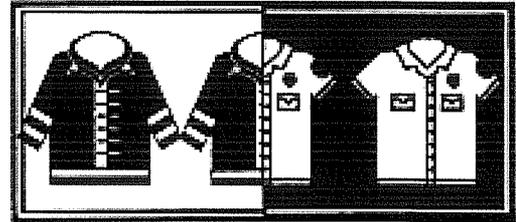


MIS REPORT

VOLUME 23 / NUMBER 4

APRIL 1991

**PUB'S COPY
RETURN TO FILE**



FORECASTING THE OUTCOME OF POLICE/ FIRE CONSOLIDATIONS

Many a local government manager has considered and rejected the possibility of consolidating police and fire services. The public safety concept, although attractive from the point of view of efficiency, is one of the most politically controversial ideas a manager can champion. Under new pressure to increase service while holding the line on taxes, local governments are revisiting the idea of merging police and fire services into one department and training public safety officers who can provide community patrol and respond to fires. What the managers of these communities need is a tool for gauging the benefits of a police/fire merger.

This report defines the issues surrounding a police/fire merger, identifies the key decisions to be made, provides guidance for assessing and overcoming environmental barriers, and presents a mathematical model for predicting the impact on costs and performance of a proposed police/fire merger, using the city of Auburn, Alabama, as a case study.



Management
Information
Service

VOLUME 23 / NUMBER 4
APRIL 1991

MIS Reports are published monthly by the Management Information Service, ICMA, 777 N. Capital St., NE, Suite 500, Washington, D.C. 20002-4201. Copyright © 1991 by the International City Management Association. No part of this report may be reproduced without permission of the copyright owner.

These reports are intended primarily to provide timely information on subjects of practical interest to local government administrators, department heads, budget and research analysts, administrative assistants, and others responsible for and concerned with operational aspects of local government.

MIS Reports are issued as part of a subscription service available to all local governments. A subscription to the Management Information Service includes unlimited access to the MIS Inquiry Service—backed up by the ICMA automated database, the MIS Update, Info Packets, and other publications.

Management Information Service

Cheryl A. Farr, *Director*
Joy M. Pierson, *Manager, Inquiry Service*
Jacqueline Harmon, *Program Assistant*

Publications

Barbara H. Moore, *Director*
Christine Ulrich, *Senior Editor*
Sonya Yates, *Editorial Assistant*
Christina Davis, *Copy Editor*
Dawn Leland, *Production Director*
Jeanne Berger, *Design Director*
Chris Draughtn, *Designer*
Brian Derr, *Production Coordinator*

Recent MIS Reports

4/90 Assessment Centers for Hiring and Development
5/90 Establishing the Cost of Services
6/90 Productivity Improvements in Public Works
7/90 Competitive Services: New Revenue Opportunities
8/90 Investing in Affordable Housing: Stretching CDBG Dollars
9/90 Making Environmental Partnerships Work
10/90 Landfill Management
11/90 Stormwater Management
12/90 Strategies to Reduce Homelessness
1/91 Emergency Planning and Community Right to Know
2/91 Updating Sign Ordinances
3/91 Public Information: Educating and Communicating

Forecasting the Outcome of Police/Fire Consolidations

The authors of this report are Leonard A. Matarese and Kenneth R. Chelst. Mr. Matarese is community manager and director of public safety for the community of Ocean Reef, Florida, and Dr. Chelst is a professor of operations research at Wayne State University in Detroit, Michigan. Their partnership, the Center for Public Safety Options, provides consulting services to local governments.

INTRODUCTION

In a public safety department, dual-trained officers respond to both police and fire calls. Some successful public safety departments in U.S. communities have begun with the incorporation of the local government (Grosse Pointe Shores and Oak Park, Michigan; Sunnyvale, California). Others have evolved as the local government moved from volunteer firefighters to full-time, paid firefighters (Coconut Creek, Florida). A number of local governments have traversed the more difficult path of merging previously separate police and fire functions (Kalamazoo, Michigan; Spartanburg, South Carolina; Aiken, South Carolina.) The reader can find a partial list of communities that have successfully merged police and fire services in Appendix A.

The public safety concept is extremely attractive to local government managers and elected officials who face demands for more service from an electorate that resists paying higher taxes. Consolidation offers them an opportunity to reduce or avoid financial costs and improve service levels.

As communities struggle to combat growing problems with crime and drugs using existing policing resources, some of the country's most prestigious law enforcement professionals are calling for a closer working relationship between the citizenry and the police and other emergency services agencies. The public safety concept can provide the additional human resources that this approach to policing, known as community-oriented policing, neighborhood policing, or team policing, may require and at the same time attract the kind of officers whose interest and skills are broader than those of people attracted to a more traditional police agency.

Despite the many factors in its favor, the concept of the public safety department, which was introduced 80 years ago in Grosse Pointe Shores, Michigan, has never

taken hold nationally, and a high proportion of attempts at consolidation have been abandoned. In many communities, the opposition of public sector labor unions, particularly the firefighters' unions, constitutes a major political stumbling block.

Reviewing the mixture of successes and failures among local governments that have tried to merge police and fire functions, most local officials would be hard-pressed to assess whether a merger is an implementable and cost-effective option for their community. Questions they need answered are: What are the political risks? What are the political, organizational, and operational barriers? How can these barriers be overcome, or are they insurmountable? What are the potential benefits of a successful consolidation, and are they significant enough to warrant a "major" political battle? Is now the right time to begin a consolidation? How long will it take to complete a consolidation?

To answer these questions, the authors of this report talked with representatives of more than 100 cities over the last eight years, conducted in-depth studies of a dozen consolidation attempts, and with funding from the National Science Foundation, the National Institute of Justice, and Wayne State University, developed a mathematical model to predict the financial performance of proposed mergers. The communities in the study were delivering public safety services in a variety of ways at the time they were considering a merger. Some had traditional, separate, paid police and fire departments; some had a traditional police department and a volunteer or combination fire department (part paid and part volunteer and/or paid on call); some had a traditional police department and contract fire services. Many of these case study cities are referred to throughout this report to illustrate the various environmental and operational issues that affect the success of a merger attempt. (Descriptions of ten merger attempts and applications of the authors' predic-

tion model to five of them have been published in an ICMA Clearinghouse Report, "Police/Fire Consolidation Case Studies." See Additional Resources.)

The authors' research suggests two principles:

- When properly implemented, a police/fire merger can reduce costs and dramatically improve police and fire service delivery. When key decisions concerning personnel allocation and pay differentials are made improperly, the merged agency may be more costly to operate than traditional police and fire departments. However, even in such instances, service levels will generally improve.
- Significant environmental barriers to a successful implementation exist. These barriers are largely political and/or labor management issues rather than technical difficulties, and these issues are generally underestimated. Most articles and studies on public safety consolidation do not discuss the cities in which major political battles were fought and lost long before the first police officer or firefighter was cross-trained.

Until recently no methodology existed to help local officials accurately predict the financial or operational effects of a merger on their community. City managers and elected officials have relied largely on case studies of other communities to predict the performance of a proposed consolidation. The authors' research demonstrates that although case studies may be of some value, a more effective method is available to analyze the potential for success and the impacts of a proposed merger plan in a specific community.

This report is designed to

- Define the quantifiable and non-quantifiable issues surrounding a merger and to identify the key decisions
- Provide guidance to local officials to help them assess and overcome environmental barriers
- Present a mathematical methodology for predicting the impact on cost and performance of a proposed merger.

The purpose of this report is to change the merger debate from "Do police/fire mergers work?" to "Is a specific merger plan cost-effective and implementable in a specific locale?"

KEY DECISIONS

Three decisions determine the long-term cost-effectiveness of a police/fire merger:

- Setting the number of personnel maintained in fire stations
- Setting the number of dual-trained officers on patrol
- Setting the salary for dual-trained personnel.

A number of other decisions have a smaller economic impact:

- Whether to cross-train the remaining fire station personnel and give them an accompanying pay raise
- Whether to cross-train police officers not assigned to patrol and give them an accompanying pay raise
- Whether to keep fire station personnel on the same shift schedule as patrol officers.

The following discussion will contrast separate, traditional police and fire departments with a dual-trained patrol force. For a city without a full-time, paid fire department, the key decisions are the same but the dual-trained, full-time public safety department will increase operating costs. The increase will be less than that associated with a full-time fire department, so, in this context, the savings discussed should be interpreted as a cost avoidance.

Fire Station Personnel

The most important and controversial decision is setting the number of personnel to remain on duty in the fire stations. This decision drives the economics of a merger. Under a merger, salaries go up, more people are on patrol, and the only source of savings is a reduction in station-bound personnel. A local government interested in a merger must plan for long-term dramatic reductions. The elimination of one position per fire station is a reasonable first-year goal. However, as a long-term plan, this minimal change yields no significant savings and may undermine the merger. A decision for minimal reduction was the major factor in the demise of the public safety concept in Oakland Park, Florida. For the same reason, Morganton, North Carolina, has not as yet realized significant benefits from its merger.

A low number of calls for fire service is what makes a police/fire merger viable. In more than a dozen fire departments studied, less than 5 percent of the time is spent responding to calls for service. A merger is designed to capitalize on the firefighters' in-between time, which is an underused resource in many fire departments.

Even this low percentage does not accurately reflect the demand for fire-fighting capabilities. Many calls are non-emergency, and many calls reported as fires are nonmalicious false alarms. Even in the case of an actual fire, the data indicate that often only small amounts of water are required to extinguish the fire. This factor is significant because with a merger, a public safety officer with at least a fire extinguisher and possibly a one-man quick response vehicle (QRV) can arrive on the scene faster than the first major piece of fire apparatus.

One oft-expressed concern in merger debates is that significant numbers of public safety patrol officers will be tied up at fire scenes for extended periods. Appendix B presents data on the personnel needed at fire scenes and the duration of fires drawn from Kentwood, Michigan; Oakland Park, Florida; and Union, New Jersey. The

data are representative of the situation found by the authors in other small to medium-sized cities in other parts of the country and show that the number of active fires these cities fight is relatively small and that few of these fires are in structures. A fire department is able to put out most fires with the small amount of water contained on a fire truck. These firefighting efforts do not require more than four firefighters at the scene, although some departments routinely send more than twice that number to all fire calls. It is statistics such as those illustrated in Appendix B that should force every local government official to ask, "Do we need to maintain four or five firefighters in each stationhouse around the clock?"

In the long term, a local government should plan to staff fire stations with only enough personnel to drive the vehicles that are currently fully staffed. This usually means one person per primary response vehicle. These personnel should be supplemented by a limited number of supervisors assigned to fire station duty.

The decision maker should anticipate a battle when making this decision. As the fire service tries to maintain its status, numerous arguments will be offered for maintaining a large fire station staff. The last line of defense will almost always be safety ("it is unsafe for only one individual to be on a fire engine"). However, existing public safety departments routinely operate with only one person on a vehicle, as do trucking companies.

