Analysis of the Risk Management Decisionmaking Processes and the Decision Support Systems in the Wildland Fire Agencies

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Abstract—*This paper offers an analysis of the strengths, weaknesses, opportunities, and threats in the risk management process, decision support systems (DSSs), and other types of decisionmaking, including recognition primed decisionmaking, bricolage with the goal of improving DSSs and decisionmaking. DSSs may be thought of as any technology or knowledge that is used as an aid in decisionmaking. Many types of risk management processes and DSSs exist in wildland fire, wildland fire, and prescribed fire at the tactical, operational, and strategic levels. In the wildland fire community, DSSs exist as check-lists, handbooks, implementation guides, computer programs, and more. Many wildland fire suppression agencies and other high reliability organizations have embraced what may be called a rationalistic based decisionmaking process in the form of risk management, programmed decisions, and more. Critics charge that while an attempt is made to rationalize decisions, many "judgments" within the rationalistic systems reduce their logic, making their rationality questionable. While rationalistic based decisionmaking processes exist at all levels of the fire suppression agencies, naturalistic decisionmaking is found primarily at the tactical level in the form of recognition primed decisionmaking, or bricolage. Many argue that the risk management decisionmaking school of thought is contraindicated by the naturalistic decisionmaking school of thought. Finally the role of DSSs in the naturalistic and rationalistic based decisionmaking is explored.*

Introduction

This paper is based on the premise that the decision support systems (DSSs) used in wildland fire suppression should be integrated so that they function optimally together in a seamless manner. Ultimately this type of integration would begin to integrate the DSSs and their uses at the tactical, middle, and strategic levels of action. DSSs may be thought of as any technology or knowledge, whether in a material or immaterial form, that is used as an aid in decisionmaking. Many types of DSSs exist in wildland fire, wildland fire use, and prescribed fire at the tactical, middle, and strategic levels. In the wildland fire community, DSSs exist as check-lists, handbooks, implementation guides, computer programs, and more.

The decision support systems examined here include the 59 fire guidelines (which include the 10 Standard Firefighting Orders, the 18 Watch Out Situations, the seven Downhill Line Construction Checklist, the four Common Denominators of Fire Behavior on Tragedy Fires, the seven Look Up, Down & Around Factors, the four LCES Components, and the nine Wildland Urban Watch Outs) and the Region 4 Incident Organizer (Version 2004). It is believed that these DSSs (the 59 fire guidelines and the incident organizer) should be integrated with the basic components of an incident

In: Butler, Bret W.; Cook, Wayne, comps. 2007. The fire environment—innovations, management, and policy; conference proceedings. 26-30 March 2007; Destin, FL. Proceedings RMRS-P-46CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 662 p. CD-ROM.

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action plan (IAP), the Wildland Fire Use Implementation Procedures Reference Guide, and the proposed new fire doctrine. These documents provide the entire spectrum of rules and strategies that guide the fire and fire use communities. Despite the fact that such a large-scale project is beyond the scope of this paper, it is nevertheless important to address the issue of a "full spectrum" of integration of DSSs because they operate at all levels of action from the tactical level, to middle level, to the strategic level. They operate on all sizes of fire and fire use. The levels operate independently of each other, in other ways they are closely tied together, and an action or aim at one level may impact one or more of the other levels. So while this project is just beginning the discussion of the integration of rules, actions, and aims, the integration proposed here is only part of the picture, and it must be taken in a context of all levels of action and all levels of DSSs.

The need for the integration of the DSSs and planning and action at the tactical, middle, and strategic levels can be seen in two manners. First, the examination below will demonstrate that the 59 fire guidelines and the typical incident organizer (IO) (as well as the typical IAP, WFU Guide, and other DSSs not covered here) do not have any overlap written into them, and yet conceptually they have much in common. Second, Vergari demonstrated in "Back to Basics for Fire Program Managers" (2005) that there is little consistency in the manner in which firefighters plan and act, and also that there is a wide variance of understanding and usage of tactics, objectives, and strategies. The present study attempts to integrate two DSSs, the 59 fire guidelines, and the typical IO, in order to gain efficiency and effectiveness by allowing the overlap between the DSSs to create a more seamless operating tempo, by gaining consistency in operation, and by integrating tactical, middle, and strategic level planning through a common body of DSSs.

