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AN ASSESSMENT OF THE CALCULATION PROCESS AND VALIDITY OF FALSE ALARM ESTIMATES

Submitted to the Alarm Industry Research and Educational Foundation

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EXECUTIVE SUMMARY

I. Defining false security alarms and reviewing the various methods used for responding to false security alarms

Defining False Security Alarms

- In the past, false alarm activations and dispatches have been consistently reported at over ninety percent. Alarm ownership rates are also increasing. Therefore, although there is a national downward trend for false alarm calls, law enforcement agencies in some jurisdictions (e.g., areas with no alarm ordinance) are responding to increased numbers of false alarm activations. In these types of jurisdictions, false alarms may account for a considerable proportion of calls for service.

- Academic research specifically addressing the issue of false alarms is scarce.

- Considerable variability exists in how false alarms and false dispatches are defined and calculated.

    - False alarms are often described as residential or commercial security *alarm activations* that lead to a *law enforcement response*, but where *no evidence* of criminal activity is found. However, there are inconsistencies within this definitional framework.

    - Of greater concern with the broadly used term "false alarm" is the lack of clarification between false alarm "activations" and false "dispatches."

        - A false alarm is broadly defined as an unsubstantiated alarm activation.

        - A false dispatch involves the unwarranted request for law enforcement response. False dispatches should be a greater concern for local jurisdictions given the consumption of scarce resources and the opportunity costs associated with responding.

    - Calls for service that are determined to be unknown in origin are generally declared as false by law enforcement, but the alarm industry may consider these valid based on the assumption that an intrusion was likely prevented. Both positions have merit.

II. Different methods for calculating or estimating false security alarms

- There is widespread inconsistency in the calculation process and terminology used when reporting false alarm and false dispatch percentages, rates, and reductions.
    - As one example, false alarms *rates* are typically calculated as the *percentage* of unwarranted calls in relation to the total calls for service.
- In reporting false alarm data, different types of information/numbers are typically used to report percents and rates.

Percents

- Mathematically, a percentage is the part of the whole number expressed in hundredths, and the units of measure for the numerator and denominator are typically the same. In reporting false alarms, percents are typically calculated as the number of false alarms divided by the number of alarm activations.
- Percentages are often seen as advantageous because they are easily understood by most stakeholders and by the public. However, reporting percentages alone, in the absence of raw numbers, presents a concern with subsequent interpretation.
    - For example, if a jurisdiction has 100 calls for service and 98 of them are false, then 98 percent of the alarms are technically false. However, in a jurisdiction that receives 10,000 calls for service and 98 percent are false, the demand on law enforcement is clearly much higher.
    - Further, percents have limited usefulness in demonstrating changes over time. That is, by reporting only the resulting percentage, it is impossible to determine whether the raw numbers have changed over time. Perhaps in the first year the jurisdiction received 10,000 calls for service and 98 percent were false. But, after implementing new technologies and preventive ordinances the number of calls for service was reduced to 5,000. However, if 4,900 were again false, the percentage of false alarms is still 98 percent, but the magnitude of the problem was reduced considerably. Consequently, reporting only percentages does not show the success of measures implemented to reduce false alarms.
- Percentages may also be misleading when looking at changes in the number of alarm dispatches over time. That is, reporting only percentages makes it impossible to determine whether the raw numbers have changed over time.

- For example, a change between *Time 1* and *Time 2* may be reported as 10% when law enforcement responds to 10,000 calls in *Time 1* but only 9,000 calls in *Time 2*. From *Time 2* to *Time 3*, if total dispatches are reduced from 9,000 to 8,100 then the change remains 10%. While the change reduction remained constant, the jurisdiction actually received 100 fewer requests for service from *Time 2* to *Time 3* than from *Time 1* to *Time 2*.

- Raw percentages, as they are *often* used to report false alarms, can be misleading and do not convey a precise description of the extent of false alarms. Consequently, percentages are *not recommended* as a means to communicate alarm dispatches or the scope of false alarms within a jurisdiction.

Rates

- Rates are defined as a quantity, amount, or degree of something measured per unit of another measure (e.g., the population of known alarm users).

- The "Alarm Factor" is a commonly used term in the alarm industry. It is a rate calculated by dividing the number of alarm dispatches by the number of alarm permits in a jurisdiction. The false alarm factor is calculated by dividing the number of false/invalid alarms by the number of registered users.

