



## WHAT FACTORS AFFECT FIREFIGHTER USE OF STANDARD OPERATING PROCEDURES

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### **BACKGROUND**

Standard Operating Procedures (SOPs) are designed to ensure safe systems of work within the Fire and Rescue Service (HM Government, 2008), and often form the foundations of the information required to address specific risks at incidents (Duncan et al., 2014; Chief Fire & Rescue Adviser, 2012). Firefighters will draw on available information, professional judgement, experience and relevant SOPs to decide the appropriate approach to take (Burke & Hendry, 1997; HM Government, 2008). SOPs are therefore a crucial element for resolving incidents safely and effectively, influencing decisions and actions taken.

Despite the important role of SOPs, limited research has specifically focused on identifying the most effective ways of supporting firefighters to make use of them in practice. However, there is a large body of research that focuses on skill acquisition across a variety of domains, including medicine (Ericsson, 2015), chess (Charness et al., 2005), sports (Helsen et al., 1998), and crisis decision-making (McKinney & Davis, 2004). These findings show that more complex skills require greater cognitive effort to learn and regular practice to maintain (Paas & van Gog, 2009). Applying these findings to the context of emergency response indicates that the more complex a SOP is to understand and implement, the more regularly it needs to be practiced.

Over the past two decades, the number of incidents firefighters attend has fallen by 41% (Brown et al., 2019), reducing operational exposure and experience with implementing a variety of SOPs in practice. Training has become all the more crucial for providing this regular and varied exposure. However, significant cuts to funding also mean a degree of prioritisation is needed when deciding how to allocate training resources. Whilst findings from the large body of skill acquisition literature suggest that such training decisions should be partly informed by the complexity of SOPs, there is a limited evidence base to draw on in order to identify which SOPs are most complex and what would improve their use.

Accordingly, at the request of Merseyside Fire and Rescue Service (MFRS), the University of Liverpool conducted a research project between April and September 2020 to examine which SOPs firefighters find most complex to understand and implement, why, and what would improve their ability to apply SOPs in practice.

### **METHOD**

Data was collected using a combination of questionnaires and interviews in order to draw on firefighter perspectives and experiences with SOPs. Electronic questionnaires were developed to measure how difficult firefighters perceived each SOP to be to understand and implement. Unfortunately, the questionnaire was distributed during the first wave of the

COVID-19 pandemic, which hindered participation and resulted in a sample size of 14 firefighters. A brief summary of these findings is still reported below to provide preliminary indications. Semi-structured interviews were conducted with 14 firefighters from a variety of different roles within the service (firefighter through to Station Manager and training roles), in order to provide more in-depth understanding of what factors affect how complex SOPs are to understand and implement and how this could be improved. Interviews were recorded, transcribed, and analysed to identify common themes.

## KEY FINDINGS

- Questionnaire findings show that SOPs relating to Hazardous Materials and Marauding Terrorist Attack were the most difficult to understand and implement. Common reasons given included lack of training, nature of the subject, unfamiliarity with incident type, layout of SOPs, and incident pressures.
- More broadly, interviews highlighted four themes that affect firefighters ability to understand and use SOPs in practice: i) Content, Structure and Length; ii) Motivation; iii) Training; and iv) Use of Technology.

## EVIDENCE REVIEW

### Questionnaires:

Firefighters were asked to identify which five SOPs they found most difficult to understand and implement. Table 1 shows the five SOPs that were most frequently identified as being the most difficult to understand and implement (responses obtained from 14 firefighters). Table 2 shows the most common reasons given by firefighters for why they found these SOPs to be the most difficult to understand and implement. Most notably, these reasons centred on the technical nature of the SOP, lack of familiarity with the subject or lack of focus directed to the SOP during training, the way the information is laid out in the SOP, and the situational pressures imposed by particular incidents.

