

Fire Operations Report

Sandusky, Ohio



FIRE/EMS

OPERATIONS

C E N T E R F O R P U B L I C S A F E T Y M A N A G E M E N T

Submitted by:
ICMA Center for Public Safety Management
International City/County Management Association
777 North Capitol Street, NE, Suite 500
Washington, DC 20002
ConsultingServices@icma.org
202-962-3607
Copyright © 2011 ICMA



Leaders at the Core of Better Communities

ICMA Background

The International City/County Management Association (ICMA) is the premier local government leadership and management organization. Since **1914, ICMA's mission has been to create excellence in local governance by** developing and advocating professional local government management worldwide. ICMA provides an information clearinghouse, technical assistance, training, and professional development to more than 9,000 city, town, and county experts and other individuals throughout the world.

ICMA Center for Public Safety Management

ICMA Center for Public Safety Management helps communities solve critical problems by providing management support to local governments. One of ICMA areas of expertise is public safety services, which encompasses the following areas and beyond: organizational development, leadership and ethics, training, assessment of calls for service workload, staffing requirements analysis, design of standards and hiring guidelines for police and fire chief recruitment, police/fire consolidation, community-oriented policing, and city/county/regional mergers.

Table of Contents

Executive Summary.....	6
I. Introduction	8
II. Overview	9
III. Operations Analysis	10
A. Governance and Administration	10
B. Assessment and Planning	15
C. Goals and Objectives	19
D. Measuring Performance	22
E. Staffing and Deployment	28
F. EMS.....	40
G. Fire Prevention and Public Education	41
H. Communications	43
I. Value-added services.....	45
J. Potential Revenue Sources	47
Recommendations Summary	50

Tables

Table 1. Temperature Drops™ High Level -1000 Degrees F. Down To 212 Degrees F.	33
Table 2. Call Workload by Unit and Station	39
Table 3. Engine, Ladder, and Boat Units: Daily Average Deployed Minutes by Call Type	39

Figures

Figure 1. Existing SFD Organizational Chart	11
Figure 2. Proposed SFD Functional Table of Organization Chart.....	12
Figure 3. Components of a Comprehensive Needs Assessment	16
Figure 4. Performance Measurement System.....	24
Figure 5. Generic Program Logic Model.....	25

Executive Summary

This report provides an evaluation and analysis of strategic and operational planning, staffing and deployment practices, and service delivery methodologies within the Sandusky Fire Department. **This report's** assumptions are based on a critical literature review of both professional and academic sources. It is limited in its review of the cited areas to these methods.

Strategic planning is the cornerstone of organizational success. Department business plans therefore should be revised regularly and operational and action plans should be developed to monitor progress toward goal achievement. Prior to this process, an adequate needs assessment and hazard analysis must be accomplished using available industry tools. The results of the process will not only aid in strategic goal development, but will assist department administrators in the development of a master plan for inclusion within the city comprehensive master plan.

Staffing and deployment practices must take advantage of new technological innovations aimed at reducing personnel and costly vehicle requirements. Recruitment and selection policies should be revised to take advantage of pre-certified applicants. Use of civilian fire inspectors to reduce labor costs is commonplace within the fire service arena today. The need to produce additional revenue has caused local governments to look to user fees and charges to reduce budgetary shortfalls. Regionalization of public safety communications services should seek to include non-public safety entities as potential revenue sources. Finally, some cost recovery methods such as first responder charges to private ambulance companies are exploratory. Others

such as fees for developmental impact and fire rescue standby service are long-standing.

I. Introduction

The City of Sandusky, Ohio contracted with the International City/County Management Association to conduct a fire operations and data analysis of its **fire department. Today's economy has prompted local government officials** to take a closer look at public safety service delivery with the goal of finding cost reductions. The question is: How can costs be reduced without sacrificing the level or quality of service to citizens? Many approaches to this question are being explored within the fire service, where only a few short years ago they were considered undoable in the public safety environment. Staffing levels have decreased and service delivery models are changing. A paradigm shift is occurring and the fire service will be affected in a positive way.

II. Overview

This report evaluates operational effectiveness and efficiency in the wake of reduced staffing and shifts in deployment strategies within the Sandusky Fire Department. All service delivery areas were examined with a close eye toward strategic management and decision-making processes. The study required an examination of all aspects of fire department service delivery. Data gathered from the computer aided dispatch system was analyzed to identify workload measures and response times with resultant observations. Information from the data analysis was synthesized as a basis for critical recommendations of the operations assessment.

III. Operations Analysis

A. Governance and Administration

The City of Sandusky has a commission-manager form of government consisting of a commission of seven citizens elected at large. The commission constitutes the governing body with powers to pass ordinances, adopt regulations, and appoint a chief administrative officer, the City Manager¹

City ordinance 05-157 established the Division of Fire (Sandusky Fire Department) on 10-24-05 to be headed by a fire chief and aided by assistant chiefs, battalion chiefs, captains, lieutenants and firefighters. The duties and functions of the department and the number and duties of the various classes of officers and employees are determined by the city manager in consultation with the fire chief and the city commission as provided in the city charter.

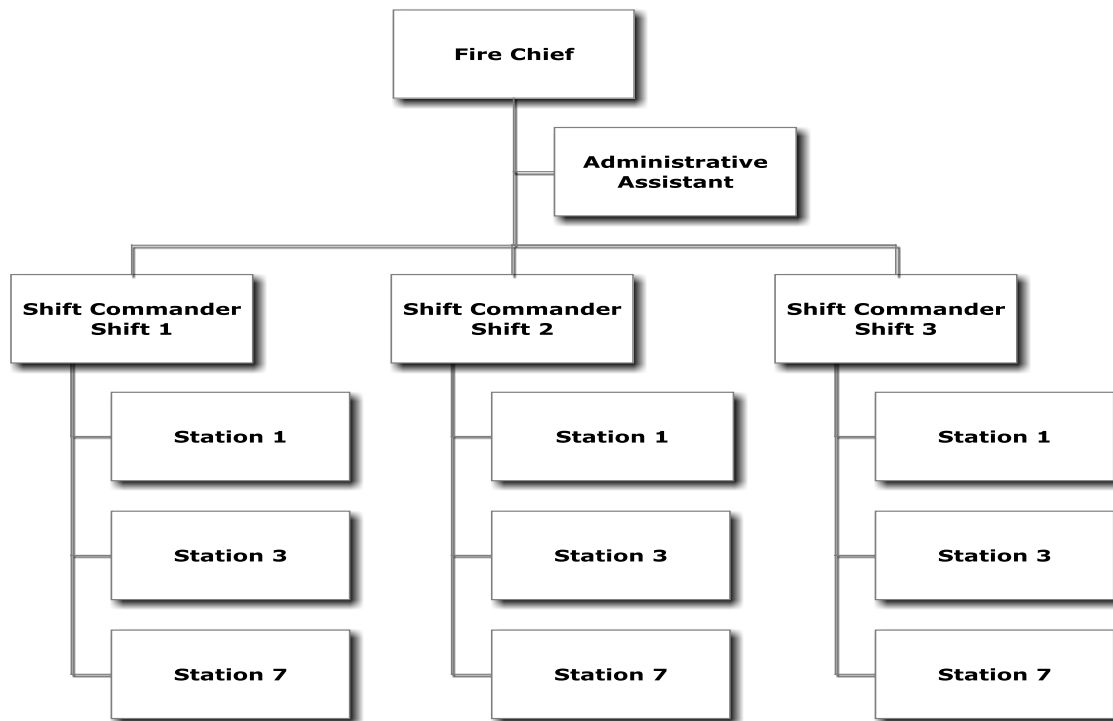
1. Organization and Structure

The role of the fire service in many communities has evolved over time to include many different aspects of emergency management. Emergency medical service (EMS) has become the primary focus or core business aspect of many volunteer and career departments. Special operations such as technical rescue, water rescue, and hazardous material response have also found their way into the core business functions of many fire service organizations. Although the Sandusky Fire Department (SFD) has broadened

