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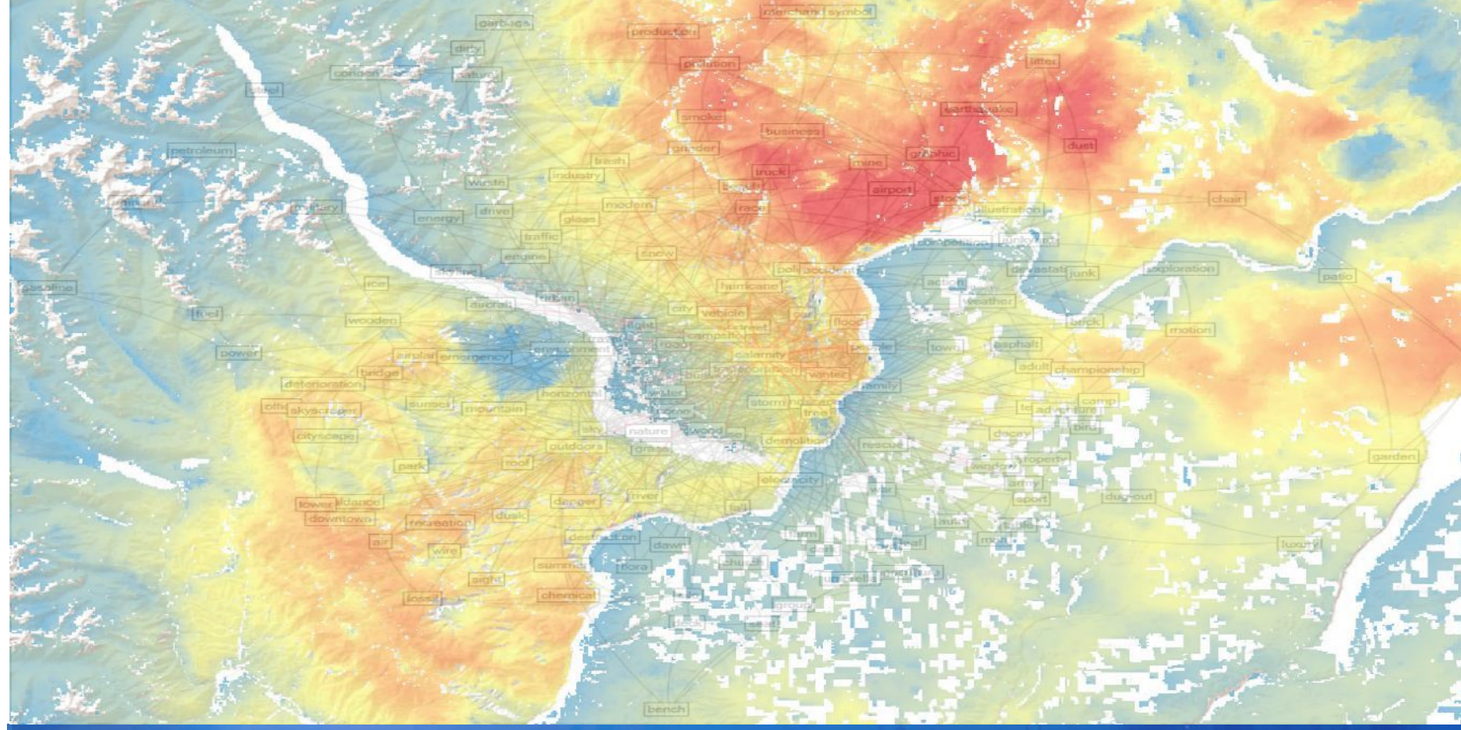
# AI Modeling & Data Analytics for Wildfire Preparedness, Mitigation, and Response

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Washington State House Innovation, Community & Economic Development, and Veterans Committee





