

REDUCING FALSE FIRE ALARMS

A Study of selected European Countries

Lance Rütimann

Senior Manager Industry Affairs, Siemens Switzerland Ltd.

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IMPORTANT:

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Reducing False Fire Alarms

1 Introduction

1.1 Initiative

Certain European jurisdictions confronted with budget challenges have by their expenditure reduction actions exerted pressure on fire services to react to receiving less funding. The varied approaches range between reductions in non-intervention activities such as inspections through requiring eye witness verification prior to deployment. This inadvertently leads to delayed responses to real events, hence increasing the risk towards lives and assets. It has been observed in one European country, that the automated connections to the fires services are being removed.

The industry, trade associations and public institutions continue to take measures to reduce these unwanted events. Examples of these are specific programs for owners/operators, modernization of older systems and encouraging regular maintenance of fire safety systems. However, these measures should be coordinated with all stakeholders.

1.2 Scope

The focus of this study was on fire alarm systems with an automated alarm transmission; either direct or routed via alarm receiving station. Not all European countries use this approach. However, it is perceived as important that the industry react to the developments described above to avoid an inevitable increase in risk. This risk increase equates to deaths, injuries and increased damage to buildings and structures. A further consideration is the collateral damage.

1.3 Data Basis

The pre-requisite towards identifying possible measures was to establish a picture of the situation today and its development in the past. The reference period for the collection of statistical data was defined as 10 years; 2000 until 2010. The basis for the collection and analysis of the data was a questionnaire. Representatives from SE, GB, NL, DE, FR and CH were asked to participate and contribute. The targeted deliverable was to contain three key areas:

- analysis and interpretation of the data
- Best Practice examples
- proposals to further towards false fire alarm reduction

2 Outcome of Data Collection

We received information only from Sweden, England, Germany and Switzerland. During the course of this study, very specific information on Denmark was received and is included in chapter 7.

The fire alarm system industry is reliant on the efforts of the fire services to record and publish information on fire alarms, and also to define and implement the guidelines for keeping records.

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The availability of statistical data with a view to a European insight proved to be more challenging than expected. If such data is collected and published, this does not happen along agreed parameters; even within one country. It became apparent that significant field effort would be necessary to identify and collect comparable, statistical data. These resources were not available.

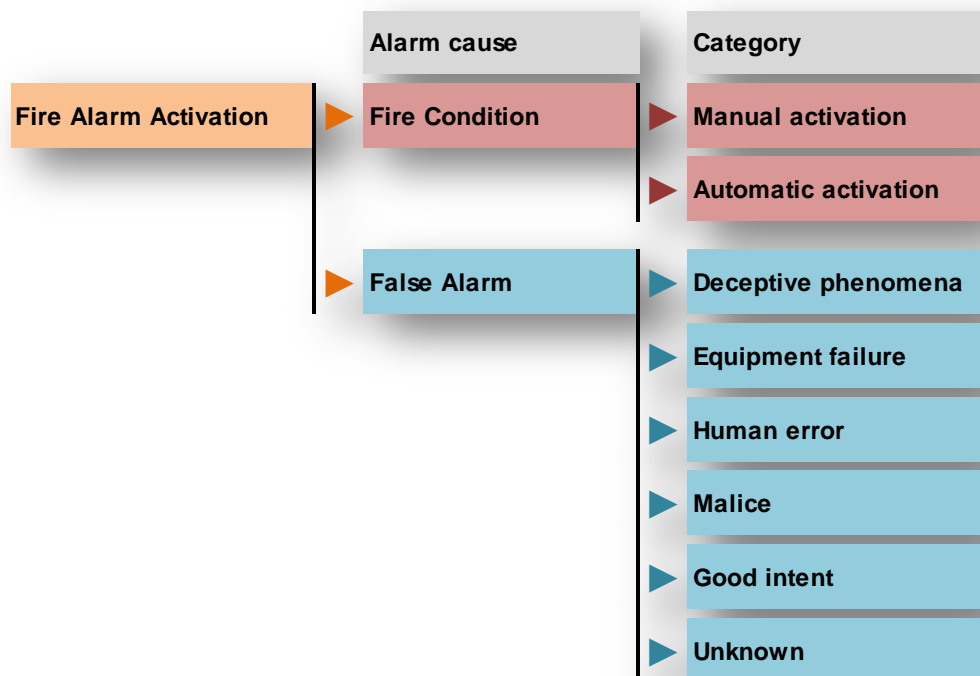
In spite of this set back, a number of best practice examples were found and recorded. Further, the review of the country information at a Meta level did provide a certain level of insight into what is needed to reduce false fire alarms. This information is provided in this report.

