> was designed to investigate the experiences of residents who had actively participated in a local C/F group for 1 to 2 years. The sampling included groups from all facilitators (in 4 regions); within locations, participants[ants were randomly selected. Group <X> ('non-C/F' residents), selected in the same areas, served as a 'base sample' for a group of *new* C/F participants <"N"> and a comparison group <"C"> without any involvement in the C/F program; these two groups were interviewed twice, *before* and about 6 months *after* the C/F program was implemented in the respective area (data N1/N2; C1/C2). This quasi-experimental design allows for intra-individual and inter-individual outcome analyses (e.g., by comparisons N1 vs N2 and N2 vs C2; further possible comparisons are E vs X and F).

Box 6:

SURVEY DESIGN: TARGET GROUPS & SAMPLES	*<Project EBP>*
<E> Residents participating in *existing* C/F program	N=110
<X> Bushfire-prone areas; no C/F; future CFG's likely	N=126
out of <X> - interviewed again in Phase II:	
<N> residents participating in *new* C/F group	N=21
<C> *comparison* group not exposed to C/F, same areas	N=36
<F> Residents exposed to *fires* in Victoria in 1997	N=30
<P> CFA *personnel*: officers dealing with the C/F program	N=20

The interviews were done face-to-face by a trained interviewer team and based on a standardized questionnaire (including lists and response scales), constructed with respect to the conceptual framework outlined above.

Box 7:

LIST OF TOPICS COVERED IN THE QUESTIONNAIRES *<Project EBP>*	
A	Perceived risk level and vulnerability (for area and house)
B	Level of understanding bushfire issues
C	Sources of existing knowledge and competence
D	Personal experiences with actual bushfires
E	Subjective information needs of residents
F	Assessment of information sources (authorities)
G	Expectations about responsibility (re bushfire hazard)
H	Level of preparedness for bushfires
I	Motivation for participating in a C/F group
J	Actual participation in C/F activities (individual & group)
K	Involvement pattern for household members
L	Evaluation of discussions/group activities/exercises
M	Evaluation of printed materials, videos etc
N	Evaluation of involved CFA staff (facilitators, officers)
O	Action: taken/intended/induced by C/F (technical/organiz.)
P	Satisfaction with process and outcomes of C/F program
Q	Intentions for future participation in C/F
X	Personal attitudes (inc.: life style, social participation)
Y	General/other community involvement
Z	Demographics

Note: Each topic was explicated by several questions/scales.

The list in *Box 7* shows the 20 principal topics covered in the 6 questionnaires developed for the substudies of this project. They also apply to the two studies extending beyond an evaluation of the C/F program, namely the survey <P> with selected personnel (i.e., C/F facilitators and firebrigade officers) and the special study <F> with people who had been exposed to actual bushfires within the last year.

Given the large amount of data (and the fact that the project is still running), only selected preliminary results can be presented here. This section will focus on findings relevant for the C/F program.

Firstly, the demographic data for the main samples in *Box 8* show that the most respondents have been living in their residential area for 10 to 20 years already; in comparison to the general population, higher ages, educational levels and occupational status are over-represented in the groups targeted in this project.

Box 8:

DEMOGRAPHIC DESCRIPTION OF SUB-SAMPLES *<Project EBP>*

#	*Topic/Variable*	*Sub-Sample* E	X	N	C	F
Z4	Age	51.0	45.0	46.4	46.1	47.0
Z11	Sex (% Male)	51.0	50.0	56.3	44	28.0
Z2	Length of residence in area	1982	1979	1981	1981	1982
Z1	Length of residence in house	1985	1985	1984	1986	1978
Z8	Education (%)					
	Primary	6.0	2.0	6.3	0.0	0.0
	Secondary	56.0	43.0	31.3	44	47.0
	Tertiary	38.0	55.0	62.5	56	53.0
Z9	Work Description (%)					
	Running household	10	11	06	08	09
	Retired	24	08	00	12	16
	Predominantly White-collar	45	60	75	68	63
	Predominantly Blue-collar	14	13	18	12	03

The next *Box 9* presents selected results for the sub-studies <E> and <X>. (Please note that these samples are not designed to be directly comparable, as they served different research purposes; cf. box 6).

The main findings can be summarized as follows:

> Most residents are aware of the high bushfire risk in their area and have read quite a bit of respective material (brochures etc) (cf. A1/2, C5);

> they feel knowledgeable to a moderate but not high degree; most would like further information (cf. B1, B4, C6, E1);

> those who participate in C/F are more likely to accept their own responsibility for bushfire preparedness and safety than seeing this predominantly as CFA's task (cf. G2);

> the majority of respondents have realized a variety of risk-reducing activities and feel reasonably but not fully prepared for a future bushfire (O1, H1/2);

> As can be expected, the respondents from the "X" sample are lower on all of these variables; the differences are not very large though.

The lower part of *Box 9* comprises the participants' evaluations of the C/F program and its outcomes:

> participation is high for meetings, but the lower the more effort is required (cf. examples under J6);

> evaluations of activities, materials, involved CFA personnel and outcomes for understanding bushfire issues tend to be very positive (L1/M1/N1 and P1 to P6);

> the majority of group <E> assumes further involvement in C/F (P7, Q1).

Box 9:

RESIDENT'S VIEWS ON BUSHFIRE ISSUES - GROUPS "E", "X" <Project EBP>

#	Topic/Variable	Sub-Study: "E"	"X"
A1	Rating of area's bushfire risk (*0..100*)	80.0	70.0
A2	Likelihood of bushfire threat in next 5 years (*1..5*)	3.70	3.20
B1	Understanding bushfire issues (self-rating *0..100*)	74.0	61.0
B4&	Knowledge index re bushfire issues (*0..24*)	15.5	13.5
C5	Brochures/pamphlets re bushfires read (%)	95.0	67.0
C6&	Extent of informedness (%)	41.0	21.0
D1	Personally experienced a bushfire (%)	53.0	42.0
E1	Need for information re bushfire issues (%)	44.0	49.0
F1	Best source for info needed is CFG (%)	32.0	0.0
G2&	Responsibility attitude regarding the bushfire risk		
	Accepted as *own* responsibility (*3..15*)	8.3	7.7
	Seen as CFA's responsibility (*2..15*)	7.6	9.0
H1	Overall bushfire preparedness (self-rating) (*0..100*)	73.0	61.0
H2	Specific appraisals of preparedness		
	Technically (*1..5*)	3.8	3.2
	Organisationally (*1..5*)	3.8	2.8
	Psychologically (*1..5*)	3.8	3.5
O1&	Overall extent of actions taken (*0..16*)	11.3	7.1
J6	Frequency of joining CFG activities (examples)		
	Attended meeting to discuss fire behavior issues (%)	97	--
	Joined street walk in order ot inspect properties (%)	48	--
	Attended a working bee or a burn-off (%)	5	--
L1&	Mean evaluation of CFG activities (*10..50*)	42.4	--
M1&	Mean evaluation of materials used in CFG (*10..50*)	45.0	--
N1&	Mean evaluation of CFA staff involved in CFG (*10..50*)	44.5	--
P1	Overall improvement in understanding bushfires (*1..5*)	3.9	--
P2	Level of dependence of CFA re: bushfire threat (*1..5*)	3.7	--
P3	Overall assessment of participating in CFG (*1..5*)	4.2	--
P6	Improvement in dealing with b.f. issues as group (*1..5*)	3.6	--
P7	Likelihood that CFG continues even without CFA input (*1..5*)	3.4	--
Q1	Likelihood of own future involvement in a CFG (*1..5*)	4.3	--

Of course these results can be influenced by socio-psychological expectations - evaluations of a principally valuable activity tend to be biased towards a favorable outcome appraisal. Therefore comparisons based on the "N" and "C" groups of respondents provide a more valid examination; see *Box 10*.

These results demonstrate:

> Judgments of risk awareness, knowledge re bushfires, own responsibilities, technical fire preparedness as well as actions taken (A1, B1, B4, G2, H2, O1) slightly increased for new C/F participants from phase 1 to phase 2, while perceived information need and reading activities decreased (E1, C5).

> However, very similar effects occurred within the comparison group (see columns C1/C2), and the differences tend to be higher (cf. C2-C1 vs N2-N1).

> While the absolute level of awareness, reading, knowledge, and actions taken is still somewhat lower in the 'Non-C/F' group (cf. C2/N2), subjective understanding, preparedness and acceptance of own responsibilities (cf. B1, G2, H2) is actually slightly higher than for C/F participants.

Box 10:

RESIDENT'S VIEWS ON BUSHFIRE ISSUES -COMPARISON PHASE 1--2					<Project EBP>
		New C/F groups		*Comparison group*	
#	*Topic/Variable*	N1	N2	C1	C2
A1	Rating of area's bushfire risk (*0..100*)	81.2	84.4	74.0	82.6
B1	Understanding bushfire issues (self-rating *0..100*)	63.8	68.1	62.0	72.1
B4&	Knowledge index re bushfire issues (*0..24*)	16.1	17.6	13.6	13.8
C5	Brochures/pamphlets re bushfires read (%)	93.8	75.0	60.0	45.8
D1	Personally experienced a bushfire (%)	56.3	68.8	52.0	44.0
E1	Need for information re bushfire issues (%)	62.5	37.5	48.0	28.0
F1	Best source for info needed is CFG (%)	25.0	28.6	0.0	14.0
G2&	Responsibility attitude regarding the bushfire risk				
	Accepted as *own* responsibility (*3..15*)	7.8	8.0	8.1	8.4
	Seen as CFA's responsibility (*2..15*)	8.2	6.8	8.8	7.9
H2	Specific appraisals of preparedness *(1..5)*				
	Technically	3.4	3.9	3.1	3.3
	Organisationally	3.6	3.5	2.9	3.6
	Psychologically	3.6	3.4	3.5	3.9
O1&	Overall extent of actions taken (*0..16*)	8.1	10.6	8.0	8.2
L1&	Mean evaluation of CFG activities (*10..50*)	--	39.6	--	--
M1&	Mean evaluation of materials used in CFG (*10..50*)	--	43.2	--	--
N1&	Mean evaluation of CFA staff for CFG work (*10..50*)	--	42.6	--	--
P1	Overall improvement in understanding bushfires *(1..5)*	--	3.9	--	--
P2	Level of dependence of CFA re: bushfire threat *(1..5)*	--	2.9	--	--
P6	Improvement in dealing with problems as group *(1..5)*	--	3.1	--	--
P3	Overall assessment of participating in CFG *(1..5)*	--	4.3	--	--

> The lower part of box 10 contains the "N" group's appraisals of C/F activities and respective outcomes (L1 to P3); these evaluations are predominantly positive and almost as approving as those given by the "E" group (cf. box 9 above), in spite of the shorter duration of C/F participation.

> Perceived shortcomings of the C/F program seem to be limited to mainly two issues: high demands on time, and difficulties in applying advice to the individual problem case.

While principally favorable, the data gained so far are not as convincing as expected (and hoped for). However, the final - and methodologically crucial - data collection in phase II was severely confounded by two 'external' events:

> large fires occurred in the Sydney region in Nov. '97 - this happened much earlier than usual and induced wide-spread media activities;

> the CFA had to modify its community education approach (including the program under study) in response to predictions of high bushfire risk in 1998.

It seems highly likely that these circumstances increased problem awareness and consequently bushfire preparedness in all investigation areas - by that blurring the specific effects of C/F and reducing the difference between the 'experimental' group "N" and the 'control' group "C".

Also, far less people than expected formed or joined new C/F groups in 1997; thus the time the surveyed residents had spent with C/F activities was significantly shorter than originally planned (in most cases considerably less than half a year) so that outcomes could not fully unfold.

Consequently, the currently available results do not permit (yet) unequivocal conclusions about the outcomes of the C/F program.

However, evidence from the "E" study as well as other parts of the project (such as the survey with personnel or the focus groups conducted in 1997 and 1998) clearly indicate that the community-based "Fireguard" approach is beneficial on the whole to the bushfire preparedness of residents in fire risk areas and improves both individual and group risk mitigation.

5 ASSESSING PROGRAM EFFECTIVENESS: CONCLUSIONS

The research presented above provides two main messages: firstly that the empirical assessment of risk communication programs is both feasible and fruitful, and secondly that evaluation studies are 'serious business' which can fail if not conducted carefully.

With respect to the restricted validity of the evidence available so far, a phase III is clearly needed to confirm and clarify the benefits and shortcomings of programs such as the CFA's C/F; respective planning is currently under way.

The present project seems to be the only 'full' evaluation of fire risk communication outcomes - obviously more studies are desirable in order to consolidate the scientific knowledge on effective strategies and necessary prerequisites. In the final *Box 11*, some more general conclusions are listed:

Box 11:

ASSESSING FIRE RISK COMMUNICATION: SOME CONCLUSIONS

Substantial issues

- develop sound theoretical framework for risk communication
- measure evaluation criteria with respect to participants' actual experiences, attitudes and activities
- distinguish between cognitive and behavioral effects
- conduct specific studies on the socio-psychological barriers to effective (fire) risk communication
- tailor evaluations to the characteristics of the local case

Methodological issues

- employ appropriate state-of-the-art experimental designs
- consider both short-term and long-term program impacts
- check all as many alternative causes for effects (besides the intervention under study) as possible
- investigate validity of findings across cultural groups
- plan ahead how to deal with confounding events in the field
- explicate the results' internal and external validity
- incorporate evaluation research into a program in advance

Practical issues

- ensure trustful collaboration with the program's agency
- secure sufficient funds: proper evaluation will be expensive
- participate in the dissemination of evaluation findings

In *substantial* terms, theoretical/conceptual efforts and tailoring general principles of evaluation towards the specific program case under study are the

most important considerations.

Regarding *methods*, strict methodological standards are absolutely indispensable, and the validity and scope of findings needs to be clarified by the researcher. (In fact misleading knowledge might be worse than missing knowledge, as KASPERSON & ROHRMANN 1988 stated in a review).

With respect to *practical* issues - evaluation research will gain from close co-operation with the agency/authority which is responsible for the risk communication program. (This might also help to 'transmit' the complexity of evaluations, as non-researchers tend to underestimate the design, cost and time requirements). However, collaboration must be balanced with the necessary independence of the researcher; otherwise the credibility of the results might be reduced, as there will always some social pressure for positive results (PATTON 1986).

Finally, the thorough dissemination of findings (beyond academic circles) is essential - evaluation research would be futile if not systematically utilized for improving fire risk information/ communication/education programs!

References

Ajzen, I. (1993). Attitude theory and the attitude-behavior relation. In D. Krebs & P. Schmidt (Eds.), New directions in attitude measurement (pp. 41-57). New York: de Gruyter.

Barham, R. (1996). Fire engineering and emergency planning. London: Spon.

Beckingsale, D. (1994). Community fireguard and the rural-urban interface. Fire Management Quarterly, 1-8.

Beckingsale, D. & Petris, S. 1994. The CFA community FireGuard program (manuscript). Melbourne: Country Fire Authority.

Canter, D. (1985). Studies of human behaviour in fire: empirical results and their implications for education and design. University of Surrey.

Canter, D. (1990). An overview of human behavior in fires. In D. e. Canter (Ed.), Fires and human behavior (pp. 205-243). London: Fulton.

Chase, R. A. (1993). Protecting people and resources from wildfire: Conflict in the interface. In A. Ewert, D. J.; Magill, A. W. (Ed.), Culture, conflict and communication in the wildland-urban interface. Boulder: Westview.

Country Fire Authority (CFA) (1995). Community Fireguard. Melbourne: CFA.

Country Fire Authority (CFA). (1995). Bushfires - Living with Australia's natural heritage. Melbourne: CFA.

Covello, V. T., Mccallum, D. B., & Pavlova, M. (1989). Effective risk communication. The role and responsibility of government and nongovernment organizations. New York: Plenum.

Drabek, T. E. (1990). Emergency management: Strategies for maintaining organizational integrity. NY: Springer-Verlag.

Eagly, A. H., , & Chaiken, S. (1993). The psychology of attitudes. Fort Worth: Harcourt-Brace.

Fink, A. (1993). Evaluation fundamentals, guiding health programs, research,and policy. London: Sage.

Fischhoff, B., Bostrom, A., & Quadrel, M. J. (1993). Risk perception and communication. Annual Review of Public Health, 14, 183-203.

Gaull, E. (1997). Show me the results. Fire chief, May, 75-81.

Handmer, J., Dutton, B., Guerin, B., & Smithson, M. (1991). New perspectives on uncertainty and risk. Canberra: ANU.

Jones, R. (1987). Community involvement: The missing link. Bush Fire Bulletin, 14-15.

Jungermann, H., Rohrmann, B. & Wiedemann, P. (1991). Risikokontroversen - Konzepte, Konflikte, Kommunikation. Berlin etc.: Springer.

Kasperson, R. M., & Rohrmann, B. (1988). Evaluation of risk communication

strategies. In H. Jungermann, R. M. Kasperson, & P. M. Wiedemann (Eds.), Themes and tasks of risk communication Jülich: Research Center Jülich.
Kasperson, R. E., & Stallen, P. M. (Eds.). (1990). Communicating risks to the public. Dordrecht: Kluwer.
Krimsky, S., & Plough, A. (1988). Environmental hazards - Communicating risks as a social process. Dover: Arborn.
Krusel, N., & Petris, S. (1992). Staying alive: lessons learnt from a study of civilian deaths in 1983 Ash Wednesday bushfires. Fire Management Quarterly, 1-17.
Lundgren, R. (1994). Risk communication: A handbook for communicating environmental safety and health risks. Columbus/OH: Batelle Press.
Munro-Clark, M. (Ed.) 1992. Citizen participation in government. Sydney: Hale and Ironmonger.
Patton, M. Q. (1986). Utilization-focused evaluation. London: Sage.
Pyne, S. J. (1991). Burning bush: A fire history of Australia. Melbourne:Allen and Unwin.
Raphael, B. (1986). When disaster strikes - How communities and individuals cope with catastrophe. New York: Basic Books.
Robertson, J. C. (1989). Introduction to fire prevention. New York: Macmillan.
Rohrmann, B. (1992). The evaluation of risk communication effectiveness. Acta Psychologica, 81, 169-192 (a).
Rohrmann, B. (1995). Effective risk communication for fire preparedness: A conceptual framework. The Australian Journal of Emergency Management 10, 43-48.
Rohrmann, B. (1998). Assessing hazard information/communication programs. Australian Psychologist, 33, 1-8.
Rohrmann, B., Wiedemann, P., & Stegelmann, H. U. (Eds.). (1991). Risk communication - An interdisciplinary bibliography. Juelich: Research Center MUT.
Rossi, P. H., & Freeman, H. E. (1993). Evaluation: A systematic approach. Beverly Hills: Sage.
Smith, P., Nicholson, J., & Collett, L. (1996). Risk management in the fire and emergency services: Enhancing community safety. Melbourne: Proceedings of the "Fire Australia" Conference.
Webler, T., & Renn, O. (1995). A brief primer on participation:Philosophy and practice. In O. Renn, T. Webler, & P. Wiedemann (Eds.), Fairness and competence in citizen participation evaluating models for environmental discourse (pp. 17-34). Hingham/MA: Kluwer.
Whelan, M. (1987). Encouraging community participation in bushfire preparedness: the role of the Municipal Fire Prevention Officer. Monash University: Thesis, Environmental Science.
Yates, J. F. E. (1992). Risk-taking behavior. Chichester: Wiley.

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Paper 9

Partners in Protecting the Community

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PARTNERS IN PROTECTING THE COMMUNITY

Submission by: COMMANDER WAYNE BRADBORN

Metropolitan Fire and Emergency Services Board Fire Prevention Department

Presentation - Aim: To provide an overview of a Fire Safe Strategy for the intellectually and physically disabled community.

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PARTNERS IN PROTECTING THE COMMUNITY

Commander Wayne Bradborn
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Abstract

The State Government has adopted a philosophy of returning institutionalised persons to mainstream living. The government's policy has brought about new challenges for the fire service to create fire safe environments for these people.

There have been several fires in premises referred to by Human Services as Community Residential Units. Some of the fires have resulted in injuries and deaths. In essence these units house individuals that are either physically and/or intellectually disabled. Generally, each house will have somewhere between 4-10 residents, with varying degrees of disability. Clients in the main are mature aged and are supervised by live-in carers.

Human Services have developed a policy and have committed funding for the installation of residential sprinkler protection for these premises. To complement the installation of active fire protection equipment, the Metropolitan Fire and Emergency Services, in partnership with Human Services have developed a self-paced learning package for CRU staff. The package with supporting video, is designed to better prepare carers to firstly prevent fires from eventuating, but if the need did arise, the ability to initiate the correct procedures to help guarantee the safety of the occupants.

Another dimension to this training strategy is the practical training that is being delivered to house supervisors. The supervisors are responsible for ensuring all house staff complete the self-paced package and video satisfactorily. The training

will equip these individuals with the necessary tools so that vigilance can be exercised in preventing fires and preparing households to better cope in the event of a fire. The house supervisors will be a resource to assist all other employees completing the training program.

The program has been adopted across Victoria. It is a partnership between the Metropolitan Fire & Emergency Services Board and Human Services.

It demonstrates the importance of having a balance of fire safety systems, emergency procedures and staff that have been trained to react appropriately in the event of fire.

The Metropolitan Fire and Emergency Services Board believes that this self-paced learning package is an ideal model given many other governments are committing to de-institutionalizing physically and intellectually disabled individuals. It is a strategy that most fire services could adopt.

Paper 10

Fire Behaviour Prediction. Information in Anticipation, through Coupled Meso-Meteorological Models

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Fire Behaviour Prediction. Information in Anticipation, Through Coupled Meso-Meteorological Models.

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Abstract

This paper classifies fire behaviour models (or fire danger meters) into four classes. Experiential models, empirical models, semi- empirical models and theoretical models. The limitations of each type of model is given and a description of the recently emerging coupled meso-model which relies upon the numerical solution of the Navier-Stokes equations to provide for the first time a fire model that will be capable of providing for the needs of fire managers in the next century.
An example of the model output and the techniques to validate it are given in the paper and a video of the model output will be shown.

Introduction

Bushfires in Australia have become an increasing problem since European colonization over 200 years ago. Before that fires were an accepted and integral part of the Australian eco- system. The Aboriginal practice of regular low intensity firing of the bush (Robinson et al, 1995) ensured that our forest areas were healthy, accessible and had low fuel levels so ensuring that any wild fires were of mostly low intensity and small area. It is probable that the lack of regular burning in the southern areas of Australia will lead to irreversible ecological changes during the next few decades.

The understanding of the role and effect of fire in the Australian environment depends intimately on the existence of fire behaviour models or fire danger meters or prescribed burning guides to give names to at least three variations on the same theme. The role of various models has been canvassed in a paper given to the CALM Landscape Fires 93 conference in Perth and titled "The Orchestra Grows! Two New Fire Models (Packham et al ,1993). This paper continues the theme and provides some outputs of the technique of fire behaviour modelling based upon rigorous physical principles.

Fire behaviour models

Fires in the in the ecosystem are almost always moving fires spreading through a fuel bed. The nature of the fuel bed determines the nature of the fire. Fires that burn in grassland have different characteristics than those burning in forest areas. A few moments reflection will show that there are so many variations of these two principle fuel types that great variations in fire behaviour can occur even when the meteorological parameters have been fixed.

For fires to burn it is necessary for the weather to be right with the right mix of recent rainfall (or lack of it) sufficient wind and a fairly narrow range of temperature and humidity to condition the fuel. The resulting fuel moisture content must be less than 20% . At the dry end , say around 3%fire behaviour will be very intense with flame heights measured in tens or even hundreds of meters and at the moist end (around 20%) flame heights are measured in centimetres and ignition is sometimes frustratingly difficult.

The purpose for which actual or potential fire behaviour information is needed determines the type of model that is most appropriate. There has been amongst some fire managers the wish for a universal model that will supply all the fire behaviour information that is needed from prediction of probable fire location in an extreme bushfire situation to a guide for fuel management burns and an ability to assess the effectiveness of fire management practices and policies over a seasonal time scale. To seek such a universal model is a waste of time as no model can provide that range of information with out a complexity of inputs that renders it useless as a tool.

Fire behaviour models can be divided up into four classes, each useful within its range of application. The classes I have chosen are called experiential, empirical, semi-empirical and theoretical.

Experiential models

Every one of us carries an experiential model lodged solidly in our heads. We all know that if it is hot, dry and windy then the fire will be hot and fast. Some have even converted that subjective knowledge to models that provide some type of classification for the fire behaviour. Such models have made a good contribution to our ability to use and understand fire. For example at home when I burn I rely upon my experience to guide my pyrological gardening and the indigenous people managed the entire Australian continent using inbuilt experiential models.

Empirical models

The next class of models was the great leap forward for understanding fire in the Australian ecosystem. Fire behaviour scientists notably a forester Alan McArthur in the Eastern states and an Agriculturist, George Peet in Western Australia went out into the bush and lit fires and measured the resulting spread rate and flame height. These fundamental measurements of fire behaviour were then correlated against all the likely parameters that could be imagined. The parameters included fuel loading, fuel moisture, wind, temperature, humidity, overnight drying, recent rain and various dubious measures such as the Keetch-Byram Drought Index. These models work extremely well providing that the predictions are within the range of parameters that the models were developed in. In the case of prescribed burning that is not too hard to do as FRB is a discretional activity. Some times the empirical models work quite well for bushfires and sometimes they fail in a spectacular fashion even in some cases causing serious loss of life.

Semi-empirical models

The semi-empirical models rely upon some form of theoretical description of how fire spreads and tend to use wind tunnel fire data to convert the theory into a realistic fire behaviour model. These model have tended to be useful for scientific study of fires as they produce measurable parameters that can then studied. The application of these models to actual fire behaviour in the ecosystem have mostly been successful but occasionally spectacular in their failures.

The empirical and semi- empirical models have become enshrined in fire management practice and are applied in Australia for example for declaring total fire ban days and most fuel reduction burning is based on models from either of these classes.

Theoretical models

Theoretical models where fire behaviour predictions are based upon the application of mathematical methods to physical principles have so far been very unsuccessful at predicting fire behaviour. The reason for the failures have been in my opinion the lack of powerful enough computers to cope with the enormous complexity of the fire process and some incorrect assumptions as to the actual physical mechanism of fire spread. That is now all set to change with two of the world's biggest laboratories putting significant resources into solving the mystery of fire spread. The two Laboratories are the National Center for Atmospheric Research (NCAR) and the US Los Alamos National Laboratory. The NCAR work is under the direction of Dr Terry Clark who is in Australia at the Dept of Mathematics at Monash University of a one year sabbatical. His work in continuing the coupled-meso fire model here in Australia has had additional financial support from the Universities Grant Commission, the Victorian Country Fire Authority and AMCOR.

The coupled- meso model

Some details of the model and its techniques are available in two papers (Clark et al 1996a , and 1996b) .

The aim of the project is to develop a model that allows the fire to interact with the atmosphere and to predict fire behaviour parameters for all conditions of fuel, terrain and meteorology. This is a big ask but the initial indications are that the approach will be successful.

The principle of the coupled meso-modelling approach is to solve the basic equations of state of the atmosphere with fire as an input and then to incorporate the feed back process that determines to progress of the fire. The equations that are to be solved are the Navier- Stokes equations that are the basis of all of the world's numerical weather predictions. The complexity of the model is enormous and at this stage it take 30- 60 minutes of super-computer time to predict one minute of fire time. The results are however spectacular. It is now becoming possible to understand for example the shape that fires take up , the formation of fire whirlwinds, the transport of spot fires and the sudden blow ups that have been the major causes of loss of life in bushfires. Further description of the computational process should not take place here but for those who wish to know more the first contact should be the two Clark papers cited above.

Uses of the Coupled Model

What would be appropriate would be some suggestions for the utilisation of the vast quantities of fire behaviour information that can come from the coupled- model.

Bushfire spread

The most obvious but perhaps not the most important will be the ability to predict the future location of a wildfire. The hope is that this will enable more effective firefighting or demonstrate the fallacy of mass evacuations. Accurate model predictions which can predict blow up conditions however can save firefighter lives and permit successful burn out operations.

Fire safety

"Blow up" conditions where the fire suddenly in a matter of a few seconds increases its spread rate and fire intensity many times have not been understood nor observed in such a way that meaningful observations could be made. It is these rare events that however seem to be at the heart of most fire entrapments. To be able to reproduce these "blow- ups" in the coupled model and to identify the conditions under which they can occur will provide the information that can prevent these tragic entrapments.

Spotting

Australian fires are the very devil for throwing burning embers down wind usually a couple of kilometres where they start new fires called spot fires. Some spots have be recorded in excess of 30 km and do change the nature of the firefighting operation. The coupled model could have the capacity to predict up draughts within the fire and so possibly provide good predictions of spotting distance.

Training
Very severe fires are a rarity and tend to be once in a lifetime events. A realistic simulation of fire spread and behaviour which has so far not been available would assist the training of fire managers and firefighters who will one day be involved in a fire event that is so much bigger and more dynamic than they could imagine.

Fire analysis

All serious wildfires deserve a rerun to analyse the sequence of events and so improve fire management performance. Such post-mortems are particularly useful information swapping exercises and can result in policy changes that can save lives, property and environmental values. A dramatic example is the demonstration of the dangers of evacuations in the front of fast moving high intensity wildfires. The coupled model appears to help re-run these fires.

Fire experiments
The lack of a theoretical basis for fire behaviour has meant that empirical knowledge has been obtained with a data shot gun approach using many experimental fires to try to cope with the great variation in fire behaviour. A strong theoretical understanding and application of sound physical principles should make possible key experiments at low cost for model validation and application to operational and management problems. The days of high intensity forest fire experiments are probably gone due to lack of funds for this type of research and the lack of suitable areas to experiment in.

A good coupled model will allow the highest intensity range of bushfires to be investigated and understood with little more expense than computer time. A field validation would however nearly always be necessary.

Understanding fire behaviour
A coupled model will enable the physical and chemical processes that determine fire behaviour to be understood . Questions like why does wind increase burning rate? how does water interfere with the spread of fire?, how is the heat transferred from bushfire by both radiation and convection? can all be tackled with such a useful tool.

How does the coupled model work?

The state of the atmosphere (or any other fluid) can be described by a number of equations that require that matter and energy are conserved, that momentum is also conserved and that the effect of the earths spin is accounted for. The equations that are used are the Navier-Stokes equations and are the basis of computer weather forecasting and modern aircraft and race car design. The equations do not contain any fatal approximations or assumptions. Their only problem is that they cannot be solved by analytical methods but rely upon numerical methods in large computers.

The solution of the equations does however require approximations, assumptions and simplifications that are applied by the modeller. It is this ability to massage the model that raises the role of modeller from computer slave to artist. The computing requirements are enormous and it is only now possible to have computers big enough and fast enough to be useful.

The coupled- model is based upon a general meso-model that we believe can be simplified and

with the cost of large computers falling and their performance still increasing it is clear that one day soon a coupled fire will run in real time. Already calculations have been made on large workstations.

The coupled model starts off with the input from all available meteorological observing stations within a hundred or so kilometres of the fire. Hence the continuing importance of meteorological information during fire events. It takes note of the terrain and the fuel maps and uses the best estimates of fuel conditions. The model is allowed to "spin up" and it then is capable of predicting the atmospheric parameters for at least 19 levels through the atmosphere and at a grid spacing of a few kilometres. The model then nests at finer resolutions until we are calculating the parameters for a few meters vertically and horizontally that correspond to ground and crown fires.

The fuel is then burnt and the heat released drives the model around the fire which then modifies the temperature, wind and humidity within the fire itself. At this stage the fire is then moved on by using the empirical McArthur model but it is our intention to do away with this rather crude use of an empirical model.

Validation

Validation of any model is vital and so it is with the coupled model. The validation technique is to observe spreading fires with a digital infra-red video camera and then analysing the temperatures and movement of the flames on a very fine scale. A comparison can be made using appropriate statistical methods with the dynamics calculated from the model. This technique has been used an the Experimental forest crown fire in the North-West Territories of Canada in June last year and is underway for wheat stubble fires in the Victorian Wimmera and is proposed for some experiments in tropical savannah fire in the Norther Territory in June this year.

Fig 1. shows one of the analysed images with vectors and temperature zones for a crown fire travelling at about 1 m per sec in pines. The fire was a small experimental crown fire that was very intense and had accelerated to high speed in a few hundred meters.

Fig 2. shows a typical computer output for a simulated fire.

The video presented is an animation made up of the outputs from the coupled model at discrete times. The air movements and strength of the wind vectors can be easily seen.

Conclusion

The generation of fire behaviour information is taking a great leap forward with the coupling of an atmospheric numerical meso-model with a physical model of fire spread. The gains from such a coupling are likely to be very significant and I expect that it will be the beginning of advances in fire management. The full application of coupled models will have to await improvements in model construction and increases in speed and decreases in cost of large, fast computers. All these developments are taking place now.

The coupled model needs support from empirical models for validation as both models must produce the same fire behaviour in regions where it has been demonstrated that the empirical models work. Improvements in empirical and operational models can be achieved by establishing the boundaries for the empirical models and predicting the parameters that cause breakdown in the empirical models.

Improvements are sure to follow and investment in this approach is indicated.

References

Robinson,C., Powell, J. and Packham, D.R., (1995) *Cleaning up the Bush*, Wildfire 4(1):26-30

Packham, D.R., Bally, J., Clark, T., Knight,I., Krusel, N., and Tapper, N., *The Orchestra grows! Two new Fire Models.* Conference on Landscape Fires '93, Perth, Sept. 1993.

Clark, T.L., Jenkins, M.A., Coen,J. and Packham, D.R. (1996a) *A Coupled Atmosphere-fire model; Convective feedback on Fire line Dynamics*, Journal of Applied meteorology, 35:875-901.

Clark, T.L., Jenkins, M.A., Coen, J. and Packham, D.R. (1996b) *Coupled Fire Meso-meteorological Modelling.* International Journal of Wildland Fire , 6(4):177-190.

Captions for Figures

Fig. 1. This is a validation image of a very fast Canadian pine crown fire photographed by an Inframetrics digital infra red camera. The image is capable of being processed to yield air movement vectors shown as the black arrows, the radiation temperature, shown as colour and the heat output at different heights above ground.

Fig. 2. An interesting example of the output of the Clark coupled model. The simulated fire was burning in a wind of 2m /sec (7.2 kph) .It was initially lit as a 1500m wide fire . The wind vectors around the fire at 30m above ground are shown . Notice the formation of a fire whirlwind which produced a dramatic increase in the spread rate of the fire and caused the development of finger shapes of fire edge.

