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Regulating safety in an unsafe world (risk reduction *for* and *with* communities)

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Abstract

Safety regulators and the public they serve often have contrasting views on risk perception and the veracity of institutional estimates of risk and harm. Conflict and distrust between these groups is often a result of a lack of public involvement in decision making on safety related matters. Such concerns also emerge from differences in professional training, authority and experience between the groups. Fire services internationally, carryout fire safety assessments on behalf of communities. This assessment role is unusual in that unlike conventional approaches to regulatory safety assessment, fire fighters are direct end-users of their own regulatory assessment and closer to the people they protect. This paper discusses how fire services are beginning to seek closer links with communities by defining clear regulatory frameworks for conventional safety assessments and conceptual frameworks that allow a redefinition of their role towards establishing partnerships with communities to promote sustained safety. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

From a social science perspective, risk perception involves people's feelings, beliefs, attitudes and judgements about the nature of certain types of (i.e. from industry) or resultant harm or loss [1]. Such beliefs and opinions are at the core of public opposition to a range of potentially hazardous technologies and concern about the safety of these technologies [2].

A common problem for institutional regulators where conflict exists over community safety is public disbelief about official reassurances of minimal risk to life or health from a particular hazard or technology. Fear of large scale industrial disasters or concern about

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harm from less visible ‘slow-burn’ toxic exposures are often seen as misplaced by authorities who point to more obvious threats to health and well-being existing in everyday life [3].

Three factors are known to be important in explaining this concern and disbelief. Credibility may have been affected by a lack of public trust and confidence in the institutions involved in the control of hazards and regulation of risk [4,5]; the failure to disclose key pieces of information; or by inaccuracies in the communication process [6]. Such concerns can also be influenced by the political context of past bureaucratic decisions and public involvement in those decisions [7]. Other factors such as inequity in exposure to harm, or fear of the catastrophic potential of some hazard or the safety and acceptability of a range of modern technologies, are also important [2,8].

This chasm of distrust and disbelief between the public on one side and regulatory authority on the other, has been a central issue in institutional regulation of safety over an extended period [2,5]. Differences such as this have broad significance for ongoing policy development on harm minimisation and regulatory governance in particular. Early commentators on this phenomenon suggested that people were exhibiting irrational behaviour or had a deficient understanding of science, especially the science of risk assessment [9]. While these explanations may be initially inviting, they are by themselves, simplistic and condescending.

In representative democracies, it is inevitable that decisions about safety at a societal level are made by others. People can evacuate their homes as a cyclone approaches, or choose to take part in certain hazardous activities, but they cannot avoid the results of another person’s decisions. For people who are not involved in that decision-making process, issues are likely to look different. A double standard might be evident in the evaluation of risk (the potential for harm) in some situation depending on whether an individual is in control of a situation or its further development [10]. Regulatory governance in the form of safety assessment based on standardised criteria is often incomplete, as it does not consider the complexity of human interaction with and as part of socio-technical systems [11]. What is often absent is a view that risk analysis is a political process informed by appropriate degrees of public involvement.

This paper presents details of approaches to risk and governance applied in a number of emergency services settings in Australia. Details of two evolving operational frameworks are discussed in the context of prevention and mitigation activities in pre- and post-emergency settings. The first framework is a mechanism for defining the regulatory risk assessment work of modern fire services. The second framework defines a conceptual approach for public consultation carried out not from an institutional perspective but by directly engaging people at the community level. The paper begins with an examination of very real differences in perception and belief between institutional authorities and the public in respect to risk and the regulation of safety.

2. Differences in perception between experts and the public

Discussion of the differences between institutions and the public begins with pre-industrial society. Traditional societies are known to have relied on myth and metaphor for explaining the meaning and purpose of disasters and other catastrophic events disruptive to the social fabric [12]. Explanation of the nature of danger, the prediction of calamity and the

communication of information on the avoidance of hazardous situations was predominantly a community-based process. This might be expected as it has been noted that shared ritualistic practices are often evident in situations where doubt, uncertainty and risk are present [13]. In post-traditional times, however, response to danger and situations of harm have been transformed from the level of folk discourse to that of an expert centred concept [14].