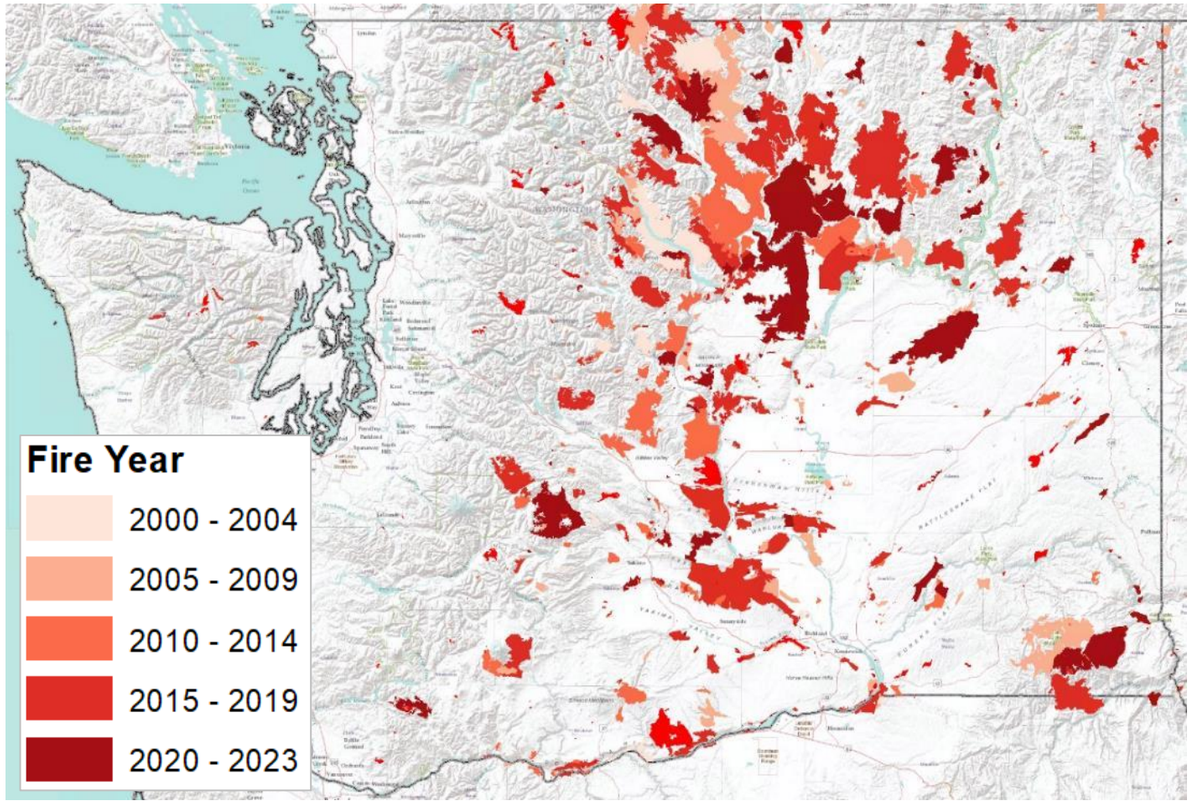
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UNCLASSIFIED

# Wildfires in Washington occurring more frequently and with increasing burn area

*WA Burn Area (5-year Groups)*




*Fire is prevalent in both **forest** and **rangelands***

**2,403** **Wildland fires** since 2000

**8.6** MILLION **Number of acres burned in Washington since 2000**

**19%** **Portion of state in burn area**

**256k** ACRES **Largest burn area** (Carlton Complex)

**17** **Fires greater than 100,000 acres** (13 since 2014)

**190k** ACRES **Burn area average 2000-2009**

**386k** ACRES **Burn area average 2010-2019**



# AI-powered tools increase utility of existing data and ability to solve complex problems

## Challenges of standard analytics

- Outdated datasets used in models to inform today's conditions
- Monitoring frequency isn't keeping pace with highly dynamic events
- Inconsistent modeling and analytics approaches across organizations
- Lack of common data and tools across jurisdictions and entities

## Advanced analytics

- Integrate multiple sources of data to consistently inform on hazard risk
- Automated data retrieval and AI models help provide frequent data and analysis updates
- Enable downstream consequence analysis beyond the hazard itself
- Provide accessible, intuitive, and actionable products to a variety of end-users