Because the DSSs have never been integrated, this analysis will address only some of the possibilities in integrating the documents. First the integration of the 59 fire guidelines and the incident organizer will be presented.

Information Overload

The very necessity of using checklists, shortcuts, handbooks, DSSs, and so forth demonstrates that there are innumerable factors impacting any given situation on the fireline. And because the environment is turbulent—that is, changing rapidly in real time—the factors impacting fireline situations also change rapidly. Furthermore, while there are innumerable factors impacting a typical situation on a fireline, in a crisis situation, with the additional factors that arise, the number of factors interacting becomes infinite in a practical sense.

In other words, the fireground and the firefighter training—factors creating an extremely large body of situational knowledge and background knowledge—are both capable of creating information overload on the fireline. Some people use the existence of information overload to argue that a development of integrated, comprehensive DSSs or standard operating guidelines (SOGs) is impossible. Their solutions lie in either eschewing rational decisionmaking (for recognition primed decisionmaking, RPDM, or bricolage) or in standing by the status quo. I contend that it is quite possible to overcome information overload, and that integrated and systematized DSSs can operate well using the decisionmaking styles of risk management, RPDM, or bricolage.

However, there are principles of information organization that need to be looked at.

Standard Operating Guidelines

Recently, I presented work consolidating the 59 fire guidelines into the 10 essential factors in (wildland) firefighting (TEFF). The TEFF consolidated 59 firefighting guidelines, including the 10 Standard Firefighting Orders, the 18 Watch Out Situations, the seven Downhill Line Construction Checklist, the four Common Denominators of Fire Behavior on Tragedy Fires, the seven Look Up, Down & Around Factors, the four LCES Components, and the nine Wildland Urban Watch Outs, into 10 essential factors in wildland firefighting. (See appendix A for more on the TEFF.) The principles behind the development of the TEFF are important in understanding both the purpose and the functioning of an integrated set of DSSs. As was reported in the TriData studies (1998) after the South Canyon Fire of 1994, firefighters and fire managers do not believe any more checklists or other DSSs are needed. Despite this, rules and guidelines have continued to grow. As a result of the 30 Mile Fire, Incident Organizers and other documents and procedures have been changed and expanded. It is not clear what changes will occur as a result of the Cramer Fire, and all the implications of the 30 Mile Fire have not yet played out. And it is likely that tactical level rules and guidelines will continue to growth despite the pleas to the contrary. The analysis presented here holds that the solution to this problem is not to force a moratorium on guidelines, but rather it is to systematize and organize them in order to eliminate fluff, redundancy, and confusion and replace them with a tighter, more efficient system. Ultimately that system would develop from what it is now, a series of "orders," "watch outs," "checklists," "common denominators," and so on, and replace them with standard operating guidelines (SOGs) that direct flexible action with greater clarity than currently exists. An example of the weakness of the current system can be seen in the debate within the wildland fire community that occurred in the years following South Canyon over whether the fire orders were in fact invioble orders or whether they were simply guidelines. (No clear policy directive on this debate was ever reached even though consideration of it occurred in the upper echelons of the firefighting community.) A clear set of SOGs would end such a debate because they would clearly state where a standard operating procedure functioned and where it did not. And as discussed at the end of this document, there are methods for addressing situations where SOGs usefulness ends.

While the principle of establishing SOGs is not the focus of this paper, the integration of the 59 fire guidelines, the IO, and other DSSs is a step in that direction. And both SOGs and the integrated DSSs aim to systematize and standardize planning and action, as well as offer an aid to dealing with information overload.

Nesting

The TEFF consolidated the 59 fire guidelines into just 10 factors or guidelines that the firefighter on the ground needs to follow. The TEFF was designed so that if firefighters notice or sense that there is a problem meeting the requirements of an individual TEFF, then they need to refer to the numerous rules that resulted in the formulation of that individual TEFF. For example, if a firefighter notices that communications are problematic, under a fully developed TEFF system, the firefighter might refer to any or all of the appropriate former guidelines such as Fire Order 7: Remain in communication w/ crew members, your supervisor, & adjoining forces; or Fire Order 8: Ensure instructions are given & understood; or Watch Out 5: Uninformed on strategy, tactics, & hazards; or Watch Out 6: Instruction & assignments not clear;

or Watch Out 7: No communication link w/ crew members or supervisor; or Downhill Line Construction Rule 3a: Crew supervisor is in direct contact w/ lookout who can see the fire; or any of a total of nine fire guidelines dealing with communications that are scattered throughout the 59 fire guidelines. In addition, as my analysis of the 59 fire guidelines demonstrated, there are also gaps and omissions of common situations, indicating that there may need to be new tactical guidelines added to any comprehensive curriculum on tactics and tactical DSSs.