¹ <http://www.conwaygreene.com/Sandusky/lpext.dll?f=templates&fn=main-h.htm&2.0>

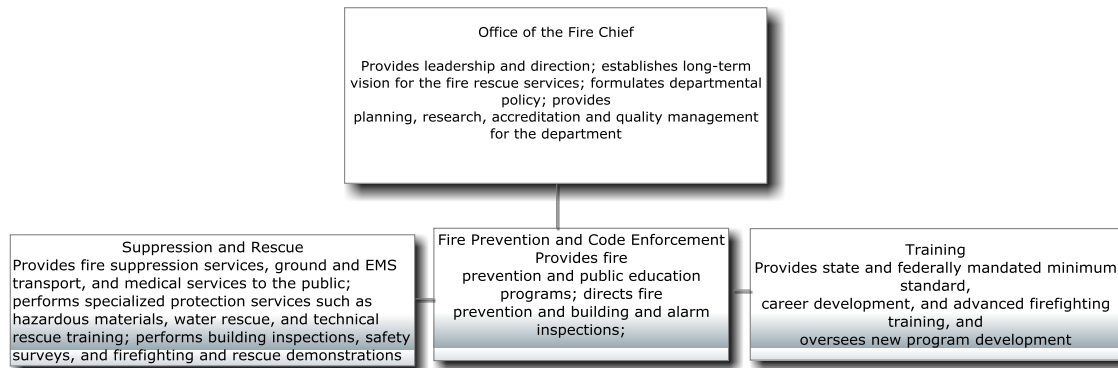
its range of services over the years to include these services, it is not apparent in looking at its organizational chart.

Figure 1. Existing SFD Organizational Chart



The functional table of organization chart, provides stakeholders in the community a clear picture of what and where these key services are located within the department. In the functional organizational chart, each job becomes the focal point. Similar function-based jobs done by the employees are put together in silos. Specialization is centralized and employees who are doing these specialized jobs are clustered, thus each unique division is born. Figure 2 is an example of a functional table of organization chart showing the SFD core business activities.

Figure 2. Proposed SFD Functional Table of Organization Chart



The information provided in this proposed chart gives greater detail about the various services performed by the department.

Recommendation #1: Develop a functional table of organization chart for the department and include it in all budget documents and annual reports.

2. Rules and Procedures

Any organization needs directives to govern operations, set performance standards, and outline expectations of behavior. Operating procedures are of utmost importance. The SFD has developed an extensive document entitled **“Employee Handbook” that details various aspects of organizational life.**

However, close review indicates there are several procedural issues that should be included. Among these are controlled medical drug policy, union representation at investigatory meetings, and citizen complaint procedures.

Controlled medical drug policy. The department’s controlled medical drug policy, referred to under Ohio State Administrative Code 4729-33-03,

“Security and Storage of Dangerous Drugs,” requires adherence to specific procedures in handling, disposing, and record keeping. All personnel having been trained to the level of emergency medical technician (EMT) should be familiar with its contents. To ensure compliance, it should be readily available to all response personnel.

Union representation at investigatory meetings. The set of rules, procedures, and laws under which today’s leaders must perform is subject to judicial scrutiny. **Employees’** right to union representation at any meeting which could lead to disciplinary action is important to ensure effective labor management relations. *NLRB v. Weingarten, Inc.* U.S. 251 (1975), was a private sector case under the National Labor Relations Act, but the principles resulting from the case are recognized universally throughout the United States for both private and public sector employees. The “Weingarten rule” dictates that employees have a right to engage in concerted action for mutual aid and protection, and that to deny union representation to an employee union during a disciplinary meeting or hearing violates that right. The following are key aspects of Weingarten rights:²

- The right to have a union representative present applies only in situations where an employee reasonably believes that the investigation will result in disciplinary action.
- The meeting must be investigatory in nature. When the purpose of a meeting is simply to discuss or convey management’s complaints about the employee’s performance in a nondisciplinary manner, the employees’ Weingarten rights have not been denied by not having a union representative present.

² J. Curtis Varone, *Legal Considerations for Fire and Emergency Services*, 2007, 368.

- The employee must request that a union representative be present, or the right is considered to be waived. Weingarten does not require an employer to warn an employee of the right to union representation.

Citizen complaint procedures. The handling of citizen complaints and requests for services can be both an important indicator of the **government's** responsiveness to its citizens and a key element in measuring the quality of services provided by the department.³ How well a governmental entity handles a complaint or request for service may well be of considerable political as well as operational importance. A good process for analyzing and tracking response quality can provide important ongoing feedback for ways to improve the services about which citizens are contacting the government.

The number of SFD EMS responses is considerable compared to other direct citizen contacts. It is not unrealistic to think that some of these responses will generate a negative view of the service. To help mitigate these occurrences a policy and procedure should be in place. The SFD recognizes the importance of obtaining citizen feedback on the service it provides. It has listed as a major initiative within its business plan a goal to develop a customer feedback program and a customer training program. The scope of the customer feedback program should include the development of a policy statement and procedural guidelines for the reporting and handling of citizen complaints and requests for service.

Recommendation #2: Amend the Employee Handbook to include Controlled Medical Drug, Weingarten Rule, and Citizen Complaint and

³ *How Effective Are Your Community Services*, ICMA, The Urban Institute, 2006, 121

Requests policies and procedures.

B. Assessment and Planning

Fire officials should conduct a comprehensive needs assessment and hazards analysis within their communities for use in the planning process. This helps determine the necessary resources needed to accomplish **the department's** assigned functions. There are tools and processes available for help in this undertaking. Figure 3 shows the components of a comprehensive needs assessment.

Figure 3. Components of a Comprehensive Needs Assessment



One assessment tool that should be employed by the SFD is accreditation. The accreditation program managed by the Commission on Fire Accreditation International (CFAI) provides an analytical self-assessment process to evaluate ten categories of performance. Integral within the ten categories is an expectation for the community to analyze itself by planning zones, to identify the hazards posed within each planning zone, to rank hazards by potential severity, and to ensure that the appropriate resources are available to manage the hazards.⁴ There is a fee associated with the CFAI engaging a fire department in this process. The process involves a detailed self-assessment in which managers examine more than 240 separate performance indicators, 98 of which are considered core or required competencies.