Table 1.  
The five most difficult SOPs to understand and implement

Most Difficult to Understand		Most Difficult to Implement	
SOP	Frequency	SOP	Frequency
4.1.0 Hazardous Materials	8	4.1.0 Hazardous Materials	7
4.1.1 Hazardous Materials: Physical	6	5.1.0 Response to an MTA	7
5.1.0 Response to an MTA	6	1.5.0 Petrochemical Installations	5
4.1.2 Hazardous Materials: Health	5	4.1.1 Hazardous Materials: Physical	5
1.5.0 Petrochemical Installations	3	4.1.2 Hazardous Materials: Health	5

Table 2.  
Reasons given for why these were the five most difficult SOPs to understand and implement

Reason	Examples of Supporting Quotes for Difficulty to Understand	Examples of Supporting Quotes for Difficulty to Implement
Lack of Training and Practical Input	<i>"We don't cover them as much or pay enough attention to them when"</i>	<i>"Not enough practical application and limited training/input"</i>

	<i>training.”</i>	
Nature of the Subject	<i>“The subjects such as rail and air again are quite specialised”</i>	<i>“Hazmat SOP's due to technical nature of some of the information. Again I think that the subjects here are very specialised”</i>
Infrequency and Unfamiliarity with Incident Type	<i>“The last three are also difficult to understand due to the fact these incidents don't happen everyday and they can go wrong and quick!”</i>	<i>“Lack of familiarity with the subject makes it difficult to implement”</i>
Layout and Presentation	<i>“There is a lot of information to process. Lots of very small bits of information which are all as important as one another”</i>	<i>“Order of hazards and initial considerations; these sometimes don't seem to be in any order, either time ordered or severity order would help particularly if referring to the aide memoires”</i>
Pressure of Specific Incidents	<i>“CON space information on SOP does not reflect the Con Space regulations and its hazard mitigation criteria.”</i>	<i>“Size of the sites, amount of hazardous material and responsible people (you need them to know exactly what to do at that time). Area of operation, access and egress, staff welfare and massive JESIP presences Hazards present, area, public and staff safety and actually dealing with the incident”</i>

### **Interviews:**

Interviews were conducted to gain in-depth understanding of what factors affect how difficult firefighters find SOPs to understand and implement, and how this could be improved. Direct quotes are provided in blue to support each of the four themes identified.

#### **1. Content, Structure and Length**

Firefighters commented on the impact that the content, structure and length of SOPs had on their ability to understand and utilise them in practice. For example, SOPs were noted as being more difficult to make sense of when the language used was complex and technical.

*“So, it's quite straightforward but what throws, you know for me, when we revise the SOP we introduce these versions of them. We put terms in like a ‘reconnaissance team’. So, you know again, ‘what's a reconnaissance team? What's one of them?’ And people would get hung up on these terms of going well, its overly complex language. You know, it doesn't help. So, I think these SOPs that, certainly terms, people will struggle with”*

*“Yeah whereas the SOP expounds on that but there's a lot of phrases that are sort of generic waffle...they're not specific and you don't gain nothing from them where whereas the one line one liners in the aide-memoire are quite straight to the point useful”*

Firefighters generally agreed that the structure of SOPs is logical in terms of being broken down into different sections. However, in order to accommodate different learning styles, they suggested including more visual elements, such as checklists and aide-memoires. Firefighters also felt that inclusion of these visual elements would be beneficial for making SOPs easier to refer to when working in dynamic, time pressured environments where they do not have time to process large bodies of text but need prompts for what to consider.

*“The SOPs need to be in different formats for different types of learning style or different people types of ways of some, you know, people see it, but ultimately get to the same point.”*

*“I think it helps remove some of the human elements, you know heart rate being elevated and adrenaline kicking in etc. But also, from a command control perspective, if you’ve got a tablet in front of you can flick through a couple of aid memoirs, you can almost identify actions, to be actions and not required, and it can alter the list, but also if you’re doing a handover to an oncoming officer, whether they’re taking over for you or you’re giving them a section to manage etc, you can use that to a briefing tool because, again, you’re not trying to keep everything up here [in your head], and can’t remember several different hazards, what you’ve got crew doing and who you’ve spoken too etc etc.”*

Many firefighters felt that SOPs were unnecessarily long, with some taking up 30 pages. Comments indicated that whilst much of this information is relevant, designed to cover the theory and all potential outcomes, there is also *“generic and repetitive information”*. This makes them impractical for use at a live incident because it is difficult to quickly identify the most pertinent aspects to attend to. Firefighters suggested simplifying and condensing the content to present the most pertinent information up front, with supplementary links to that could be followed for more in-depth information where needed. This would help to make the content easier to navigate under dynamic, time-constrained situations. Firefighters also commented that they would be more likely to spend time viewing SOPs to refresh their memory and remain up to date with them if these changes were made.