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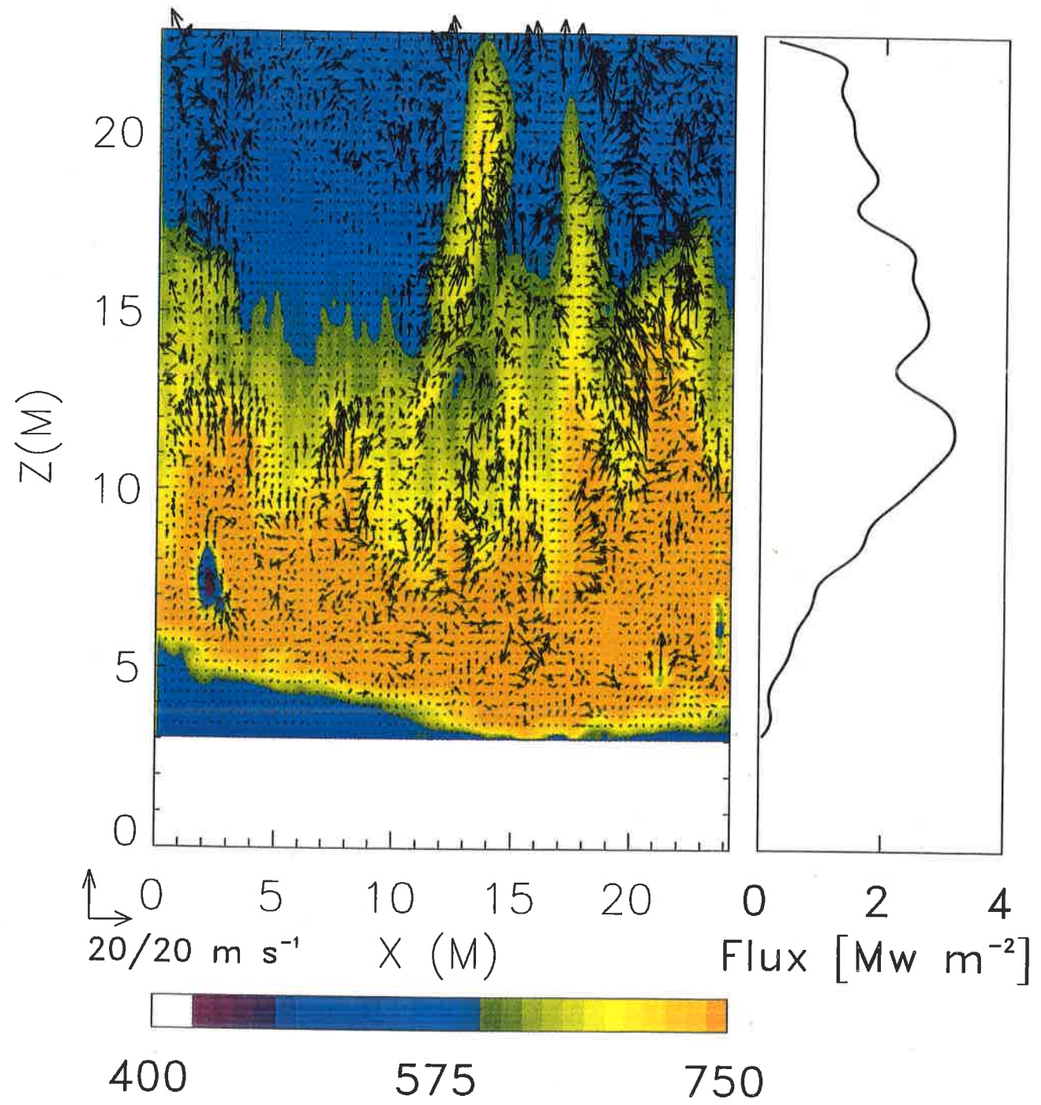

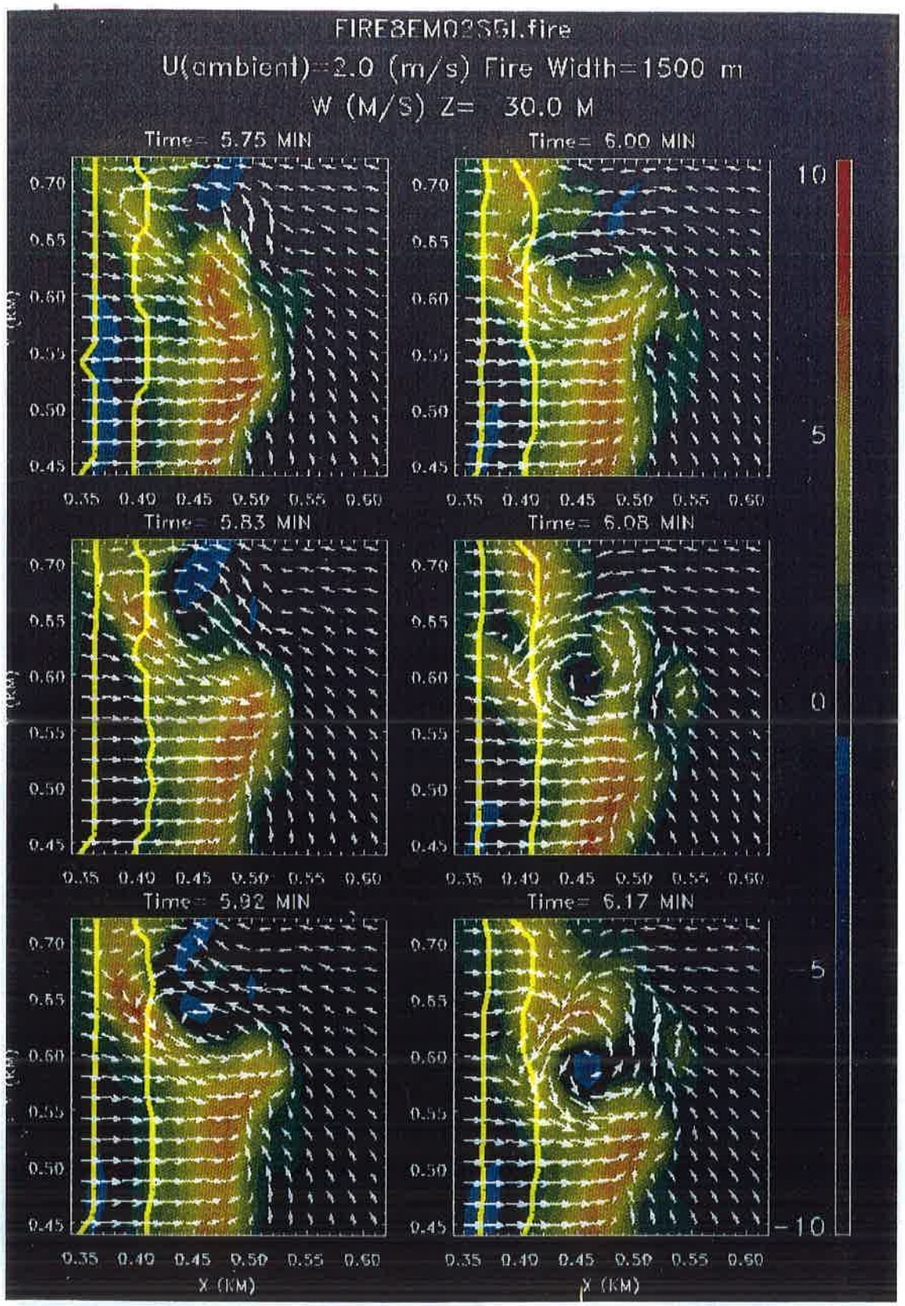
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David Packham

A chemist by training David has been playing with bushfires since 1962 when he joined the CSIRO Division of Physical Chemistry in the Bushfire Section. Since then he has studied heat and mass transfer in fires and developed with George Peet from WA the technique of aerial prescribed burning. George and David were both awarded an OAM for this bit of applied arson.

He has been very interested in the chemistry and physics of bushfire flames, smoke production and dispersion as well as human survival in bushfires. An inventor of the VESDA high sensitivity fire detector and now working with Dr Terry Clark and Dr Michael Reeder on the coupled-meso meteorological model at Monash University.

Was the Deputy Director of the Australian Counter Disaster College at Mt Macedon and the Supervising Meteorologist for the Weather Bureau's fire weather warning services.

Now retired but can hardly notice.

Paper 11

Realistic Hot Fire Training to Deal Safely with Flashover and Backdraft

Shan Raffel, Queensland Fire & Rescue Authority

REALISTIC HOT FIRE TRAINING TO DEAL SAFELY WITH FLASHOVER AND BACKDRAUGHT

Shan Raffel GIFireE, *Station Officer, Queensland Fire and Rescue Authority.*

Plastics and other synthetic materials that are used extensively in the construction and contents of all buildings, do not burn cleanly but generate large volumes of smoke. International research has revealed that the amount of unburnt fuel in this smoke is much greater than previously thought. These unburnt energy-rich gases congregate in the ceiling area and gradually heat up towards their spontaneous ignition temperature. When this temperature is reached, the result can be a rapid ignition of the gases, creating a wave of flame that radiates down onto the contents of the room. Not only does this lead to rapid fire spread, but it poses a major occupational hazard to firefighters and often results in death, or serious injury to persons caught in this heat wave.

Sometimes this effect can be delayed until after firefighters have entered. When they direct a stream of water onto the base of the fire, fresh air is introduced, and the embers are stirred up. This may cause the gases to ignite. A large number of the serious injuries and firefighter fatalities across the world can be attributed to this phenomenon.

In contrast, Sweden has not suffered death or serious injury from flashover since the introduction of live fire behaviour training involving the use of fire flashover simulators over 13 years ago.

This paper discusses the need for realistic training methods to teach firefighters how to safely reduce the likelihood of flashover and backdraft.

INTRODUCTION

Throughout the world there is agreement that firefighting is a potentially dangerous profession. Yet in some parts of the world, firefighters are expected to carry out firefighting operations in life threatening emergency situations without ever having the opportunity to observe the development of a fire in a compartment, in a safe, low stress environment.

It has long been realised by the military that a soldier has to operate in a wide range of extremely hostile environments. These can range from jungle, alpine, desert, swamp terrain, etc. If they are to operate effectively in these environments then they must not only have a sound theoretical understanding of what to expect and how to survive, but they must be exposed to these environments and carry out realistic training exercises. The end result of live, realistic training is not only an increase in efficiency, but a reduction in battle field casualties.

The firefighter is also required to carry out his duties in very hostile environments. The environment in a typical structural fire can suddenly change from what appears to be relatively stable to an inferno with temperatures over 1000 degrees Celsius at ceiling height and over 300

degrees Celsius at floor level. While sudden, such changes can be anticipated if the indicators are recognised. Unless the firefighter is able to "read" the signals that the fire is sending, he could become a victim instead of a rescuer. Therefore it is essential that the firefighter has a solid understanding of the fundamentals of fire behaviour. This can only be achieved by allowing the firefighter the opportunity to witness the development phases of a fire in a realistic, safe, controlled and predictable environment. The firefighter can then see the results of the different firefighting techniques on the dynamics of the environment. This leads to an understanding of the implications of his actions not only on the fire but also entrapped occupants, other firefighters, and possible effects on fire spread to surrounding areas. Then it is possible to obtain full benefit from the next phase of "Realistic Training", ie Tactical Live Fire Training.

In this paper I focus primarily on realistic training methods designed to teach fire behaviour in compartments. The purpose is to teach firefighters how a fire develops in a compartment, and how to recognise and safely deal with Flashover/Backdraught and other emergent fire phenomena. These training methods originated in Sweden where they have been incorporated into basic firefighter training since the mid eighties.

BACKGROUND

There have been enormous changes in construction materials and the typical contents of buildings and vessels in the last forty years. One of the most significant to firefighters is the wide spread use of synthetic materials such as plastics. These materials do not burn cleanly but generate large volumes of thick dark energy rich smoke. The unburnt gases in the smoke congregate in the ceiling area and gradually heat up towards their auto ignition temperature (AIT), the result can be a rapid ignition of the gases creating a wave of flame that radiates down onto the firefighters, and the contents of the room.

There have also been enormous changes in the equipment and protective clothing available to firefighters. One of the most significant is the wide spread use of self contained breathing apparatus. There have also been advances in protective clothing, branch design and communications. The combined effect is that firefighters are able to go further into structures and stay in for longer than ever before. Overall this has allowed the firefighter to carry out his tasks with greater safety and efficiency. However, it has also created other problems.

There has been an increase in the number of firefighters killed or injured due to sudden and unexpected fire phenomenon such as flashover and backdraught. In many parts of the world there has been a tendency to blame this on the fact that the combination of improved protective clothing and SCBA use allows us to go further into the structure. At the same time the insulative properties of the protective clothing reduce the ability to sense the great heat. There is no doubt that this is part of the picture. What has been fatally over looked by firefighters is the combustible nature of smoke in modern buildings.

Urban firefighters are often arriving at structural fires at the 'pre flashover' phase. They can easily find themselves in a situation where the failure to recognise the signs of imminent flashover, and take appropriate precautions, can lead to life threatening situations. Often the situations that look the most hazardous are not, and sometimes the 'routine fire' turns out to be the most dangerous. Realistic hot fire training gives firefighters the chance to observe and understand the

development of a fire in a compartment and teaches them how to avoid becoming a victim of flashover and backdraught.

It is vitally important to realise that this smoke can be ignited after congregating outside the room of origin. This cold grey smoke, which we have hardly considered in the past as a hazard, can be ignited if the conditions are right, with disastrous consequences. This "Delayed Flashover" can be very unexpected and powerful, and has been the cause of a large number of firefighter deaths.

There has been enormous pressure on Fire Authorities world wide to reduce costs. In many cases this has lead to reduced crew sizes and to situations where junior firefighters do not have the same opportunities that were available in the past to learn the skills required to safely carry out 'aggressive interior attack' and 'search and rescue' in burning buildings, under the direction of an experienced firefighter.

DEVELOPMENT

SWEDEN

In Sweden the theory of the combustibility of smoke has been long understood and practical training methods applied that teach firefighters to recognise, anticipate and deal with the flashover phenomenon have been in use since the mid 1980's. This has reduced the number of firefighters being killed from flashover and backdraught from an average of three every two years, to zero since the introduction of realistic fire behaviour training. (Cederholm 1997)

One of the main factors that caused a major rethink in Sweden, was a tragic fire in 1985 which resulted in two firefighters losing their lives when an apparently subdued fire inexplicably erupted into a fireball. This was only a few months after two other firefighters lost their lives to flashover. These events changed the Swedish Fire Service. There was a national inquiry into the problem and a number of recommendations became law. Breathing Apparatus (BA) control procedures were reviewed and regulations were introduced to ensure that all brigades were able to support BA teams by the formation of a "Smoke Diving Team" consisting of two firefighters (smokedivers), and a BA Leader, who carries out BA control at the point of entry while wearing BA. He is also equipped with a charged hose line and maintains radio contact, his primary purpose is to ensure the safety of the crew. Fitness standards and annual tests were introduced. There was also a recognition of the need for firefighters to have a sound understanding of fire behaviour and development in compartments. (Svenssen 1997)

For several years before these events, two Swedish Fire Engineers had been teaching some radical theories on the combustibility of smoke. In their efforts to prove their theories they challenged the existing knowledge and science of fire behaviour in compartments. Krister Giselsson and Mats Rosander provided a new angle to fire behaviour, reasons for the tragic occurrences in fires and, most importantly, extinguishing techniques that would improve firefighter safety. Giselsson and Rosander focussed their extinguishing research at a molecular level. From a re-examination of the fundamental of fire the Swedes started to develop practical techniques and procedures for structural firefighting. From the close cooperation of the Fire Engineers and Firefighters, the Swedes then developed a total package for structural firefighting.

Around the same time, Anders Lauren, a Station Officer in the Stockholm Fire Service, had been putting into practice the theories of Giselsson's and Rosander's by carrying out live burns in derelict houses. These of course were in limited supply and Lauren turned to Giselsson for assistance to develop an idea he had for modifying shipping containers to produce a compartment fire simulator. These simulators also proved the theory combustibility of smoke. It can be clearly seen that when there is only a pile of wood burning in the rear corner of a container, the only other available fuel source is the smoke. The smoke can be seen burning as it rolls across the non combustible ceiling. As the temperature approaches the Auto Ignition Temperature (AIT) small tongues of flame can be seen to ignite well away from the burning combustibles. Seconds later the smoke layer can be seen to ignite. This is known as Lean Gas Combustion (LGC) and the resultant radiant heat will lead to ignition of all other combustibles in the room (Flashover) (Giselsson 1997).

Today, with more than 13 years of experience in this type of training, the Swedes are regarded as experts in firefighting worldwide. Many of the world's fire services are today trying to fast track the Swedish methods.

United Kingdom

The UK Fire Service operates under three main pieces of legislation that provide the foundation for
the provision of operational training;
1.Section 1(1)b of the Fire Services Act 1947,
2.The Management of Health and Safety at Work Regulations, 1992,
3. Section 2(1) of the Health and Safety at Work Act, 1974.

This legislation recognises that firefighters are often called upon to work in extremely hazardous environments and that there is a need for realistic training to ensure that they are able to react in the most appropriate manner to ensure their safety and the safety of their colleagues.

The Home Office Health and Safety publication "Training for Hazardous Occupations", HSE OP8 has this to say about firefighting:

> *"The activities which firefighters are required to perform can be frightening. They frequently must work at heights, they are exposed to heat and smoke and they may have to enter dark confined spaces for rescue work. Unless the firefighter has experienced the fears to which these conditions give rise and has learnt to control them, there is a risk that he will get into difficulties in the hazardous circumstances of the fireground and will himself need to be rescued. He must also rely greatly upon his colleagues and his officers to look after him in hazardous situations. He needs to be confident in their ability to do so. He needs to know that if he is given an order by an officer that an officer will have considered the firefighters safety before asking him to do the task. He must also be confident that the task is within his own capabilities if he is to approach it in the right frame of mind. Each of these aspects, control of fear, and confidence in himself and his colleagues and his officers can be developed in training, but only if the training is undertaken under realistic conditions which may well expose the firefighter to risk."*

There is strong recognition that the employer has a legal obligation to train staff to meet the

hazardous situations to which they may encounter. Sensible, risk based, realistic training is essential to ensure that firefighters are able to react appropriately and safely to the extreme environments and situations they are often exposed to.

British Research

In 1993 the Home Office Fire Experimental Unit was asked to investigate the whole field of the science of firefighting and suppression. The goal of the unit was to determine whether the Fire Service was sufficiently informed about what was known about fire behaviour, and whether there were any areas that required future research. The Fire Research Station was commissioned to examine flashover and backdraft. They concluded that the Fire Scientists had a clear understanding of both phenomena, but that this information was not being effectively communicated to the Fire Service. The Home office reacted by producing two supplements to the Manuals of Firemanship; "The Behaviour of Fire - Compartment Fires", and "The Behaviour of Fire - Tactical Ventilation of Buildings and Structures". The ongoing research is causing a major rethink on firefighting tactics and training. The Institution of Fire Engineers (IFE) has been actively stimulating discussion and research into this area (Thomas 1996, pp25-26).

Blaina Tragedy

On the 1st February 1996 a fire occurred that sent shock waves through the British Fire Service and reinforced the fact that the employer has an obligation to ensure that employees are adequately trained to meet any safety hazards they are likely to encounter during the performance of their duties.

Two firefighters in Wales (Blaina, Gwent) were killed when they were searching a smoke filled house for a person reported missing. The firefighting crew attended what appeared to be a routine job - no obvious flame visible, just smoke, and in the back kitchen an orange glow. A child was rescued from the top floor, and after a report that there may be a second child still inside, the team made entry a second time. Moments later a powerful whoosh was heard and the entire building erupted into a fireball. The entry door slammed shut onto the hose reel line, trapping the two firefighters in the inferno. Such was the intensity of the fire that it forced back the desperate attempts of the rescuers. It took nearly eleven minutes to subdue the fire to the point where the firefighters could be removed from the building. (Baglin 1996, p17)

A Health and Safety Executive investigation was launched and the findings indicated that the training given to the firefighters did not adequately prepare them to deal with the situation they had encountered. As a result of the findings an Improvement Notice was served on the South Wales Fire Brigade.

The following is a quote from part of the findings;
"2. The training provided did not adequately equip firefighters to recognise and deal with the situation encountered at Blaina.
3. Monitoring of watch based training was not sufficiently rigorous to spot areas which had not been covered adequately. Resources for Officers delivering training were not sufficient to ensure quality training (e.g.. comprehensive bibliographies, lecture packs, overhead slides).
4. Few firefighters in Gwent had received useful hot fire training." (Baglin 1996, p17)

This incident occurred only months after the Home Office Review Team published their preliminary recommendations. The review team recommended that the training of firefighters must equip them with tools and knowledge necessary to carry out firefighting tasks safely. Basically if firefighters are to be exposed to risks in the duties of their employment, they should be prepared for this by being exposed to a degree of risk in controlled training scenarios.

It can be clearly seen that the UK Fire Service has recognised the need for realistic training and in particular, fire behaviour training. Many brigades in the UK are in the process of developing or delivering flashover training to their firefighters. Moreton-in-Marsh is nearing completion of their facility and it should be delivering training before the middle of 1998. As well as the supplements to the manuals of firemanship, an effective audio-visual training aid has been developed.

AUSTRALIA

In Australia legislative requirements outline the "Duty of Care" of both employers and employees and their responsibilities to contribute to workplace safety. The employer has responsibility to ensure that hazards are identified, risk is assessed, and appropriate actions are put in place to remove or reduce the risk. This involves not only the appropriate protective clothing, but safe systems of work and adequate training. Many Fire Services have seen realistic training as necessary to prepare and develop firefighters for their operational tasks.

Typically, training is carried out using props to simulate the conditions experienced during petrochemical and gas firefighting operations. These are mostly "outdoor" setups. Tactical hot fire training is carried out in purpose built buildings to simulate the conditions experienced during structural firefighting, ship firefighting, aircraft etc. These are mostly fuelled by LPG, because it is relatively inexpensive and burns cleanly. The problem with using these facilities to teach compartment fire behaviour is that LPG does not allow the firefighter to witness and experience the development of an ordinary combustible fire from incipient to the "lean gas combustion" phase (the phase immediately preceding flashover), or to experiment with the effects of the introduction of water spray into the smoke, flame zone or the combustible linings that are producing the energy rich gases.

The Queensland Fire and Rescue Authority (QFRA) has recognised the need for firefighters to have the opportunity to witness fire development and learn extinguishing techniques in a controlled environment. Fire behaviour training is seen as the foundation for the understanding of fire behaviour in compartments. This can be achieved by the use of Flashover Fire Simulators (FFS). These are modified shipping containers designed to allow for the burning of six sheets of particle board. This is based on the tried and proven methods pioneered by Station Officer Anders Lauren (Stockholm Fire Service) and Fire Engineers Krister Giselssen and Mats Rosander, which was endorsed by the Swedish National Rescue Board and has formed the basis of all "Indoor Firefighting" training. The QFRA has carried out extensive research and is currently developing a Compartment Firefighting course in cooperation with the United Firefighters Union of Australia, Queensland Branch.

Current Understanding of Flashover, Backdraught and other emergent Fire Phenomena

Combustibility of Smoke

Traditionally, firefighters have been taught to attack the 'seat' or base of the fire. In a compartment this can lead to the entrainment of air which supplies oxygen to the super heated unburnt fuel in the ceiling. This could lead to a flashover or backdraught. The Swedish methods are more holistic and focus on cooling, shrinking, and diluting the smoke to prevent sudden flashover or backdraught, and aid in locating victims and the seat of the fire with greater safety and efficiency. It is essential that the firefighter realises that this combustible smoke layer can ignite spontaneously when the AIT is reached (provided there is sufficient oxygen present). This can occur in the room of origin, or from the ignition of smoke that has drifted into other parts of the structure.

Terminology

There is still a great deal of confusion regarding terminology. The Swedes refer basically to four types of "flashover".

1. Lean Flashover
This is the ignition of the gas layer in the ceiling leading to total involvement of the compartment.

2. Rich Flashover
This occurs when the combustible gases are ignited at the upper region of the flammability range. This can occur when opening up a compartment in which the fire has subsided to a lack of oxygen. The ignition source can be the re-ignition of the smouldering objects, or the stirring up of embers by the air track.

3. Delayed Flashover
This occurs when the ignition of the smoke layer has been delayed. Ignition can occur at any point within the flammability range and the result can be very unpredictable. If ignition occurs at the Ideal Mixture (IM) then the result can be a very violent ignition (Smoke Gas Explosion).

4. Hot Rich Flashover
This occurs when super heated rich smoke leaves a compartment at or above the AIT. Upon mixing with the air the smoke is diluted down to the UFL and ignition occurs spontaneously. The resultant flame can propagate back into the compartment resulting in an event similar to the rich flashover.

There is currently a great deal of debate on terminology. There is reluctance on the part of the part of some British fire scientists to accept the Swedish terminology. Some of them may feel that it is not scientific enough. This is a shame because the Swedish terminology was created to describe the events that firefighters had been experiencing for many years. It was created in an attempt to give firefighters a practical understanding of the different events and how they occurred.

The British Standard definition for flashover is:
"Sudden transition to a state of total surface involvement in a fire of combustible materials within a compartment". (BS 4422, 1987)

Backdraft, or backdraught (English spelling) is a term commonly used in America. The NFPA definition for Backdraft is:
"The explosive or rapid burning of heated gases that occurs when oxygen is introduced into a building that has not been properly ventilated and has a depleted supply of oxygen due to fire." (Burklin, NFPA 1980)

A video produced for the Home Office in 1997, entitled "Compartment Fires and Tactical Ventilation" talks of "Delayed Backdraught". This is the event that the Swedes are calling Delayed flashover.

As you can seen there are currently a number of ways of describing the same event. It may be quite some time before terminology is standardised. Until then firefighters will have to be aware of the variations and make their own determination as to what definition is the most meaningful. The most important point is that firefighters are aware of the different events, how they occur, how to recognise the conditions that could lead to them, and most importantly, how to safely deal with these phenomena.

CONCLUSIONS

In order for firefighters to competently and safety function in the dangerous situations and environments that they are often placed in, they must experience in training the conditions that may be encountered, in a safe low stress environment. This builds confidence and allows for the recognition of conditions that could endanger their lives.

To obtain maximum benefit from Tactical Live Fire Training exercises, it is essential that the firefighter has a sound understanding of fire behaviour in compartments. This can be achieved through the combination of theory, small scale demonstrations, and then live training in a facility designed to allow firefighters to safely experience all stages of fire development in a compartment. The firefighter is then ready to undergo Tactical Live Fire training. The next logical step is the use of derelict buildings for controlled fire suppression training.

Review of realistic training sessions can greatly assist in identifying and rectifying deficiencies in training, equipment, protective clothing and operational procedures. The final step is the review of actual fire incidents through debriefing. During my firefighting career it has been my experience that everyone tries to do their very best at an emergency incident. Rarely is our performance "perfect", there is always something to be learnt from every incident. Firstly we must encourage people to honestly appraise their own performance and then to appraise the performance of others in the team in a positive manner to ensure that people are not discouraged, strengths should be reinforced, and areas of improvement should be identified. Strategies can then be developed to ensure increased efficiency and safety.

The result of the holistic approach to training is a firefighting team that is able to respond to actual fire situations in a calm, confident manner and accurately "read" the conditions, reacting

instinctively, efficiently and safely.

REFERENCES

Baglin P. 1996. Editorial, ***Fire Engineers Journal*** Vol. 56 No.185, pp13,17).

BS 4422, ***British Standard Glossary of Terms Associated with Fire. Part 1. General terms and phenomena of fire.*** British Standards Institution 1987.

Burklin R.W., Purington R.G. ***Fire Terms: A Guide to their Meaning and Use. NFPA 1980***

Cederholm, G. 1997. Pers. Comm.

Chitty, R. 1994. **A Survey of Backdraught**. Home Office. Fire Research and Development Group. HMSO, London

Giselssen K. 1997. Pers. Comm.

Home Office. Central Fire Brigades Advisory Councils (C.F.B.A.C.). Joint Training Committee. Realistic Training Working Group, 1996. ***The principles of operational training : report of the Realistic Training Working Group of the Joint Training Committee of the Central FireBrigades Advisory Councils.*** HMSO, London

Svenssen G. 1997. Pers. Comm.

Thomas M. 1996. The Development of Home Office Advice on Ventilation as a Firefighting Tactic. ***Fire Engineers Journal*** Vol. 56 No.184 pp25-26).

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Paper 12

Vehicle Mounted Data Systems

Ian Taylor, Hereford and Worcester Fire Brigade

Vehicle Mounted Data Systems

PowerPoint and video presentation by Ian Taylor, MIFireE, Hereford and Worcester Fire Brigade

All over the United Kingdom, Fire Services are looking for ways of providing critical information for crews attending the vast range of incidents that they may encounter. A large amount of attention has been focused on the Hereford and Worcester Fire Brigade, who were the first brigade to fit Vehicle Mounted Data Systems to their appliances.

With the current speed of advancement in technology, the possibilities are increasing every day, and this has recently resulted in trials of systems incorporating modems and GPS. This presentation has been developed from a paper by Phil Goodwin who led the project team tasked with obtaining Vehicle Mounted Data Systems for Hereford and Worcester Fire Brigade , and John Humphreys of Joyce-Loebl who provided the system.

I would like to pay special thanks to Phil Goodwin for his time, effort and patience, and for the constant supply of information he has sent me over the Internet.

Reference:

Vehicle Mounted Data Systems: Building on Success, by Phil Goodwin and John Humphreys, Fire Engineers Journal, September 1997, 39 - 41

Paper 13

Community Fireguard: Creating Partnerships with the Community to Minimise the Impact of Wildfire

Jon Boura, Country Fire Authority, Victoria

Community Fireguard:
Creating Partnerships with the Community to Minimise the Impact of Wildfire

Jon Boura, *Wildfire Research & Mitigation, Risk Management Department, Country Fire Authority, Melbourne, Australia*

Abstract

Community Fireguard recognises that on days of extreme wildfire danger suppression capabilities are limited and Country Fire Authority (CFA) cannot guarantee protection to each property.

On such occasions the key to community safety is the preparedness and response of the residents threatened. By promoting the development of wildfire survival strategies by communities at greatest risk, Community Fireguard promises to significantly reduce the vulnerability of these residents. Enabling residents to accept responsibility for their own safety, means that CFA is not only reducing wildfire threat, but also transferring risk to those best able to manage it - the residents.

The principles of empowerment on which Community Fireguard is based are described, and the efficacy of the program in reducing losses in recent wildfires is discussed.

The findings reinforce that reliance solely on suppression to ensure the safety of communities threatened by wildfire is an ineffective strategy. The greatest potential for increasing safety is for fire agencies to enhance community self reliance, through long term public education supported by fire protection works that assist residents defend themselves.

Wildfires in Victoria

Protection of life and property are the fundamental goals of firefighting and counter-disaster operations. Yet, the protection of life and property in high intensity wildfire is problematic, and in Victoria significant losses continue to occur several times a decade (see Figure 1).

YEAR	FIRE(S)	FATALITIES	HOUSE LOSSES
1962	Dandenongs	14	454
1965	Longwood	12	53
1969	Lara	23	230
1977	Western Districts	5	123
1983	Ash Wednesday	47	2,090
1985	Maryborough	6	102
1990	Strathbogies	1	17
1995	Berringa-Enfield	-	9
1997	Dandenongs	3	40
1998	Springfield	-	7

Figure 1: Wildfires in Victoria 1962-1998 with significant losses.

Australian wildfires are usually described by their intensity, that is the amount of heat energy

produced by each metre of active fire front. Suppression effectiveness has been shown to be linked to fire intensity, with direct attack becoming ineffective in forest at less than 4,000 kW m^{-1} (Luke and McArthur, 1978) and in grassland at approximately 10,000 kW m^{-1} (Packham, *pers. comm.*).

Occasionally there come about combinations of weather, fuel, topography and an ignition source which produce wildfires of an intensity many times greater than can be suppressed. Fire intensity during the 1997 Dandenongs fires exceeded 30,000 kW $^{m-1}$ (CFA & NRE, 1997), whilst on Ash Wednesday fire intensity peaked at more than 100,000 kW m^{-1} (Packham, 1992).

When such fires occur in the urban-forest interface they have the potential to grow to a large size and involve thousands of properties. In this event, fire fighting agencies are stretched to the limit, and it is impossible to provide individual protection to each property. On Ash Wednesday, for example, the CFA was able to commit approximately 450 tankers to the six major interface fires, whilst over 1900 homes were destroyed and thousands more directly threatened. Approximately 85% of economic damage attributable to wildfire in Victoria results from just 0.1% of all fires over a hectare in size (Loane and Gould, 1986). That is from those rare fires whose size and intensity overwhelm suppression capabilities.

Clearly most residents are going to have to face these disaster fires alone. It is going to be their preparation, and their decisions on the day which will determine whether they and their homes survive.

Strategies for protecting life and property in extreme wildfire

The good news is that wildfires are survivable, and research into how houses burn down and why people die, has demonstrated that there is much the community can do to improve their safety and minimise their losses.

The most common cause of house loss are fires started by burning embers landing on or near the building (Lazarus and Elley, 1984; Wilson, 1984; Wilson and Ferguson, 1984; Ramsay *et al.*, 1987; Ramsay *et al.*, 1995). A house will generally survive the passage of the fire front if fire intensity in the immediate vicinity is reduced by managing the fine fuels. However, many houses burn down in the hours afterwards if there is no one present to extinguish ember caused fires.

The pattern of deaths in wildfires in south-eastern Australia clearly indicates that the greatest danger is being caught in the open or in a vehicle as the fire front passes (Packham, 1995; Krusel and Petris, 1992). Thus evacuation immediately before the fire arrives is an extremely hazardous activity. Whilst early evacuation is the option with lowest risk, the inability to provide the threatened community with warnings, the logistics and time required for emergency services to conduct a community wide evacuation, and the tendency of self-evacuees to wait until the fire is obviously and immediately threatening them, means that evacuation is unlikely to happen early enough to be considered preferable to resident's staying with their homes.

Popular perception, however, seems to be that evacuation is the "safe" option (Boura *et al.*, 1995; Murray, 1986). Media coverage tends to concentrate on the dramatic stories of householders' who have left their properties only when they perceived the fire as being very close, and portrays this to the community as the only possible, and hence correct, response (Silberbauer, 1997). In fact able-bodied people who are well prepared and take shelter in their homes not only have a good chance of surviving a wildfire, but are likely to be able to extinguish any small fires after the fire front has passed, thereby saving their homes. Also, unless people

choose to leave well in advance of the arrival of a wildfire, sheltering in a house will generally be safer than evacuation. A decision to use the declaration of a Total Fire Ban Day as a warning to leave the fire threat area at 10.00 am prior to any fire starting, requires just as much commitment to wildfire safety as deciding to stay and defend the property.

Residents need to develop survival strategies that suit them

In Victoria the right of each resident to decide for themselves whether they will stay and defend their property is enshrined in legislation (*Country Fire Authority Act, 1958*; *Emergency Management Act, 1986*). Every resident who is faced with a wildfire will have to make a decision as to how they are going to respond to that wildfire. A role of CFA public education programs is to motivate residents to make that decision well before the fire season, and then help them develop a family survival strategy which reflects their needs and capabilities.

Yet clearly many residents of high risk areas are not developing the strategies which would enable them and their assets to survive the next major wildfire.

Traditionally, CFA has used television, radio and brochures to inform the general community of the most appropriate bushfire survival strategies. The shortcomings of this media approach have long been recognised and major fire reports since Ash Wednesday have questioned the ability of public education strategies to change people's behaviour (Boura *et al.*, 1995; House of Representatives Standing Committee on Environment and Conservation, 1984; Miller *et al.*, 1983; Wilmoth, 1992). The literature on risk perception and adult education suggest that passive publicity is not the most effective way to achieve significant changes in attitude, perception and behaviour (Rangan, *et al.*, 1996; Silberbauer, 1990; Simms and Baumann, 1983).

The traditional Information-Action model, ie information leads to awareness and awareness leads to action, assumes that the links between receiving information and taking action are strong and direct. It assumes that the community is an homogeneous group with the same needs and values (Beckingsale, 1994). The communication is also one-way with fire services unable to correct any misunderstandings.

If asked why residents are not undertaking fire prevention work, many fire service personnel would probably reply that the community are apathetic, or that there are too many "greenies", they might even criticise those who live on heavily vegetated blocks as being "stupid".

Our experience is that most members of a fire-prone community want to improve their safety, and where residents are not doing what we think they should there are usually good reasons for it. Three of these could be that:

- residents do not believe that they are personally at risk.
- the advice/direction residents are being given conflicts with their values in life, e.g. people with a strong conservation ethic being told that they must clear their properties.
- the fire safety message is not reaching residents in an effective manner (Rhodes and Boura, 1996), and they do not understand the message or do not have the ability to apply it.

Community Fireguard attempts to overcome these obstacles. It explains to people why they are at risk - the realities of fire behaviour in their area, the limitations of the fire service in halting the fire or protecting every home, and the difficulties of evacuation. It demonstrates that there is much they can do to reduce their vulnerability without destroying their lifestyle, and helps them develop and implement survival plans that fit their values and priorities.

How Community Fireguard works

Community Fireguard is based firmly on theories of adult education, participation and empowerment. It involves small groups of people living in high fire risk areas, taking responsibility for their own fire safety and working together to devise survival strategies which suit their particular situation. It is very much a 'bottom up' process of CFA assisting people to develop their own strategies rather than a 'top down' approach of telling them what to do.

The vast majority of Community Fireguard groups are self-initiated. Often one or two residents concerned about their level of safety or about a local issue such as Council or public land, poor access or water supplies, will initiate formation of a group. Others are a direct result of public meetings held by the local Brigade, CFA's Bushfire Blitz street corner meeting program, or publicity in local media. Others still are existing groups such as Land Care or Conservation groups who adopt Community Fireguard as part of their activities.

High profile wildfires in Sydney in 1994 and the Dandenong Ranges in 1997 prompted surges in group formation. Program growth in its five years of operation is shown in Figure 2, from humble beginnings with 2 part-time staff to nearly 400 active groups serviced by 9 Area-based paid facilitators, a dozen or more volunteers and staff working within their Brigade areas, and a part-time program support officer.

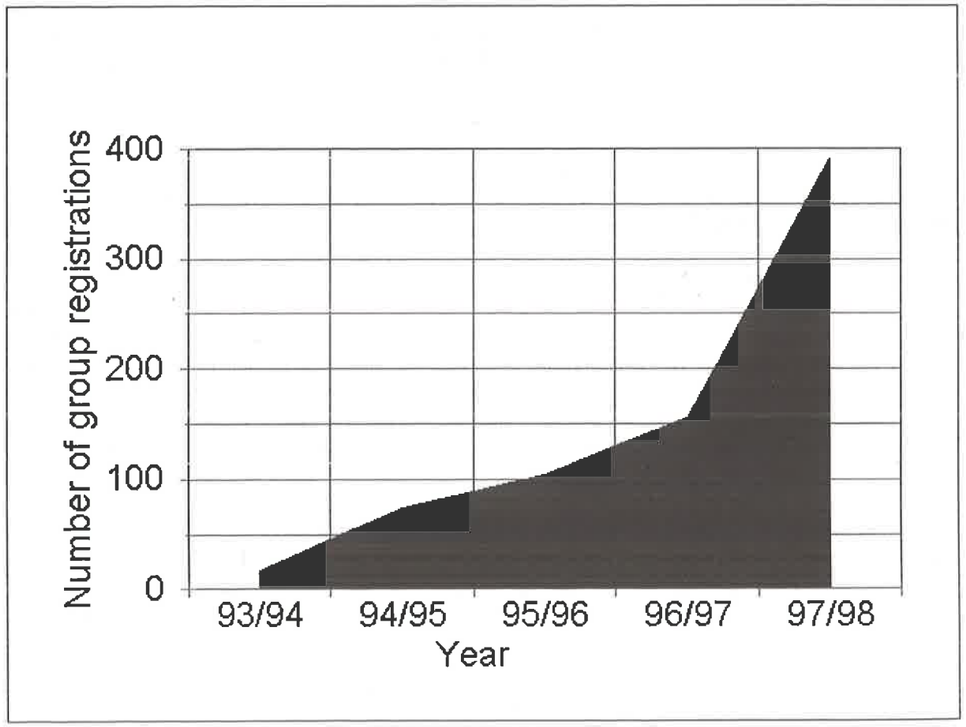


Figure 2: Growth in the number of Community Fireguard groups 1993-1998.

Once formed, Community Fireguard groups tend to go through an intense period of information collection followed by the formulation and enactment of survival strategies. A trained facilitator helps the group learn, and then acts as a sounding board as plans are developed.