⁴ *Fire Protection Handbook*, 20th Edition, Volume II, 2008, National Fire Protection Association, 12-46.

Recommendation #3: Conduct Commission on Fire Accreditation International (CFAI) fire department self-assessment as a means toward overall organizational improvements.

1. Community Risk Analysis

The term integrated risk management, developed first in the United Kingdom, refers to a planning methodology that recognizes that citizen safety, plus the protection of property and the environment from fire and related causes, must include provisions for the reasonable safety of emergency responders. This means assessing the risk faced, taking preventive action, and deploying the proper resources in the right place at the right time.⁵

The cost of providing fire protection and EMS to communities continues to escalate; therefore the need to examine the planning processes involved are paramount. Each jurisdiction decides what degree of risk is acceptable in that jurisdiction; the determination is based on criteria that has been developed to define the levels of risk (e.g., of fire) within all sections of the community.⁶ To that end, a comprehensive planning approach to include a fire risk assessment and hazard analysis is essential in determining local needs.

What's involved in a fire risk analysis? A universally available tool that allows the entire community to be evaluated in relation to the risk of fire is the Risk, Hazard, and Value Evaluation (RHAVE) model, which the Commission

⁵ *Fire Protection Handbook*, 20th Edition, Volume II, 2008, National Fire Protection Association, 12 -3.

⁶ *Managing Fire and Rescue Services*, 2002. ICMA, 39.

on Fire Accreditation International developed as a way to classify individual properties in relation to protecting lives and property. The RHAVE software and documentation are available at no cost from the U. S. Fire Administration.

Using this tool, a department collects and organizes risk evaluation information about individual properties and on the basis of the rated factors **can derive a “fire risk score” for each property. The score is then used to** categorize the property as one of low, moderate, or high/maximum risk. This program can also be used to create a database of information that can be used to manage the fire department interaction with each property, such as scheduling fire prevention inspections, as well as for pre-incident planning surveys and to identify locations in the community where particular hazards are present.⁷

Recommendation #4: Conduct a community fire risk analysis using CFAI’s Risk, Hazard, and Value Evaluation (RHAVE) model.

2. Strategic Management

The development of a long-range fire protection and prevention plan involves three key steps. The first step is to generate a view of what the community will look like at the end of the planning horizon. The second step is to assess realistically the strengths and weaknesses of the existing fire protection system, including codes, standards, and ordinances relating to

⁷ *Managing Fire and Rescue Services*, 2002, ICMA, 40.

safety, fire prevention efforts, public safety education programs, and emergency response capability.

Finally, the third step is to project the needed capabilities and capacity of the fire protection system and its vitally important fire department component as the community changes.⁸ In Sandusky, **the city's** comprehensive master plan lacks the **fire department's** master plan, which represents a significant **part of the city's commitment toward ensuring its** future fire protection needs. It determines how much risk the community is willing to assume.

Recommendation #5: Develop a fire department master plan annex as an addendum to the city's comprehensive master plan.

C. Goals and Objectives

In 1996 the City of Sandusky contracted with Architectural Resource Corporation to develop a Facilities Master Plan for the SFD. The plan makes recommendations for a 20-year period (through 2016) to enhance the fire protection infrastructure. To date, only the construction of a new administration and training facility has been implemented.

The fire department's planning and reporting chart should represent an inclusive, tiered approach to developing and publishing the organization's mission, vision, goals, and accomplishments. Long-range, strategic-level documents should include a 25-year infrastructure plan and a 10-year

⁸ Fire Protection Handbook, 20th Edition, 2008, National Fire Protection Association, 12-5

strategic plan. Shorter-range, management-level documents should include a 5-year operating plan, a 5-year reaccreditation plan with annual updates, and a 2-year financial (budget) plan. Short-range operational documents should include annual reports, six-month activity plans, program management guides, and project action plans.⁹

Missing from the SFD planning documents are an identifiable strategic plan, six month activity plans, program management guides, and project action plans. **The department's business plan appears to serve as a hybrid for the strategic and action plan.** A departmental priority should be established for the development of separate planning documents.

Recommendation #6: Develop separate planning documents for strategic planning, six-month activity plans, program management guides, and project action plans.

Strategic planning is a disciplined effort to produce fundamental decisions and actions that shape and guide what an organization is, what it does, and why it does it.¹⁰ This process helps to ensure an adequate level of resources, **including staffing, are allocated to meet the community's needs for the services delivered by the fire department.** The SFD has undertaken this initiative and has produced a strategic plan which is currently undergoing its second iteration.

⁹ *Fire Protection Handbook*, 20th Edition, 2008, National Fire Association, 12-29.

¹⁰ John M. Bryson, *Creating and Implementing Your Strategic Plan*, 2004, 3.

In conjunction with the strategic planning process, the department has developed a business plan. How does the plan meet departmental goals and objectives? First and foremost, the business plan is the direct link between the operational planning of a department and the overall political agenda. By definition, business planning is the process of arriving at a document that outlines how the organization will achieve its objectives in conjunction with the fiscal constraints set by the budget process. The document outlines both the major tasks to be performed to a specified level of service (e.g., responding in certain number of minutes in at least a certain percentage of calls, or having a certain number of firefighters on the scene within a certain number of minutes for at least a certain percentage of all reported working fires) and the associated costs.¹¹

Our review of the SFD business plan led to the following observations.

First, the environmental scan that determines the context of the plan does not fully identify the strengths and weaknesses of the department, and the opportunities and threats it faces. This is also referred to as a SWOT analysis. The fundamental question that should be asked is: What are the dependent and independent variables that shape the **organization's present** working conditions? It is after this process has been completed that the formulation of goals and objectives can be achieved. The results of the SWOT analysis should be a part of either the business or strategic plan or both.

Secondly, the department's goals and objectives are not clearly identified within the plan document. The direction the department seeks to move in is more generally expressed in the form of initiatives or issues rather than true

¹¹ *Managing Fire Services, 2002, International City/County Management Association, 173.*

enabling goals and objectives. Where the strategic plan identifies department goals and objectives in broad terms, the business plan should and must provide goals and objectives that are more specific. Objectives should be SMART: **s**pecific, **m**easurable, **a**mbitious/**a**ttainable, **r**ealistic, and **t**ime-bound. The following statement will serve as an example: To increase the number of working smoking detectors in homes by five percent within the next six months. Time constraints are broad and not attached to all goals and objectives, which in some cases are loosely defined.

Finally, the action plan mentioned in the document, although identifying a specific person responsible for its completion, does not provide a detailed description of how the objective will be accomplished. The time horizon on most listed initiatives should be more definitive. And finally, the plan should identify the funds available for specific activities. The plan must then be monitored periodically to ensure progress toward its implementation.

Recommendation 7: Revise the business plan to incorporate improved goals and objectives that conform to traditional definitions, and develop an action plan with specific tasks, assignment timelines, and appropriated funds.

D. Measuring Performance

The question of how to measure agency and program performance within a public organization is one of the big issues within the field of public administration today. Strategic planning and management has come to the fire service and is unlikely to go away. It is leadership and the proper and

effective use of the right tools that will impact plan implementation. SFD has taken the initial steps toward improving its organizational effectiveness with the development of its strategic and business plan. However, much is yet to be done in preparing the department to meet the challenges of the future.

