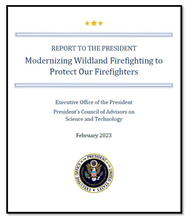
Critical Wildfire Intelligence Gaps: Near- and Medium-Term Solutions

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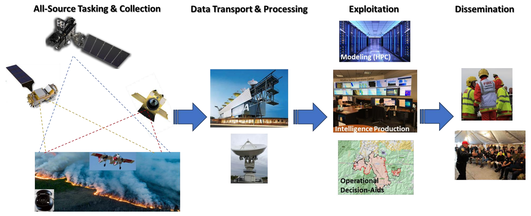
PROBLEM STATEMENT

- In a 2023 report, the U.S. Congress Joint Economic Committee estimated an annual economic burden from wildfires of $394 - $900 billion. This impact is amplified by the increasing expansion of people and critical infrastructure into fire adapted ecosystems known as the wildland-urban interface (WUI). Wildfire stakeholders have identified numerous capability gaps across the wildfire intelligence value chain. Findings from 2023 studies by the President's Council of Advisors on Science and Technology (PCAST) and a Congressionally directed Wildland Fire Mitigation and Management Commission amplified the call for increased Federal investment strategy to narrow the gaps.





Wildfire Intelligence Value Chain



APPROACH

- Building on insights from document review and dozens of stakeholder/user interviews, we conducted deep dives to address seven gaps in pre-fire and active-fire intelligence representing an important subset of wildfire critical capability gaps.
- We binned solutions into mature, current (2024) technology available to address gaps and emerging capabilities project to be relevant and mature by 2034.
- The seven critical gaps address six wildfire mission threads

Capability Gaps

Mission Threads	Fuels Intelligence	Wildfire Detection	Persistent Wildfire Surveillance	Weather Intelligence	Data Integration & Interoperability	Unmounted Firefighter Tracking	Last Mile Connectivity
Fire Planning	X	X	X	X	X		X
Incident Command & Control	X	X	X	X	X	X	X
Fuels Management	X		X	X			
Fire Weather & Smoke Forecasting	X	X	X	X	X		X
Fire Behavior Analysis	X	X		X	X		
Fire Danger Risk Analysis & Warnings (pre-fire)	X			X			

KEY FINDINGS

Weather Intelligence

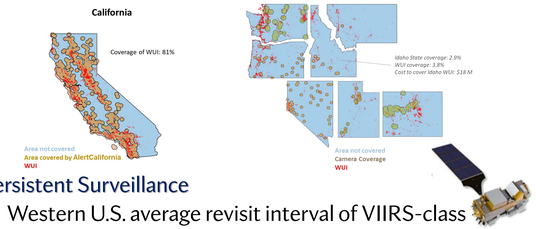


- Gaps are minimal relative to other areas
- Recommendations:
  - *Establish a Joint National Fire Env. Center benchmarking NOAA's Water Office with main hub and 9 regional centers*
  - *Increase the of Remote Automated Weather Stations (RAWS); expand Incident RAWS (IRAWS) pool; add soil moisture capability*
  - *Strengthen wildfire modeling to operational 24/7 cycle*
  - *Enhance boundary layer measurements in active fires with small UAVs*
  - *ROM cost: > $200 M initial investment; > $100 M/yr O&M*

KEY FINDINGS

Detection

- Fixed wildfire cameras are mature, proven tech that provides fast detection/notification (i.e., within minutes)
- Recommendations:
  - *Expand deployment of ground-based, AI-enabled fixed wildfire cameras across WUI*
  - *ROM Cost (proliferate cameras): $185 M (includes 10 years O&M)*
  - *ROM Cost (comprehensive AI upgrades): $415 M*

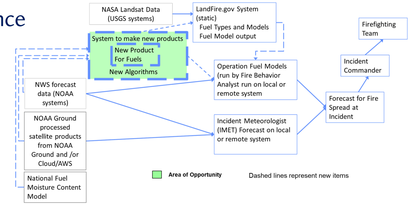


Persistent Surveillance

- Western U.S. average revisit interval of VIIRS-class instruments decreases from 180 to 90 minutes by 2030
- Game changer (by ~2030) will be commercial wildfire constellations if fully realized with local revisit ~10 min
- Recommend U.S. Government engage commercial offerors to accelerate deployment of new capabilities
  - *ROM Cost: $55 - $100 M/year*

Fuels Intelligence

- Ripe for improvement with reduced stove-piping, and new products and wildfire fuels system



- Recommendations:
  - Invest in improved exploitation of existing data and growing commercial hyperspectral capabilities
  - Create new consolidated Fuel Intelligence System to improve timeliness, cost and fidelity of fuels products

KEY FINDINGS

Unmounted Firefighter Tracking

- Mature, piloted commercial solutions are available
- Recommendation: Fund to deploy at scale
  - *ROM cost: $5 M up front, $300 K per year to replenish (12000 units)*

Data Interoperability & Integration (Data I&I)

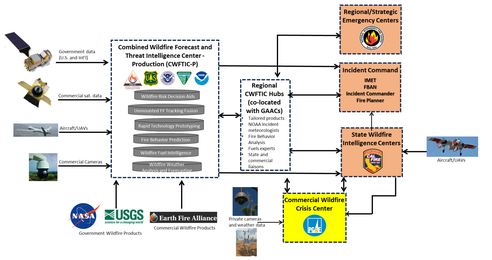
- COP across local, state, Federal responders to wildfire would boost firefighter safety and tactical decisions
- Recommendations: Establish data standards, acquire/deploy Team Awareness Kit (TAK), engage product centers and gvmt TAK users

Last Mile Communications

- Mature options available – all require extensive training and robust IT support. Successful Data I&I depends on closing last mile comm gap. Resilience is important.
- Recommendations: Leverage TAK; consider SATCOM solutions; watch non-terrestrial network (NTN) handsets

COMBINED INTEL CENTER

- Based on cross-cutting analysis, we recommend establishment of a **National Combined Wildfire Forecast and Threat Intelligence Center** to pool compute, accelerate RTO and provide timely, authoritative wildfire intelligence equitably across U.S.



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