3 Grouping of events

The grouping and definitions of events is important for everything that follows. One of the challenges is finding alignment in this preparatory stage of the work. Opinions on how to group vary.

The following solution was suggested as being an enabler for the defining of processes and deployment of measures. It is important to keep the solution as simple as possible; otherwise the effort will surmount the value of collecting and evaluating the data.

It was noted, that there is value in analysing both false and real fire alarms. A site responsible would be able to identify causes and take very specific actions. This in turn would not only reduce the false alarm rate, but also increase the fire safety as a whole.



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4 Key Findings

4.1 False Alarm Rates

In common between countries/regions with automated transmission of fire alarms is a rate of ~95% False alarms to ~5% Real alarms (fire condition). One exception to this is Switzerland which has a significantly lower False alarm rate of ~85%. The details are described in the section "Country Specifics".

4.2 False Alarm Costs

The issue of the cost of false alarms requires a more specific review and cannot be generalized. For example, there is a significant difference in the cost structure between 24/7 manned fire services (common in cities) and auxiliary fire services, in that the latter will largely be variable. There is little impact on the overall costs if personal from a 24/7 manned fire service conduct repairs or respond to a false alarm. A Swedish study confirmed this. Auxiliary fire services have immediate variable costs with every response.

In some countries, verification (e.g. visual confirmation) of an alarm is required before intervention forces are deployed. The rationale for this is to avoid the costs of false alarms, but this view is limited to the impact for the fire services alone. Studies from Sweden and England show that the overall costs for a society are much higher, if verification of an alarm delays the deployment. The resulting damage to the object will be large enough to prohibit use of parts or all of it. A company may go out of business due to the inability to serve its customer base, which in turn will negatively impact employees and their families; just to mention one example.

4.3 Anomalies

There were a number of interesting facts that were established:

- In some cases, building occupants were confronted with a false fire alarm that would impose relatively high costs. In order to avoid this, a real event was initiated such as burning paper in a waste basket.
- In one municipality, the "false alarm rates" for residential objects was 18% for fix and 16% for mobile telephone; malice excluded. It was not expected to see such high rates being the call would be initiated from or near the location in question.
- Cultural differences impact the statistical data making it difficult to compare. In the UK, toasters are very popular and are a major cause of false activations.
- Areas with significant modernization demonstrate lower overall false alarm rates.
- It was unclear how and if residential smoke alarms are impacting the data.

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5 PEST Analysis

The PEST analysis (political, economical, social, technical) indicates the challenges and the strategies needed to avoid an increase in risk whilst reducing the false fire alarm rates. In short, the industry, building owners/operators, policy makers and authorities need to work together.

5.1 Political

- budget cutting leading to reduction in fire service levels
- new legislation calling for verification prior to deployment = delays!
- policy makers not pressuring building owners/operators to improve systems

5.2 Economical

- delays in deployment will increase initial and collateral damage costs
- insurance rates will increase to compensate for higher risk
- simplest measures can be very cost efficient along with being effective

5.3 Social

- false alarms subdue our sense to protect ourselves (boy crying wolf), or lead to anxiety
- society not truly aware of the real cost of false alarms
- false alarms must not impair the welfare of a society

5.4 Technical

- highly reliable detection technology available since almost 20 years
- product/system standards do not adequately address false alarms
- application guidelines provide guidance for design and maintenance

6 Improvement Measures for Systems

From the discussions conducted, there are two main issues that impact false alarm rates in the long run:

- regular maintenance and upkeep of existing systems
- modernization and upgrading of older technologies

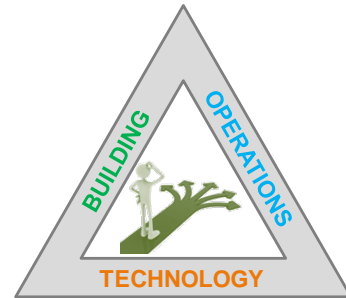
Both issues are a challenge. Discussions with the owner/operator of fire alarm systems to regularly invest money can be difficult at best. In jurisdictions with penalties for false alarms, owners/operators are compelled to take measures to avoid extra cost. This can take the form of municipalities retrieving their costs for unnecessary deployments. It can also happen that the owner/operator of a system is forced to route alarms of their "faulty" system through an Alarm Receiving Centre (ARC) until the deficiencies are corrected.