The groups meet in members' homes in a friendly and informal atmosphere. A small group in a neighbours lounge provides a more effective learning environment than a larger gathering in a cold uncomfortable public hall. The optimum learning environment is one where people feel comfortable to ask questions, safe to explore different ideas, and where their participation is valued (Beckingsale, 1994).

Group dynamics are important in this learning environment, and are also critical in sharing knowledge and developing strategies. The processes used in Community Fireguard to facilitate group discussion recognise the indigenous knowledge within the group. The facilitator and Brigade representative are not the "font of all knowledge".

Belonging to a group has numerous benefits. A group can provide motivation and enthusiasm, it can provide several, or better, solutions to a problem. It can be a powerful lobby for presenting a local view to the authorities as a community group approach is more likely to be responded to, than an individual approach. Neighbourhood groups also provide community development and the social benefits derived make it more likely that residents will choose to be involved for a period of time, thus increasing the likelihood of creating a culture of safety in that locality.

The only bushfire safety strategies that people will understand, trust and actually implement during a major fire are those they develop themselves. Consequently Community Fireguard recognises the importance of empowering people to develop their own bushfire safety strategies.

Empowerment requires people to realise that they are responsible for their own safety, and accept that they themselves can do what is necessary to successfully manage the threat of fire. They need to overcome the learned helplessness promoted by inaccurate and sensationalised media reporting of wildfires. They also need to have the knowledge and skills to develop their own strategies, and they need the technical and resource support to enable them to implement those strategies. The Community Fireguard process does not end with the provision of information but rather recognises the need to work with the community over time to achieve long term behaviour change (See Figure 3).

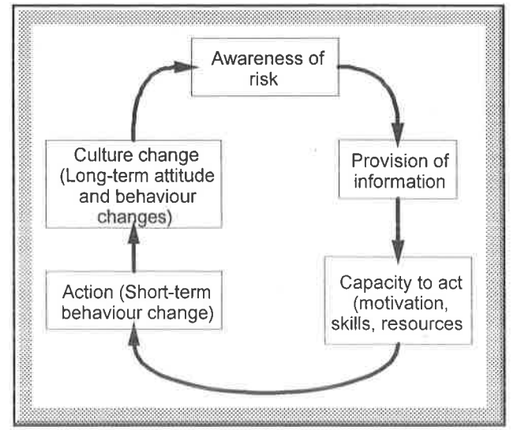


Figure 3: The community education cycle (after McWaters, *pers. com.*).

What can Community Fireguard groups do ?

Community Fireguard recognises the complex nature of the bushfire threat, and that for a community to reduce their vulnerability to fire they must take a holistic approach.

To develop an effective survival strategy a family needs to:

- know what they can expect from the fire and emergency services during a major fire, understand the law regarding evacuation and road blocks, and appreciate the unreliability of reticulated water, power, and telephones.
- be prepared for what a major fire looks, sounds, and feels like.
- understand how houses are ignited, what can be done to improve their safety by reducing fire intensity and reducing avenues for embers attack, and the importance of active defence by residents in reducing house loss.
- make the decision to stay or evacuate considering the safety level of their home, how much warning they would get, how far they would have to travel to safety and what sort of roads they would have to use.
- consider the capabilities of the family members who will be home. Does there need to be a different plan for week days when only mum and two young children are home, as opposed to the weekend when the whole family is there ? What will the rest of the street be doing ?

Working as a Community Fireguard group increases the options available to residents:

- complementary fuel management and the organisation of working bees to help those less able to manage their property.
- the development of telephone trees to facilitate the spread of emergency information through the group.
- selection of "safer homes" in which people can shelter whilst the fire front passes.
- identification of more vulnerable members of the community who need additional assistance, e.g. the old, infirm, or even someone without a car at home or a shift worker asleep during the afternoon.
- a knowledge of what neighbours will do during the fire, and the opportunity to support each other morally and physically during the fire.

Once plans have been finalised many groups become less active as there is little reason for them to continue to meet, however the community networks developed during the education and planning stages remain and this mutual support can prove vital during wildfire. It has been encouraging that groups which formed during one summer have chosen to meet again prior to the next fire season. Groups are also kept in touch via a quarterly newsletter, which contains many articles provided by program participants themselves.

An interface with the community throughout the emergency management process

Community Fireguard is not just an education program. Rather it provides a framework for emergency services to interact with high risk communities throughout the emergency management process - prevention, preparation, response and recovery. In this way Community Fireguard is fundamentally different from other "education" programs which are limited to provision of prevention or preparedness messages.

Community Fireguard groups are in a unique position to interact with emergency managers during a wildfire. Not only does the education phase give them the knowledge necessary to appreciate the issues of emergency management, but their history of working with local CFA

brigades and staff, and personnel from local government and public authorities to solve fire safety issues has built up confidence and trust.

This relationship is an important prerequisite to an effective warning system - something which has proved extremely difficult to provide for wildfire (Boura *et al.*, 1995; CFA and NRE, 1997; Miller *et al.*, 1984; Petris, 1995; Senate Standing Committee on Industry, Science, Technology, Transport, Communications and Infrastructure, 1994). For an emergency information, or warning, system to be effective several requirements must be met:

(i) the community must understand the system, know how to access it, and believe the information it provides
(ii) appropriate information must be collected and analysed by the fire agency within a very short time frame, e.g. 10 minutes
(iii) timely and accurate information must be actively disseminated to the threatened community through a variety of channels
(iv) the threatened community needs to possess the knowledge necessary to react appropriately to the information they receive

Thus an effective warning system needs to be developed with the community, and requires an ongoing public education component as well as a strong commitment from the Incident Management Team and wider emergency management network.

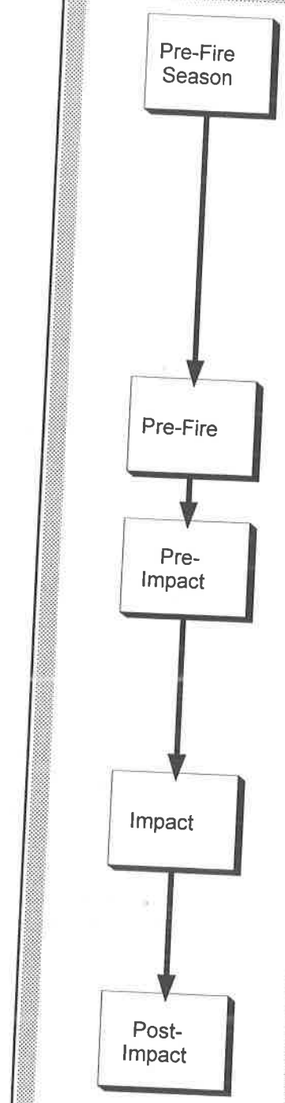
In time emergency managers will come to see programs such as Community Fireguard as an integral part of managing a wildfire emergency, rather than as a "touchy feely" education program. Figure 4 is a compilation of the interaction between Community Fireguard groups and CFA during recent wildfires.

Community Fireguard successes

The real test of a wildfire safety program is wildfire. In the five years that the Community Fireguard program has been in operation a number of groups have been put to the test.

In November 1994 the Moggs Creek group were directly affected by the fire which burnt through their neighbourhood, and it is acknowledged that the fire protection work they had done helped minimise the damage to their properties compared to that suffered by people who had not been involved in the program (Boura, 1995). In February 1995 the Berringa-Enfield fire threatened the South Dereel Community Fireguard group and, although the fire did not actually reach them, their preparation and planning ensured that they received early warning of the fire and in turn notified neighbours who had not attended any Community Fireguard meetings. A private scanner provided regular updates on the fire's progress. Suitably clothed and armed with independent water supplies and home defence equipment all members of the group stayed with their homes ready to protect them if the fire reached their neighbourhood (Boura *et al.*, 1995).

Community Fireguard groups also put their plans into action in response to the Dandenong Ranges and Arthurs Seat fires of January 21 1997 and the Kalorama fires of March 1998, although in all cases the fires were contained before they impacted directly on the Community Fireguard streets. Those whose plan was to evacuate left early in a calm manner. Those who stayed were appropriately dressed and equipped and their properties well prepared. Feedback from residents who formed Community Fireguard groups as a response to the 1997 Dandenongs fires shows a marked change in the confidence and ease with which they coped with the 1998 fire. As Dawna Richardson of the Upalong Road Mt. Dandenong Community Fireguard Group wrote the day after the 1998 fire "we were much better informed ... we no longer have a victim mentality ..... having a plan empowered us."



The education component of Community Fireguard includes the experience of a major fire, basic fire behaviour, how houses are ignited, and why people die.

This information is then used by families to develop a survival plan. Working as a neighbourhood group enables family plans to comprise a community plan, with all the benefits of peer support in resources, complementary fuel management, and help on the day of the fire.

Prior to the fire season well established Community Fireguard groups meet to touch base with each other and with CFA, bring any new residents into the group, and inform each other of any changes to their plans or resources.

Physical preparations might include testing the group's 'phone tree or trying on their wildfire clothes. Many groups undertake cooperative fuel management, and conduct working bees in the street or for those unable to do the work themselves.

The forecast of hot and windy conditions for the next day, or the declaration of a Total Fire Ban Day, is used as a prompt to put survival plans into action. Those who have chosen to evacuate may go shopping or visit friends in the city; those who have chosen to defend their properties might arrange to work from home that day.

Once a fire has started, warning information needs to be provided to the community as rapidly as possible to allow residents to enact survival strategies.

Community Fireguard groups can have an advantage over other residents. They have better access to emergency information through possession of radio receivers capable of picking up CFA transmissions. In some cases the Area Community Fireguard Facilitator has a role in phoning the "mover & shakers" of groups with timely and accurate information. This is then rapidly disseminated through the groups" phone trees. This can be valuable warning or reassurance depending upon the fire's proximity to that group.

With an understanding of the dangers of ember attack to their homes and radiant heat to themselves, appropriately dressed and equipped group members patrol for spot fires. Peer group support, both moral and physical, makes its easier for them. Residents fulfill the asset defence role freeing up CFA resources for fire attack.

Updates of the fire location and status are passed through the group. This information is supplemented by advice and moral support from CFA personnel becoming more familiar with the concepts of Community Fireguard.

Following the fire there is a need to for those involved to debrief, a form Critical Incident Stress counselling for residents. The CFA Facilitator can explain exactly what happened - how and where the fire started, how severe it was in comparison with others, what the emergency services did, what losses there were.

For those who lost their home, probably evacuees, Community Fireguard can be the process to link residents with recovery agencies. After the January 1997 fires a seminar on rebuilding wildfire safer homes was organised.

Figure 4: Community Fireguard - a partnership between the community and CFA before, during and after major wildfire.

During the 1998 Kalorama fires the Yarra Area Facilitators rang the contact people of the 35 Community Fireguard groups in the northern part of the Dandenong Ranges thus activating their phone trees and passing timely and accurate information to an estimated 700 families. A similar role was played by the Midlands Area Facilitator during the Spring Hill fire of March 1998 which destroyed 7 homes. Whilst this information service cannot be guaranteed it points to the potential of community based warning systems.

The high level of preparedness is mirrored by the high level of commitment participants have to the program. In the Yarra Area members of Community Fireguard groups meet several times a year to help the Area facilitators steer the program. Group members did most of the organising of two Fire Safety Expos which attracted a total of more than 3,500 residents. In the Midlands Area, the Wheatsheaf Community Fireguard group publishes its own regular newsletter. Both initiatives were recognised with Community Awards during Fire Awareness Week 1997.

Conclusion

Further reduction in wildfire losses requires the development of a culture of safety within high risk communities. Residents in Community Fireguard streets have come to see sensible levels of fire prevention and preparedness as an important responsibility for people living in their neighbourhood.

The investment by CFA of time and money in high risk communities through the Community Fireguard program can already be seen to have reduced both the immediate cost of wildfire in terms of life and property, and also the unmeasured cost of social dislocation and psychological distress that occurs when vulnerable communities are exposed to major wildfire.

As fire services become more outcome focused and redefine their role as promoting community safety rather than as fighting fires, there will be greater emphasis given to mitigation including community education. Programs such as Community Fireguard which also provide a framework within which to work with the community during the response phase become doubly attractive.

Wildfire will be an ongoing expense, whether it be fire losses, suppression costs or mitigation costs. Fire services are well advised to invest before the fire in creating meaningful partnerships with the community to minimise the impact of wildfire.

Acknowledgements
Alan Rhodes commented on the manuscript, whilst Steve Pascoe, Nan Oates and Gayne Kirkhouse provided details of Community Fireguard group involvement in recent wildfires, and Lucia Boxelaar constructed the graph of Community Fireguard growth.

References

Beckingsale, D. (1994). Community Fireguard and the rural-urban interface. *Fire Management Quarterly*, **10**, 1-8.

Boura, J. (1995). Analysis of fire protection strategies in the Moggs Creek wildfire 19.11.1994. *Fire Management Department Internal Report*, Country Fire Authority, Melbourne.

Boura, J., Wassing, M., Silberbauer, G. and Jerome, H. (1995). *Analysis of CFA Fire Management Strategies in the Berringa-Enfield wildfire 25-26.02.1995.* Risk Management and Headquarters Operations, Country Fire Authority, Melbourne.

CFA and NRE (1997). *Review of the Significant Fires of January 20 and 21, 1997.* Country Fire Authority and Department of Natural Resources and Environment, Melbourne.

Country Fire Authority Act, 1958. No. 6228/1958, State of Victoria.

Emergency Management Act, 1986. No. 30/1986, State of Victoria.

House of Representatives Standing Committee on Environment and Conservation (1984). *Bushfires and the Australian Environment.* AGPS, Canberra.

Krusel, N. and Petris, S. (1992). Staying alive: Lessons learnt from a study of civilian deaths in the 1983 Ash Wednesday bushfires. *Fire Management Quarterly*, **2**, 1-20.

Lazarus, G. and Elley, J. (1984). A study of the effect of household occupancy during the Ash Wednesday bushfire in Upper Beaconsfield, Victoria, February 1983. *NCRFR Technical Paper No. 3*, National Centre for Rural Fire Research.

Loane, I.T. and Gould, J.S. (1986). *Aerial Suppression of Bushfires: Cost-Benefit Study for Victoria.* National Bushfire Research Unit, CSIRO, Canberra.

Luke, R.H. and McArthur, A.G. (1986). *Bushfires in Australia.* Australian Government Publishing Service, Canberra.

McWaters, V. (1993). *Personal communication.* YarraCare, Melbourne.

Miller, S.I., Carter, W. and Stephens, R.G. (1984). *Report of the Bushfire Review Committee on Bushfire Preparedness in Victoria, Australia, following the Ash Wednesday Fires 16 February 1983.* Government Printer, Melbourne.

Murray, I.G. (1986). Credibility of disaster research. *CIRDNH Occasional Paper 1*, Chisholm Institute of Technology, Melbourne.

Packham, D. (1992). Bushfires in Australia. *Australian Planner*, **30**, 8-12.

Packham, D. (1993). *Personal communication.* Department of Geography, Monash University.

Packham, D. (1995). Evacuation in wild fires: The Australian experience. *The Australian Journal of Emergency Management*, **10**, 39-43.

Petris, S. (1995). *A Review of All State and Federal Reports on Major Conflagrations in Australia During the Period 1939-1994.* Emergency Management Australia, Canberra.

Ramsay, C., McArthur, N.A. and Dowling, V.P. (1987). Building survival in bushfires. *Operations*, **182**, 1-3, 6-8.

Ramsay, C., McArthur, N.A. and Dowling, V.P. (1995). Planning in fire-prone areas: Building survival. In Brown, C. And Tohver, L, (eds) *Bushfire ! Looking to the Future.* Nature

Conservation Council of NSW, Sydney.

Rangan, V.K., Karim, S. and Sandberg, S. (1996). Do better at doing good. *Harvard Business Review*, May-June 1996.

Rhodes, A. and Boura, J. (1996). Public education as a risk management tool. Paper presented at *Australian Fire Authorities Council Conference,* 11-13 October 1996, Brisbane.

Senate Standing Committee on Industry, Science, Technology, Transport, Communications and Infrastructure (1994). *Disaster Management*. Canberra.

Silberbauer, G. (1990). Community participation in bushfire defence. *Proceedings of the Twelfth National Conference on Fire*. Australian Fire Protection Association.

Silberbauer, G. (1997). Press and television news coverage of the fires of 20-21 January, 1997. *Risk Management Department Internal Report*. Country Fire Authority, Melbourne.

Simms J. and Baumann, D.D. (1983). Educational programs and human responses to natural hazards. *Environment and Behaviour*, **15**, 165-189.

Wilmoth, W. (1992). *Record of investigation into a fire at Warrandyte on 25th February 1991. Case No. 626/91.* State Coroner Victoria, Melbourne.

Wilson, A.A.G. (1984). Assessing the bushfire hazard of houses: A quantitative approach. *NCRFR Technical Paper No. 6*, National Centre for Rural Fire Research.

Wilson, A.A.G. and Ferguson, I.S. (1984). Fight or flee ? A case study of the Mount Macedon bushfire. *Australian Forestry*, **47**, 230-236.

Biography

Jon Boura joined CFA staff in 1993 and worked for two years as Community Fireguard Facilitator in the Westernport and Yarra Areas, and then three years as Municipal Programs Coordinator in the Risk Management Department, a role which included management of the Community Fireguard program across the State. Jon now works in the Wildfire Research and Mitigation Section in the Risk Management Department and is currently project managing the major review of the Spring Hill fire of 22 March 1998.

Jon has been a volunteer firefighter for 17 years, the last 10 as second lieutenant of the Upper Beaconsfield Fire Brigade.

Paper 14

High Rise Fire Pattaya Thailand Investigation

Garry Martin, Metropolitan Fire and Emergency Services Board, Melbourne

ROYAL JOMTIEN RESORT FIRE PATTAYA THAILAND

11th July, 1997

In Fire Conference Paper

Presented by
Inspector Garry J. Martin AFSM
Metropolitan Fire and Emergency Services Board
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Contents

INTRODUCTION

At approximately 10.20 a.m. Friday 11th July, 1997, a fire originated in the ground floor coffee shop, at the Royal Jomtien Resort, Jomtien Beach, Pattaya, Thailand.

The fire caused the deaths of 91 occupants of the Royal Jomtien Resort. Eleven emergency service personnel also died as a result of a vehicle accident en route to the fire. The fire resulted in substantial damage to the resort.

The investigation identified a number of systems failures that occurred at the time of the fire and which contributed to the fire development and subsequent fire deaths.

History

Pattaya, a popular tourist destination is located approximately 200 km southeast of Bangkok and is situated on the coast of the Gulf of Thailand.

Pattaya, once a quiet fishing village gained popularity as a tourist destination following the attendance of a handful of American servicemen for R&R during the late 1950s. As a result of these early visits, the word about Pattaya quickly spread, and by the late 1970s Pattaya was becoming a well-developed tourist destination.

Today, Pattaya is firmly established as a popular tourist destination upon which the economy of the region heavily relies. Pattaya currently boasts 340 hotels, with a total of more than 23,000 rooms, 300 restaurants and bars and an undetermined number of smaller accommodation residences.

Building History

Architectural drawings for the original development of the Royal Jomtien Resort were completed in 1987. Approval for the construction was given in 1988 via the Pattaya building approval process. Construction of the original sections of the hotel began in 1988 with the hotel opening for operation in 1991.

The development of the Resort continued over the next few years with approval being given to extend sections of the Resort. However, some additional modifications, post-1991, occurred which impacted significantly on the egress paths from the hotel.

Building Inspections

The Pattaya Fire Brigade does not have any formal jurisdiction in relation to fire safety inspections or the building approval process. The Fire Brigade can only visit a site with the express permission, following an invitation by the building owners. Following invitation, the Fire Brigade are permitted only to carry out pre-fire planning and conduct simulated exercises. There was no such invitation given with regard to the Royal Jomtien Resort and as such, the Fire Brigade had not attended the site prior to the fire.

BUILDING DESCRIPTION

The Royal Jomtien Resort consisted of a twelve (12) storey residential tower situated on top of a three storey retail and entertainment area. A basement also existed that was used as a plant room with a storage area and machinery room located on top of the roof.

The Resort measured 55.1 metres in height. The total undivided floor area measured approximately 30,425 square metres.

The building was constructed generally of concrete floor slabs, supported by concrete beams, columns with non-load bearing external concrete infill panel walls.

Internally, non-load bearing walls typically consisted of concrete infill panels, with some clay masonry infill. The exposed roofing materials, in the main, consisted of metal deck with some corrugated asbestos cement sheeting at the area above the laundry.

The discotheque (at ground level) and seminar areas (on the second level) had been constructed using unprotected steel trusses, covered with metal deck roofing. These unprotected steel sections had suffered total collapse during the fire.

The internal linings of the resort varied throughout and consisted of a mixture of concrete render to masonry walls, plasterboard suspended ceiling panels (suspended via steel suspension rods and channelling) and some plasterboard to timber framed partition walls. Much of the hotel's interior was also clad with timber panelling to columns with dado panels to the walls.

The internal furnishings also varied throughout the complex, from traditional Thai carved timbers, used for tables and chairs, to more modern, non-fire retardant, steel framed polyurethane and vinyl covered furnishings.

Ground Floor

The ground floor comprised a large lobby, lounge area, office facilities, a number of restaurants, shops and entertainment areas. Located at the western end of the ground floor was the Leab Haad coffee shop this being the area of fire origin. The coffee shop incorporated a snooker room and bar and provided access to the external covered terrace.

Other restaurants on this level included the:

- *Real Arab Restaurant and snack bar, both located on the south-side toward the eastern end; and the*
- *Korean Restaurant located at the north-east corner.*

Located at the northern side of the ground floor was a ten-pin bowling alley of eight lanes incorporating full bar services.

The area south of the lobby accommodated an administration area at centre, with kitchens and service areas located to the south of the administration area.

Egress Ground Floor

Egress from the ground floor of the resort was provided on all sides of the building. However the closest egress door serving the area of fire origin, was via double aluminium glazed doors. These double doors were locked at the time of the fire.

Mezzanine Floor

The mezzanine floor accommodated a fitness centre, health club and buffet on the southern side and a restaurant bar and lounge, that overlooked the Leab Haad coffee. These areas were the subject of renovations at the time of the fire.

Located at the eastern end of this level were the main administration area, the boardroom and the President's office, all of which were staffed at the time of the fire.

Egress from the western end of the mezzanine floor could be made via the central open stairway and two internal spiral staircases available. One at the east end and one at the west end of the floor.

However, the exit door leading to the main spiral staircase, located at the western end of the complex had been welded shut and sealed with 2 x 25mm tube steel bars across its width.

Egress from the eastern end spiral staircase could be made however, modifications post 1991 caused this stair to discharge into the interior of the hotel.

Second Floor

Located at the western end of the second floor were seminar rooms and amenities.

Egress from the seminar rooms could only be made via the central stairway and via toilets constructed around the entry to the spiral staircase on the western end.

Located at the eastern end of the second floor were the grand ballroom, meeting rooms, amenities and an industrial laundry.

Egress from the meeting rooms and ballroom was provided via the central stairway and the eastern spiral staircase. The laundry contained a timber stairway that led to a dead end storage area.

3.5 Third to Fifteenth Floor (Hotel Section)

The upper levels housed the hotel section of the resort, which consisted of 384 rooms and suites. Egress from the hotel section could be made via either of the stairways. The top floor of the hotel tower contained plant room, machine and storage rooms. Again, a multiple choice could be made between any of the three exits.

HOTEL USE AT THE TIME OF THE FIRE

At the time of the fire, the complex was booked to 80% capacity. Three Thai companies were conducting seminars at the resort and many of the seminar attendees had brought their families to Pattaya and were staying at the hotel. Those organisations conducting the seminars consisted of the following:

- *Electrical Generating Authority of Thailand (EGAT).*
- *a government agency had many of the company's more senior managers were in attendance. 108 staff of EGAT were present.*

- *Sermsuk Co. Sales Promotion Section (Thailand distributors of PEPSI Cola) were convening a marketing seminar and had 54 company representatives in attendance.*
- *Concrete Products and Aggregate Co. (CPAC) had 38 company representatives in attendance.*
- *In addition to the seminar attendees and their families, many local and overseas tourists were also staying at the resort.*

FIRE BRIGADE RESOURCES

Pattaya has two full time Fire Brigades. Headquarters station, located some 20 minutes travel time from the Royal Jomtien Resort and the second station located 7 to 8 minutes away. Mutual aid procedures exist within the region and when required, additional volunteer resources are drawn from local villages surrounding Pattaya.

The resources of the various Fire Brigades differed considerably throughout Pattaya, however, the resources of the permanent Brigades were as follows.

Headquarters station:

- one aerial appliance consisting of a turntable ladder with an effective working height of approximately 27 metres;
- one rescue/salvage vehicle;
- two pumpers, approximately 2,250 lpm;
- one spare pumper;
- one spare water tanker approximately 6,750 lpm;
- *one damaged water tanker, not available for use; and*
- four portable pumps, approximately 2,250 lpm.

Resources at the second station included:

- one tanker, approximately 6,750 lpm;
- one pumper tanker;
- one pumper, 2,250 lpm; and
- one portable pump.

The protective clothing available to fire crews at both the permanent stations consisted of:

- *general purpose rubber boots;*
- *light weight fibreglass helmet; and*
- *a lightweight, non-lined jacket.*

WEATHER CONDITIONS AT TIME OF FIRE

In the hours leading up to the fire, the weather conditions at Pattaya were relatively constant.

The weather recording station, located in close proximity to the Royal Jomtien Resort, recorded the following details as at 10.00 a.m. on the day of the fire.

• *dry bulb temperature,*	*29 degree Celsius;*
• *moisture content,*	*66%;*
• *wind direction,*	*240 degrees (from the west);*
• *wind speed,*	*11 knots (20 kph);*
• *cloud,*	*no low level cloud; and*
• *precipitation,*	*nil.*

FIRE BRIGADE RESPONSE

The central communications facility at Pattaya received the first notification of the fire from a local beach rescue foundation crew who were patrolling nearby.

The local fire station crews who at the time were monitoring the radio traffic overheard this first call. They responded immediately and are said to have arrived on scene within 7 to 10 minutes.

Observations of the first crew on scene indicated that the fire was well advanced when they arrived. Flames were emanating from the western end of the complex, and extending through the roof of the discotheque. Smoke was also visible from the top of the hotel towers.

The first crews on scene observed a number of distressed persons located on the canopy above the hotel foyer.

To protect the people on the foyer canopy who were exposed to the fire, the initial crews set up 2 x 65 mm hand lines and a vehicle mounted monitor and directed the water streams into the hotel foyer.

Given that the priority was to conduct rescues and protect people, no attempt to restrict the spread of fire was made at the time.

Water supplies were not accessible during the early stages of firefighting operations, the first on-scene appliance had to leave the scene to replenish water supplies. Due to the size of the fire and the demands on the fire crews, additional resources were responded from the Pattaya headquarters station.

An aerial appliance was positioned at the north face where 14 people on the canopy above the foyer were rescued.

The ladder crew then repostponed to rescue two people trapped on the third floor of the hotel tower. The ladder was also used to allow fire crews to enter the building via windows on the third floor to perform search and rescue and engage in firefighting activities.

An attempt to attack the fire from the inside of the building using the internal hydrant system failed as the hydrant system was dry.

Other responding appliances from the headquarters fire station positioned crews at the north face and at the eastern end of the complex in the vicinity of the discotheque where they attempted to contain the fire to the discotheque and protect those occupants on the upper residential floors exposed to the fire.

A second ladder (a civil defence unit) was positioned at the south-east corner of the complex and carried out the rescue of two persons from the roof of the entertainment section. These people had lowered themselves from a fifth floor hotel room by tying a number of bed sheets together and securing them to the window frame.

The only external hydrant at the resort was located on the south-west section of the complex, amongst a garden area in proximity to the hotel's swimming pool.

It was not possible to position a fire appliance in proximity to this hydrant and when an attempt was made to connect hose to the outlet, it was found that the hydrant connection was not compatible with those of the firefighting hoses carried by the Fire Brigade.

As such, fire crews utilised the static water supply in the hotel's inground swimming pool that contained approximately 336,000 litres of water to feed fire pumps.

Water was obtained by positioning five portable pumps around the pool and a floating pump on the pool.

The contents of the pool were supplemented from an open hose line, connected to an internal hydrant and later connected to the external hydrant at the south-west corner of the complex.

As the fire developed, a task force that included two ladders and one hydraulic platform, responded from Bangkok. Interviews with the Task Force Commander indicated that the task force arrived on-scene some 4½ hours into the incident.

Once on-scene, a Colonel from the Thai Police/Fire Service, Bangkok, who commanded the task force, instructed his crews to access the hotel tower at the western end of the seventh floor. When inside, fire crews commenced a search for survivors and attempted to contain the fire.

During the internal attack crews searched the western most end of the seventh floor, moved down to the sixth floor and up to the eighth floor.

As this was occurring, additional firefighters were positioned on the roof of the hotel towers, by helicopters. This was done to enable crews to conduct rescues and attempt to access the building interior from the roof.

During the firefighting operations, the resources deployed totalled twenty fire appliances, four helicopters and over two hundred crew.

OCCUPANTS ACCOUNT OF THE FIRE

One of the persons rescued from the canopy located above the hotel's foyer, was interviewed and revealed the following:

He worked for EGAT, the Electrical Generating Authority of Thailand, and was attending a seminar at the complex. His wife and two children were staying with him at the Royal Jomtien Resort.

During a break in seminar proceedings he had gone to the third floor of the hotel to visit his wife and children. When he was returning to the seminar rooms on the second floor via the lift, the lift doors opened and he observed flames. He also noted that smoke was filling the immediate area. He broke through a window and along with thirteen other persons, made his way onto the foyer canopy. His family, unaware of the fire, tragically perished.

An American tourist and her daughter were staying in the hotel's western tower, on the top floor. This person became aware that a fire was underway within the hotel complex when she opened her room door and observed the passageway becoming smoke logged. She procured wet towels and linen and proceeded to smoke-stop the opening beneath her door.

She was able to make contact with a friend using a cellular mobile phone and subsequently advised that she and her daughter were trapped in their hotel room.

Having been made aware that the woman and her daughter were still located on the top floor of the hotel, the firefighters now positioned on the roof were able to move to the northern face of the hotel, above where the two trapped occupants were located and lowered a rope line in an attempt to rescue the two.

The woman, using her daughter's "Teddy Bear" to extend her reach, was able to reach the rope line. The woman placed her daughter into the loop created at the end of the rope and the rescuers retrieved the young girl by hauling on the rope line. Once the girl was safely on the roof, the procedure was repeated and the woman was also rescued.

The two rescued occupants were subsequently carried from the roof by way of the helicopters.

FIRE CAUSE AND ORIGIN

The fire occurred at approximately 10.20 a.m. on Friday, July 11th, 1997, in the Leab Haad coffee shop, located at the western end of the ground floor.

Prior to the fire, approximately eight staff members detected an odour consistent with gas emanating from the buffet area of the coffee shop. After investigating its source, a male staff member observed that the gas was leaking from the valve assembly of a 9-kg liquid propane gas cylinder.

The male staff member attempted to isolate the leak by shutting down the main control valve of the cylinder. In his panic, he turned the valve in the wrong direction, thereby increasing the flow of gas by fully opening the cylinder valve.

The leaking product, expanding on release from the cylinder, quickly filled the immediate buffet area. As the volume of gas increased, it was ignited when it came into contact with one of the many ignition sources present. The most likely source being a naked flame associated with a spirit burner, used to warm food.

Following ignition of the vapour, flame flashed back to the point of the leak, at the cylinder valve, where it continued to burn with the flame now impinging on the cylinder.

The impingement of direct flame on the cylinder caused an increase in the internal cylinder pressure, which in turn caused the cylinder relief valve to operate. The release of vapour from the relief valve subsequently ignited, causing an increase in intensity of the fire, at the cylinder.

The fire rapidly developed, involving combustibles in close proximity to the cylinder. The investigation did not reveal evidence that any further action was taken by staff to combat the fire.

FIRE DEVELOPMENT

A combination of nearby combustible furnishings, decor and a lack of active fire suppression systems in the area of fire origin led to a rapidly developing fire.

As the fire increased in intensity, the design of the structure, with its open central stairway and a lack of compartmentation and aided by a westerly breeze caused the fire to spread towards the centre of the Resort.

As the fire spread eastward, heated gases entered the central stairway and service shafts from the ground and second levels.

Windows at the north-west area of the coffee shop failed in the early stages of the fire allowing a free flow of air in the area of fire origin, further influencing the spread and growth of fire.

The fire quickly spread to the mezzanine floor, above the area of fire origin. Lateral fire spread was occurring with the fire developing towards the eastern end of the complex, then towards the area of the Discotheque and vertically to the upper levels of the hotel tower by way of the central staircase and non fire stopped service shafts.

The fire continued to spread both laterally and vertically throughout the complex with smoke logging occurring within the hotel tower. This occurred as a result of smoke entering the stair and service shafts on the tower levels, subsequently penetrating the upper levels. This was due to the lack of stairwell pressurisation, a lack of self closers on many of the doors throughout the upper levels, and due to the fact that no fire stopping had occurred within the service shafts.

With the fire now developing uncontrolled, convection gases were spreading across the uppermost levels of the hotel. Evidence gained at the time of the investigation revealed that these gases subsequently ignited, causing extensive fire damage to the top two levels of the hotel.

FIRE SAFETY SYSTEM

At the time of development of the Royal Jomtien Resort, the applicable building legislation contained very few requirements relating to fire safety.

In fact, the regulations developed in 1979, which governed this particular building, only required that portable fire extinguishers be located at each level, a downward path of travel be provided, a fire hydrant system through each rise in storey, and access to the roof.

New building codes were introduced in 1992 which were more prescriptive, however, these were not made retrospective.

Exits\Stairs

Pursuant to the building regulations at the time of construction (pre 1992), a building of this type and size was only required to have one exit and that exit was not required to be fire isolated.

The architects during design however, identified that a single exit was not sufficient to effectively deal with the expected occupancy numbers and as such, two additional exits were designed. This brought the number of exits serving the upper levels within the structure to three.

These consisted of:

One centrally located stairway constructed of concrete and contained within a central concrete shaft. The shaft however, was not fire isolated in that it opened directly onto each floor of the hotel. Aluminium framed, glazed doors were fitted on all floors above the fourth level of the complex. However, the integrity of these doors was compromised due to the intense heat of the fire. The stairway below the fourth level was completely open.

There were two spiral stairs constructed of steel, one at the eastern end of the hotel tower and one at the western end. These spiral stairs extended the entire height of the hotel tower, with the western stair discharging directly outside of the structure.

The eastern stair, although originally designed to exit directly outside of the structure, at the time of the fire, did not.

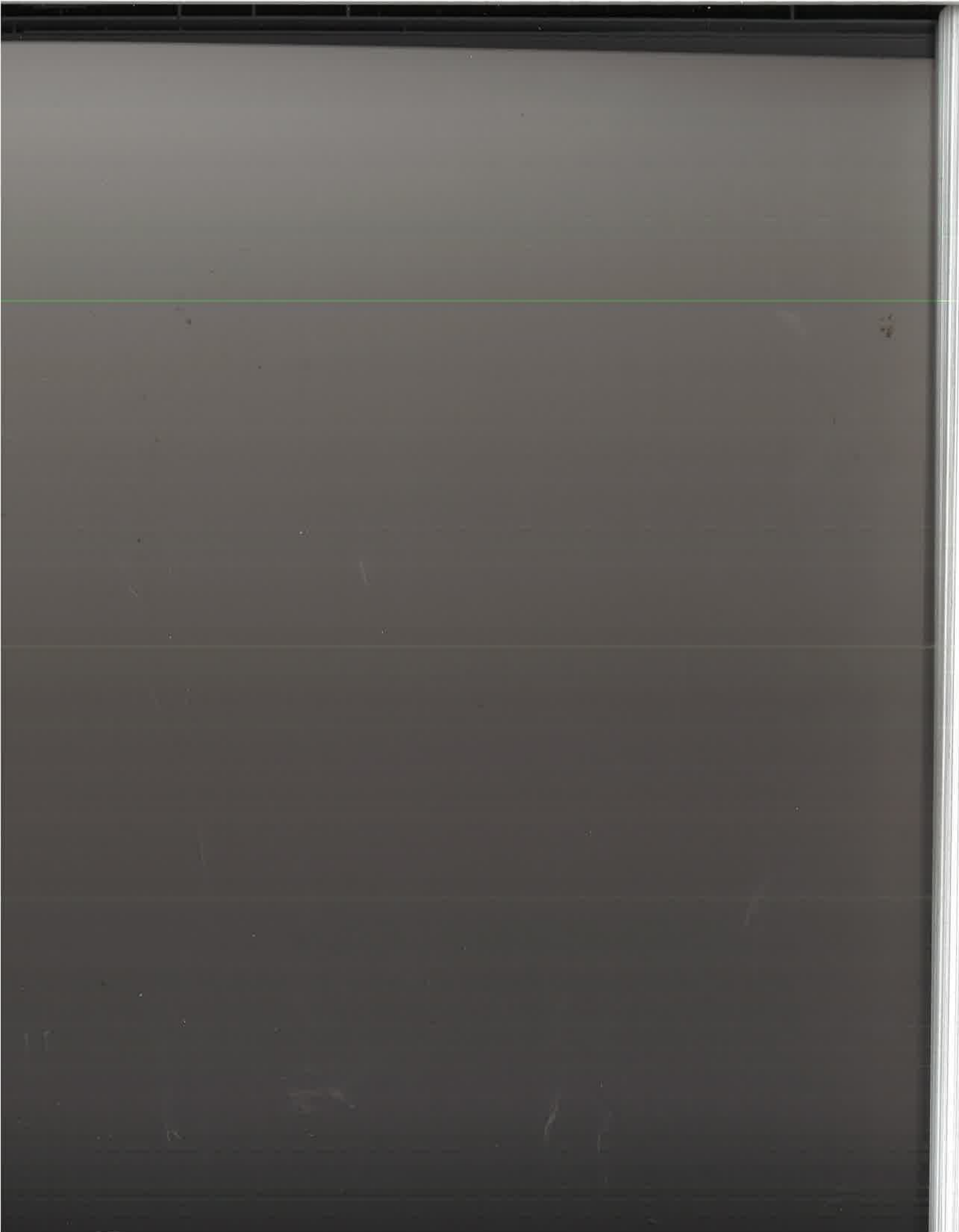
Further additions to the lower three levels of the eastern end of the Resort, had seen the eastern stair built around. These additions now required a series of corridors, rooms and dead ends to be negotiated prior to finally exiting the Resort, via the kitchens to the south.