- Reporting false alarm or dispatch rates (e.g., the false alarm factor) has some advantages.

    - First, rates demonstrate the problem across the specific portion of the population of alarm users. For example, if the annual rate is .30 per user, each user on average has less than one false alarm per year.

    - Second, rates can capture the growth or decline of alarm users.

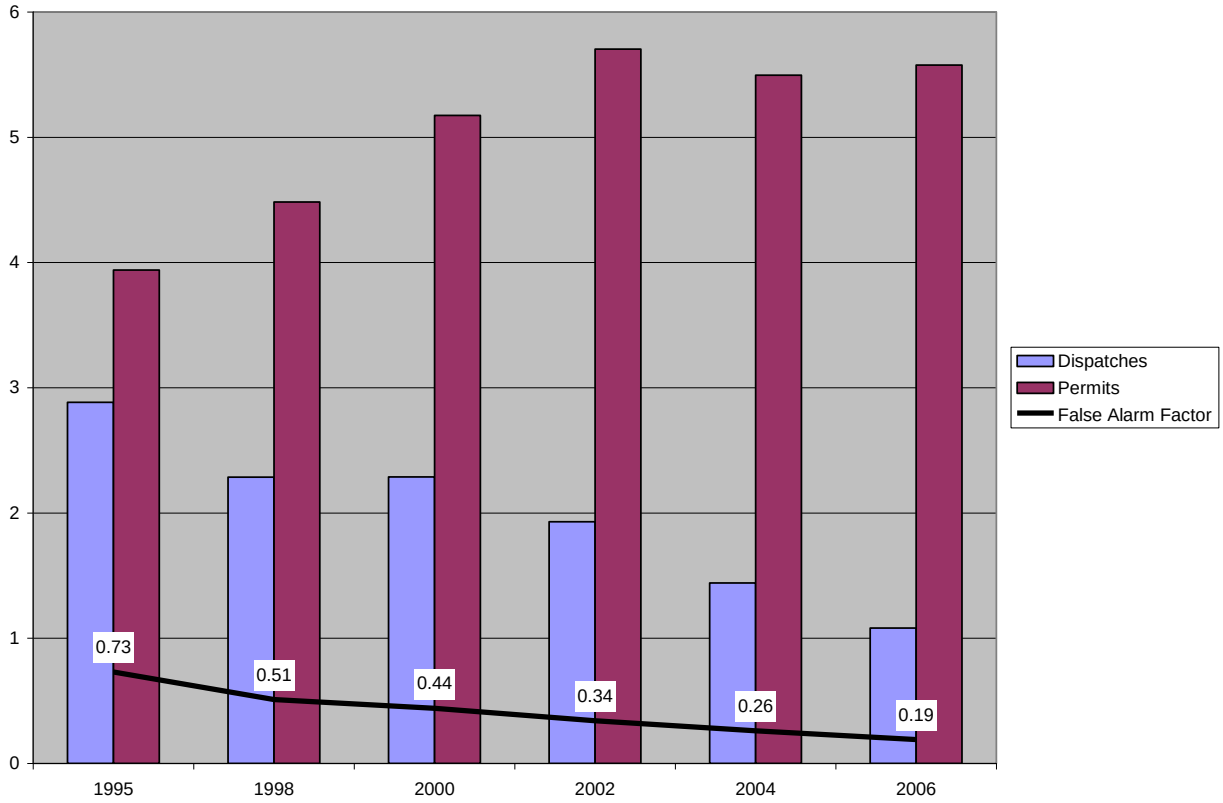
    - Third, rates allow a baseline measure that can be used for comparisons *between jurisdictions* or within a single jurisdiction *over time*.

        - For example, a city with an alarm ordinance might have a false alarm factor of .25 (one false alarm per registered permit every four years), while a city without an alarm ordinance might have a false alarm factor of .75 (three invalid alarms per registered permit every four years).

        - Further, a jurisdiction can accurately track its false alarm factor over time to see if the number of false alarms per registered user has changed. Also, rates can be used when jurisdictions are measuring the effectiveness of alarm ordinances or technologies aimed at reducing false alarms. For instance, a jurisdiction might set a goal of reducing the alarm factor to .25. Officials can track the alarm factor and measure progress toward reaching that goal.