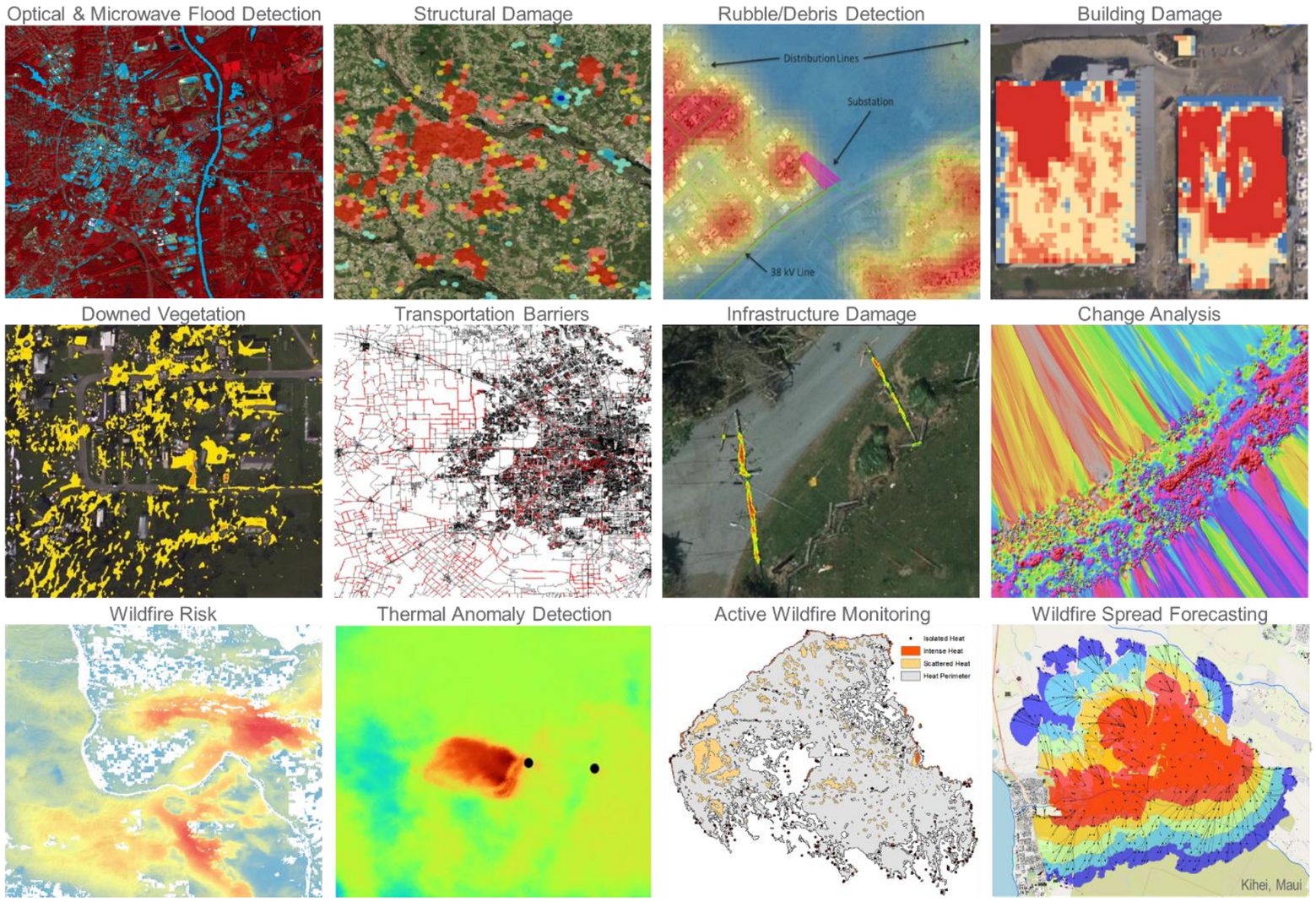
# Rapid Analytics for Disaster Response

## RADR: A multi-risk assessment, situational awareness and forecasting system

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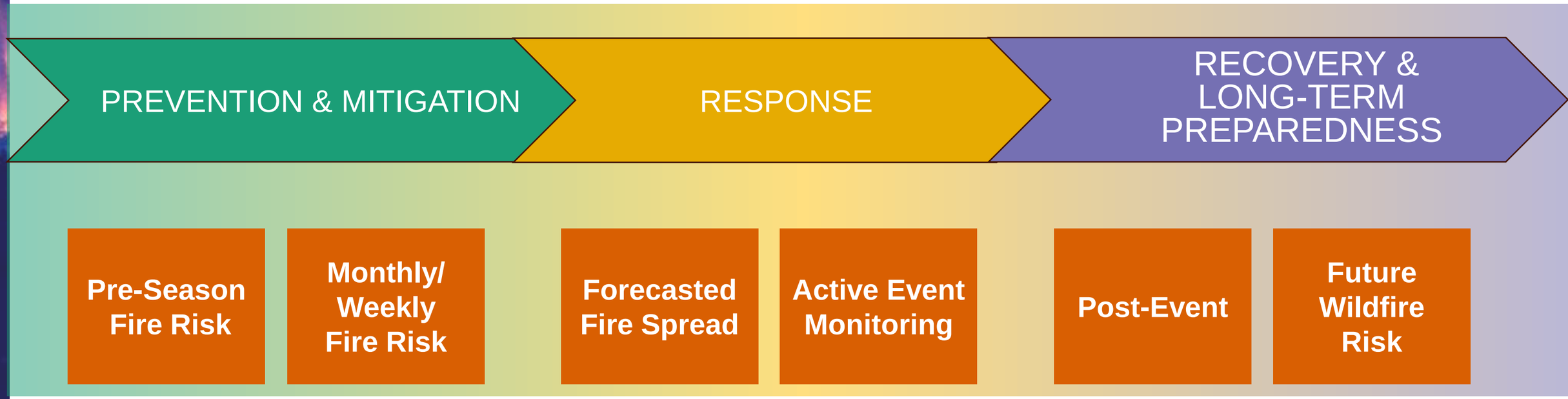
RADR

2020 R&D 100 WINNER




- Flood Detection
- Structural Damage
- Rubble/Debris Detection
- Building Damage
- Vegetation Damage
- Transportation Barriers
- Infrastructure Damage
- Change Analysis
- *Pre-Event Wildfire Risk*
- *Thermal Anomaly Detection*
- *Active Wildfire Monitoring*
- *Wildfire Spread Forecasting*

# Different types of models enable triple-line defense for wildfire resiliency



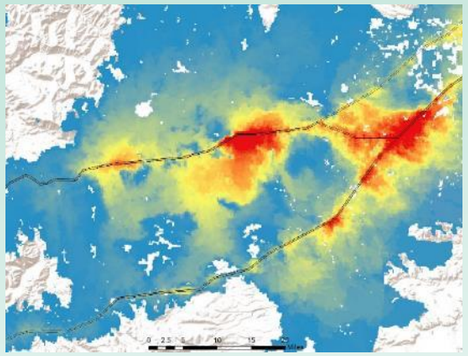
# Models for prevention and mitigation focus on pre-season and ongoing fire risk

PREVENTION & MITIGATION

**Types of Data**

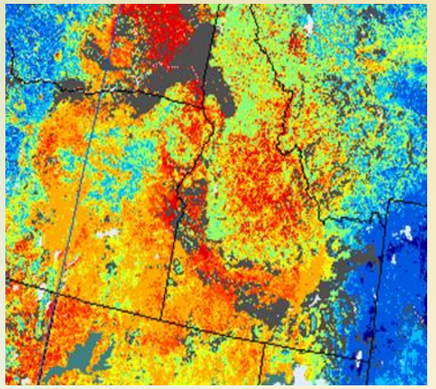