It should not be assumed, however, that traditional systems of meaning are less rational than those present in modern society. Such belief systems are as valid for operation within traditional social and cultural settings as are human approaches to existence in the post-traditional (globalised) world. In this sense, a conception that tribal people possess primitive systems of belief is entirely inappropriate. Traditional practices such as folk medicine for example has often been found as empirically sound and steeped in group-tradition. Further many forms of 'magical' medicine regularly seek to determine cause and effect (as in modern science), even though explanation of the phenomena and causes involved may be derived from metaphysical sources of knowledge [15].

The translation of 'risk' from community to expert responsibility occurred along side the historically unprecedented increase in both the scale and amount of technological development worldwide and the rise of the modern state as the dominant political institution [14]. Along with the laudable benefits to society derived from this techno-industrial expansion has come an increasing variety of costs, both actual and potential [16]. Of these costs, concerns about global environmental quality, pollution and industrial accidents have increased public sensitivity to health and safety and hazards in general. The political legitimacy of the modern state as a bureaucratic entity derives from claims that it can best protect the public from harm. In order to provide this protection efficiently and effectively, societal response to hazards and resultant risk was raised from a community-based activity to one carried out by a professionalised bureaucracy [14].

Accompanying this prestige of expertise and the power of authority came a certain arrogance; an ideology of expertise' [17]. Such expertise might presuppose a greater fitness for decision making naturally expressed by certain credentialed individuals. It may also be presumed that a non-credentialed lay-public could not gain such standing. It has been suggested that many scientists view their work as an exclusive rite for a few initiates and see little need or responsibility for the provision of information to the public [18]. Like any specialised group such an elite possesses unique sets of norms, linguistic conventions, processes of socialisation and specific cultural forms of behaviour. The activities of these elites became imbued with scientific and decision making authority especially in the area of policy formation with most decisions relating to societal safety being made at a centralised, institutional level rather than at an individual or community level [19–21]. Socially and culturally, such groups are very different from a generalised public. In general, they operate from within institutions and large organisations [22].

With the professionalisation of risk and hazard analysis came certain preferred frameworks for problem definition and decision making based on a 'technical' worldview. For expert risk assessors, information of relevance was more likely to be expressed in technical terms and their approach to risk communication problems may assume the inability of the public to understand technical knowledge [23]. For a technical elite, the inability of a public audience to understand accurate risk estimates correctly may be seen as analogous to the situation faced by engineering students in their first semester. 'They are ignorant but

well intentioned, hard working but without a clue' [24]. If the public are really 'would-be engineers' then they need only to be filled with the requisite amount of technical detail. Then they would share the same understanding as the technical elite and all perceptual differences would dissolve. A number of explanatory frameworks have been developed to examine important factors and symbolic dimensions of expert and public attitudes towards hazards and the risks that they create [14,25,26]. A definitive model identifies two broad thematic worldviews: a technical rationale and a cultural rationale.

A technical rationality encompasses the position that risk can be studied independently of the social context in which it is embedded and experienced. A cultural rationale, however, does not discount technical knowledge but seeks to incorporate it into a broader experience-based decision making framework. Both themes are valid within their own value systems but are potentially antagonistic. Manifestation of such a technical rationale could be derived from a reliance on scientific frames of reference displayed by some technocrats and their beliefs about the certainty of technical knowledge. These assumptions may be symptomatic of institutional blind spots that automatically devalue the contextual experience of risk. Furthermore, such frames of reference while recognising certain technically accessible issues can miss a whole dimension of perceptual and evaluative criteria relevant to public concern [6]. An over-reliance on seeking answers only from a technocratic elite may in fact enhance an inculcated sense of helplessness and apathy in the public.

