Cohesive Wildland Fire Management Strategy

National Goals; Collective Solutions

Response to Wildfire

Fire Adapted Communities

Resilient Landscapes

Supported by Science

Scientific Basis for Modeling Wildland Fire Management:

Phase II Report of the National Science and Analysis Team

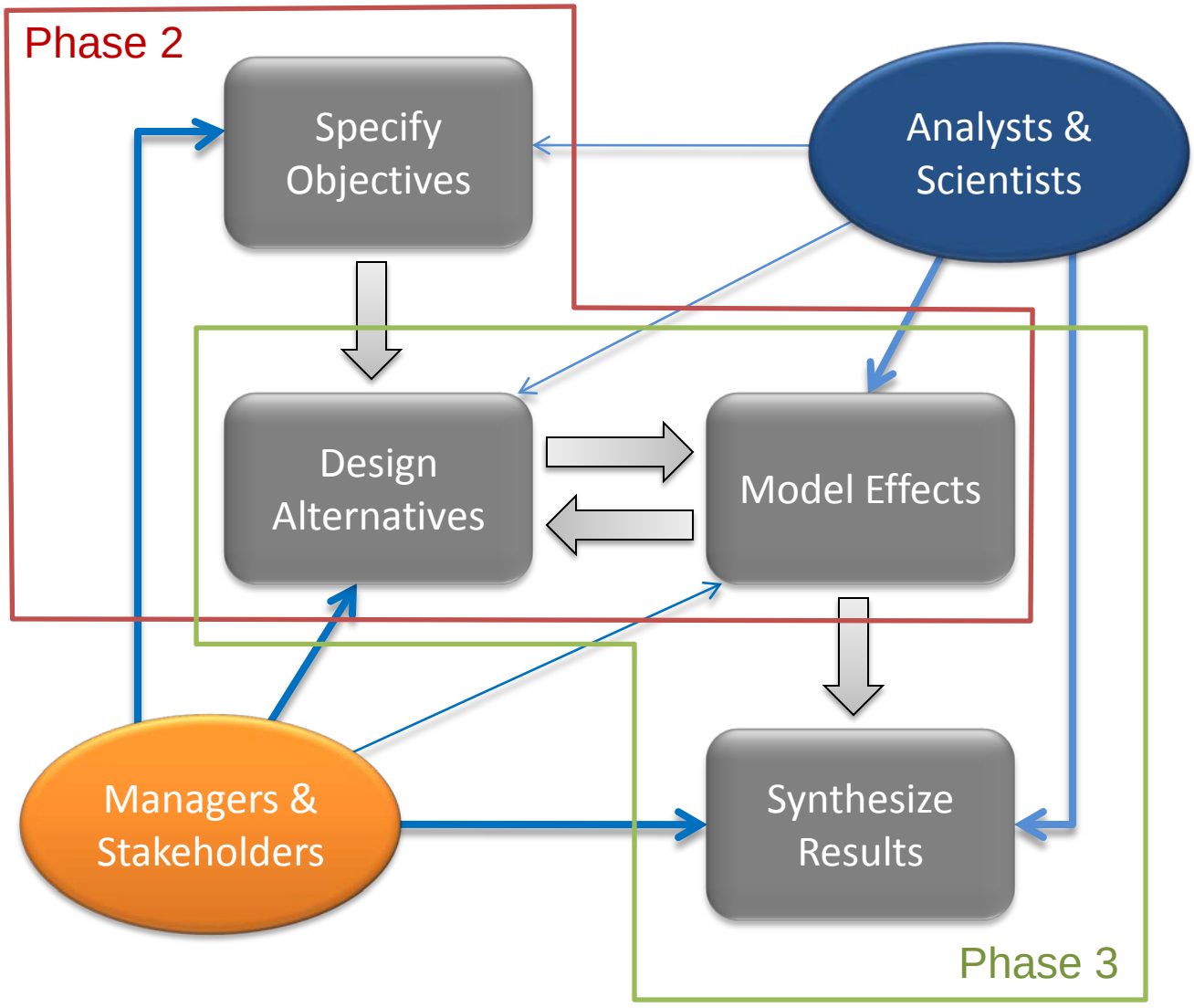
Tasks Assigned to NSAT

1. Assemble credible scientific information, data, and preexisting models that can be used by all teams working on the Cohesive Strategy.
2. Develop a conceptual framework that describes the relative effectiveness of proposed actions and activities on managing risks associated with wildland fire.
3. Construct an analytical system using the products developed in Tasks 1 and 2 to quantitatively analyze regional and national alternatives.