Lighting within the spiral stairways was only powered by a primary power source. No auxiliary power supply was available nor was there any emergency lighting within the stairway.

Contained within the eastern stair shaft at each level was a service area measuring approximately seven square metres. Located within this area was a laundry chute, measuring 500 mm diameter, which extended the full height of the hotel tower, terminating in the laundry which was located on the third level.

Also located within the service area were a toilet, a timber maintenance cupboard and a timber enclosure that gave access to the service shaft containing the hydrant system. This shaft was not fire isolated between floors nor was there any fire separation between the service shaft, the hotel's corridor and the stairway.

The fire had extended through all levels of the hotel by way of the service shaft. The fire had also penetrated the stairway at each level due to a lack of fire separation within the shaft.



The design of the eastern spiral stair caused it to discharge persons exiting from it, facing away from the exit path leading out of the building. If someone approached the base of the stair, because of this design, they would be facing an additional doorway leading to the basement. Evidence indicated that at the time of the fire this door had been closed and secured by a hasp and staple.

Evidence further supports that occupants, in an endeavour to escape the fire, came to this door and, after opening the hasp and staple continued down into the basement.

Once at the base of the eastern stairs, and after realising that there was no way out, the occupants then returned to the ground level where seven of these persons were overcome by the smoke and subsequently died.

An inspection of the western stair shaft revealed that it had been used for the storage of tables and chairs. This area had been fully blocked by furnishings and it was necessary for those attempting to exit to climb over the chairs to exit the stair shaft.

The western stairway was not accessible from the mezzanine floor. The door leading to the exit had been welded shut with two 25 mm tube steel bars also welded across the opening.

Sprinklers

The complex, which was over 55 metres in height, did not contain a sprinkler system.

Alarm System

The building contained an automatic smoke detection system.

Due to the degree of damage, it is not possible to determine exactly what areas were covered. A report from Honeywell Thailand suggests that all areas were covered, however, witness statements suggest that the system did not work.

Emergency lighting

Examination of the complex revealed evidence that an emergency lighting system existed within some areas of the complex. This evidence consisted of an emergency lighting control panel, still energised at the time of investigation. However, the degree of fire damage and the lack of appropriate drawings made it difficult to establish the exact degree of emergency lighting coverage

Exit Signs

A detailed examination of the complex failed to reveal the existence of any luminated exit signs. One non-luminated exit sign was located on top of the hydrant box at the western end of the eleventh floor of the hotel tower.

Emergency Warning & Intercom System (EWIS)

Examination of the complex did not reveal any evidence of an EWIS system within the resort.

Hydrant Systems

The hydrant system was a dry system and relied on an electric pump located at the rear of the complex to boost the system. This was the only means of pressurising the system, apart from mains pressure, and given that there was no signage to indicate its location, the hydrant booster pump and the control valve for mains pressure were not used.

Generally the location and equipping of hydrants was to an acceptable standard. That is, all levels of the hotel towers were equipped internally with 65 mm hydrants equipped with 30 metres of canvas hose. The hydrants were all within four metres of an exit. However due to penetrations on each level within the hydrant riser shaft the fire quickly compromised many of the hydrants.

Special Purpose Extinguishers

Generally, the location and type of fire extinguishers were to an acceptable level. However some special risk areas, such as electrical switchboards did not have extinguishers provided

Floor Penetrations/Unprotected Openings

Located in the lift lobby, on each level of the hotel, were a fire hydrant and hose and the electrical service switchboard. Both of these service areas were enclosed within light timber cupboards. The fire hydrant risers and the power cables rose through each level of the Resort via unprotected openings.

These penetrations within the floor had allowed fire extension to the upper levels of the complex and as such, resulted in the rapid development of fire and the subsequent high death toll.

Staff Fire Safety Training

Discussion with investigating Police members and staff revealed that no formal or in fact, even ad hoc training existed at the complex.

FIRE PROCEDURES

The fire procedures and fire orders that existed at the complex were minimal. Attached to the interior of each door leading into each sole occupancy unit were the hotel's standard fire orders.

These orders involved a standard floor plan of the hotel showing each room. It should be noted that the number of rooms nominated on the plan was not accurate. There were two additional rooms located at the western end of each floor.

Whilst I have referred to the plan as "fire orders", they do not constitute fire orders as they do not advise on the actions to take in an emergency.

They give an indication as to the location of a particular room within the Resort in relation to exits.

To supplement the standard orders, the Royal Jomtien Resort "Directory of Services" has at page 4, a section titled "Fire Safety Information", "Fire Exits" and actions to follow "On Leaving Your Room". The full content of each section is as follows:

Jomtien Resort Fire Safety Information

It is unlikely that you will ever experience a hotel fire however we offer some hints in case of an emergency.

Fire Exits

In the event of an outbreak you will be notified by the ringing of the fire bell.

On Leaving Your Room

1. *Take your room key (you may have to return if your exit is blocked) and close the door to safeguard your belongings.*
2. *A wet towel will protect your eyes and lungs against smoke.*
3. *Leave your luggage in the room to take it will delay you and impede your exit.*
4. *Do not use elevator*
5. *Try not to panic or rush unduly.*

The additional information contained within the service directory is basic and relies on the occupant being aware of its existence so that it can be considered. The directory index is on the last page and does not make reference to the emergency procedures. The information contained is confusing and considered to be of little value.

The section headed "Fire Safety Information" does not provide any fire safety information and in fact advises that it is unlikely that a fire will occur. It does not offer any hints in the case of an emergency the latter further suggesting that a fire is unlikely.

The section headed "Fire Exits" neglects to discuss fire exits but states that "in the event of a fire, you will be notified by the ringing of a bell".

The section headed "On Leaving Your Room" provides five steps to assist in an emergency.

Point 1: advises to take your room key you may need to return to your room as your exit may be blocked.

This suggests that a blocked exit is likely. This in fact was the case during the actual fire where some exits were blocked;

Point 2: suggests that a wet towel will protect your eyes and lungs against smoke. Whilst it is acknowledged that a wet towel will afford some cooling of heated gases and may act as a particulate filter, its worth in isolating carbon monoxide and the like is minimal. However, it is accepted that a wet towel in some instances may, if even psychological, provide some minimal assistance;

Point 3: advises to leave luggage in the room as it will delay or impede your exit;

Point 4: advises not to use an elevator;

Point 5: provides a general request not to panic or rush unduly.

DETAILS OF DECEASED

Ninety-one residents, staff and guests of the Royal Jomtien Resort, died as a direct result of the fire. In addition, eleven crew from the Por Tek Tung Foundation, a rescue foundation located at Pattaya, died en route to the scene of the fire after being involved in a single vehicle road accident.

The 91 deceased at the resort involved:

- *23 employees of the Electrical Generating Authority of Thailand (EGAT);*
- *9 employees of the Concrete Products and Aggregate Company (CPAC);*
- *4 employees of the Sermsuk Company Sales Promotion;*
- *7 tourists holding Hungarian Passports;*
- *2 tourists holding Korean passports;*
- *1 tourist holding a Belgium passport;*
- *3 tourists who at the time of the report being completed, were not identified;*
- *31 staff members; and*
- *11 deceased who could not be identified.*

The deceased involved 45 males ranging in ages between 2 and 58 years, and 43 females ranging in ages between 1 and 59 years. Due to the degree of fire damage, the sex of three of the deceased were not identified.

Many of the deceased were located on the ground floor with the bodies of 10 deceased staff members located in the Leap Haad coffee shop, in the area of fire origin.

The bodies of six deceased were located at the base of the eastern spiral staircase at ground level and the body of one deceased was located just outside the exit door of that stair.

The bodies of three deceased were located in the entry to the eastern spiral staircase, on the 3rd floor with a further two deceased located in the passage way between the eastern and central stairs, on that same floor.

Nine deceased were located in the passage of the 8th floor of the hotel tower between the eastern and central stair.

The bodies of two deceased were located on the 9th floor in close proximity to the central stair.

One deceased died as a result of injuries sustained after jumping from an upper level hotel room.

It was not possible to state the exact locations of the remainder of the deceased as no record regarding their location was maintained.

It has however, been established that many of the deceased were located near exits. This fact suggests that if the exits were fire isolated and pressurised that many would have survived.

CONCLUSION

The fire that occurred at the Royal Jomtien Resort started as a result of leaking petroleum gas from a portable gas cylinder located in the ground floor coffee shop known as the Leab Haad coffee shop.

Due to a lack of training and a lack of emergency procedures, the fire was not contained in its incipient stages by hotel staff, who were in close proximity to the leak and were fully aware that it was occurring. Aided by the combustible fuels located within the immediate area, the fire quickly developed to the stage that it spread extremely rapidly throughout the complex both laterally and vertically.

Unaware that a fire was in progress, many of the resort's staff, residents and guests went about their normal functions. It wasn't until many of the upper levels of the complex had become smoke logged, that the resorts occupants finally became aware of the fire. Unfortunately at this late stage, the stairways had become impassable.

The fire continued to burn throughout the night of the 11th of July and continued well into the next day before being extinguished. Once the fire was extinguished, rescue crews commenced a detailed search of the complex for the missing persons.

As a direct result of this investigation, it has been established that the extent of damage and the high number of deaths was the direct result of building legislation in force at the time of construction of the resort, insufficient means of detecting a fire and providing timely warning to the occupants, insufficient means of suppressing a fire, insufficient means of escape, the lack of formal fire safety procedures, a lack of emergency pre planning and the further development of the resort's buildings that occurred over recent years.

It must be acknowledged that the building regulations have changed significantly since the construction of the Royal Jomtien Resort. However, there are many areas that need to be considered to improve associated Fire Safety systems.

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Paper 15

Focusing on the Front Line

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FOCUSING ON THE FRONT LINE

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The NSW Fire Brigades has developed an Information Management Policy that focuses on using information to meet the organisation's mission of reducing the impact of emergency incidents on the community. An analysis of information gathering and usage activity revealed that while our firefighting staff were providing a lot of information to administrative and support areas, very little information was going the other way. The focus of much information gathering and processing activity was cost control - the bottom line - rather than operational decision making - the front line activities of preparedness, prevention, firefighting, hazmat and rescue. As well as trying to encourage a culture of information The NSW Fire Brigades is now designing and funding new information systems that aim to redress this information imbalance. These systems include an Intranet supporting an Operational Information System, a new system for recording Australian Incident Reporting System data, competency based training manuals and access to standard information resources. The aim is to empower our firefighters with the information needed to make the best decisions for the protection of their local communities and to take the most effective actions when an emergency occurs.

1. Introduction

Modern fire services operate in an environment of rapid change. Developments in technology, changes in urban infrastructure, and demographic trends all lead to a demand for fire services to deal with a wider range of emergencies, and offer hazardous materials, rescue, disaster management and other services alongside the traditional firefighting services. Community and government expectations are for fire services to be more accountable, more efficient and to be pro-active in their response to change. It is difficult, if not impossible, to change fire services staffing, infrastructure and equipment fast enough to anticipate these demands, fire services are realising that the most effective strategy for meeting this challenge is to upgrade the information available to firefighters and their ability to use it.

The NSW Fire Brigades (NSWFB) is the largest urban fire service in Australia, with 325 fire stations crewed by 2800 full time and 3150 retained part time firefighters. It provides fire protection to over 90% of the State's population and protects the whole State from hazardous material incidents. The NSWFB has long experience in managing its finances, personnel and infrastructure and has recently become aware that information must be managed as a strategic resource to achieve the organisation's mission of reducing the impact of emergency incidents on the community.

2. An information audit

As a first step in considering the management of information as a strategic resource, the NSWFB conducted an information audit in 1995. A fairly rapid survey identified over 230 separate information collections, most of them either paper based systems or running on stand alone personal computers. It appeared that one response to change had been the proliferation of information systems. Every time information was required to manage a new process, another information system was established. Firefighters were required to fill in new or bigger forms and send in multiple copies. Stations kept logs and registers. Central sections kept ledgers, card files, records and, in the last few decades, databases on personal computer or networks. There was lots and lots of data, but could it be used to make good decisions?

The results of the information audit were studied and a number of interesting conclusions were drawn:

- most of the information *use* was concentrated in the centralised administration and support areas
- most of the information was *provided* by firefighters in fire stations
- although firefighters in fire stations generated a large amount of information, they had access to and used very few information resources in their day to day decision making
- information technology infrastructure was concentrated in the centralised administration and support areas, with the most sophisticated and expensive systems concentrated in personnel and financial management, while the most sophisticated information technology in most fire stations was the telephone
- most of the information gathered related to the availability of resources (which people and what equipment was where), methods (instructions, administrative procedures) and cost control
- only a small proportion of information related to the competence of personnel, actions required to combat emergency incidents, community needs or feedback on the effectiveness of actions in meeting community needs
- there was little communication of information between the various sections of the organisation.

In studying these conclusions, the NSWFB management realised that there were many opportunities to improve the organisation's efficiency and effectiveness by treating information as a resource and making a high level commitment to its management. A senior management committee, the Information Management Steering Committee (IMSC), was tasked with the responsibility for developing and information management policy and overseeing its implementation. The IMSC consists of all the NSWFB's Directors, the Commissioner and key information management staff.

3. The information management policy

The essence of the NSWFB's Information Management Policy is that information will be used to support our core business - fire prevention, fire suppression, hazardous materials response and rescue. Information systems are prioritised to:

- protect the community by identifying hazards, devising methods of reduction and protecting the community from threats
- protect our firefighters who must have access to all necessary information as well as the capability to enable them to effectively protect our community
- provide useful, timely and accurate performance feedback to enable us to learn from experience and for our firefighters around the State to use those lessons to continuously improve our effectiveness
- enable the superior use of resources to ensure efficiency of our operations, and
- report to government so that our actions and decisions are fully accounted for, while being entirely aware of government and community needs.

The introduction of new information systems is driven by the requirements for information management rather than the capabilities of information technology. Giving somebody a computer does not solve all their problems. What we aim to do is find solutions to our problems and *then* consider whether the solutions require new computers, software, telecommunications infrastructure, etc. Financial support for information projects is prioritised on the basis of the business case presented.

4. The NSW Government IM&T environment

The NSWFB is not implementing this policy in a vacuum. The NSW Government is also interested in using information management to improve its services to the community while managing the public sector's investment in information technology. In February 1997 the Government published an *Information Management and Technology Blueprint for NSW - a well-connected future* (Government Information Management Division 1997) which provides a strategic framework for NSW Government Departments and Agencies. It embraced many of the same principles that the NSWFB has in its Information Management Policy and set up a reporting framework with which the NSWFB has to comply. This has reinforced the high level management commitment to the policy, as the NSWFB has to make its business cases to Treasury to get funding for major information technology projects. Later in the year, the Premier launched *An Internet strategy for NSW - connect.nsw* (Government Information Management Division 1997) which outlines the way that the NSW Government is going to improve its services to the community by using Internet technology. Again, the NSWFB had already decided to implement an Intranet as the main platform for communicating electronic information to its internal customers, and is also considering ways to use the Internet to communicate with external customers.

5. Where are we going?

Since setting itself these policy goals, the NSWFB has improved and developed a number of major information projects. These can only be outlined in the context of this paper; more information can be provided to interested parties on request.

5.1 The Operational Information System

The flagship product of this new approach to the development of information systems in the NSWFB is the Operational Information System (OIS) currently being developed by our State Operations Division. This system is designed to run on the NSWFB's Intranet and has been developed from an analysis of the information needs of firefighters in fire stations. When complete the OIS will consist of the following modules:

- area management
- equipment management
- crew management
- procedures and methods
- training support
- performance management and lessons learnt
- station management

The Area Management module is currently being piloted in the nine fire stations closest to the site for the 2000 Olympic Games, and has been enthusiastically received. At the fire station, firefighters are able to access geographic information including aerial photographs of the area, road maps, utility services such as water, power and drainage, legal boundaries of areas, locations of buildings and, where available, detailed plans of buildings and information about their content. Much of this data has been made available by other agencies, such as the Land Information Council, the Roads and Transport Authority, local governments and utility providers in accordance with the principles in the *IM&T Blueprint*. In return, we will share our information with them.

Displaying the information spatially allows firefighters to see an integrated view of their area and reveals important correlations and patterns. As firefighters collect additional information through pre-incident planning and liaison with the community they will be able to check the accuracy of the data provided by other agencies, formulate risk reduction and management strategies, and have instant access to information about the hazards of a site at which an incident is reported.

As it develops, the OIS will interface with other NSWFB systems, including personnel and finance systems, the incident reporting system, the dispatch system, asset management and fleet management systems. The NSWFB has also collaborated with WorkCover NSW on a Stored Chemical Information Database System (SCIDS) which is a database of sites which require a dangerous goods licence from WorkCover. We expect to find other opportunities for sharing data as work progresses.

5.2 AIRS97

The AIRS97 system is a fully integrated software solution to incident reporting which meets the requirements of Australian Standard AS 2577 - 1992 *Fire incident reporting system.* AIRS stands for Australian Incident Reporting System, and, as its name suggests, is capable of reporting on a range of emergency incidents, not just fires. In the past, firefighters have filled in long, complex forms which they send in to a centralised data entry point where clerical officers entered the data on a text based system. On the new system, data entry is done on Windows-based screens and searching and retrieving functions are available through a wide range of software tools and Internet browsers.

The system has been designed to give firefighters a sense of ownership of the data. The data is entered at the fire station by the firefighters who went to the fire, so they can be sure that what is in the system reflects what they did. A system of error checking at the point of data entry will ensure that all the relevant fields are filled with acceptable data. They will not, however, be sending this information off into the blue, never to be seen again, as they will also be able to interrogate the AIRS database through the NSWFB Intranet. They can ask for data about their station and their performance, and compare their performance with the performance of other stations using standard reports that will display the data in graphical and other interpretive forms.

AIRS97 interfaces with the NSWFB's new computer aided dispatch system, FireCAD. For each incident, FireCAD will generate a new record in AIRS97 and fill in the basic fields with information that has already been gathered by the dispatch system. For example, the time of the call, response time, which appliances responded, the location of the incident and the stop time have already been entered in FireCAD. In accordance with the Information Management Policy's principle of only entering data once, this data will be copied from FireCAD to the incident report and will be available when the firefighter sits down to fill in the rest of the fields.

Another feature of the system is its ability to let specialist sections add data to the original incident report after it has been submitted by the fire station. If there is a fire investigation, or a building inspection, if specialist hazardous material or rescue staff were responded, personnel from those sections can add their information to the incident report, providing the NSWFB and other interested parties with a much more complete description of the incident. The system will also contain information relating to false alarms and other non-emergency calls that will assist us to manage risk and identify service issues.

With the more complete data and higher quality control of data available through this system, the NSWFB will be able to refine its models for resource allocation, target fire safety campaigns more effectively and advise government on strategies for improving community safety in NSW. The expertise that the NSWFB has developed with handling incident statistics and the capabilities of our systems have enabled the NSWFB's Statistics Unit to win a contract from the Australasian Fire Authorities Council to manage the national incident database and the production of national statistical reports.

5.3 Standard Operational Guidelines

The systems discussed above have been examples of electronic information systems, but the NSWFB is also providing resources to develop information resources that, while they may be distributed through the Intranet, are more about knowledge management than technology. The NSWFB is currently developing a new series of Standard Operational Guidelines which are designed to provide firefighters with information relating to actions that need to be taken at emergency incidents.

The basis of the new guidelines is the introduction of a formal Incident Control System, based on AIIMS, the Australian Inter-service Incident Management System (Incident Control System 1992), but tailored to meet the specific needs of NSWFB firefighters. All the other Standard Operational Guidelines are based on the assumption that the Incident Control System will be used to manage the incident and give details of the application of ICS to specific situations and of specialist procedures for handling particular hazards. There are many situations where the NSWFB will be the combat agency, but other agencies will have an interest in the outcomes of the operation, for example any incident that is likely to pollute the environment is of concern to the Environment Protection Authority. The NSWFB is consulting with these other agencies while it is writing the Guidelines, ensuring that all agencies are clear on how incidents will be managed, and giving other agencies information so that they can review their own guidelines to match ours.

These Guidelines are also being used as the basis for reaching agreements with other NSW emergency services about the management of multi-agency incidents. For example, the NSWFB's agreement with the NSW Rural Fire Service, which handles non-urban incidents, contains sections on which agency will provide the Incident Controller and Operations Officer for incidents where one agency responds into the other's area of responsibility. At very large incidents, the NSWFB's Incident Control System will merged into the AIIMS incident control system, with which it is compatible.

5.4 Competency based training

Training programs are of particular importance to information management in a fire service organisation. Much of the knowledge that firefighters must have to perform effectively is of a very practical nature and is often better imparted by demonstrations and hands on training than by issuing paper or electronic instructions. That said, in the modern world, firefighters must also be trained in information literacy so they can also make sense of the large quantities of information that it is not economically possible to deliver only in face to face situations.

The Australasian Fire Authorities Council has coordinated the production of a national set of competencies for firefighters and the NSWFB is moving to competency based training using these guidelines. This has necessitated the production of an entirely new set of information resources to support the new training programs. A curriculum development unit has been established, with eight technical writers being employed for three years to do the initial development. Some modules are outsourced, with materials coming from the Australasian Fire Authorities Council, the NSW Department of Education and Training and from the Tasmanian Department of Technical and Further Education, but modules that relate directly to the specific services and procedures required by the NSWFB have to be produced in-house.

Initially, the information resources required to support competency based training will be produced in hard copy, but reference sets will probably be placed on the Intranet or on CD-ROM so that the information is available to everyone, not just the firefighters who are undertaking a particular course. We are also looking at interactive CD products as a method of delivering training. The training information systems also need to be cross referenced with other information systems such as the Standard Operational Guidelines and the Operational Information System.

6. Conclusion

The NSWFB is an information based organisation. Without information we cannot provide services to the community of NSW or ensure that our firefighters are using safe working practices with an understanding of the environment in which they are operating. Introducing new information systems running on effective information technology is one way of trying to manage the flows of data, information and knowledge around the organisation. The challenge is to manage information strategically, coordinating information between different information systems, making sure our messages are consistent across different media. We must remember, too, that there is no substitute for going out and talking to people.

References

Government Information Management Division, NSW Department of Public Works and Services, 1997, ***Information management and technology blueprint for NSW - a well-connected future***, Department of Public Works and Services, Sydney, NSW. http://www.nsw.gov.au/blueprint/

Government Information Management Division, NSW Department of Public Works and Services, 1997, ***An Internet strategy for NSW - connect.nsw***, Department of Public Works and Services, Sydney, NSW. http://www.nsw.gov.au/connect.nsw/html/connect/

Incident Control System: the operating system of AIIMS, 1992, 2nd ed, AFAC Limited, Mount Waverley, Victoria.

Biography

Anne Pickles holds of a Bachelor of Arts from Sydney University and a Graduate Diploma in Library Science from Kuring-gai College of Advanced Education. She currently holds the position of NSW Fire Brigades' Information Coordinator and is responsible for maintaining and publishing a number of internal publications, assisting with the development of policy and procedures, providing editorial services and advising management on information management issues as a member of the Information Management Steering Committee. Previously, she was the NSW Fire Brigades Librarian for five years. Before joining the Fire Brigades, Anne was employed as a Librarian in the Sydney Information Centre of the Standards Association of Australia from 1986 to 1989, there acquiring a broad knowledge of standards from many countries on a wide range of topics.

Anne has held executive positions in the Architects Construction and Consulting Engineers Specialist Services (ACCESS) Librarians Group, the Sydney INMAGIC Users Group and the Government Library and Information Network of NSW (GLINN). She has also been a member of the Training Libraries Network and is a member of the Australasian Librarians in Emergency Services (ALIES) Network. Outside interests include history, the environment, classical music and lots of reading as well as working as a volunteer for 2MBS-FM, a public radio station dedicated to broadcasting classical and other fine music.

Paper 16

Knowledge Management: What is it and what do we do about it?

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Knowledge Management: What is it and what do we do about it?

By

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Articles have been written about knowledge management for over 10 years, but just recently there has been a significant amount of discussion in library literature linking librarians and knowledge management roles. Much of what has been written tends to be theoretical. This discussion attempts to demystify, simplify and present practical information and tips for librarians interested in knowledge management. Definitions by theorists and practitioners and knowledge management case studies are examined to ascertain the components of knowledge management. Although components appear to be many and varied, definitions and case studies point to a need to gather, organize, and disseminate knowledge. These and other skills traditionally associated with librarians, such as search skills, reference interview techniques, and creating user interfaces, are all identified as critical to successful knowledge management projects.

Introduction

In June 1997, *Information Outlook*, the monthly magazine of the Special Libraries Association, published nearly an entire issue on knowledge management. In early September, the American Society for Information Science New England Chapter (NEASIS) presented a day-long program on knowledge management. All of the presenters were currently involved in knowledge management programs in their organizations. In the September 15 issue of *Library Journal* the cover announced "Focus on Special Libraries: The New Wave of Knowledge Managers." It appeared that knowledge management was certainly something that should be of interest to librarians, yet many wondered what all the hype was about. In an effort to learn more about this subject additional information sources were sought. Several definitions and real life examples were gathered to illustrate the components of knowledge management and determine what skills and resources are necessary to successfully manage knowledge. Finally, the role of the librarian and traditional library charge of collecting, organizing and disseminating information as it relates to knowledge management was investigated.

History

"The Information Age is dead, this is the dawn of the Age of Knowledge," proclaim some management soothsayers, but articles have been published about knowledge management for over a decade. Peter F. Drucker, a world renowned expert on corporate management and professor at Claremont Graduate School, coined the term "knowledge worker" in the 1950's (Skyrme 1997).

Cynics see knowledge management as the latest business fad, following TQM and reengineering. Yet, others feel that knowledge management is perhaps the inevitable result of reengineering. In many instances reengineering has been synonymous with down-sizing and a loss of long-term employees possessing unique knowledge. This has left organizations with an increased realization of the value of that knowledge and the importance of retaining it. This loss of organizational knowledge combined with advances in information technology which provide platforms for capturing this knowledge (specifically intranets and the Worldwide Web), has created intense organizational interest in knowledge management. But what exactly *is* knowledge management?

Definitions

Definitions of knowledge management are many and varied. The following four definitions were chosen for clarity and origin. The first two are from representatives of distinguished organizations whose core mission involves promoting the concept of knowledge management. The last two are from successful practitioners.

Philip C. Murry, Editor-in Chief of *KM Briefs* and *KMetazine* defines knowledge management as "a strategy that turns an organization's intellectual assets—both recorded information and the talents of its members—into greater productivity, new value, and increased competitiveness. It teaches corporations, from managers to employees, how to produce and optimize skills as a collective entity." (Murry1997, TERM2.HTM)

A definition from the University of Texas Web site, where knowledge management guru Tom Davenport teaches, states that knowledge management is "the systematic process of finding, selecting, organizing, distilling and presenting information in a way that improves an employee's comprehension in a specific area of interest. Knowledge management helps an organization to gain insight and understanding from its own experience. Specific knowledge management activities help focus the organization on acquiring, storing and utilizing knowledge for such things as problem solving, dynamic learning, strategic planning and decision making. It also protects intellectual assets from decay, adds to firm intelligence and provides increased flexibility." (Paulson 1997)

DiMattia and Older, in the September 15, 1997 issue of *Library Journal,* acknowledge that definitions are "legion" but go on to explain that "knowledge management involves blending a company's internal and external information and turning it into actionable knowledge via a technology platform" (DiMattia and Older1977, p33).

In an article in the February 1997 issue of the *Australian Library Journal*, Marian Broadbent defines knowledge management as "a form of expertise centered management

which draws out tacit knowledge making it accessible for specific purposes to improve the performance of organisations. Successful application of knowledge management practices involves understanding and constructively utilizing organisational learning and the information politics of an organisation." (Broadbent1997, p6)

It is important to understand what Broadbent means by "tacit knowledge." Explicit knowledge is that "which can be articulated in formal language and transmitted among individuals" and tacit knowledge is "personal knowledge embedded in individual experience and involving such intangible factors as personal belief, perspective, and values." (Murray 1997/11). Tacit knowledge implies a period of apprenticeship. The business of knowledge management professionals is to make the tacit explicit.

Knowledge management in the above definitions is "a strategy," "a systematic process," "a form of management," and "involves information". The first definition includes "teaching", the second discusses "gaining insight" and the fourth mentions "improving performance". There is some commonality here involving learning. In addition many articles on knowledge management suggest that if any organization knew what it already knows then it would be much more successful.

However there are those who do not believe that knowledge can be managed. For example, Lawrence Prusak, co-author with Thomas Davenport of a new book on knowledge management, says "I call my field 'knowledge management' but you can't manage knowledge…knowledge originates in human beings. It is insight, judgment, innovation, based on experience, heuristic methods, passions and neural connectors…knowledge is the single most important resource a company can have." (Prusak 1997) However he does believe that organizations can manage an environment that optimizes knowledge and that people acquire knowledge through learning in organizations. Organizations that successfully utilize knowledge management will create policies, practices, and procedures, to facilitate the use of knowledge. They will reward those who effectively generate, transfer and utilize knowledge.

The argument about whether or not knowledge can actually be managed may continue ad infinitum. Examining the knowledge management programs developed by some organizations may help to answer the question.

Case Studies

Digital Equipment Corporation

An article in the June 1997 issue of *Library Journal* by Mary Lee Kennedy, manager of the Corporate Library Group at Digital Equipment Corporation, discussed three knowledge management programs: the Market Research and Competitive Information Program, the Technical Information Program, and the Strategic Information Program. (Kennedy 1997, p41). The Corporate Library Group utilized Web technology on Digital's intranet and were responsible for managing external content only. Information professionals trained in research and analysis focused their efforts on strategic areas where they knew they could be successful. They consciously sought business partners who would champion their efforts and measured their success based on fulfilling these partners' program requirements. Quarterly deliverables differed for each program but overall success was proven by an increase in intellectual capital and

technological innovation. The WebLibrary they have developed is not yet interactive, but they are encouraged because the user sessions continue to multiply.

Microsoft

Microsoft is involved with a project called SPUD, Skills Planning "und" Development, designed to identify and maintain knowledge competencies within the internal Information Technology group to ensure the company remains in a position of industry dominance. Each job was identified as having four levels of competency ranging from job specific to universal. Each level then had four associated skill levels ranging from basic to expert. Each skill level was clearly defined to avoid ambiguity when rating employees, and employees and managers worked together to determine ratings. Steps in the project included developing the competency structure, defining knowledge required for specific jobs, rating performance of employees in jobs, implementing an on-line system, and linking knowledge to training programs. Goals were to match jobs with employee capabilities and identify needs for further training. The SPUD project involved building an on-line system with a Web front end. Access and security issues involving the on-line system are not completely resolved, but the project is progressing well. (Davenport and Prusak 1998, p75)

Teltech

Teltech is a small company based in Minneapolis, Minnesota, USA. It is in the business of knowledge management. Clients come to Teltech seeking knowledge and information and Teltech provides four basic products: a network of experts in technical fields, 1600 on-line databases, a service that locates vendors for client identified products, and an alert service for client defined topics. Teltech prides itself on utilizing its people as effective guides to information. Teltech employees (many of whom are Librarians) mediate all searches, thoroughly discussing a client's needs, to pinpoint exactly what resource will be best. Often the dialog between Teltech and client reveals that what is originally requested is not what is desired. (Isn't that the classic reference interview?)

Teltech uses web technology and maintains a database of their associates' expertise using a thesaurus of technical terminology to match clients with experts. The thesaurus is updated daily to correlate client terminology with expertise. No attempt is made to download the expert's knowledge into a computer, but Teltech is investigating the feasibility of capturing frequently asked questions and answers in a database. Each client is called after a referral to assess the quality of the expert and the expertise. Teltech also requires its personnel to participate in a great deal of training on information sources, search techniques, and emerging fields of knowledge. This, as well as Teltech's other services, are labor intensive, but successfully manage the knowledge their clients need. (Davenport, 1996)

Lessons

What can be learned from these three examples? They all had a clear vision of what they wanted to accomplish and they all had a solid technological infrastructure that could handle their needs (Web technology). All of these organizations rely heavily on continuous training for their employees

At Digital the library was providing a service to specific business units involving external resources only, Microsoft's SPUD project focused on identifying the skills of one internal group, and Teltech's services involve a variety of knowledge transfer mechanisms that are client based. Yet all of these programs and services are referred to by the same term - knowledge management.

Discussion

There are three basic challenges awaiting anyone who wants to begin a knowledge management initiative: what to include, what mechanism to use and how to ensure it will be used.

What to Include

Target knowledge that will improve performance, something that will help people do their jobs better. Determine what specific knowledge people think is important and locate it or get those "in the know" to share it. Provide metadata tags that add value. Also try to measure the financial impact of your efforts.

Only you can identify the knowledge that is most valuable for your own organization but here are some suggestions to consider:

- Internal intellectual capital, who's who, biographies, resumes, expertise information
- Organizational best practices, lessons learned with hypertext links to directories of human expertise and published material
- Reports, proposals, speeches, discussions or work group notes, case studies, debriefings, internal committee or initiative information
- Client/customer information, contact information, client feedback
- Competitive intelligence, market intelligence
- Policy information, newsletters
- In-house workshop documentation
- Product information

Start small. Although many experts would disagree and feel that knowledge management needs to be organization-wide with top management backing, several of the examples of successful knowledge management initiatives in the literature, including two of the three case studies discussed above, began with localized knowledge management projects geared toward a specific business unit's needs. Often organization-wide

initiatives get bogged down in red tape or attempt to be so all-inclusive that they end up being useless to everyone.

Mechanism

Lotus Notes and Worldwide Web technology are most often employed by those currently writing about their activities involving knowledge management. There is also software specifically developed for knowledge management. A list of this software is available on the Special Libraries Association's "Selected Reference on Knowledge Management" site at http://www.sla.org/membership/irc/knowledge.html. There were nine listings in March 1998.

Remember that just because your organization has spent a lot of money on a product does not mean that it is a good platform for your application. In the past librarians have often been forced to use whatever database software was available in an organization to create an automated catalog. This has often meant long hours involved in work-arounds that produced a product inferior to commercially available cataloging software. The same is true for knowledge management. Technology is merely a tool and should not dictate how to manage knowledge.

Usability

This seems simple; give people what they want and make it easy to use. Provide a good design with an easy-to-use interface. However, the "if you build it they will come" philosophy alone will probably not work even if everything has been done to capture needed information in an easy-to-use format for a specific application. Marketing skills and PR, in the form of mailings, newsletter articles and demonstrations, will all have to be employed to ensure the product is used. Some organizations have contests and give out prizes for using knowledge management techniques. Personal performance ratings are based on employing knowledge management practices and demonstrating that use of knowledge management has positively affected the bottom line.

To be useful it is absolutely essential that information be kept up-to-date and some mechanism must be put in place to ensure this. (People skills will be very important for coercing busy employees to provide/submit changes.) The more people use and rely on something the more willing they are to contribute towards its accuracy. New knowledge must be continually developed and distributed. Knowledge must be available where it is needed for decision making processes (the desktop), when it is needed (24 hours a day), and you need to ensure that everyone in the organization knows where they can get the knowledge (more marketing and PR).

Ultimately, to succeed, there has to be an organizational culture in place that values knowledge. If sharing knowledge is recognized and rewarded in your organization then knowledge management projects have a chance of succeeding. If, on the other hand, your organization acts as if it's major competitors are not external entities, but the various departments within your own organization, then you should direct your energies to other projects.

Role of the Librarian

Many organizations have jumped on the knowledge management bandwagon and are appointing Chief Knowledge Officers, usually from Information Technology departments (IT). Yet gathering and analyzing information is not the forte of IT. Their expertise is in electronic manipulation and delivery of information. According to Davenport, "IT professionals have little patience with the needs of the end user. They throw technology at information problems; and whatever the problems - - many of which result from ignoring how people and information relate to each other, not software glitches or idiot end users - - this 'machine-engineering' approach continues to dominate us all." (Davenport 1997)

There are many roles for librarians interested in knowledge management. Librarians are trained to work with people, to assess their needs, and provide the information tools they need. Librarians are skilled in helping users help themselves and can provide valuable support to knowledge management initiatives in this capacity by working with people, creating how-to guides and on-line help screens.

Librarians are knowledgeable in the use of Worldwide Web technology. In many organizations it was librarians who first embraced this new tool as an expanded reference resource. Librarians have the experience and the search techniques both to create user-friendly interfaces and to assist others with more complex needs.

One of the hurdles of knowledge management is getting people to share knowledge. Librarians have been practicing reference interview techniques for decades, if not centuries, to understand user needs. These same techniques can help people overcome their reluctance to share knowledge.

Librarians make information more accessible and valuable to the end-user by organizing and creating indexes and catalogs that ensure information can be found when needed, allowing more time for turning it into knowledge. The traditional library skills of collecting, organizing and disseminating information are crucial to the success of any knowledge management initiative.