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6.1 Methodology to effective measures

An analysis of collected data will provide areas of improvement and enable the definition and deployment of measures. Cost savings due to lower false alarms are part of the analysis.

An approach addressing the building and its structural characteristics, the processes on how certain activities are conducted and the professional care and upkeep of the fire safety system are key elements.



Every building and the operation in it poses much different situations. Nonetheless, the following examples outline the kind of measures that can be most effective:

- **Building:** Install and maintain equipment to avoid smoke transfer (e.g. kitchen fumes). Mount protective covers for alarm buttons.
- **Operations:** Implement processes with tasks, metrics and control means. Train staff and external service personal of Dos and Don'ts.
- **Technical:** Set up contract with a competent supplier to inspect, service, adjust and upgrade system on a regular, periodic basis.

6.2 Regular Maintenance & Servicing

Servicing as defined in the DIN 51030 (inspection, corrective maintenance, preventive maintenance and improvement) is a proven structured approach towards maintaining a balance between the demands on the system and what it is able to deliver. The approach will additionally indicate areas for correction or improvement also in both structural (e.g. ventilation of deceptive phenomena) and organisational areas (e.g. shutting off parts of system during specific types of smoke producing works). This holistic approach requires that service personal are correctly and regularly trained to conduct this work.

6.3 Modernization and Upgrading

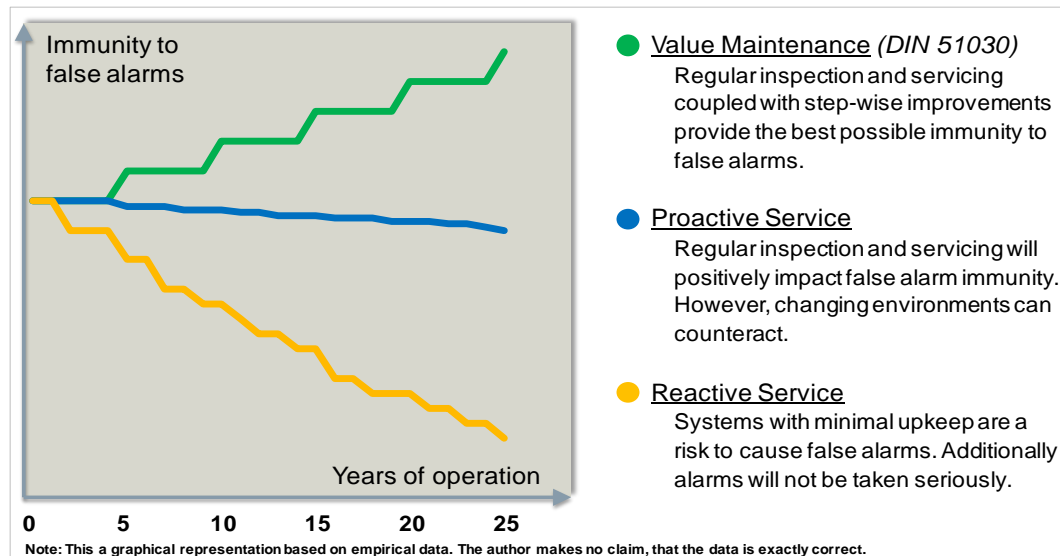
The reduction of false alarm rates through modernization is made possible through the ability of modern fire detection technology to be more selective. This is due to the use of more powerful components (microprocessor) and complex analysis methodologies (multi-criteria, algorithms). Since approximately 20 years, fire alarm systems that are both highly resistance to deceptive phenomena and intelligent in differentiating between threatening and non-threatening (e.g. burning cigar) events have been available.

With this technology being readily available, requirements on detectors to avoid false alarms must find their way into the broader standardization. Modern detectors can significantly reduce the impact of deceptive phenomena in being a cause for false alarms by a factor of 20 over simpler threshold detectors.

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6.4 Value Maintenance

The concept of “Value Maintenance” is based on regular maintenance and servicing (6.2) coupled with modernization and upgrading (6.3). This approach provides the best possible immunity to false alarms. It can also be the most cost effective, all things taken into consideration.



7 Country Specifics

The following is a short summary on what seemed to be specific for that country. In comparing these summaries, the reader can derive a number of questions. Within the context of this study, only some of the aspects were looked into with greater detail.

7.1 England

- Considerable success with reducing false alarms in dormitories in the City of London has been achieved. The focus has been on building awareness. Due to the fact that the use of toasters is very popular, and that not all smoke detectors can deal with the airborne particles emitting from the toast, false alarms are often unavoidable.
- The FIA (Fire Industry Association) has developed and dedicated a specific area in their internet site to the reduction of false alarms. The tips, tools, documents are simple to understand and implement.