Patrol Force

The second major decision is setting the number of public safety officers to add to the patrol force. The decision maker's options range from using all of the fire savings to fund as many additional patrol units as possible, to using 75, 50, or 25 percent of the fire personnel savings to fund a more limited increase in patrol forces. Making this decision demands a complex trade-off between dollar savings and system performance as measured in response time to fires, response time to police calls, and patrol time available for directed activities. (In the section "Analysis of a Merger," sophisticated mathematical models that allow a decision maker to explore this trade-off are illustrated. A simple rule of thumb serves as a starting point in assessing the trade-off: Increase the patrol force by half the number of people removed from the fire department. If the fire service is to be cut by 20 positions, the patrol force is increased by 10 people.

Pay Raises

The last decision is setting the pay raise for dual-trained officers. A common misconception is that because officers are handling two jobs the pay scale can and should be dramatically increased. But paying a high premium for dual training significantly reduces the cost-effectiveness of a merger.

One strategy for holding down the cost of a raise is to negotiate it as part of the next contractual agreement. A 12 percent raise for officers who cross-train will sound attractive compared with a token raise of 2 percent for

officers who do not cross-train and creates a 10 percent differential between dual-trained and singled-trained officers. However, the actual increased cost to the city is not 10 percent but the difference between 12 percent and the average pay raise for other classes of city employees. If that average is 5 percent, then the city pays a premium of 7 percent for dual training. Grosse Pointe Park, Michigan, negotiated its pay raise structure as part of a new contract. Dual-trained officers were paid \$2,250 more than single-trained police officers. However, the public safety officers' new pay scale was only \$1,750 more than patrol officers were paid on the previous contract. This pay raise was no larger than that offered to firefighters who remained single-trained.

The primary goal of a pay raise is to encourage patrol officers to dual train. A merger will require them to maintain two skill levels but will not increase their workloads. Although the patrol force is required to respond also to fire calls, the per officer calls decline because a merger increases the number of patrol officers on duty. Consequently, even a modest pay raise will encourage enough patrol officers to cross-train, making a merger feasible in the short term.

The pay raise for firefighters who cross-train will usually be substantially higher than for police officers. In many cities, fire pay is 10 percent lower than police pay. A 10 percent differential between police and public safety officers could mean a 20 percent pay raise for firefighters who become public safety officers. Nevertheless, even this raise will not be attractive to many firefighters because changing from fire to public safety dramatically increases a firefighter's workload. Of even greater significance, firefighters who work 24-hour shifts with two or three consecutive days off, can maintain second jobs at substantial pay. A change to a public safety officer's schedule makes the maintenance of a substantial second job almost impossible. Thus, even a 20 percent pay raise may not in itself attract firefighters to take on patrol officers' schedules and responsibilities.

The only officers who must be dual trained and receive a pay raise are those who respond to police and fire calls. This force may represent less than 50 percent of the personnel in the combined police and fire services. Specialized police officers such as detectives and the officers assigned to the fire stationhouse may have no need for dual training and higher pay. In small cities with small patrol forces, dual training even for specialized police officers is recommended to provide a reserve in case of a rare major fire.

Other Decisions

The stationhouses will be manned initially by firefighters who are not dual trained. Even in the long term, it is cost-effective to keep these positions for single-trained officers receiving lower pay. These positions may be kept as entry-level positions for people joining the department. As public safety patrol positions become available, these personnel can be cross-trained and promoted to public safety officers and assigned to patrol.

Personnel on stationhouse duty should not retain the title of firefighter because that undermines the organizational integrity of the new public safety department. In addition, these personnel should be given some minimal police-related responsibilities to make them part of the broader public safety force. For instance, fire stations can serve as local facilities for citizens to file crime reports or fill out permits.

The disadvantage of this approach is that fire station personnel are not rotated out of stationhouse duty and have a smaller commitment to the public safety concept. Sunnyvale, California, opted to cross-train all personnel, allowing them to rotate between patrol and the stationhouse.

One last decision relates to the work schedule of fire station personnel. It is cheaper to keep them on a traditional fire rotation of 24 hours on and 48 hours off duty. This averages to 52-56 hours per week and requires approximately 3.6 people to cover each full-time position around the clock. The disadvantage is that patrolling public safety officers and fire station personnel cannot work routinely as part of the same team. If, instead, the station personnel maintain the patrol force's schedule, to form a consistent team, 5 people are required per position and operating costs are increased by almost 1.5 persons for each fire station position. If 2 people are in the station, the cost of the additional 3 (2 x 1.5) officers ranges between \$100,000 to \$150,000. The trade-off between the team concept and lower cost is only one of the many trade-offs that decision makers will have to consider.

Current Status Factors

The three major decisions discussed earlier interact in defining the cost-effectiveness of a merger. In addition to these decisions, the magnitude of the savings associated with a reduction in staffing depends on a number of existing conditions:

- The current average fire deployment level
- The average workweek
- The salary and benefits of fire personnel.

The more personnel currently deployed in fire stations, the greater the potential for savings in a merger. A department that places 5 people in each station offers greater savings potential than one that keeps 4 people.

The average workweek is another significant factor. The impact of a reduction, for example, from 5 to 2 officers on duty in the station is far more than 3 officers. This number must be multiplied by the number of people needed to staff one position throughout the 168 hours of a week. This multiplier is called a coverage factor. In departments where personnel work one 24-hour shift every three days, the coverage factor is approximately 3.6 people for each on-duty person. In contrast, in departments working a 40-hour shift, the coverage factor could be 5 or more people. The 3-person reduction in on-duty personnel translates to 10-11 people in the first

group of departments and to 15 or more people in departments with 40-hour workweeks. With the push for shorter and shorter workweeks for firefighters, the cost savings associated with a merger could increase by as much as 40 percent.

The last factors are salary and benefits. In this context it is also important to determine the cost differential between fire and police officers. In a merger, patrol power will be increased. The increased cost for an individual who was previously a firefighter but is now a cross-trained patrol officer is the sum of the salary bonus for cross-training plus the salary differential between police and fire. All other things being equal, a city with significantly higher salaries for police officers than firefighters will not benefit as much from a merger as a city in which the salary scales are about equal.

The above discussion presents a number of interrelated factors that affect savings. Even this limited discussion suggests why many cities often have not achieved the savings they anticipated. (The section "Analysis of a Merger" presents a Lotus spreadsheet model created by the authors that incorporates all of these factors.)

Implementation Time Frame

The implementation of a merger involves the dual training of a significant portion of the primary responders. Once this training is completed, the local government gains much of the performance benefit of a merger: more patrol strength and shorter initial response to fire and police calls. Most of this added training can be accomplished within two years of committing to a merger.

In contrast, dollar savings generated by a merger can take five to ten years to materialize. If a local government uses attrition to reduce personnel levels, the speed with which it obtains the economic benefits of a merger depends upon three factors: departure rates, age and years of service of current personnel, and the number of firefighters who agree to cross-train.

Departures consist of retirements and resignations, with resignations usually accounting for at least 70 percent of the total. Departure rates vary by the number of years of service of personnel. High resignation rates are usual in the first five years of service. The rate declines between six and ten years of service and declines dramatically beyond ten years of service. Departures due to retirements begin to occur in many cities once twenty years of service are reached. The retirement pattern will depend on the structure of the retirement program and incentives for working beyond the earliest retirement date.

In Kalispel, Montana, the majority of personnel retired in the first year of eligibility because retirement benefits did not increase beyond the minimum. In most cities studied, benefits did increase and less than 25 percent of the officers retired in the first year of eligibility.

If some firefighters agree to cross-train as police officers, these cross-trained personnel can fill patrol spots, as patrol officers leave the department. The result is a

decline in total personnel. If no firefighters cross-train, each departure from the police service must be filled with a new employee, and this contributes nothing to downsizing.

LOCAL CIRCUMSTANCES

Each community that considers or attempts a police/fire merger faces a unique set of circumstances. These "environmental conditions" include issues such as the political, social, and physical make-up of the community; the labor situation; and the managerial skills of the existing police and fire chiefs. In reviewing many consolidation efforts the authors have identified seven kinds of issues that influence the outcome of a merger attempt.

Political Conditions

Leadership. Political leadership seems to be the critical variable. Someone in a leadership position in the council must support the consolidation effort and also take the public lead on the issue. This role typically falls to the mayor. In Coconut Creek, Florida, for instance, the mayor took a strong lead in the ultimately successful consolidation effort. In Grosse Pointe Park, Michigan, the mayor's re-election on a platform of support for the public safety concept paved the way for a successful consolidation. These situations contrasted sharply with that of Kentwood, Michigan, where the entire discussion of a public safety merger occurred within a committee appointed by the council. The mayor took no public position on the matter, and no formal public discussion was held until the committee's report was submitted. The proposed merger was subsequently rejected by the council under heavy citizen pressure. In Tequesta, Florida, the mayor and village council, although privately supporting the concept, took no public position, leaving the village manager to promote the merger. Again, the consolidation effort was unable to survive political opposition.

At the minimum the political leader must have the courage to withstand an initial onslaught of uninformed public opinion. Ideally the leadership should be able to coalesce public opinion in support of a merger. And the leader must be able to communicate "the premise that the police and fire services exist to benefit the community; the community does not exist for the benefit of the police and fire services."¹

Political climate. The existing political climate in the community will no doubt have a dramatic effect on the success or failure of a merger effort. The average tenure of the individual councilmember may influence the members' willingness to embark upon a radical change in the municipal organizational structure. Newly elected members may be reluctant to initiate or participate in the merger effort. Long-term councilmembers may be unwilling to modify a structure with which they have grown accustomed to working. In one city,

Evaluating Environmental Conditions

Are top city officials courageous and innovative?
Is the political climate right for change?
Is the mayor or a leading member of council willing to take a leadership role?
Do councilmembers work well together and do they support management?
Is the community labor- or management-oriented?
Is the public satisfied with existing service levels?
Does a neighboring community have a public safety department and, if so, does it have a good reputation?
Does the community have a history of innovation?
What is the relationship between labor and management?
Do state laws permit a merger?
Is the chief executive a leader and well-versed in emergency services management?
Is an experienced and qualified person available to serve as public safety director?
Is now the right time within the government organization to attempt a consolidation?

councilmembers who were running for reelection voted against the consolidation while those retiring from office all supported it.

Council harmony. Harmony and a history of working together on the part of councilmembers certainly will affect a merger consideration. A successful merger effort will require a united effort on the part of the council and the management staff. Divided councils cannot accomplish a merger. Unanimous support or near unanimous support for any merger plan is a prerequisite for a successful merger. Minority council opposition can make the merger an issue in subsequent elections.

Study commission. A study commission to evaluate the feasibility of a merger can serve as the base for building public support (this was the case in Grosse Pointe Park), but it can be a mixed blessing if it includes representatives of the emergency services who strongly oppose a merger. If these representatives contend at every meeting that the concept "can't work here," commission members will naturally wonder how a merger can succeed in the face of strong employee opposition.

Community Factors

Relations between council and workers. The relationship between the individual police officers or firefighters and councilmembers can greatly influence the outcome of a merger effort. In communities where the municipal workers are family members, friends, or political supporters of councilmembers, they will obviously have greater influence than in those cities in which the emergency services workers are seen as employees and public

servants by the council. Certainly the residency of the workers also becomes a consideration. Where most workers are residents of and voters in the community, they wield far greater influence than in municipalities where the employees live in a different community.