- Reporting false alarm rates over time is particularly informative. For example, the graphic below shows alarm information from the Montgomery County Police Department for 1995 to 2006. The graph includes the raw numbers for false alarm dispatches and the number of permits (both of these elements have been scaled to 1 = 10,000), as well as the false alarm factor for each year. The chart reveals that, in just over 10 years, the false alarm factor for Montgomery County has been reduced from .73 (almost one false alarm per registered user every year and a half) to .19 (approximately one false alarm per registered user every five years).

Montgomery County Police Department Data



III. Recommendations for a Systematic False Alarm Calculation Process

Proposed Definitions

- **False alarm activations** are residential or commercial alarm activations caused by mechanical failure, malfunction, improper installation, or negligent use by authorized users that do not yield evidence of criminal activity or attempted criminal activity.

- **False dispatches** are requests for public law enforcement service that do not result in any type of criminal report.

- **Law enforcement response** includes any actions taken by public law enforcement once dispatched to the site of the alarm activation.

- **Criminal activity** includes any evidence that is directly linked to the alarm activation. Criminal activity should not be limited to burglary or any other specific type of crime.

Recommended Calculation Processes

- The false alarm factor (rate) is strongly recommended over the typically reported percentage of false alarms.

- Reporting changes in the false/invalid alarm factor (i.e., rates) *over time* is ***highly recommended*** to evaluate the impact of implementing a new ordinance or response technique. Such outcome measures are also beneficial for describing false/invalid alarm and dispatch trends over time.

    - Change measures must capture reasonable time periods before and after the change. If there has been no change in policy or practice, practical and logical time frames should still be used (e.g., six months or a year).

    - Reported changes should be coupled with alarm ownership (permits) trends and local crime rates for various types of related criminal activity such as burglary, larceny, or robbery. Further, the raw number of alarm activations, dispatches, and known alarm users should be provided.

- Percentages are *not* recommended unless additional information (e.g., raw numbers) is provided. In the absence of providing all relevant information, readers are left with the inability to accurately assess the magnitude of the problem.

- Future evaluations should consider the use of improved methodological techniques such as control/comparison sites, longitudinal trend analyses, and process evaluations when measuring and reporting false alarm information.

Introduction

False alarms and invalid dispatches are a growing concern for law enforcement agencies, local governments, and alarm companies. Over time the percentage of false alarms has been consistently reported at above ninety percent (Webster, 1970; Kakalik & Wildhorn, 1971, 1977; Cunningham, Strauchs, & VanMeter, 1990; Moslow, 1994; Hakim, Rengert, & Shachmurove, 1995; Sampson, 2007). Meanwhile alarm ownership rates have expanded in recent years (White, 2002; Blackwell & Burns, 2008, Lee, 2008). Therefore, although there is a national downward trend for false alarm calls, some jurisdictions, particularly those that are lacking in resources or inattentive to a growing alarm base, may be responding to a greater number of false alarm activations. For some jurisdictions this may account for a considerable proportion of their calls for service (Hakim et al., 1995; Sampson, 2007). Research suggests that response time is longer, alarm calls are no longer considered a high priority, and law enforcement agencies may minimize the potential danger of responding to these calls (McLaurin, 1984; Hakim et al., 1995). Without a properly structured alarm ordinance that is enforced, false alarms can threaten the ability of law enforcement agencies to provide adequate and efficient service to their communities.

Academic research specifically addressing the issue of false alarms is scarce. Academic efforts have typically focused on the extent and nature of burglary and the effectiveness of burglar alarms to reduce burglary (see Cromwell, Olsen, & Avary, 1991; Wright & Decker, 1994; Hakim, 1995; LeBeau & Vincent, 1997; Lee, 2008). The few available academic publications that present a review of false alarm rates often cite findings from the Hakim-Buck study (such as Blackstone, Buck, Hakim & Spiegel, 2007; Blackstone, Buck, & Hakim, 2005; Hakim et al., 1995; Blackwell & Burns, 2008). Other resources refer to false alarm rates published in 1976 by the Private Security Advisory Council (Cunningham & Taylor, 1985; Cunningham et al., 1990; ORI, 1993). However, a growing body of information is available through published law enforcement agency statistics, city council memorandums, citizen surveys, or newspaper and magazine articles posted on the Internet (Brunner, 2003; Dallas Police Department, 2007; Freemont Police Department, n.d.; Moslow, 1994; Salem Police Department, 2004; The Salt Lake Tribune, 2000; Schwartz, 2004; White, 2002).