## Pre-Season Fire Risk

- Historic meteorology
- Fire occurrence, size, and duration
- Seasonal analogs
- Latest fuelscape
- Probabilistic risk modeling
- Corridor-specific risk



## Monthly/Weekly Fire Risk

- Current meteorology
- Latest fuelscape
- Fuel moisture state
- Soil moisture state
- Wildfire risk + spread



**Applications**

- Vegetation Management
- Infrastructure Hardening
- Community Resiliency
- Consequence Analysis
- Planning, Preparedness, Monitoring, & Policy Actions
- Infrastructure & Site Operations

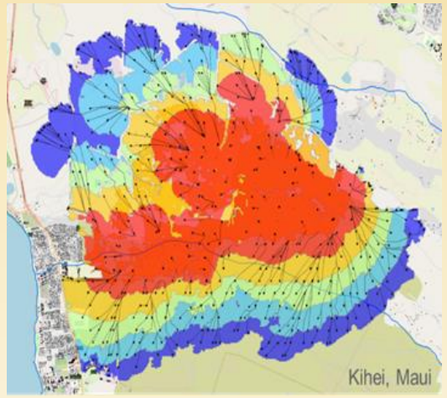
# Models for response include forecasts and monitoring of active events

RESPONSE

## Forecasted Fire Spread

**Types of Data**

- Current meteorology
- Forecasted meteorology
- Vegetation state
- Fuel moisture
- Ignition point scenarios
- Active fire front(s)
- Spot fires

