



STANDARD OPERATING PROCEDURES BEST PRACTICES

Whether called Standard Operating Procedures (SOP), Standard Operating Guidelines (SOG), or Directives, standardized operational procedures help firefighters and emergency medical responders recall information and make decisions. A procedure is a communication tool that describes the most efficient and safest way to complete a task.

However, creating and implementing a procedure can be problematic, especially if the writer neglects their team's needs, preferences, and physical and cognitive abilities. Procedures that have been validated by an interactive design process will better reflect the realities of the task. The NFPA Fire Protection Research Foundation's review of emergency agencies' SOPs/SOGs confirmed that SOPs improve overall operational efficiency and effectiveness.

Generally, if a task is safety-critical, a procedure is recommended. A safety-critical task is a task in which poor human factors could cause or contribute to a significant accident. Well-developed procedures support human performance in several ways:

- They reduce memory workload, which increases the capacity to deal with unanticipated events.
- They ensure critical steps are performed.
- They standardize good practices.
- They are the basis for consistent training and education.
- They help minimize the likelihood of knowledge-based errors.

The Science Behind Effective Procedures

Sweller, van Merriënboer, and Paas (1998) established [Cognitive Load Theory \(CLT\)](#), which has profound implications for how procedures should be written and organized. CLT holds that human working memory is severely limited, capable of holding only approximately five to nine items of information at a time, and even fewer (two to three) when information must be actively processed, compared, or manipulated simultaneously.

For firefighters and EMS providers operating in high-stress, time-compressed environments, this limitation is critical. Poorly designed procedures that present too much information, use complex language, or require responders to integrate information from multiple sources impose what researchers call "extraneous cognitive load," unnecessary mental effort that does not contribute to task performance.

Landmark research by Gary Klein and colleagues (1985, published 2010) on fireground commanders produced the [Recognition-Primed Decision \(RPD\) model](#). Klein found that in over 80% of decision points, commanders did not compare multiple options. Instead, they used experience to rapidly recognize a situation as typical of a known prototype and immediately identified a course of action.

This has important implications for SOP design:

SOPs should encode expert pattern recognition. Procedures should capture the "if X, then Y" logic that experienced responders use intuitively, making that expertise accessible to less experienced personnel.

SOPs should support, not replace, situational awareness. Because experienced responders rely on situational cues to trigger recognition, procedures should be written to help responders identify the right situation type before prescribing action.

Training with SOPs builds the experience base. Klein's research showed that novice responders who lack the experience base of veterans were forced into slower, analytical decision-making. Repeated training with SOPs accelerates the development of pattern recognition.

A Seven-Step Approach To Developing Effective Procedures

STEP 1: Identify Needs - *What tasks are critical to the successful performance of the agency?*

The FEMA/U.S. Fire Administration's Guide to Developing Effective Standard Operating Procedures for Fire and EMS Departments (FA-197, 1999) recommends that fire and EMS departments periodically conduct a formal needs assessment. This assessment should:

- Review existing SOPs for deficiencies and inconsistencies
- Evaluate the current operating environment, standard of practice, and local needs
- Identify changes to laws, regulations, or standards, and recent legal precedents

STEP 2: Decide the Level of Procedural Support - *How thoroughly does the procedure need to be?*

Research and practitioner guidance distinguish between Standard Operating Procedures (SOPs) — which are directive and prescriptive — and Standard Operating Guidelines (SOGs) — which allow for professional judgment and situational adaptation.

A practical framework:

- High-frequency, well-understood tasks → SOG format with professional discretion built in
- Safety-critical, low-frequency, or high-consequence tasks → SOP format with explicit, mandatory steps

STEP 3: Understand the Hazards and Risks – *Try to foresee what and how things could go wrong.*

The NFPA Fire Protection Research Foundation's review of North American fire department SOPs found that a key feature lacking in most collected SOPs was scientific references. NFPA 1700, Guide for Structural Firefighting, was developed specifically to ground firefighting SOPs in science-based fire dynamics research, recognizing that even as reliance on SOPs has increased over the years, fireground injury rates have held steady. This suggests that the content of procedures matters, not just their existence.