Because entities that report false alarm rates are not guided by a structured format, such as the Uniform Crime Reports, considerable variability exists in the definition of false alarms and how these rates are calculated. In addition, the steps taken to reduce false alarms rates vary widely given the laws and resources of the jurisdictions. Therefore, the purpose of this study is to review and summarize the current body of evidence on false alarm estimates. First, commonly referenced definitions of false alarms and calculations of false alarm rates are reviewed. Second, the various methods of measurement employed to reduce false alarms will be discussed and evaluated. Finally, some recommendations will be made to encourage a more systematic false alarm calculation process that accurately and fairly represents the effectiveness of alarm ordnances and other programs and strategies created to curb the incidence of invalid alarm dispatches.

I. Defining false security alarms and reviewing the various methods used for responding to false security alarms

Defining false alarms

Numerous definitions of false alarms are cited within the literature, but three key components are consistently acknowledged. False alarms are often described as residential or commercial security *alarm activations* that lead to a *law enforcement response* but where *no evidence* of criminal activity is found (Cunningham & Taylor, 1985; NFBAA, n.d.). While this definition seems relatively straightforward, a number of inconsistencies are apparent.

First, the term "false alarm" may evoke different meanings among different stakeholders, which could lead to a lack of consensus for an appropriate measure of false alarm rates. This is critical to acknowledge because utilizing different measures obviously results in conflicting false alarm estimates. For example, law enforcement sometimes defines false alarms as calls for service that do not result in evidence of criminal activity (McLaurin, 1984). Under this classification, false alarms rates are typically calculated as the percentage of unwarranted calls in relation to total calls for service. These rates are commonly referenced by the media and academic researchers (McLaurin, 1984; The Salt Lake Tribune, 2000; Schwartz, 2004; Blackstone et al., 2005) and are further elaborated on in terms of the manpower and resources expended in response to false alarms (Baranzini, 2002; White, 2002; Sampson, 2007). Alternatively, the alarm industry often reports the number of false (or invalid) alarms per monitored alarm system (McLaurin, 1984; FARA, 2005, 2007a, 2007b). A detailed discussion of the various measurements and their implications is provided below.

An additional concern about the broadly used term "false alarm" is the lack of clarification between false alarm "activations" and false "dispatches." Some literature defines false alarm rates and false dispatch rates independently (NFBAA, n.d.; ORI, 1993), but other studies either use the terms interchangeably (Webster, 1970; Freemont Police Department, n.d., Dallas Police Department, 2007) or assume that a call for service denotes a law enforcement response (Baranzini, 2002; Blackstone et al., 2005; Blackwell & Burns, 2008). Again, it is critical to differentiate between these terms.

A false alarm, broadly defined, is an unsubstantiated alarm activation. A false dispatch involves the unwarranted request for law enforcement response.[1] Both are determined to be false when no evidence of criminal activity is found or reported. However, false alarm activations may not necessarily generate a law enforcement response. Therefore, the burden on public resources is evidenced by false dispatches. By breaking down the problem into separate areas, numerous jurisdictions have documented reductions in false dispatch rates over time even though false alarm rates may not have changed (FARA, 2005, 2007a, 2007b). Attention to the specific issue of false dispatch rates is also demonstrated by the efforts of the alarm industry through advancements in technology and monitoring that enhance verification prior to requesting law enforcement response (Mowrey & Rice, 2004). Overall, future studies must embrace this

[1] See ORI (1993) for a summary of the causes and classifications of false alarms.

distinction in order to produce a systematic and comprehensive understanding and measurement of the issue.

Second, law enforcement response has sometimes been defined as being dispatched to respond while other jurisdictions may require the physical presence of law enforcement at the site of the alarm activation. It is reasonable to assume that some dispatches will be cancelled en route, and it is generally recognized that dispatches will not be included if an officer does not arrive on scene. However, in this review, evidence regarding the volume of cancelled dispatches was not available and therefore the true impact on false alarm rates may be unknown.

Third, the condition that no criminal activity was found upon responding to the alarm was applied somewhat inconsistently across studies. For example, most studies or reports implied that no criminal activity of any kind was documented, but other research only classified criminal activity as evidence of burglary (LeBeau & Vincent, 1997; Gaines, Famega, & Bichler, 2007). Further, calls for service that are determined to be unknown in origin are generally declared as false by law enforcement, however the alarm industry may consider these valid based on the assumption that an intrusion was likely prevented (McLaurin, 1984). While these distinctions may have negligible impacts on false alarm measures, it again underscores the need for clear and systematic definitions associated with false alarms.