Performance measurement is the ongoing monitoring and reporting of program accomplishments, particularly the progress toward pre-established goals. The need to continually assess performance requires the addition of new words and definitions to the fire service lexicon.

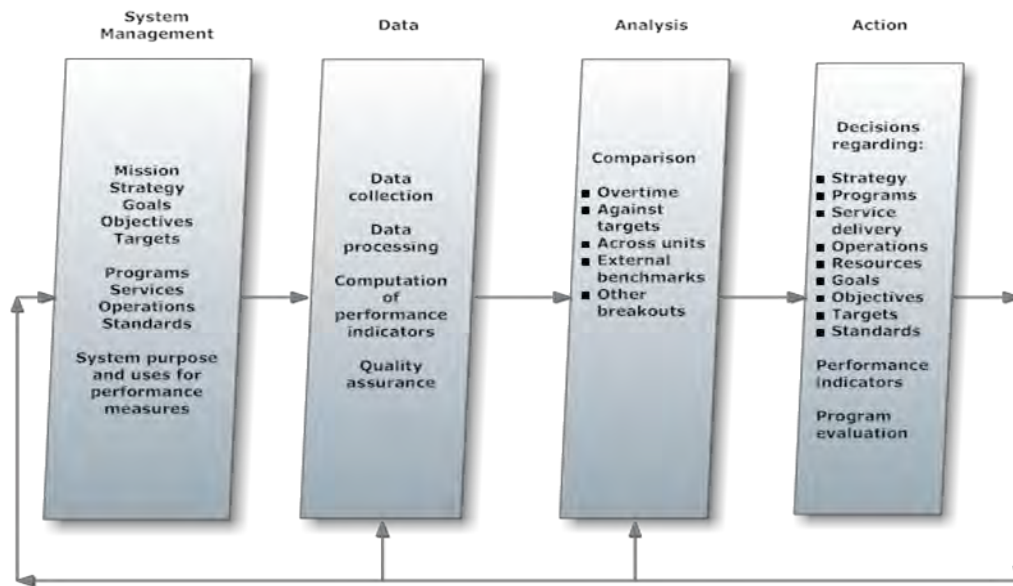
Fire administrators need to know the different tools available and the consequences of their use.¹²

- Administrative feasibility. How difficult will it be to set up and operate the program?
- Effectiveness. Does the program produce the intended effect in the specified time? Does it reach the intended target group?
- Efficiency. How do the benefits compare with the costs?
- Equity. Are the benefits distributed equitably with respect to region, income, sex, ethnicity, age, and so forth?
- Political feasibility. Will the program attract and maintain key actors with a stake in the program area?

A performance measurement system is made up of three components: data collection and processing, analysis, and consequent action or decision making, as shown in Figure 4.

¹² Starling Grover, *Managing the Public Sector*, Eighth Edition, 2008, 242.

Figure 4. Performance Measurement System¹³



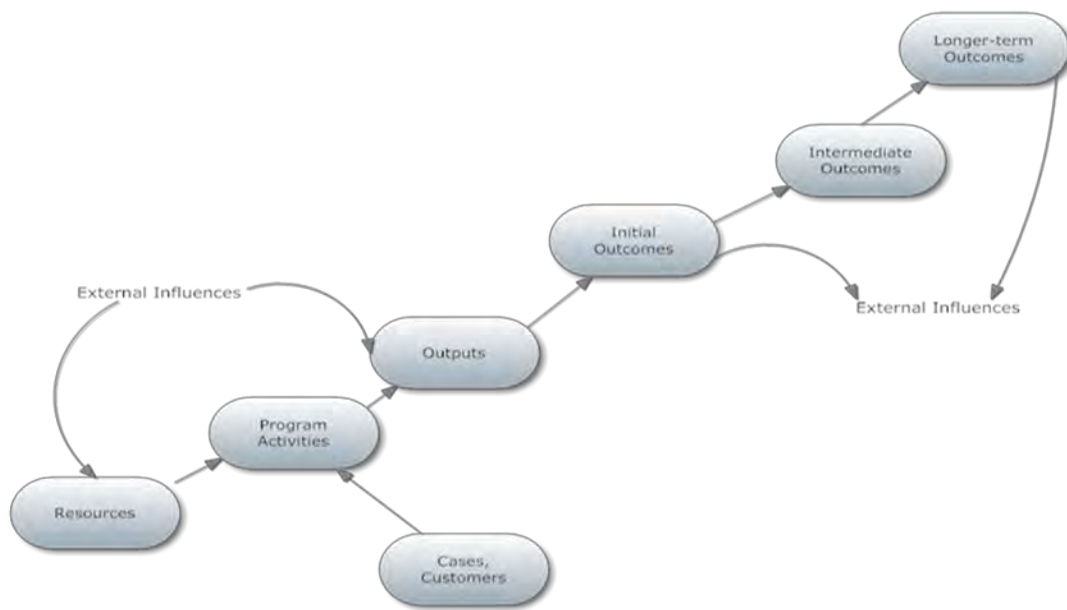
1. Program Logic

Public programs should be planned and managed with an eye toward specifying and achieving desirable results. If a program cannot articulate worthwhile results and provide evidence that its activities are producing them, continued support should and will be questioned. Any sound program design must be based on a set of assumptions regarding the services the program provides, the clients it serves or the cases it treats, its intended results, and the logic of how the use of resources in particular programmatic activities will be expected to produce these results.¹⁴ Figure 5 represents a pictorial view of the logic model.

¹³ Theodore Positer, *Measuring Performance in Public and Non-Profit Organizations*, 2003, 16.

¹⁴ Theodore Poister, *Measuring Performance in Public and Non-Profit Organizations*, 2003, 36-37.

Figure 5. Generic Program Logic Model¹⁵



Generic Program Logic Model

The logic model clarifies what goes into a program, who its customers are, what services it provides, what immediate products or outputs it produces, and what outcomes it is supposed to generate. Once this has been done, the most relevant measures can be identified. For the most part, the type of measures include measures of output, efficiency, productivity, service quality, effectiveness, cost-effectiveness, and customer satisfaction.¹⁶

There are several studies, some of which date back to the 1970s, that highlight important performance measures for fire departments. The SFD

¹⁵ Ibid., 37.

¹⁶ Theodore Poister, *Measuring Performance in Public and Non-Profit Organizations*, 2003, 47.

measures its performance primarily in the form of workload and output measures. Although appropriate in terms of number of fire or EMS calls within the system, they do little to show how efficiently the call was handled or its effectiveness. In *How Effective Are Your Community Services?* Harry P. Hatry and colleagues provide a number of examples illustrating how data can be used to highlight the effectiveness of fire protection functions. Their material that deals with fire protection offers information about measures and data collection procedures that are linked to several areas: loss minimization, prevention, suppression, and citizen satisfaction.