In Oakland Park, Florida, for example, where a merger proposal was recently rejected, the majority of firefighters lived in the city, had known councilmembers personally for years, and were actively involved in the political process. Members of council were particularly responsive to the employees, to the extent that some councilmembers regularly intervened between the city manager and individual police officers and firefighters on issues such as shift assignments. City councilmembers in Kentwood, Michigan, counted firefighters as friends and were hurt when some of these friends turned a cold shoulder as a result of the preliminary report supporting a merger. In contrast, in Grosse Pointe Park, Michigan, a particularly affluent community, most city workers did not reside in the community and the police officers and firefighters were viewed as public servants.

Socio-economic factors. It appears that mergers may be easier to implement in communities with a higher percentage of white-collar, professional, and managerial residents than in cities where more workers are blue-collar and unionized. Residents from white-collar backgrounds probably will be more sensitive to productivity improvement attempts and less concerned about such union issues as transfer of bargaining rights, which may be an issue in a merger attempt. Roseville, Michigan, is an example of a blue-collar community that rose in support of its firefighters' union and voted against a consolidation proposal two to one in a citywide referendum. Grosse Pointe Park, one of the wealthiest communities in the United States, illustrates the other end of the spectrum: in Grosse Pointe Park, citizens supported consolidation in a referendum.

Community satisfaction with existing services. Obviously, a city in which the residents are generally satisfied with the levels and costs of community services is not a good candidate for a merger effort. Residents and elected officials who see their police and fire departments as hardworking, professional, reasonably staffed, and service-oriented have little incentive to make the radical changes a merger requires.

However, residents and elected officials may be satisfied with services levels but unaware of the costs of operating the traditional fire and police services. Interest in a consolidation may develop only after the costs of existing services are closely analyzed and widely discussed. In Union, New Jersey, for example, the council's interest in a consolidation rose dramatically after an internal municipal study showed that because of excessive union contracts, a firefighter with ten years seniority actually reported for duty only sixty days per calendar year.

Public interest in a consolidation can also be gener-

ated when residents become aware of the percentage of on-duty time that firefighters, and to a lesser extent police officers, spend carrying out specific duties. In Grosse Pointe Park, the local press reported in detail the limited amount of time that firefighters spent on firefighting activities (less than 3 percent). This was believed to be a significant factor in the success of the merger referendum.

Community innovativeness. A community's past experiences in implementing innovative programs may provide a good indicator of its chances of succeeding in a merger effort. A community that has a history of ongoing internal review and productivity enhancement efforts may have the organizational skills necessary to achieve a merger. Efforts such as regional cooperation, centralized communications and records, and joint venture efforts with the private sector or other governmental agencies may have provided the community with the experience to tackle a complicated merger. However, a community that has not accomplished such successful efforts may lack the required organizational skills and leadership. A police/fire consolidation is not the place to begin a community's productivity improvement efforts.

Neighboring public safety communities. Somewhat surprisingly, a community considering a merger derives little advantage from being near a working, successful public safety agency that it could use as a model. Every community will face different conditions when attempting to implement a consolidation, and the variables discussed (leadership, council commitment, etc.) seem to outweigh the value of having a public safety department in a neighboring city.

Kentwood, Michigan, was unable to develop support for a merger even though its neighbor, East Grand Rapids, had successfully operated a public safety department for years. Margate, Florida, also unsuccessful, is adjacent to Coconut Creek, North Lauderdale, and Parkland, all of which operate merged agencies. Grosse Pointe Shores operates the country's oldest public safety department, but neighboring communities are still grappling with the issue. Roseville, Michigan, whose citizens soundly defeated a merger referendum, is only a fifteen-minute drive from Oak Park, Michigan, one of the country's model public safety agencies. And there are three successful, long-term, public safety departments in the same Florida county as Tequesta, where consolidation failed.

Often, a neighboring community's experiences operating a consolidated department can be used against a merger effort in another community. Incidents that would be considered normal events in a traditional department are blown out of proportion in the merged context. An unavoidable fire (death), or a total-loss structural fire, which would have occurred despite the best of traditional fire suppression services, may be offered as "proof" that the public safety concept does not work

when it occurs in a community providing consolidated services. And some consolidated services, just like traditional police and fire departments, are poorly managed and provide less service and protection than they should.

Labor Relations

A major element in the success or failure of a merger is the community's existing labor conditions. Although unionized police and fire services with bargaining rights certainly complicate the effort, they in no way preclude a successful merger effort. Kalamazoo, Michigan, was heavily unionized when the city achieved its merger. Michigan, in general, is one of the leaders in the number of consolidated departments despite its strong public sector union tradition.

Likewise, the absence of a collective bargaining agent is not necessarily a guarantee of success. In Morganton, North Carolina, the police union is not recognized as the bargaining agent, and only a small percentage of police officers are union members. However, as a result of the union's efforts, the media has routinely scrutinized the merged agency's performance and the local police association president's attacks on the agency are regularly quoted in the local press. The union's efforts have helped delay the program's full implementation.

Perhaps a better indicator than unionization is the ability of labor and management to work jointly to improve service to the community. Effective and ongoing labor/management teams and a willingness of rank and file, as well as union leaders, to accept new ideas and work rules will help a merger. The number of grievance arbitrations per year may be a good indicator of the ability of labor and management to work together.

Legal Conditions

Existing local or state statutes may prohibit a police/fire merger. For example, consolidations are specifically prohibited in New York State. In Massachusetts, cities with populations exceeding 40,000 are prohibited from merging police and fire services. In addition, case law, or attorney generals' opinions may prohibit a merger. The Wisconsin state supreme court ruled against the city of Eau Claire's consolidation effort, stating that the absence of a statute specifically creating a public safety officer position meant that local governments, despite home rule powers, could not create such a position. The action resulting in this ruling was brought by the city's firefighters union and is an example of the legal challenge a community can face. (The absence of specific statutory reference does not necessarily mean a merger will be prohibited. In 1977 in Iowa, the state supreme court held that a public safety force could exercise duties much broader than just firefighting or law enforcement, in response to an action brought by the local firefighters union against the Airport Commission of Cedar Rapids.)

Even in states where no expressed prohibition

against consolidations exists, subsidiary legal problems may be insurmountable. Legal issues can force major modifications in a merger plan that make the effort less financially or operationally attractive. In New Jersey, the state attorney general ruled that firefighters, even after completing applicable police training, could not carry weapons, thus effectively ending the Clifton, New Jersey, program.

Often, pension systems and/or civil service regulations will present problems in defining the public safety officer position and may affect the eligibility of existing police and fire officers to serve as public safety officers. In New Jersey, although the state civil service system recognizes the position of public safety officer, it is identified as a voluntary, promotional position from the fire service. This effectively eliminates use of the position if firefighters refuse to take the "promotion." However, the Florida state legislature enacted a statute stating that public safety officers were to be treated the same as police officers for pension purposes.

Legal challenges to a merger effort may be beyond the scope of the municipal attorney and require retention of a specialist in labor law. If all else fails, "past practices" can serve as a basis for bringing many issues associated with a merger to arbitration.

City Manager

More than any one the chief executive of the community—mayor or city manager—will influence the outcome of a merger effort. Much of the success or failure of the program will be attributed to his or her public image and willingness to take the lead, a vulnerable position, in a merger effort. A manager seen by the community and the elected officials as a leader will fare better than a manager perceived as an administrator and follower.

Just as the community must have a history of successes before embarking on the consolidation course, so must the manager. A merger is generally not an arena in which to begin an experiment in productivity improvements. Of course, there are exceptions. Coconut Creek's merger was led by a first-time city manager who was hired specifically to resolve problems in the police service. Even so the merger effort was a test of his strength and his council support.

Generally, the more secure the manager, the better the chances of achieving a merger. In Oakland Park, the original merger was orchestrated by a manager with solid community and council support. The abandonment occurred while a newly appointed manager (supportive of the concept) was in office. Additionally, the manager should understand emergency services delivery systems. Since, few schools of public administration devote much course work to managing emergency services, the typical manager may be handicapped when dealing with this element of local government.

Finally, perhaps the most important criteria for a manager embarking on a consolidation effort is to have the fortitude to complete what may be the most difficult

challenge to his or her skills, perseverance, courage, and leadership.

Existing Police and Fire Operations

Progressive departments. The current operations and performance of the police and fire agencies may be an indicator of the success of a merger effort. It is unrealistic to expect that poorly run, badly managed police and fire departments can be merged into a quality public safety department. Are the existing departments currently using innovative and progressive management techniques that reduce manpower needs and improve productivity? Often, introduction of modern emergency management techniques into a traditional police or fire agency can generate significant productivity improvements without the trauma of a merger.

The rare fire will require aggressive preemption of other public safety activities to provide the personnel to staff fire apparatus. If the dispatch operation is not under the control of the city, it may be difficult to get the necessary cooperation for implementing the complex fire dispatching in a public safety department.

Fire departments that run five-person engine companies may not have the skills and experience to operate with fewer personnel. Agencies that do not control calls for service through differential police response or other techniques (rather than allowing calls to control the agency) may have a difficult time administering a dispatch operation in a merged agency.

Police and fire management. Probably the most important decision a manager will make in a merger effort will be the selection of the public safety director. This individual will be responsible for management of all emergency services functions and his or her ability to quickly and smoothly adjust what will be an evolving organization will ultimately determine the outcome of the merger effort. In the past, the job has often fallen to the existing police chief for several reasons. Typically, the fire chief is less than supportive of the proposed merger. Furthermore, the police service in this country, in large part because of federal funding patterns, has a better history over the past twenty years of research and innovation than the fire service.

The manager must include the fire service in the decision-making process to ensure that the ultimate consolidation plan adequately addresses fire-fighting techniques. At the same time the manager has to strip away much of the fire service's traditional approach. In a time of dramatic change, the public safety manager must differentiate between legitimate concerns and deliberate stumbling blocks. He or she must have the strength to address acts of borderline insubordination quickly and forcefully while keeping implementation on track. Grosse Pointe Park's operational success was clearly tied to the abilities of its new director of public safety to handle attempts by individual firefighters to undermine the merger. In larger cities such as Kalamazoo, these con-

cerns can be addressed through a special working committee established to address labor relations problems evolving from the merger.

In naming a public safety director, the appointing authority must understand that the position requires greater management skills than those required to run a separate police or fire department and may require an appointment from outside the agency.

Relationship with the community. Sometimes there are political or legal reasons why the department leadership should come from within the agency. In Spartanburg, South Carolina, the police chief was a life-long resident of the community, had a strong following among the members of the police and fire services, and his father had been a firefighter in the community. Much of the merger's success can be attributed to his personal commitment to the concept. The merger might not have been accomplished if an outsider had been selected as the new department head.

In Union, New Jersey, the state statutes prohibit a director of public safety from running the day-to-day operations of the police service if there is an incumbent police chief. Thus, to permit the administrative consolidation, the current police chief was offered the position as director in exchange for his retirement as police chief.

The relative political strength of the current police or fire chief should always be considered. Chiefs who hold civil service tenure and who oppose the merger concept can thwart efforts to consolidate.