Mary Corcoran and Rebecca Jones wrote an excellent, comprehensive article in the June 1997 issue of *Information Outlook* that explained what skills, experience and competencies organizations are looking for when they consider hiring a Chief Knowledge Officer. They carefully compared these to the skills, experience and competencies of a librarian and explained what librarians need to do to compete for these positions. Anyone interested in assuming this position within their organization should read this article.

Conclusion

Knowledge management is not cheap. It requires a great deal of human labor. However, Davenport and Prousak give three examples wherein the inability to share knowledge nearly ruined a major company.

In the early 1980's, Ken Olson, the founder of Digital Equipment Corporation forbid discussion of the concept, and even the words "personal computer" thus rendering employees powerless to work in that field. At Polaroid, Edwin Land insisted that Polavision, an instant movie file, would be a prime product, stifling research into other products and nearly ruining that company. Wang Laboratories President's exclusive

control over the direction of that company and his unwillingness to share his knowledge had a similar effect there. (Davenport and Prousak 1998, p50)

Yes, knowledge management is expensive but duplication of effort and time wasted searching for needed knowledge is even more expensive. Organizations cannot afford not to know what they really do know.

SLA Board of Directors member, Stephen Abram described the role of librarians in the new world as "guides and navigators for the exploration of the information ocean…We will form the base for informed, intelligent, and impactful decision-making in our society and enterprises." (Abram 1997, p23) Librarians, because of their skills and training, are uniquely qualified to play a pivotal role in any knowledge management initiative. The exact nature of that role depends largely on individual initiative and insight.

USEFUL KNOWLEDGE MANAGMENT WEB RESOURCES

CIO magazine's archive of on-line articles on knowledge management:
http://www.cio.com/archive/index_knowledge_management.html

University of Texas links of books, papers, journals on knowledge management and related topics:
http://www.bus.utexas.edu/kman/pubs.htm

Special Libraries Association's bibliography of articles, books, Web sites and software on knowledge management (many are linked):
http://www.sla.org.membership/irc/knowledge.html

References

Abram, S., 1997. Post Information Age Positioning for Special Librarians: Is Knowledge Management the Answer? ***Information Outlook***, 1 (6) p. 18-25.

Broadbent, M., 1997. The Emerging Phenomenon of Knowledge Management. ***Australian Library Journal***,46 (1). p. 6-24

Corcoran, M. and Jones, R., 1997. Chief Knowledge Officers? Perceptions, Pitfalls, & Potential. ***Information Outlook***, 1 (6) p. 30-36.

Davenport, T. H., 1996. Teltech: The Business of Knowledge Management Case Study. ***http://ww.bus.utexas.edu/kman/telcase.htm***

Davenport, T. H., 1997. Book Excerpt: Information Ecology: The Bigger Picture. ***http://www.cio/com.archive/051597_book_content.html***

Davenport, Thomas H. and Laurence Prusak, 1998. ***Working Knowledge: How Organizations Manage What They Know***. Harvard Business School Press: Boston

DiMattia, S. and Oder, N., 1997. Knowledge Management: Hope, Hype, or Harbinger? ***Library Journal***, 122 (15) p. 33-35.

Hildebrand, C., 1995. Information Mapping: Guiding Principles. ***http://www.cio.com/archive.070195_map_content html***

Kennedy, M. L., 1997. Building Blocks for Knowledge Management at Digital Equipment Corporation: The WebLibrary. ***Information Outlook***, 1 (6) p. 39-42.

Murray, P. C., 1997/11. Information , Knowledge, and Document Management Technology. ***http://www.ktic.com/topic7/12_INKFKM.HTM#e102265***

Murray, P. C., 1997. New Language for New Leverage: the Terminology of Knowledge Management. ***http://www.ktic.com/topic6/13_TERM1.HTM*** through ***http://www.ktic.com/topic6/13_TERM5.HTM***

Paulson, A., 1997. *KM* Answers to Frequently Asked Questions About Knowledge Management. ***http://www.bus.utexas.edu/kman/answers.htm#how***

Prousak, L., 1997. Knowledge Management: The Ultimate Competitive Weapon. ***http://www.ibm.com/services/articles/knowman.html***

Skyrme, D. J., 1997. From Information to Knowledge Management: Are You Prepared? ***http://www.skyrme.com/pubs/0n97full.htm***

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Janet is the Manager of the Technical Information Center, which is responsible for fulfilling the technical information needs of Factory Mutual's worldwide offices. She received her BA degree from Bates College and her MLS from the University of Rhode Island. She worked in various positions within the Technical Information Center before assuming her current position as Manager in 1988. Janet planned and coordinated the automation of various catalogs and other corporate information and has participated on committees responsible for developing an Internet Web site and a corporate intranet. She has edited several in-house publications and has previously presented papers at inFIRE Annual meetings. Her current responsibilities involve automating internal processes and collaborating on various knowledge management initiatives.

Paper 17

The Australian Institute of Police Management and Information Literacy Programs for Professionalism

Margaret Davson, Australian Institute of Police Management, Sydney

The Australian Institute of Police Management and Information Literacy Programs for Professionalism

Margaret Davson
Manager, Library & Information Services
Australian Institute of Police Management

Abstract

This paper describes the role of the Australian Institute of Police Management as a provider of Post-Graduate education for law enforcement officers and allied organisations. Emphasis is given to the Library's role in this education process, particularly its Information Literacy programs. Literacy Programs were developed to ensure course participants were provided with the skills to conduct research, write academic papers and develop themselves to be self-sufficient learners. This knowledge is a pre-requisite for today's society in which the information explosion has become a reality, and is critical for public safety officers who are moving from an occupation to professional status. This paper highlights the need for literacy programs and provides aims and objectives for developing information skills. The requirement for managers to become information literate is also discussed and why this is essential in today's political environment.

ROLE OF THE INSTITUTE

The Australian Institute of Police Management (AIPM) is a Nationally Accredited Post-graduate education provider under the Australian National Qualifications Framework. It is accredited to award the Graduate Certificate in Applied Management, which is a vocationally-oriented professional development qualification in the fields of Leadership and Executive Development in the law enforcement and public safety sectors. The AIPM also offers the Police Executive Leadership Program and a number of Critical Issues Seminars.

The primary role of the AIPM is to improve the corporate performance and productivity of Australasian law enforcement and allied agencies by developing superior managers and executives through its management and leadership programs. In pursuing this role, the Institute plays a major part in supporting the professionalisation of Australasian policing.

The long-term goal of the AIPM is to be recognised as Australasia's Leading Management Development Institute in its chosen niche market. AIPM staff members are committed to a corporate philosophy of providing excellent, timely, efficient and cost effective professional services.

AIPM LEARNING PHILOSOPHY

The AIPM's learning philosophy is based upon developmental principles within a non-judgmental, non-competitive, self-directed learning environment. This philosophy is focused on the personal and professional development needs of individual participants, and it challenges participants to strive to achieve their full potential and to extend their capacities rather than compete against each other.

This philosophy lays the foundation for programs that accommodate a broad range of abilities and experiences of participants who are drawn from widely different organisations. Within this learning environment, participants can retreat from their usual responsibilities, undertake critical self-reflection, and have the opportunity to analyse strategic issues in police management, debate alternative solutions and develop professional networks, under the general guidance of an AIPM mentor.

Emphasis is given to highly interactive syndicate analysis of all major lecture presentations structured around experiential learning and inductive reasoning. Such analyses include real-life case studies, high-pressure briefing exercises, strategic leadership and command management simulation, public participation sessions, debating sessions, media workshops and role-playing scenarios.

AIPM programs are structured to encourage flexibility of thinking, initiative, innovation and personal responsibility for self-directed learning. Emphasis is also placed on the need to develop appropriate research and technical skills.

On completion of each program, participants receive a comprehensive assessment portfolio which provides a multidimensional personal profile and professional action plan.

HISTORY OF THE AIPM

The Australian Institute of Police Management is situated on the foreshores in Sydney Harbour National Park at North Head, Manly. It was originally part of the Quarantine Station and the buildings were used as crews' quarters. As it is in the case of ships, Crews' quarters were always well segregated from passengers and are always found in the lower levels of the ship. So it was only logical to set up the crew's quarters along the water front and beside Spring Cove, Collins Beach. The crew's supplies were also unloaded at the original dock in Spring Cove.

As the need for crew's quarters diminished, the buildings were utilised in other ways, such as for housing migrants with no other accommodation. The

buildings became part of the Commonwealth Department of Health in 1925 and during World War 11 were used as barracks by the Australian Army.

In 1957, the buildings were utilised by the Commonwealth Government for the purpose of establishing as Australian Police College for executive training of Commonwealth Police officers.

The Australian Police College was officially opened on 25 October 1960 by the Commonwealth Solicitor-General, the late Sir Kenneth Bailey, C.B.E. Between 1960 and the late 1970s, the College undertook a arrange of courses reflecting its joint Commonwealth in-house and national executive training roles.

The Australian Police College became the Australian Police Staff College by resolution of the Board of Control on 5 December, 1986 and was formally named by His Excellency the Right Honourable Sir Ninian Stephen, A.K.., G.C.M.G., G.C.V.O., K.B.E., Governor-General of the Commonwealth of Australia, at a ceremony held at the College on 18 June 1987.

Following a review of the College during 1994, it was decided that the name of the College should be changed to reflect its new role and direction in Australian Policing. On 22 March 1995 the Australian Police Staff College was officially renamed the Australian Institute of Police Management by the Minister for Justice, The Right Honourable Duncan Kerr, MP.

On 14 April 1992, an affiliation agreement was signed by Senator Michael Tate, the Federal Minister for Justice and Mr David Asimus, AO, Chancellor of Charles Sturt University, which established the Australian Graduate School of Police Management and offers courses via distant education mode.

Since 1960, more than 5,500 police have attended AIPM courses, including over 3,000 commissioned officers. Apart from Australia and New Zealand, course members have come from the United States, Indonesia, Malaysia, Papua New Guinea, the Pacific, South-East Asia and Africa.

LIBRARY

The AIPM Library is a specialist library servicing the unique information needs and requirements of the Australasian Police Services and related agencies.

The goal of the library is to support the philosophy and mission of the AIPM through sound management practices, quality service delivery and use of the latest technology.

The library shares and implements the AIPM's aims and objectives. The library is involved in the teaching and learning process, curriculum development and other educational aims and objectives of the Institute.

INTRODUCTION

When I agreed to write and present a paper at this conference, I began with the idea that I would speak about the AIPM and the information needs of senior police officers.

I began a search for studies on the information needs of police officers, but quickly discovered that there was very little information available, and as far as I could ascertain, nobody has studied the information needs of police officers. To conduct my own study and present the results would take a considerable amount of time, which I did not have. To do justice to such a research project could take more than a year. Nonetheless, a study of this nature would be very interesting.

Given the lack of research into the information needs of police officers it seemed appropriate to talk about the experiences I have had in educating Australasian Police officers in the use of libraries and developing their information literacy skills.

There has been a considerable amount written about the importance of Information Literacy since the mid 1980s. We are living in an age of information explosion and my basic research has shown that law enforcement officers are well prepared for explosions of many other kinds but not the information kind! This probably holds true for most people engaged in public safety occupations.

Sister Veronica Green, Director of School Libraries for the Catholic Education Office in 1987, stated that "we are witnessing the development of an information élite in our society. Those who know how to acquire and access information form that elite. Those who don't, slip quietly into the ranks of the poor in our society".

We must not run the risk of widening this gap between "information rich" and "information poor" in the emergency services environment. Learning what to do with data and information is a critical, indeed essential skill for our future ability to function and succeed in an information society. In the current environment where emergency services have undergone such enormous change and where promotion is no longer a matter of seniority but based on merit, the "information elite" are moving up the ranks at an incredible speed.

It is interesting to note that in 1998, more than ten years on; Information Literacy is still a topic high on the list for people in the education field. The AIPM has, for the past ten years, made considerable efforts to develop policing as a profession, and we have encouraged police officers to do research, write, and publish. As a Librarian, I have taken great pride in the fact that I have contributed to the development of policing as a profession.

Yet, until 1988, for example, course members of the Australian Police Staff College were not given instruction in using the library; they were just informed that it was there and they could use it if they wanted to. Lecturing staff spoon-fed course members and they were supplied with a "kit" which consisted of about five different readings relating to the topic. They were then instructed to do an assignment/essay on the topic. This type of kit is still used today for Distance Education modules, but at that time, distance education was not part of the College's curriculum or training methods. Course members were not encouraged to do their own research and as a consequence, the assignments were very mediocre and lacked imagination and creativity. The assignments were also very similar and the same views were continually aired. The kits were used constantly and were not regularly assessed to inject newer readings. There were a few innovative course members who did make use of the library and made some attempts to research beyond the readings provided, but without basic instruction in library skills, they too were disadvantaged.

Since the late 1970s, and more particularly, in the late 1980s, police officers have strengthened their desire and need for professionalisation. Professor Timothy Rohl, Executive Director of the AIPM stated in a paper on police professionalism –

> "The nature, role and practice of policing at all levels is being redefined to better meet the needs of a society which is itself undergoing significant transformation. Policing must become more professional if it is to provide the level and quality of service expected by an increasingly concerned, better educated and politically alert community. The challenges confronting policing as it prepares for the next decades are unprecedented. Policing is not pedestrian. The scope of police practice is no longer confined by geography, it has been extended by a greater intellectual appreciation of the needs of society".
>
> (Rohl, 1990:6)

This has meant that officers must now be much better educated than in the past. No longer can a person join the police services without a matriculation pass in the HSC or equivalent; senior police officers are not appointed without tertiary qualifications; and more recently, police jurisdictions have formed strategic alliances with various universities to achieve this learning objective. Persons joining police services today will be required to undergo at least one year's preparation at university, which will lead to a degree in policing. Without library and information literacy skills, the police service will be out of reach for many people, and for others already in the service, promotion will be severely constrained.

Moving to professional status also means that for the occupation to be recognised as a profession, they must combine their education and skills to build and develop a "body of knowledge". Building a "body of knowledge" requires research and writing. Without the necessary information literacy skills this "body of knowledge" cannot be built.

Developing information literacy amongst members of the emergency services and other related agencies is a challenge to both librarians and educators within that system. The teaching of information literacy should be coordinated by the library and its interests should be high on the priority list of academy/college support.

What is Information Literacy?

> "Information Literacy is the ability to recognise the need for information; to find, organise, evaluate and use such information for effective decision-making or problem solving and to apply these skills to independent lifelong Learning"
>
> (McKie, 1993)

> "Information Literacy involves the full range of skills - finding, collecting, defining, analysing and evaluating information...trying to give a precise definition of information literacy is like trying to swim through treacle"
>
> (Cheek J *et.al*, 1995).

Information Literacy and Information skills are broad in scope; they are part of the process concerned with meaning, understanding, knowing, doing, thinking, imagining, expressing and communicating. They underpin:-

- resource-based learning, an holistic approach which takes account of individual differences, particularly in rate and style of learning
- self-directed learning, in which students take control over and responsibility for their own learning
- lifelong learning, essential for an individual's effective management of personal, social and technological change.

As police officers and other allied organisations move towards professional status, librarians must be prepared to extend themselves beyond the internal environment of their profession and utilise all the skills they have acquired to assist in this education and professionalisation process. Although it is generally acknowledged that there are inequalities of education amongst emergency services there need not be inequalities in their ability to acquire and access information.

Demand for the College to raise the standard of the course content meant that new lecturing staff with special skills and qualifications were employed. The "new breed" of lecturing staff recognised the need for the course members to be more innovative and better informed before they could produce a better standard of assignment and at the end of the course to be better educated. This meant that course members would have to develop some basic research skills. After much discussion and badgering, the Librarian became part of the curriculum team. This greatly enhanced the library's impact as part of the academic/educational team.

As a better curriculum was developed it was decided that "kits" were no longer appropriate, and course members would be encouraged to "research" the topic they were given for assignment. The Librarian was to develop a program which would assist in the instruction of course members in the use of the library and how best to complete an assignment/essay.

Before courses begin, the library staff have a clear understanding about the course content, assignments to be completed by course members, and the program for the duration of the course. With this knowledge, library staff are able to ensure that resources are available and they have an understanding of where they can be of greater assistance.

Library staff are encouraged to observe the various class sessions presented by both AIPM lecturers and visiting guest lecturers. This further enhances the library staff's ability to understand course content and how it fits within the objectives of the course and content of assignments.

Initially AIPM courses were entirely residential and were conducted over a period of eight weeks. This has since changed considerably; they were first dropped to six weeks and are now conducted for a period of four weeks. The program was developed to include three library sessions of instruction. Two sessions in the first week of the program and another at the end of week three, before course members began their final strategic planning exercise based on operational problems.

For on-campus students, research skills are usually developed by specially designed information searching components often taught jointly by librarians and faculty in their library's reader education program. At the AIPM we follow this model. The librarians are involved in curriculum planning, program planning and teaching the skills required by our course members to achieve the graduate awards. In the first week of the residential component emphasis is placed on the need to develop appropriate research and technical skills. This ensures that course members will have the skills to use the library effectively to research and complete two major assignments, one of which is the development of a corporate initiative strategy. Each participant undertakes an action-research project that incorporates critical problem analysis and the development of innovative ways of addressing key challenges in corporate policy and performance.

Unfortunately, off-campus students rarely benefit in this way. They miss out on orientation programs, which impart even such basic library survival skills as using catalogues, reference books and bibliographies.

In 1988 we began our library skills program in the following way:

The first session was an **Introduction to the Library**. On completion of **session one,** course participants were able to:-

- Find books and journals on the shelves
- Use the OPAC terminals to locate and retrieve information in the library
- Know who the library staff are and what services are available
- Use the PC and CD-Rom to locate and retrieve information
- How to borrow and return library resources
- How to use journals, indexes and abstracts for locating and using information
- How to develop a search strategy to begin research
- Understand the principles of information skills
- Identify uses of information skills
- Understand their basic copyright responsibilities in relation to research and use in education
- Find all equipment they may need to use. E.g. photocopiers, television, VCR, radio cassette player etc.

Yes, session one was very basic but nonetheless important. The course participants, in some cases, had reached the rank of Assistant Commissioner without ever having been inside a library. They also joined the service at a time when the education requirements were very minimal and libraries were not an integral part of the school system.

Session two: Beginning Research. On completion of this session the course participants were able to:

- Analyse their information need
- Identify main concepts and ideas
- Identify and define keywords
- formulate a specific search strategy
- develop a search plan
- identify non-library resources
- use different types of indexes
- use a catalogue
- identify and describe fact finding tools
- Use periodical indexes and abstracts
- Locate data within resources
- Access usefulness and relevance of data

- Record sources of data
- Understand steps involved in processing information
- Apply information skills to learning strategies

Session three: Other sources of information. This session introduced course participants to a wider field of information. On completion of this session participants were able to:-

- Understand the benefits of online searching of external databases
- Have a knowledge of how much information is available and how easy it is to access. And use this information for specific needs.

The main **objectives** of teaching these skills were as follows:

- To identify and define the skills needed to access and use information
- To access and retrieve course-relevant information To using library sources and resources
- To recognise the value of being able to access information from a variety of sources
- To become familiar with the role of the library in relation to the range of information sources available
- To explain ways of incorporating information skills into learning strategies

Since 1988 the library sessions have been continually evaluated and changed in order to meet the needs of the curriculum and course participants. The course participants of today are better informed and better educated, thus resulting in a decreasing need for very basic library instruction. Whilst there have been considerable changes to the program our objectives have remained the same.

The sessions are now broken into four parts:

1. **Introduction to the library**. This involves basic information such as, where to find resources, how to use the photocopier, how to borrow, the kinds of services available, inter-library loans, using the fax etc.
2. **How to use the Library** Catalogue, Internet, CD-Roms, Reuters Newswire Online, using abstracts and indexes.
3. **Beginning research**: This involves the art of skimming, notetaking, referencing, bibliographies, developing keywords and thinking skills
4. **Problem analysis**: This involves defining the problem, synthesizing what the literature uncovers and then how to seek a solution

In the new approach to teaching library skills:

Session One now includes much of the old session three because of the advent of, and access to, the Internet. **Session Two** has become an integral

part of the problem-solving session provided in the classroom with lecturing staff taking part in that process. We still have the odd participant who needs to be taken right back to basics and when those participants are identified they are given personal attention.

How successful have these sessions been? We have lots of anecdotal evidence that our course participants leave the AIPM with a greater knowledge and understanding of the role of the library. The standard of assignments submitted for assessment have significantly improved to a level not imagined a few years ago. Whilst the library cannot take full credit for this new very high standard of assignment presented, it can be sure that it has played a very large role in raising standard. Course participants conduct very broad literature searches and are much more innovative in their views and analysis. Our recent accreditation as a tertiary education provider was due in some part to the fact that the AIPM has a well-resourced library and that the skills are taught to use this resource effectively.

As stated earlier, the residential component of the course has now been reduced to four weeks. Overall though, the courses have increased in length. Course participants now take part in a Distance Education Module of twelve weeks prior to the residential, thus making the course sixteen weeks long. During this twelve week period participants must submit two assignments based on the Self-Directed Learning readings and bring with them to the residential another completed assignment to present orally on Day Two of the residential.

With the advent of a distance education mode the library staff had to devise another method of teaching some basic research and learning skills in order for the participants to write a high standard assignment. We put together four booklets, which are sent out to each course participant with the required readings. These booklets consist of:--

1. **Self-Directed Learning Guidelines**
   This booklet contains information that will assist course participants to manage time; planning; developing reading strategies; note taking; how best to write the paper; and developing self-evaluating criteria. It is anticipated that information provided in the booklet will make a participant feel more confident about writing assignments.
2. **Research Guidelines**
   This booklet provides information to assist in developing a strategy for researching a topic

3. **The Library & Information Resource Centre**
   This booklet is designed to assist in using other libraries as well as the AIPM library. It contains information on using OPACS, developing keywords to search and general information about shelf location numbers (e.g. Dewey). It also provides information about our services and how to contact us should they require any assistance.
4. **Referencing**
   This booklet is a guide designed to help participants to reference their work clearly and accurately in order to meet academic conventions.

The booklets are sent out as a ***"Self-Directed Learning Kit"*** in which we provide additional information in the folder. This includes: A pathfinder to guide users to find management information; library pamphlet; business cards, and any other relevant information that may be available at the time of sending out. These Self-Directed Learning Kits are sent out with the first module of readings.

It is assumed that apart from the readings provided, course participants will seek out additional reading by using other libraries within their living areas. There are some participants who will not have easy access to a library, and in this case they are encouraged to contact our library for assistance.

The teaching of information literacy should be coordinated by the library and in its interests should be high on the priority list of academy/college support. As Librarians in the Emergency Management arena we are providers of information to this community and we are also partners in the process of helping public safety officers and related workers to become self-directed, life-long users of information.

The staff responsible for library and information services should provide the link between learners and information resources by enabling them to find and effectively use the resources they need. They should also ensure that these services help organisation achieve its educational program aims.

Librarians have the specialist skills to teach information literacy and it is an opportunity to confirm their role in the education process, and within the organisation. As Emergency Services move closer to being a profession, the unique skills of librarians will be in greater demand because of their skills. Interestingly, research literature has indicated that only about one professional in six is "information literate".

Professional status for public safety officers will provide a more meaningful career path. This will create a higher demand for information literacy and, in time, a higher demand for library and information services. Programs are needed which will equip our officers anywhere at any time to use any library and conduct research no matter how basic that research is. We must prepare ourselves to meet those demands.

The teaching of information skills should be a whole program embedded in the overall education program at police academies, emergency services academies, and colleges.

Librarians in these institutions can contribute in the following ways:

- participating in the planning and implementation of the academy's/college's total curriculum, particularly by advising on the use of resources
- selecting (with the involvement of lecturers), acquiring, organising and operating a collection of resources and services appropriate to meet the needs of students
- cooperating with lecturing staff in the planning, teaching and evaluation of units of work
- negotiating with lecturers to determine what will be covered for particular groups of students
- teaching the skills as mutually agreed upon
- giving incidental, follow-up support and reinforcement to individual library users

(Adapted from Lundin, 1983:12)

All universities and colleges recognise that it is one of their fundamental responsibilities to produce graduates able to use libraries and information resources effectively. It is essential that they be able to find information for themselves in their particular disciplines, and to keep themselves up-to-date with information and literature in their special fields throughout their professional lives.

At the AIPM we are constantly assessing and evaluating our programs' content and delivery, to encourage and develop Information Literacy and Skills. In the future we would like to develop a video that could be distributed to participants. Many universities do use video for teaching information skills and indications are that this is very successful. As our participants become more computer literate and have greater access to electronic mail and the Internet we may be able to produce a program that could be delivered in this format. Video conferencing may also be an option in the future. Eventually our programs may need only be refresher sessions to get them started back into study. Whatever the situation, there will always be some need for teaching information skills.

INFORMATION SKILLS FOR MANAGERS

Aside from academic reasons for teaching and developing information literacy, today's world requires that managers must be competent in gathering and using information. It is also generally acknowledged that research and technological skills are considered essential requirements for senior managers.

Today's high level public safety executive has information needs extending far beyond immediate public safety interests, and so must be well read on a wide variety of current topics. Public Safety executives find themselves very much in the political arena and must be prepared for battles that are seemingly unrelated to their profession.

> "The successful manager of the future must be 'well informed'. He/She will need the facility to learn rapidly what sources of information are available within his/her field. Every individual manager must learn to exploit to the full those information services and sources that are required to help him/her achieve his/her aims and objectives. Like the other resources at his/her disposal, his/her success will come or not come from the effectiveness with which he/she can use them"
>
> (Norton & Peel, 1989:44).

The AIPM, as the name implies, is in the business of developing and educating police officers for executive management. There is a need for all police and other public safety officers at all levels to become better managers. Unarguably this is also the case for emergency services managers.

Norton and Peel made the following statement about management and information:

> "the role of information within management is in a state of dramatic transformation. Managers must grasp and act on the implications of this change if they are to maintain their competitive position both corporately and as individuals. Individual managers, whatever their function, must learn to take full advantage of the information resources available to them, and to do so continuously as part of their management techniques. Organizations must develop an information strategy and corporate structure, which ensures the fullest use of internal and external resources. The position of the librarian within this overall task remains well-placed, although his/her relevance and role remain very much a question for his/her own initiative".
>
> (Norton & Peel, 1989:2)

Although Norton and Peel made this statement in 1989, nothing has changed; the statement is still very valid. As Norton and Peel suggest, it is very much upon us as to how we use our initiative and seek to remain well placed within the organization. What can we do to improve our services to our users and provide relevant information to help emergency services officers to become effective managers?

A training program can be designed and implemented to educate departmental heads in the use of data and information as a tool for planning and management. In this way a manager's productivity will be increased through the information system. Future managers need to learn about the availability of many of the sources of information, and they must seek not only to be computer literate but information literate.

Information needed by executives differs from that required by the "operational people". It must be less detailed but wider in scope, with more emphasis on present and future developments, and gives an analysis that may indicate areas where results and processes are deficient.

Whilst the effective use of internally generated information is very important to the success of any manager, success also depends on the manager's individual ability "to know what is outside", and to be able to acquire intelligence about emergency agencies internationally, corporate bodies, trends and initiatives, and methods and techniques which will enable him/her to develop strategies for growth, flexibility and efficiency.

One way emergency services managers can become more effective is to take advantage of the available information technology. The literature on information technology suggests that managers and executives are reluctant users of electronic information sources.

> "information is what drives a company, and our ability to obtain and analyse information is what will determine the future of the company"
>
> (Denis Rediker, Director of Strategy & Planning at the Mead Corporation).

I think Denis Rediker is correct and his statement is certainly relevant to emergency service organisations. The technology used, and skills and information needed in today's environment for emergency safety professionals will require strong information literacy.

CONCLUSION:

There is no doubt in my mind that Librarians and Information Managers in Public Safety organisations will be in greater demand as these organisations move closer to professional status.

The new educational reality is a scenario filled with challenges. Strategic plans must be developed if librarians are to begin to shape and participate in what is happening

As the educational sectors of public safety organisations realise the need to develop members' understanding of the power which information literacy delivers, and how vital it is to professional development; as management grasps the implications of the information industry; and as education and training begins to incorporate information skills in their programs, it will be expected that librarians and Information Managers be ready and prepared to help develop the policies which will ensure that all public safety professionals are information literate.

Librarians and Information Managers must now begin to create a new image for themselves; the traditional image is no longer applicable to the information society of the late 1990's and the 21st century. We must look beyond our traditional routines and techniques; beyond the processes of acquiring, storing and retrieving. We must adopt a willingness to demonstrate versatility and a readiness to adapt. We must develop proactive behaviours that involve creating direction, anticipating problems and planning for the future.

For information policies to be developed and implemented throughout public safety organisations, it is essential that cooperation exists between the various agencies. This conference could become an ideal vehicle for the promotion and development of an information policy, which will identify the information skills, required by public safety professionals. Such a policy must also include activities such as resource sharing, networking, and the teaching of information skills. We must plan now to meet the information needs of today's members of public safety organisations if we aim to ensure that public safety officers of tomorrow and the 21st century are information literate.

Libraries are places for empowering people, so by definition, librarians are in the business of empowerment. This is a complex issue because it is basically about facilitating people to be all they can be, which includes allowing them to make mistakes.

To remain alert and satisfied, individuals need to keep learning. Librarians have a professional obligation to be involved in continuing education; they

have an obligation to instruct users on how to manage and access information.

I leave you with this joint statement by the Colorado Department of Education, State Library and Adult Education Office, and the Colorado Educational Media Association.

> "Information literate people are competent, independent learners. They know their information needs and actively engage in the world of ideas. They display confidence in their ability to solve problems and know what is relevant information. They manage technology tools to access information and to communicate. They operate comfortably in situations where there are multiple answers, as well as those with no answers. They hold high standards for their work and create quality products. Information literate people are flexible, can adapt to change, and are able to function independently and in groups" (1994).

REFERENCES

Cheek, J. et al (1995). *Finding Out: Information Literacy for the 21st Century*, University of South Australia: Adelaide.

Colorado Department of Education. State Library and Adult Education Office. Colorado Educational Media Association. (1994). *Model Information Literacy Guidelines*. Denver, CO.

Lundin, R. (1987). cited in Information Skills in Schools, J. Kirk. *Australian Library Journal*, **36**(2):87.

McKie, A. (1993). *Information Literacy Within the University of South Australia: A Report*. Unpublished.

Rediker, D. (1988). Cited in Online Information: The Key to Effective Management, B. Norton & A Haddon. *Management Education and Development*, **19**(2):114.

Norton B. & **Peel**, M. (1989). Information: The Key to Effective Management. *Library Management*, **10**(2/3):2,44.

Rohl, T. (1990). *Moving to a Professional Status*. Address by Timothy Rohl, Director, Australian Institute of Police Management to the National Seminar "Restructuring the Police – An Occupation in Transition". Melbourne, 13-14 February. Unpublished.

MARGARET DAVSON

Margaret Davson joined the Australian Institute of Police Management in March 1987. Margaret has worked in a number of educational, research and special libraries prior to her employment at the AIPM. Margaret has a special interest in information literacy and the teaching of library and information skills. Some of Margaret's achievements include:

- the development of Self-Directed Learning booklets
- Being an active member of the curriculum development process at the Institute.
- National Police Assessment Centres both as an approved assessor and in the marking of written papers for the assessment centres.
- A full active member on Library Review Committees for Queensland, New South Wales and the Australian Federal Police Services.
- Participation in, and assisting in, the preparation and coordinating of special Critical Issues Seminars
- Provided a consultancy service to individual police patrols and sections

Margaret has a Bachelor of Arts from the University of Technology, Sydney. Margaret has also studied Political Science, Sociology and Social Psychology. She is a member of several networks including, ALIES, PLANZ and the NSW Training Libraries Network.

Paper 18

A customer-defined library service for emergency services personnel

Jill Don, Department of Emergency Services, Queensland

A customer-defined library service for emergency services personnel

Jill Don, *Department of Emergency Services, Queensland, Australia*

In the years since its inception in 1991, the Department of Emergency Services Library had operated on staff perceptions of organisational needs, guided by the demand from individual customers. The major customer groups (Fire, Ambulance and Disaster Management) provided no strategic direction, nor did they ever question the suitability of the 1991 concept of information provision.

The impending change to operation on commercial principles, guided by service level agreements, was seen as a time to assess services and resources. It also provided an opportunity to educate client groups and management on the nature and cost of present services.

A review in 1997 examined customer expectations and requirements, alternative ways of satisfying these demands, and better ways of utilising the limited staff resources.

Changes in technology, and attitudes towards information use and retrieval have been dramatic in recent years. The review revealed a clientele well aware of these changes, with practical ideas on their implementation within the Department. Several plans were developed, and actions identified. Some items were for immediate investigation or implementation. Others had a 3 to 5 year time-frame.

The implementation of improvements will of course depend on the nature of the changes facing the Department and the Library. Even the best ideas cannot be implemented if the money or the infrastructure cannot support them.

Background

The formation of the Bureau of Emergency Services in 1991 brought together disparate emergency services groups as a single government entity. Several name changes and administrative reorganisations over the years culminated in the formation of the present Queensland Department of Emergency Services (DES), consisting of the Queensland Fire and Rescue Authority, the Queensland Ambulance Service, and an Emergency Services Division responsible for disaster management and chemical hazards. These are supported by planning and support services. The Department's staff totals 6000, excluding honorary Ambulance officers and volunteers.

Library services are provided by the one full-time and two part-time staff. The Library's aim is to provide support for work-related requirements. Requests come from research ,operational and administrative personnel.

Queensland has an area of 1,727,000 square kilometres. Some of the towns and cities served by these personnel are centres with tertiary institutions and good library facilities. Other towns may have a population below 700, with no public library, and a long drive to any sort of library. The Ambulance officer may be the only medical person in thousands of square kilometres. Personnel in these centres rely on a responsive, efficient Departmental library for information on all facets of their work and career development.

Communications infrastructure varies throughout the state. All personnel can be reached by telephone, fax and mail. Only the major regional centres are on the Departmental network with its email facilities. Only one section accesses the Library's catalogue (via a government computer centre link). CD-ROM products can be accessed only on a stand-alone PC in the Library. There is no Intranet, and Internet access is restricted. This is disappointing, and limits the way the Library can provide service. However, given the size of the state, the spread of sites, and the costs of network infrastructure, universal networking is something we can only look forward to.

Why review the Library?

Comment from clients has always been positive. The 1993 Public Sector Management Commission review (1) and the Department's own Regional Information Needs Survey of 1994 (2) supported this attitude. The 1995 Queensland Fire Service - Survey of Information Use (3) reinforced it.

Why review the Library when the customers' comments reflect satisfaction and a job well done? If people complain, there is usually a starting point for investigation and improvement. A positive climate rarely indicates things which could be done differently or better. However satisfaction is hazardous in that it can mask a need to evaluate and assess in the light of change.

1. Change means change

The Department's different Divisions were turning to a business approach. Technological change offers new sources of , and delivery options for, information. Attitudes change - the Internet is seen as the universal provider; clients expect rapid delivery; information users are willing and able to do more for themselves and expect an infrastructure to facilitate this. The Department is moving to a suburban location in mid-1998 - a long way from the State Library, tertiary libraries, and the government special libraries which supplement Departmental information resources.

2. Involvement is essential

Customers should have a say in the services provided and the manner of their delivery. Attempts over many years to obtain strategic direction from the various Divisions never succeeded. As Library services were provided centrally by administrative or support services units, ownership was not clearly defined. Without a sense of ownership, no relationship between the Library's direction and client group aims was established. The unit which administers the Library is not a user of its services. Collection development and service direction developed around the requirements of regular customers.

In addition, each Division saw only its own needs, not the demands of others. It was proving difficult for the Library staff to respond effectively to varied expectations.

3. Staff resources are limited

The ratio of staff to customers was 1:3013. In order to maintain a reasonable and suitable level of service, demand had to be managed. Marketing was never considered. The client base and the services were restricted. For any increase in demand on staff time, there would need to be rationalisation somewhere.

4. The varied interests and needs have to be identified and acknowledged

To address distinctly different subject areas is time-consuming. The major interests of clients could be designated as chemical hazards, fire, prehospital care, disaster management, and management/personnel. Some have a rich electronic and paper information resource to call on. Others such as fire and chemical hazards are spread through many locations, or are not addressed in commercial sources.

The information requirements of Ambulance officers usually centre on their training. For fire fighters, the requirement is usually operational and immediate. Personnel in remote towns require greater assistance in obtaining information than those in cities with several tertiary libraries.

These differences impose additional demands on Library staff in terms of their own knowledge, and the organisation of tasks.

5. A library cannot exist and develop in isolation

Knowledge and understanding of the services offered, the opportunity costs, and the intricate network of activities which underpin a library service were not understood outside the Library itself. Any host organisation must understand these activities if it is to make an educated decision to support its library's existence.

The burden of monitoring technological development and maintaining effective operations fell on the Library. It is important for a library, or any unit, to move with its host organisation. Its host must understand its activities.

6. An agreed role, clientele and level of service reduces uncertainty and forces a focus on business.

There was an expectation from some quarters, both within and without the Department, of universal service, particularly for tertiary studies. Where no-one provided a particular service or facility, there was the anticipation that perhaps the Library could take it up.

The review

An external consultant handled the review.

This gave us the benefit of wide experience to draw on. An external person would be seen as impartial and able to view the DES Library in the context of other libraries. They would also be able to focus on the task, without the distractions of day-to-day activities. Better still, the consultant prepares the report!

Both clients and Library staff contributed to the review.

Library staff identified time- and cost-saving practices, what they saw as significant differences between client groups, and how the groups could be better served. For each client group, or service, staff recommended expansion, cut-backs, or maintenance of the status quo.