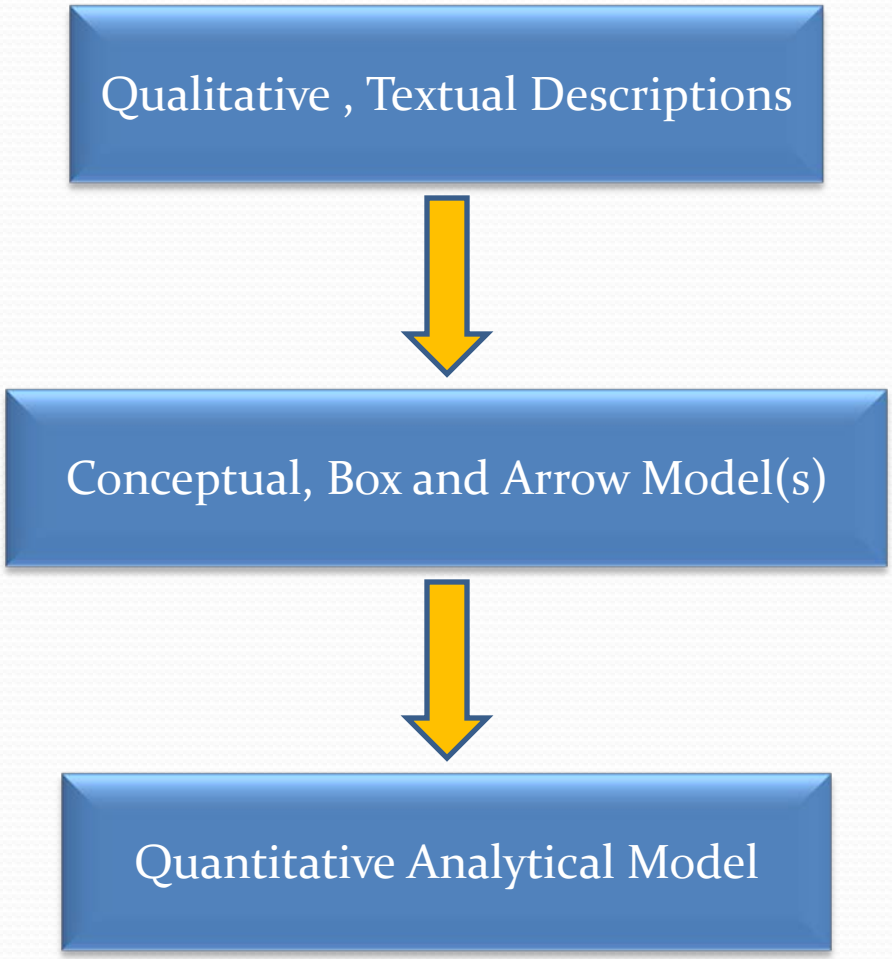
Organization by Topics

- Landscape resilience
- Wildfire ignitions and preventions
- Fuels management, wildfire extent and intensity
- Wildfire response and suppression effectiveness
- Fire adapted human communities
- Firefighter safety
- Smoke management and impacts
- Public acceptance and policy effectiveness