Timing

Finally, timing must be considered. Simply put, the manager must ask, "Is now the right time to attempt a merger?" Generally, a crisis provides the initial motivation for a merger. Loss of revenues, labor or management problems in the police or fire department, sudden growth through annexation, or an increase in criminal activities can provide the impetus for a merger.

The timing of personnel departures should be considered. If a significant number of current personnel leave the department in the near future, the city will achieve the benefits of a merger quickly. Conversely, if departures are few, substantial financial benefits of a merger may be delayed for more than five years. One factor in Battle Creek's decision not to pursue a merger was the low number of anticipated departures in the next five to ten years.

ANALYSIS OF A MERGER

Local government officials need to assess the range of impact of a merger before committing to a comprehensive study and plan. A Lotus spreadsheet model that estimates the range of impact of a merger on cost, patrol levels, and first-unit response time and highlights the

key decisions, variables, and trade-offs is described in this section using data from Auburn, Alabama.² To simplify the presentation, all dollar figures are rounded to \$100, a single average value for multiple supervisory ranks is used, and no adjustments to overtime costs are made.

The city of Auburn provides police and fire services to a community that includes a major university and a large number of visitors, particularly on weekends when there are major sporting events. The permanent population is approximately 35,000.

The police and fire divisions are part of a public safety department under the management of one director. However, there is no cross-training and little administrative consolidation. Each division is headed by a chief.

The fire service employs 40 firefighters and officers deployed in two stations. The department works a 48-hours-on, 96-hours-off schedule. Responsibility for ambulance and emergency medical services was recently transferred to a local hospital.

The consolidation impact analysis model developed by the authors and used in a study of the Auburn department requires three sets of data:

- Deployment levels
- Costs of personnel and patrol vehicles
- Personnel data such as age, years of service of current personnel, and departures in the past ten years.

Deployment and Coverage

Deployment data are used to estimate the average number of fire and police patrol response personnel on duty around the clock. The authors recommend taking a sample of four weeks, one from each of four separated months (e.g., February, May, August, and November). In fire departments in which personnel work 24-hour shifts, record the number of people of each rank that are on duty each day. Then calculate the four-month average for each rank.

The Auburn fire department staffed two fire stations with an average of 6.4 firefighters and 3.8 senior personnel (including lieutenants, majors, and captains). The number of personnel on staff for each of these categories was 26 and 13, respectively. The total staff is divided by the average deployment to determine the coverage factor. This is the number of people needed to staff one position 24 hours a day, seven days a week. The coverage factor in Auburn was 4.0 for firefighters and 3.4 for supervisors.

Steps in Analyzing a Merge

1. Calculate average police and fire deployment levels by rank.
2. Calculate coverage factor by rank.
3. Determine average personnel costs by rank (payments, pension and benefits).
4. Calculate average annual vehicle cost per patrol officer.
5. Decide whether to reduce staffing level of fire stations.
6. Calculate total fire personnel needed to staff and supervise.
7. Calculate total savings from reduced fire personnel.
8. Generate maximum cost savings plan (Plan A).
9. Generate maximum patrol increase plan (Plan B).
10. Calculate increased patrol levels for each plan.
11. Calculate savings and related statistics for each plan.
12. Calculate response time statistics for each plan.
13. Determine ten-year departure totals for police and fire personnel.
14. Calculate annual departure rates of personnel.
15. Estimate time frame to achieve full financial savings through personnel attrition.

All of the above calculations are included in a Lotus spreadsheet model, designed by the authors. Only step 12 requires advanced modeling techniques.

Calculating Coverage Factor for Fire Service

	Firefighters	Supervisors
Average deployment	6.4	3.8
Total personnel	26	13
Coverage factor	4.0	3.4

The average deployment level for police is usually more difficult to calculate because of multiple shifts. The average deployment for each of the police department's shifts is determined. Each shift's average is multiplied by the number of hours in the shift, and these numbers are added together and divided by 24 to obtain the overall average. This method works with all types of shift schedules including overlapping shifts. In the calculation for a department with three overlapping 10-hour shifts shown below, the average deployments for shifts 1, 2, and 3 are 7, 6, and 5 units, respectively. Each value is multiplied by 10 hours and the total is 180 patrol-unit hours per day. This is divided by 24 and the result is an average of 7.5 patrol units on duty. (The actual deployment level will range from a low of 5 to a high of 13 during overlapping shifts, but the average is 7.5.)

Calculating Average Deployment for Police Service

Shift	Average deployment	Hours	Product	
1	7	×	10	70
2	6	×	10	60
3	5	×	10	50
Overall average deployment: 180/24 = 7.5				

10 Management Information Service

With nonoverlapping 8- or 12-hour shifts, this calculation can be simplified to the average of the three or two shifts.

In Auburn, the department averaged 5.7 patrol officers and 2.6 patrol supervisors (corporals, sergeants, and lieutenants) between 6 a.m. and 6 p.m. During the night, the average was 6.5 patrol officers and 2.4 supervisors. The overall average was just the average of these two sets, 6.1 patrol officers and 2.5 supervisors. When calculating the patrol coverage factor, it is important to include in the total staff figures only those personnel who routinely go out in patrol cars or directly supervise patrol officers. The coverage factor for the Auburn patrol division was a low 4.4 for patrol officers and 4.8 for patrol supervisors.

Calculating Coverage Factor for Police Service

	Patrol officers	Supervisors
Average deployment	6.1	2.5
Total personnel	27	12
Coverage factor	4.4	4.8

Costs

Next, fire and police personnel costs and patrol vehicle costs are calculated. These are the major operating expenses that will affect the economics of a merger. For the average officer cost, the major categories are direct payments (base pay, overtime, longevity, holiday, vacation), benefits that are related to direct payments (pension, social security, worker's compensation), and other benefits (medical insurance, life insurance, clothing allowances). If overtime is significant, the city should gather data on the components of overtime costs. In Auburn, direct payment to a firefighter averaged \$21,200. Pension plus benefits added \$4,200 for a total cost of \$25,400. The corresponding total for a patrol officer was \$31,100.

Calculating Average Officer Costs

	Fire Service		Police Service	
	Firefighter	Supervisor	officer	Supervisor
Salary				
Payments	\$21,200	\$28,200	\$23,100	\$31,200
Pension, etc.	\$4,200	\$5,100	\$5,000	\$5,800
Vehicle		\$3,000		\$3,000
Total	\$25,400	\$33,300	\$31,100	\$40,000

To calculate the patrol vehicle costs per officer, the trade-in value of a car is subtracted from the purchase price. To this "net cost" is added the preparation cost (installation of radio and related equipment). The total is divided by the number of years until trade-in. This annual capital cost plus the annual operating cost of a vehicle (gas, oil, tires, and all maintenance) is the cost per vehicle per year. This number is multiplied by the number of cars assigned to the patrol division and di-

vided by the number of officers (including supervisors) who use these vehicles on patrol. The final number is the average patrol vehicle cost per officer per year. This cost must be included when determining the cost of additional patrol officers in a public safety merger.

Calculating Vehicle Cost per Officer per Year

Purchase price	\$13,125
- Trade-in value	- 2,625
Net cost	10,500
+Preparation Cost	+ 175
Net + Prep. Cost	10,675
+Average years until trade-in	/2.5 years
Capital cost per year	4,270
+ Annual operating expense	+ 4,200
Capital + operating cost	8,470
x Fleet size	x 14 cars
Total fleet cost	118,580
+ Number of personnel	/39 officers
Vehicle cost per officer per year	\$3,041

Key Decision: Fire Station Staffing Level

A crucial decision is determining the number of personnel to retain in the fire stations. The Auburn fire department staffed three vehicles: one engine and one ladder at headquarters and one engine at a second station. The proposed public safety deployment plan would maintain 3 firefighters to drive the equipment and 1 supervisor. Multiplying these numbers by the respective coverage factors (4 and 3.4) and rounding determines the number of personnel required: 12 firefighters and 4 captains. If the department has one additional senior officer in charge, the plan's net savings is 23 fire personnel. This reduction generates savings of \$686,800.

Calculating Fire Cost Savings

	Number of personnel	Cost per officer	Total cost
Firefighters	14	\$25,400	\$355,600
Supervisors	7	\$33,300	\$233,100
Senior officers	2	\$49,050	\$98,100
Total personnel	23		
Total cost savings			\$686,800

The police cost data are then used to estimate the number of additional patrol personnel that can be funded out of this savings. The spreadsheet model automatically generates two patrol deployment plans. Plan A maximizes savings, and Plan B maximizes the additional patrol resources. Plan A is generated by increasing patrol resources by half the number of positions eliminated

from the fire service. For Auburn, this adds 11 officers to patrol. Dividing 11 by the coverage factor, 4.4, yields the average increase in deployment: 2.5 more officers on patrol, for a total of more than 8.5 on patrol not including supervisors.

The net savings are calculated by multiplying the personnel saved at each fire rank by the corresponding total cost and subtracting the cost of adding patrol officers including vehicles. In Auburn, the combined services would have 12 fewer personnel with a projected annual savings of \$344,700.

Calculating Cost Savings under Plan A

Fire cost savings	\$686,800
Cost of additional police (11 × \$31,100)	\$342,100
Net savings	\$344,700

This savings does not consider salary increases for dual-trained officers. The cost of a raise is calculated by determining the total of direct payments plus pension plus similar costs that are a percentage of direct payments (e.g., social security) for all current and additional patrol officers. When vehicle and insurance costs are excluded, the per officer costs were estimated to be \$25,500 for patrolmen and \$34,400 for patrol supervisors. The total for all officers is divided by 100 to obtain an estimate of a 1 percent pay raise. In Auburn, this amount was \$13,800. It is an easy calculation to translate this number into a 5 percent (\$69,000), 7 percent (\$96,600), or 13 percent (\$179,400) raise.

Calculating Cost of Pay Raise under Plan A

	Number of personnel	Cost per officer	Total cost
Patrol officer	(27 + 11)	\$25,500	\$969,000
Supervisor	12	\$34,400	\$412,800
Total payroll			\$1,381,800
Cost of 1% pay raise			\$13,818

Plan B is generated by dividing the total fire personnel savings by the average cost of a patrol officer including vehicle costs. This plan represents the largest possible increase in patrol strength while holding costs approximately constant. To determine Plan B for Auburn, the fire savings (\$686,800) were divided by the total cost per patrol officer (\$31,100). For Auburn, Plan B adds 22 officers to the patrol force. These officers can staff an additional 5 patrol units around the clock, for a total of 11 patrol units.

Calculating Cost Savings under Plan B

Fire cost savings	\$686,800
Cost of additional police (22 × \$31,100)	\$684,200
Net savings	\$2,600

Because the dual-trained force is larger under Plan B, the cost of each 1 percent pay raise increases to \$16,623.

Calculating Cost of Pay Raise under Plan B

	Number of personnel	Cost per officer	Total cost
Patrol officer	(27 + 22)	\$25,500	\$1,249,500
Supervisor	12	\$34,400	\$ 412,800
Total payroll			\$1,662,300
Cost of 1% pay raise			\$ 16,623

Impact on Performance

With an estimate of the number of hours of on-going training for a firefighter and the standard dispatch to major and minor fires, it is possible to calculate a series of performance measures. In Auburn, annual on-going fire training was estimated to take 90 hours per officer. The standard dispatch policy was 4 officers to a minor fire and 8 to a major fire.

