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

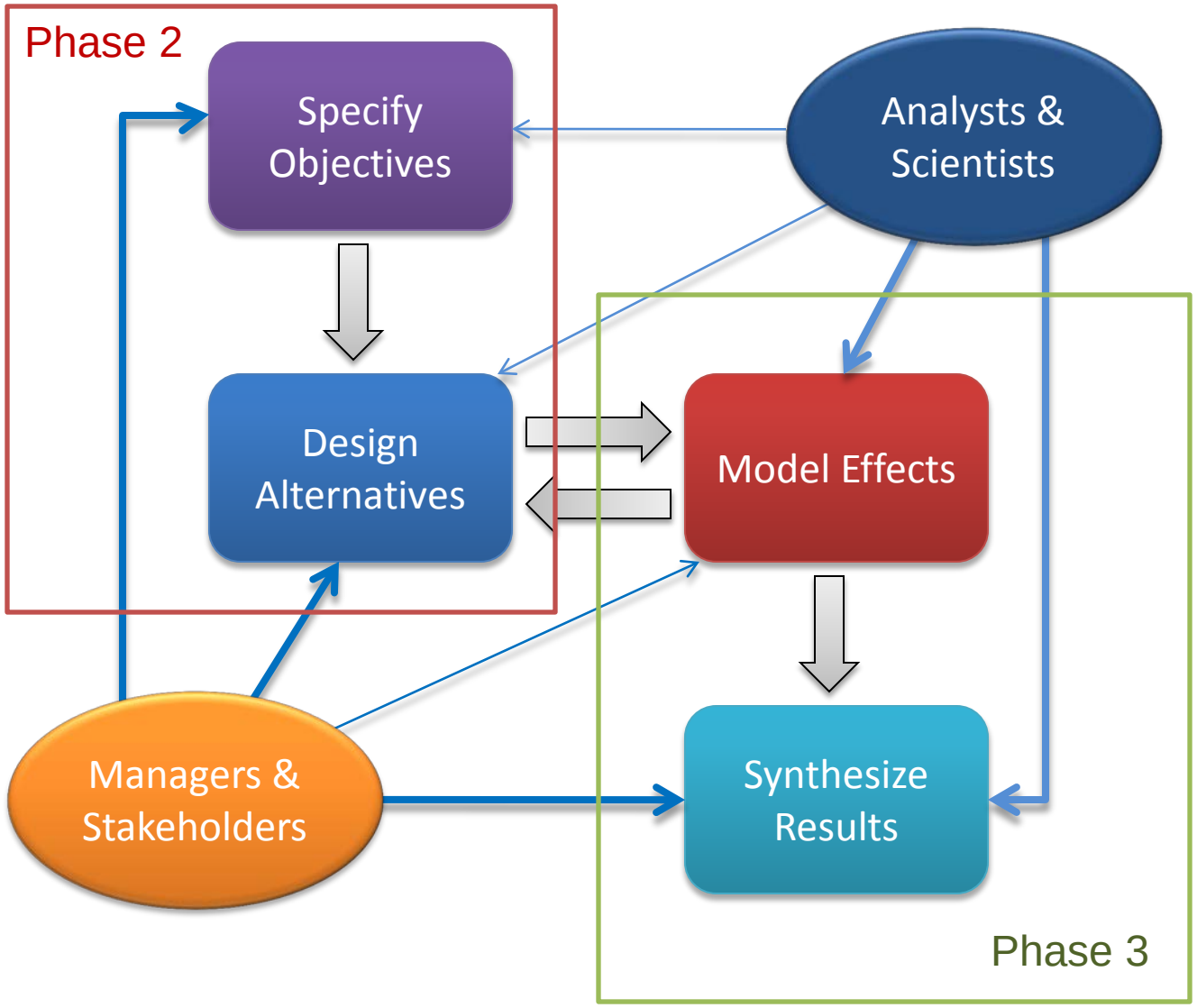
Tasks Assigned to NSAT

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

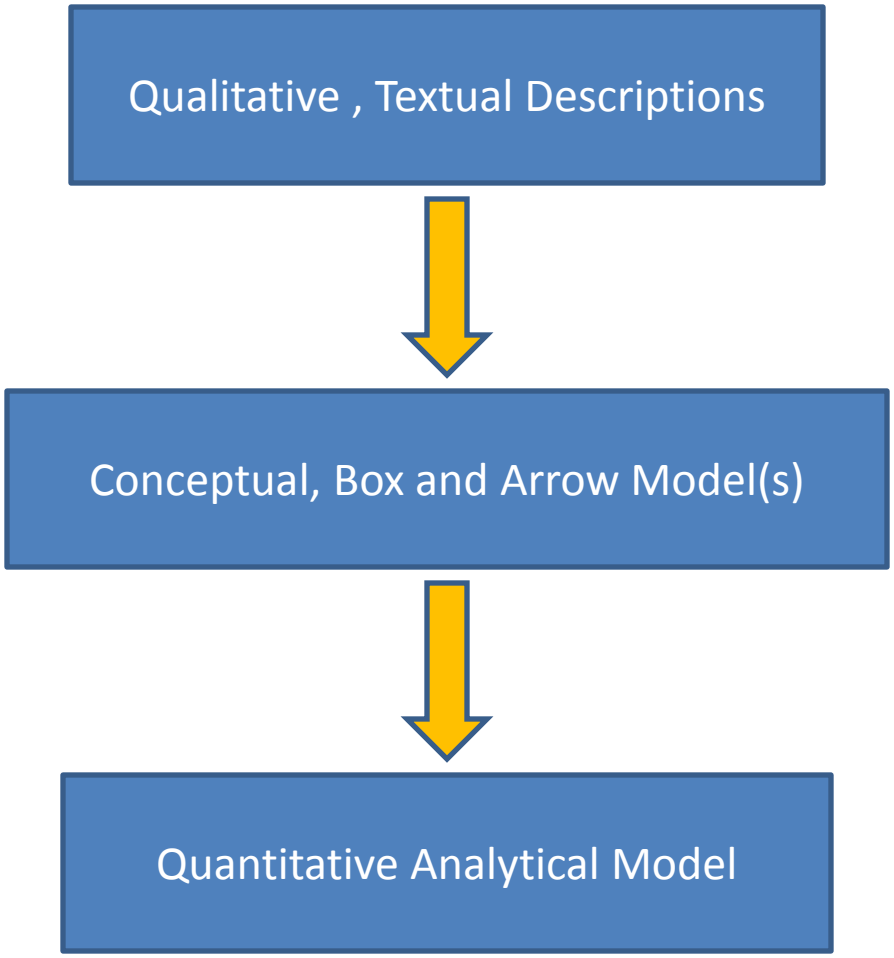
Organization by Topics

- 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

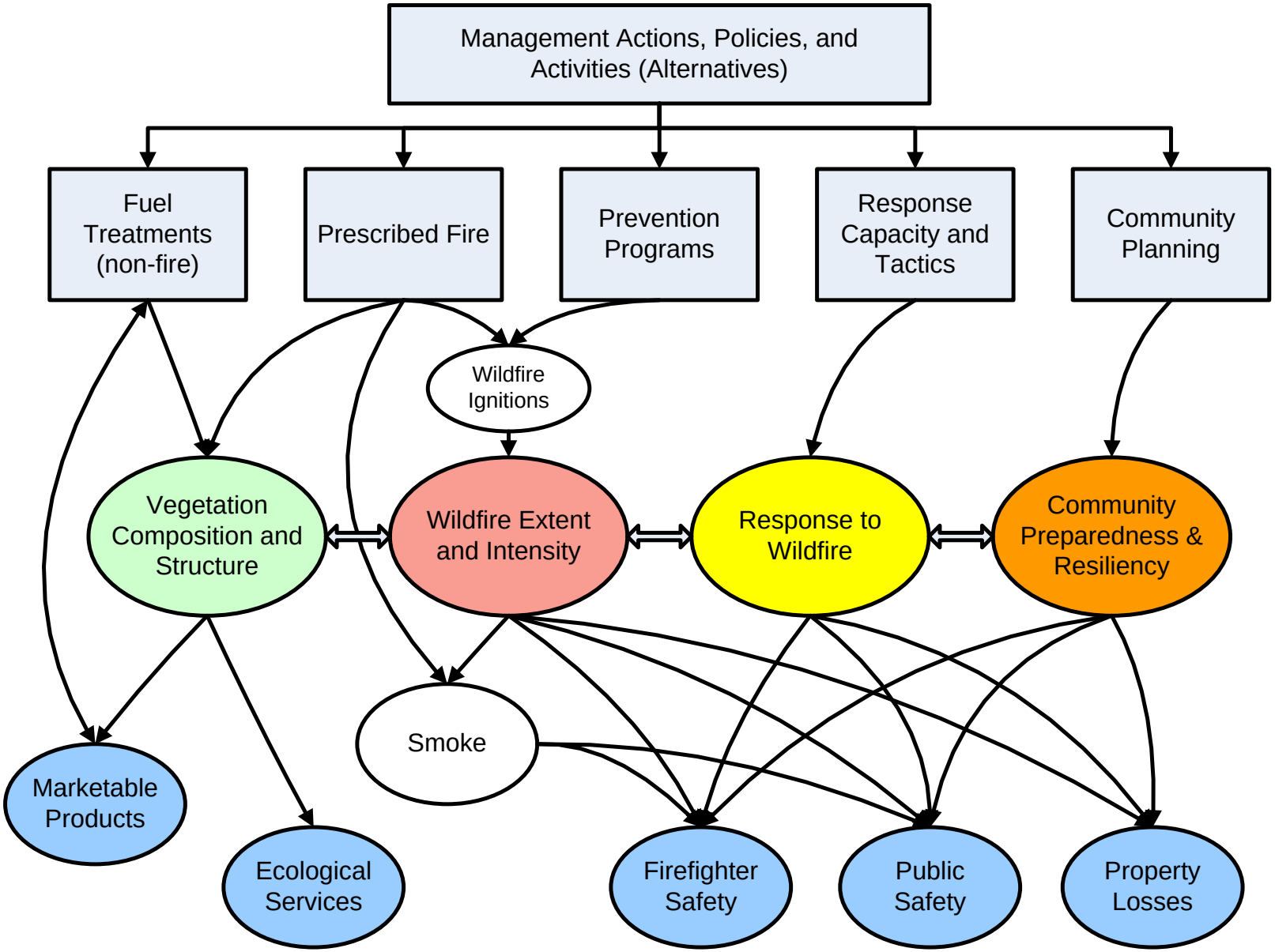
Basic CRAFT Process



General Analysis Process



Overall Conceptual Diagram



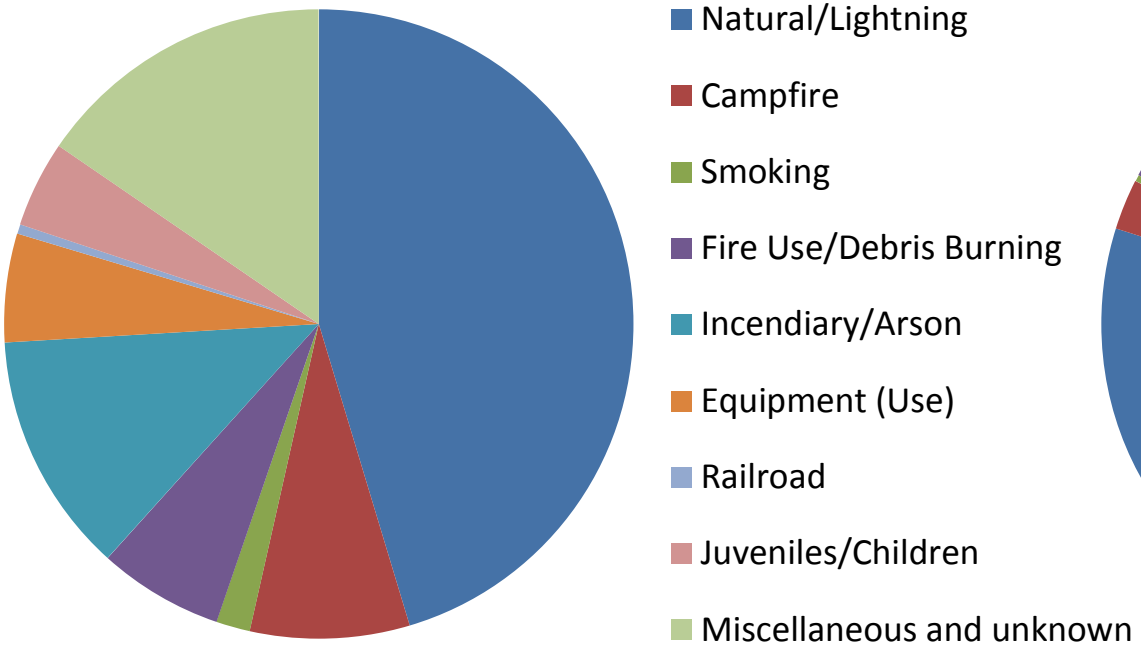
Landscape Resilience is the ability of a landscape to absorb the effects of fire by regaining or maintaining its characteristic structural, compositional and functional attributes. The amount of resilience