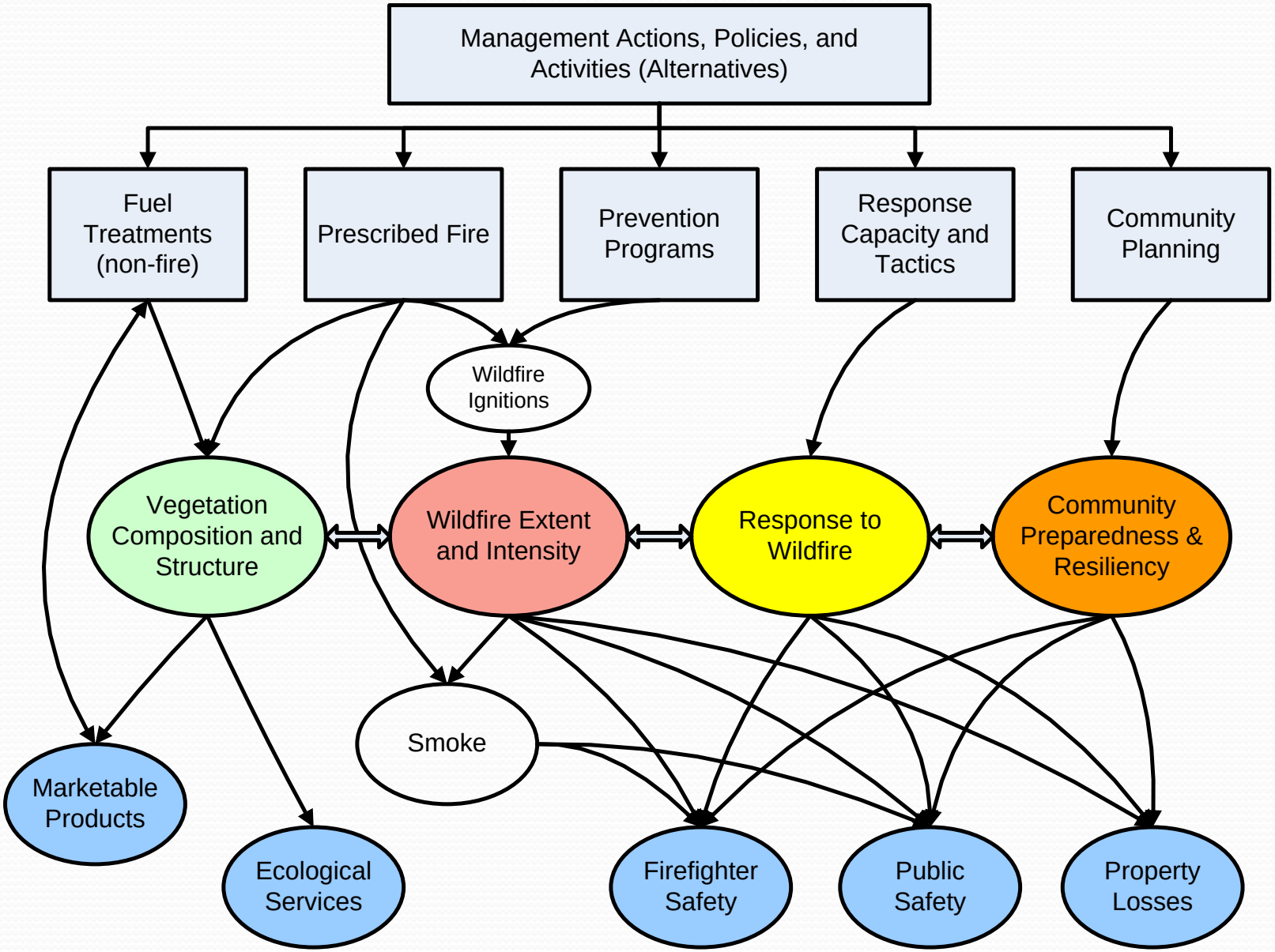
Basic CRAFT Process



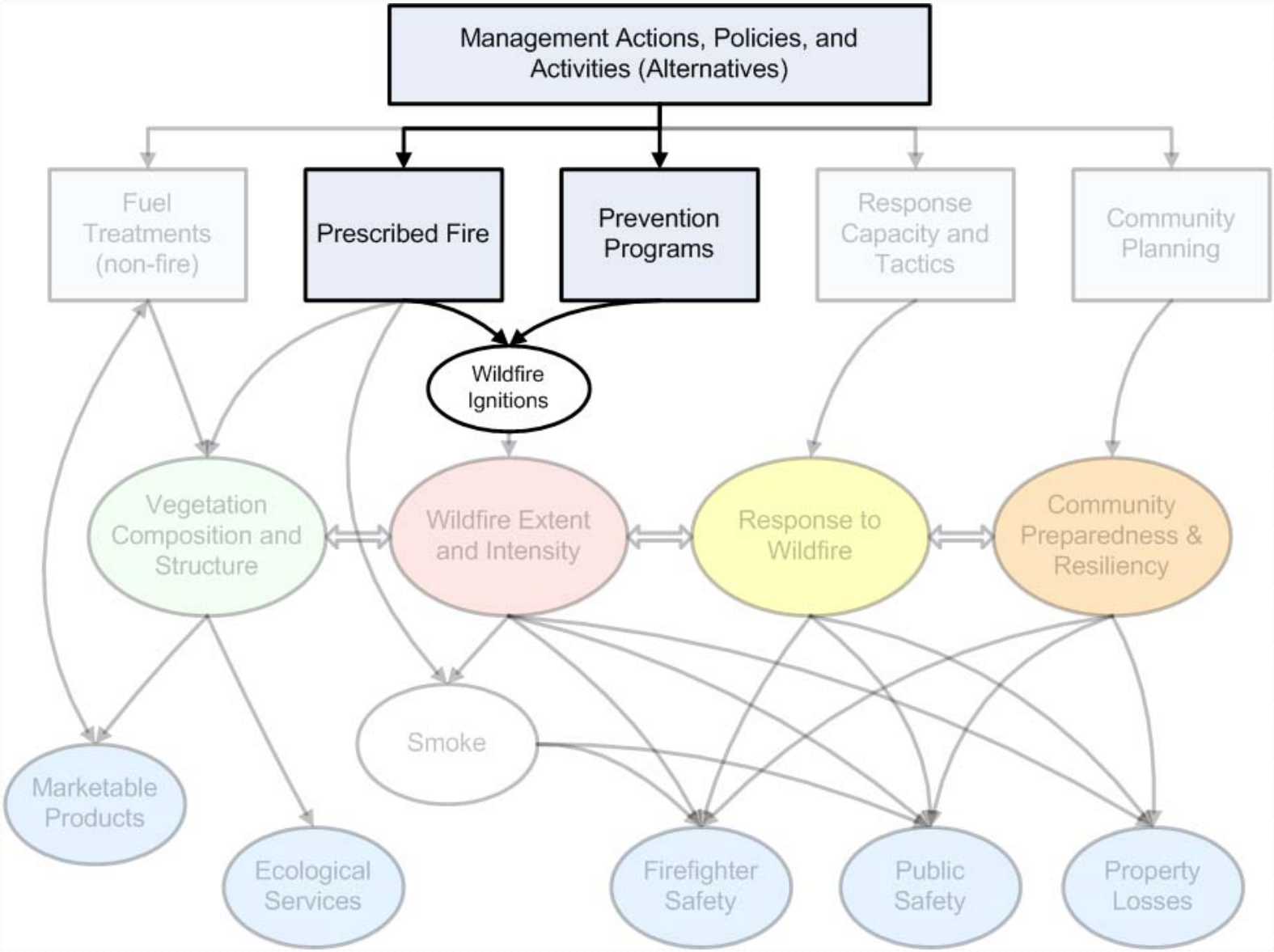
General Analysis Process



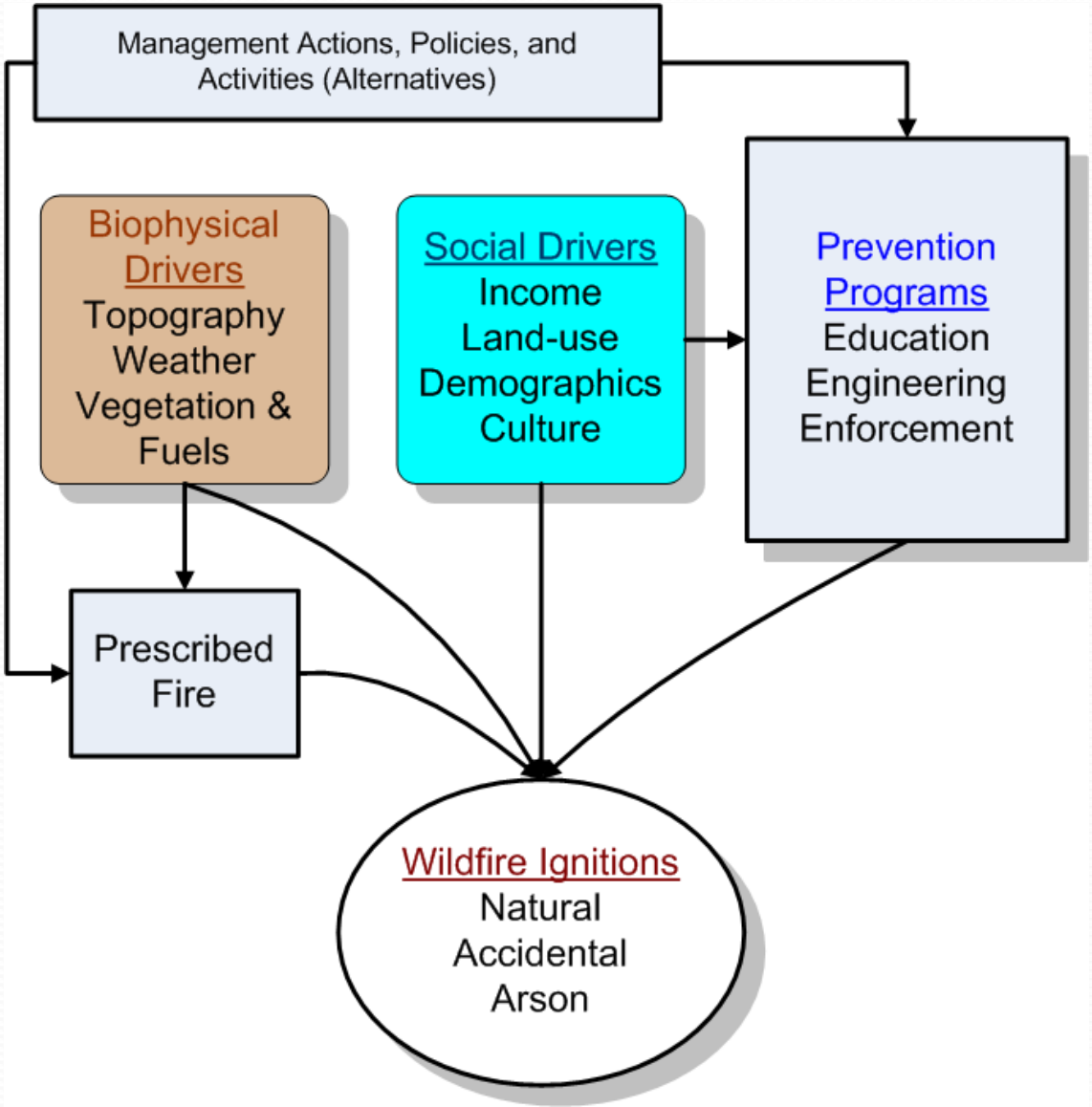
Overall Conceptual Diagram



Highlight Ignitions and Prevention