Under a merger, police patrol time will be lost because officers take on new activities (i.e., fire training and response to minor fires). The model calculates the change in the level of patrol during each of these activities. For Auburn, the model assumed training would entail the removal of 2 patrol officers at a time to train along with fire station personnel. During training periods, under Plan A, which added 2.5 patrol officers, the city still has slightly more personnel on the streets. Under Plan B, the city has 3 more personnel on the streets. Training would be scheduled during all shifts, and some training would be in progress 19 percent of the time. The 19 percent is obtained by the following formula:

$$\frac{100\% \times 90 \text{ hours training} \times 8.6 \text{ patrol}}{(2,000 \text{ hours} \times 2 \text{ people})}$$

Training averages 90 hours per person per year, and this is multiplied by the average number of officers on patrol, 8.6, and then divided by 2,000 hours, which is approximately the number of hours per person per year. This calculation is divided by two, because two officers train at a time. If the city pulled three people off the road at a time for training, the percentage of time when training is in progress would drop to 12 percent, but during this period the city would have slightly fewer officers on patrol.

If a city does not have summary fire workload data, the model assumes, conservatively, that 4 percent of public safety officers' time is spent on minor fire calls and 1 percent is spent on major fire calls. In Auburn, the data indicated that only 2 percent of the firefighters' time was spent on minor fire calls. During a major fire, to which 3 fire station personnel are dispatched along with 5 road patrol officers, the city would experience a reduction of patrol of an average of 2.5 officers under Plan A. This would still leave 3 patrol officers plus supervisors

to handle other emergencies. In exchange for this rare reduction in patrol, the city would experience a significant increase in patrol the remaining 78 percent of the time. With Plan B, the city's patrol level never drops below its current value, even during a major fire. Seventy-three percent of the time, patrol strength would increase by 5 officers and during training and minor fires, patrol strength would increase by 3 officers.

Calculating Impact on Patrol Levels

Activity	Time spent (%)	Change in patrol level (units)	
		Plan A	Plan B
Training	19-24	+0.5	+3
Minor fire	2	+0.5	+3
Major fire	1	-2.5	0.0
Normal	78-73	+2.5	+5

The last set of performance measures are estimates of system performance on an average or busy shift. To avoid extensive data collection, the model assumes current workloads of 40 percent for an average day and 70 percent for a current busy day. However, in Auburn, the data indicated the average was closer to 30 percent and a busy shift was 50 percent. The model also assumes that 10 percent of all calls are high priority and that on average a call ties up a patrol unit for 30 minutes. Two other pieces of data needed are the area of the city and travel speeds. The model assumes a speed of 20 m.p.h. for low-priority calls and 30 m.p.h. for high-priority calls.

The model uses two sets of equations to calculate average first-unit response time for high- and low-priority calls. One set of equations estimates average travel time, and the other uses queuing theory to estimate average dispatch delay due to officer unavailability. In this analysis, only the response time of patrol officers is considered and that of supervisors is not included. The travel time formula derived using concepts of geometric probability is called the square root law:

$$\text{Avg. travel time} = (c/5) \sqrt{A/N(1-b)}$$

where A = Area in square miles
 N = Number of patrol officers deployed
 S = Average travel speed in miles per minutes
 b = Average fraction of time patrol officer is busy and unavailable for immediate dispatch
 c = 0.63, a constant of proportionality that should be calibrated with actual data.

The formula should be calibrated with actual travel time data, which involves time-consuming data collection and validation. This validation is always done before the development of final merger deployment plans, but the

uncalibrated equation is useful at an early stage in providing an estimate of the relative travel times and total response times for a separate police patrol force as compared with a larger, dual-trained patrol force.

In Auburn, the primary area of patrol responsibility is 17 square miles. The denominator $[N(1 - b)]$ represents the average number of patrol officers available for immediate dispatch. If there are 6 units and units b is 0.30, on average 4.2 units $[6(1 - 0.3)]$ are available for immediate dispatch and 1.8 units $[6 - 4.2]$ are busy. If an average response speed of 0.5 miles per minute (i.e., 30 m.p.h.) is assumed, then the estimate of travel time is 2.6 minutes.

Under Plan A, the patrol force would increase by an average of 2.5 officers and under Plan B by 5 officers. A current deployment of 6 units was compared with deployment of 8 units under Plan A and 11 units under Plan B. The average busy percentage decreases in a merger because the workload is shared by more patrol units. For Plan A, each of the 2 additional units is estimated to generate activities such as traffic stops or breaks that consume 15 percent of its time irrespective of current workloads. As a result the total number of busy patrol units is estimated to be $1.8 + (2 \times 0.15) = 2.1$, and the average number of patrol units available for immediate dispatch would be 5.9 units $(8 - 2.1)$. The average travel time would be 2.1 minutes. The travel time to high priority calls is identical to the total response time (travel + queuing delay) because police departments with workloads of 30 percent and 6 units on the road rarely experience queuing delays for high priority calls—see Appendix C.

The increased patrol with Plan A would reduce response time by an estimated 0.5 minutes for high-priority calls on average shifts and slightly more for low-priority calls. The average number of officers on preventive or directed patrol would increase by 40 percent from 4.2 to 5.9. The impact during a busy shift would be greater. High-priority response time would drop by a minute. Low-priority response time would decrease by almost two minutes—these calls are affected more because they are more likely to be delayed when officers are unavailable. Performance measures would be more impressive under Plan B, which would double the number of patrol officers available for preventive patrol activities. See Table 1 for these figures.

This spreadsheet model provides the decision maker with an estimate of the impact of a range of deployment options. If saving money is crucial, then a city official would opt for Plan A. In Auburn, if an 8 percent dual-training bonus is assumed, the estimated savings would decline by approximately \$110,000. If the greater concern were increased patrol resources, the city official would opt for Plan B. If an 8 percent raise is contemplated, Auburn can increase patrol to 10 officers instead of 11 without increased costs. Naturally, a city official can choose an option somewhere between A and B that strikes a different balance between savings and patrol strength.

TABLE 1—Impact on Response Times—Auburn, Alabama

	Available patrol officers and average response times		
	Current structure (6 officers deployed)	Plan A (8 officers deployed)	Plan B (11 officers deployed)
When workload is average (30 percent)			
Average number of officers on preventive patrol (and available for dispatch) is	4.2	5.9	8.5
Average response time for high-priority calls is	2.6 minutes	2.1 minutes	1.8 minutes
Average response time for low-priority calls is	3.9 minutes	3.2 minutes	2.7 minutes
When workload is busy (50 percent)			
Average number of officers on preventive patrol (and available for dispatch) is	3.0	4.7	7.3
Average response time for high-priority calls is	3.5 minutes	2.5 minutes	1.9 minutes
Average response time for low-priority calls is	5.5 minutes	3.7 minutes	2.9 minutes

Implementation through Attrition

A final model addresses the implementation timeframe. One aspect of implementation is the dual training of personnel. This can usually be completed within a couple of years and is unlikely to take more than four years (Kalamazoo, which has the second largest public safety department in the country, cross-trained its personnel in less than four years). Cross-training provides the performance benefits of a merger but personnel reduction provides the savings. If the merger is implemented without layoffs, the cost savings timeframe depends more on attrition than on the time to cross-train.

The data needed to analyze attrition time are the year of departure and year of hire of all personnel who left the police and fire departments within the last ten years. All departures during the ten-year timeframe of personnel who had been hired before the ten-year period are counted. Departures of personnel who were hired within the time period are not counted. In Auburn 41 personnel departed from the fire department between 1980 and 1989, but only 17 had been employed before 1980. In the police department, 53 personnel departed, 28 of whom had been employed before 1980. Divide 17 and 28 by 10 to estimate the average annual departure rate from the fire (1.7) and the police (2.8) departments.

The goal of the merger was a 23-person reduction from the fire department. The combined annual departure rate, 4.5, is divided into 23 to obtain an estimate of the number of years until 23 people have departed. In Auburn, in approximately five years, 23 current personnel

will have left. Of this total, 9 will leave the fire department. If 14 firefighters agree to cross-train and join patrol, the full economic benefits of a merger can accrue in five years. Despite traditional fire service opposition to a merger, experience in other cities suggests it is not unreasonable to expect that 14 or more firefighters out of the 37 will agree to cross-train given the financial and promotional incentives. In ten years, there would be 17 departures from the fire service, and the city would still need to cross-train 6 firefighters to achieve full savings.

Even if it takes more than five years to achieve full savings, in the meantime the city can capture a significant portion of the savings while gaining almost all of the performance benefits of the merger. If the timeframe is extended, rather than rushing to dual train all willing personnel and pay them more, the city should proceed at a pace that allows savings due to attrition to more than cover the increased salary of dual-trained officers.

The merger itself will speed up attrition. Personnel who are unhappy with the new department concept may leave and personnel eligible for retirement may retire early rather than accumulate increased pension benefits. A city may want to offer cash bonuses for early retirement because the costs can quickly be recouped in a merger.

Estimates for future attrition will approximate those of the recent past if departure patterns have been relatively stable. However, if a large number of personnel recently retired, then the number of retirements in the near future would be below average and vice versa. To address this potential data problem, the authors have

developed an advanced Markov chain model that does not assume that annual departures have remained relatively stable but uses the historical departure data in conjunction with data on the age and years of service of all current police and fire personnel to provide detailed year-by-year estimates of departures. Figure 1 presents the results for Auburn. The estimate for the first five years is close to that of the simplified analysis explained earlier. The estimate for the subsequent five years is significantly lower than that predicted earlier. These numbers indicate 18 percent fewer departures over a ten-year period than the simplified analysis indicated.