A variation of this taxonomy of technical and cultural viewpoints has been noted in a study of conceptual differences between engineers and anthropologists in their approach to development issues [27]. Significant ontological differences were noted across the two professions with clear differences identified regarding their approach to development issues (contrasting a focus on 'things' versus a focus on 'people') and reinforcing profound and extreme dissimilarities between technical (in this case engineers) and public worldviews. These findings strongly support notions of what Snow referred to as the 'two cultures' [28]. Snow's work emphasised different intellectual and professional mindsets contributed to vast differences in methodology, problem definition and approaches to problem resolution. It has been suggested that such differing views about safety within modern society should be seen not merely as independent ideas or personal preferences but as expressions reflecting different underlying social and political structures [29]. Thus, within a theoretical landscape covering a 'centre' and a 'border', people may accept a range of political judgements about human nature and the physical world that support either position. Individuals having made choices about which of the social institutions they are most comfortable with then align their decisions to fit the arguments that best fit their chosen political stance. Following this, each grouping exhibits a tendency to be immune to contrasting reason or argument as both centre and border take the view that the other side is in opposition. Dichotomies like the centre–border and technical–cultural however, offer a simplistic view on these issues by presenting an illusion of separate homogeneous groupings [30]. In addition, these frameworks define very crude political stratifications representing a multitude of stakeholders that may be interested and active in relevant issues. Furthermore, such theoretical classifications do not include the everyday experiences of minority groups or those with limited economic or political choice, power or influence [30].

Variable and often extreme contrast both on ontological and epistemological grounds is a common point among all of these analyses of technical and the non-technical viewpoints.

These contrasting positions may be seen as symptoms of the differences between a personal experience of a particular reality and science's explanation of the same reality [31]. The notion of the 'experience' of harm is of critical importance. While human reactions to risks (threats) have been recognised as a socially created and defined phenomena [23,32–35], systematic assessment of the social and cultural dimensions in which threats are experienced remain relatively unaddressed. Institutional response in cases of public concern, historically, has been to discover the scope of public misunderstanding or misperception of the 'real' risks. Once the level of misapprehension has been gauged and its extent mapped out a common institutional reaction has been to 'treat' it with risk communication. It seems logical to assume that if a comprehensive appreciation of the nature of public concern about an issue is not available then attempts to communicate away these worries may be at best ineffective and inappropriate. At worst, presumptive attempts to educate the public could add to what may already be a situation of distrust and diminished confidence.

3. Regulatory risk assessment by fire services

In contrast to the notion of regulation-at-a-distance discussed above, the safety activities of fire services are very different. Fire services respond to certain types of emergency incidents. While many of these are not preventable, regulatory assessment can affect the likelihood of occurrence of many of them. Traditionally, the mandate of fire services worldwide has focussed on extinguishing fires. A general international trend in service delivery among fire services is a de-emphasis on resource intensive response capacity and a shift to putting greater emphasis on the prevention of emergencies with the retention of an effective ability to react when needed.

Effective prevention requires sustained activity and focus in areas where emergencies occur and have their greatest impact — local communities. While a number of exceptions exist, coordinated prevention programs used by fire services aimed at enhancing safety at the community-level, have remained relatively underdeveloped in recent times. Fire services carry out an unusual regulatory role.

Rather than the polarised extremes discussed above fire services are closely associated with the results of their own regulatory assessment as end-users of the safety standards that they regulate. Other than for compliance inspections and audits it is unlikely that safety regulators from other industries would become involved with a situation directly related to the issues regulated as an end-user of their own legislative outcomes. A health and sanitation inspector for example, would not normally rely on compliance with food safety laws in the direct line of their work. They are not for example required to confirm regulatory compliance by restaurants from sampling (eating) the food. It is a convention internationally, that fire services are involved in the regulation of fire safety in buildings. This regulatory process is preventive in that its purpose is to reduce the likelihood of ignition, minimise loss by restricting propagation of a fire, or providing the means of early warning that ignition has occurred. As a result, the risk of loss of life and property is reduced. This regulatory role might entail ensuring that building designs include features such as fire rated doors and walls or have a suitable number of water hydrants positioned correctly throughout the structure.