II. Different methods for calculating or estimating false security alarms

A variety of approaches were utilized to measure false alarms across the body of literature reviewed. In the tables below, several calculation methods are presented. **Table 1** and **Table 2** summarize the assortment of false alarm and dispatch calculation processes used in prior publications. Often different estimations provided the same result, but for the context of this review it is important to acknowledge the subtle differences in the processes used. Also, many of the resources were literature reviews or summaries and therefore do not provide calculations of original data but may have referenced prior evidence or studies. If the calculation process of the referenced work was clearly presented, the citation was included in the table. The purpose of this summary is to draw attention to the inconsistency associated with false alarm reporting.

Table 1. False Alarm Measures

Measurement	Various Calculation Processes	Citation(s)
False Alarm Percent	(# of false alarms / total # of alarm calls) * 100	White, 2002; Dallas Police Dept., 2007; Hakim et al., 1995; Sampson, 2007; Schwartz, 2004; Webster, 1970 [α]
	[1 - (# of valid reports / # of police responses)] *100	Johnson City PD, n.d.; Kakalik & Wildhorn, 1971
	(# of alarm activations - # of burglary reports / # of alarm activations) *100	Freemont Police Dept., n.d., Gaines et al., 2007; LeBeau & Vincent, 1997
False Alarm Rate	# of false alarm activations / total # of alarm users	Hakim et al., 1995
	# of false alarm responses / total # of alarm users	FARA, 2005 [α]
False Alarm Reduction	(# of false alarms at Time 1 - # of false alarms at Time 2) / # of false alarms at Time 1	FARA, 2005 [α]; Dallas Police Dept., 2007

[α] ***Authors use the term interchangeably with corresponding false dispatch measures***

Table 2: False Dispatch Measures

Measurement	Various Calculation Processes	Citation(s)
False Dispatch Percent	(# of false alarm responses / total # of alarm responses) *100	McLaurin, 1984 [α]; Moslow, 1994 [α]; Salem Police Dept., 2003; The Salt Lake Tribune, 2000 [α]
False Dispatch Rate	# of false alarm dispatches / total # of alarm users # of responses / total # of alarm users # of false alarm responses / total # of alarm users	FARA, 2007b FARA, 2007a FARA, 2005 [α]
False Dispatch Reduction	(# of false dispatches at Time 1 - # of false dispatches at Time 2) / # of false dispatches at Time 1	FARA, 2005 [α], 2007a, 2007b; M. Nichols Strategic Communications, 2006, Mowry & Rice, 2002 [α]

[α] ***Authors use the term interchangeably with corresponding false alarm measures***

Discussion of Previously Used Terms and Measures

- False Alarm and False Dispatch Percent

Percentages are advantageous because they are easily understood by stakeholders and the public. Mathematically, a percentage is the part of the whole number expressed in hundredths and the units of measure for the numerator and denominator are typically the same. For false alarms and false dispatches, this is generally calculated as the number of false alarms or dispatches relative to the total number of alarms or dispatches.

Reporting percentages in the absence of raw numbers presents a concern with subsequent interpretation. For example, if a jurisdiction receives 100 calls for service and 98 of them are false, then 98 percent of dispatches are technically false. However, in a jurisdiction that receives 10,000 calls for service where 98 percent are false, then the demand on law enforcement is clearly much greater.

Further, by reporting only the percentage, it is impossible to determine whether the raw numbers have changed over time. Perhaps in the first year the jurisdiction received 10,000 calls for service and 98 percent were false. But, after implementing new technologies and ordinances the number of calls for service was reduced to 5,000. If 4,900 were false, the percentage is still 98 percent but the demand on resources has clearly dropped.

- False Alarm and False Dispatch Rates

Rates are defined as a quantity, amount, or degree of something measured per unit of another measure. False alarm and false dispatch rates are commonly derived using the population of known alarm users. The rate is sometimes referred to as the false/invalid "alarm factor" (FARA, 2005). Specifically, this process calculates the volume of invalid/false alarms or dispatches relative to the total numbers of monitored alarm systems.[2] For example, if 30 false alarms are reported among 100 known users, the false alarm *rate* equals .30. Often commercial and residential rates are reported separately because commercial establishments commonly have higher rates, and failing to separate the two would unfairly imply that residential alarm users are more problematic.