Clients contributed in several ways - by focus group discussion plus questionnaire, or questionnaire only. The focus groups, one for each Division, brought people together for a two-hour discussion. A phone-in time was provided for questionnaire-only persons who might wish to expand on their ideas. Participation was by invitation to ensure fair representation of all sectors - training, research and operational. All participants received a paper outlining the Library's present services, and potential services (Appendix 1).

Focus groups were designed to be informal exchanges, and proved to be an excellent way of obtaining ideas. The sessions consisted of two parts - a structured time and a visionary time. During the structured time people addressed the particular services provided. This was educational for the participants in that those who used only a narrow range saw the potential of other services. They also saw how their colleagues were using information and the Library's services. The process identified what people valued, and yielded practical ideas on how to improve, - what was good, what was lacking. The visionary segment - less controllable - was enlightening. No limit was placed on money or technology. The wish-list revealed a technologically-literate client group with sound practical ideas on improving their access to information. They were supportive and appreciative of the Library's services, and aware of the limitations placed by the available staff time. The value of the focus groups was that one person's ideas and imagination fuelled someone else's, and pie-in-the-sky ideas were quickly shaped into something workable.

Questionnaires provided a statistical basis for claims and actions. To some extent the questionnaire replicated the structured segment of focus group discussions, but the output was not as informative. For people in county areas, the questionnaire was the main means of contributing. Often, the return did not reflect the excellent ideas the participant had expressed in preliminary discussions. Nevertheless, the questionnaire was valid, in that there was similarity in responses across the Department, and congruence with the comments from the focus groups.

The comments

So what do the clients like?

The quality of the collection was regarded as good. The loans and copy services, and the provision of inter-library loans were popular. The structure and content of the publications was praised, but more detail required by some. Those who benefited from the advisory and referral service regarded it as helpful. Training in information and library usage was regarded as useful.

And what do they want?

Some suggested changes were:

- putting more detail in the annotations to books and journal article records
- distributing the Library's catalogue, and publications on CD-ROM or email
- putting resource guides on popular subjects on the proposed QFRA WAN
- centralising the entire Department's video collections. Collect locally-held video clips for wider distribution
- including information on the Library in each induction course, and offering in-depth training related to research and Internet use
- more publicity
- better visitor facilities

- faster response on loans
- better distribution mechanisms for publications (by email, or the appointment of an officer in stations to ensure it was available to all)
- more subject bibliographies
- increased frequency of Library bulletin
- an alteration to opening hours to accommodate shift workers

Some suggested additions were:

- supporting study-related information requests (i.e. interlibrary loans)
- extending service to non-Departmental groups through the stations
- establishing station liaison persons for better distribution of Library materials
- developing an Intranet bulletin board
- upgrading search services (specifically the Library software)
- collating and organising the fire and hazmat reports, and encouraging report writing
- working more closely with training departments
- networked CD-ROMs and Library catalogue; desktop access to these
- provision of in-depth research service
- journal circulation
- corporate subscriptions to current awareness services and commercial Net sites
- development of newsgroups and chatrooms
- provision of interactive CD-ROMs, and additional full-text or bibliographic (occupational health, legislation)
- provision of Library catalogue on a private member-only Net site
- a "mobile" library
- handling the archiving of Departmental publications
- a union catalogue of the Department's information resources
- a closer working relationship with different specialist groups

Many participants said they would consider additional funding to obtain the addition of desired services. People were also happy with the present staff specialisations (a particular professional handles all enquiries, cataloguing and purchasing for a particular group of clients e.g. Fire or Disaster Management).

And what did the Library staff want?

- heavy Interlibrary loans users to establish own document supply accounts
- an extension of information technology to facilitate information provision, especially more extensive use by Ambulance officers of the rich store of information on the Internet
- strategic direction from the various Divisions
- a statement of role, clientele and level of service expectations
- an immediate action plan, and strategies for the next couple of years
- a recognition that clientele and level of service were restricted in order to manage demand

The plans (main features)

Plan 1 - immediate implementation

- establish a Library Advisory committee; improve contact with regions and stations
- alter Library work practices and systems (reallocation of duties; alteration to schedules)
- investigate efficiencies and improvements with regard to Library publications

- reduce indexing and collecting in certain subject areas; adopt J I T approach instead
- continue to restrict clientele and services to staff-defined incidences
- aim to be included in all introductory tours and induction training
- increase use of current awareness service, but limit to electronic distribution
- investigate the new services requested by clients, in terms of cost, efficiency and practicability

Plan 2 - implementation after the Department's mid-year move to suburban location

- establish a central reception point for phone and personal enquiries
- re-examine Library work practices and systems
- commence investigation of upgrade to Library software
- investigate training in research and information literacy, particularly for Ambulance officers
- investigate service issues with regard to clients in remote areas
- investigate use of one Division's WAN for publications distribution

Plan 3 - the next 3 to 5 years

- replace Library software
- investigate CD-ROM distribution of Library catalogue if necessary
- assess Library staffing
- establish procedures for clients to obtain documents through direct delivery

In conclusion

The clients' vision was realistic, but sometimes well in advance of the Library's situation. Certain ideas are well down on the Department's priority list, or simply regarded as impossible within the present network infrastructure.

Clients reaffirmed satisfaction with, and support for, the Library. They presented practical solutions to perceived shortcomings. Through alterations to work practices, Library staff will be able to accommodate some changes. Other changes can be implemented through the newly-formed Library Advisory Committee. Some things will require a complete change of attitude, especially if they require a shift in financial responsibility.

The value of the review is that it required several parties to be involved. Clients examined their usage and requirements. Library staff examined their work practices, and explained the basis for operational and policy decisions. Management were provided with a detailed statement of the reality and the dream. Immediate, intermediate and long-term statements of action have been prepared.

The review highlighted what clients and Library staff saw as good and bad - and the two did not always coincide. We can work towards a line of best fit.

References

1. Queensland. Public Sector Management Commission, **1993 Review of the Bureau of Emergency Services 1993.** The Commission, Brisbane

2. Queensland. Dept of Emergency Services, 1994, **Regional Information Needs Survey** (unpublished)

3. Don, Jill, 1995, **Queensland Fire Service - survey of information use** (unpublished)

Appendix 1 - Current services and potential services

Current services

Some of these, such as database development, or networking, might not be regarded as "services". However, they are an activity carried out for the benefit of clients. Clients receive direct benefit, even though they have not asked for the basic activity.

Interlibrary loans (procedures and costs)
Photocopying
Information requests (procedures and sources)
Database development (description of indexing activity and rationale)
Publications (accessions lists, video catalogues, subject guides)
Current awareness (formal and informal; procedures)
Networking (rationale and contacts)
Provision of centralised collection
Advisory service (such as document management, Internet matters, copyright)
Referrals
Training

Potential services

These are services people ask for, expect, or hint that we ought to take up. There are some that the Library staff would like to be able to offer. Inclusion does not mean that it is an accepted activity. Each was described. Advantages and disadvantages were stated.

Journal circulation
Desktop access to Library catalogue and CD-ROMs
Internet training
Service to the public
Interlibrary loans to DES staff for private study
Purchasing service
Archiving of Departmental publications, photos and video footage
Indepth research
Management of off-site collections
Maintenance of comprehensive collection of Queensland legislation
Internet messaging service
Support for an Internet user group

Biographical details

Jill Don established the Department of Emergency Services Library in 1991. She holds a degree in Asian Studies from the Australian National University, and a Graduate Diploma in Library Science from the Queensland University of Technology. Jill has worked principally in special libraries (Queensland Main Roads Department and Telecom Australia) and at the University of Central Queensland. In 1998 she is on leave, painting, running, renovating, and catching up on friends, family and sleep.

Paper 19

Preservation and Restoration of Library Collections from Fire

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PRESERVATION AND RESTORATION OF LIBRARY COLLECTIONS FROM FIRE

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ABSTRACT

One of the roles of library managers is to preserve and protect the library's collection from natural and unnatural disasters. Statistics are presented to illustrate recent library fires in the United States, followed by a description of early fire tests for libraries which provided library managers with a knowledge base for fire protection decisions for their collections. A discussion of fire protection for collections housed in compact mobile shelving is included as well as protecting rare book collections. The final discussion addresses creating evacuation and salvage plans.

INTRODUCTION

From the beginning of recorded history library collections have been subject to fires, either accidental or intentional. Sprinklers were introduced in the 1960s and installed in some large public and university libraries. Rare book collections require a somewhat different approach to fire protection because of water damage. Compact mobile shelving may present other fire protection challenges.

LIBRARY STATISTICS

The earliest recorded large library fire (over 700,000 works) can be traced to Alexandria, Egypt (48 B.C.). Large loss fires are still experienced; for example the $8 million Los Angeles Central Library fire, 29 April 1986.[1] These large loss fires gained a lot of media attention. However, there are many more smaller, less publicized library fires. A look at the U.S. Fire Administration statistics on recent library fires in the United States provide an understanding of the current situation.[2]

Table 1. Fires in United States Libraries, 1991-1995.

Year	Total Number of Fires	Sprinklers Not Present	Sprinklers Present	Estimated Loss (U.S. $1000)
1991	91	46	45	68
1992	80	43	37	1,300
1993	65	33	32	1,400
1994	69	34	35	97
1995	66	35	31	658

The number of library fires has decreased from 1991 through 1995. Using NFIRS (National Fire Incident Reporting System) data, John Hall estimated a 61 percent reduction in the average loss per fire due to automatic suppression equipment over this period for stand-alone libraries and from one-half to two-thirds reduction for all other libraries when automatic suppression equipment was present.[3]

LIBRARY FIRE TESTS

Is fire still a threat to libraries? The answer is "yes." One means to respond to the fire threat in libraries is to install automatic sprinkler systems. Thus, their effectiveness is an important consideration. One of the first documented fire tests of effectiveness of sprinklers in libraries was done for the New York City Public Library after two large library fires raised concern amongst insurance companies.[4] In 1950 the Factory Mutual Insurance Corporation in Norwood, MA, conducted two library fire tests. The assembly was built with four tiers of open shelves, nine meters high, and loaded with books. The first fire test was conducted with sprinklers. It took three minutes and 43 seconds for the first sprinkler to activate and another four minutes, 48 seconds before the fire was under control by a total of two sprinklers operating. A total of 350 liters of water were used. For comparison, a second fire test was conducted without sprinklers. It took nine minutes for the fire to reach the fourth tier, 7.3 meters above the floor. It took firefighters a total of 20 minutes and 10,600 liters of water to bring the fire under control and it smoldered for hours. Librarians who saw the tests were not convinced of the overall effectiveness of sprinklers because of the water damage to the books and non-print materials. They had the American Library Association (ALA) study the problem further. In 1963 ALA made their recommendations available but there was no endorsement for automatic sprinklers; the report "... was a good guide to various aspects of construction and other forms of protection for libraries."[5]

UNIQUE LIBRARY COLLECTION PROBLEMS

Over the past few decades new fire protection challenges have emerged. These include the use of compact mobile shelving and the conflict between ceiling height and sprinkler spacing. In addition, another major challenge is how to best protect rare book collections.

An example of the National Archives/Library of Canada's situation is instructive. A new sprinkler system installation was planned to protect compact mobile shelving located three levels below ground. The challenge was to provide an acceptable level of safety without losing any shelving space due to an existing low ceiling. Lougheed et al.[6] stated that the recommended distance from the top of the sprinkler deflector to the top of the storage is 457 mm; the library had only 178 mm. Losing a lot of storage space was an option, albeit an unacceptable one. It was agreed that a series of fire tests would be conducted to determine how to achieve an acceptable level of fire safety and minimum loss of storage capacity. By instituting the recommendations (vertical fire barriers, a minimum of 26 mm clearance between storage containers, no newspapers stored in open document boxes), the library was able to satisfy their fire safety objectives using horizontal sidewall sprinklers with a high spray density. The fire safety goals were able to be met without changing the 178 mm clearance from the top of the document boxes to the ceiling.

Water typically is not used for protection of rare book collections. Stains from water striking centuries-old vellum or parchment may not be easy to remove. Bindings deteriorate from

water damage too. Delicate inks in many colors may be damaged by water and not possible to restore. For a while it appeared that Halon 1301, a gaseous agent, was the fire suppression agent of choice. However, with advanced scientific evidence that halon was environmentally damaging, many people are asking whether or not existing halon systems should be removed. The Artim[7] and Roberts[8] articles provide some practical suggestions, as well as insight into the economics, of converting from a Halon 1301 system to one of the new environmentally friendly fire suppression systems.

PLANNING FOR EVACUATION AND SALVAGE

Preplanning to ensure safe evacuation of the patrons and staff in the library is essential. Guidelines outlined in the National Fire Protection Association's NFPA 910[9] and unpublished library plans are informative. The librarian and/or the library committee working with the fire department can draw up evacuation plans for their specific environment. After the evacuation procedure has been reviewed, and approval given by the fire department, the task of evaluating the books, journals, reports., etc. to be salvaged from water and/or fire damage should be made by designated library staff to expedite the salvage process and recover as much as possible.

EVACUATION PLANS

The following examples are extracted from NFPA 910, World Wide Web sites, and the unpublished library plans.

The size and complexity of the library spaces are important considerations in developing a plan. A one room library with one staff person, no automatic sprinkler system, two exits, and no alarm system will have a simple plan. It may resemble the following:

- Call the fire department (e.g., 911);
- make a voice announcement to evacuate the building;
- check the stack area(s) for patrons;
- close the library door after the last person;
- notify other building occupants if the fire department has not yet arrived.

If the library has multiple floors in one or more buildings, it is necessary to develop a detailed plan. The University of California, Berkeley has a very detailed plan available on the World Wide Web.[10] A committee composed of the representatives from the library staff, security, and the Berkeley facilities group provided good university representation to the committee developing guidelines. As the libraries are staffed solely by student assistants in the evenings and weekends, there is a greater need for detail due to the ephemeral nature of student employment. A yearly fire drill as part of the evacuation plan is a good way to review the feasibility of the evacuation plan.

It would be excellent if all libraries conducted fire drills, but the amount of preplanning with the local fire department and library staff, and the cost thereof is often a deterrent. Conversely, the fire department may provide onsite training for the staff, e.g., how to use water fire extinguishers, Class ABC fire extinguishers.

As noted above, the following examples are extracted from NFPA 910, World Wide Web sites, and unpublished library plans.

A. If the alarm goes off in the building:

- identify the exit(s) the staff and patrons should use;
- make the announcement to evacuate;
- leave all equipment "as is";
- do not re-enter the building until approval has been given to do so by the fire department.

B. If the alarm goes off in another building:

- do not give the announcement to evacuate;
- send staff to pre-determined points of control;
- follow instructions of fire department personnel.

Other management decisions to be made may be how to secure the Rare Books Room. If there is a rare books room, should this area be on the same key as the rest of the library? For security purposes should this room have its own fire suppression system? If not, what will the library policy state in the event of a fire? The more guidelines that can be provided, the easier it will be for the staff to perform their tasks during an emergency. Staff should review the plans periodically to ensure ease of usage and understanding of individual responsibilities.

SALVAGE PLANS

A potential scenario is a small fire in one of the stacks. One sprinkler head extinguished the fire within five minutes; that is, the fire department was alerted but when they arrived the fire was extinguished. What is the damage? What are the guidelines for establishing the priorities of what will be salvaged? Newer technologies have been useful preserving documents from water damage. For example, freeze drying was first used in the Temple University Library fire as a way of salvaging water-damaged collections.[11] Some items to consider: preserving the bibliographic records of the collection (e.g., shelf list, card catalog, magnetic tapes); what are the priority items in the collection; items that should not be frozen (e.g., microforms, photographs); items that should not be air-dried (glossy, coated paper or water soluble inks). The priority items should be marked on the library floor plan to assist the workers performing the salvage. In the above scenario only one section was affected, so the conclusion could be to air dry the books.

The National Archives/Records Administration (NARA) offers salvage and recovery training to libraries throughout the United States. In 1996 the National Institute of Standards and Technology (NIST) archivist hosted the training class and arranged for live fire tests in the Large Fire Test Facility. After the fire was extinguished the participants performed a variety of tasks.

- They prioritized what items were to be freeze-dried;
- they prepared items for air drying;
- they processed book and non-book materials.

Other libraries run similar programs with or without the support of NARA. One example is the San Diego/Imperial County Libraries Disaster Response Network (SILDRN) two day seminar entitled: In an Emergency: Library Collections Salvage. In their scenario there was an earthquake and a resultant fire. They also have an extensive resource list which is available to the libraries throughout the library system.

Some salvage procedures noted in NFPA 910[12] are:

- Turn off heat and create free circulation of air;
- keep fans and air conditioning on at night (except when a fungicidal fogging operation is in progress);
- no restoration on site;
- clean gently with cold running water and dab with cellulose sponge;
- do not remove all mud by sponging;
- do not remove covers from books;
- do not use colored paper for interleaving in the drying process;
- do not pack newly dried materials in boxes and ignore for several days.

Each library may wish to draw upon the planning and experience of others to create a salvage policy. The exercise of identifying key resources in an area is invaluable. The local fire department or commercial establishments also may be able to provide leads to experts and equipment to use during salvage.

CONCLUSIONS

Fires present a challenge in protecting library collections. Statistical data indicates that there is a reduction in damage when automatic sprinkler systems are present, as well as the potential of reclaiming the collection after being protected by water. Evacuation plans, plans to restore the collection after a fire, salvage plans, names and addresses of experts and companies to perform the salvage are primary tools needed by the library in the event of a fire. It is to this end that we will be able to better protect library collections.

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REFERENCES

1. Libraries, Collections and Works of Art: Always at Risk, 1989 October. **Cerberus Alarm**, No. 107, pp. 1-4.

2. National Fire Incident Reporting System, 1997 December 12. U.S. Fire Administration, Emmitsburg, MD USA.

3. Hall, J. R., Jr., 1996. U. S. Experience With Sprinklers: Who Has Them? How Well Do They Work? National Fire Protection Association, Quincy, MA USA.

4. Morris, J., 1991. Protecting Libraries and Museums From Fire. **Fire Science & Technology**, Vol. 11, Nos. 1,2, pp. 35-43, Special Issue for CIB W14 (Fire).

5. Morris, J., p. 35.

6. Lougheed, G. D., Mawhinney, J. R. and O'Neill, J., 1994 First Quarter. Full-Scale Fire Tests and the Development of Design Criteria for Sprinkler Protection of Mobile Shelving Units. **Fire Technology**, Vol. 30, No. 1, pp. 98-133.

7. Artim, N., 1993 May. Cultural Heritage Fire Suppression Systems: Alternatives to Halon 1301. **WAAC Newsletter**, Vol. 15, No. 2, pp. 34-36. <http://palimpsest.stanford.edu/waac/wn/wn15/wn 15-2/wn 15-209.html> 10 February 1997 (Accessed 25 November 1997).

8. Roberts, B. O. 1993 May. Fire Suppression and Life Without Halon. **WAAC Newsletter**, Vol. 15, No. 2, pp. 31-33. <http://palimpsest.stanford.edu/waac/wn/wn15/wn 15-2/wn 15-208.html> 10 February 1997 (Accessed 25 November 1997).

9. NFPA 910, 1991. Recommended Practice for the Protection of Libraries and Library Collections. National Fire Protection Association, Quincy, MA 02269 USA

10. University of California, Berkeley (UCB) Library. Program for Safety, Emergency Preparedness and Emergency Response. <http://www.lib.berkeley.edu/AboutLibrary/Security/> 30 September 1997 (Accessed 10 November 1997).

11. Bush, S. B., Private communication, 1998 February 12.

12. NFPA 910, 1991.

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The Fire Research Information Services (FRIS) is the only fire research information center in the United States. In 1971 Ms. Jason joined the National Bureau of Standards (currently the National Institute of Standards and Technology) to build a fire safety database for the National Aeronautics and Space Administration, Aerospace Safety Research and Data Institute (ASRDI). The database is now part of NASA RECON (their bibliographic database). The NASA work stimulated the beginning of FRIS and the building of the fire research collection. The collection has grown from zero to over 60,000 items during this time period. Access to the collection has been automated and national and international users can access the database, FIREDOC, from their home or office via modem, Internet, or World Wide Web. FIREDOC contains the bibliographic references, keywords, identifiers and (where possible) abstracts to the items in the collection. Under her guidance the first fire CD-ROM in the world was created, ***Fire Research Publications, 1993***, replaced by the ***BFRL Publications*** series, which is in its 4th edition.

After receiving her Master of Library of Science degree from the State University of New York at Albany, Ms. Jason accepted a position as cataloger, Sacramento Sate College, California. From 1967-1970 she was an Administrative Librarian, Stuttgart and Head Librarian, Munich, Germany, Special Services Libraries respectively. Upon the completion of a three-year contract she returned to the United States to accept the position in FRIS.

Ms. Jason has established national and international document exchange programs with her counterparts. As one of the driving forces of inFIRE (international network of Fire Information and Reference Exchange), she has been instrumental in developing products, e.g., a Union List of Serials, for use by the fire information community. Special projects also have been done for government agencies; for example, NASA, Minerals Management Service. Ms. Jason was an observer at the Federal Pre-White House Conference on Libraries and Information Services held at the National Library of Medicine in 1990 and the White House Conference on Libraries and Information Service, 1991. She was awarded the Society of Fire Protection Engineers Director's Award for the 1992 Outstanding Committee Chair, as the Chair of the inFIRE Advisory Committee. She is a member of the Special Libraries Association, inFIRE, and the Textile Information Users Council.

Paper 20

New Parents: the Intranet at the Fire & Rescue Service of Western Australia

Elizabeth Hides, Fire & Rescue Service of Western Australia

New Parents: the Intranet at the Fire & Rescue Service of Western Australia.

Elizabeth Hides, Manager Information Resources, Fire & Emergency Services

Abstract.

The Fire & Rescue Service of Western Australia established a pilot Intranet facility in early 1997. The pilot trial consisted of a small number of information "pages" for the purpose of: assessing the technology and associated development tools, assessing the effectiveness of the Intranet as a communications medium and to create an initial policy and standards framework.

The two projects selected to test the system were the internal telephone directory and circulars. The internal telephone directory is one area where you can guarantee people will look and check to find their details. Also, due to the number of changes involving the telephone directory, it would enable decisions to be made on the frequency of update and how updates would be recognised and processed. The other area selected was circulars that contain information of operational relevance and job vacancies. This information has a requirement to be widely disseminated and readily available. There have been inherent problems with the distribution of this type of information and it was anticipated that their storage on the Intranet would address some of these problems.

From a fire service perspective, the Intranet provides timely, accurate, decentralised access to information that is available 24 hours a day, 7 days a week. It enables co-workers to communicate efficiently regardless of their physical location or shift allocation.

Introduction:

For most new parents a plethora of information exists about what to expect, when to expect it and how to handle it. But there is nothing like experiencing the real thing. From my biography, you will know that I worked primarily in Health Libraries prior to my joining the FRS in late 1996, so I equated the development of our Intranet with becoming a new parent.

I have been involved with Intranets mainly from a management viewpoint, not only how to make information more accessible to clients but also as a way of survival. Now, not only am I an Intranet provider, I also am involved in the overall customer focus of the Intranet. Our role as Librarians is becoming more market focused, what our clients want and how they want it packaged. The Intranet has the potential to assist us to reach more clients, more frequently and alert them to information sources without them even visiting a library. This is particularly important when our client base is decentralised.

Background to FRS in WA (the Gene Pool)

Western Australia represents nearly one third of Australia's land mass (or 2,525,000 square kilometres), however it contains only one tenth of the population. This vast expanse of land and relatively small population poses some unique problems in providing an effective operational fire and emergency service, let alone an information service.

To quote from our recent annual report.

... "The Fire & Rescue Service of Western Australia is a multi-functional organisation which is undergoing dynamic change. In WA today, fire and other emergency services are provided by the Fire & Rescue Service of Western Australia, the Bush Fires Board, Department of Conservation and Land Management, the State Emergency Service and major corporations. The FRS provides services from 128 locations throughout WA, as well as to Cocos and Christmas Islands. These services relate to property fire, bush fire, road and other rescue and hazardous materials combat. These services are provided by approximately 1,000 employees and 2,500 volunteers...".

As a response to changing community expectations and a requirement by government for continuous improvement, increased efficiency and cost effectiveness, it is proposed to implement a new structure that will reflect the amalgamation of emergency services. This has resulted in the development of a new umbrella agency (Fire and Emergency Services Authority or FESA), that brings together Bush Fires Board, Fire & Rescue Service of Western Australia and the State Emergency Service. The services delivery arms of FESA will retain their corporate identities. However, corporate services will be provided by a Corporate (or re-named Business) Services directorate. It is under this directorate that the library service sits.

Definition

One area that caused concern was the interpretation of an Intranet. There appeared at times some confusion over what is an Intranet and the Internet. To clarify, the definition of an Intranet is as follows: Intranet is the term for the use of Internet and World Wide Web (WWW) technology on an internal network. An Intranet can connect and make accessible islands of information on separate computers within an organisation. The Intranet allows information to be controlled by the people who prepare it.

The Development of a Pilot Group or Family Planning

As part of its Strategic Plan Information Action, a small group was formed to work on the Intranet project in late 1996. This group consisted of both uniformed and non-uniformed representatives. Roles were assigned to group members and included not only user representation (country and metropolitan area), but also system and application development, graphics and policy. The Intranet group workshopped potential Intranet projects, such as telephone directories and station contacts. From here projects were chosen for both ease of implementation, usefulness, and assigned a priority code.

The pilot trial consisted of a small number of information "pages" for the purpose of assessing the technology and associated development tools, to assess the effectiveness of the Intranet as a communications medium and to create an initial policy and standards framework.

The two projects selected to test the system were the Internal Telephone Directory and Circulars. The Internal Telephone Directory is one area where you can guarantee people will look and check to find their details. Also, due to the number of changes involving the telephone directory, it would enable decisions to be made on the frequency of update and how updates would be recognised and processed. The other area selected were circulars that contain information of operational relevance and job vacancies. This information has a requirement to be widely disseminated and available to all employees. There have been inherent problems with the distribution of this type of information and it was anticipated that their storage on the Intranet would offset some of these problems.

The position I hold is also responsible for the operation of the Switchboard and the distribution of Circulars. Internal telephone directories are usually inherently dated as soon as they are printed. The opportunity to have this type of information available on the Intranet was timely. It was also a useful way of persuading some clients that their ability to use technology to find information was not as difficult as first thought.

Corporate Information or Telling the Relatives

The dissemination of corporate information is critical to any organisation. The distribution system that was in place for circulars was not satisfactory either from a provider or receiver viewpoint. One major concern was the criticism that no matter how many paper copies were sent to stations, they rarely managed to be disseminated to all shifts and all personnel. Due either to the lack of photocopying facilities on each station or the tight timeframe to respond to job vacancies, some circulars "were never received".

The Intranet enables corporate information to be available almost as soon as it is published. For example, a job vacancy arrives on my desk at 9.00am. By 9.30am the paper copies have been completed in parallel with the electronic copying of the circular onto the Intranet. The "What's New Page" is amended to reflect the new addition, and to all the stations that are connected to the Intranet, that circular is now available. Each shift that comes on will check out the "What's New Page" and print off the required number of copies.

If you compare this with the traditional way of disseminating information, the mailbag leaves at 3.15pm and arrives at the station by 8.00am the following day. If it is a weekend, then delivery will only be by Monday. If the two copies go astray, then the other three shifts will not receive the updated information.

This is particularly important in relation to operational information. For example, in early 1997 a spate of wildfires on the Darling Escarpment (some 45 kilometres east of Perth), saw responding firefighters experience difficulties with radio communication channels. The information had been sent out, but in a different format than it was usually made available. As a result, some stations took on the updated changes to radio communication channels, whilst others had not recognised those changes and were still operating on outdated channels. This had serious implications in the coordination of activities to combat these wildfires, not only with FRS firefighters, but also in the liaison with other fire services. As a result the process was changed to reflect a consistent communication level to operational personnel. Information of an operational nature would be primarily released through a specific type of circular.

Home Page Design or What's in a Name

The issue of the home page design involved a lot of discussion, especially in regard to the number and naming of headings. It was difficult to visualise what we wanted as an Agency. We could only view what other Agencies had done with their Internet / Intranet, but it is still very much a personal choice that each Agency needs to make.

The names of the headings was just like selecting names for baby. Do you go with the older, established name or be new and trendy (along with different

spellings, or ethnic influences). Of course, whether the heading had a male or female influence was not really an issue.

So this topic was workshopped. As a result, seven headings were proposed, however it was decided that icons would not be used until the headings were finalised. The design cost of each icon required that we be very clear of our final choice.

Uploading Data (Pre-term or full-term)

Pre-term babies require more attention and specialised care. The same can be said for the format of material which is received for inputting onto the Intranet. Ideally the documents to be uploaded onto the Intranet are already in html format. This makes the transfer very quick and relatively easy for the novice uploader. If the material is not provided in a ready to convert format, then this impacts on the ability of the Intranet uploader. Unfortunately, the FRS does not have a dedicated resource for this task. Most of the uploading of data is done from our automated systems, and some like circulars already have links in place.

This lack of suitable skilled resource and mindset of potential Intranet providers to change the way they produce documents (for example, our FRS Update) is an area of concern as the Intranet does raise expectations to provide current and timely information.

For example, leave rosters from the Staff Deployment area. These rosters contain leave information for all shifts and locations for the period January 1999 to January 2000, potentially all employees. While the information has widespread appeal, it has a pre-determined circulation list. The information is generated from the Staff Deployment system, and then it is created by manually cutting and pasting together. Hence, the upload to the Intranet is not easy or quick.

The options available were to re-type, scan or not put the entire document up. Since the expectations of clients had to be met; this last option was not viable. Ideally scanning would have been favoured but for some reason the scanner and the IT expertise was not to be. The only other option was to re-type the information. Whilst this was time consuming and not as quick as I would have wanted, it did solve a number of problems, especially for those employees in the Staff Deployment section. The availability of this information at the desktop reduced the number of telephone enquiries received regarding this information. Once clients become reliant upon the Intranet for their source of information, it is important to maintain the currency of the Intranet.

Technology or Equipping the Nursery

The other areas that impacted on the pilot trial involved technology and the nature of the Fire Service. The development of any automated system is only as good as its availability for access. A suitable IT infrastructure had to be put in place to enable the pilot to proceed.

It took time to establish links and also provide the necessary hardware and software for the system to operate. What this meant in reality was that while some stations were given personal computers, they were definitely not the latest make and model. This affected the transaction speed when searches were performed. Once the equipment was in place, then came the test for the clients. There is an assumption that everybody knows how to use a computer or at least know their way around a keyboard. In reality, this is not always the case and became a sensitive issue with some senior firefighters and their subordinates. Assisting our operational firefighters to become computer-literate took on a new meaning.

For most Librarians we have been fortunate to have exposure to automated systems, either through our library catalogues or by accessing on-line information systems. My experience in health libraries has shown that whilst on-line access to Medline (the automated version of Index Medicus) was possible in the early eighties, access for most clients did not occur until the early nineties. I remember attending the first On-line conference in Sydney in 1986 and marvelling with my colleagues about the introduction of cd-rom technology. Our ability as Librarians to access and retrieve information faster and more effectively than before enhanced our standing in the organisational structure.

Librarians held the key to accessing information for two main reasons: they understood access points and the logic involved in combining terms to produce a result. It was also accepted that Librarians could access on-line databases, they were given training and usually had an automated library catalogue. If we compare the access operational firefighters have to automated systems, I would guess that they were on the lower end of the scale. With the introduction of library catalogues and now the Intranet, clients are able to access these systems from their desktop. Other areas of the fire and emergency services are becoming automated, such as land data, street maps and hydrant locations.

Pilot Sites or New Parents

These comprised of operational stations in the South Metropolitan Region: Canning Vale, Fremantle, Kensington, O'Connor, Rockingham (both permanent and volunteer), and Spearwood Fire Stations plus the Kwinana Volunteer Station. The District Officer (who was an Intranet team member) for this region visited each station and took the operational firefighters at these stations through the basics.

There were no formal manuals or training guides developed at this time. Remembering that each station has a complement of four shifts and the pilot commenced in the middle of our summer season was possibly not the best start.

The instructions given to each pilot group was to access the Intranet and test it. Some of the pilot group members did this extremely well. For example, access to our Corporate Records system via the Intranet revealed that some of the restricted name-identified information could now be seen by all. The protocols in the Corporate Records System were amended to protect this type of information. It demonstrated that what we assume people won't look at, is what some people immediately look for. It also highlighted that the searching capability on the Intranet was more powerful than what existed on the Corporate Records system.

Demonstration or Ante-Natal Classes

One other important part of the pilot project involved an actual demonstration of work completed on the Intranet to date. This involved the pilot group members working through the Intranet screen by screen. It was extremely useful from the point of view of clarifying some areas of mystery and sharing some of the useful parts of the Intranet. Each information contributor to the Intranet was able to take other group members through their information and how it linked together. For example, from the telephone listing, it linked to the employee's details, which linked to their e-mail address and any other cross-references, such as Team Listings. This forum was extremely beneficial from a recognition point of view and also to increase the awareness of team members who took this information back to their sections and imparted their knowledge.

Recognition or the Birth Notice

An area that can be overlooked in the implementation of any system is the recognition of the groups' efforts. The demonstration that I have just mentioned was valuable. It is important to remember that we implemented our Intranet with no real dedicated resource. The team members assisted in whatever capacity whilst still undertaking their own jobs and responsibilities. The District Officer, Perth South West, Gary Kennedy played an integral part in introducing the Intranet to firefighters. The other team member that I will mention was the IT guru, Fred Kroeger. It was his work in setting up the framework and testing different things that really gave our Intranet project a shove in the right direction.

Politics or the Christening

The other area I will mention is the politics. It is difficult to place a value on the importance of timely and current information. To quote from Meg Paul's introduction in "The Winning Package"

Librarians face the problem of quantifying information and placing a value on the benefits of the library to the organisation. They are at a disadvantage in an organisation where others produce measurable products.

Whilst this is true of our role as Librarians, it is also true of the Intranet. Whilst benefits can be gained from the use of an Intranet, it is not always seen as priority.

I was invited to do a presentation at the Executive Management Team of the FRS, along with Fred (the IT guru). This was done using the Intranet on a large projector screen. It is difficult to sell the Intranet when you just bandy words. It is often easier to show the power and flexibility of searching for and retrieving information. Two points to make here, it was necessary to import a lot more data onto the Intranet and the session was carefully scripted to highlight what exactly we could look for and find.

From this session, Fred and I did a similar presentation to the Board. I prepared a handout that would summarise the main points of the Intranet, list Intranet members and briefly described what information was available from each heading. From a fire service perspective, the Intranet provides timely, accurate, decentralised access to information that is available 24 hours a day, 7 days a week. It enables coworkers to communicate efficiently regardless of their physical location or shift.

What is Currently Available on the FRS Intranet or Brag Photos

This home page is divided into the following main categories.

Screen 1. What's New. This is an important area, especially for those operational clients who are on shift. When they resume duty, they can see quite clearly what has been added since they last checked the Intranet. It also negates the need for clients to know where information may be stored. They can locate circular information very quickly through this page.

Screen 2. Locations. This section is still under development and is divided into two sections: FRS directorates and Metropolitan Fire Stations. This will enable each station or branch to have their own home page. In the case of the Directorates, it enables branches to identify their employees and the areas of responsibility. It also enables more detail to be given on specific projects that each branch is working on. For example, in the Planning area, exactly what is

GIS and what does it do. By listing this information, it clearly enables other sections throughout the FRS to find out what each Branch is involved in. The same would also apply to the Station pages. Some stations may be involved in activities specific to their locality, such as community fairs.

Screen 3: This section lists our Publications, which are divided into categories: Strategic Plan, Circulars, Health Safety and Welfare, FRS Update, EMS Update. The newsletters published by the FRS come in an array of formats and frequency. Some like the FRS Update relate to information of a local nature, what incidents have occurred, retirements, and functions or activities held by each station. The Health Safety and Welfare Update is specifically on health and safety issues. Circulars (or operational information) are published more frequently, and are further sub-divided by category of circular. Sometimes two or three are issued on the same day and they relate to specific topics, such as dry cleaning or tripod maintenance. Most of the 1996 circulars are on the Intranet and all of the 1997/98 are. This also protects the corporate memory by storing them electronically. The circulars are searchable as well as being able to select them from under specific circular types.

Screen 4: Contains contact information, which enables us to find a FRS employee providing they have a telephone extension. While it does pick up most of the support and regional based employees, it does not pick up most operational employees. However, for those employees such as the CEO, this listing will also bring up his e-mail address and cross-reference back to his brief personnel record. This information is used as internal white telephone pages and the Switchboard Operators are finding this extremely useful. The information is updated as soon as notification is received on changes.

Screen 5: Information Resources. This section enables clients to perform searches, both across the Intranet and within certain files. The ability to search across the Intranet is useful especially if you don't know where the information may be contained (either in a circular or FRS update). There are two types of searches, concept (broad) and keyword (specific). For example, searching for information on hydrants will list results from all types of publications and circulars. It also enables you to view the most current document, but see the link with an earlier edition. This assists in ensuring that our clients are finding the most up-to-date information and policies.

Access to our records management system is possible from this Section. An interesting point to note is that the automated system used by the FRS for its library is based on its records management system. Hence, if the term arson is searched, it will bring up not only all the correspondence relating to this topic, but also books and videos. Considering the library collection is quite small, it is a good way of utilising of existing resources and finding the most appropriate source of information to suit client needs, regardless of where that material is

held. A tender is currently being evaluated for a replacement records and documents management system. This system will not only manage paper and electronic records, but also library material (books, journal titles and videos) but also building plans.

From a records management viewpoint, both file titles and correspondence can be located. Searching for file titles brings up all files that have a particular keyword, together with the correct file number and other descriptors.