The principle demonstrated here is that, like the TEFF, the DSSs are always shortcuts with a large body of knowledge, or rules, behind them. Large amounts of knowledge are nested within shortcut guidelines such as the TEFF, the Fire Orders, and many other fireline guidelines. Thus, under the proposed new system of integrated DSSs and SOGs, no information is lost, it is only organized or nested for easy access.

Hierarchicization

The existence of information overload and the necessity of nesting that information implies that information must be arranged in a hierarchy—in other words, that some information is more important than other information. The principle of hierarchy implies that the firefighting community must decide the best short-hand methodology and terminology for its DSSs so that general categories are examined first, and then as they either become problems or enter into the risk management decisionmaking process, the information that backs them up would become apparent.

Status of Information Use

If these principles of standardization, nesting, and hierarchicization were firmly established in wildland fire, then both the curriculum and the DSSs that attempt to summarize the curriculum would be arranged so that firefighters could address problems with the most general rules, and then address finer points by moving into the more detailed levels of the nested hierarchy of information.

Returning to the example of the firefighter who notices that communications are problematic: if that firefighter had a DSS, backed by a parallel training curriculum, she or he would examine that problem in a similar manner to any other firefighter and presumably in a more efficient manner than a firefighter would today. My research confirms Vergari's (2004) contention that there are only minimal *standard* operating procedures in that most firefighters report that they rarely refer to any of the Fire Orders, Watch Outs, or any of the other fire guidelines or DSSs, and that they interpret and utilize them in different manners. Most firefighters have their own personal "core" of the 59 fire guidelines that they use regularly. Any of the DSSs or anything that looks like a SOG is only referred to when there is some minor or major crisis that makes a decision difficult.

Today none of the DSSs are good examples of dealing with information overload, standardization, nesting, or the hierarchicization of knowledge. The existence of 59 fire guidelines that have been compiled over the entire history of modern wildland fire suppression, the fact that many locales have their own model of an incident organizer, their own model of an IAP, or their own model of a Fire Plan, and the fact that locales are left to interpret strategic direction in such a way that results in different policies all demonstrate that there is little coordination in the wildfire suppression community.

Integrating the Fire Guidelines and the Incident Organizer

How might the 59 fire guidelines and the incident organizer be integrated? First, many IOs today are designed to meet 30 Mile Accident Prevention requirements. This is fine, but in the interest of integration, the 30 Mile Accident Prevention requirements should not be the center around which an IO is formulated. Below are some suggestions as to how IOs and the 59 fire guidelines might be improved through integration, standardization, recognizing information overload, nesting, or the hierarchicization of knowledge.

Because the curriculum of fire training is not nested or hierarchicalized, the fact that the 59 fire guidelines and the IOs are not nested or hierarchicalized is not readily apparent. Firefighters have not been trained to think or operate based on any hierarchy of knowledge or SOGs. This point is important for the following analysis because the integrations proposed here would be much more valuable if firefighters were trained in a manner that encouraged the use of SOGs, nested knowledge, and hierarchicalized knowledge. This analysis' proposal for the integration of all DSSs, for the integration of tactical, middle, and strategic level planning and action implies that such an integration of all firefighter training would also prove valuable. In fact, the wildland fire agency's development of a new foundational doctrine is a good beginning.

Currently the organization of the IO is accomplished in 14 sections:

1. size up
2. resource summary
3. objectives
4. organization
5. map sketch
6. radio frequencies
7. risk management
8. decision points
9. risk analysis
10. incident complexity analysis
11. summary of actions
12. spot weather forecast
13. work rest ratio documentation
14. the after action review

Most IOs begin appropriately with a fire size up section. The size up should clearly be divided into two segments: the physical fire size up, and the resource size up. Currently this is done in section 1: the size up; and section 2: the resource summary. Some of the information about resources is done in its own section and is not seen as part of the size up. Some of the fire size up is done in section 10: the incident complexity analysis; and section 12: the spot weather forecast. It is important to integrate the fire and resources size up so that the incident commander (IC) and firefighters start their planning based on what they can do, rather than simply on what needs to be done. This ties both the IO and the incident's plan to the strategic plans of the administrative unit under which this fire suppression effort is operating in that the IC may request more resources, but the fire program manager (FPM) may want to allocate those resources to another incident. The pairing of the fire situation with the available resources establishes the idea that a safe incident is one that accomplishes what it can with the available

resources. It is felt that this would minimize any chance of "over-zealousness" as spurious as that argument was.