There have been many key changes in fire codes since the 1970s. These changes can have a profound impact on measures of fire department performance. Fire detection and suppression equipment is now required in most new construction. There are more requirements for nonflammable building contents, such as upholstered furniture and mattresses and bedding.¹⁷ The easiest and best way of applying quantitative performance measures to qualitative goal statements is to specifically identify target rates, percentages, and ratios to each goal. Elected officials will then gain a better understanding of what the department is trying to achieve. For example, to say the goal is to inspect 250 buildings within the next six months does not convey a valid performance outcome over time as does stating the goal of inspecting 25 percent of all required building inspections within the next six months.

2. Performance Measures

Performance measures are objective, quantitative indicators of various aspects of the performance of public programs or agencies. Different kinds

¹⁷ *Fire Service Performance Measures*, 2009, National Fire Protection Association, 3.

of measures are used to track particular dimensions of performance, such as effectiveness, operating efficiency, productivity, service quality, customer satisfaction, and cost-effectiveness. Performance measurement refers to the process of defining, observing, and using such measures. How can the SFD meet the need for improved measurement strategies within its organization? The following step-by-step process for designing and implementing a performance measurement system will help:¹⁸

1. Secure management commitment.
2. Organize the system development process.
3. Clarify purpose and system parameters.
4. Identify outcomes and other performance criteria.
5. Define, evaluate, and select indicators.
6. Develop data collection procedures.
7. Specify the system design.
 - Identify reporting frequencies and channels.
 - Determine analytical and reporting formats.
 - Assign responsibilities for maintaining the system.
8. Conduct a pilot and revise if necessary (optional).
9. Implement full-scale system.
10. Use, evaluate, and modify the system as appropriate.

Recommendation #8: Implement a performance measurement system for observing, reporting, and using performance measures and develop performance measures for all department service areas.

¹⁸ Measuring Performance in Public and Non-Profit Organizations, Poister, Theodore H., 2003, page 3-4.

E. Staffing and Deployment

The SFD is an organization of local government with a mission of providing fire protection, EMS, and other technical services to citizens. In any fire protection service, it is necessary to provide an adequate fire protection program that includes fire prevention activities, pre-incident organization and planning, fire station location planning, and the delivery of emergency services.¹⁹ **A community's fire risk analysis and the department's pre-incident planning process** should determine the number and type of engine companies, truck companies, heavy rescue companies, EMS units, and command officers needed to respond to a reported fire.²⁰ Fire prevention activities have always ranked lowest among the priorities in the fire department budget. Suppression activities receive far more media attention, even though preventing fires from starting is the primary mission of any fire department.

The proper location of fire stations is critical to reducing response times to emergencies, which in turn is one of the key performance measures in determining the efficiency of department operations. The network of fire stations as a whole seeks to optimize coverage with short travel distances while giving special attention to natural and manmade barriers that can create response-time problems.²¹ The City of Sandusky has placed a high priority on building this network to ensure maximum benefit. As reported earlier in this report, the city has undertaken the development of a facilities master plan. **The long-range intent was to prepare to meet the department's**

¹⁹ *Organizing for Fire and Rescue Services*, 2003, National Fire Protection Association, 97

²⁰ *Managing Fire and Rescue Services*, 2002, International City/County Management Association, 52.

²¹ *Managing Fire Services*, 2002, International City/County Management Association, 122.

facility needs for the next twenty years. To date only the administration and training facility has been constructed. Other elements of the plan, including the relocation or remodeling of current fire stations, have been placed on hold due to budgetary constraints.

It should be noted that although the city has responsibility for major repair and maintenance of fire stations, firefighters can be credited for making sure that facilities are in fact maintained in a timely manner. The ICMA consultant was extremely impressed with SFD firefighters and the initiative they exhibited in this regard. During the site visit the consultant was directed to a bathroom at one fire station where a crewmember had recently finished tile work. At another fire station firefighters took on the task of removing and reinstalling rain gutters that were improperly installed by contractors. These repairs had been done largely on the firefighters on time, and in some cases at their expense.

1. Minimum Staffing

The question of how many firefighters are needed to appropriately staff an apparatus has long been debated. Various experts in the field of fireground operations have attempted to provide an answer. The issue is important in that it can have a profound effect on a number of values, including safety, economic losses from fire, employment opportunities for firefighters, and the cost of providing fire protection.

Those who propose a national standard for minimum staffing do not take into account the many variations in local fire problems, in addition to other causal relationships. According to an article written by Cortez Lawrence, several other elements affect fire loss and injury rates, including environmental factors, training and fitness levels of response personnel,

leadership skills and capacity, firefighter accountability and operational management systems, fuel density and types, and exposures and effectiveness of fire programs and operations.²²

The problem with adoption of a national standard by any jurisdiction is that it does not take into account the various aspects particular to that community. Therefore, community demands and expectations must be identified before appropriate company size can be determined.

A recent report released by the National Institute of Standards and Technology concluded that while resource deployment was addressed in the context of a single structure type and risk level, public policy decisions are a function of many other factors. These include geography, local risks and hazards, and available resources, as well as community expectations (which the report did not specifically address).²³

Adding to controversy of company size is the fact that although time is a factor in measuring fire company effectiveness by different sizes of fire companies performing specific fireground evolutions, it does not take into account the gap between laboratory and actual field conditions. Because of delays in notification, plus normal dispatch, turnout, and response times, few professionals feel that they arrive at most unattended fires in less than ten to twelve minutes. Yet, the flashover rate is relatively low.²⁴

In its business plan the SFD acknowledges National Fire Protection Association Standard 1710, Standard for the Organization and Deployment

²² Cortez Lawrence, *Fire Technology*, , 2001 Kulwer Academic Publications, 199.

²³ Report on Residential Fireground Field Experiments, 2010, U.S. Dept. of Commerce, NIST, 11.

²⁴ Cortez Lawrence, *Fire Technology*, 2001, Kulwer Academic Publications, 200.

of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, as an initiative to be achieved as its minimum staffing policy. As explained previously, a standard is not to be used interchangeably among various fire service organizations. There are literally thousands of fire departments, both career and volunteer, operating effectively outside of the nationally recognized minimum staffing standard. Some would argue that safety should be the chief concern with regard to emergency response crews, and rightly so. However, before blanket standards can be accepted, all aspects of the issue should be researched and tested within the context of the various aspects of a given community.

The current body of knowledge does not support the hypothesis that three-person engine crews are any less safe than four- or five-person engine crews. The standards produced and recommended by the NFPA for use, while important to the profession in providing safe, effective, and efficient operating environments for fire service organizations, are not enforceable by law. It is not the intent of this report to diminish the importance of the work done by professional organizations, but to emphasize where these standards fit into the bigger picture. Again, it is the role of the individual community to adopt those NFPA recommendations it sees as being in the best interest of citizens based on its financial assets.

2. Use of Technology in Staffing and Deployment Strategies

Currently, SFD uses reduced staffing policy options or **“brownouts”** as a means of decreasing overtime costs. Brownouts occur when staff is reduced on each engine or truck company, often on a rotating basis as an alternative to closing specific stations or taking certain pieces of equipment out of service. Engine companies are operating with two- or three-person staffing

levels based on personnel availability. The policy reflects management's attempts to reduce cost, while maintaining an effective firefighting force. The policy takes an incremental approach to solving a very difficult problem.