MANAGEMENT ISSUES

Once the choice has been made to pursue a consolidation, management decisions and organizational design will significantly affect success. As Esai Berenbaum, a former director of the Durham, North Carolina, public safety department warned, communities considering a merger must ensure "that compromises are not made with opponents of the program which will result in a weak organization, weak leadership, uncoordinated operations, and inadequate training."³ Unfortunately, even in communities in which organizational activity and design are not predetermined by compromises, management errors often lead to the failure of the merger. Six management

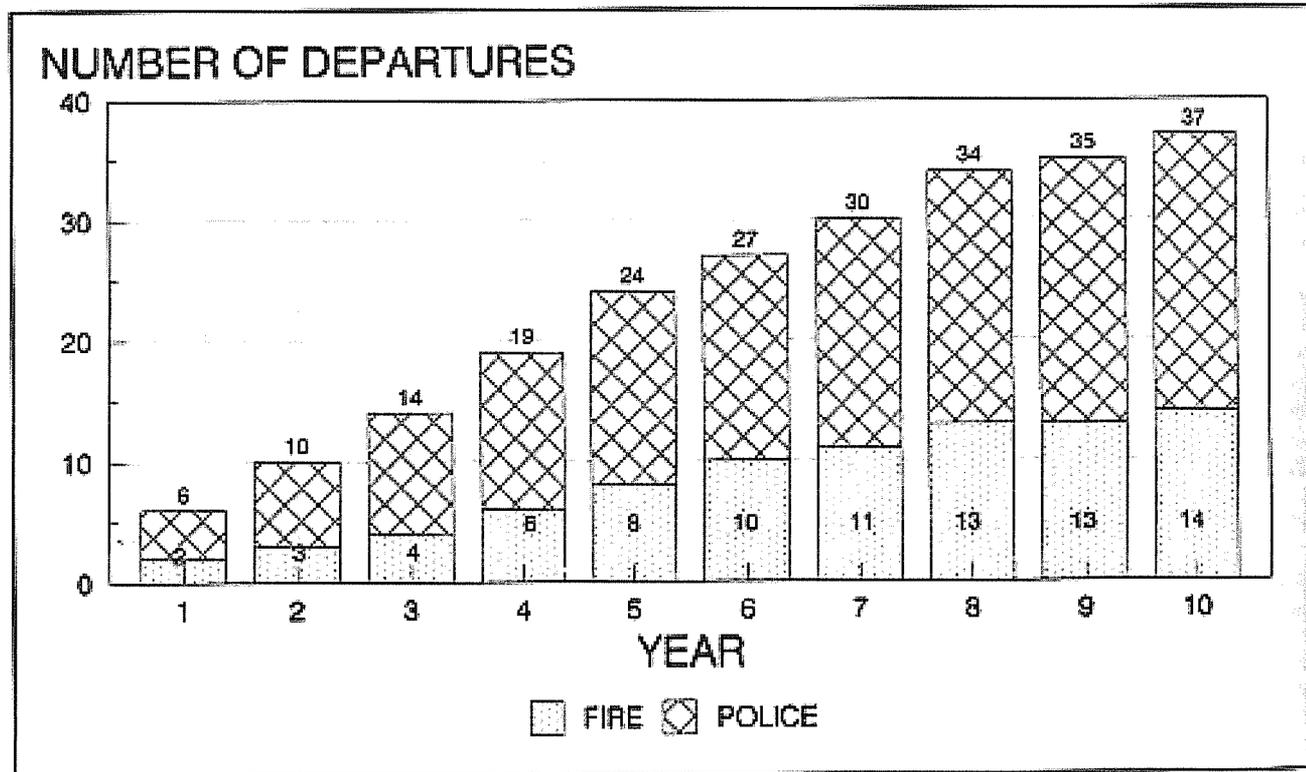
areas will affect the success of a merged agency and should be considered closely when establishing a consolidated department.

Personnel Management

Perhaps more than any other issue, the ability of the management team to handle effectively the personnel issues involved will determine the success of the merger effort. Administrators must be sensitive to the major change that will occur in the lives of police officers and firefighters as they assume the new, cross-trained role. At the same time administrators must be willing to effect the merger forcefully, if necessary.

The police and fire services carry with them a hundred years of tradition, and a merger severely violates those traditions. In the fire service in particular a merger dramatically changes the lifestyles and work habits long considered an integral part of the profession. Managers must be prepared to address the real and imagined fears of employees who are suddenly faced with changes that dramatically alter their work environment, career aspirations, and plans. Although the rank and file should be involved in the planning of the new agency, the reality is that many will resist the proposed changes even when given the chance to participate in the plans. The manager must be prepared to answer their concerns but also understand that the answers, in many instances, are ones that the employees do not want to hear.

Figure 1—Cumulative personnel departures forecasted for Auburn, Alabama.



One objection that inevitably arises is that "one person cannot learn two jobs." The administrator must be prepared to deal with that issue head on. Although it is true that some individuals may not be capable of performing police and fire tasks, many people can do both and do so well. Indeed, the experience of many agencies is that these skills complement each other and that the public safety officer position, because of its diversity and community orientation, attracts high-quality candidates. The recruitment process for future hires should be designed to test for the broader range of skills required for the dual-trained position.

Some current employees, however, may find the acquisition of the new skills difficult, even impossible, and the administrator must have an organizational design available to accommodate those individuals who cannot complete the cross-training. Even after cross-training, some personnel may find it difficult to adapt to their new daily routines and to the different work cultures of police or fire. Police officers often handle emergencies on their own and between calls take the initiative to aggressively patrol and solve problems. The interest in the self-starter police officer is growing as community-oriented policing gains wider acceptance in the police community. In contrast, firefighters work as a team with close supervision and in reaction to calls for service. Some personnel may have difficulty in moving between these two cultures as they handle their dual role.

Almost every successful consolidation examined by the authors involved voluntary participation in the cross-training program. Determining what incentives to offer is one of the important decisions for managers. Participants can be offered financial incentives to accept the new positions, but incentives need not be limited to financial benefits. Promotional opportunities may be restricted to cross-trained personnel, and this should be communicated early in the recruitment process. Individuals who may not volunteer for the program in response to financial incentives may do so if they understand that their career opportunities will be limited if they do not participate.

Finally, the management must be flexible in making assignments. It is impossible to determine in advance which of the existing personnel will perform the best under the merged role. The administrator must be prepared to amend the initial plan, often many times, to take advantage of previously unrecognized leadership abilities as well as to incorporate into the department personnel who perform adequately in current roles but are unable to complete cross-training or handle the dual role satisfactorily.

Organizational Structure

The table of organization for the merged department will affect its performance significantly. A critical component of a successful public safety agency and a part of its basic description is the "management and control of all emergency services functions under the direction of a

single individual, the public safety director." The consolidation of authority at the top is symbolic. Often, however, the continuity of command and control is lost at the lower levels of the organization.

A problem in partially merged public safety agencies is the shift in supervisory responsibilities that occurs when personnel are moved from a law enforcement mode to a fire suppression response. In Oakland Park, Florida, public safety officers responding to a fire call moved from the supervision of a police sergeant to the supervision of a fire lieutenant. Such split supervision eliminates effective command and control of people and often creates situations where the police supervisor and the fire supervisor have conflicting goals and demands. Public safety officers are caught in the middle of such conflicts.

Supervision is more clearly defined in a fully consolidated agency and in partially consolidated agencies in which all personnel, whether fire, police, or public safety officers, report to the same first-line supervisor. The supervisor has complete control of human and equipment resources at the scene of any incident, and the chain of command is clear. Such a structure requires that first-line supervisory personnel be well trained in both disciplines.

Moving up the table of organization, a unity of command should be maintained with platoon and division commanders responsible for all public safety operations in a geographic area. This has been accomplished in Morganton, North Carolina, and Coconut Creek, Florida, by dividing the agency into two divisions, operations and support. Operations, headed by one person, is responsible for all field operations, including police patrol and investigations as well as fire suppression. Such an organizational structure does not preclude specialists, who may serve as staff personnel providing a higher level of expertise in specific operations.

Inclusion of the investigative personnel in the operations unit can contribute to the fire suppression force and reduce the need for call backs or mutual aid assistance in the event of a major incident. Investigative personnel are rarely involved in noninterruptible activities. If cross-trained, they are a resource in case of a major fire. Alternatively, they can perform as patrol personnel while uniformed personnel respond to a fire. They can quickly don jumpsuits or jackets clearly identifying them as police officers and temporarily assume patrol duties during the course of the fire. Cross-trained investigative and administrative personnel may even be assigned as engine drivers responsible for delivery of apparatus to a fire scene. In Coconut Creek, this responsibility was assigned to the detective bureau. The supervisor of that unit ensured that one detective was always prepared to report quickly to the fire bays.

Scheduling

Scheduling is always a problem in emergency services because of the 24-hour, seven-day-a-week nature of these

organizations. Scheduling is further complicated in a merged agency because of the conflicting demands of the police and fire services.

The volume of calls for police service varies by time of day and day of week in a fairly consistent pattern. High- and low-demand periods also depend on local conditions. Standard practice in modern police departments is to schedule personnel according to these patterns, adding additional patrol resources during heavy-demand periods and reducing resources during times of lower demand. The fire service, on the other hand, must maintain minimum personnel levels to be ready to respond to a fire and to staff apparatus. These requirements do not vary by time of day.

Fire-fighting is team-oriented in contrast with police work, which typically requires one or two officers per call. Fire-fighting teams must be maintained not only in actual deployment but also during in-service training so that the fire-fighting response will be a coordinated effort. Additionally, fire-fighting training and equipment maintenance and service demands are significantly different from those of the police service. Because the volume of fire calls is typically very low, a major commitment must be made to regular, on-going in-service training to ensure that fire-fighting personnel are familiar with apparatus, equipment, and tactics. These in-service training requirements reduce patrol personnel resources and are often not considered in the initial design of a public safety agency.

Failure to consider these inherent scheduling conflicts when implementing a merger can lead to program failure. In Morganton, North Carolina, and in Twin Falls, Idaho, a major concern was the lack of adequate training time, which led to perceived operational failures at fire scenes. In both instances, management made significant initial training commitments but did not continue this level of training because of patrol staffing demands.

These scheduling conflicts can be overcome with a thoughtful deployment design but are difficult to deal with in standard 8- or 10-hour shifts. Cities have found that a 12-hour schedule is particularly well suited for the public safety concept. Kalamazoo has been operating on such a schedule since the initial implementation of its program and continues to do so after labor and management efforts to identify alternative schedules. Coconut Creek has operated on 12-hour shifts since 1982.

Although there are several variations, 12-hour schedules typically assign employees to one of four platoons or teams. The members of each team consistently work together under the same supervisor and share the same days off. These schedules involve one 36-hour workweek followed by one 48-hour week, averaging 42 hours per week, and are consistent with Fair Labor Standards Act requirements. One design, shown in Figure 2, provides a three-day week to each officer every other week. Additional personnel can be assigned to a floating squad or team that can be used to provide training relief and for specialized assignments such as selective traffic enforcement or plainclothes patrol.

Assigning fire station-bound personnel to a 24-hour shift while operating field forces on a different schedule will be less expensive than a deployment where all personnel work the same hours. However, such a schedule should be avoided for at least two important reasons.

Different schedules essentially eliminate the team responses that are necessary for effective fire-fighting and create two classes of employees, which may involve separate labor unions, work rules, etc. Also they maintain a separate fire-fighting force, which may never consider itself part of the public safety program and may work to undermine the consolidation effort. In Twin Falls, public safety officers reported that when they responded to a fire scene they felt uncomfortable interacting with the firefighters because they rarely trained or

Figure 2—12-Hour Day, 42-Hour Week Schedule for Four Public Safety Officer Teams

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
8 a.m. - 8 p.m.	1	2	2	1	1	2	2
8 p.m. - 8 a.m.	3	4	4	3	3	4	4
8 a.m. - 8 p.m.	2	1	1	2	2	1	1
8 p.m. - 8 a.m.	4	3	3	4	4	3	3
8 a.m. - 8 p.m.	1	2	2	1	1	2	2
8 p.m. - 8 a.m.	3	4	4	3	3	4	4
8 a.m. - 8 p.m.	2	1	1	2	2	1	1
8 p.m. - 8 a.m.	4	3	3	4	4	3	3

worked with them. Sometimes they felt they were placed (by the firefighters) in positions for which they were untrained. In Oakland Park, the station-bound firefighters never considered themselves part of the public safety department, referred to their organization as the "fire department," and ultimately prevailed in undermining the public safety program.