Reporting false alarm or dispatch rates has several advantages. First, the rate (or false/invalid alarm factor) measures the problem across the population of alarm users. If the rate is .30 per user, the public can be informed that each user, on average, has less than one false alarm per year. In this context the false alarm issue might be considered minor. Second, rates also capture the growth or decline of alarm users over time, an important metric for those jurisdictions that are testing the effectiveness of various interventions.

However, similar to reporting percentages, reporting rates ***alone*** can also disguise the magnitude of the demand on resources. Relying again on the example rate of .30 per user, the reported rate would be the same if the number of false alarms or dispatches were 300 among 1,000 users or 3,000 among 10,000 users. Further, the impact of 300 versus 3,000 requests for response may differ substantially across jurisdictions depending on the alarm user population size relative to available resources within the jurisdiction.

- False Alarm and False Dispatch Percent Change or Rate Change

Over time, various jurisdictions have responded in a variety of ways (e.g., ordinances, fines, advanced monitoring techniques, filtering systems) to reduce the impact of false alarms. As a result, many have reported the results of their programs or interventions as a percentage or rate increase or decrease in alarm calls or dispatches from one time period to the next. This measure is qualitatively different than a single percentage or rate because it allows the stakeholders and the public to assess short-term results of the implemented changes and monitor the cumulative changes over time.

Measures of change are important indicators of the success of newly implemented programs and interventions. They are also useful to show trends over time. However, reporting a percentage change over time can still be ambiguous. Just as a reported percentage may remain the same even if the raw numbers change, so might the change measure. For example, a percent change between *Time 1* to *Time 2* may be reported as 10 percent when law enforcement responds to 10,000 calls in *Time 1* but only 9,000 calls in *Time 2*. From *Time 2* to *Time 3*, if total

[2] Users can be defined as registered users only or those with actively monitored systems (in jurisdictions that do not have registration requirements). As a result, the reported rates can vary substantially based on how users are defined.

dispatches were reduced from 9,000 to 8,100 then the change remains 10 percent. So while change is constant at 10 percent, the jurisdiction actually received 100 fewer requests for service from *Time 2* to *Time 3* than from *Time 1* to *Time 2*. In this example, the actual raw number of reduced requests (e.g., demand for services) may be overlooked depending on how the data are presented.

A change measure using rates is more informative than a percentage change. For example, if a jurisdiction reports a false alarm rate of 3.5 at *Time 1*, 1.5 at *Time 2*, and .75 at *Time 3*, the audience will know that false alarms decreased by two per registered user per year from *Time 1* to *Time 2*, by .75 from *Time 2* to *Time 3*, and by 2.75 false alarms per year from *Time 1* to *Time 3*.

Summary of Commonly Used Terms and Measures

Based on this review of the various calculations used in past studies, two major concerns emerge. The first concern is the lack of systematic definitions from which they are derived. Although this imprecision was discussed in the previous section, its impact must be emphasized. Without a consensus for defining what is a false alarm, false dispatch, law enforcement response, or criminal activity it is difficult to compare statistics across or within jurisdictions. Furthermore, if stakeholders adopt or revise their definitions, comparing results across time becomes more challenging. At a time when stakeholders and researchers are attempting to assemble national statistics it is problematic to rely on vague definitions.

Second, there are a variety of ways to calculate and subsequently present false alarm data. Understanding and clarifying these distinctions is important because various stakeholders present data in different ways. Law enforcement may be primarily concerned with demonstrating that private security alarms are placing excessive burdens on public resources. Therefore they are more likely to present false alarm and dispatch percentages because percentages of that magnitude suggest a substantial concern from their perspective. Reporting percentages ***alone***, while sometimes easier to understand, often convey the least amount of information.

Meanwhile, the alarm industry is interested in demonstrating that false alarms and dispatches are decreasing relative to the growing population of users and that they are proactively advancing system and monitoring technologies that reduce the demand for responses. Therefore, the alarm industry tends to report the false/invalid alarm factor (i.e., rate) that reflects the number of false/invalid alarms per registered user per year. These rates can also be used to measure changes over time and to compare false alarms across jurisdictions. Nevertheless, it is evident that reporting as much detailed information as possible (e.g., raw numbers) will help clarify the challenges associated with measuring and reporting false alarms.

