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Ronny J. Coleman

Social Vulnerability

One of primary areas of concern in the contemporary fire service is to be able to match up our response resources with the problem in the community, so that these resources can adequately protect them. In other articles I have discussed concepts such as the risk hazard and value evaluation (RHAVE) system as well as discussing the virtues of various forms of databases and mapping techniques to help describe a community's fire problem. The original emphasis in most all of that work was on the vulnerability of buildings. Small buildings versus large ones create one kind of problem. Sometimes size doesn't matter. Simple buildings versus complicated buildings can create another kind of problem. Buildings their contents and other improvements are the basic values that fire departments have been established to try to protect through fire suppression.

However, what makes many of those buildings vulnerable to fire are the acts and omissions of the human beings that occupy those buildings. Most of our mission statements start off "to save lives and property" not the other way around. But we, in the past have focused upon the buildings for the primary way of identifying risk and hazards and values because they are so easily measurable. We have avoided looking at the human factors in risk assessment except as anecdotal information. Now that many fire agencies are more involved in responding to medical emergencies the attention is turning towards the people in the equation.

In looking at structural conditions, and then comparing that set of observations to what is actually happening in the real time fire records, perhaps it is time for us to take another look at what we are actually analyzing. The reality is that we are having fewer and fewer structure fires per thousand buildings than we had perhaps a hundred years ago. One doesn't have to go too much further than reviewing the building code and the fire code provisions to find one of the reasons why. Beginning about the 1950's the emphasis on built in fire protection started to increase significantly. Concepts that had evolved in the confines of these two codes have done a great deal towards reducing the risk of fire spread so that when a fire does occur it is most likely to completely destroy the building. Sprinklers now exist in buildings that were the source of urban renewal in the last century. Redevelopment agencies have upgraded a lot of non-conforming buildings too

I used to hear my friend Charlie Rule talk about this concept as he posited the idea that every building that ever burned down was burnt down according to some code. It is often true that the severity of specific fire risk is often a function of how old a building is rather than any other factor.

In other words, how a building was constructed was based upon what the codes allowed to be in it at the time, and how the fire service was able to deal effectively with entry, ventilation, and interior attack in that building was a function of the technology and regulation of the time.



CHIEF'S FILE CABINET

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Social vulnerability, on the other hand, deals with part of the formula that is not as easily measured nor is it as easily even discussed openly. By this I am referring to the concept of how vulnerable the occupants of building are to having a problem. Remember the old phrase that the three main causes of fire are men, women and children? What is driving the dynamic of using risk assessment to predict our resource needs is not all about fire it is sometimes about people.

To the contrary, fire as a driving element of our workload has been impacted by the activity of many fire departments getting into the emergency medical services arena. It is not uncommon for many fire agencies to respond to as many as seven to eight medical aids for every fire event. This raises a question: what are we really planning for? And, of course the theory of risk management tells us that the relationship between frequency and severity results in four quadrants. Of these quadrants, the high frequency low consequence events have an impact on the day to day operations of most all fire agencies. That is because people are creating this demand, not buildings

Therefore, it might be useful to start examining the social side of our fire problem to see if there are elements there that we ought to be thinking about as we plan fire department deployment. Moreover, it may be that the social vulnerability factors may have a lot to do with the nature of the services that we provide, not just the location from which we respond.

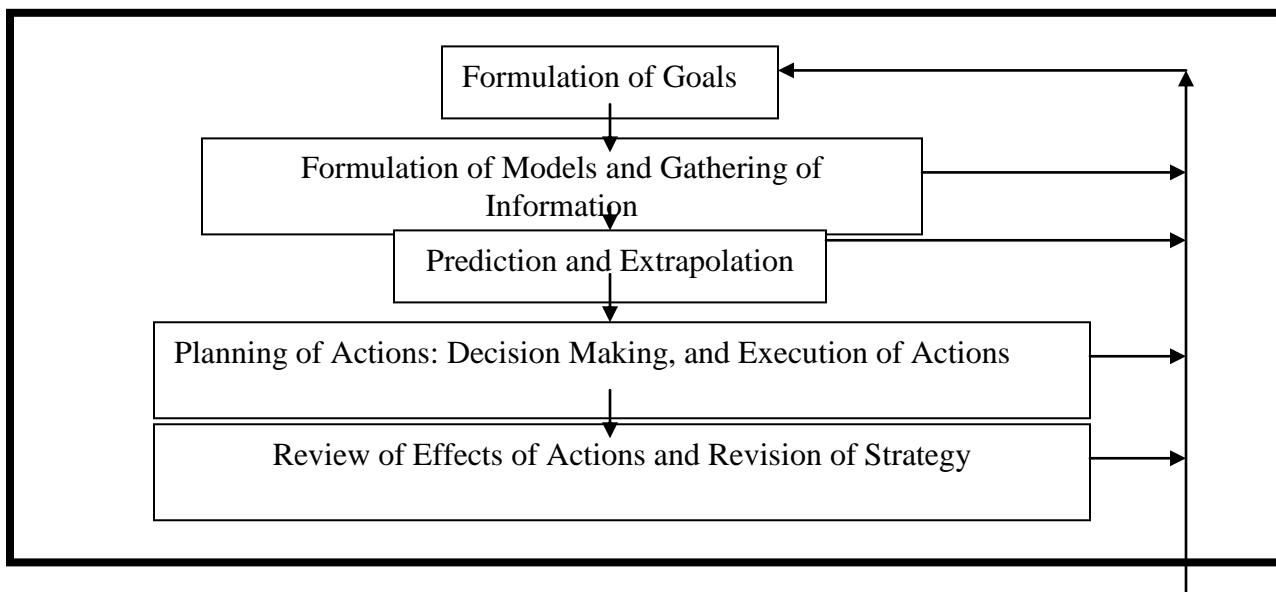
A word of caution however! Social vulnerability has some elements to it that maybe found politically unacceptable in the context of some open policy discussions. It might be useful to state at this point that it is very important for practitioners of this type of analysis to totally abstain from any consideration that social vulnerability is reflected in causation. In other words, the purpose behind doing this review of demographics is to look at what the potential is for call frequency and severity rather than to fix blame for what prompted the call in the first place.