In summary, having station-bound personnel working the same schedule as patrol personnel builds a more cohesive, team-oriented organization and offsets the additional costs of this type of schedule.

Equipment

The fire service is in the midst of a technological revolution. Progressive fire departments have discovered that mini-pumpers and quick response vehicles (QRVs) may provide faster and more flexible response than traditional large-volume pumpers. They are relying more on chemical agents, such as Class A foam and other wetting agents, which dramatically increase the fire suppression capabilities of plain water. This new technology, when combined with the use of compressed air, may reduce personnel requirements and enhance attack and exposure protection capabilities.

The public safety administrator must be prepared to adopt new approaches and new technology for the delivery of emergency services. In Palm Springs, Green Acres City, and Coconut Creek, Florida, officers routinely patrol in QRVs, four-wheel-drive pickups outfitted with a slide-on high-compression pump and 250 gallons of water. Assigned to regular police patrols, these marked units perform selective traffic enforcement and respond to routine police service calls. In a fire call, they can begin to attack the fire. Typical small fires in dumpsters and cars, for example, are regularly handled by these units, reducing the demands on larger and more expensive fire apparatus. This immediate initial attack can prevent a small fire from expanding into a large fire. Because of their rapid response, QRVs have been credited with saving structures, including mobile homes, that might have been lost if larger but slower fire apparatus were dispatched.

Communications

Effective command and control of all emergency responses requires a well-managed dispatch and communications center in any emergency services organization. In a consolidated agency, the demand for communication is even greater—active call-for-service-management and aggressive preemption strategies are required. All emergency services organizations have a de facto preemption strategy: police officers routinely leave less important calls to respond to more serious emergencies when no other officers are available. In public safety departments, such strategies must be formalized and consistently implemented.

It would be impossible to integrate a public safety

response successfully without control over fire and police radio frequencies. Communities considering a consolidation would be wise to ensure such control before implementation. All calls for service should be dispatched over one channel so that all public safety personnel are aware of the emergency, including field units involved in inspections or investigations. Aiken, South Carolina, began its successful consolidation with the merger of all dispatch operations. In communities with a large patrol force, operations may be segmented into geographical areas, each of which may be assigned a separate frequency. The critical issue in reducing response times is to ensure that all public safety personnel responsible for services in an area are made immediately aware of each incident. Aggressive control of calls for service using such techniques as "differential police response" should be used to increase personnel availability.

One indicator of poor control over dispatch and patrol is frequent response by multiple patrol units to calls. An official policy should make clear when two officers (or more) are to be dispatched to a call. In an emergency, patrol units should not self-dispatch in large numbers. Even on a slow night, five units should not respond to an emergency just because they want to be part of the action. Even in a traditional police department, such response patterns leave the rest of the city divested of patrol. In a public safety department, these responses leave the city vulnerable as well to fire emergencies.

Training

The relationship between in-service training and scheduling has been discussed. However, the importance of adequate fire training cannot be overemphasized. Many consolidations fail because of inadequate training. If public safety officers respond quickly to a fire but are unable to use equipment or fail to use proper fire attack techniques, they are not effective.

In the initial stages of a merger, the transitional training of police personnel in fire-fighting techniques will consume significant time that inevitably results either in reduced police patrol or in additional overtime. It is imperative that service levels not decrease during this vulnerable period, and administrators must budget for this expense. The cost to cross-train police officers and the impact on patrol levels will be sensitive to state requirements and local training practices. Many states, such as New Jersey, do not have minimum firefighter training requirements. Others provide that the basic training can be done in-house. Still others, such as Florida, have stringent training requirements that can be met only by attending state certified academics.

In contrast, police training regulations are more consistent among states and generally require greater time commitments than fire-fighting training. Basic police training always occurs within an academy setting. Basic training requirements may exceed 600 hours. In

any case, basic police training must be scheduled and funded.

The necessity of on-going, in-service fire-fighting training cannot be overstated. Only through repetitive practice can persons develop solid fire-fighting skills. This training also provides the opportunity to regularly inspect and test equipment and apparatus. The maintenance of equipment in a public safety department can be a particular problem because of the significant reduction in station-based personnel. There is a danger that in a public safety agency, training on equipment and the maintenance of the apparatus may be postponed or neglected in deference to patrol demands. Doing so will ultimately lead to performance failures of equipment and personnel.

SUMMARY

The issues surrounding a proposed police/fire consolidation include financial, personnel, political, and social considerations. Sorting out the answers is not easy. Key decisions must be made regarding staffing levels and salaries, which may meet opposition, particularly from public sector unions. Local circumstances will determine the strength and effectiveness of this opposition. The mathematical model developed by the authors of this report can provide the manager with answers to questions about the impact of a consolidation on service levels and costs. Being able to demonstrate the effect of a proposed merger will be important in building political support for the public safety concept. Finally, the experience of many successful public safety departments suggests guidelines for staffing, equipping, training, and managing a consolidated department that will contribute to its effectiveness.

¹ Letter from John E. Ross, Public Safety Director, Kalamazoo, Michigan.

² The development of a detailed merger plan is a complex time-consuming process involving numerous tradeoffs. To assist in this task, the authors have developed a number of advanced mathematical models in addition to the simplified model described in this report. These advanced models estimate a variety of related performance measures for a public safety department, including

- Average response time of the first, second, third, etc., patrol unit responding to an emergency call
- Average response time of the first and second fire engine
- The probability that the first unit at a fire scene will be a patrol unit
- The probability that there will be enough patrol units available for immediate dispatch to a minor or major fire.

The model capabilities are illustrated in the Kentwood case study contained in the Clearinghouse Report "Police/Fire Consolidation Case Studies" (see Additional Resources).

³ Police-Fire Consolidations: A Case Study, MIS Report, ICMA, March 1974.

ADDITIONAL RESOURCES

- Kenneth Chelst, "A Public Safety Merger in Grosse Pointe Park, Michigan— A Short and Sweet Study," *INTERFACES* 18, July-August, 1988.
- Kenneth Chelst, "Queuing Models for Police-Fire Merger Analysis," *Queuing Systems Theory and Applications*, Vol. 7, 1990.
- International Association of Fire Fighters, *Consolidation of Fire and Police Departments; Consolidation Kit*, 1982.
- R. C. Larson, *Urban Police Patrol Analysis*, (Cambridge, Mass.: The MIT Press, 1972).
- Leonard Matarese, "The Public Safety Concept Comes of Age," *New Jersey Municipalities*, New Jersey League of Municipalities, May, 1986.
- Leonard Matarese, "Police/Fire Consolidations: Issues and Strategies," in *Implementation Strategies for Consolidation of Police and Fire Operations*, Joint Center for Environmental and Urban Problems, Boca Raton, Florida, May, 1983.
- "Police/Fire Consolidation Case Studies," Clearinghouse Report (ICMA, 1991).
- Police/Fire Consolidation in Municipalities 10,000 and Over*, Urban Data Service, Vol. 9, No. 9, (ICMA, 1977).
- Police/Fire Consolidation in Municipalities 10,000 and Under*, Urban Data Service, Vol. 10, No. 10, (ICMA, 1978).
- Police-Fire Consolidations: A Case Study*, MIS Report (ICMA, March, 1974).
- Public Safety Departments: Combining the Police and Fire Functions*, MIS Report (ICMA, July, 1976).
- Update: Public Safety Departments— Combining the Police and Fire Functions*, MIS Report (ICMA, November, 1982).
- W. E. Walker, J. M. Chaiken, and E. J. Ignall, *Fire Department Deployment Analysis*, (New York: Elsevier North Holland, 1979).
- B. Wolkison, K. Chelst, and L. Shepard, "Arbitration Issues in the Consolidation of Police-Fire Bargaining Units," *The Arbitration Journal*, Vol. 40, No. 4, December, 1985.

APPENDIX A: Consolidated Public Safety Departments

A partial list of communities that have succeeded in consolidating police and fire services follows.

Murrelle, Arkansas
 Texarkana, Arkansas
 Esquimalt, British Columbia
 Marina, California
 Rohnert, California
 Sunnyvale, California
 Coconut Creek, Florida
 Greenacre City, Florida
 Indian River Shores, Florida
 North Lauderdale, Florida
 North Palm Beach, Florida
 Ocean Ridge, Florida
 Palm Springs, Florida
 Parkland, Florida
 Bainbridge, Georgia
 Glencoe, Illinois
 Highland Park, Illinois
 Rosemont, Illinois
 El Dorado, Kansas
 Albion, Michigan
 Berkley, Michigan
 Bloomfield Hills, Michigan
 Centerline, Michigan
 East Grand Rapids, Michigan
 Emmitt, Michigan
 Escanaba, Michigan
 Farmington, Michigan
 Fraser, Michigan
 Greenville, Michigan
 Grosse Pointe City, Michigan
 Grosse Pointe Farms, Michigan
 Grosse Pointe Park, Michigan
 Grosse Pointe Shores, Michigan
 Highland Park, Michigan
 Huntington Woods, Michigan
 Ionia, Michigan
 Ironwood, Michigan
 Kalamazoo, Michigan
 Manistique, Michigan
 Oak Park, Michigan
 Gladstone, Missouri
 Rio Rancho, New Mexico
 Morganton, North Carolina
 Aiken, South Carolina
 Spartanburg, South Carolina
 Union, South Carolina
 Dallas/Ft. Worth Airport, Texas
 Highland Park, Texas
 Lake Worth, Texas
 South Lake, Texas
 Woodway, Texas
 Orem, Utah
 West Jordan, Utah
 Stellacoom, Washington

Ashwaubenon, Wisconsin
 Bayside, Wisconsin
 Brown Deer, Wisconsin
 Fox Point, Wisconsin
 Rivershill, Wisconsin

APPENDIX B: Fire Workload

Kentwood, Michigan

During 1986 Kentwood, Michigan, deployed an average of nine people in two fire stations for 45 hours during weekdays. More recently, the city expanded coverage to 50 hours per week. At other times, fire calls were responded to by personnel called into the station to staff the equipment. In 1986 the department responded to 533 calls, approximately 1.5 per day. Of this total, 131 involved actual fires of which 55 were structural fires (see Table B-1).

TABLE B-1
Calls for Service, Kentwood, Michigan, Fire Department

Call Type	Number	Percent
Structural fires	55	10
Nonstructural fires	76	14
Rescue	81	15
Medical	79	15
Hazardous conditions	73	14
Service	57	11
False alarms	88	17
Other	24	5
Total	533	100

One indication of the severity of a fire is the amount of water applied to the fire. The Michigan Fire Incident Reporting System contains estimates of water use. The Kentwood department applied water 104 times during the year, an average of twice a week. In 64 percent of the fires, the water was applied through a booster hose connected to a water tank on the fire engine. Thirty-seven times during the year, the department laid a regular hose connected to a hydrant. It is estimated that in 60 percent of the cases, 100 gallons of water or less were needed and less than once every two months, 1,000 gallons of water or more were used at the fire scene (see Figure B-1).