III. Recommendations for a Systematic False Alarm Calculation Process

Standard Definitions

Before law enforcement agencies, the alarm industry, and academic researchers can reach a consensus about the appropriate method of disseminating information about false alarms, standard definitions must be embraced. These definitions must be clear, concise, and applicable for all relevant parties. The proposed definitions are derived from the body of the literature and therefore represent the most currently used terminology.

- False or Invalid Alarm Activation

> *False or invalid alarm activations are residential or commercial alarm activations caused by mechanical failure, malfunction, improper installation, or negligent use by authorized users that do not yield documented evidence of criminal activity or attempted criminal activity.*

The literature clearly illustrates that the definition of false alarms is a central point of contention in the ongoing debate on how to manage false alarms. Because not all false alarms have obvious causes or prompt requests for law enforcement response, it is important to accept a broader definition of false or invalid alarms. Conflicts can be further minimized by distinguishing between false/invalid alarm activations and false/invalid alarm dispatches.

- False or Invalid Alarm Dispatch

> *False/invalid dispatches are requests for public law enforcement service that do not result in a documented criminal report.*

False/invalid dispatches must be distinguished from false/invalid alarm activations. Because jurisdictions utilize different methods of verification, the opportunity for false/invalid dispatches varies. For example, the traditional practice of dispatching law enforcement immediately without any verification generates a greater likelihood of false/invalid alarm dispatches. Utilization and consistent enforcement of ordinances, registration permits, fines and fee schedules, and call verification help to reduce the potential of a false/invalid alarm dispatch. More aggressive responses such as enhanced call verification and suspension of response to chronic abusers further limit the number of false/invalid dispatches. Overall, each additional layer of verification reduces the risk and total number of false/invalid dispatches.

- Law Enforcement Response

> *Law enforcement response includes any actions taken by public law enforcement once dispatched to the site of the alarm activation.*

Law enforcement activities may include drive time, investigation, report writing, communication time with the authorized alarm user, or any other activity associated with the alarm activation that consumes law enforcement resources.

- Criminal Activity

> *Any evidence of criminal activity or attempted criminal activity that is directly linked to the alarm activation should be considered a legitimate activation. Criminal activity or attempted criminal activity should not be limited to burglary or any other specific type of crime.*

Criminal activity must be broadly defined by data collection agents and researchers in order to capture the full spectrum of activity associated with burglar alarms. Arguably, alarms have greater deterrence benefits beyond the crime of burglary, as alarm activations may reduce vandalism to a home or business or prevent other types of personal crimes associated with home invasions (see Lee, 2008).