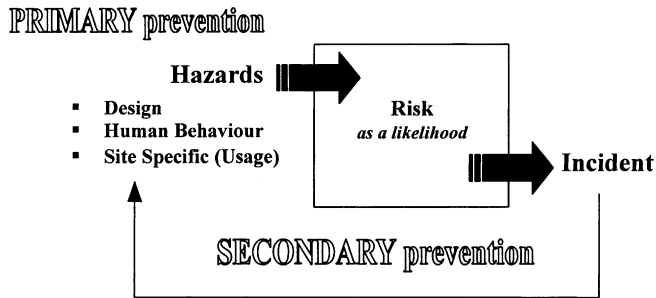


Fig. 1. An incident-based governance framework [36].

Regulatory requirements for such features vary from relatively straightforward prescriptive elements of a building code to fully performance-based regulatory environments.

Compliance with regulatory and maintenance requirements of fire detection and suppression systems in buildings is as critical for the survival of the visiting public as they are for fire fighters during a response. For example, 2 h rated fire escape doors may be required in a multilevel building by law (i.e. the door retains structural integrity for at least 2 h if affected by fire). Many modern building designs include fire escape stairwells that are pressurised to prevent smoke from entering the space. In addition to escape, fire stairs are used by fire fighters to move equipment into a building to the location of the incident. This access into the burning building is critical as power to lifts is often unavailable during emergencies. Failure of a fire door in such circumstances would impact heavily on these activities and place the responders in extreme danger in addition to reducing the likelihood of a safe escape for building occupants.

Regulatory assessment as described above focuses predominantly on early detection of combustion, warning and enhancing the means of escape. The notion of fire services in a self-referential role, as end-user of regulatory assessment, however, is incomplete without consideration of the reality of emergency response. How is *prevention* and *response* co-related in a single regulatory framework? A process being explored in Australia is based on the notion of a hazard — incident continuum. Fig. 1 details this framework.

A basic premise of the framework is that fire services are unlikely to ever accurately and consistently predict when an incident will occur. Given careful analysis, however, and willing human capital, it may be possible to anticipate the general location and type of emergency events over a specific period.

Thus, the framework is predicated on the basis of recognised fire safety assessments and specific post-incident responses. As a governance framework, this entails a two phased prevention process: Primary and Secondary prevention.

Primary prevention: The pre-incident fire safety assessments are in reality, hazard identification and characterisation functions. They focus on existing regulatory requirements for safe design. Emergency planning requirements for industrial developments (site and off-site specific) provide both hazard related processes but include details of risk and impact mitigation. Community education practices and other awareness raising activities aim at change behaviour and promote sustained awareness that fire safety and other safety issues should

become normative. This initial process of prevention is intended to reduce the likelihood of emergency events (risk reduction). Historically, when fire or emergency event occurs, investigation activities are carried out to determine causal factors, triggers or other contributory issues. The integrated process defined here includes investigation of events from a more comprehensive perspective. The need for this more complete approach derives from the reality that human behaviour, site specific hazards and failures related to design or construction all contribute to the *cause(s)* of emergency events. The results of these activities form a process of secondary prevention.