Two-thirds of on-duty calls were responded to by three or fewer personnel. Only 17 times during weekdays did eight or more people work at the scene of a call. The average time at a call was 30 minutes, and 91 percent of all calls were serviced in one hour or less. Only five calls during the year took longer than two hours. It is during these long calls that a public safety department needs to call back off-duty personnel to provide additional patrol and fire coverage.

The total workload of on-duty personnel was calcu-

lated by multiplying the number of on-scene personnel by the time spent at the scene for each call. This workload was totaled for all calls handled during the on-duty hours. This total was then divided by the average number of personnel on duty. The call for service workload for on-duty personnel averaged 2.1 percent of their time or 11 minutes during their nine-hour tour of duty. If the department staffed their stations around-the-clock, the percentage would drop below 2 percent i.e., less than 30 minutes per 24 hours) because the call rate during off-duty hours was even lower.

Auburn, Alabama

The Auburn fire service staffed two stations around-the-clock with an average of 10 persons. During a 16-week sample period, the fire services responded to 161 calls, 1.4 per day. The call breakdown and the status at the time of arrival at the call is illustrated in Figure B-2. Half of the calls involved a report of a fire in a structure. However, the majority of these calls were false alarms. There was a structural fire in progress upon arrival of fire apparatus only 13 times during the 16-week period. Sixty percent of these structure fires and 90 percent of the nonstructure fires were put out with a booster line fed by water on the engine only. The department connected hose to a hydrant less than once every two weeks.

The average time a firefighter spent at calls for ser-

vice including false alarms was 22 minutes per 24-hour shift or 1.5 percent of on-duty time. The average time spent at a call was 21 minutes. Eleven calls lasted an hour or longer, and only one call during the 16 weeks lasted more than two hours.

Oakland Park, Florida

Oakland Park averaged nearly four dual-trained officers on patrol around the clock, in addition to a sizeable patrol force of police officers. Nonetheless the department maintained, on average, more than nine single-trained firefighters in the city's two stations. During the 16-week sample period, the city responded to 327 calls, an average of almost three per day. The largest category of calls was emergency medical with 92 calls. These calls do not include a larger group of emergency medical service calls for which the fire department staffed a separate advanced life support vehicle. The total workload averaged in the range of 42 to 52 minutes per firefighter in the station house per 24-hour day. (The data on personnel at the fire scene did not differentiate between firefighter and public safety officers). The estimated workload is 3 percent to 4 percent.

The number of actual fire calls during the 16-week sample period was 84, but only 21 were structure fires. The department took action to extinguish a structure fire in only half of the reported structure fires. Almost all of

Figure B-1—Water applied to fires in Kentwood, Michigan (1986 fire data).

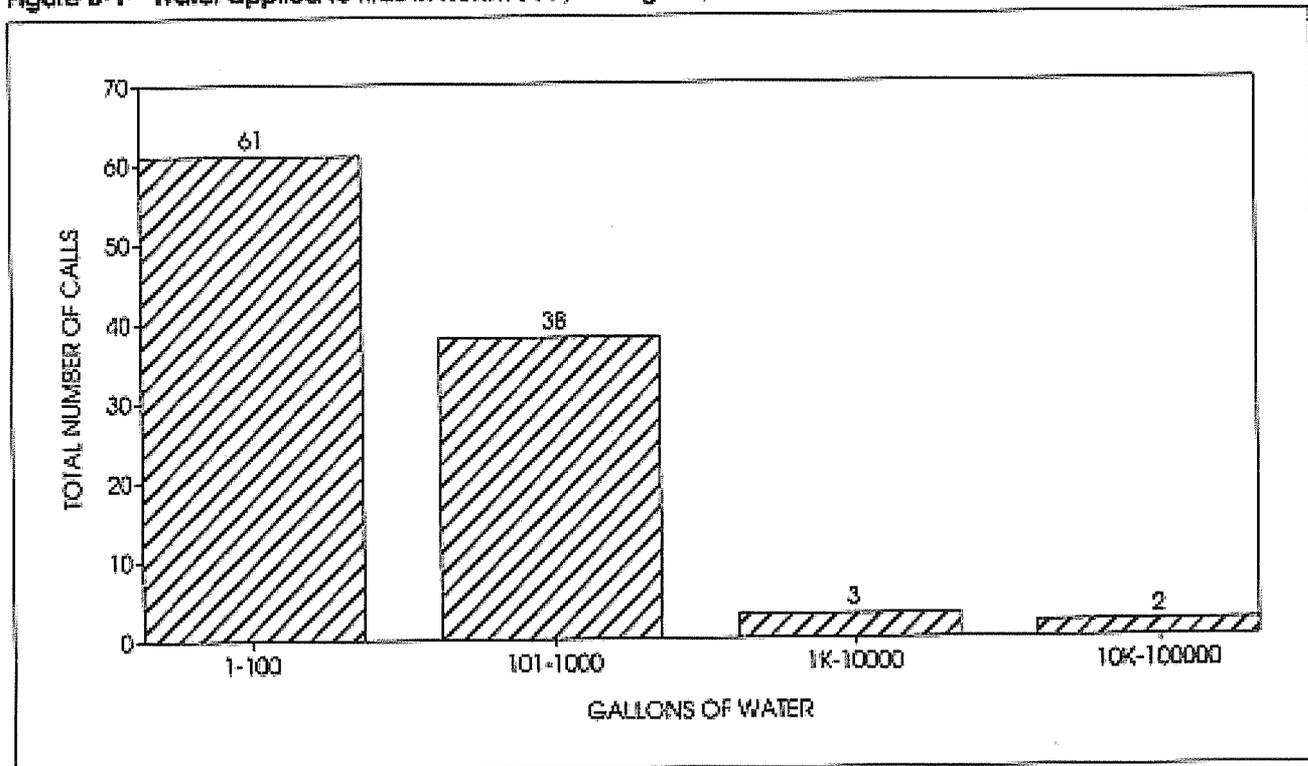
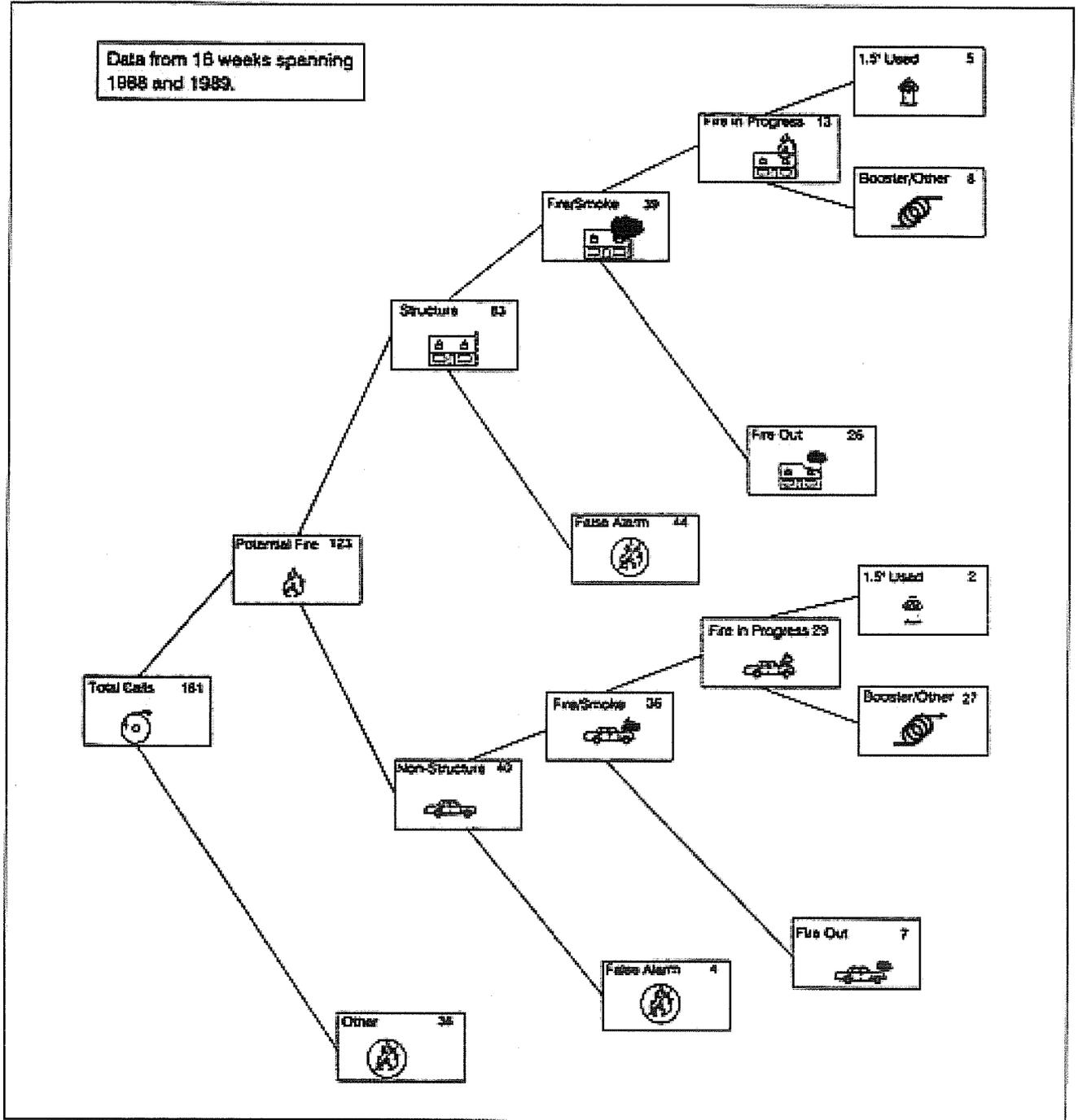


Figure B-2—Call type and fire status on arrival in Auburn, Alabama.



the on-going fire calls were put out with either an extinguisher or a fire truck hose. The department connected hose to a fire hydrant only once during the 16-week period and that was for a nonstructure fire call.

APPENDIX C: Queuing Delays

The dispatch delay due to all patrol units being busy at the time of a call is called a queuing delay. This delay can be estimated using advanced stochastic models that include several call priority categories. The mathematics involved is beyond the scope of this report but is embedded in the spreadsheet.

In Auburn, the combined average queuing delay for both high and low priority calls would be only 0.2 minutes. However, the magnitude of the queuing delay is sensitive to increases in workload. If the 6 units had an average workload of 50 percent, the average queuing delay would increase to 1 minute. As the workload grows to 60 percent or 70 percent, queuing delay increases to

2.4 minutes and 5.5 minutes respectively. If a department had priority dispatching procedures, then high priority calls would experience significantly shorter delays and low priority calls would experience delays above these averages. The queuing delays also depend upon the number of units deployed, as illustrated in the table below. A fifty percent workload would produce significant delays, 5.1 minutes on average, for 4 patrol units and only modest delays, 1.3 minutes on average, for 7 patrol units.

Average Queuing Delays (in minutes)

Number of patrol units	Average workload			
	30%	50%	60%	70%
4	0.8	5.1	10.7	21.2
5	0.3	3.1	7.0	14.9
6	0.2	2.0	4.9	11.1
7	0.1	1.3	3.5	8.5

**Management Information Service
Forecasting the Outcome of Police/
Fire Consolidations**

**Volume 23 / Number 4
April 1991**