And before we take that on, it might be appropriate to discuss this whole idea of planning anyway. Dietrich Dorner, the Author of *The Logic of Failure*, (Basic Books – Persues Books Group, New York, 1996) suggests that once you identify the general characteristics of a problem you can consider guidelines for coping with it. The following model has been provided by Dorner.



CHIEF'S FILE CABINET

Ronny J. Coleman



Let's start with a real simple type of question. What is the "goal" of our delivery system? I know that many will respond to that question with the standard answer from the response goal work that has gone on for years. But I would submit that the goal that belongs in this box is: "to save lives and property."

The Second box has two components: Models and Information. I think that our current model of response is based upon time and distance. The fact that we have called it a goal in the past notwithstanding that is what we are doing; using time and distance to model performance

The next component is all about information. In the past we have focused upon structures. However there are other dimensions of information. For example, how much do you know about the census information in your community? The census, while it happens to be out of date most of the time, is still one of the most fundamental ways of describing the social stratification in your community. By this I want to be real careful when I talk about stratification not to indicate that any one strata is any more important than any other but rather how we need to use this information to identify what our potential calls for service might be.

For example, a census will tell you that following ten factors about your community:

- A. Population
- B. Number of males and females
- C. Number of people in a household
- D. Annual income
- E. Ethnic background



CHIEF'S FILE CABINET

Ronny J. Coleman

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- F. Nature of vocation
 - G. Level of education
 - H. Single parent household
 - I. Language spoken in the home
 - J. Age group

What the census tells us is that every community has got a lot in common and every community has a different mixture. For example, in conducting studies of fire departments I have found that there are some communities that have a much larger population of senior citizens than others. Without focusing on any specific senior citizen, it doesn't take a quantum leap to realize that senior citizens are probably going to place a higher demand on emergency medical services than middle aged folks are. Of course this case remains to be proven by the look at specific data in a specific community, but in general the social vulnerability hierarchy we are talking about here is that every one of these factors creates a potential attribute that can lead to the nature of a fire departments problem.

For example let's just take something as simple as number of people per home. Take an imaginary area that has exactly 1,000 homes in a district. And the census says that the average number of members of a family is 2.87. That means that in that specific area it is reasonable to expect that there will be 2,870 people in that area. If we go back and look at the response data over the last three years and come up with an indicator of what is the average number of calls generated by a population of 1,000 people you might come up with a number such as 65. What this really means is that for purposes of planning if we project those same 2,800 people as equaling 2.8 and we take the factor of 65 responses per thousand population it would be reasonable to expect that the social factors in that particular neighborhood would generate in the following year 182 events. Now lets take that same area and say that a new housing complex is brought in, a high rise low rent income apartment house is constructed that adds another 1,000 people to the population it is fairly easy to project that you are now going to increase the workload by an additional 65 calls just for that one location. But maybe not!

Now move on to some trickier ground by saying, what if you had two identical neighborhoods that had a 1,000 homes in them, however one set of homes had a median house price of 750,000 and the other area had a median house price of 85,000? Would you expect there to be some differences in the social vulnerability between these two neighborhoods? Don't be to quick to jump to conclusions that poor people are lower income people are more likely to have a risk than more well off counter parts, but rather you might have to come to the realization that the only way that you are going to be able to determine if there is any difference is to recognize the fact that the difference exists. Then as you start to look at call frequency, call location and the nature of those calls you might be able to determine that the social vulnerability in rich neighborhoods is not the same as it is in moderate or low income neighborhoods.



CHIEF'S FILE CABINET

Ronny J. Coleman

Without labeling these as being good, bad or indifferent, one can at least form some observations that these demographic factors do play into a combination of workload and frequency.