The fire size up itself should be divided into clear segments that address the TEFF factors of fire behavior, fire status, fuel type, weather, and terrain. In combination, these five factors represent more than 40 fire guidelines including some of the Fire Orders, Watch Outs, Urban Watch Outs, and others. This focuses the firefighters' thinking in terms of these five critical factors related to the physical fire, and should be accompanied by a similar focus on the fire guidelines that apply to these critical physical fire factors.

A radical change from current practice would have the IC, or the person filling out the size up, indicate both current conditions, *as well as expected conditions.* While admittedly this is not standard practice today, training firefighters to track specific conditions and to tie these conditions to the 59 fire guidelines and the IO would integrate the practice of tracking trends, tying trends to specific actions on the fireline, and to link both of these to the incident's plan in the form of the newly integrated IO. Tracking conditions is inherently part of the risk management process in that one is to engage another iteration of risk management any time conditions change, whether these be physical or firefighting resource conditions on the fireground. The 59 firefighting guidelines also inherently require trend tracking in, for example FO 3: Base all action on current and expected fire behavior; Downhill Line Construction Guideline 7: Bottom of the fire will be monitored; if the potential exists for the fire to spread, action will be taken to secure the fire edge; WO 11: Unburned fuel between you & fire; and more. Tracking conditions on the fireline is another DSS schema to encourage firefighters to link SOGs, conditions, and tactics (or actions). An example of one possible method to track trends can be found in appendix A: "Side 1 of the TEFF card."

As discussed above, section 2: the Resource Summary should be part of the initial size up in order to facilitate the standard procedure of establishing a plan that fits the resources. This should emphasize the principle that the IC and the firefighters need to be aware of the situation and the resources that they have to deal with that situation. The Resource Summary should divide resources into the categories of those actually on scene, those assigned to the incident but not yet on scene, and resources who are unfilled requests. Again the purpose is to emphasize the importance of ingraining into the thinking of firefighters the necessity of matching plans and tactics to resources. My analysis of the 59 fire guidelines, and the development of the TEFF indicate that the fire guidelines, as currently constructed, do not emphasize the necessity of matching tactics to available resources unless one counts "Fight fire aggressively, but provide for safety first." There are six other fire guidelines that refer to firefighting resources (see appendix A), such as FO 9: Retain control at all times. And all of the other resource oriented fire guidelines, as currently constituted, refer to controlling people, and not to matching available resources to tactics. This is one of the critical lapses in our fire fighting guidelines that have resulted from the haphazard development of these guidelines, SOGs, over the decades of modern fire suppression.

Next in the IO is the tactical planning section. The tactical planning section might include the already existing section of Incident Objectives, the Incident Organization, the Map, and Radio Frequencies. Following that, in the existing IO are the sections on Risk Management & Decision Points, Incident Risk Analysis, Incident Complexity Analysis. These sections should be integrated in a different manner in order to solidify the linkages between the fire guidelines, which are the best axioms that we have for SOGs, tactics, and decisionmaking.

Note that while IOs could be reformulated in such a manner as to integrate in SOGs, this analysis focuses only on integrating in the DSSs that we have: the 59 firefighting guidelines and the IO.

In the present IO, the first Incident Objective is written in: SAFETY of firefighters and public. After that, the IC is free to enter in one or more objective of her or his own. Because it was not their original intended purpose, there are no specific objectives written into the current firefighting guidelines; however, some objectives are implied in WO 8: Constructing line without safe anchor point; WO 9: Building fireline downhill with fire below; and several implied objectives in the Downhill Line Checklist. These firefighting guidelines imply a direct or indirect line placement objective. Thus, the current firefighting guidelines are noticeably lacking in supporting the development of objectives. The generalist nature of all the current firefighting guidelines fails to provide clear direction for the setting of objectives that make it clear that, while these guidelines do present the firefighter with the possibility of information overload, they are nonetheless incomplete. While the current 59 firefighting guidelines do not address incident objectives, incident objectives are perhaps the most important single factor impacting firefighter safety. Safe objectives make for safe operations.