a landscape possesses is proportional to the magnitude of fire effects required to fundamentally change the system.

Considerations with Resiliency

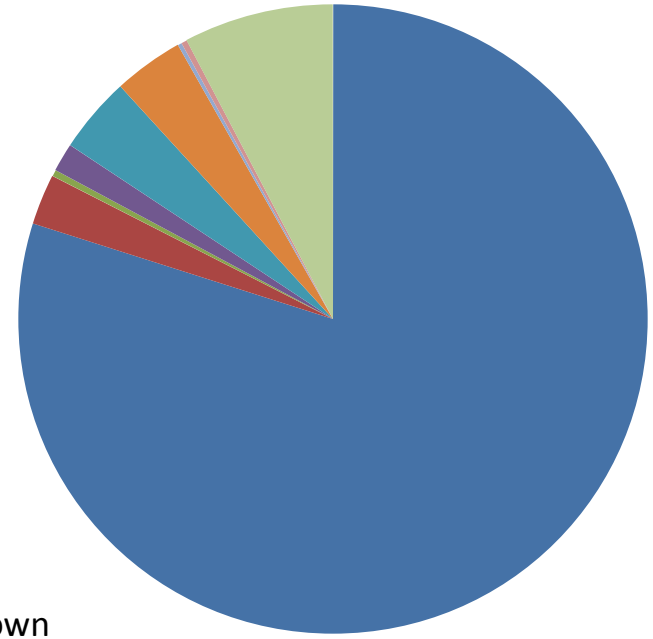
- Resiliency is contextual, not absolute
  - Is the system likely to change under the fire regime that it will experience?
  - Conceptually straightforward, difficult to quantify
- Resiliency is not inherently normative
  - Generally a positive attribute, but not always
- Two ways to affect resiliency
  - Change the fire regime (climatic shifts or through human activities)
  - Change the nature of the system to make it more or less consistent with existing fire regime.

