

Operationalizing Responder Exposure Metrics to Support Response Decisions, Learning, and Accountability

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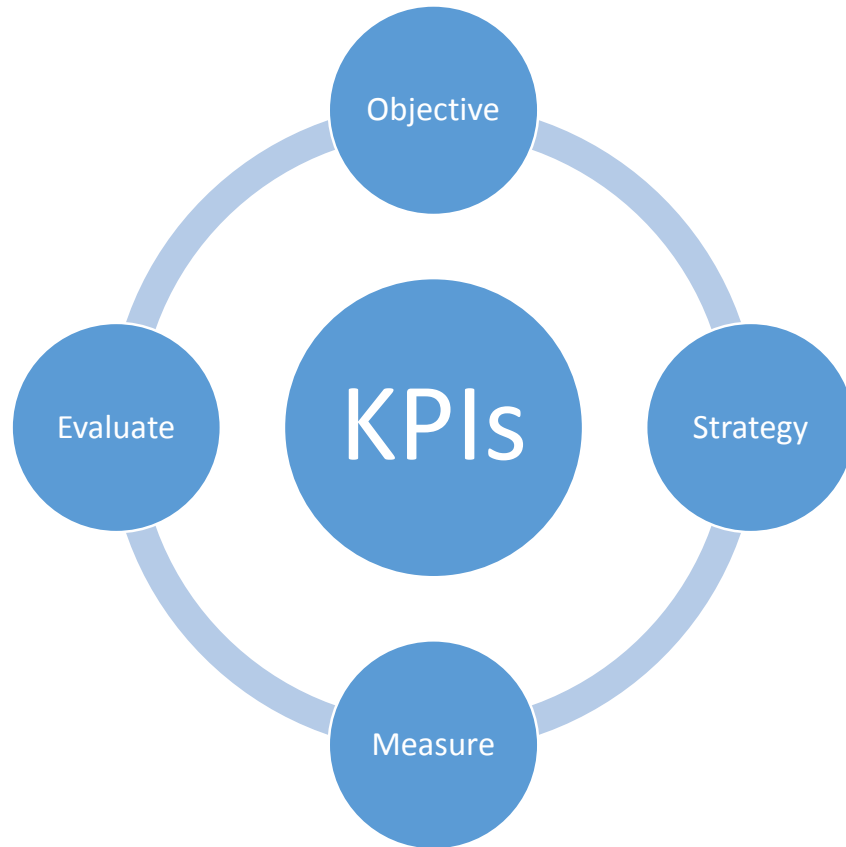


Photo: Mary Lata

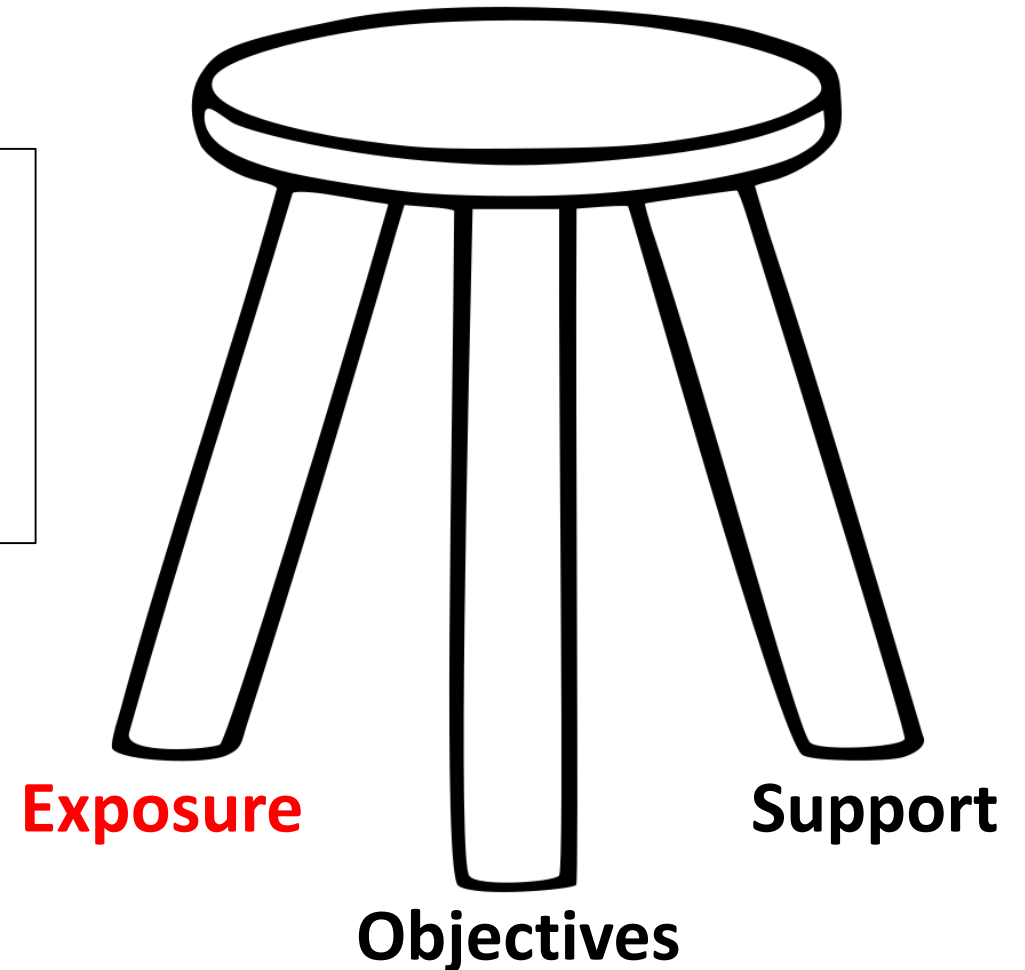
Defining Success

Safely achieving reasonable objectives with the least firefighter exposure necessary while enhancing stakeholder support for our management efforts