Next in the current IO is the Risk Management & Decision Points, Incident Risk Analysis, Incident Complexity Analysis. These sections have many facets that strongly imply, but do not make, connections to the 59 firefighting guidelines and other DSSs, especially the Incident Response Pocket Guide (IRPG 2006). For example, in the Decision Points Section, firefighters are asked to confirm that "Controls in place for identified hazards?" Here is the connection to the 59 firefighting guidelines that could be made more apparent, nested, and hierarchicalized. The Incident Risk Analysis (215a) has a similar connection that needs to be integrated with the 59 firefighting guidelines in that certainly some of the Fire Orders, nearly all of the Watchouts, as well as many others may be applied here under the rubric in the Incident Risk Analysis of "Hazardous Actions or Conditions."

In the Incident Complexity Analysis (Type, 3, 4, 5) many of the 59 firefighting guidelines can be implied, but none are directly referenced. For example, under the sub-section Fire Behavior, one of the components is "Weather forecast indicating no significant relief or worsening conditions." This component of the IO is represented in several of the weather related 59 firefighting guidelines such as FO 1: Recognize current weather conditions & obtain forecasts; WO 14: Weather becoming hotter & drier. WO 15: Wind increases and/or changes direction; CD 3: When there is an unexpected shift in wind direction or in wind speed; UW 8: Strong winds. Certainly the references to weather could be improved in both the IO and the 59 firefighting guidelines. Many other components in the IO Fire Behavior section and sub-sections could be more effectively integrated with the 59 firefighting guidelines creating a seamless set of DSSs.

While many of the components of the IO Incident Complexity Analysis are closely related to the DSS of the 59 firefighting guidelines, there are also components of that are not found in the those guidelines, and probably should be. For example, the sub-section Firefighter Safety has three components: (a) Performance of firefighting resources affected by cumulative fatigue; (b) Overhead overextended mentally and/or physically; (c) Communication ineffective with tactical resources or dispatch. The only firefighting guideline referred to here is, possibly, WO 18: Taking a nap near the fireline. This demonstrates again that the current 59 firefighting guidelines are incomplete. And perhaps in an integrated set of DSSs, these factors would be addressed more effectively.

The Decisionmaking Process

Inherent in the argument for a seamless integrated set of DSSs that function to integrate tactical, middle, and strategic planning and action is an argument for a particular type of decisionmaking. Recent discussions within the wildland firefighting community have often implied that rational decisionmaking, such as that found in the risk management decisionmaking process, is inadequate. Many wildland fire suppression agencies and other high reliability organizations have embraced naturalistic decisionmaking, often specifically in the form of recognition primed decisionmaking (RPDM) (Klein 1993) and bricolage (Weick 1993, 2001) wherein the decisionmaker's expertise allows him or her to make the correct decision. RPDM is a method of decisionmaking wherein the decisionmaker utilizes a first impression, through intuitive or blink decisionmaking, to develop an alternative that is then analyzed to develop the final decision that is implemented. Weick holds that the bricoleur demonstrates intimate knowledge of the situation, makes careful observations, listens, trusts her or his ideas, and proceeds while being open to feedback.

On the other hand, one of the primary models of decisionmaking used by wildland fire suppression agencies is the risk management. The risk management process is listed on page 1 of the Incident Response Pocket Guide (USDA 2006). Many argue that the risk management decisionmaking school of thought is contraindicated by the naturalistic decisionmaking school of thought. However, this is not the case. I contend that all of these widely varied decisionmaking systems can, and indeed do, work together in a manner that is beneficial to all. The system proposed here is one that would employ a seamless set of DSSs, SOGs and the risk management process of decisionmaking to plan and act on fires at the tactical, middle, and strategic levels. RPDM and bricolage are in many ways based on this system in that, however different, they take as their starting point the examination of excellent decisions made by accomplished actors. While standard operating procedures as embodied in DSSs and SOGs are designed to address all contingencies, in practice this is impossible. When standard models reach their limits, when as Weick (1993) calls it, there is a "collapse of decisionmaking," RPDM and bricolage are useful decisionmaking strategies.