Secondary prevention: The post-incident phase begins with an examination of an event from a number of critical perspectives and aims to produce varied types of causal information. Conceptually, this approach could resemble a HAZOP study in reverse. It is further considered that the analysis of failure within socio-technical systems is a challenge that requires the application of a detailed, sophisticated methodology implemented by multi-skilled teams. This information will then be included in reports that are made available to members of the design and building industry to inform future design and construction activities. For example, if a fire occurred in a building designed under performance-based construction rules or codes, causal analysis may identify previously unknown conditions that were not accounted for in the conceptual approach used. In such circumstances, findings once clarified and confirmed would be used to brief the relevant Standards Association and thus enhance the regulatory criteria. Similarly, behavioural issues if found to be critical to initiation of the event, or its propagation, can be used to reinforce community safety messages and other community-focussed prevention work. If such behaviour was found to be related to non-compliance with legislative safety requirements, appropriate measures may also be taken.

A further outcome of use of the framework allows fire services to direct their prevention and risk reduction activities where they will be most effective. In this way assessors 'close-the-loop' between hazards (contextual, specific and unknown) and emergency events. It defines a means by which post-regulatory activities can be applied to maximise benefit in the community. The regulatory framework examined above provides an operational structure for defining how risk reduction can be carried out *for* communities.

The following section examines a theoretical framework defining the second element of the title of this paper: risk reduction *with* communities.

4. A wider context: a community-focussed governance framework

A reality that may not be freely acknowledged among fire services is the existence of a form of the Pareto Principle operating within society. That is 80% of their resource demand (expressed in their actual emergency responses) deriving from 20% of the population they serve. While this is obviously an exaggeration, the notion of significant differences in vulnerability across socio-demographic categories is a key issue.

In Australia and many other countries, incident data consistently indicates that disadvantaged communities are at a higher risk of involvement in emergency situations (fires and other incidents). In addition to this they are often the most difficult groupings to reach with prevention messages and information provision. Clearly, such at-risk groupings could not

Table 1
Conceptual goals

Goal
To promote improved and sustained levels of fire safety in target communities
Objectives
To better understand the culturally specific safety needs of the target communities and how fire service personnel can engage with culturally diverse communities
To assist the communities in taking more control over their own safety
To improve efficiency and effectiveness of delivering safety information to the target communities
Strategies
Carry out an in-depth assessment of community fire safety and general safety needs
Establish ongoing contact with community groups and community members
Review existing prevention programs to ensure that they match the cultural and socio-economic needs of the community
Offer activities that match expressed community need
Participate in a coordinated network linking public and non-public agencies and the communities to meet identified needs

be put in the ‘too-hard-basket’. Fire services are generally very familiar with the groups that are at-risk from fire in communities with and many of the causal links for injury and fatalities are known. There is, however, a resistance to conventional fire education messages. Liberal doses of educational ‘penicillin’ however, are not appropriate as a means of addressing the problems. An approach to such situations derived from the community development paradigm was defined within the Queensland Fire and Rescue Authority. The initial approach in this study involved seeking to generate three *enabling* processes in the target communities:

- *Self-help*: Empowerment of individuals and groups.
- *Mutual-aid*: Strengthening community representation, involvement and control.
- *Promote safer environments*: Effective building fire safety and enhanced individual and group safety awareness.

This community safety concept was designed to be part of an urban and community renewal process in targeted disadvantaged communities. By working with other government agencies a key outcome was to find out how the Fire and Rescue Authority could assist a community by designing prevention programs that were culturally acceptable and designed with the self-expressed needs of the communities. Conceptual goals are listed in Table 1.

In the context of urban renewal and the revitalisation of urban landscapes, the approach was designed to seek to better understand how to engender an enhanced and sustained awareness of fire safety among the people in these communities given the socio-demographic constraints under which they live. The conceptual framework underpinning this work is shown in Fig. 2. Based on models of community development used in public health, it begins with the notion that sustained community safety is a result of a balance between a *viable* built and ambient environment; an *adequately prosperous* local economy; and a *convivial* community.