STEP 4: Create a Human-Centered Procedure - *The procedure needs to be relevant, concise, and workable.*

Consider the following factors:

- Decide on the format and structure — Often, the agency has a standard template for SOP, SOG, and Directives. Decide how to best design and structure the information and resources within the template.
- Give it a logical and intuitive name.
- Keep it simple. More is less. Focus on must-have information.
- Keep the number of steps to the bare minimum — Give only one action per step. Do not expand unnecessarily on individual steps.
- Consider flow charts, checklists, and other learning aids. Use eye-catching symbols and colors for critical information or steps.
- Information should be grouped into meaningful clusters of no more than five to seven items. Long lists of steps should be broken into phases or sub-procedures.

STEP 5: Test It Out Before It's Rollout - *Request feedback from stakeholders.*

Recommended Testing Methods:

- Tabletop exercises and functional drills
- [Delphi review](#) — Circulate draft procedures to subject matter experts for structured feedback
- Cognitive walkthrough — Have a representative end-user (e.g., a firefighter or EMT) attempt to follow the procedure step-by-step while thinking aloud, revealing points of confusion

STEP 6: Launch It and Train Personnel - *Emailing a copy of the procedure is not enough.*

Consider:

- How will the agency make the procedure and associated learning aids available when and where the procedure is needed? Will laminated copies be beneficial?
- How will the training need to be updated to incorporate the new procedure? In what time frame?
- How will the agency maintain effective version control? It is not unusual for individuals to print or digitally save copies on personal devices. These can become uncontrolled and outdated.

Research has direct implications for how SOP training should be designed. Because experienced responders rely on pattern recognition rather than analytical deliberation, training should:

- Use realistic scenarios that expose responders to the situational cues that trigger correct SOP application
- Emphasize cue recognition — teaching responders what to look for, not just what to do
- Include anomalous cases — scenarios where the "typical" pattern is violated, requiring responders to diagnose the situation before acting.
- Provide cognitive feedback in after-action reviews — allowing responders to examine their own decision-making process.

STEP 7: Continuously Monitor and Update the Policy - *Nothing stays the same. Policies are living documents.*

Review the procedure regularly. Review the procedure if any of the following occur:

- Complaints are raised by firefighters, EMTs, agency leaders, or the citizens served by the agency
- Changes to the hardware, software, or environment involved in the procedure
- The policy is mentioned in an after-action debriefing or incident/accident investigation

After Action Reviews (AARs) are a powerful tool for organizational learning when used systematically, but researchers identified significant weaknesses in how AARs are typically developed and used. AARs are often conducted without sufficient rigor or analytical frameworks. Lessons identified in AARs frequently are not incorporated into updated SOPs

A review published in BMC Public Health (Nuzzo et al., 2019) identified best practices for AARs that result in meaningful organizational learning:

- Focus on incidents selected for their learning value.
- Involve an appropriately broad range of perspectives (all ranks, all functions).
- Allow sufficient time for reflection — a "hot wash" immediately after an incident should be followed by deeper analysis in the weeks that follow.
- Employ systems frameworks and root cause analysis rather than focusing on individual blame.
- Strike a balance between incident-specific lessons and generalizable capabilities.

Logical Framework

The FEMA FA-197 guide recommends organizing SOPs into a logical framework using headings and sub-headings that clarify functional relationships and the roles played by different groups. Most experts recommend dividing the SOP manual into separate sections for:

Administration — Hiring, equipment maintenance, building inspections, rehabilitation, personnel policies

Operations — Fire suppression, medical services, hazardous materials response, technical rescue, etc.

Operational SOPs can be further subdivided into units that separately address each major component of the organization's mission.

A well-written procedure is not the end of undesirable actions and decisions but rather the starting point. Consistent training, coaching, and enforcement by leaders will be needed to attain consistently desirable outcomes. Procedures must be designed with human working memory limitations in mind. Simplicity, chunking, visual aids, and one-action-per-step formatting are evidence-based design requirements. Operational SOPs should encode the pattern recognition and situational awareness of experienced responders, making that expertise accessible to all personnel.