Technological advances have been made in fire extinguishment to supplement the overall effectiveness and efficiency of a reduced workforce. These advances have introduced viable alternatives to meeting NFPA minimum staffing recommendations. Two primary innovations to be considered in limited staffing situations are a compressed air foam system **(CAFS) and the Ara Safety Pro™ Fire Interruption Technology® (FIT)** knockdown tool. Both are available commercially and both have amassed vast anecdotal references substantiating their effectiveness within the firefighting community.

Compressed air foam systems were introduced and advocated for structural firefighting in the 1990s as a way to provide greater fire knock-down power, and to decrease water usage, hose line weight, and water damage. CAFS is now slowly becoming viewed as a possible way to off-set reduced staffing policies among career fire service organizations and decreased volunteerism among volunteer and a combination departments.

So what is CAFS? It is a pumping and delivery system that mixes water, foam solution, and compressed air.

The use of CAFS as a primary fire attack tool is now being proposed in the UK; the East Sussex Fire & Rescue Brigade has two **years' experience** of operational trials in structures. The brigade has several front-line fire engines equipped with the German-made Schmitz GmbH 'One Seven' system. Other brigades across the UK are fast following this innovative approach.

The growing acceptance of CAFS is being driven by fire leaders who see an opportunity for a simple system of primary fire attack that will replace the high-pressure water-fog system. CAFS appears to offer increased performance in fire suppression of post-flashover fire and possibly pre-flashover situations. It reduces the amount of water needed to suppress a vast majority of fires, so primary water tanks and fire engines can become smaller, possibly fewer firefighters are needed, and attacks on a fire can be made from a safer distance. Further still, the costs associated with training firefighters in primary fire attack may well be reduced substantially.²⁵

Closer to home, the effects of CAFS on needed manpower for suppression activities are well-documented in the literature and have been consistently observed, both in actual fireground situations and in simulated exercises.²⁶ For example, controlled room and contents fire tests utilizing CAFS were performed at Wallops Island, Virginia, and Salem, Connecticut, by Hale Fire Pump, the Atlantic Virginia Fire Department, Ansul Fire Protection, the International Society of Fire Service Instructors, Elkhart Brass, the National Aeronautics and Space Administration-Goddard Flight Center Fire Department, the Charlotte, North Carolina, Fire Department, the Fairfax County, Virginia, Fire Department, F.I.E.R.O. (Fire Industry Equipment Research Organization), and the Salem Connecticut Fire Department. Table 1 shows the results of these tests.²⁷

Table 1. Temperature Drops™ High Level -1000 Degrees F. Down To 212 Degrees F.

²⁵ <http://www.firetactics.com/CAFS.htm>.

²⁶ http://www.cafsinfo.com/cafs_limited_staffing.html.

²⁷ <http://www.firetactics.com/CAFS.htm>.

Medium	Time (Seconds)	Drop Rate (Degrees F. per Sec.)
Water	222.9	3.5
Foam Solution	102.9	7.6
Compressed Air Foam	38.5	20.5

The table shows the significant difference in temperature drop rate using CAFS as compared to the other extinguishing mediums of plain water and a simple foam solution.

In 1990, the Los Angeles County Fire Department began an intensive evaluation of Class A foam. That led to the specification of direct-injection, multiple-outlet foam proportioners on all new engines starting in 1992. In 1995, the department purchased three engines equipped with compressed-air foam systems. Today, the LACFD has 224 front-line engines, 10 reserve engines, and 15 front-line quints equipped with Class A foam proportioners. An additional 19 front-line engines are equipped with CAFS.²⁸

An article entitled “Bubbles Beat Water” in the July 2001 issue of *Fire Chief Magazine*, reports the LA County Fire Department conducted a series of tests in an effort to provide hard numbers on the use of CAFS. One of the misconceptions associated with the use of foam solutions in fire extinguishment is its cost. In the Class A foam/water solution test, LA County personnel used only thirty-one fluid ounces of concentrate to knock down and overhaul a fire in four rooms. At an average cost of \$13 per gallon, the test used only \$3.10 worth of concentrate. The CAFS test used even less – only six fluid ounces of concentrate, or about sixty cents worth.

²⁸ <http://www.firetactics.com/CAFS.htm>.

Many fire professionals are starting to advocate the benefits of foam as a first line extinguishing agent compared to water. The A-Foam Authority is a nonprofit trade association created to provide accurate, generic information about the benefits of Class A foam. The A-Foam Authority is comprised of end users (fire chiefs, officers, and firefighters); equipment and foam manufacturers; technical and training specialists; wildland and urban agencies; and other experts in the field of safety and prevention. The A-Foam Authority believes that through research and third-party testing, it can offer statistical data verifying the many benefits of Class A foam, including: increased firefighter safety, quicker extinguishment that will benefit the environment with less air pollution and less water usage, quicker return to service, reduced frequency of rekindles, less smoke and water damage to structures, and less financial impact on the community.²⁹

The manufacturer of the **Ara Safety Pro™ Fire Interruption Technology®** (FIT) knockdown tool claims that it can be deployed in a wide variety of structure fire scenarios, from incipient to fully involved, as well as in defensive, offensive, and transitional modes. In some fireground situations, water may be unavailable, the duty commander may be on site before working crews and trucks, or an EMS call may leave the crew short for the two-in and two-out rule.³⁰ The tool can be used to supplant firefighting forces and mitigate the effects of fire in the incipient stages, thereby reducing the risk of flashover. Reducing the risk to firefighters and the public is always of primary concern. The device is made for use by professional firefighters only and proper training in its deployment is required. Current pricing stands at approximately \$1,000 per tool.

²⁹ <http://afoam.org/about.cfm>.

³⁰ <http://www.arasafety.com/products/arasafetypro.htm>.

One of the most significant aspects in the use of this new technology is the fact that interior attacks can be initiated through a door or window. This allows greater stand-off distances and thus reduces the risks to firefighters.

3. Vehicles and Equipment

A **fire department's** reliance on the proper vehicles and equipment in order to carry out its mission can never be underestimated. The SFD has taken great care to ensure that its personnel are provided with the latest in vehicle apparatus and equipment. There is no national standard governing or recommending the replacement of emergency vehicles. The decision is left to each locality and represents a balancing of numerous factors: fire activity levels, maintenance and cost history, individual vehicle reliability, funding availability, technological changes, firefighter safety, and vehicle use.³¹

The use of full-size suppression apparatus is giving way to a much more measured approach in vehicle acquisition and deployment. It is no longer practical to provide each geographic area within a jurisdiction with the traditional suppression apparatus without conducting a comprehensive analysis of what is needed to meet the assessed level of risk. Many departments, both large and small, are beginning to make purchasing decisions for vehicle replacement based on perceived risk rather than using a "one size fits all" mentality. There are a number of manufacturers producing smaller, mid-size pumpers that have all the firefighting functions of their larger counterparts. Water pumps, water tanks, and ladders are all a part of the package. Further, the industry is evolving toward the use of even **smaller firefighting apparatus termed "quick response vehicles," or QRV,** to

³¹ Managing Fire and Rescue Services, 2002, International City/County Management Association, 213.

use in place of the more traditional vehicles. The following is a pictorial view of a QRV.