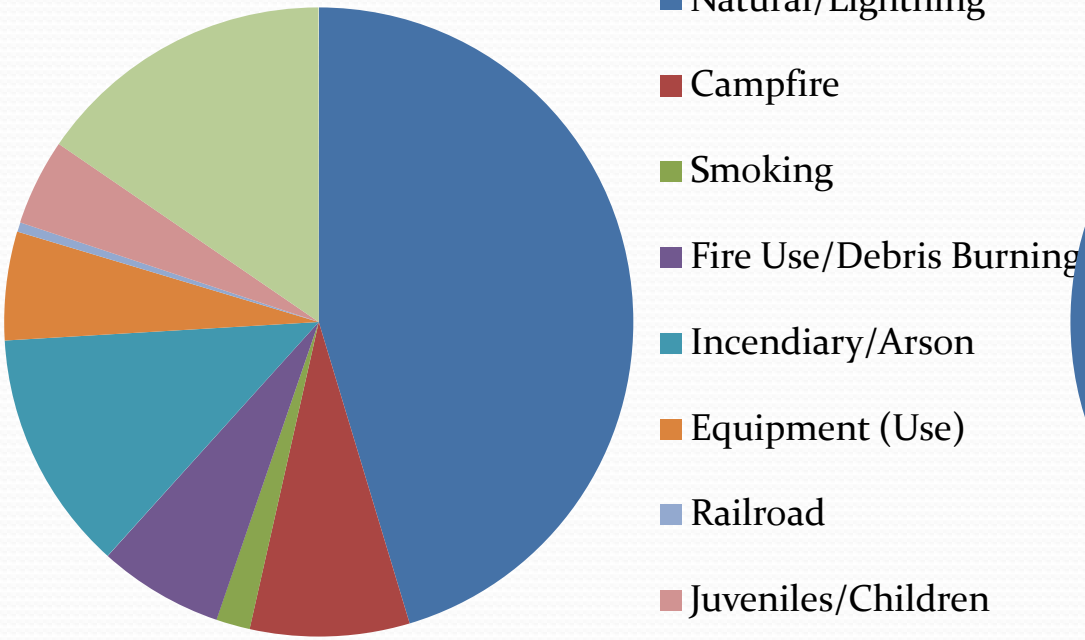


Expand I&P Conceptual Model to Include Additional Factors and Detail

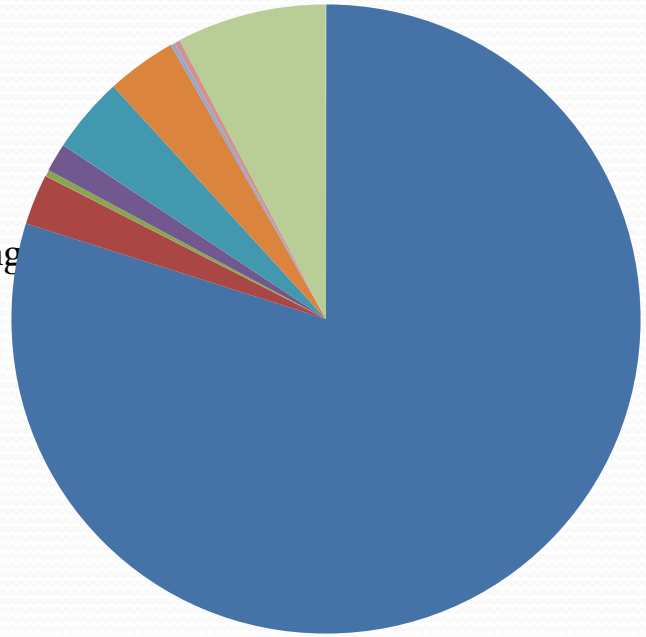


Wildfire Data from USDOI and FS Lands, 2000-2008

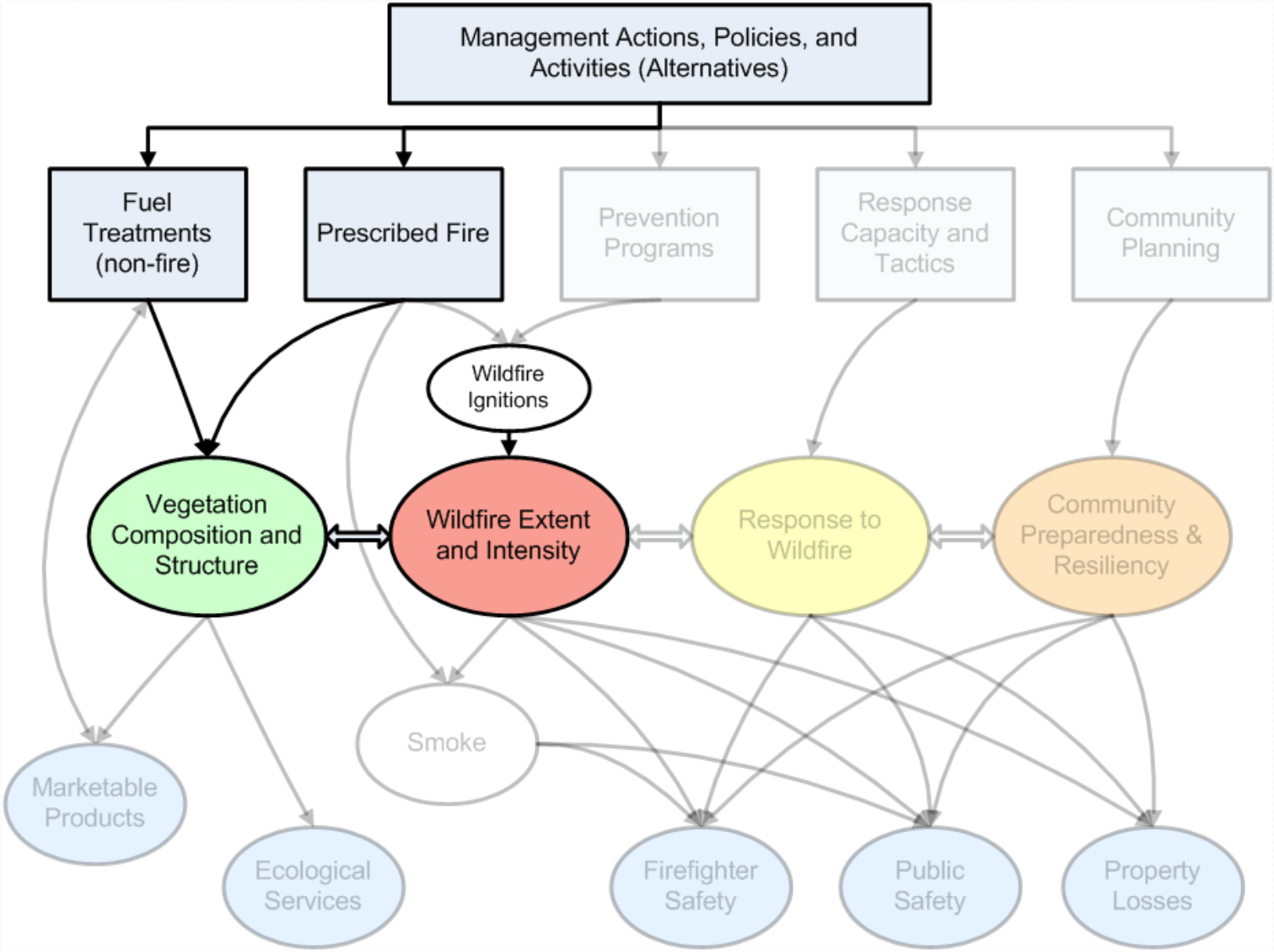
Number of Ignitions