Forest Service Manual, Chapter 5130 – Wildfire Response

*Firefighter and public safety is the first priority
in every fire management activity*

Federal Wildland Fire Management Policy



***What does success look like?
How would we know?***

Measuring Success

- Develop **Key Performance Indicators (KPIs)**
 - Proxies between organizational performance and organizational goals
 - Provide the baseline to measure competencies, capacities, and success
 - Metrics, targets, and standards for success

Category	Definition	Target
Key Performance Indicator	Percent of acres burned by natural ignition with resource benefits	n/a
Performance Measure	Percent change from the 10-year average for the number of wildfires controlled during initial attack.	0.2%
Performance Measure	Percent of fires not contained in initial attack that exceed a Stratified Cost Index	24%
Performance Measure	Three-year average percent of fires not contained in initial attack that exceed a Stratified Cost Index	26%

Source: USFS FY2018 Budget Justification

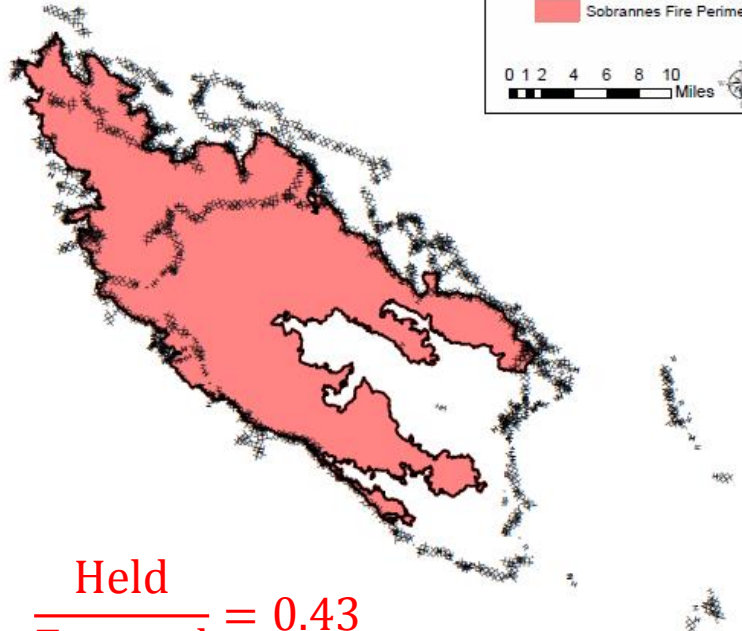
Three elements of success appear nowhere in existing performance measurement systems.

Can we systematically monitor, quantify, and evaluate exposure?

Prototyping Exposure KPIs

Ground: fire line effectiveness

$$\frac{\text{Engaged}}{\text{Total}} = 0.62$$



$$\frac{\text{Held}}{\text{Engaged}} = 0.43$$

$$\frac{\text{Held}}{\text{Total}} = 0.27$$

Meters of line engaging fire perimeter: 484,734.49
 Meters of Burned over line in fire perimeter: 630,866.15
 Total meters of all line: 1,789,406.62
 Total meters of line not engaged fire: 673,805.98

Aerial: drop conditions ~p(success)

Time of day category	Majority fuel type			Count by slope category	Slope steepness category (percent)
	Grass	Shrub	Timber		
Before 1200	0	0	0	2	< 5
1200 - 1500	0	0	0		
1500 - 1800	0	1	0		
After 1800	1	0	0		
Before 1200	3	0	0	37	5 to 15
1200 - 1500	13	0	2		
1500 - 1800	9	1	1		
After 1800	8	0	0		
Before 1200	10	0	1	76	15 to 25
1200 - 1500	19	1	2		
1500 - 1800	24	4	1		
After 1800	12	2	0		
Before 1200	27	3	10	495	> 25
1200 - 1500	92	19	34		
1500 - 1800	159	27	13		
After 1800	71	25	15		

$$\frac{\text{Steep slopes}}{\text{Total \# drops}} = 0.81$$

$$\frac{\text{Steep \& hot}}{\text{Total \# drops}} = 0.56$$

What do we need?

More, better data

Operations data

Streamlined information systems

Engaged leadership

Commitment to learning & improvement

Embrace evidence-based management

Abstract

- The U.S. Forest Service defines success in the wildland fire response environment as “safely achieving reasonable objectives with the least firefighter exposure necessary while enhancing stakeholder support for our management efforts.” The focus on reducing unnecessary exposure is consistent with policy stating that “firefighter and public safety is the first priority in every fire management activity.” And yet the agency does not systematically monitor or quantify exposure, such that it has a limited ability to measure performance with respect to its own definition of success. In this micro-talk I will briefly review best practices as they relate to organizational performance measurement, and put in a plug for new analysis techniques intended to improve responder exposure assessment and enhance the safety of ground and aerial suppression resources.