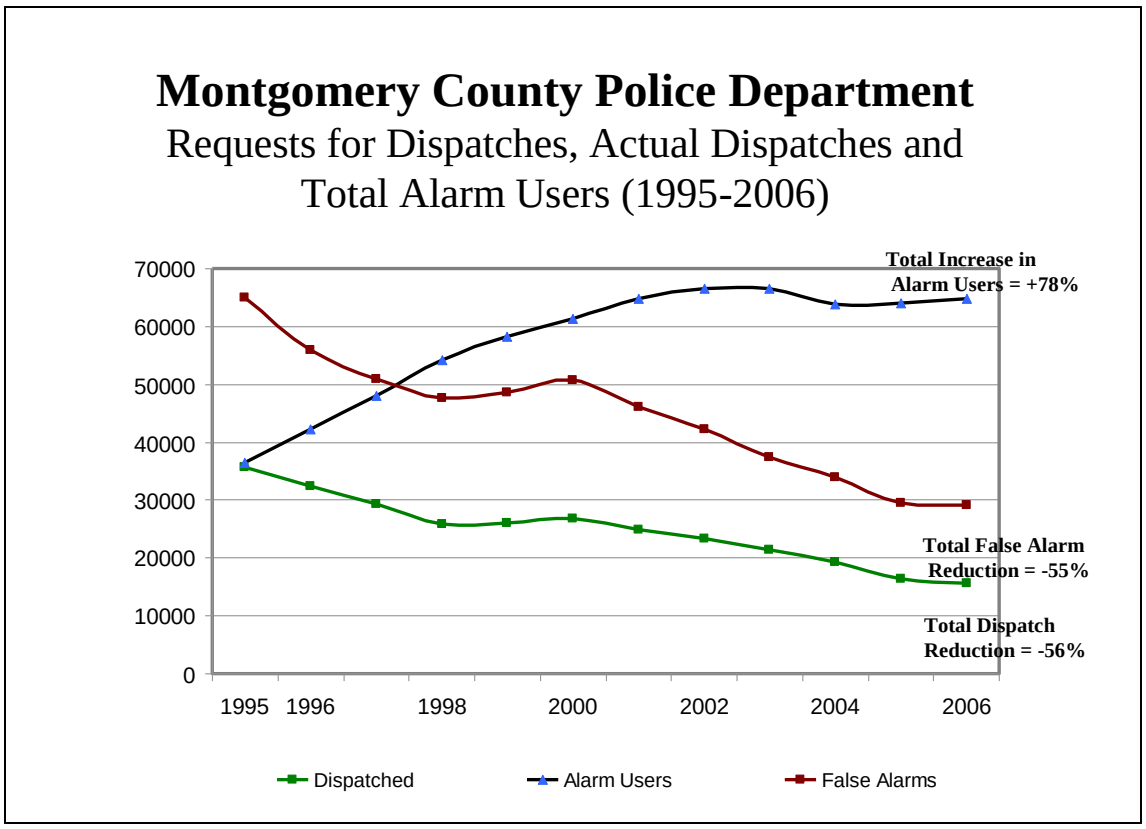
Standard Calculation

Various calculations can be used to gauge the magnitude of false alarms, and stakeholders tend to utilize measures that best represent their position. While this study may not convince all stakeholders to use one specific measure, the goal is to work towards a more systematic calculation process. Furthermore, one specific measure may not adequately represent the data. Therefore it is the responsibility of those that disseminate information to provide stakeholders and the public with as much detail as possible.

- Measures of Change

Reporting changes in the false/invalid alarm factor (i.e., rates) *over time* is ***highly recommended*** to evaluate the impact of implementing a new ordinance or response technique. This outcome measure is also beneficial for describing false/invalid alarm and dispatch trends over time. In order for change measures to be useful, they must capture a reasonable time period before and after the implemented change. While local governments may sometimes request six month reviews, these short-term results should generally be accepted with caution. At minimum, reports should include the raw numbers for false/invalid alarm and dispatches for each time period as well as the number of registered alarm users (or known users in jurisdictions without registration requirements). Such information will serve to reduce the ambiguity associated with basic descriptive statistics.

To illustrate this point, consider the chart below. This example, derived from published reports from the Montgomery County Police Department (see FARA, 2007b), illustrates the impact following an increase in enforcement of a broad alarm ordinance. The chart suggests that the total numbers of alarm users increased substantially over an eleven year timeframe and the total requests for dispatches actually remained relatively stable. However, actual law enforcement dispatches and reported false alarms dropped by over 50% each during that timeframe. These drops are obviously more impressive given the substantial increases in alarm ownership rates.



In addition to the use of change measures, improved and enhanced methodological approaches may accurately discern the impact of responses while recognizing the various challenges of implementing quasi-experimental designs. For example, an area that can be treated as a similarly-situated control site should be incorporated into future studies. This will help to determine if the jurisdiction in question differs significantly from the comparison jurisdiction because of the ordinance or new response. While this level of scientific rigor may surpass the typical needs of law enforcement or other agencies, such improved methodological approaches provide more scientifically-valid outcome measures.

- Rates and Percentages

Percentages and rates are not recommended measures to report ***unless*** additional information is also provided. Specifically, such reports should include raw numbers of false/invalid alarm activations, false/invalid alarm dispatches, and alarm ownership rates if available (based on clearly presented definitions). Failure to disclose all relevant information potentially misleads subsequent interpretation of summary statistics.

Summary of Recommendations for Systematic False/Invalid Alarm Calculation Process

The alarm industry, law enforcement, and local policy makers would be benefit from using consistent language, clearly defining terms, and providing complete information and data when presenting statistics associated with the magnitude and impact of false/invalid alarms. This report provides a starting point for identifying and defining the relevant terminology as well as offering suggestions for improved false/invalid alarm calculation and reporting in the future. While we recognize that different jurisdictions might prefer to use differing language and statistics, clearly there are some fundamental steps that might be taken to improve consistency and validity when measuring and disseminating false/invalid alarm information.

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