The ability to search for individual items of correspondence is made more sophisticated and faster via the Intranet than through the records management system. For example, you can search on a particular employee name (what they have written, had sent to them or relating to them) or by a month and year. This has been extremely valuable when some clients can't remember what they have done with a particular letter. The entire contents of corporate files are not shown, only the description of each folio is displayed. These results are sorted by the most current information, file number, relevant folio number, date of correspondence, who the document is to and from, along with brief details of the document.

For those clients in decentralised locations who do not have the actual corporate file in front of them, this is a valuable way of searching the database. It is hoped that with the new records and document management system, the scanned image of the document will also be available. As a result of the pilot project, the contents of all restricted files are not searchable.

Screen 6: Employee Information. This information is taken directly from the human resource system and provides brief details on employees, for example when they joined the FRS, their brigade number, their substantive or acting position and their current location. It is anticipated that individual employee home pages can be created from this area.

The Intranet is also used to list specific teams, for example the Intranet Team. This will be expanded to include Peer Support, Grievance Officers and Health and Safety representatives.

Screen 7: The last heading is Statistics. This section includes copies of tables from the Annual Report Incident Statistics for 1995/96 and 1996/97. This section has recently been updated and now includes daily, weekly and fortnightly reports split by region. This relates to basic information on 2nd alarm incidents with a summary of the incidents by region. Incomplete incident listings for the metropolitan area are included, as well as incident listings for country permanent and country volunteer.

Summary:

1. By publishing a document on the Intranet, it is immediately accessible by all employees.

2. Eventually we will be able to view scanned images from corporate files, which is useful for decentralised management. Often by using the Intranet it is a cheaper option than purchasing a number of inquiry only licences.

3. Regions will be able to post information to their stations electronically.

4. If a printer is located at a Station, forms and documents stored electronically can be printed on-site, such as leave and order forms.

5. We also now have the ability to search and locate documents quickly from our desktop.

Where to Now or the Joys of Parenthood

I am the first to admit that our introduction of the Intranet was not perfect, in fact in some areas it was quite poor. However, there have been some gains and changes to how we do, or will do business in the future. It has not been easy introducing new technology to an environment where in some instances, stations do not even have access to a facsimile machine. The cost of upgrading all stations, both with communication links and computer terminals was not feasible in one financial year. Also, the Fire & Rescue Service is not a static organisation. Not only has it undergone a review of services but it is also in the process of upgrading its major automated systems. The tyranny of distance will always be there but as communication links (through e-mail) become more established, this should avoid a lot of the problems we have had to contend with.

However, the future looks bright. The dust is settling from the review and our co-workers from Bush Fire Service and the State Emergency Service are joining with FRS support personnel. A joint effort is being made to have a common Internet page, with links back to the Intranet pages. The Intranet does offer value-added information that is relatively easy to access from the user point of view.

To conclude, the wait is over, labour was tough. We have wet the baby's head and now begins the exciting times ahead for both parent and baby.

References.

Emergency Services Taskforce. 1997. ***Report to the Minister for Police & Emergency Services***. Government of Western Australia, Perth

Fire & Rescue Service of Western Australia. 1997. ***Annual Report 1996-1997 Western Australian Fire Brigades Board***. Fire & Rescue Service of Western Australia, Perth

Information Policy Council. 1997. ***Best Practice Guideline - The Internet***. Government of Western Australia, Perth

Lindesay, C., 1997. Intranets: passing trend or core technology? ***Document World***. v2 (4) July-August p. 9.

MBR Consulting Inc. 1995. ***10 Minute Guide to Intranets***. QUE, Indiana

Paul, M., 1996. ***The Winning Package***. ACLIS, Canberra

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Paper 21

CSIRO Infobuild: Information Brokering in the Construction Industry

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CSIRO InfoBuild: Information Brokering in the Construction Industry

Gaye McDermott, *Manager, CSIRO Building Information Resource Centre*

Abstract: CSIRO InfoBuild was established in November, 1994, after independently commissioned market research indicated a niche for an information service aimed at the construction industry in Australia.
Although well established information brokers were operating in the market generally, an information service targeted at the construction industry did not exist.
The construction industry is, by nature, fragmented and slow to adopt R&D results, innovations and management practices, even where improvements on current practice are demonstrable.
This paper addresses the marketing of InfoBuild, the differences in kinds and levels of information required by the industry and impediments and opportunities available to information brokers operating in such a market.

Introduction

The imperative for the CSIRO Building Information Resource Centre to become at least partly self funding in order to remain in business had become a reality by 1994. Words such as "commercialisation", "profit centre", "return on investment", "external income" had been introduced into the culture of the CSIRO for some time before this. As Australia's largest scientific research organisation, prior to this new era of commercialisation CSIRO had been an organisation funded by public money. Overnight. it seemed, the Government expected the CSIRO to become self funding to the extent of 30 per cent of its budget. Possible avenues for generating external income were examined across the Division (of Building, Construction and Engineering) and it was at this time that the then Manager of the Building Information Resource Centre commissioned independent market research to determine if a market existed for a fee-based information service targeted at the construction industry.

And so, CSIRO InfoBuild was born.

Creation of CSIRO InfoBuild

CSIRO Building, Construction and Engineering already had an established "library", renamed the Building Information Resource Centre in 1994, which had operated since the Division's inception in the 1940's. Historically, this had been the repository of not only the results of CSIRO scientific research but also of international work related to building and construction. In addition to a document collection, over the last twenty years the Information Resource Centre had taken advantage of information technology in the sourcing, storage, retrieval and delivery of a vast number of information resources, not unlike any other sophisticated information service.

Although the primary reason for the establishment of InfoBuild was the imperative for the Building Information Resource Centre to become partly self funded, another reason was to seek a return on the considerable investment already made in the collection, much of which is unique. The investment in creating, maintaining and updating a pertinent collection is considerable and is difficult to measure in terms of value to customers. It is unfortunate that just because it is difficult to measure, the importance of value as the major component in assessing the effectiveness of an information service, is not reduced. Return on investment is the basis for the distribution of resources. By making the resources of the Information Resource Centre available to "external" customers, we were increasing our return on investment.

Because CSIRO is the primary government funded research in Australia, it had always been the focus for building information from all sectors of the construction industry, including home owners. In addition to its main function of supporting the information needs of the scientific staff, the Building Information Resource Centre had routinely been providing "free" information for many years.

There are no direct competitors in the local market for CSIRO InfoBuild, although all information brokers in Australia offer many services in common. The competitive advantage of InfoBuild lies in its expertise in, and access to, specialised construction and engineering information. The Building Information Resource Centre holds the resources of more than forty years' worth of unique research material in construction that is highly regarded and sought after by industry.

The objectives of InfoBuild were to -
. create a viable commercial venture through the selling of expertise as an information provider in the building, construction and engineering industries,
. provide a quality information service to targeted customers to meet the specific information needs of individuals and organisations, and,
. to create a high volume repeat business through demonstrated cost effectiveness in continued use of the service by customers.

Budget and Marketing

Very little additional investment was needed to create a commercial venture since the "product" already existed. InfoBuild had the advantage of being an ancillary service to its primary reason for being, which is to serve the information needs of the scientific and technical staff of the Division. Apart from the initial market research, the marketing investment consisted of the following:
. Determining who the customers were. They form a diverse group made up of construction companies, design/architecture firms, large structural engineering companies, building product manufacturers, public sector agencies, local government, associations, tertiary institutions conducting building research. Many contacts were passed on by research staff through their collaborative work with the industry. I have given

presentations at meetings with industry representatives and have used various directories and databases for possible contacts.
. Determining who the most appropriate people are in the targeted organisation. This is by far the hardest part to get right and requires great determination and perseverance for the people you need to see hold a special place within organisations and do not always have a label. The key individuals must have an understanding of information as a commodity, be familiar with the roles/information needs of other key individuals, have a good strategic ovrview of all elements of the company, be empowered to make decisions and to act on them, and be able to influence outcomes.
. Determining customers' information needs. With a product that can be as amorphous, intangible and unquantifiable as information, it is important to find out what information is already being used, how it is acquired and used, and which requirements are unsatisfied.
. Presentations. It is important to target these to expressed information needs. Providing information "samples" are a good idea. Sometimes information services are misunderstood, misinterpreted and oversimplified by an audience.
. Cold calling.
. Brochure mail outs.
. Writing articles for trade magazines.
. Selective advertising. This is very expensive and placement has to be considered carefully. Issues such as pitching advertising to specific segments in specialist media or going for a more general approach in high circulation press are important. We limited advertising to the Division's magazine "Building Innovation", with a circulation of about 12,000.
. Press releases.
. Attending association meetings/giving talks to members.
.Delivering papers at industry conferences.
. Exhibiting at building industry conferences.
. Having an internet presence. InfoBuild has a home page. In addition to this, APESMA, the Association of Professional Engineers, Scientists and Managers, Australia, has incorporated a link from their home page to ours and mentions InfoBuild as a service for members. We have undertaken to provide monthly news items on their page in exchange for a member discount on InfoBuild services. This is "free" advertising for InfoBuild. F

We have a marketing department who assists with press releases, strategies, and public relations material including display/promotional graphics for exhibition.

Services

In response to the various and diverse information needs from industry sectors, different products and services are offered at differing levels. Basic product information is available, plus research and development results, technical information, market research, export information, construction management, company intelligence, media and newswire services and statistical data. Location and supply of documents independently of source is included as part of the service.

InfoBuild will also gather information from a wide variety of sources and provide summaries. If it is an answer that is required to a specific question or solution to a problem, InfoBuild will locate an appropriate "expert". While InfoBuild provides traditional information services, it also adds value to existing information and uses non traditional means of locating the right information where appropriate.

The scope of questions asked of InfoBuild is broad. To illustrate, some examples of the questions that InfoBuild has provided answers to include the following:

. A company looking at three possible locations in Melbourne for an office. The mix of existing businesses in each area was critical to the future success of the business. We were able to provide them with two lists on a disc in Excel, one, a list of businesses and their primary activities, the other, a list by street of the business names. In this way, they were able to make an informed decision on the optimum location for their office.

.The current state of the art for tunnelling practices, required to assist a large construction company to compete for a major contract.

. Reports of recent fire tests on carpet.

. Supply of product catalogues, including specifications, from manufacturers of steel reinforcing mesh in the UK, US and Europe.

. The current world practices for recycling building waste and minimising waste.

. The size of the housing industry in South Africa, required by a company wishing to expand its building products business.

. The market for concrete in Indonesia, required by a manufacturer of building products.

. The state of the art technology for transforming sewage sludge into bricks.

. Reported effects of sonic boom on domestic dwellings that caused structural damage, required by a consultant engaged by an insurance company.

. Earthquake damage data for buildings in Australia, required by an overseas insurance company.

Customer feedback is sought on the services provided by asking customers to complete customer satisfaction surveys. While the rate of return of completed questionnaires is low, they generally express a high level of satisfaction with the service to the degree where most of the respondents say they would use the service again. In those few instances where some dissatisfaction is registered, the issues have been related to cost.

InfoBuild Three Years On

In July, 1997, the then Manager, Building Information Resource Centre, left the organisation and I was appointed to this position. Prior to this, as the Manager, CSIRO InfoBuild, my sole function was to provide an information service to external customers. Now my brief was to give priority to the Division's staff.

There was a widely held perception within the organisation that the Information Resource Centre had become almost entirely commercially focused to the detriment of the information needs of its own staff. This view had increased the cynicism of many of the staff who had originally opposed the creation of a fee based information service for industry. Some of the more expensive services purchased around this time were sometimes viewed as relevant to industry interests only and of marginal interest to the researchers.

So, where are we now? The InfoBuild and Building Information Resource Managers' positions have been combined and InfoBuild activities have been incorporated into the routine activities of the Information Resource Centre. Rather than using the resources of a dedicated staff member, enquiries from external customers are handled on an opportunistic basis by existing staff. In this way, income is generated to offset costs with no additional outlay and service to primary customers is not compromised.

Some Issues Affecting the Market For Information Services

Some of my observations over the last three years as they relate to the market for information services include the following:

. Low price expectations. This is partly related to provision of search results without any accompanying analysis or interpretation.

. Resistance in the market to paying for information. There is still a widely held expectation that information is free, although not at the more sophisticated end of the market.

. Purchase of information is often regarded as highly optional.

. Difficulty of closing sales. Timing is critical. If a potential customer is offered a good or service at precisely the time it is needed, a sale has a much higher likelihood of taking place than if these coincidences do not exist.

. Softness in demand. Information brokering is still a very small market segment in the domain of professional services.

Another issue concerns the nature of the construction industry itself. The construction industry is diverse and fragmented. The adoption of new and innovative technologies is generally low, even in instances where improved processes and cost effective solutions to

long standing construction problems are known. The problem of the low adoption rate of improved materials, processes and management methods, as well as the reluctance of the industry to adopt current technologies, is not easily solved. The research, development and adoption process should be viewed as a complete system. Often, however, the research and development and information dissemination parts of the process are viewed as separate and unrelated activities to the process of construction. There is a dichotomy between the pressure to achieve industry improvements in both quality and value and the unco ordinated nature of the industry which works against communication of research results to practitioners as well as within the industry itself.

The work of Wilson (1) and Bardin, Blachere and Davidson (2) report on and explore these phenomena in detail.

Opportunities

There is a market for the more traditional literature search and there will always be a demand for this service. The margins on literature searches are very small and the opportunities for growth are limited if this is where the service begins and ends. The market for "analysed" or interpreted data and other products is stronger than for literature searches. Refinement of contents generally has higher demand and is more highly valued.

There is a high value placed on distilled knowledge, for example, this Division's series "Notes on the Science of Building" and "Information Sheets" continue to have a high profile and are still in demand even after twenty years or more. These are a precis of the results of years of scientific research and represent excellent value for money. An information service needs some "products" that require initial resource input, but that can be sold over and over again, in addition to customised services.

To address the problems mentioned above that relate to the construction industry, information services have a special role.

Howard Leslie, Project Manager, Building Information Systems, CSIRO Building, Construction and Engineering, is instrumental in developing a common language for the construction industry to help facilitate more effective integration within the industry and to solve some of the communication and co-ordination problems that mitigate against it maximising resources and productivity.

Lexis is a language for communication that will form the basis for information management within the industry. The objective of the AEC (Architectural, Engineering, Construction) information framework is "to establish a basis for improving communication and coordination between stages of the project lifecycle, decision-makers within a project stage and project team and external reference sources (codes, technical literature, research findings, ...)" (3).

By examining the "dialogue" between the various members of the project team, and between these decision-makers and the various sources of external reference data (for example, technical data, research results), CSIRO is seeking to identify and describe the objects required for industry to clearly and concisely describe a facility from an operational, spatial and physical perspective.

Lexis Core identifies the nominated objects, including their respective attributes, relationships and processes. Its purpose is to establish a common industry agreed repository from which domain-specific "views" can be developed.

In addition to supporting the development of decision-support software, the views will enable stakeholders to compare potential project solutions and to make information gained on one project available to subsequent ones. Using a common repository to build these views provides a common language and a basis for clear, concise intra-project communication.

While the project is still being developed, the proposal offers the construction industry a real vehicle to exploit expertise, data, knowledge and information technology in a combination that will be accessible and applicable to real projects. Another impact will be to ensure that information is not diluted or lost over time, as so often still happens. Lexis should minimise the difficulty of transferring research into practice.

The role of the information professional is a collaborative one in a project such as this. They are in a good position to be able to identify, locate and package each piece of data that will eventually be linked. Their involvement is a long term one, if only to maintain currency of the data.

The problem of "lost" data is very real in the construction industry. By this I mean significant research results containing the remedies for major common building problems. A good example of this can be found in the work of Ron Ballantyne (4), where he describes the incidence of fracturing occuring in glass wall cladding in multistorey buildings and the research leading to a remedy for this. The research was done in the early 1960's but is just as relevant today.

My point here is that information professionals have an important role in keeping unique material alive, rather than letting it languish in collections where it can become forgotten. This is often an indexing and retrieval issue, but also one of recognising the relative importance and relevance of information as it can be applied by industry practitioners. The opportunities for information professionals here are almost unlimited.

Conclusion

The opportunities for information professionals, including brokers, are there, but require breaking through some real or imaginary barriers to think about information provision in novel ways. While I have primarily addressed InfoBuild and fee based information

services, the same opportunities and challenges apply to the information industry generally.

References

1.Wilson, Duncan M., 1974. ***Utilization of research results in the building industry: a state of the art survey***. Boston Architectural Centre, Boston, MA. NTIS Report PB 252 351.

2. Bardin, S., Blachere, G., Davidson, C. H., 1993. Are Research Results Used in Practice? ***Building Research and Information.*** 21 (6) p. 347-354.

3. Leslie, H., January, M., McKay, D., no date. ***Lexis Cost: a Cost Management View of Building and Construction: part of Lexis, a Common Language for the Management and Exchange of Information in the Architectural, Engineering and Construction Industry.*** CSIRO Building, Construction and Engineering, The Australian Institute of Quantity Surveyors. Draft Only.

4. Ballantyne, E. R., 1961. ***Fracture of Toughened Glass Wall Cladding, I.C.I. House, Melbourne.*** CSIRO Division of Building Research, Melbourne. Report 06.1-5.

Gaye McDermott was appointed Manager, CSIRO InfoBuild in November, 1994 and was given the additional responsibility of Manager, Building Information Resource Centre, in July, 1997.
Prior to moving to Melbourne, Gaye was Library Manager, Defence Centre, Sydney, a position which involved providing library services to some 28 Defence libraries in New South Wales, as well as local customers.
Other positions include Librarian, (former) Departments of Science and Technology, Science and the Environment, Bureau of Transport Economics, Trade and Resources, all based in Canberra.
Gaye was on the Australasian Online and Ondisc Conference committee from 1985 until her move to Melbourne in 1994.

Paper 22

Beyond the Walls to Where

Rob Fleming, Australian Emergency Management Institute

Beyond the Walls to Where

Rob Fleming, Assistant Director Information Services, Australian Emergency Management Institute.

Paper to be presented at the inFIRE Conference, May 4-8, 1998, to be held at the Melbourne Fire & Emergency Services Training & Fire Safety Complex, Abbotsford, Melbourne.

Abstract

This paper utilises as a case study the Information Centre of the Australian Emergency Management Institute and examines the expansion of non-traditional library services and its products. However, these products are based upon a strong set of services that are tightly integrated ensuring that they are seen as integral services that meet client needs in line with corporate objectives. The non-traditional roles include the management and development of an national and international journal, a range of research support and services, development of the Electronic Services, networking, publications and specialist databases. It has been able to positioning itself strongly within the organisation through bench-marking, planning and taping into the internal power politics to ensure access to resources and support. As a result it is seen as a national resource both within the organisation as its legitimate role and is well recognised within the field.

Introduction

In this paper I would like to use as a case study the Information Centre of the Australian Emergency Management Institute and its development within the total organisation and its role within its specific field of emergency management. In doing so I would first like to point out that these are my views and do not represent or necessarily reflect the views of my employee, the Australian Emergency Management Institute (AEMI). In doing so, I would also like to state that to a large degree every library is very unique and what may have evolved in my library may not be transferable to other libraries.

From this case study I would like to examine some of the steps involved with its planning and development and the significant factors that have broaden the horizons of a traditional library. This broadening of services, products and role have been necessary to meet future needs, but at the same time, many of the traditional library processes are essential to its effectiveness. These non-traditional roles include journal editor and management, research coordinator, project manager, teacher, network liaison officer, and senior manager.

Although many people may state that these are not the roles of a librarian or of a library, and they do have intrinsic links to the effectiveness of a library service. However, often non-traditional library services can and do play an important part within organisations and if the library does not undertake such roles it may run the risk of being marginalised and lose access to resources that they badly need. I believe that we need to play the internal politics just as hard as the rest of the organisation. We have to demonstrate that a library is not just a collection of books, journals and a catalogue. The library must revolve around its people who are seen as integral to the current business and future of the organisation as well as performing value added services.

In 1988, I was appointed the first full time librarian and operated the library as a one-person library. In 1998 we now have a staff of four permanent members, one part-time member in

our Canberra head office and a full time contract person plus other people working on related projects. So why does this library seem to go against the trend of downsizing and cut backs both in size of staff and budgets? Is it luck? Bad-management on the part of the organisation? Empire-building without constraints and without accountability? Or is there some other reason?

In attempting to look at the past 10 years and examine why this particular library goes against the trend, I have to admit there has to be a great some degree of planning and some good fortune in all this.

Organisational analysis

What do you do when you walk into a library which is run down, has very limited current information, a small budget, lack of ability on the part of management to improve it, no supervision or no hand-over of processes or knowledge. Two years prior to this I completed a thesis on strategic planning for special libraries and its central tenet was to plan, plan plan. But what does planning involve when faced with this?

Well planning to me was to involve a lot of hard thinking about what business the organisation is in, what is my role in it and where should I be placing my energies. During what I termed the clean-up phase of the library which took about six months, I was able to get some understanding about what my organisation did and who did what. I found that it was a very fractured organisation in terms of what sort of business we were in. Some sections in the Canberra head office felt that its main responsibility was to responded to disasters, and the staff at the Education and Training Institute felt we were there to enhance Australia's emergency management capability through its activities, as this was part of the Institute's Charter.

As I was located at the Institute I felt that it was in my best interest to examine more deeply who were my clients and what were their characteristics and needs. Initially there were two groups of primary clients. These were the educational staff and the students.

An analysis of the educational staff revealed that even they were divided in terms of educational vis operational perspectives. It was very important not only to find what the 'business was' but the politics and power within and outside the organisation. In hindsight these last two factors were to prove, the most crucial to any desired development and support.

The organisation had two separate locations. The Head Office is based in Canberra and the Education and Training Centre at Mt Macedon in Victoria. The organisation is part of the Commonwealth Department of Defence. In 1988, most of the senior positions within head office were military appointments on a three-year rotation and this even included the head of the organisation. Even most of the civilian positions in Head Office, were staffed by ex-military people. Whereas, in Mt Macedon the staff were civilian and did not have any military background and were either from an education background or had some links to the emergency services.

I found out that the Mt Macedon site was trying to recover from a massive internal conflict where it's Director and Deputy Director were dismissed and a new one appointed. One of the

main tasks of the new Director was trying and heal the severe rift that developed between the two sites and the external environment. I also found out that there was major distrust and conflict between the two sites. For me, finding out what the politics were, became a matter of survival. Any organisational analysis will bring benefits for you. In this case it not only provided me with a clearer picture of what business we were in but also the areas where the organisation was not carrying out its role. The library had a wonderful opportunity to play a role in resolving or supporting these areas.

It was also a time to discern the culture of the organisations. I found that there was no overall culture but a set of sub-cultures competing for power, influence and dominance. Mainly the dominance was directed from the Head Office to the Training Institute that followed the normal bureaucratic functional lines and in line with normal military chain of command. This chain of command and its strict hierarchy did not suit the educational establishment that needed to be pro-active and innovative. However, in terms of knowledge and influence within the 'industry', the power and influence rested within the Training Institute. This was because the Head Office staff had little basic knowledge of what the Institute business was all about. As military personnel, they expected that the knowledge and skills required for this posting could be just be picked as in the normal military hand-over way process.

At the other end of the scale, the Institute staff had been working within the field for a number of years and had built up considerable insight and networks within it that provided a avenue for influencing decisions and directions within the external environment. This external influence was often resented by the Head Office staff as undermining their role and authority.

To determine the needs of the Institute staff in light of an educational and training establishment was to seek, access and provide material that reflected the most current issues and trends associated with emergency management. The educational/management material needed to support, develop and run the programs. The objective was to ensure that the Educational staff were aquatinted with these trends and issues so that they could incorporate them into the courses. So in turn the overall programs reflected the current thought and issues relevant to the field.

Integration of services

The information needs and interests of the Institute staff were diverse. Some required enormous amount of inter-library loans while others desired and needed little. The demand for loans also reflected the poor quality of material within the library during this early stage. In order to determine what was needed within the field, it was necessary to be involved in some way. This opportunity became available by offering my services as an assistant on courses and workshops. In time, this led to conducting the actual Institute courses and workshops themselves.

This provided a very valuable bridge between the library and the educational staff as I was included in all educational development matters. This put me on an equal footing with the educational staff. Having been included as part of the educational team proved of benefit for upgrading the position and securing additional staff within the library. This role was

accepted within the organisation and proved how a valuable resource such as library and its staff could be in delivering and supporting the educational program. This was during a time of staff shortages but it provided a wonderful means by which one could establish the library's credentials and pave the way for future development and enhancements.

Additional to the establishment of a library bulletin, SDI's, loans etc, further development or expansion of services to the students was still needed. Our courses are only short one week courses, although some courses in the early days were up to three weeks. We felt that we needed to utilise the library in supporting the courses more directly than in the past. We achieved this by providing case studies, utilising the libraries as a resource in setting assignments for the students while at the Institute. We initiated a short elementary user education sessions and we still conduct a library briefing on all courses, many workshops and seminars.

A National Centre

What we did find in time was that our library was the only source available within Australia for most of this specialist type of material. Once students returned to their organisations and tried to source information on emergency management matters they would have to request us for assistance to borrow material. This has resulted, over a relatively short period of time, to changing our focus from an in-house support to a more external focus. The majority of loans and services are now being directed to this external clientele. This enabled us to establish the Centre as a National reference and referral service not restricted to supporting the organisation but including the external clientele. This was easy to justify in terms of our Charter as it was stated that the Institute was tasked to enhance Australia's emergency management capability. In time it was accepted by our organisation as the demand was coming in, often via the heads of the organisation itself. We now have three primary clientele educational staff, residential students and what we call the emergency management community.

Creation of database

Responding and meeting the needs of this larger clientele demanded new ways to access information. The information within the field, which reflected new issues and trends, was largely US dominated. We were able to utilise a range of traditional library services such as current awareness services and electronic SDI's. But to be really up-to-date we set-up a range of Information exchange agreements with key agencies and research institutes overseas such as the University of Colorado, and Delaware, and our equivalent organisations in the US and England. This was also supported by a large budget allocation to allow additional book and journal purchasing.

By the mid 90s the need for loans for the internal clientele had greatly diminished. Underpinning all this was the slow evolution of what is a very unique database. This database contains abstracts of books and reports, most of which are unavailable in Australia and importantly, abstracts of journal article most of which are not commercially available anywhere. From a small collection of 2000 items, there is now approximately 30,000 records available. This is now available through the Web and to each of our staff within Mt Macedon and Canberra. Complimentary to this we have been able to provide a national

reference and referral service. This has benefited this highly specialised field. It will be of interest to see in the future, now that we have much of our material accessible via the Internet, whether the direct contact will increase or decrease. It may also result in an increase demand for lending of material.

Journal management

Staff shortages were a chronic situation within the Institute during the late 80s to mid 90s. These shortages were a direct result of the difficulties of recruiting suitable people from the field, through staff cut backs or either through the prolonged Commonwealth staff recruitment process. Even when people were employed it took about twelve months for them to become fully functional and thus required extensive learning on the job. It is very noticeable that when staff cut backs occur it tends to force people to channel their energies into the key business. During one of these crisis events an opportunity arose to manage the in-house newsletter. This was an initiative the Institute undertook in 1986. While I could talk about the ins and outs of journal management, I would like to briefly discuss what was required and the benefits it brought to the library both in terms of prestige and influence.

The four page newsletter commenced in 1988 with a distribution of a few hundred and had a small 'newsy' focus of what was occurring within the field. When this task was devolved to my area in 1990, I did not have the knowledge of field or the contacts within it to continue that approach. However, it was felt that the organisation should have some publication as it was one of the most public faces and public relations medium available. As a result I started to change the focus from a newsletter to having more substance. Working within a Institute that runs many seminars and workshops and having guest speakers continually passing through enabled me to tap into these resources. It was more effective to publish a guest speakers paper and distribute it to over several thousand than just to have them come and speak to a course or workshop which number about 30.

The publication has become a journal of approximately 60 pages. It is fully refereed and is sought out to have papers published by staff, guest speakers, academics and overseas people. It has a distribution of approximately 5,000. It now provides a major public relation face for the organisation. It has also been responsible to some degree for changing the emergency management literature to a more Australian focus and content from the previous US focus. It has often been used to promote specific issues such as recovery, environmental health and disaster medicine.

The role of a journal editor requires a very pro-active presence in the field. This often requires you to negotiate with prospective authors and supporting others. You learn quickly who you need to push and support. If you require articles on specific issues it requires finding the appropriate people who are willing to write for you. Thus, it has been in some way responsible for creating and building the Australian body of knowledge in this field.

The journal is now sought out for book reviews, which benefit the library, and the inclusion of conference announcements. I now continually receive manuscripts from the academic field without any solicitation and many of these are from overseas. It has become an important source of information that has enhanced Australia' emergency management capability. It has now transferred the in-house focus of the library to a much more wider

perspective of not only accessing information but in some cases, the promotion and creation of information.

Benchmarking

During 1990 I was looking at examining other centres overseas that we could model our services and products on and provide us with some goals, objectives and future directions for planning. These models also provide benchmarks against which you can measure your effectiveness, performance and directions. Benchmarking is a process through which organisations seek to identify the best practices that are relevant to the industry. It is different from identifying what a competitor does (Hussey 1994, p.183). However, the process is very subjective. You have to be aware that not all practices can be adapted. These may be due to structural incompatibility or culture differences. Benchmarking, if used wisely, can provide you with the opportunity to learn from similar organisations, such as issues, initiatives, and the problem they have encountered.

Reading the Benchmarking Self Help Manual Published by the AustrIndustry Best Practice Program (1995) revealed many aspects about Benchmarking that we should be aware of. Benchmarking has been applied to many activities and there are very many interpretations about what it is and what it does.

Benchmarking is not:

- ***Industrial tourism.*** It may be seen as this when you go on visits to organisations as an orchestrated program. Any visit must be to learn, compare, evaluate and if need be, to change and implement.

- ***Just a labour cost cutting exercise.*** Labour costs are a component of every organisation's cost structure but emphasis must first be on effectiveness not efficiency. Undue focus of this can distract the organisation from other opportunities.

- ***Just playing 'catch-up' to international performance standards.*** A properly managed process should just 'pick-the-best' by synthesising good ideas from different sources.

- ***Just a competitive analysis.*** This may be useful, but data can be much less reliable than it appears at face value. The full picture may not be able to be seen especially if competitors and others are not willing to share information.

Then what is its use for libraries? I believe that benchmarking should not be viewed not only as a mechanism or process to be followed but as a concept that should be viewed and used in-conjunction with a larger overview or process. It is an ongoing process and should be used with strategic planning, budgeting, and or continuous improvement. These programs are cyclical and benchmarking should be viewed in the same context. If it is used as a systematic process then what are the essentials that have to be incorporated?

Again the 'Self Help Manual' (1995) describes a number of characteristics that we should perhaps take note of, these are:

Involving the right people so that preparation and implementation is strongly supported;

Choosing the right things to benchmark; that is, those things that are most important to the success of the organisation. This is where the integration within a strategic plan is of great value;

Having a common understanding of just what is involved so that the process can be managed. Clear communication is also needed to ensure people know what is expected of them and the benefits of any new initiative. Often good project management skills are needed to ensure you meet the time-lines and effective liaison within your organisation.

Gaining a thorough understanding of your own situation so that when you compare your business practices with somebody else's you are not doing it from a position of ignorance. Good analytical skills are of benefit to determine the appropriateness and relevance of models or services.

Turning ideas and lessons from visits into practical improvement projects and managing the improvement projects to fruition. Thus, without the support of your organisation it is often difficult to totally implement new ideas and often you will need the support from the power brokers from within your organisation to achieve your objectives.

As a result benchmarking is not a stand-alone solution or cure. It should be used in the context of a well-planned, comprehensive and integrated change program and thus, constantly be viewed as a state of mind.

As a result we were able to choose what organisations we needed to visit and talk to with. The aim was to fill the areas within the organisation where it was not performing. These areas where the research, and information exchange functions. It was not used as a basis for cost-cutting but improving its effectiveness within the field and meeting corporate objectives. We did not need just to catch up but to establish a role and have an effective presence. We did need to assess if there were any competitors so we did not upset anyone or get into any territorial disputes.

We have been able to incorporate what we have identified into the corporate objectives of the organisation, so it's not just a library goal but a corporate goal. It was valuable to pick and choose services and products and then adapt them to suit an Australian environment. In this way we were able to define more clearly what is was we were undertaking and provide clear communication channels. Having some degree of analytical skills enabled us to determine what could be used or adopt.

Having some political skills enabled us to determine the processes to go through and the timeframes in which it would take to implement. The political skills were important to ensure that any lessons and ideas picked up could be turned into reality.

Although many of the ideas that we have eventually incorporated have come from a wide range of agencies, the predominate one was the Natural Hazards Center in Boulder Colorado. The Natural Hazards Center and other agencies across the globe have been very supportive in providing details of their programs and often many of the precise procedures they follow. Not

all agencies provide helpful information or are willing to talk to you. Although the Boulder Center did provide useful framework, we had to be very mindful of not importing an overseas model to Australia but to customise it to meet the Australian circumstances.

Research

Research was a key factor within the Boulder model. While our Charter incorporated an aspect of research, the Institute had never been able to take this up seriously. What was very pronounced within the field during the 80s and early 90s was a very prominent anti-research culture within the emergency services. In fact, many of the practitioners from the community and our Head Office staff would accuse the Institute's educational staff of having their heads in the clouds and other derogative names.

However, this lack any initiative by the organisation provided another opportunity or challenge for the library to play in this field. However, due to politics within the organisation it required a very careful approach and it was not politically wise to fully take on such a role until the climate had changed. In the 80s and early 90s many of the senior management were vehemently opposed to any involvement in this area. With a change of management, who had a different perspective to research and its use, enabled the library to take some initiatives in this area.

However, prior to this the library was already assisting in the development and support of research. This was through developing an important collection of material that had not been available to any degree in Australia and assisting researchers to access this material. The Australian Journal of Emergency Management also provided an avenue for the few Australian researchers to have their work or findings published. The library was the only section within the organisation supporting research.

Research Database

As the field itself was very diverse it was difficult to know how much research was occurring within Australia. In the mid 80s a Research Officer was employed at the Institute and his main task was the development and publication of a Hazards Research Directory which included Australian researchers and research being undertaken. Although this was to be maintained annually, it did not get the full support of the Head Office and as a result only two issues were ever produced. In 1994 an opportunity arose through the Macquarie University Natural Hazards Centre to participate in an up-to-date version of this project. However, rather than produce a hard copy, it was to be developed electronically and to be located on our Web site. The library undertook the project management for this endeavour and this forms an important part in ascertaining what research is being undertaken where and by whom. It also allows for on-line updating and registration of new research.

One area where research was not being undertaken in Australia was at the actual times of disaster or incidents

The Quick Response Program we adopted from the Natural Hazards Center in Boulder is called the Australian Disaster Research Grants program. It provides limited financial support for **Australian** researchers to go to a disaster site in Australia to gather valuable data which

might otherwise be lost. The intension is that research is undertaken in the immediate post-impact period (within a few days or weeks after the event) to conduct short qualitative and quantitative field investigations of disasters.

This program started in 1996 and five programs commenced following the 1997 Tasmanian bushfires, the Macedon bushfire in February, the Townsville floods and the Cyclone that brought extensive flooding to the gulf country this year. The program facilitates research within the field that was not occurring. As a result, the library is able to be pro-active in initiating the development of information and provides access to the findings immediately on its release. It is hoped that the library will be taking responsibility for the major research and project grants program which the organisation also runs later in the year.

Glossary and Thesaurus

The library has also been pro-active in the development of an Australian Emergency Management Glossary and Thesaurus. These will be released in late 1998. Although much of the work has been done through consultants, the library has had an important role as project management and coordinator of the projects. In these projects, the library has been able to demonstrate that it has assisted in providing a common terminology within the field of Australian emergency management, which will assist in communication across all agencies. Thus, contributing to an enhanced Australian emergency management capability. The Thesaurus will be useful to interrogate our database and will be of value for researchers, indexers and even file managers.

Electronic services

The library has been very active in developing its electronic services. It first started in 1990 with the development of an electronic Bulletin Board. This Bulletin Board included full text article from the journal, access to the library catalogue on-line and message areas on various aspects of emergency management. This has now been superseded by the Web page that provides much more. We are still however, working at restoring our journal as an electronic version.

The development and maintenance of our Web site caused considerable friction within the organisation. It was interesting to see the power games being played over ownership and gate-keeping of information and roles. This situation was so frustrating that it enabled the Information Centre to host its own Web site through a commercial provider and utilising an Agency for the hack-work for marking up and maintenance. In time, we provided a such good quality image and reliability of service and a good public relations face for the organisation that the library was sought out to assist in developing the total Home Page.

I am not interested in managing the whole process, as I believe it is essential to give back responsibility to each section of the organisation the responsibility of managing their portion of the information. In this way, each section is held accountable for its quality and accuracy of information and provides some degree of ownership. The library has been seen as a major contributor not only to information but as a major player in promoting the organisation through its ability, skills and knowledge.

There is competition for us in the field of the Internet. This is not commercial competition but we are competing with the volume, quality and accuracy of information. We have found even among our staff, there is a perception that people believe that they can get everything they want from the Internet. There is little analysis being undertaken about the worth, currency or accuracy of that information. I don't know if its worthwhile trying to compete with that perception but the only thing we have at our disposal is to ensure that we have our information available via the same source. This may ensure that there is no 'gatekeeping' role by us, and perhaps a quality comparison of our data vs other sources will be done in time by the users themselves.

Yvonne Butler (1996 p.551) makes the claim that the next source of power will not be information itself, but the ability to access, collate and interpret it. We need to be at a source where people will access it. Most people seem to believe that if it's not available on the Web it does not exist. At least being there, demonstrates that we do exist and we compete against that perception. Being an initiator and helping to assist in the development of knowledge also provides greater legitimacy.