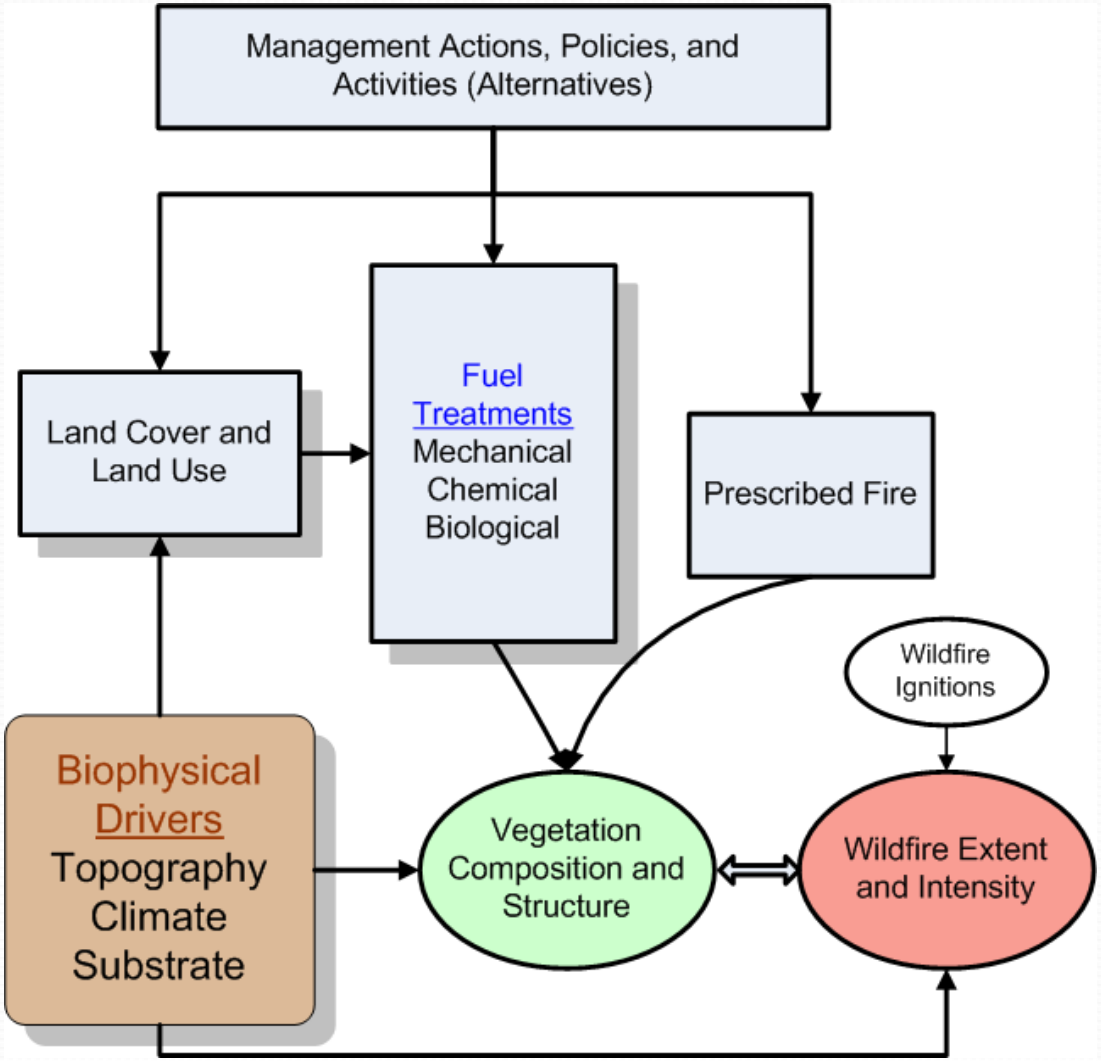
Area Burned



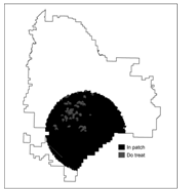
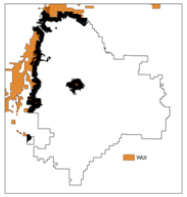
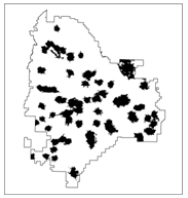
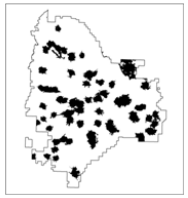
Highlight Fuels Management and Fire Behavior