Another element that we may need to look at is what I call cluster effect. Cluster effect is when you have a particular occupancy that spans a particular type of call on a fairly frequent basis. We all know these exist. As a matter of fact many fire departments have anecdotal stories that they love to share about their “frequent flyers” program. It is not uncommon for example to find the places that house elderly folks and/or our magnets for the homeless, i.e., bus depots, institutional facilities and other type locations frequently impact a communities emergency services.

The social vulnerability in this case would be to look at the causation of why those people are placing demand on the services. Frankly, there is not a lot to do to educate these people how to be a customer nor are you going to regulate them out of existence. However, understanding where they are and what they are doing there could open up some avenue of dialogue regarding funding and the deployment of resources to cope with the problem. Many politicians would like to think that problems of this nature are simply going to go away if we just don't talk about it. From the standpoint of a modern fire department problems don't go away. They continue to fester until something is done to reconcile them with the resources allocation.

It is my belief that most fire departments are not paying enough attention to crime statistics as causation for demand in their system. Granted most of us know that if we are called to the scene of gang shootings and/or acts of domestic violence, what I am talking about is assessing this degree of social vulnerability during the planning process. It is conceivable that lessons learned from these kinds of things might play into the decision of training of our emergency medical services people and/or improved relationships with law enforcement for purposes of enhancing security.

The essence of what I am referring to in this article is that social vulnerability is behaviorally driven and is every bit as important as a planning process as the structural conditions in our neighborhood. When it comes to pre-planning of fires we look at building construction and fire behavior to give us kind of a heads up on what to expect with occupancies. Social vulnerability talks about looking at the culture of a community combined with the contributing factors that cause individuals to place demands upon our system. Social vulnerability should be part of the pre-incident planning that goes on for emergency medical services.

I am not suggesting that this exercise looking at the demographics for communities should be used to predict that we treat people differently. To the contrary. I think that the science of being able to predict what is going to happen with any specific individual is a long way off. But if we look at Dorner's model the word extrapolation is there. Extrapolation is the use of information to extend beyond where it is currently in play and identify trends and patterns. What I am saying is that this technology can be



CHIEF'S FILE CABINET

Ronny J. Coleman

used to project patterns of distribution and concentration of risk for an emergency medical services point of view. The danger in all of this is that by attempting to examine social vulnerability there are various groups that are very sensitive to the implication of being singled out. I think that is something that we need to avoid at all costs. That doesn't preclude us from at least taking a look at the information that is a matter of public record.

When we are doing fire statistics it is not uncommon for us to look at arson or undetermined fire causes and try to come up with a rationale as to what neighborhoods are the most heavily impacted. Social vulnerability does the same thing accept looks at emergency medical services. One might carry the same line of logic all the way over to the field of hazardous materials because after all these have been placing demands on the fire service also.

Dorner's model says that there are two more components. The Planning of Actions is not limited to just one element of the model. This is where decision makers need to be identifying options and alternatives. He also says that we need to review the effects of actions and revise our strategy from time to time. Speaking as a person that has looked at a lot of response systems this is the one area that the fire service is the weakest. In fact the lack of serious consideration of this activity is the basis of some of the criticism that is directed towards our basic model of time and distance. We do not have very much information on outcomes. Nor do we place much emphasis on reviewing the outcomes of EMS internally. Many fire agencies let that data reside in the EMS community.

To the contrary social vulnerability may be an area where we need to be targeting public education efforts, injury prevention programs, other community based health programs and so forth instead of adding additional resources. If we truly want to do as good a job in reducing the loss of life in emergency medical services we should tear a page out of the textbook on structural firefighting and begin to manage the risk as discretely and as specifically as we possibly can.

One tool that could help fire agencies get a better hand on the issue of social structure in their community that builds upon the census information is called Community Tapestry. It is product of Environmental Systems Research Institute's (ESRI) work in the field of GIS. This system provides a portrait of 65 different U.S. Consumer markets that are divided up into 12 "LifeMode" groups, and these groups are further divided into 11 different Urbanization groups. Descriptions are provided by the program for each sub-grouping so that distinct patterns can be derived from the information from each categorization. While this methodology is not as frequently used by fire agencies as it is by other planners in local government, it could shed a lot of light on the subject of life-styles and help define propensity for certain types of demands upon emergency services.

I realize that this article may raise more questions than it answers. For example if response time is truly the only parameter we have to measure our success in saving lives and property, what is meant by



CHIEF'S FILE CABINET

Ronny J. Coleman

"saving". We often look at our losses in property and the death rate as sort of a byproduct of what we do, but seldom come up with any assessment of what could have made the difference to the victims. If risk assessment is to be meaningful to the outcomes of why we are out there responding we ought to be able to measure our successes not our failures.

Looking at the social vulnerability of our customers and addressing all of the ways we can protect them and their property may be the ultimate in customer service.

For additional information on Community Tapestry, Contact ESRI, 380 New York Street, Redlands, CA 92373-8100, USA. www.esri.com