*“Yeah, way too much information. When you’re looking at something, you want to know what the basics of that SOP is trying to give you, that information. If you need to know anymore then it probably should stand outside of the SOP.”*

*“I think on station, mostly, as long as it wasn’t every day, it’s not for hours on end, and it was a more condensed version for them, I think firefighters would sit down and especially if there as something built into the training day that said something like spend half an hour reviewing a SOP and then the OIC can give a mini lecture or group chat for half an hour a day, but a month and a half you’d have probably covered all the SOP’s and you can go back and restart the process.”*

## **2. Motivation**

Firefighters in senior roles were more likely to view SOPs on a regular basis. They were motivated to do so because of their position of authority and responsibility for making decisions quickly that would affect the outcome of an incident and the safety of their colleagues. Firefighters that were not in managerial positions did not perceive SOPs as being written for them, noting that the majority of content referred to the decisions that officers would make. Instead, they spent time learning theory via e-learning platforms, which they felt was more relevant for their role. These firefighters also noted being more likely to regularly view specific SOPs if they had a personal interest in a topic or if they wanted to avoid the anxiety of being asked a question by senior staff and not knowing the

answer. They suggested creating a shorter, condensed version to encourage individuals to more regularly review SOPs, focusing directly on the knowledge of a specific incident type.

*"It would be my role, it's personal motivation. I suppose it's at the end of the day, simply not wanting to be in a situation and not knowing what to do, or what the guidance is. If you're going to choose to go outside of the guidance, you still need to be aware of what the guidance is. Understanding that is the key for making any decision."*

*"A lot of the information in the SOP's are only relevant for commanders and it's only the decisions that commanders can make, firefighters can put in line some of the procedures because they're not trained to do it and it's not their role. The OIC is guided by the SOP, but the firefighter is guided by the OIC."*

*"If you're interested in it, you're more likely to take more time and consideration reading it properly. But, if you get a subject where you know realistically you're not going to get that job, or it's a one off job, like marine, think I've had one ship fire in the 24 years, but all the complexities of the terminology and everything that goes on with that, in the back of your head you're thinking "do I really need to know all of this" but you have to do it unfortunately."*

### **3. Training**

Across all firefighters interviewed, including those in training positions, the electronic LearnPro system received criticism. Comments highlighted that 'cheat' sheets are often passed amongst a station, which disrupts the level of learning and makes this system seem more of a 'tick box' exercise to meet targets. Firefighters felt pressured to meet training targets, regardless of how many incidents they were also attending. Having limited time available to meet these demands further encouraged the use of cheat sheets in order to tick a box and get the task done.

*"The e-learning packages are evolving, and they are getting better, but the problem with e-learning for me is that they became a bit of a target, so it was like you need to do 5 this month and people will just do the 5 of them and not pay attention to digesting them or what score they've got, it's just like there's the scores to make sure you pass it so just click through the slides. There needs to be something about the quality of the information in there and that being the important bit, rather than how many you get done. But I understand that we also need to make sure that we cover all of the themes that we need to cover from a health and safety perspective. So, I think that will come with the improvements with them."*

*"If they were told they've got a set time to sit down, but if they've got to go to a fire then never mind, you can miss that day, they'd probably do it. They're already expected to do a lot of things, fix fire alarms, do home safety visits, and it only takes one fire to blow that all out of the window, and if the OIC is coming out questioning why they've not set up so many fire alarms today they'll say that they've been at a fire and be told to make sure it gets done. Firefighters need to be given the time to say that if they haven't done something for a good reason, like going to an incident, that that's fine."*

There was consensus across firefighters interviewed that more practical training was needed, particularly for complex incidents with complex SOPs, such as those involving

hazardous materials. Firefighters understood that due to limited resources, this may not always be possible, but suggested more regular structured group discussions as a beneficial alternative. In particular, they felt that informal meetings within their own watch groups provided a mechanism for discussing procedures and practices, and sharing knowledge and experienced to promote learning within Merseyside. They also noted that spacing the questions throughout the Learn-Pro modules to focus on quality rather than quantity of information would encourage better engagement.