Seminars and Conferences

The database of conference and seminars can be accessed through our homepage and often this gives direct links to the conference homepages. The database can be searched by key word or by a geographic location such as Australasia, North America or the UK and Europe. It also provides a source by which researchers can present their findings and practitioners can learn of current research, issues, and trends. It has also been a great source of information used by people as part of their study visits or fellowships. Conference organisers are also grateful in advertising their events on a global scale.

The Australasian Libraries in Emergency Services Network

One other role the library has played, has been through the development of the Australasian Libraries in Emergency Services network or ALIES. This development was initially conceived under the guise of assistance to the States. We were able to develop and run two successful conferences where participants were accommodated and travel provided at the Commonwealth expense. The network has developed within each State and has been very useful in bringing together librarians from similar fields with common problems and issues. Within Victoria we have been able to develop some shared indexing and abstracting of common journals. The network also assisted with the development of this inFire conference. The network aims to:

- to promote and facilitate library development in emergency service agencies;
- to enhance the standing of emergency service agency libraries;
- to develop better utilisation of emergency service agency library resources and facilities;
- to promote more effective planning, development and operation of emergency service agency libraries;
- to promote opportunities for exchange of experience, skill and resources;
- to provide an avenue through which emergency service-wide library and information problems, concerns and interests can be addressed;
- to provide a mechanism through which emergency service agency libraries can contribute

to policy issues which specifically affect them;
- to provide an avenue through which emergency service agency library's special interests can be represented to the appropriate policy making bodies; and
- to enhance cooperation between emergency service agency libraries.

Informal information networks

One of the key factors of attending activities at the Institute is the opportunity to meet people from different States and Agencies. This enables people to break out of the strictly controlled agency environment. I call this part of the 'hidden curriculum'. However, as an Information Centre we must be seen to part of this informal network. This networking has enabled people within the field to, not only cross Agencies but cross States. The Information Centre is seen as one source that can cross these boundaries. If we did not participate in these Institute activities, the Centre would not be considered to be part of the network.

The library as a place

Our value and worth does not have to be seen as a physical identity such as a library but as staff who have knowledge, contacts and may know what is happening. The Information Centre does not have to exist as an entity in itself.

There is a perception that libraries are judged on their size of collection or staff and the larger it is, then it has to be better. As organisations become leaner, those in charge seem less interested in retaining the library as a physical place. In 1996, I was able to visit a number research centres of international repute and was quite surprised to find only very small offices. The quality and size of their establishments was not reflected their status or reputation in the field. A reputation of the library is built by the staff not the size and presentation of library. I agree with Butler (1997 p.553) who says *"stop protecting our physical space and concentrate on the bigger issues"*. These issues are what we do, how effective we are, and how we add value.

Planning

Having information skills can lead to providing a wider range of services and far greater opportunities for your organisation and yourself. The breaking out of the traditional duties and roles of a librarian is important. It is essential to plan, find out what your organisation's business is all about. Find out the strengths and weaknesses within your organisation and how you can use internal and external factors to achieve what you see is a valuable role, not necessary for you personally, but for your organisation, not just the library. Your worth will be judged not necessarily by how good you are, but what you bring to the organisation in terms value adding and effectiveness.

Within our business at the Institute we have to constantly remind our clientele that plans are not static documents but have very limited life spans and need to be constantly reviewed, changed or even scrapped according to the environment. So the process is more important that a final document as it only represents the current state of thought at that time. Often organisations are influenced by current issues or even personalities and as they come and go,

your plans needs to be checked against the prevailing winds of the day.

Positioning

Positioning your library along-side the important and dynamic functions of your organisation will enable you to access money, and resources and help you to be seen as an integral part of the business. It is necessary to meet the needs of the clientele in line with corporate objectives. I have also found that this may mean that you may have assist in writing the corporate objectives, or influence decision-makers and power brokers within your organisation. I have also found that your organisation's goals and objectives can change so be sure that you are flexible and if possible, be at the forefront of that change. We must ensure that we are close to the core business of our organisation to maintain our viability and access to resources. This may well mean changing services, products, relocating resources and energies.

One process may be through utilising reviews or analysis of library services. While many may see this as a risk taking, it is imperative that 'you' initiate such activities and assist in the channelling of desired outcomes. While we had many such internal reviews over the past decade the external review that we initiated was excellent in terms of its articulation of the role of the library within the organisation. The process by which it was conducted ensured that senior management and decision-makers were comfortable with its directions and outcomes. We were able to implement all of the significant recommendations with the support of the organisation. I own a debt of gratitude to the consultants Fay Nicholson and Margaret Findlay who developed a very good rapport with the senior management. Many of the recommendations had been the subject of past internal reviews but there seems to be more credibility given to external consultants and if this is the case, it is a very useful process to instigate provided you have some major control over it.

The review also enabled us to crystallise what our role was within the organisation and the field. We were able to develop a charter for our Centre, which has been incorporated into the management's corporate plan and its business planning. Thus it has established clear directions and broadened to scope of our horizons. It is as follows:

AUSTRALIAN EMERGENCY MANAGEMENT INFORMATION CENTRE CHARTER

The Australian Emergency Management Information Centre (AEMIC) is a national resource which promotes and supports all aspects of emergency management by:

- fostering and facilitating the exchange of emergency management information between agencies within Australia, and between Australian and overseas agencies;
- promoting and supporting education and training activities;
- providing a national reference and referral service, and facilitating access to emergency management information, including electronic and on-line access;

- developing and maintaining a focussed, multi-disciplinary emergency management collection of national significance;
- disseminating information through the development and distribution of appropriate services and products;
- leading and promoting the development of networking between emergency management information services; and
- facilitating the progress of research into aspects of emergency management both within Australia and internationally.

One thing is clear and that is, you will not be able to have much influence if you keep a low profile and be very lowly placed within the organisational structure. Your steps up are through developing alliances and deals with champions and the power brokers. These transactions must be seen in terms of Win-Win for them as people and the organisation, not necessarily you personally. Often you may provide a solution to situations or issues and it can be dropped or seemed to be ignored but it may reappear later as some other persons initiative, but so what, if it meets your long term objects then you have achieved what you have set out for. Most organisations find themselves in a learning mode and 'continuous improvement' is one of the buzz-words that are used today.

As a librarian for over a decade now, I found that continuous improvement is just part of the profession we are in, and has always been so. So we should be cognisant of continuous improvement for change as part of our organisation's business.

Corporate Knowledge

One benefit from the study of your organisation is the gaining of the historical knowledge of past events, people and responses. My organisation would be typical of most Agencies or businesses, in that many of its perceptions and procedures are based on responses to past crisis events, and are part of the corporate culture. Quite often even the memory of how the organisation reacted has been lost due to the staff retirement or retrenchment but its procedures and reactions to similar crisis are often based on these earlier events. Although many organisations stress that they should not reinvent the wheel, they in fact do, because corporate knowledge walks out the door. We, as librarians may be useful in holding the keys to such corporate knowledge but it will take time, effort and commitment to develop this knowledge. This knowledge often will provide an insight into the structure of corporate culture that will be useful in seeking assistance, allegiances and partnerships.

Conclusion

Many say that libraries are in a vulnerable position. Access to the Internet and informal information networks often by-pass the need for libraries and their collection of material. However, we have to change our game rather than our name. This case study of the AEMI Information Centre reveals that we have been able to achieve considerable expansion of our role which goes against the current trends of budget cut backs and downsizing. It has become a role that is not constricted by traditional library roles and approaches, one that is not

constrained by a place, and one that is not restricted to a collection basis. It has developed a role as an initiator and a creator of information.

Librarians need to know their organisations in terms of its business, politics, key decision-makers and power brokers. We have to know how to work effectively within the environment which is subject to constant threats and changes. We have to be at the forefront of change, both in terms of technology, financial restrictions, politics to be effective and ensure meaningful development of any information service. We have to know the corporate culture and the methods for achieving success and we have to know what the organisation is all about not just the library business. There is a need to be entrepreneurial, flexible, competitive, be part of a team or teams within the organisation, to form and strengthen alliances and partnerships.

So far I have been successful within my organisation but its like the stock market, you need to be examining the trends and influences effecting it to stay in business. If we were to examine our influence within the organisation, it may be useful in utilising a sociological exchange perspective (Turner 1986, p215). This views services in terms of social transactions of profit or loss. Information is a commodity that has different forms and different values according to the people requiring it. In utilising this perspective within my organisation I could see that the service transactions, provided by the managing the journal, brings considerable value to the organisation in terms of public relations. It is sought out by researchers, as a means to have their findings published and thus, places the library in a position of power and influence. This could be applied to many of the services and products the library now provides. We should view ourselves in positions of a marketplace where information is a commodity for which people negotiate with each other to have influence and power through its use or even its restriction.

Lastly being a leader within your organisation requires you to be effective. Covey's (1990) *"Seven Habits of Highly Effective People"*, requires you to be pro-active, have a vision and direction, be an integral part of the business, seek mutual goals, seek to understand and be understood, be prepared to step out of your comfort zones or mind-sets and be prepared to embrace change. As a result, should we continue to run a library or a service that meets needs, whatever that service turns out to be? We take the opportunities that confront us as challenges. Who knows where they can take you. In my case the library does not have walls, it has taken been out into the market place. Within the field, it has placed the library as a key player in the future of the industry. So beyond the walls is up to you.

Acknowledgments

I would like to thank my staff at the information Centre for without such team work over these past years breaking out of the mould would not have become a reality.

Bibliography

AusIndustry Best Practice Program (1995). ***Benchmarking Self Help Manual: Your organisation's guide to achieving best practice***. 2n Ed. AGPS. Canberra

Butler, Y. (1996) Carpe Diem - Seize the day or Lose the chance. ***On The Edge: Proceedings of the Seventh Asian Pacific Specials, Health and Law Librarians' Conference***. Perth October 12-16. pp. 549-562

Covey S. (1990) **The seven habits of highly effective people: restoring the charterer ethic**. Simon & Schuster, New York

Hussey, D. E. (1994) ***Strategic Management: Theory and Practice***. Pergamon, New York

Turner, J. H. (1986) ***The Structure of Sociological Theory***. The Dorsey press, Chicago, Illinios

Rob Fleming

Rob Fleming joined the Information Centre at the Australian Emergency Management Institute (AEMI) in March 1988. Since joining the Institute he has undertaken further studies in education and is currently completing further study in the field. During his time at AEMI Rob has overseen the development of information services to the Australian emergency management community. An important part of this development has been the enhancement of the Australian Journal of Emergency Management with its wider distribution and quality of content. He has seen the enhancement of research in the field through the establishment of the Australian Research Grants Program. His interests include research, sociology, classical music, travel, reading and gardening. His qualifications include, BA (Charles Sturt), Assoc Dip Lib Stud (Adelaide), Grad Dip Ed Tertiary (Melbourne), ALIA.

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Paper 23

Risk Management in CFA and the Response of the Information Service

Heather Wood, Country Fire Authority, Victoria

RISK MANAGEMENT IN CFA AND THE RESPONSE OF THE INFORMATION SERVICE

Heather Wood, Country Fire Authority, Victoria

In recent years the Country Fire Authority (CFA) has progressively adopted risk management principles as a core business activity. With this change there has been a shift in emphasis in the traditional role of the library service, with the (now) Information Service being seen more clearly as a contributor to corporate goals, and in particular as placing much greater emphasis on the management of corporate information. This paper examines the shift in emphasis in responsibilities to meet these goals.

Introduction

Risk management is something we all do, whether consciously or intuitively. It could be argued that librarians, or "information people" probably have a natural talent for certain aspects of risk management, possibly because of their ability to transfer the disciplines of logic, systems and process of librarianship into other situations.

This paper sets out to describe how the adoption of risk management principles by the Country Fire Authority (CFA) has resulted in a shift in emphasis in the traditional role of the library service, with the Information Service being seen more clearly as a contributor to corporate goals, and a greater emphasis being placed in the management of corporate information.

Background

What is risk management?

> "Risk management is the term applied to a logical and systematic method of identifying, analysing, assessing, treating, monitoring and communicating risks associated with any activity, function or process in a way that will enable organizations to minimize losses and maximise opportunities...
>
> "Risk management is recognized as an integral part of good management practice. To be effective, risk management should become part of an organization's culture. It should be integrated into the organization's philosophy, practices and business plans rather than be viewed or practiced as a separate program. When this is achieved, risk management becomes the business of everyone in the organisation."

"Everyone in the organisation". These quotations, taken from the preface of the Australian standard for Risk Management (AS/NZS 4360:1995, p2) emphasise how every part of an organisation has a role in the practice of risk management. In providing a range of services to management and staff the library function plays an important role in supporting the risk management process. This paper describes how the CFA's

Information Service contributes to the risk management process in CFA through the delivery of library and other more broader information services.

Risk management in the fire and emergency service

A risk management approach has been increasingly adopted by a wide range of organisations and agencies in recent years. Risk management as a discipline originated in the financial and insurance sectors in the post war period where it focused on issues such as cost control and insurance management.

Traditionally fire agencies have adopted a narrow, internal focus. In the past the management of risk was primarily centred on operational and financial activities such as occupational health and safety, facility maintenance and training.

However, in recent years significant changes within their operating environment has brought increasing pressure on fire and other public agencies to reduce spending, raise management accountability and focus on service delivery outcomes. This has resulted in the need for a far more rigorous and comprehensive approach to the "business" of service provision. As a result there has been a widening of the application of risk management. Smith, Nicholson and Collett (1996), put forward a more comprehensive view of risk management and the fire and emergency services and provides the following definition:

> "Risk management in the fire and emergency services can be defined as the use of industry-wide policies and community processes for minimising the frequency and impact of emergency incidents in the natural and built environments, and for dealing with a range of financial, strategic and operational risks before they have an adverse affect on the organisation and its personnel."

Risk management in CFA

The CFA is a community service organisation constituted under the County Fire Authority Act, 1958 and as an integrated team of around 70,000 volunteers and 800 staff, provides fire and emergency services through 1219 brigades to over 2.7 million people throughout regional Victoria (except for state forests and parks) and outer metropolitan Melbourne.

In around 1994 the CFA commenced a shift to integrating a risk management approach into the "culture" of the organisation. This enabled existing programs, particularly prevention to be integrated into a wider risk context and incorporated a whole set of other activities which had previously operated independently. These included such activities as regulatory compliance, strategic planning and community education.

Risk management in CFA is carried out as a strategic activity in two broad areas. The first is the management of corporate risks such as liability and regulatory compliance, occupational health and safety, communications planning and maintenance. Equally important is the management of a range of community risks including house and industrial fires, wildfire, rescue, hazardous materials and other emergencies.

This approach is now increasingly flowing through to brigade level with some brigades recognising the need to go further than the traditional fire prevention works, letter drops and schools activities and to develop a more integrated approach to servicing their community.

The Information Service and risk management

Since 1989 there has been a library at Headquarters which had its origins in the research and development section and a library at the Training College (Fiskville) for training materials. It would be fair to say that these two services faced the same pressures being brought to bear on the parent organisation - reduced spending, raised management accountability and a focus on service delivery outcomes.

In 1994 a review of "library" activities in CFA resulted in a renewed focus with the Training College library (now the Resource Centre) and the Headquarters library being integrated into the newly formed Information Service, the role of which was defined as "to support the achievement of CFA corporate objectives through the management and provision of timely, up-to-date and accurate information".

Today, despite its modest resources, the Information Service plays an active role in CFA risk management. Information Service activities fall into roughly four areas:

- Internet and Intranet development and maintenance,
- resource collection development and service,
- maintenance of resources and other workplace tools throughout the organisation, and
- other information related functions such as copyright obligations, policy and annual report input

The contribution of the Information Service to the risk management process in CFA occurs in two areas:

- the delivery of information for the risk management process throughout CFA, and
- the development and delivery of services which have a risk management component by the Information Service

Information for the CFA risk management process

How does the Information Service contribute to the risk management process? The short answer is that it continues to do what it and other libraries have done in the past - provides information.

A framework. Now, as in the case of all other activities, there is a renewed focus as services are being delivered within an established risk management framework, thus ensuring a systematic and focused approach.

Holistic viewpoint. The role of the librarian or information manager in an organisation usually involves servicing needs right across the organisation and is usually not confined

to one department or discipline, therefore librarians are generally well attuned to the broad range of issues affecting their organisation as a whole and to the activities of individual entities within the organisation. Consequently the Information Service, unlike most other departments, is well placed to provide a holistic view of the issues which the organisation faces and of the responses that it is making.

Proactivity. Because there is now a formal framework in which the risk management process operates, there is the opportunity to take a more proactive approach than that which may have been traditionally taken. This is particularly in relation to the risk identification stages of the process where a systematic scanning of the environment can identify risks which may not have been otherwise identified during the normal business processes.

Quality. Information used in risk management must be of good quality. It may not always be possible to have the best, or all information, however it should be as relevant, comprehensive and accurate and timely as resources will permit. (MAB/MIAC, 1996, p.23.) Here the Information Service plays a role assisting in the critical evaluation of resources based on their accessibility, expense and timeliness. This is of particular importance when dealing with information obtained from less authoritative sources, especially the Internet.

The Risk Management process. The following examination of the steps in the risk management framework reveals the degree of input which the Information Service provides to CFA. Each step has been rated in terms of pro- or reactivity. Where a reactive action has been assigned, this is to signify that, in general, the action will be predominantly reactive, however that is not to say that on occasions the Information Service will not be in a position to be more proactive in its services. To illustrate service delivery the issue of the "millennium bug" or year 2000 compliance is given as an example.

Step	**Focus of Level of Input**	**Action**	**Activities - comments and** *examples*
Establish context	High	proactive	environmental scanning *identifying Y2k issues*
		reactive	response to specific enquiries *providing info on Y2k government policies*
Identify risks	High	reactive	response to specific enquiries *supply of additional information on identified risks*
		proactive	environmental scanning *identifying risks not previously identified*
Analyse risks	Low	reactive	responding to requests for additional information *providing qualitative examples of how other agencies have analysed similar risks*
Evaluate/ assess risks	Medium	reactive	provide industry best practice examples *case studies on how other organisations have assessed risks, where other organisations have failed*
Risk treatment	Medium	reactive	provide examples of options for treatment *information on how other agencies have prioritised non-*

			compliance issues/ information on products and services available
Monitor and review	Low	reactive	continual monitoring of information which has contributed to the process identification of new software tools

Response: Information service development and delivery

1. *Traditional library services.* Within the limitations of available resources, the Information Service provides many of the services traditionally provided by libraries such as circulation of books and other materials, an informal current awareness and the maintenance of Standards and other workplace tools for departmental staff. Keeping staff up to date and giving them the opportunity to stay abreast of external environment maximises their input into the risk management process.

2. *Information management.* The development of services often require that decisions be made in the light of historical precedence. In the case of CFA, wildfire history is taken into account when developing risk management strategies for the protection of communities. Fire history data for Victoria has taken a number of formats since early settlement, from sketchy newspaper reports, to hand-written reports on significant fires, to the more sophisticated collection and Fire and Incident Reporting System (FIRS) of the present day. In an effort to provide a broad historical context, the Information Service has commenced the development of a Major Fires Database, attempting to gather in one location as much data as can be retrieved for wildfires of significance. This tool is available for use in fire prevention planning, wildfire threat analysis and other applications.

A similar project for the organisation of photographs and other images is currently under consideration.

3. *Internet.* A number of new products have been added in recent years to those traditionally supplied by a library service, most relating to the development and delivery of a number of Internet-based projects. The Information Service has overall responsibility for the administration of these activities, coordinating information technology and content contributors to create sites that are responsive to the needs of the wider public (web site) and the organisation (Intranet).

3.1 *CFA web site.* The CFA web site has recently undergone a major redevelopment and relocation. For the site to remain alive and interesting, it must constantly be changing - part of this change is to ensure that the site does not contain information which would be a source of corporate risk to CFA. As the Information Service is responsible for the overall content there is a requirement for the content to be monitored in terms of authority, currency, copyright and appropriateness of content.

3.2 *"Brigades on the 'net".* The expansion of the Internet has brought about the advent of "vanity publishing": the development of web sites by individuals. In addition to these have been sites developed by CFA brigades wishing to publicise their brigades. These were recognised as having the ability to compromise CFA with the risk that

brigades would publish information that is incorrect or not considered to be corporately acceptable. As it is impractical to ban these sites, the Information Service undertook a project which sought to limit the risk posed by them. It was decided to attempt to manage them through collaboration and peer acceptance. As a result a user group of brigade members with an interest in the Internet has been formed. This group, which is operated via a listserver, has developed a set of guidelines for acceptable brigade web sites, covering issues such as publishing of fire prevention material, copyright, use of CFA logo and corporate image. Those considered to comply with the guidelines are in turn linked to a "Brigades on the Net" web site which is endorsed by CFA. This project has succeeded in improving the quality of information published on these sites and providing some support for brigades with an interest in this technology.

3.3 *CFA Intranet.* CFA is in the process of re-developing a prototype Intranet into full production. An Intranet has the capacity to deliver services in two major areas: information delivery and interactive service delivery. Given that access to accurate and up-to-date information is crucial to the risk management process (like any other business activity), the CFA Intranet has the potential to be of major corporate significance. Issues such as information access, improved distribution and reduction of costs all play a significant role in improving the performance of CFA. The most significant advantage in risk management terms however, is the ability to centrally control the content of web information, thus ensuring that the whole organisation is working with the same, most up-to-date tools. Further development of the Intranet is to incorporate interactive applications to facilitate the delivery of services. This has the potential to radically change the way CFA does business. Each new application will require a full risk analysis to be conducted jointly by the business owner and by the Information Service.

The Future: where to now?

Simple: Information management - the ability to manage what we already know. A number of organisations have been reported as having suffered risk management failures because their knowledge management was inadequate (Swan, E. 1997). The ability to effectively manage corporate information will determine how well an organisation succeeds and it is this direction in which we must take if we are to serve our organisations effectively.

References

MAB/MIAC 1996. *Guidelines for Managing Risk in the Australian Public Service.* Canberra, ACT, Management Advisory Board /Management Improvement Advisory Committee.

Smith, P., Nicholson, J. & Collett, L. 1996, Risk management in Fire and Emergency Services. *The Australian Journal of Emergency Management.* 11 (2) p.5-13.

Standards Australia/Standards New Zealand. 1995 *AS/NZS 4360:1995. Risk Management.* Homebush, NSW. Standards Australia

Swan, E. 1997. Knowledge management - the management process for the 21st century?. *The Quality Magazine*. 6 (5), p.19-24.

Bio.

Heather Wood is the Manager of the Country Fire Authority (CFA) Information Service. She has worked with CFA since 1994, having previously held positions in public and school libraries. She has also had 20 years experience as a volunteer fire fighter. She can be contacted at h.wood@cfa.vic.gov.au.

inFire Conference Program

inFire Conference Program

CONFERENCE PROGRAM

SUNDAY 3 MAY, 1998

5.30 - 7.30pm — **Conference Get-Together** at the Melbourne Fire Museum, 48 Gisborne Street, East Melbourne. Taxi from hotels (only 10 minutes)

MONDAY 4 MAY, 1998 - THEATRE, 1st FLOOR

8.00am — **Registration Desk opens**

9.00am — **Official Welcome - Commander Terry Hunter, MFESB, Melbourne, Australia**

9.15am — **Official Opening - Michael Kroll, Fire Science Library. Safety Engineering Laboratories. Michigan. inFIRE Advisory Committee member**

Chair : *Rob Fleming*

9.30 - 10.30am — **Keynote speaker - Initiatives for Emergency Services Organisations - a National Perspective.**
Roger Jones. TEM Consultants. Victoria. Australia.
Roger will focus on the significant changes which have occurred in the 1990s in the political, physical and human environment with which emergency services operate, and in the emergency services themselves. He also will touch upon some aspects of the on-going information/communication `revolution' which are posing problems for those organisations in undertaking their roles in emergency management.

10.30 - 11.00am — **Morning Tea - Canteen, 1st Floor**

11.00am — **Information Needs for Risk Management Decision Making**
Dr Paul Barnes, Queensland Fire & Rescue Authority. Australia

11.45am- 12.30pm — **Peoples' Response During Structural Fires: An Overview of Research**
Patricia Brennan. Centre for Environmental Safety and Risk Engineering, Victoria University of Technology. Australia

12.30 - 1.00pm — **Lunch - Canteen, 1st Floor**

1.00 - 1.30pm — **STATIC DISPLAY OF VARIOUS FIRE APPLIANCES IN LOWER YARD**

1.30 - 2.00pm — **Need for Risk Management by Governments : a challenge for the 21st century**
Tom Wilmot and Tony Paish, World Fire Statistics Centre, England
The work of the World Fire Statistics Centre provides an example of how the collection, collation and analysis of the total costs of each of everyday hazards such as fire. Integration of the risk management/hazard minimisation activities of different government departments and/or public institutions would next need to be considered, together with the possibility of increasing efficiency through privatisation of some activities (such as the Danish example of the Falck organisation).

2.00- 3.00pm — **Fire Fatalities In Australia**
Judy Newton, Department of Emergency Services, Queensland. Australia
The "Fire at Risk Groups" project represents a critical step in the development of enhanced strategies to reduce the number of fire fatalities in Australia and hence the overall cost to the community of fires

3.00 - 3.30pm — **Afternoon tea - Canteen, 1st Floor**

3.30 - 4.15pm — **Real Time Information in a Decentralised Fire Service**
Stephen Walls, Manager CFA State Operations Management Plan. Victoria. Australia
Stephen will explain a unique computerised information system called the Operations Management System (OMS) which runs on a client-server computer system and provides information on predicted and actual weather, fire spread, resources in use and fire control strategies. Integrated into the system are fuel curing information from satellites and real time weather information from a network of remote automatic weather stations

4.30 - 5.30pm — **Optional Activities**

- Discussion and demonstration of the FireCD and other information products by Jill Bennett, Editor FireCD, UK, and Tessa Sampson, Product Manager Electronic Media, DA Information, Melbourne - **Theatre, 1st Floor**

- Discussion with Sandra Lunardi, Melbourne, Australia (Australasian Fire Authorities Council) on the AFAC Learning Manuals and Australian Firefighter Competency Modules - **Theatre, 3rd Floor**

- Paper by Jeanine Driessens, ANPI, NVBB Service Documentation, Belgium on the importance and value of the EN Standards and European Legislation - **Room 301, 3rd Floor**

6.30 - 9.30pm — **Evening dinner at nearby Vietnamese restaurant - Loi Loi**
364 Victoria St, Richmond
Banquet $18/person

CONFERENCE PROGRAM

TUESDAY 5 MAY, 1998

Theatre - 1st floor — Chair: *Jill Don*

9.00 - 10.00am — **Assessing the Impact of Fire Risk Communication**
Bernd Rohrmann, University of Melbourne, School of Behavioural Sciences
Bernd will elaborate on methodological considerations, dealing with evaluation approaches, assessment criteria and study design for risk information / communication / education about fire hazard prevention, focussing on the socio-psychological factors which influence community safety campaigns.

10.00 - 10.30am — **Partners in Protecting the Community**
Commander Wayne Bradborn. MFESB, Melbourne, Australia
Wayne's presentation will be on the installation of active fire protection equipment in the Community Residential Units in Victoria. Also how the Metropolitan Fire and Emergency Services has partnered with the Human Services in developing a self-paced learning package to prepare carers to firstly prevent fires from eventuating and if the need did arise, the ability to initiate the correct procedures to help guarantee the safety of the occupants

10.30 - 11.00am — **Morning tea - Canteen, 1st Floor**

11.00 - 11.45am — **Fire Behaviour Prediction. Information in Anticipation, Through Coupled Meso-Meteorological Models**
David Packham, Department of Geography & Environmental Sciences. Monash University, Victoria. Australia
Video presentation on a joint project between the National Centre for Atmosphere Research in Boulder, Colorado, Monash University, Department of Applied Mathematics, Australian Research Grants Commission and Country Fire Authority, Victoria

11.45 - 12.30pm — **Realistic Hot Fire Training to Deal Safely with Flashover and Backdraft**
Shan Raffel, Station Officer, Queensland Fire & Rescue Authority, Australia
Shan will discuss the need for realistic training methods to teach firefighters how to safely deal with flashover and backdraft

12.30 - 1.30pm — **Lunch - Canteen, 1st Floor**

FPAA - Display of fire information resources in lecture room adjacent to canteen. Meet Bob Sutcliffe, Manager - Sales, Fire Protection Association Australia

1.30 - 2.15pm — **Vehicle Mounted Data Systems**
Ian Taylor, Station Officer on an Exchange Program from UK now stationed at the ACT Fire Brigade
Following a large fire in a factory in the county of Hereford & Worcester in UK, where two firefighters lost their life, the Health & Safety Executive found that insufficient information was available to oncoming crews of the risks they may face on arrival at such an incident. To overcome this, CFO David O'Dwyer threw down the gauntlet to industry to provide a vehicle mounted computer system which could provide data on mobilisation, on route and at the scene of the incident. In March 1996 all 37 front-line fire appliances were installed with these computers and one Home Office Official described it as the greatest advance in the fire service for 20 years
Includes a short video and computer aided presentation

2.15 - 3.00pm — **Community Fireguard : Creating Partnerships with the Community to Minimise the Impact of Wildfire**
Jon Boura. Municipal Programs Officer. Country Fire Authority. Melbourne, Victoria, Australia
Community Fireguard recognises that on days of extreme wildfire danger, suppression capabilities are limited and CFA cannot guarantee protection of each property. Enabling residents to accept responsibility for their own safety, means that CFA is not only reducing wildfire threat, but also transferring risk to those best able to manage it. - the residents. Jon will describe the principles to empowerment on which Community Fireguard is based and the efficacy of the program in reducing losses in recent wildfires

3.00- 3.30pm — **Afternoon tea - Canteen, 1st Floor**

3.30 - 4.30pm — **High Rise Fire Pattaya Thailand Investigation**
Garry Martin, Inspector, AFSM, MFESB, Melbourne, Victoria, Australia
Garry will talk about the history of building legislation in Thailand, the history of the Royal Jomtien Hotel, detail relative to the fire investigation, the problems of investigating in a non-English speaking country and the lessons learnt from the investigation

4.30 - 5.30pm — **Optional Activities**
- Internet Demonstration Sessions of Fire Information Library Catalogues around the world

7.00 - 9.00pm — **Bon Bons Cafe**
Mid-level, Southgate Complex, South Melbourne

CONFERENCE PROGRAM

WEDNESDAY 6 MAY, 1998

Jeff Godfredson Theatre - 3rd flr — Chair: *Nora Jason*

9.00 - 9.45am	**Focusing on the Front Line** *Anne Pickles, Brigades Information Co-ordinator. NSW Fire Brigades. Australia* Anne will provide an overview of the NSW Fire Brigades Information Management Policy which includes Intranet supporting an Operational Information System, a new system for recording Australian Incident Reporting System data, Competency Based Training manuals and access to standard information resources.
9.45 - 10.30am	**Knowledge Management : What is it and what do we do about it?** *Janet Green, Manager, Technical Information Center, Factory Mutual Research Corp. Norwood, Massachussetts, USA* Janet will discuss the definitions and examine the components of knowledge management to determine what skills and resources are necessary to successfully manage knowledge. Included will be examples of organisations who actually have knowledge management programs currently in operation. The role of the library and tradition library charge of collecting, organising and disseminating information and how this relates to knowledge management will be investigated.
10.30 - 11.00am	**Morning tea - (lounge : rear of canteen, 1st floor)**
11.00am - 12.30pm	**Panel Discussion. Putting Your Library on the Internet/Intranet. What are the Issues Involved?** *Rob Fleming, Emergency Management Australia.* *Nora Jason, National Institute of Standards & Technology, USA.* *Patricia Roddick, University of Canterbury, New Zealand.* *Mike Culhane, National Research Council, Canada.*
12.30 - 1.00pm	**Lunch - (lounge : rear of canteen, 1st floor)**
1.00 - 5.30pm	Coach trip to Country Fire Authority Computer Information Centre, Tally-Ho Technology Park, Burwood East for a demonstration on Geographic Information Systems and then to the beautiful Dandenong Ranges National Park William Ricketts Reserve. In the reserve there are sculptures depicting Australian Aborigines and bush creatures. Afternoon tea provided at Churinga Cafe. Bus transport to Central Melbourne.
7.00 - 10.00pm	Dine at the hotel or one of the nearby cafes. You may need a rest night. Optional visit to the new Melbourne Casino. Tram or taxi (10 minutes)

THURSDAY 7 MAY, 1998

Jeff Godfredson Theatre - 3rd flr — Chair: *Anne Pickles*

9.00 - 9.45am	**The Australian Institute of Police Management and Information Literacy Programs for Professionalism** *Margaret Davson. Manager Library & Information Services. Australian Institute of Police Management. Sydney. Australia* Margaret's paper looks at how more than ever, it is vital for emergency management professionals to have skills in using libraries and information gathering (intelligence). The development of library & information skills into the curriculum of courses held at the Australian Insitutue of Police Management will also be presented.
9.45 - 10.30am	**A Customer-defined Library Service for Emergency Services Personnel** *Jill Don, Librarian-in-Charge, Department of Emergency Services, Queensland. Australia* Jill's paper summarises the review process of the Queensland Department of Emergency Services Library and presents some of the options for providing information to a diverse group of emergency service personnel.
10.30 - 11.00am	**Morning tea - (lounge : rear of canteen, 1st floor)**
11.00 - 11.45am	**Panel Discussion on Teaching Information Searching Skills to Emergency Services Professionals** *Rob Fleming* — *EMA, Australia* *Margaret Davson* — *Police, Australia* *Nina McPherson* — *Fire, Australia* *Paul Bladen,* — *CSIRO, Australia* *Patricia Roddick* — *University, New Zealand*
12.30 - 1.00pm	**Lunch - (lounge : rear of canteen, 1st floor)**
1.00 - 1.30pm	**Optional Activities**

- Discussion and demonstration of the FireCD and other information products by Jill Bennett, Editor FireCD, UK, and Tessa Sampson, Product Manager Electronic Media, DA Information, Melbourne **Library, 3rd Floor**

- Discussion with Sandra Lunardi, Melbourne, Australia (Australasian Fire Authorities Council) on the AFAC Learning Manuals and Australian Firefighter Competency Modules **- Theatre, 3rd Floor**

CONFERENCE PROGRAM

THURSDAY (cont'd) 7 MAY, 1998

1.30 - 2.15pm **Preservation and Restoration of Library Collections from Fire**
Nora H Jason. National Institute of Standards and Technology, Gaithersburg, Maryland, USA
One of the roles of library collections is to preserve and protect the universal knowledge from natural and unnatural disasters whether they be housed in large copyright libraries (e.g., the Library of Congress in the United States), or in small secialised collections (e.g., the Fire Research Information Services). The first step is to develop a plan of action before there is an earthquake, fire or other type of disaster. A disaster plan includes but is not limited to fire protection systems, fire department activity, and management and staff responsibilities. Rehabilitation of items exposed to excessive water and/or smoke damage will be highlighted. The elements that such a plan should include will be discussed together with appropriate response.

2.15 - 3.00pm **New Parents : the Intranet at the Fire & Rescue Service of Western Australia**
Elizabeth Hides, Library Manager. Fire & Rescue Service of Western Australia
Elizabeth's paper will explain how Intranet was piloted at the Fire & Rescue Service of Western Australia through two projects : the internal telephone directory and circulars that contain information of operational relevance and job vacancies.

3.00 - 3.30pm **Afternoon tea - (lounge : rear of canteen, 1st floor)**

3.30 - 4.00pm **Group photograph & networking**

4.00 - 5.30pm **Optional Activities**

- NIST BFRL Publication 1997 CDROM : demonstration by Nora Jason - **Theatre, 3rd Floor**

- Discussion and demonstration of the FireCD and other information products by Jill Bennett, Editor FireCD, UK, and Tessa Sampson, Product Manager Electronic Media, DA Information, Melbourne **Library, 3rd Floor**

6.30 - 11.00pm **Conference dinner :** a Zoo-B-Cues in the Rainforest Room. (Taxi to the Melbourne Zoo - 10 minutes from hotel)

Dr David Ranson. Victorian Institute of Forensic Medicine - guest dinner speaker

Michael Kroll, Fire Science Library, Safety Engineering Laboratories, Michigan will make some presentations on behalf of the inFIRE Advisory Committee

FRIDAY 8 MAY, 1998

Jeff Godfredson Theatre - 3rd flr **Chair:** *Nina McPherson*

9.45 - 10.30am **CSIRO InfoBuild : Information Brokering in the Construction Industry**
Gaye McDermott, Manager, CSIRO Building Information Resource Centre
Gaye's paper addresses the marketing of InfoBuild, the difference in kinds and levels of information required by the industry and impediments and opportunities available to information brokers operating in such a market

9.45 - 10.30am **Beyond the Walls to Where**
Rob Fleming, Assistant Director. Information Services, Australian Emergency Management Institute
A case study of the development of the Information Centre at AEMI and how it met the information needs of the internal and external clientele and how it has strategically placed the role of the library within the organisation for future development

10.30 - 11.00am **Morning tea - (lounge : rear of canteen, 1st floor)**

11.00 - 11.45am **Risk Management in CFA and the Response of the Information Service**
Heather Wood, CFA Manager Information Centre, Melbourne, Australia
Over recent years, the Country Fire Authority has progressively adopted risk management principles as a core business activity. With this change there has been a shift of emphasis in the traditional role of the library service, with the (now) Information Service being seen more clearly as a contributor to corporate information. This paper examines the shift in emphasis in responsibilities to meet these goals and reports on a risk assessment carried out on information services functions and services

11.45 - 12.30pm **Closing Comments**
Nora H. Jason

12.30pm - onwards **Lunch & Networking - (lounge : rear of canteen, 1st floor)**