The direct fire service contribution in this framework is to assist in promoting the viability of built and ambient environments. But by assisting community groups in self-protection

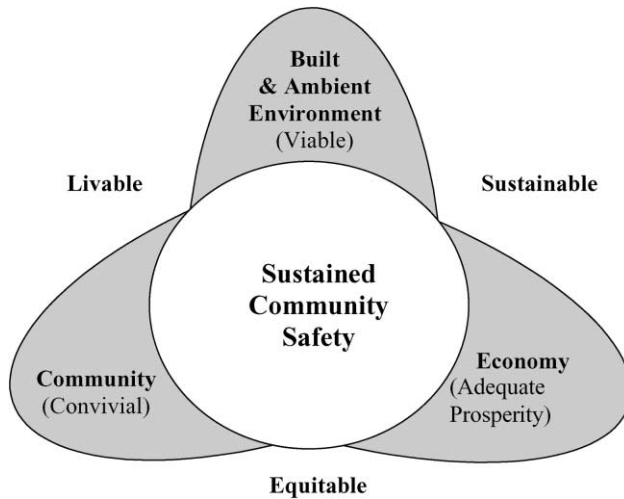


Fig. 2. Community safety framework (derived from [37]).

and mutual support, enhancement of conviviality of life in the community itself was a goal. Approaches such as that embodied above are being explored in greater depth and have had strong support across Australia.

5. Discussion

The notion that members of the public continue to retain a community-based response to issues related to hazard and risk is an important consideration. How may this notion of community manifest? ‘Community’ may be defined as a place or locality (i.e. residential units, a neighbourhood, a town, a cyber-space interest group), or equally as a network of people defined by a common interest [39]. These groupings can be ephemeral and emerge only in response to some perceived threat or concern about an issue. The first step in addressing the distance between institutions and the public therefore must involve accepting that there is a vast range of possible stakeholders (within community settings) who are significantly different to one another.

Opportunities exist for an expanded repertoire for the expression of scientific and regulatory uncertainty. This form of enhanced communication should be seen as part of a process that seeks a convergence of meaning between different participants who have equal but different contributions to make to societal decisions [23]. Thus, the credibility gap noted earlier may be seen not as merely a distance between institutions and an amorphous public but a space between a stereotypical, monoglot technical elite and a culturally diverse polyglot society. The regulatory role of fire services in Australia has broadened. Both prevention and response capacities have equally important parts in new approaches to service delivery. There are also many instances, internationally, where indicators of fire service performance

explicitly focus on reduction in the instance of preventable death or injury. At the national level, within Australia, clearly defined policy changes have supported a paradigm change towards community safety as contrasted with historical notions of fire safety. The changes required to facilitate such variation are both internal to fire services themselves with (new work and tasking patterns) and externally (the manner contact with clients — the public). Similar patterns of change in approaches to prevention are also occurring internationally [38].

Profiling a regulatory model (Fig. 1) that explicitly seeks root causes of emergency incidents and applied gained knowledge to prevent the likelihood of incidents re-occurring was an important initial requirement. Without explicitly defining what occurs in regulatory settings (safety *for* communities), it would have been difficult to establish new ways of working with communities to achieve outcomes of a broader scope. A useful aspect of the framework shown in Fig. 1 is that the pursuit of information on the causes of emergencies and its use in informing a range of stakeholders is explicit. While this multi-causal analysis may not identify new modes of failure within industrial systems or details of previously over looked human behavioural issues, it will allow fire services to promote existing prevention programs that focus on specific causal factors in an event. For example, following a post-event assessment of a fire death involving an elderly person, evidence was found that it had been a preventable fatality. The death may have been averted by the purchase of certain pieces of fire safety equipment for the home and by the application of common fire-safety behaviours. This information is normally introduced in an Older Persons Fire Education Program. Fire service staff can then timetable making a series of new courses aimed at an important at-risk group.