Wildfire Data from USDOI and FS Lands, 2000-2008

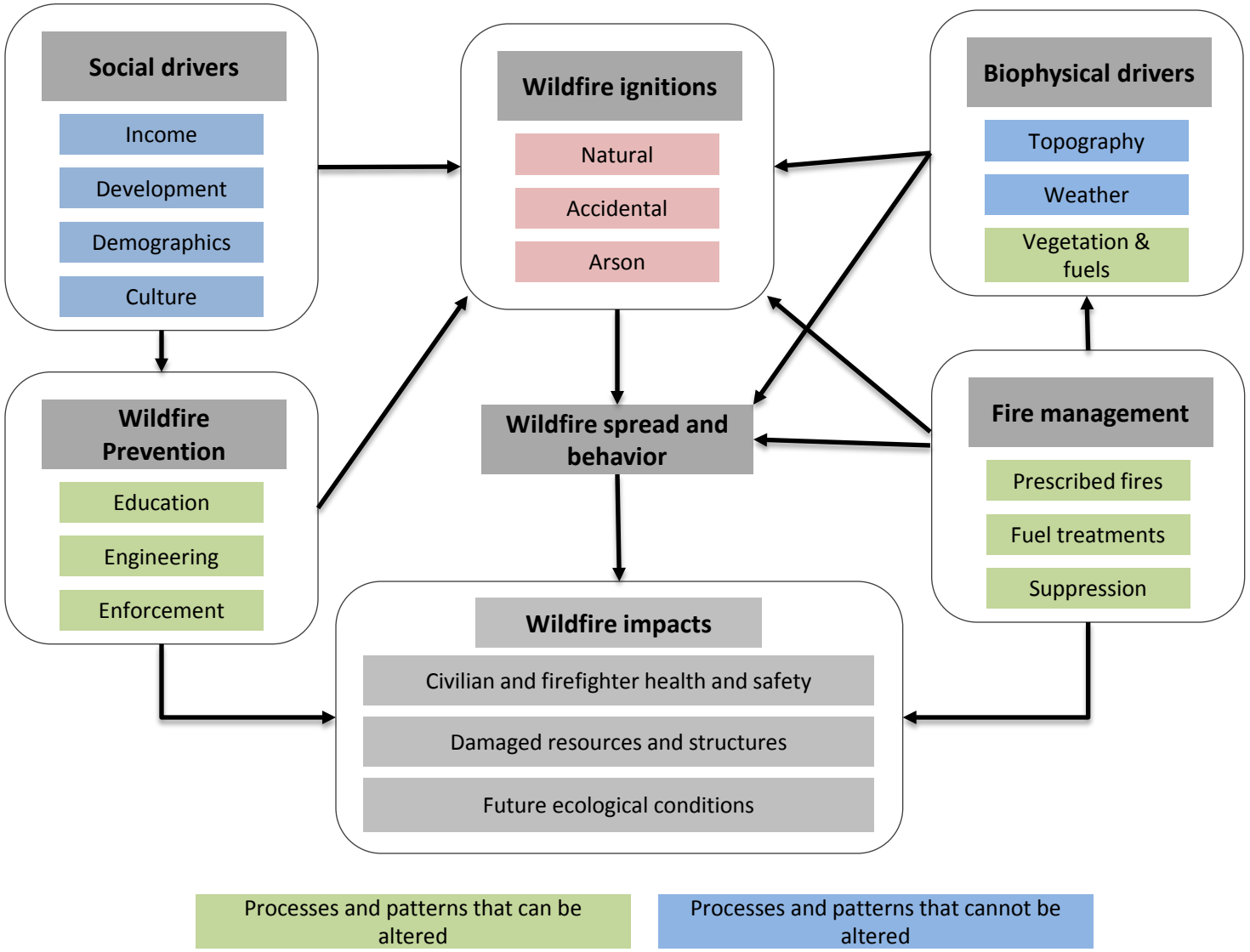
Number of Ignitions



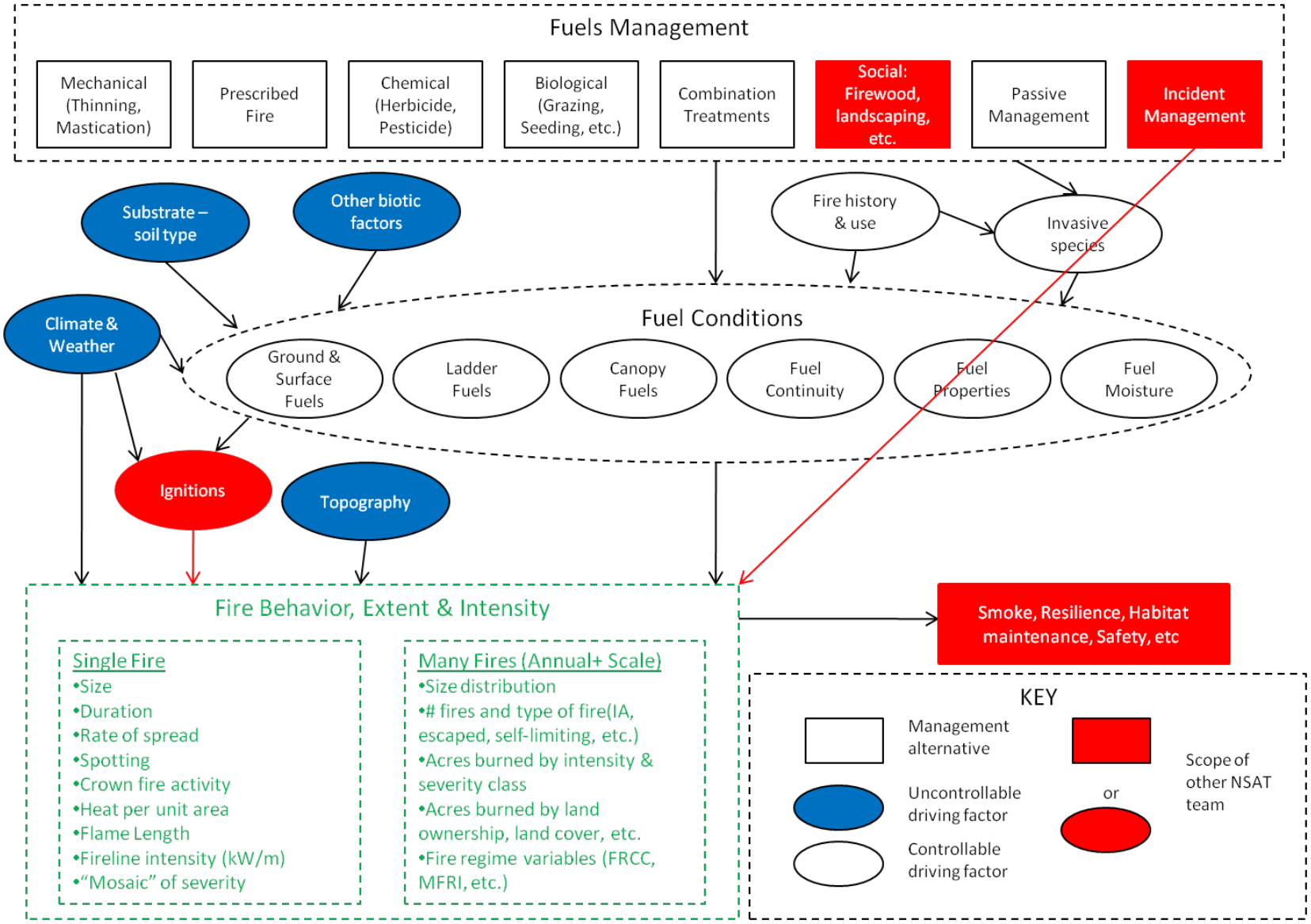
Area Burned



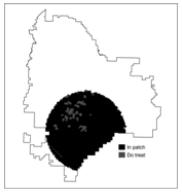
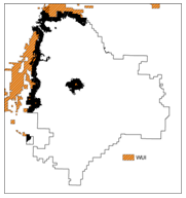
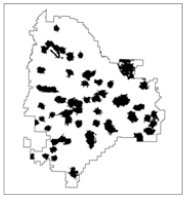
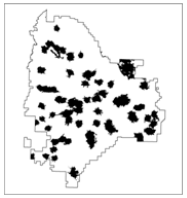
Cohesive Strategy Wildfire Ignitions and Prevention Conceptual Model