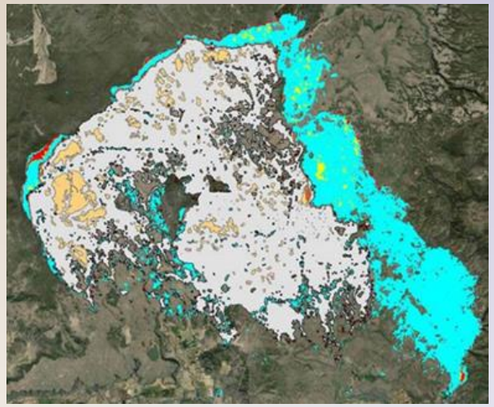



**Applications**

- Resourcing & Response
- Community Protection / Targeted Maintenance
- Evacuation
- Infrastructure & Site Operations

## Active Event Monitoring

- High-resolution satellite imagery (sees through smoke)
- 3-4x/day coverage
- Automated mapping and delivery
- Community and asset exposure risk



- Situational Awareness
- Resourcing & Response
- Infrastructure & Site Operations

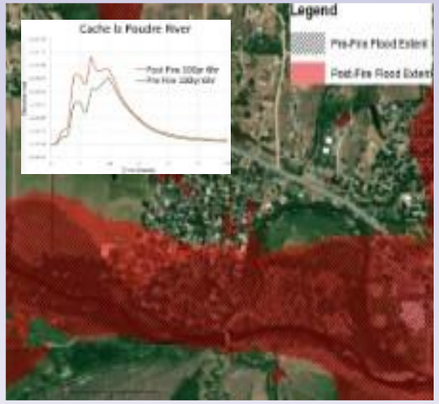
# Models for recovery and preparedness consider post-event data and future risk

RECOVERY & LONG-TERM PREPAREDNESS

**Types of Data**

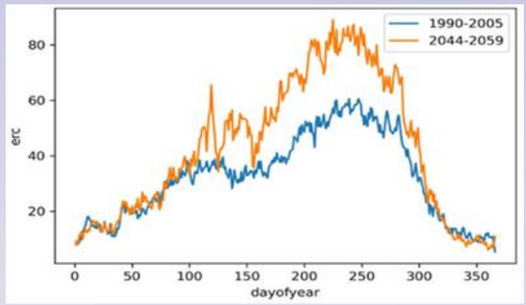
## Post-Event

- Damage inventory
- Burn severity
- Vegetation state
- Soils & topography
- Projected/design storms
- Downstream asset risk




## Future Wildfire Risk

- Climate projections
- Vegetation dynamics
- Land management
- Wildfire risk modeling