Expand Fuels Management Conceptual Model



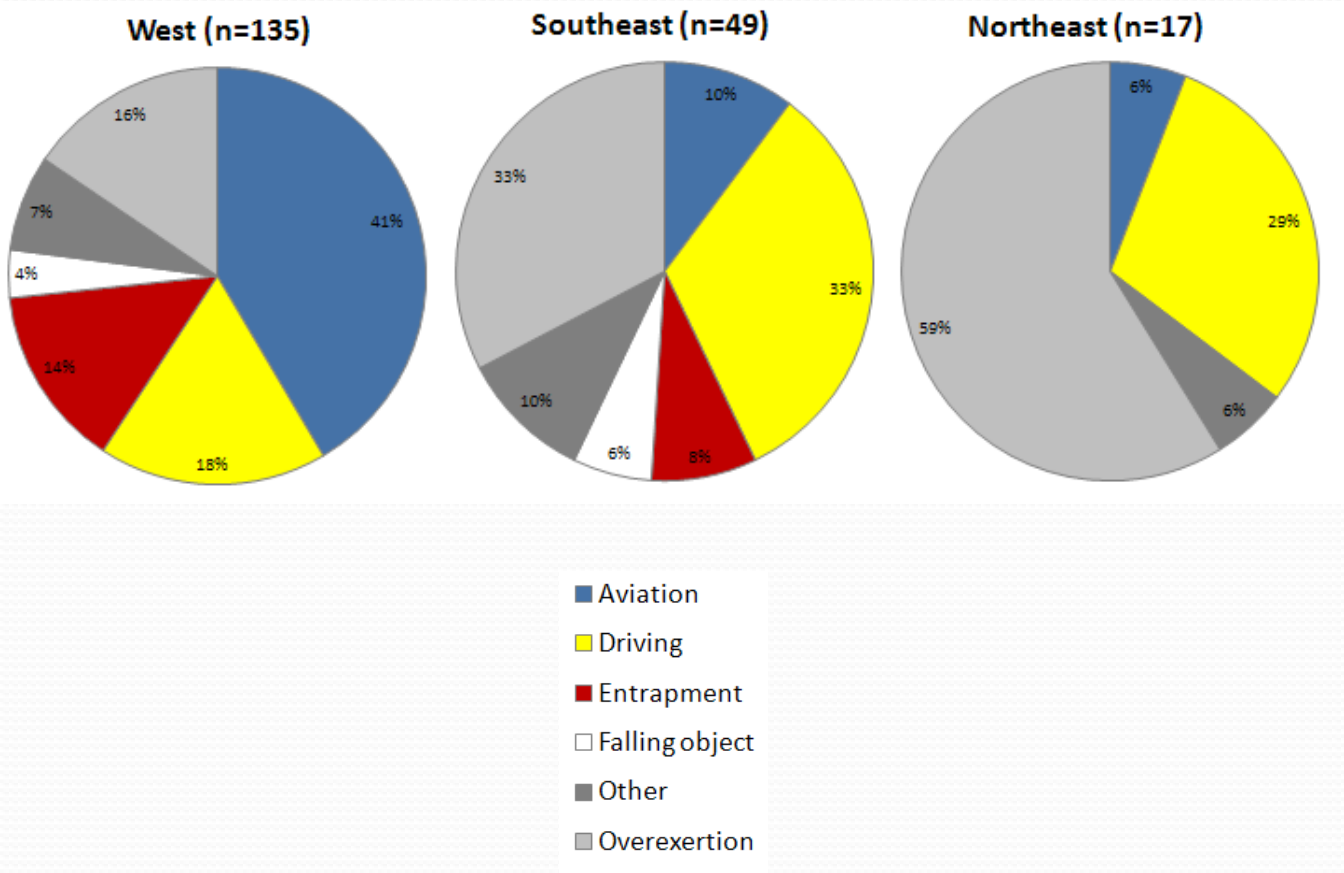
Strategic fuel treatment taxonomy, with illustrative examples of optimally placed treatments given variable motivation, fire regime, spatial pattern of values, and ultimate treatment strategy/system (Credit: Alan Ager and Nicole Vaillant)

Motivation	Restoration	Protection	Protection	Protection	Restoration	Protection
Fire regime	Low severity (+ fire)	Mixed severity (+/- fire)	Mixed severity (+/- fire)	High severity (- fire)	High severity (- fire)	High severity (- fire)
Pattern of values	Dispersed (large trees)	Dispersed and prevalent (low density WUI, T&E)	One clump	Clumpy	Any	Low or none
Treatment Strategy	Create large contiguous areas of low hazard (minimum treatment for maximum area)	Strategic (SPLATs/SPOTs)	Localized protection (targeted treatments)	Localized protection (targeted treatments)	Restore natural fire barriers	Defensible fuel breaks along roads and other barriers
Treatment system	Low hazard fire containers	Treatment optimization model (FlamMap; TOM)	Defensible fuel breaks	Defensible fuel breaks	Strategic restoration	High hazard fire containers
Spatial treatment pattern						