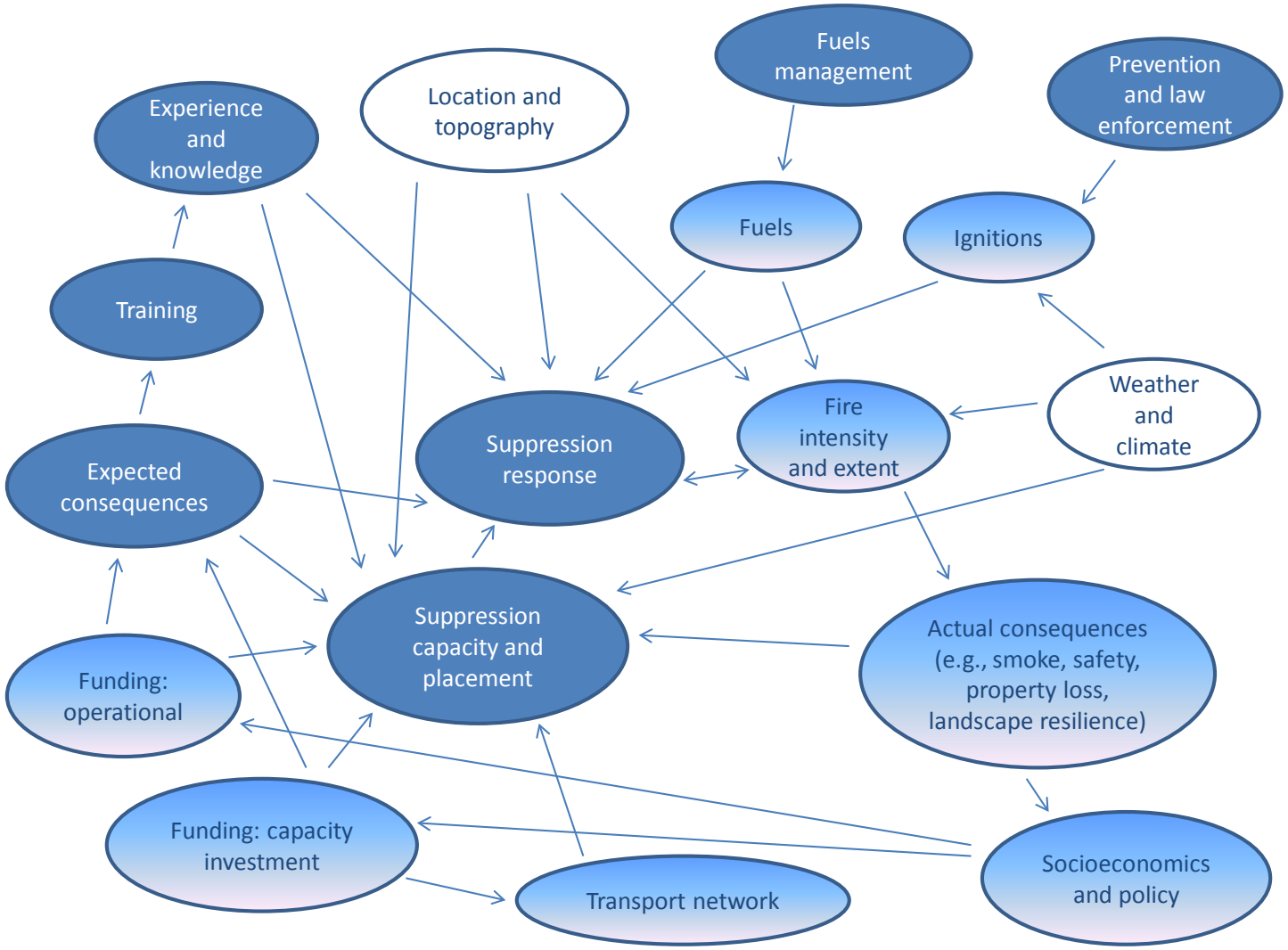
"Big Picture" Conceptual Model of Fuels Management



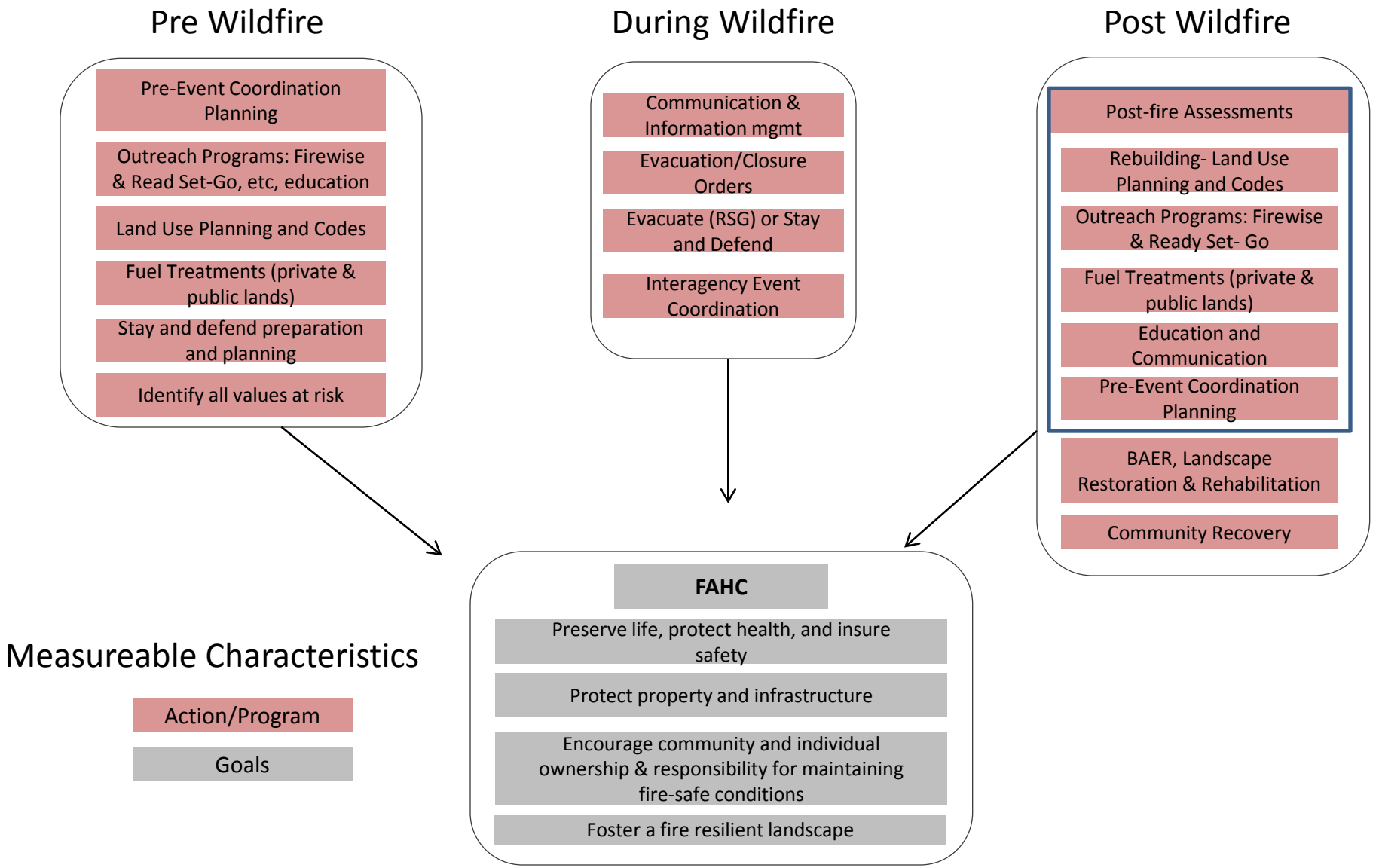
Strategic fuel treatment taxonomy, with illustrative examples of optimally placed treatments given variable motivation, fire regime, spatial pattern of values, and ultimate treatment strategy/system (Credit: Alan Ager and Nicole Vaillant)