**Applications**

Flood Risk

Landslide Risk

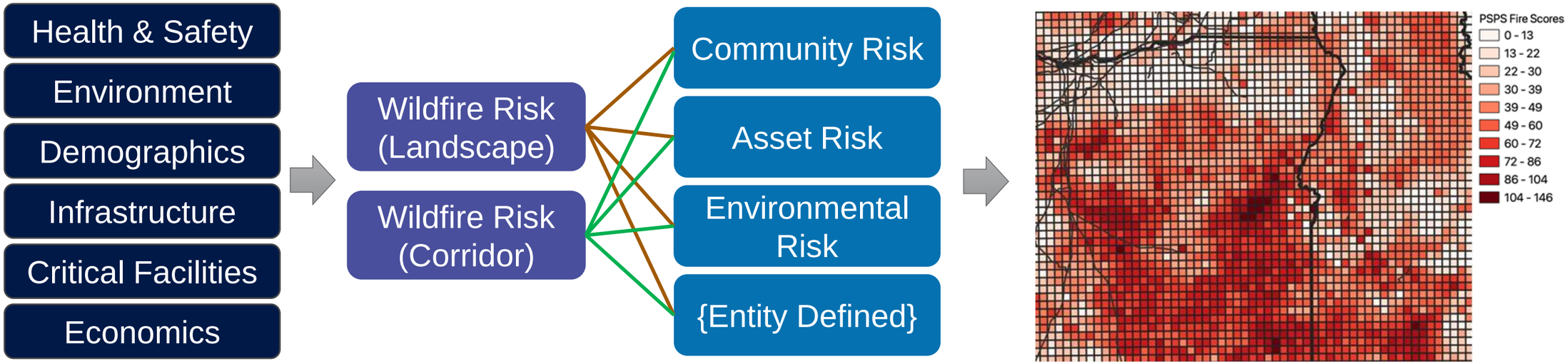
Recovery

Monitoring

Long-Term Planning & Mitigation

Policy Development

# RADR weighs hazard consequences to inform highest priority actions and investments




*User-Defined Priorities*

*Fire Modeling Scenarios*

*Topic-Level Consequence Risk*

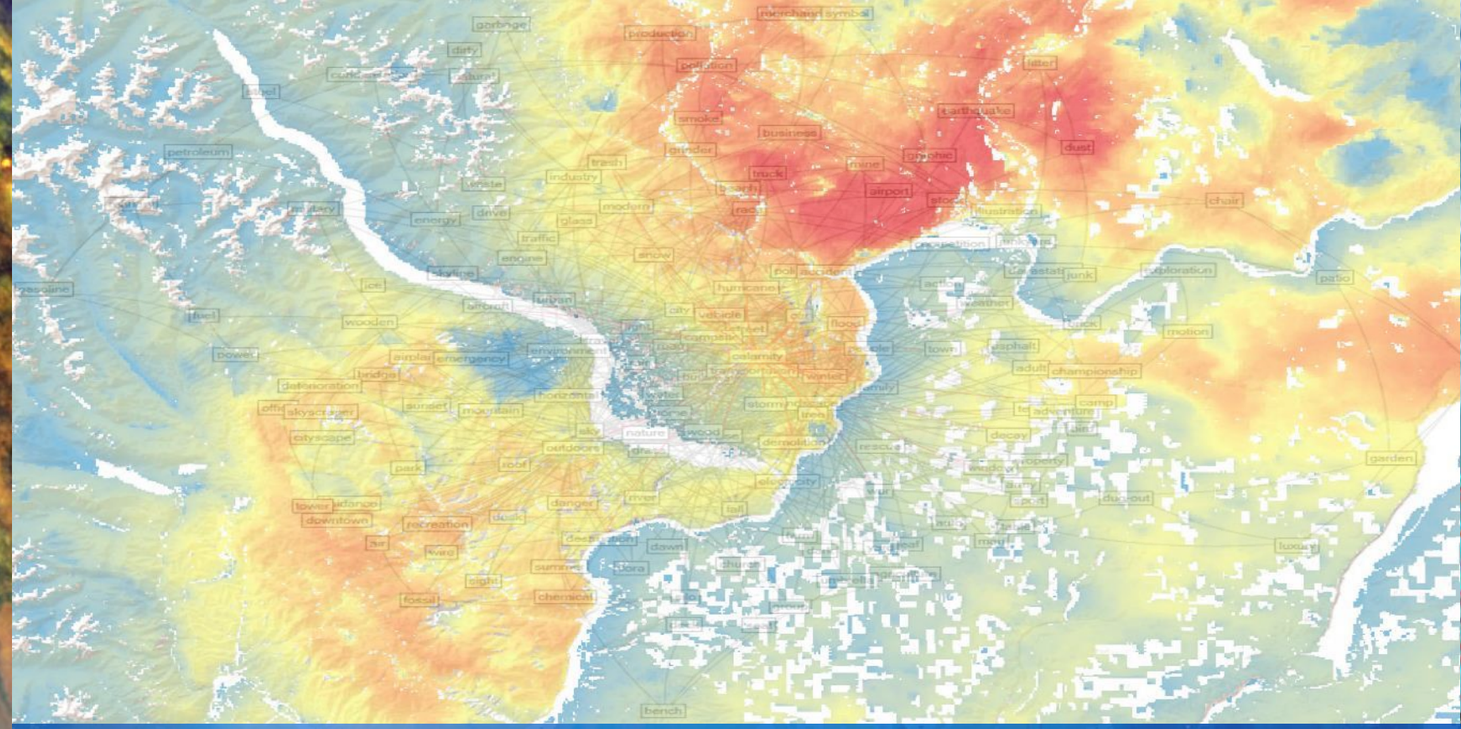
*Compound Consequence Risk Score*



# Conclusion

- Washington could leverage federally funded R&D and AI models to improve analytic tools for wildfire risk assessment, mitigation, response, and recovery.
- Development of validated, trusted data, models, and tools can help entities build a common understanding and coordinate actions based on current information.
- PNNL welcomes partnerships that continue the path of innovation to evaluate, validate, or integrate new hazard analytics products into decision-making or workflows.







# Thank You

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