*“If I’m blatantly honest, you get more out of it by doing it as a crew because of that discussion. Doing it on your own is more of a tick-box, it’s like an audit, it’s just it seems that you’re forever getting tested in this job and it’s just another way of them testing you. Whereas if you have a discussion it’ll lead to other things and after 20-minutes you’ve had a full talk about something you’d never have had on your own, so yeah, I’ve witnessed both ways, but I think you’d get more out of group learning.”*

#### **4. Use of Technology**

Some firefighters reported no difficulty with accessing SOPs via the intranet system, whilst others found the search processes confusing and experienced issues with Internet connectivity while accessing a SOP via the MDT. Recommendations were made to draw on the technology to improve the layout of SOPs, condensing the content and embedding links in electronic versions to access more detailed information where needed. Firefighters highlighted the need to use similar Mobile Data Terminals as other emergency services use in order to access more condensed versions of SOPs on the incident ground as a support reference guide. Firefighters also commented that the content of e-learning packages could be improved by embedding interactive videos to replace some of the detailed text, as the latter was more difficult to attend to.

*“But at the moment, there’s a computer at the front of the appliance that it sits on, but you can’t take it off, and if you print it you essentially get wallpaper of information, and you know, you think you turn up and there’s a fire somewhere and there’s people, it’s chaos, you just can’t digest all that. We’ve been working on having them on a tablet that you can take off and carry around and it’s got that information on. For me it’s the place we should be in is in that when you turn out, control mobilises you, it will identify the SOPs relevant and the aid memoirs that link to that SOP will flag up on the tablet.”*

*“I think people react better to short videos rather than reading pages and pages of text, some of the past learn-pros have been around 40-pages of text. After you’ve read 10 pages you just think you don’t really need to know this, some of its too in depth. Some of it is hard going because it’s not relevant to what you need to know, it’s nice to know rather than need to know.”*

#### **RECOMMENDATIONS**

Drawing on the feedback provided by firefighters participating in both interviews and questionnaires, the following recommendations are provided to improve the understanding and use of SOPs.

- **Ensure that SOPs are written as clearly and succinctly as possible.** Simplifying the language and terminology used, clarifying complex content and removing repetitive or redundant content would make SOPs less cognitively demanding to understand.

- **Structure SOPs to include a condensed summary of information up front**, with links to more detailed information that can be followed if needed. One way of doing this would be to include visual aide memoires and checklists, which would not only support firefighters with quickly accessing pertinent information on the incident ground, but would be beneficial for firefighters with different learning styles.
- **Replace fixed mobile data terminals with portable tablets** or adapt content so that SOPs can be easily viewed on smart-phones on an incident ground.
- **Increase face-to-face and practical training**, where possible. Firefighters emphasised the value of having opportunities to practice applying SOPs for improving their learning and understanding. In particular, this is important for complex SOPs relating to complex incidents such as hazardous materials and MTA incidents.
- **Increase opportunities for group discussion**. Whether this be in training environments or in watch groups, firefighters note the value of having opportunities to informally discuss SOPs, to ask questions, express concerns and learn from one another's experiences.
- **Implement interactive elements to the e-learning system**. Increasing the interactive elements of the e-learning system to break up the text will improve staff engagement and make it easier to process information.
- **Emphasise the relevance of SOPs across roles**. Firefighters will be more motivated to view and familiarise themselves with SOPs if they understand the relevance for their role and have regular opportunities to practice applying SOPs in relation to their role.

## CONCLUSIONS

Overall, firefighters find SOPs relating to Hazardous Materials and MTA Response to be the most difficult to understand and implement because of the complexity of these incidents and lack of familiarity with responding to them. Providing greater focus on these SOPs in training would improve understanding of the theory and how and when it should be implemented in practice. Findings also highlight that firefighter ability to understand and implement SOPs would be improved by simplifying the content and structure of SOPs, emphasising the relevance across all roles, ensuring that e-learning packages are more interactive, increasing opportunities to practice implementing SOPs in training and regularly spending time informally discussing SOPs and sharing best practice in watch groups.

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