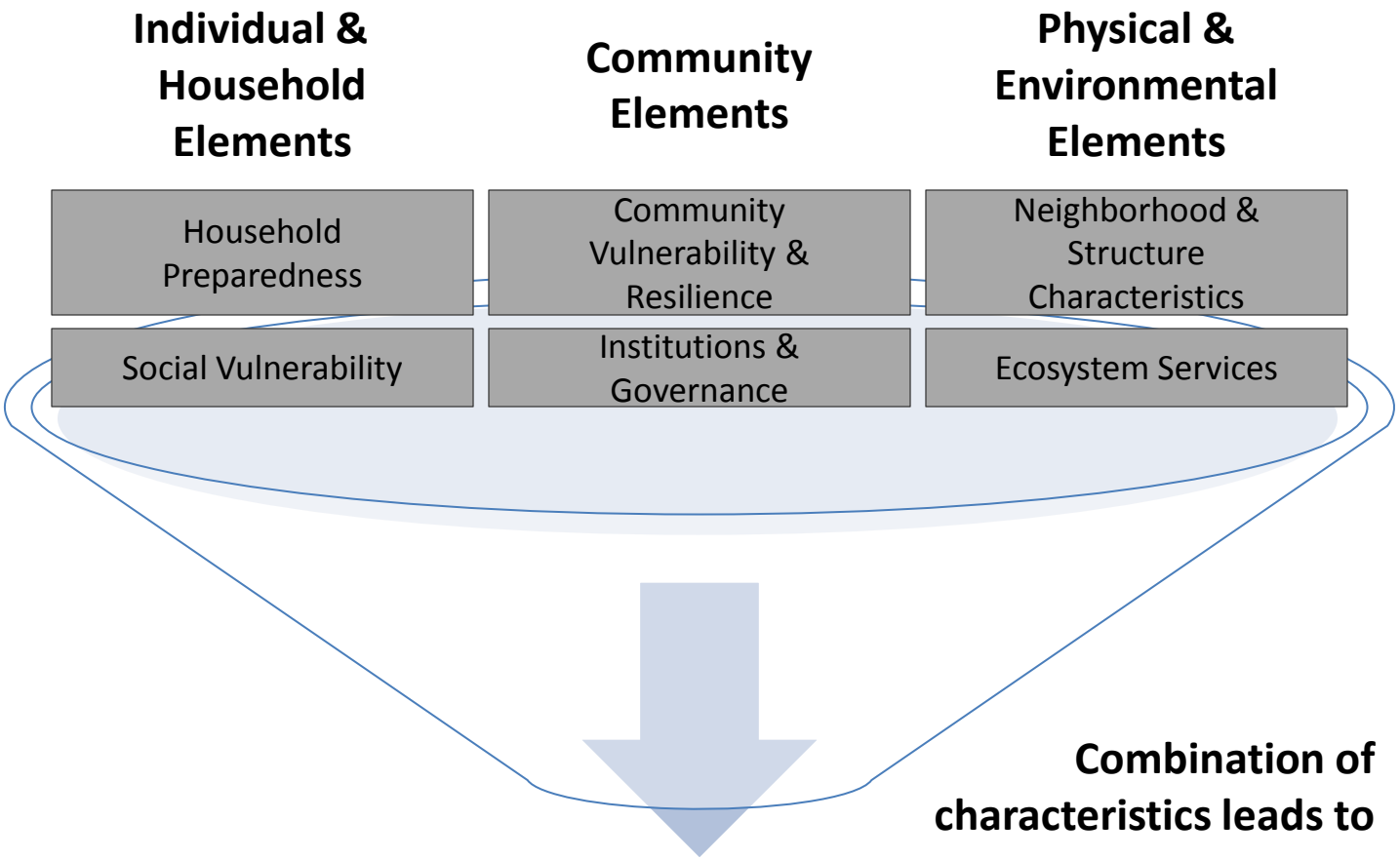
Motivation	Restoration	Protection	Protection	Protection	Restoration	Protection
Fire regime	Low severity (+ fire)	Mixed severity (+/- fire)	Mixed severity (+/- fire)	High severity (- fire)	High severity (- fire)	High severity (- fire)
Pattern of values	Dispersed (large trees)	Dispersed and prevalent (low 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						

Wildfire Suppression Response



Cohesive Strategy FAHC Conceptual Model
Range of Activities by Wildfire Timeframe