See more under <http://www.fia.uk.com/en/cut-false-alarm-costs/>

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7.2 Switzerland

85% False Alarms to 15% Real Alarms is the lowest known rate of the four countries and the lowest documented rate the author has seen. There were two strong indicators for this.

1. Switzerland is exemplary by its fate, that the market is saturated hence making the majority of the business in the area of modernization. Between 2000 and 2010, only 200 new commercial buildings were built. Many buildings are either renovated or replaced.

The number of real alarms has grown relative to building stock. In the same period the number of false alarms decreased by 40%. Swiss fire services have commented on this reduction.

2. Switzerland employs a method to avoid unnecessary alarm transmissions to the fire services called the Cerberus Alarm Concept (CAC). It was designed and introduced over 40 years ago to reduce false alarms and to avoid response requests due to minor incidents. The CAC is described in the Annex of this report.

7.3 Sweden

- A false alarm reduction program in the City of Goeteburg was conducted with 15 companies from Jul 2001 until Dec 2010. During this time the false alarms were recorded and measures to reduce such deployed. The decrease was 69%.
- A 2007 study by Elin Kågebro from Karlstads Universitet established a 94% false alarm rate as being still acceptable in relation to the costs incurred by not responding immediately and arriving at a real fire event too late. A delay by as little as 22" in a real alarm would already lead to extensive damage surmounting the extra cost incurred by responding to false alarms.

7.4 Germany

A 2013 study conducted by Dennis Schmitz and Dr. Sebastian Festag looked at false alarms in fire alarm systems in a defined geographical area. The analysis of the data was not conclusive with regards to establishing the false alarm rate. However, the following was clearly identified:

- False alarms due to deceptive phenomena play a significant role.
- Within a defined area, only a few buildings (fire alarm systems) were responsible for the significant number of false alarms.
- Fire services responses due to false alarms are inadequately documented.

7.5 Denmark

The Ministry of Defence has taken a look at reducing costs for responding to false alarms, where auxiliary fire services are involved. Danish law requires a troop of 7 people to respond. The Danish Ministry of Defence is investigating solutions to reduce cost without increasing risk. One of the possible scenarios is sending a troop of 4 people instead of 7.

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8 Best Practice Examples

8.1 False Alarm Campaigns

1. Fire Industry Association , UK
 - <http://www.fia.uk.com/en/cut-false-alarm-costs/>
2. City of Göteborg, SE
 - project with 15 owner/operators
 - “False Alarm Reduction Fund”
 - 50% reduction of false alarms in first year
 - another 50% in the following years

8.2 Data Tracking

1. Swiss Association of Security Installers (SES), CH
 - <http://www.sicher-ses.ch/de/home.html>
 - data collection since 1997
2. Nordic Statistics (DK, NO, SE, FI and IS)
 - <http://ida.msb.se/nordstat#page=a0002>

9 Proposals for Industry Associations

1. Collaborate with fire services and authorities on
 - joint programs
 - data collection and evaluation schemes
2. Collect data on the impact of proper system care and modernization in reducing false alarms.
3. Conduct information campaigns describing measures and providing simple guidelines for building owners/operators.
4. Adapt standards and/or regulations to include metrics directed towards reducing false alarms.

10 Note to Contributors

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- Graham Simons (FIA, GB)
- Jürg Schmid (Siemens, CH)
- Dr. Sebastian Festag (Hekatron, DE)

Various organisations also made information available:

- SES Swiss Association of fire safety and security system installers (CH)
- FIA Fire Industry Association (UK)
- vfdb German Fire Protection Association (DE)

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11 Annex

11.1 Cerberus Alarm Concept (CAC)

The Cerberus alarm concept prevents the unnecessary turnout of the fire department for minor incidents. It is based on an alarm organization involving the presence or absence of personnel (Manned or Unmanned).

The response of the operating personnel is monitored by two independent time circuits (V1 and V2) monitored. These are shown in the diagram below. Usual values are 3 minutes to acknowledge an alarm and 5 minutes to investigate. If either of the timers go to '0', then the alarm is transmitted automatically to the intervention forces (e.g. Fire Department).

11.2 Functional description of CAC

During the "Manned" operating mode, if an alarm is activated its source is located and the decision is taken "Emergency" or "Minor incident".

During "Unmanned" operating mode, all signals immediately generate a "Remote alarm".

The activation of a manual call point always immediately generates a "Remote alarm".