In addition to substantial cost savings in the initial purchase, with a QRV maintenance expenditures are reduced significantly. These vehicles can be equipped with CAFS, thus providing an effective initial fire attack at lower cost.

Recommendation #9: Consider acquisition of medium-size pumper for operations deployment within fire districts based on historical fire call requirements and projected community growth trends.

4. Alternative Fire Suppression Staffing and Deployment Model

The preceding information regarding innovative technologies available within the fire service makes the use of alternative methods of resource deployment viable. The use of a mid-size pumper or a QRV equipped with a fire suppression tools such as CAFS or the FIT knockdown tool could enable a department to reduce staffing to as low as one firefighter per unit. This approach is not being advocated in all deployment situations, but could be a viable option in areas where consideration of external factors regarding risk assessment is favorable for its use.

Examining the issue of staffing from a workload perspective, the ICMA data analysis observed workload by individual unit for engine 3 and engine 7 to be extremely low in comparison to that of fire engine 1.

Table 2. Call Workload by Unit and Station

Station	Unit Type	Unit ID	Average Busy Minutes per Run	Number of Runs	Runs per Day	Busy Minutes per Day	Annual Busy Hours
1	Ambulance	911	25.7	2,400	6.6	169.0	1,028.2
	Engine	921	24.8	670	1.8	45.5	276.5
	Ladder	951	29.9	153	0.4	12.5	76.2
	Rescue	945	82.8	3	0.0	0.7	4.1
	Boat	961	62.1	23	0.1	3.9	23.8
3	Ambulance	913	25.9	945	2.6	67.2	408.7
	Engine	923	29.6	223	0.6	18.1	110.2
7	Ambulance	917	31.5	648	1.8	55.9	339.9
	Engine	927	31.8	202	0.6	17.6	107.0

Further, when examining the demand with regard to types of calls responded to, on average engines 3 and 7 were busy fewer than twenty minutes per day at calls.

Table 3. Engine, Ladder, and Boat Units: Daily Average Deployed Minutes by Call Type

Unit	EMS	Structure Fire	Out-side Fire	Hazard	Alarm	Public Service	Good Intent	Total	Fire Category Calls Percentage
921	11.8	11.3	4.0	8.0	6.7	3.1	0.6	45.5	74.1
923	0.9	6.8	1.4	3.2	3.4	1.9	0.3	18.1	95.0
927	1.8	8.2	1.8	1.6	3.3	0.8	0.1	17.6	89.8
951	0.8	6.0	0.2	1.1	3.4	1.0	0.1	12.5	93.6
961	1.3	1.4	0	0.1	0	1.0	0.2	3.9	66.7

Note: Fire category calls percentage is the sum of average deployed minutes per day of all non-EMS calls divided by the total deployed minutes per day.

These numbers are not representative of large alarm fires requiring significant utilization of resources over an extended period of time.

Recommendation #10: Utilize a mid-size pumper or QRV equipped with CAFS or FIT tool, and staffed by one firefighter, at fire station 3 and fire station 7.

F. EMS

The most prevalent form of medical transportation by fire departments is emergency-only service using multirole personnel (sworn, uniformed firefighters with EMS training and certifications). SFD uses this model to provide the service to city of Sandusky.

Economically speaking, the emergency ambulance service compared to non-emergency (scheduled) transport service requires a high state of readiness, subjects vehicles to greater wear and tear, carries greater potential for civil liability, and involves a higher percentage of uncollectable fees for service. Very few private ambulance companies could survive if they limited their services to emergency transportation.³² Whether or not a public fire department can compete with a private ambulance service on a cost-recovery basis depends on factors such as demographics of the community, the payer mix, the prevailing reimbursement rates, and the effectiveness of the billing and collection processes.

³² Man aging Fire and Rescue Services, 2002, International City/County Management Association, 30.

1. Recruitment and Selection

The fire and rescue profession is one of the most desirable in the United States, with career fire service positions drawing large numbers of applicants. Costs associated with training multirole personnel (fire suppression and EMS) is an expensive proposition for most fire departments. Technical schools and community colleges now offer these career training classes to communities throughout the country. Many local governments have taken advantage of this trend by requiring job seekers to have, at the time of application, a state certification as either a firefighter, EMT, paramedic, or any combination of the these job titles. In addition to the cost saving benefit, training time is reduced substantially, because new employees require a shorter orientation and familiarization period. Individuals who have already completed training can be brought on board to fill staff vacancies in much less time.

Recommendation #11: Require prospective new hires to have, at the time of their application, certification as a firefighter and/or EMT/paramedic..

G. Fire Prevention and Public Education

For each type of possible emergency, the building blocks of prevention are engineering, enforcement, education, and investigation.³³ ***Engineering*** deals with building in appropriate fire protection components within a structure to

³³ *Managing Fire and Rescue Service*, 2002, International City/County Management Association, 358.

minimize the risk of fire and other life safety issues. This must begin with state legislation and local ordinances. The role of **enforcement** is to ensure that laws (fire and life safety codes) are adhered to in various occupancy types within the community. **Education** is needed to affect the human behavior that cannot be enforced by established laws. Finally, **investigation** is needed to develop lessons that can be learned from fire and emergency incidents when these efforts, for whatever reason, somehow fail.

Fire departments have traditionally focused more resources on mitigating the effects of fires once started than on prevention. SFD is minimally staffed in this regard, having only one full-time employee to handle the many responsibilities associated with this critical function.

Utilization of fire suppression personnel to supplement fire inspection personnel is a common practice among fire service organizations. However, firefighters are not trained directly in the finer points of fire and life safety codes, training that is needed to identify potential problems. Many communities are now hiring civilian fire safety inspectors to fill the void of career fire service inspectors. In addition to cost saving in salary and fringe and pension benefits, some see these positions as possible career ladders to becoming professionally certified firefighters and EMTs. Hiring preferences could serve as an incentive for those seeking career fire service opportunities. The state of Ohio permits municipal fire agencies to recover costs associated with fire prevention services. This is accomplished through various fee charges for fire prevention services. Therefore, the financial impact of hiring civilian inspectors could be negated.

Recommendation #12: Consider hiring civilian fire safety inspector(s)
--

H. Communications

Of all the areas in which technology can be applied to enhance public safety, none offer a greater return on investment than communications. As most public safety incidents begin with a call to a communications center, planning for improved levels of fire and life safety must begin with communications.

The SFD is working to establish an intergovernmental agreement with surrounding local governments to regionalize the emergency communications system for the handling of 911 and dispatch services. A regional system can leverage the latest technology, thus increasing overall system effectiveness. Interoperability can be enhanced through the use of trunked simulcast communications systems. Operating costs are shared among the different jurisdictions and there is an opportunity to bring in non-public safety users, such as public works, railway, and other entities that will pay for communications and dispatch services.

Recommendation #13: Explore opportunities to include non-public safety users such as public works and railway in the planning for the regional communications center planning.

Two technology tools that should be incorporated into any new communications and dispatch system are automatic vehicle location (AVL) and mobile data computers (MDCs.) An AVL system allows dispatchers to see the precise location of any unit on a computer-generated map of the

city. The AVL data can also be integrated into the CAD system to calculate the truly closest unit to any given emergency and make a dispatch recommendation accordingly, rather than making recommendations based on fixed fire station locations.