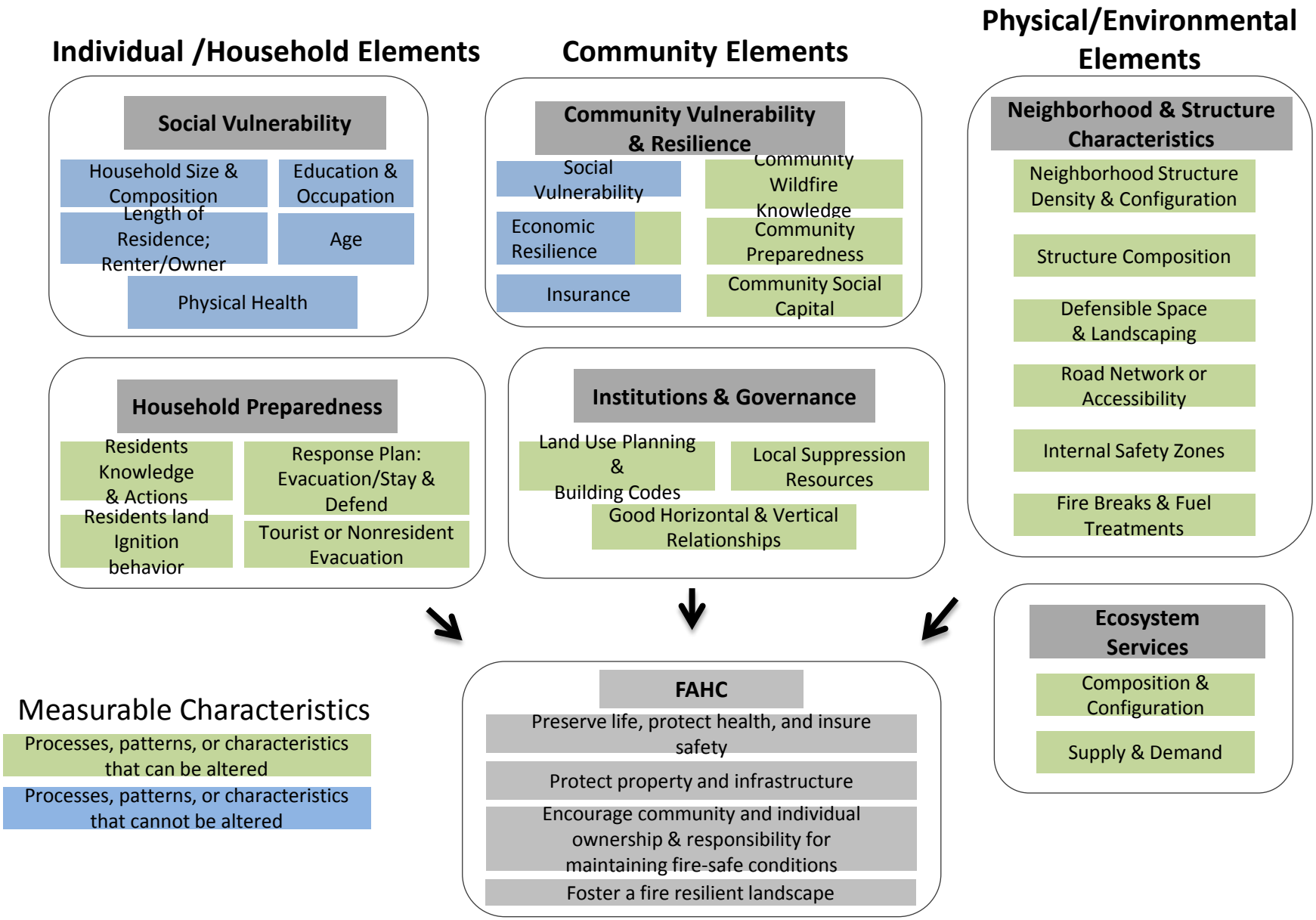


Combination of characteristics leads to

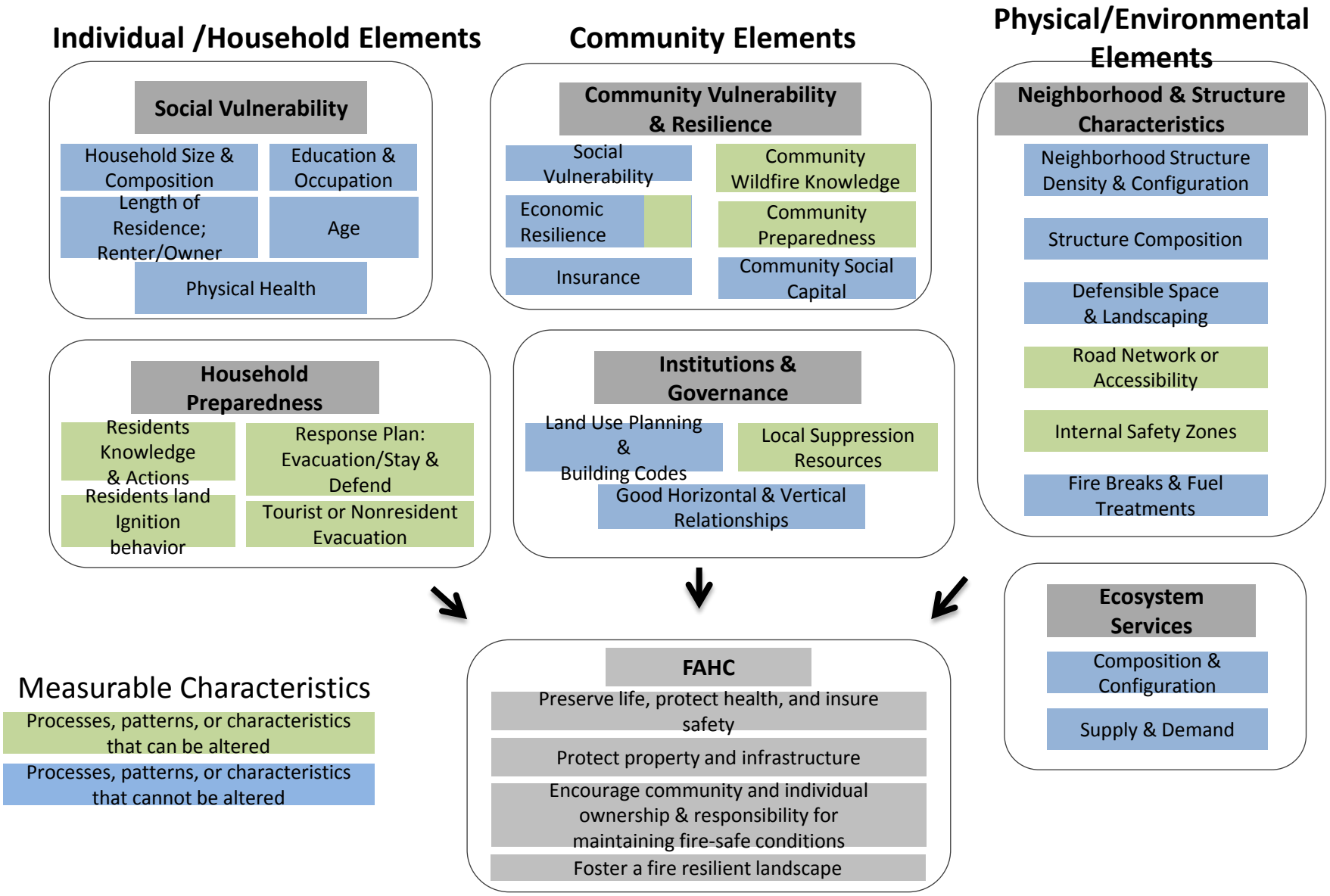
FAHC

- Preserve life, protect health, and insure safety
- Protect property and infrastructure
- Encourage community and individual ownership & responsibility for maintaining fire-safe conditions
- Foster a fire resilient landscape

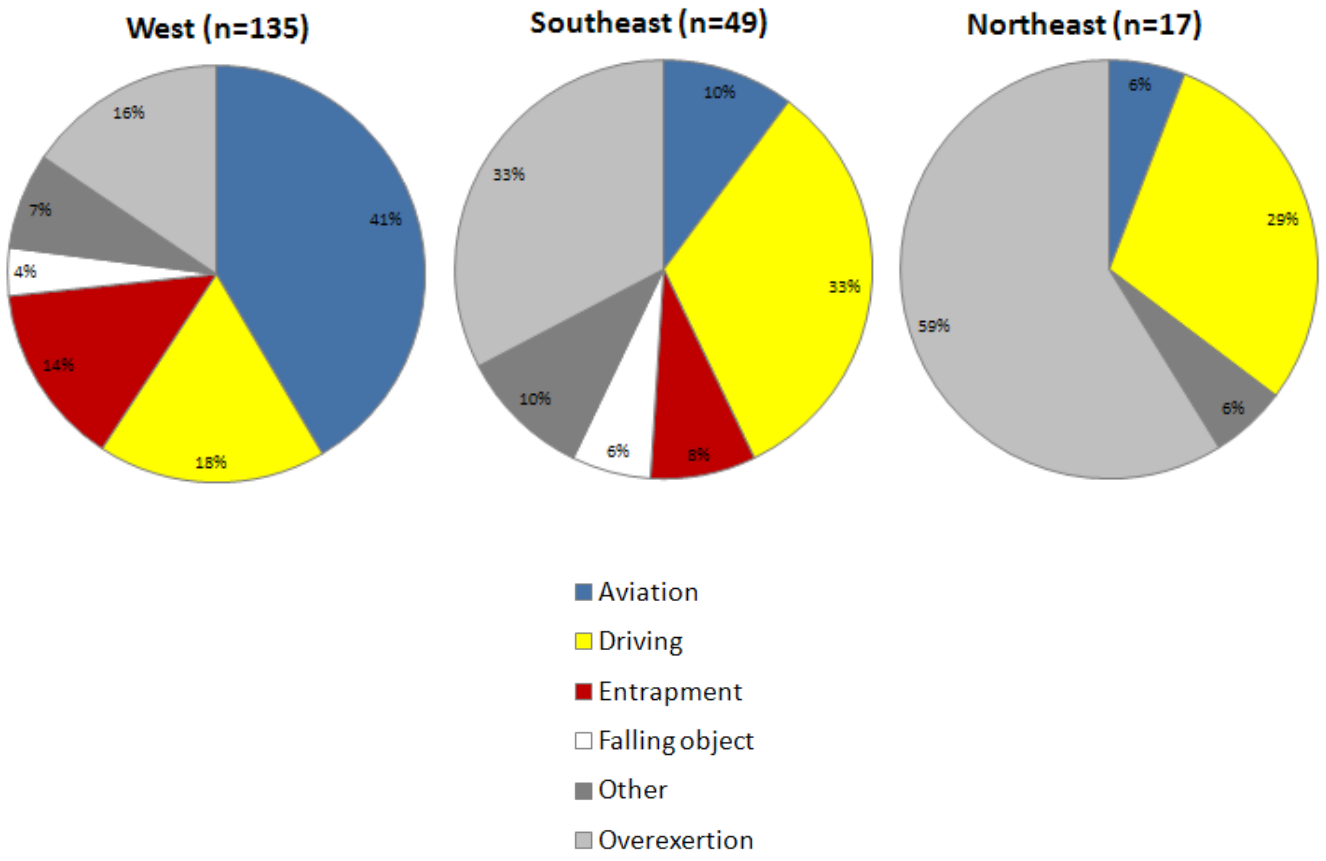
Conceptual Model for FAHC before and after wildfire event