While supporting and promoting self-help and mutual aid among communities has not been core business for fire services in the past they have been identified as emerging issues internationally [38]. The Queensland Fire and Rescue Authority recognised the lack of historical standing on these issues not as barriers but as opportunities, through inter-sectoral collaboration to work with other government agencies with more direct responsibilities for social infrastructure. The bases for validating the need for community ‘engagement’ frameworks such as shown in Fig. 2 are supported by recent research comparing approaches to prevention by selected International Fire Services [38]. An important international theme is enhancing community (and personal) capacity to survive major incidents and to have a positive influence on preventable events. In broader terms this theme is related to reducing vulnerability and seeking to enhance resilience at the community level. Selected prevention goals used internationally can be summarised as:

- Increased community self-sufficiency.
- Increased prevention awareness.
- Increased knowledge about hazards.
- Increased likelihood that appropriate actions occur.
- Increased participation in programs.

Sustainable program design that is aimed at achieving these results requires that development becomes an ongoing evolutionary process that can adapt the content and form of delivery. This by itself, however, is probably not enough to achieve sustainable results within our communities. In addition to a commitment to evolution of programs, a clear pattern internationally is the importance of *contact* strategies.

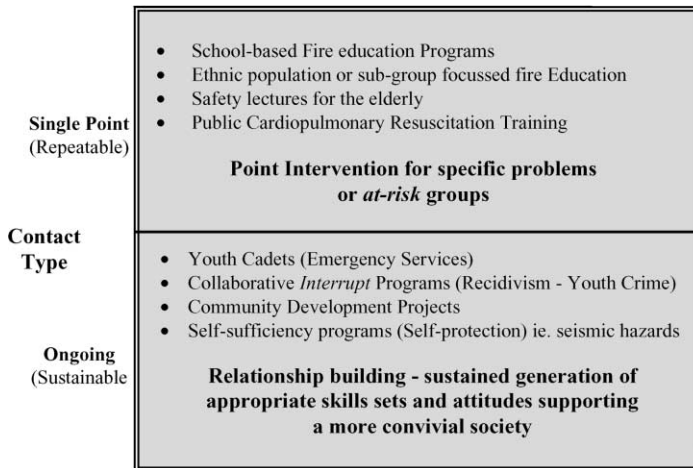


Fig. 3. Dual level contact strategies [38].

Two preferred contact types emerge from the data: *single point* and *ongoing*. These types are examined in Fig. 3.

Such findings, derived from empirically grounded research, support the notion that safety programs need to be as flexible as the communities in which they will be used.

6. Conclusion

Members of the public are concerned about the safety of the wider environment and their near surroundings. At the same time, regulators may be seen to be concerned about helping to provide safe environments. An impasse arises in this ‘mutuality’ when regulatory expertise loses credibility in the eyes of the public it is meant to serve. Reduced public trust in, and disbelief of, authority is a result.

The goal of fire safety evaluation is driven by a focus to achieve optimal levels of safety in communities. That is, ensuring the maximal effectiveness and efficiency of emergency response, safety design and behaviour. Regulatory assessment of fire safety must go beyond confirming compliance with relevant design codes. There is a need to be concerned with how the complete ‘as-built’ design would perform during an incident. A further critical element of safety design should include inclusion of the response needs of emergency services, as part of the basic design process.

The governance frameworks introduced in this paper are logical and grounded in the reality of regulatory assessment in the real world. They support the notion of fire prevention activities carried out at a level that is closer to those protected: the public. They are clearly predicated on working both *for* and *with* communities. This paper argues that the policy and administrative gap between regulatory authority and the ‘public’ referred to above, derives from very different worldviews and beliefs concerning danger and safety. This distance is a

phenomenon that has arisen from the manner in which regulatory affairs have been managed over many years. A result of this process is that many institutions fail to understand the belief systems that underlay the public perception of risk and to engage effectively with the people on whose behalf they work.

The deep-seated differences between institutional regulation and the public that it serves could be seen as based more on varieties of belief than on the misperception of scientific fact. Emphasis, when it can be redirected, should be given to the appreciation of these varied beliefs not towards efforts to change them. While closing the distance between these two groupings may not be achievable in the short-term, failure to attempt a way forward achieves little.

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