In addition to improving dispatching, AVL improves personnel safety because a unit that is in trouble can be located quickly. Additionally, an AVL system can be integrated with MDCs installed in each emergency response unit. With the appropriate integration of AVL, navigational, and MDC technologies, the AVL can provide the MDC with a visual map showing the current unit and incident location, together with the most efficient travel route.

MDCs can be used to provide CAD data, city maps, building plans, fire rescue pre-plans, hospital status, patient information, and navigational directions to responding units directly in the field. MDCs can also be used to log unit status and file field reports. They can be supported by 800 MHz radio system channels, code-division multiple access (CDMA) cellular technology (the same technology used to access the internet on cell phones), and other wireless communications technologies.

Recommendation #14: Consider purchase of an automatic vehicle location (AVL) system for a new communications center and purchase and installation of mobile data computers (MDCs) in SFD units.

I. Value-added services

Value-added services refers to additions to or enhancements of existing services that add value for the benefit of the community, the customer (patient), and/or the customer's insurers (managed care organizations).³⁴ Among these services are community health education and health screening.

1. Community Health Education

The fire department is ideally suited to provide health education services to the community. The fire service has traditionally been involved in the delivery of fire prevention information and transforming its core business practices to include public health-related issues has already begun. Many departments engage in joint efforts with the local health departments to perform various health screenings, such as blood pressure checks at fire stations, flu immunizations, and participating in community health fairs. Accident prevention programs involving falls, bicycle injuries, heart disease, child drowning, and poisoning are now a part of a typical fire department service delivery model.

³⁴ Managing Fire and Rescue Services, 2002, International City/County Management Association, 32.

2. Public Automatic Defibrillation Program

Public access defibrillation (PAD) involves making automatic external defibrillators (AEDs) available in public and private places where large numbers of people gather or where people who are at high risk for heart attacks live. The American Heart Association strongly advocates that all EMS first-response vehicles and ambulances be equipped with AEDs or another defibrillation device (semiautomatic or manual defibrillator). The AHA also supports placing AEDs in targeted public areas such as sports arenas, gated **communities, office complexes, doctor's** offices, shopping malls, etc.

Some communities have taken the additional step of equipping police vehicles with AEDs. Time is critical when a person suffers a heart attack. For those persons experiencing a complete cardiac arrest, immediate intervention is necessary if there is to be a chance for survival. Police units spend the majority of their time patrolling the streets and may be the first option for swift intervention.

The units are priced typically at \$1,500 to \$2,000. Grants are available from both the state and the federal level to assist in initiating a PAD program. Fire departments are uniquely suited to spearhead this effort by providing administrative support, medical advisory oversight, and training.

Recommendation #15: Develop a community public access defibrillation (PAD) program and equip police vehicles with automatic external defibrillators (AEDs) and train police officers in their use.

J. Potential Revenue Sources

Providing fire and rescue service within a community is a costly endeavor. Salaries and fringe benefits can account for as much as 90 percent of a **department's** budget. Cost of living increases and the rising cost in health and pension benefits are driving local governments to look for new ways of increasing revenue outside of raising property taxes. User fees and charges are becoming more common within fire and rescue department budgets.

1. First Responder Charges

With the need to find additional revenue sources, many fire departments are venturing into uncharted waters. Some are looking at the possibility of charging for emergency response (first responder) service through performance-based, private, non-emergency and emergency ambulance contracts. Since public fire departments are prohibited from charging for non-transport responses, and ambulance companies derive a benefit from the **department's first responder service**, one could conceivably frame a reasonable argument for profit sharing. Specific clauses would need to be included in any agreement mandating revenue for the provision of first responder service. Prohibitions against this potential revenue producing measure should be explored at the state level.

Recommendation #16: Consider use of specific contract language in private ambulance agreements to provide some form of cost recovery for government-based first responder service.

2. Development Impact Fees

State and local governments have for many years used development impact fees for new developments to off-set the cost of capital expenditures, such as building and equipping new fire stations. Miami-Dade County has since the early 1990s used impact fees as means to bring fire protection services to a geographic area. Although it can add to the overall cost of a new development or project, the benefits received, such as lower insurance rates for residential housing developments, can offer some form of cost saving measure for the developer.

Recommendation #17: Consider changes to current development impact fee ordinances to allow for fire protection related capital expenditures, such as building and equipment purchases.

3. Special Event Fire and Rescue Standby Service

Special events within the city can and do at times tax fire and rescue resources due to increased emergency response demands and the need to dedicate resources to the site of large public gatherings. The annual Sandusky Harley Davidson motorcycle event sponsored by the manufacturer brings many visitors to the city over the course of the event. Cities where these events are commonplace have implemented ordinances requiring the **contracting of the city's fire and rescue service** to provide standby service by a paramedic ambulance or paramedic fire engine. These fees are specifically targeted toward for-profit and not non-profit or charitable organizations.

Recommendation #17: Consider implementation of a fee schedule through city ordinance for the provision of fire rescue standby service at special events.

Recommendations Summary

1. Develop a functional table of organization chart for the department and include it in all budget documents and annual reports.
2. Amend the Employee Handbook to include Controlled Medical Drug, Weingarten Rule, and Citizen Complaint and Requests policies and procedures.
3. Conduct Commission on Fire Accreditation International (CFAI) fire department self-assessment as means toward overall organizational improvements.
4. Conduct a community fire risk analysis using the CFAI's **Risk, Hazard, and Value Evaluation (RHAVE)** model.
5. Develop a fire department master plan annex as an addendum to the **city's comprehensive master plan.**
6. Develop separate planning documents for strategic planning, six-month activity plans, program management guides, and project action plans.
7. Revise the business plan to incorporate improved goals and objectives that conform to traditional definitions, and develop an action plan with specific tasks, assignment timelines, and appropriated funds.
8. Implement a performance measurement system for observing, reporting, and using performance measures and develop performance measures for all department service areas.
9. Consider acquisition of medium-size pumper for operations deployment within fire districts based on historical fire call requirements and projected community growth trends.
10. Utilize a mid-size pumper equipped with a compressed air foam system (CAFS) or FIT tool, and staffed by one firefighter, at fire station 3 and fire station 7.

11. Require prospective new hires to have, at the time of their application, firefighter and/or EMT/paramedic certification(s).
12. Consider hiring civilian fire safety inspector(s)
13. Explore opportunities to include non-public safety users such as public works and railway in the planning for the regional communications center planning.
14. Consider purchase of an automatic vehicle location (AVL) system for the new communications center and purchase and installation of mobile data computers (MDCs) for SFD units.
15. Develop a community public access defibrillation (PAD) program and equip police vehicles with automatic external defibrillators (AEDs) and train police officers in their use.
16. Consider use of specific contract language in private ambulance agreements to provide some form of cost recovery for first responder service.
17. Consider changes to current development impact fee ordinances to allow for fire protection related capital expenditures, such as building and equipment purchases.
18. Consider implementation of a fee schedule through city ordinance for the provision of fire rescue standby service at special events.