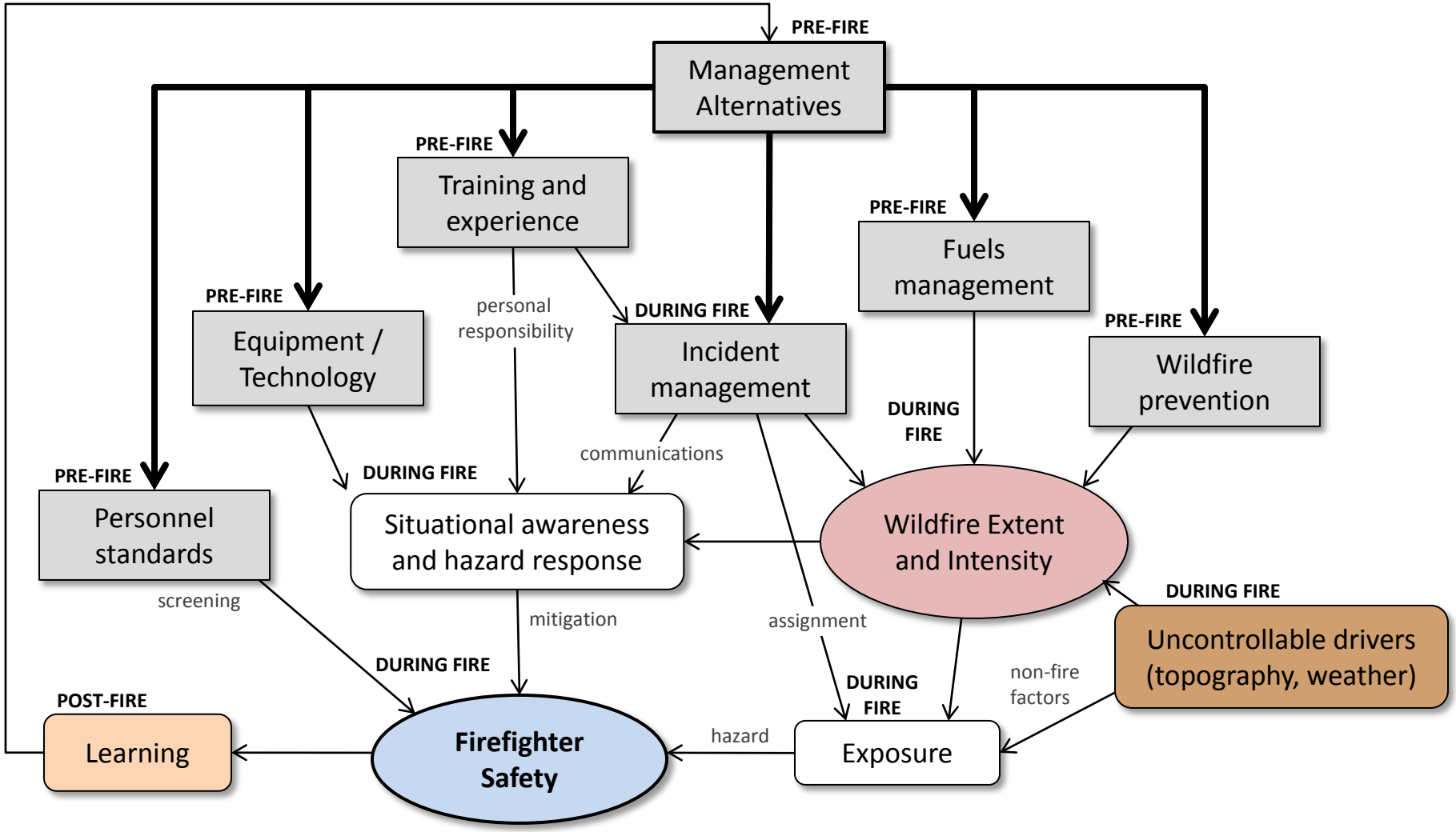
Factors Contributing to Response Effectiveness

Controllable	Partial Control	Uncontrollable
• Training	• Fuels	• Weather
• Equipment	• Ignitions	• Topography
• Experience	• Fire intensity	• Location
• Coordination	• Infrastructure	
• Tactics	• Funding	
• Prevention	• Policies	
• Enforcement	• Land use	
	• Public engagement	

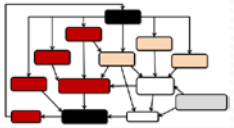
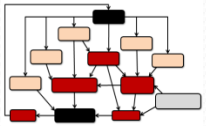
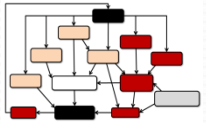
Cause of death for wildland firefighters 2000-2009 for all jurisdictions by Region in which the fatality occurred.