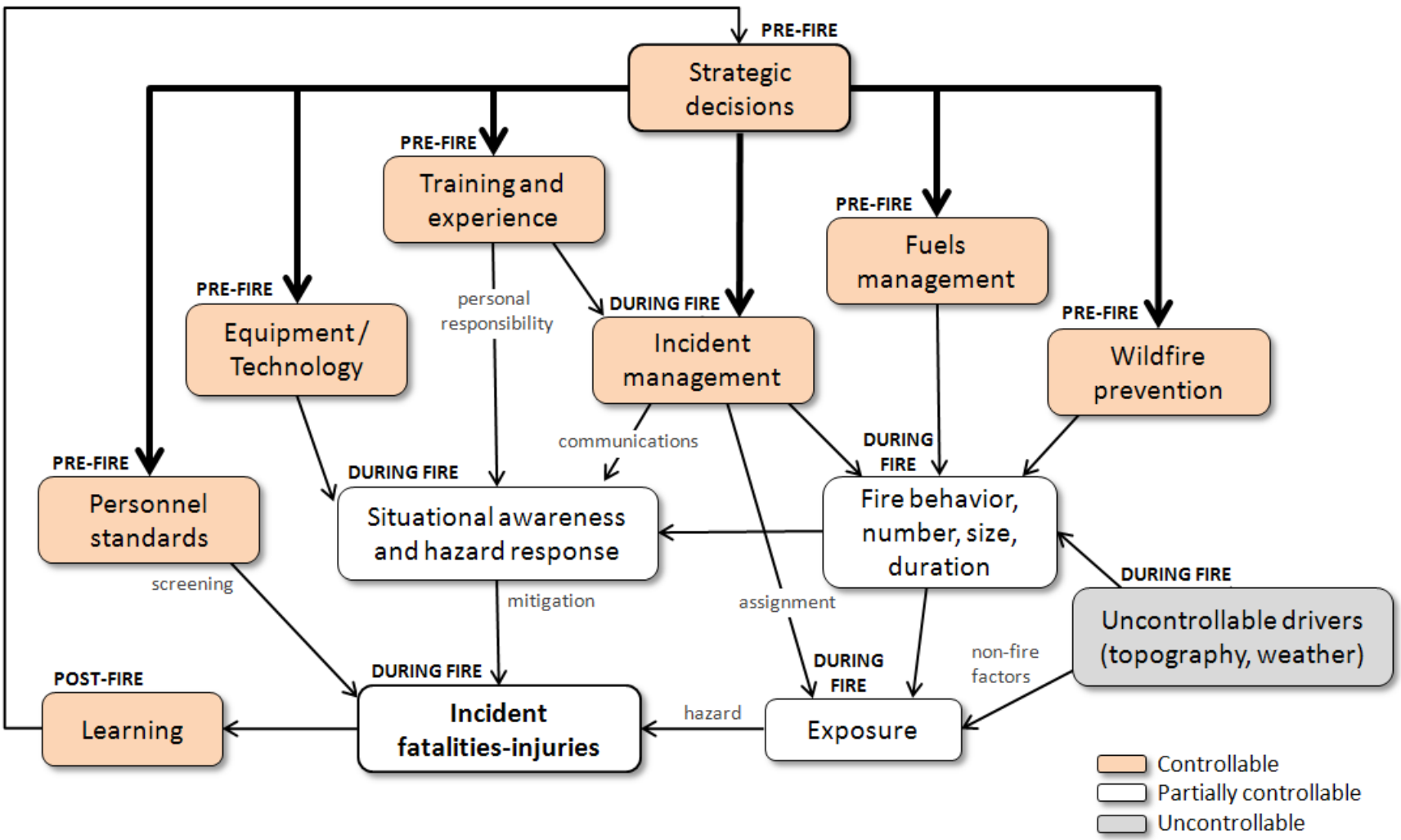
Conceptual Model for FAHC during wildfire



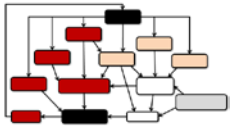
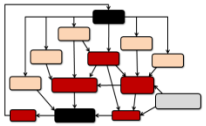
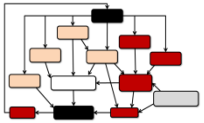
Cause of death for wildland firefighters 2000-2009 for all jurisdictions by the Cohesive Strategy Region in which the fatality occurred. Categories have been reclassified from the National Fire Administration's Fallen Firefighters Database based on incident descriptions.



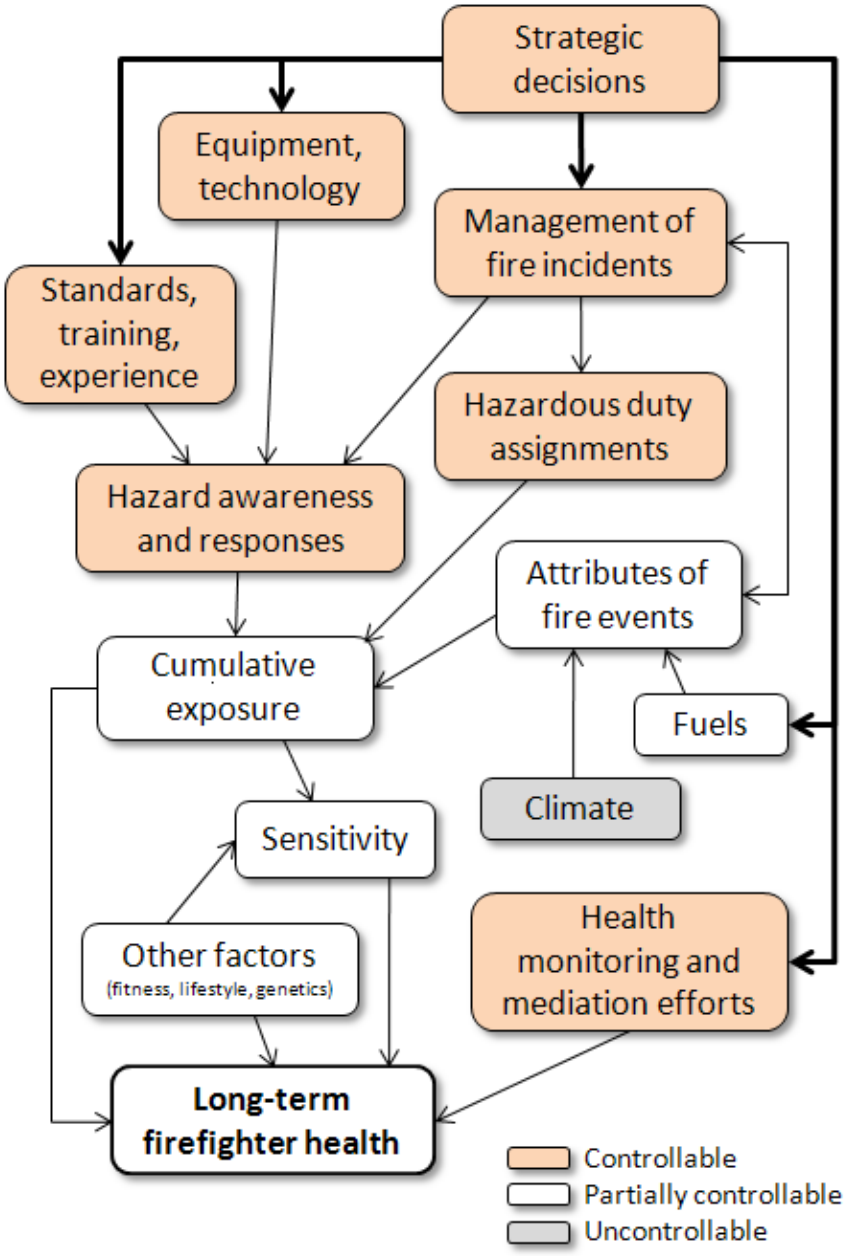
An integrated conceptual model for firefighter safety related to incidents.