As discussed above, the line between the use of the risk management process and RPDM and bricolage appears clear. However, the distinction is seldom clear in practice. Utilizing Weber's analysis of the types of rationality (1948), RPDM and bricolage operate via substantive rationality, which is the dominance of norms and values in the rational choice of means to ends. Substantive rationality creates the ability to draw on norms and values to make decisions and to motivate people to behave in a rational manner. The values and norms (social rules) used by RPDM or the bricoleur are effectiveness and success. The risk management decisionmaking process operates via intellectual rationality, also known as instrumental rationality or the rational cognitive process, which is the ability to utilize people's rational problem solving capacities. In practice most people rely on several decisionmaking processes at once. For example, in the risk management process in the situation awareness sub-process, one is to judge fire behavior. Because of the state of fire behavior analysis on the fireline today, most firefighters make their best estimate of that fire behavior, thus employing substantive rationality within the process of instrumental rationality. The people who successfully use RPDM or bricolage successfully are usually accomplished in

their field. Thus, they have employed instrumental rationality many times, and it is based on this unquantifiable body of expertise that they make their substantive decisions.

In figure 1, Legarza (2006) exemplifies the situations firefighters find themselves in. The DSSs, SOGs, and instrumental rationality in the form of the risk management process, operate best in the zone of optimal performance, that is, between the dashed red lines. The ultimate goal of the DSSs, SOGs, and instrumental rationality must be to expand the area between the dashed red lines. But as Legarza recognizes, because firefighters are operating in a turbulent, high tempo environment, even if firefighters do everything right, they may find themselves outside of the zone of optimal performance. Then one has the option: (1) use one's training and education to gain the awareness or choices one needs to return to normal operations, or (2) operate on instinct, using one's best estimate, possibly using RPDM or bricolage, to choose a path of operation. Killion (2000) notes that RPDM can also be used by those with a large reservoir of experience to make decisions more quickly than would be possible using what he calls multiattribute decisionmaking, which is a form of instrumental decisionmaking similar to the risk management process.