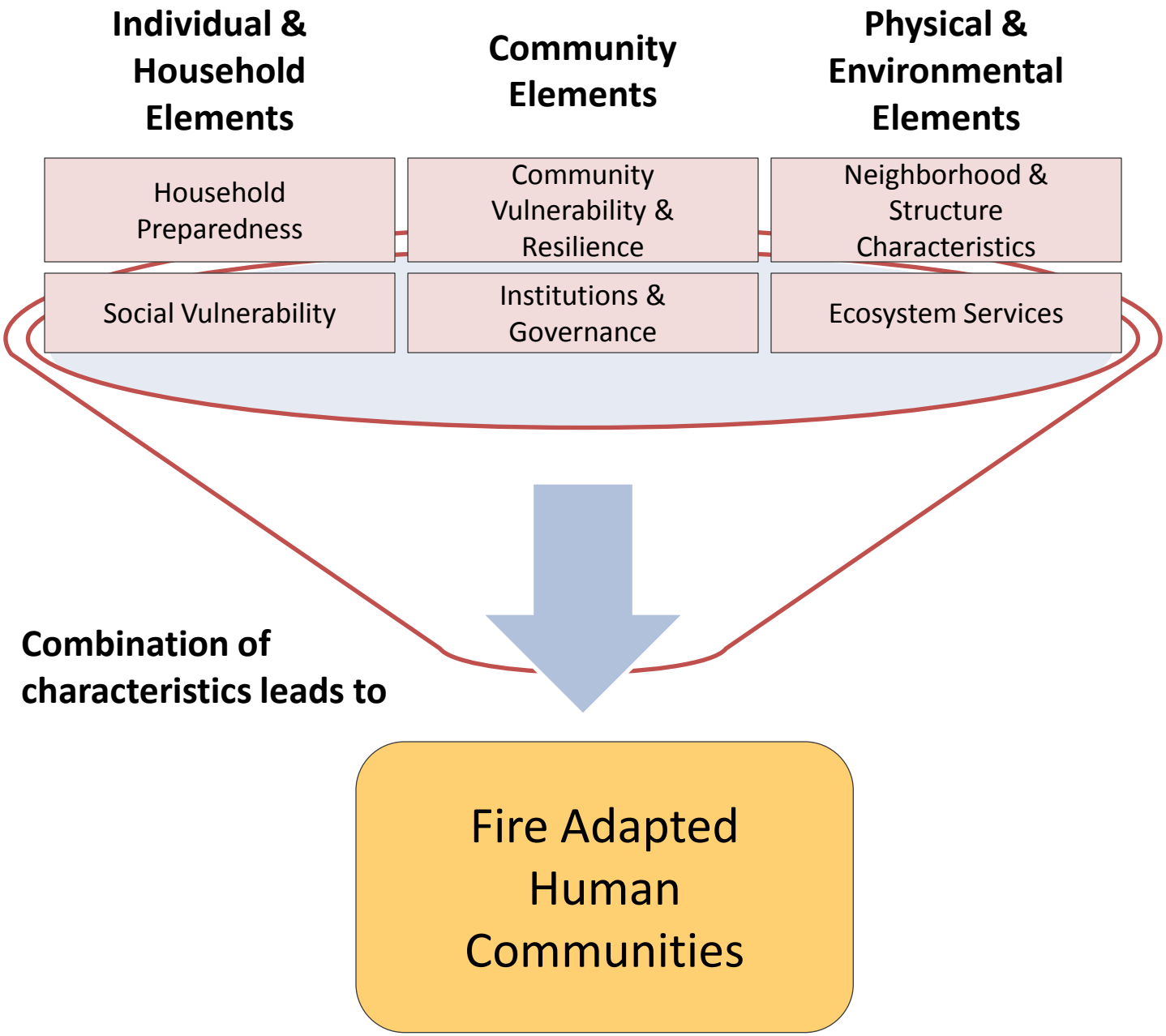


An Overview Conceptual Model of Firefighter Safety Related to Incidents

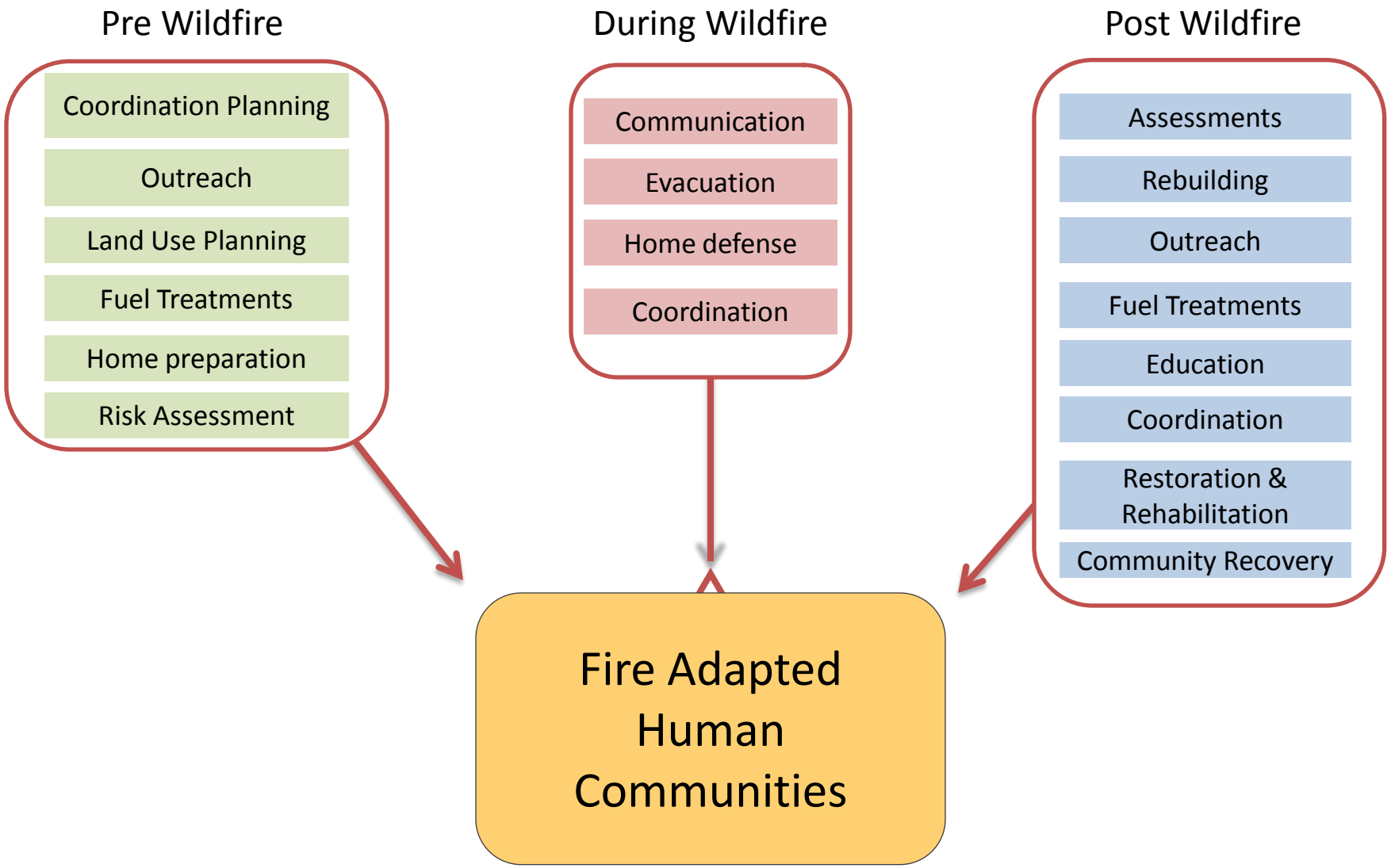


Pathways to reducing firefighter deaths and injuries

Strategic investment	Workforce emphasis	Incident management emphasis	Fire attribute emphasis
Position within Figure 2 shown by black and red:			
Standards, training, experience	X	X	
Technology, equipment	X	X	
Communications	X	X	
Health monitoring	X		
Personnel standards, screening efforts	X		
Incident learning	X	X	X
Fire behavior and weather modeling	X	X	X
Wildfire prevention efforts			X
Fuels reduction			X
Forest and disease management			X


Individual & Household Elements
Community Elements
Physical & Environmental Elements
Household Preparedness
Community Vulnerability & Resilience
Neighborhood & Structure Characteristics
Social Vulnerability
Institutions & Governance
Ecosystem Services
Combination of characteristics leads to
Fire Adapted Human Communities

FAHC Conceptual Model
Range of Activities by Wildfire Timeframe



Conclusions

- **Challenges increase with scale:** fine-scale or short-term processes are better understood than broad-scale or long-term processes or strategic issues.
- **Imbalance among sciences:** considerably more research has focused on the biophysical aspects of wildland fire than on equally important socio-political issues.
- **Integrated research increasing:** efforts that focus on interactions among human and physical factors are becoming more common and are highly promising.
- **Comprehensive data essential:** understanding nationwide trends and patterns requires consistent, standardized data.

Conclusions

- **Foundation established:** The conceptual models and accompanying information collectively provide a strong foundation for building more rigorous models in Phase III.

- **Building quantitative models challenging:** estimating risk to social values will not be easy. Various limitations in available data and understanding will pose challenges.

- **Phase III analysis a team effort:** all committees and groups have a continuing role in ensuring that the analyses are matched to the most important questions, utilize the best available knowledge, and provide transparent results.