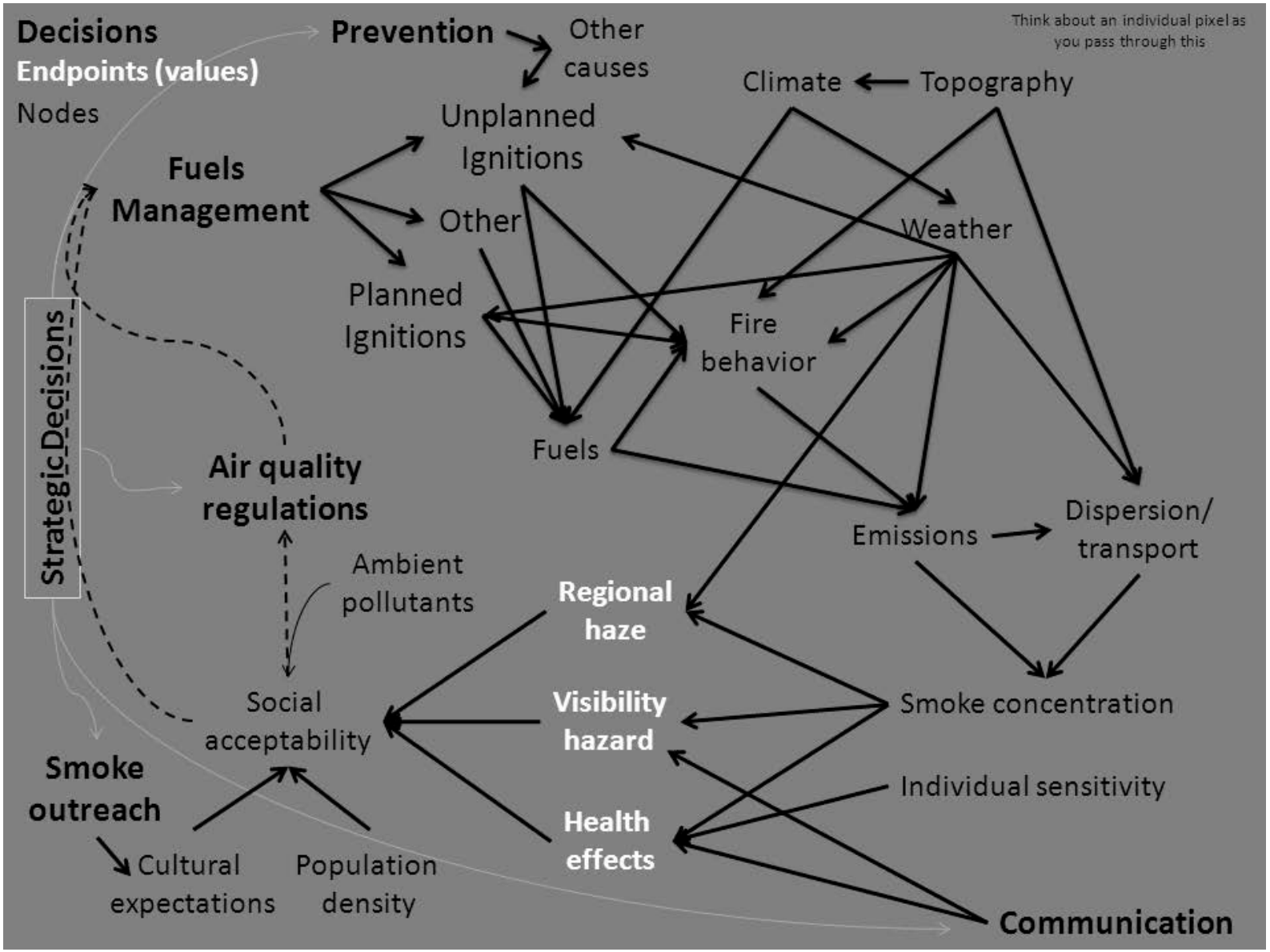
Pathways to reducing firefighter deaths and injuries and associated strategic investments.

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

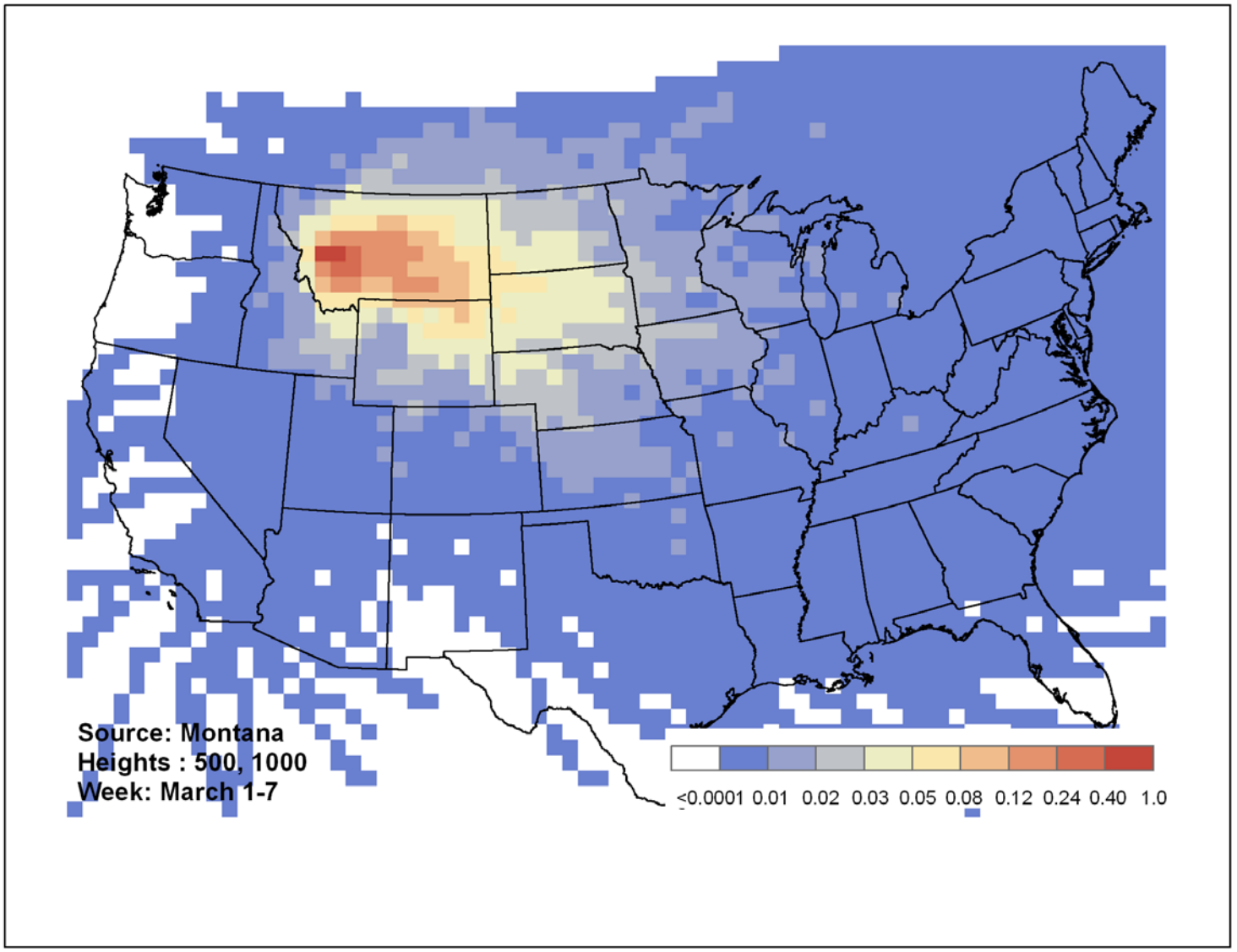
A conceptual model for long-term fire-fighter health.



Conceptual Model of Smoke Management and Impacts



Potential smoke impact from a fire in Montana illustrating the need for a transfer function.



Expectations for Phase III

1. Translate conceptual models developed in Phase II into quantitative models.
2. Compile and integrate appropriate data needed to quantify and validate the relationships presented in the models.
3. Identify performance measures that can be used across all regions and within a given region.
4. Identify geographic variations in the quantitative models to reflect appropriate differences across the regions.
5. Interact with the RSCs and WGs to validate the models.
6. Explore potential management options across the regions that reflect the decision space available for broad national and regional choices.
7. Interact with the regional committees to iteratively identify and refine regional strategies.
8. Conduct and document the comparative risk analyses – national tradeoff analysis.

Conclusions

- Fine-scale processes tend to be better understood than broad-scale processes or strategic issues.
- There has been considerably more research focused on the biophysical aspects of wildland fire than has been directed at equally important socio-political issues.
- Integrated research efforts that focus on interactions among human and physical factors are becoming more common and are highly promising.
- Data from Federal agencies is decidedly more complete and accessible than from other entities.

Conclusions

- Collectively, the conceptual models create a rich tapestry that illustrates the extensiveness, complexity and interconnectedness of wildland fire. Along with the information summarized on existing analytical models and data sources, the conceptual models provide a strong foundation for building more rigorous models in Phase III.

- Moving forward and building models that can provide quantitative estimates of risk to social values will not be easy. Each of the subteams identified limitations in available data and understanding that will pose challenges to overcome.

- Finally, remember that the work of the NSAT does not occur in isolation. All of the governing committees and advisory groups within the Cohesive Strategy have a continuing role in ensuring that the analyses are matched to the most important questions, utilize the best available understanding and data, and provide results that can be understood by all.