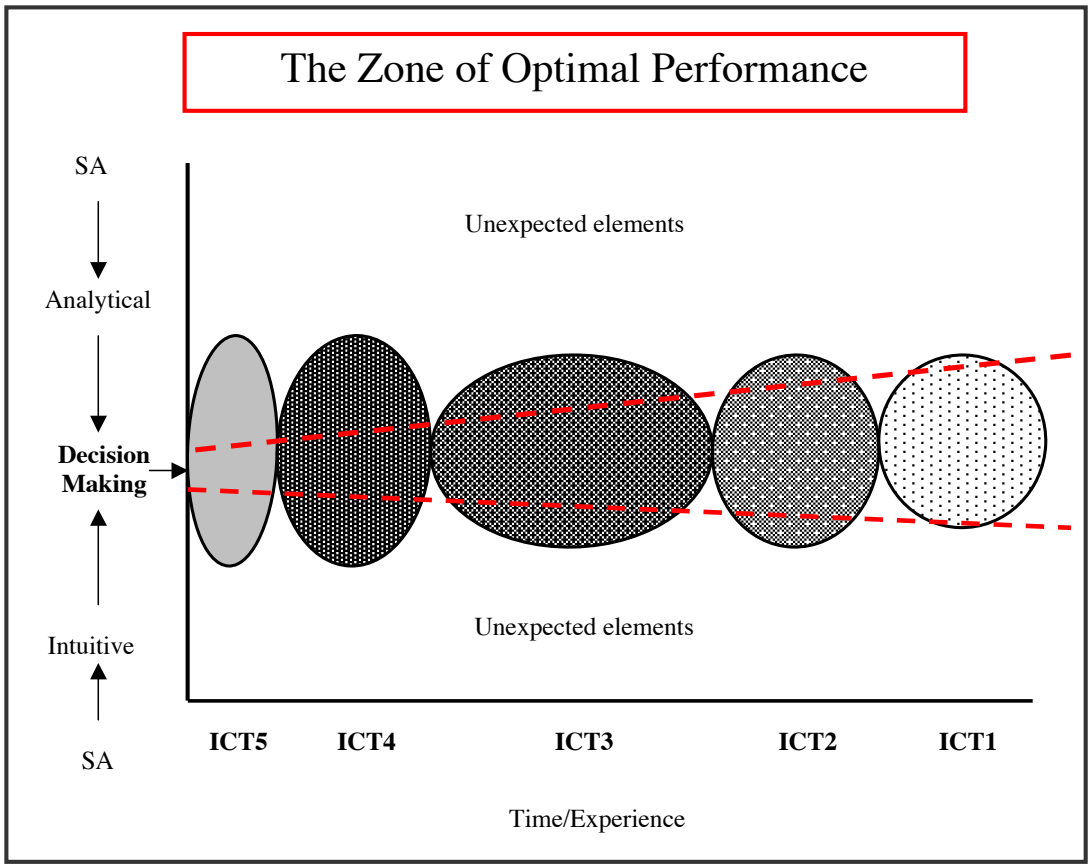

Figure 1—The Zone of Optimal Performance occurs in the middle of each circle, respectively, inside of the dashed red lines. @Legarza

The importance of understanding these varied decisionmaking processes is that in the development of DSSs, decisionmaking skills, plans of action, and so forth, it is useful for actors to understand how and why they are making particular decisions based on particular decisionmaking schemas. As we train and educate ourselves and others in fireline decisionmaking, we must realize that we can move ahead on several fronts. We can move ahead in the integration of the DSSs, and we can move ahead in advancing the skills of RPDM and bricolage.

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Appendix A: TEFF—The Ten Essential Factors in Firefighting

This table shows the breakout of the 59 firefighting guidelines within TEFF.

TEFF	**Number of firefighting guidelines included**
1. Lookouts	5
2. Communications	9
3, Escape Routes	4
4. Safety Zones	4
5. Fire Resources	7
6. Fire Behavior	6
7. Fire Status	10
8. Fuel Type	7
9. Weather	8
10. Terrain	10
Total	**70 (some guidelines appear in more than one TEFF)**
Average	**7 per TEFF**

Definitions of the factors listed above:

TEFF 1: Sufficient **Lookouts** are in place given the hazard assessment.

TEFF 2: Sufficient **Communications** are in place: generally communications are needed w/ lookout(s), crews, supervisors, & adjoining forces, but there may be other critical links.

TEFF 3: A suitable **Escape Route**(s) is known to all.

TEFF 4: A suitable **Safety Zone**(s) is known to all. The Safety Zone may be to exit the fire area.

TEFF 5: While more **Firefighting Resources** may be on order, Firefighting Resources are sufficient for firefighters to remain safe & to successfully implement current tactics.

 Factors over which you have total or limited control.

 Factors over which you have no control, but must monitor.

TEFF 6: **Fire Behavior** is understood in light of Weather, Terrain, & Fuel Type. Fire behavior is not doing anything unexpected, thus Firefighting Resources' tactics are succeeding as expected.

TEFF 7: The **Status or Scope of the Fire** is known to Firefighters, & current tactics are successful in light of amount of Firefighting Resources & to keep current Firefighters safe.

TEFF 8: **Fuel Type** is understood, and is exhibiting expected Fire Behavior

TEFF 9: The **Weather** is doing what is expected; no RH or wind trigger points have been crossed.

TEFF 10: The **Terrain** is not causing unexpected fire behavior, creating a hazard for Firefighting Resources, or compromising the Escape Route.

Side 1 of the TEFF card, which provides a matrix:

	Ten Essential Factors in Firefighting (TEFF)				**Trends Matrix**					
		Good				**Medium**				**Extreme**
		1	2	3	4	5	6	7	8	9
L	**L**ookouts									
C	**C**ommunication									
E	**E**scape Routes									
S	**S**afety Zones									
Fr	**Fr**efighting **R**esources									
Fb	**F**ire **B**ehavior									
Fs	**F**ire **S**tatus									
Ft	**F**uel **T**ype									
W	**W**eather									
T	**T**errain									

Side 2 of the TEFF card, which provides a brief overview of Fire Suppression Tactics trisecting them into Engagement, Modification, and Disengagement:

	Fire Suppression Tactics Guide	
Engagement		Send Comments on TEFF to Patrick Withen
Anchor & Flank		McCall Smokejumpers, PO Box 1065,
Direct Attack		McCall, ID 83638 Cell: 276-275-1927
Frontal Assault on Head		pwithen@virginia.edu www.fireworld.info
Indirect	**Modify**	
Backfire/Burnout	Change Engagement Tactics	
	Pull Back to better line location (indirect)	
	Consolidate Forces	**Disengagement**
	Hold, Improve, Reinforce	Pull back closer to safety zone & break
	Patrol, Hold what you have	Retreat
		Evacuate
		Last Resort