Opportunity Assessment Working Group Report

Wildfire Science & Technology Commons
October 2025

Executive Summary

The Opportunity Assessment Working Group is focused on systematically identifying critical innovation gaps in wildfire management to ensure the Wildfire Commons can support the development of relevant open science and technology solutions. Convened monthly from February through October 2025, this working group organized priority areas where the Wildfire Commons can contribute most effectively to supporting innovation. Key activities included assessing wildfire management challenges and developing targeted initiatives such as hackathons, data challenges, innovation challenges, pathfinders and community case studies to close identified innovation gaps through community engagement.

Working Group Members:

- Mark Brown, Marin Wildfire Prevention Authority
- Mikhail Teverovskiy, Imagenomix Corp.
- Josh Wilkins, BurnBot
- Ken Kempter, Cal OES
- James Zollweg, SUNY Brockport
- Ertugrul Taciroglu, UCLA
- Matthew Thompson, Pyrologix / Vibrant Planet
- Kevin Vogler, Filsinger Energy Partners
- Bryce Young, Pyrologix / Vibrant Planet

Working Group Analysis

<u>What gaps, barriers, or unmet needs for wildland fire solutions does the Wildfire Commons fill?</u>

The Wildfire Commons addresses the community's need for a centralized framework within the fragmented ecosystem of wildfire research and management. Currently, experts from diverse fields, including forestry, weather, data science, emergency management, public health, and firefighting, operate mainly in isolation. With the common driving challenge to unify these experts to better plan and manage large-scale wildland fires, the Wildfire Commons acts as a comprehensive single source for all current data, models, and services.. The Wildfire Commons is collaborating with the community to establish standardized and validated methods, along with proven ground truthing of new data sources. Through the Wildfire Commons, data and tool sharing are made possible, allowing for the benchmarking of risk assessment tools and matching stakeholders with new research approaches. We have an opportunity to offer a multisided view on the wildland fire solutions by unifying experts from multiple fields and supporting cross-organizational collaboration through the Pathfinders initiative. At its core, the

Wildfire Commons provides a single place for all people with wildfire interests to meet, share, and collaborate.

As identified above, the Wildfire Commons audience is diverse. Community members are widely separated by geography and job type/responsibility. However, they all benefit from learning from fellow experts in the various fields to improve their own work. Not only does it encompass various domains that study the ways wildland fires occur and evolve in both wildlands and the wildland urban interface (WUI), but it is also dynamic due to the type of personnel entering the community with expertise. The community of use through the Wildfire Commons are those who are looking to understand the risk and impact of wildland fires globally. Multiple disciplines and agencies have the opportunity for collaboration. The outputs of the Wildfire Commons, including integrated data, models, and services from the community, benefit the broader understanding of risk and planning around wildland fire resilience. The driver for the community is to collaborate and multiply the impact of ongoing work on this complex challenge. The solution requires mobilizing resources and developing an integrated strategy between key stakeholders.

What do other similar efforts to the Wildfire Commons do well that we could learn from (community sharing examples, technical examples, etc.)?

A few efforts that can be reviewed to explore growing the Wildfire Commons include:

- Defense Innovation Unit (DIU) - they have adopted a process to provide rapid validation and adoption of new technologies. Entities like DIU face the same fundamental problem, how to bring in new technologies, testing and developing, and new contracting through a persistent delivery from rapid innovation. Looking at scalable structures connecting broad-impact challenges with scalable solutions.
- NHERI SimCenter and NHERI DesignSafe-CI - are good examples of community research and data sharing tools (as well as supercomputing access).
- NWCG public glossary of wildland fire to inform the community around common definitions and contribute back improved definitions.
- The Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) - although it is university-centered, it has significant outreach and collaboration efforts, primarily through extension-oriented institutions like state universities. CUAHSI's collection of citable assets, compute-by-default, standards for interoperability, and continuous training with role-specific landers, operational feeds, and cross-realm matchmaking (scientists ↔ first responders; consultants ↔ municipalities).
- NERIS - NERIS empowers the fire and emergency services community by equipping them with an empirical basis for decision-making. It will provide the community with reliable predictive analytics to support enhanced preparedness and response to all-hazard incidents, wildland urban interface events, community risk reduction efforts and associated resilience and mitigation efforts, and future pandemic emergency response resource preparedness.

What partnerships or collaborations could the Wildfire Commons pursue to launch the Marketplace (how to incentivize participation in the Marketplace, listing of solutions - what information is useful for the community, etc.)

To successfully launch the Marketplace, there are several key recommendations on what should be included to make the exploration and discovery experience productive for this active community. Products listed in the Marketplace should consist of:

- Context of how to use each product - methods and results of validation within the community
- Connections to pathfinder projects like (e.g. Marin County and Incline Village) where the use of data, models, and services can be highlighted in the context of specific community challenges
- Actionable information on how to set up an agreement with the team who listed the product to use it in different ways (e.g., research, operations or sample data)
- Specific to data products for the Community Catalog feeding into the Marketplace:
    - What kind of structure environment does the data apply to (e.g., interface high structure density vs. intermix low structure density)?
    - What kind of exposure mechanism does the data apply to (e.g., embers vs. flame/radiation)
    - What spatial resolution are the data
    - Do the data cover structures, vegetation, or both?
    - What temporal resolution or how recent are the data?

What trends or changes could benefit the further development of the Wildfire Commons?

Several technological trends position the Wildfire Commons for significant growth and impact. The Wildfire Commons brings to the wildland fire community access to powerful computers, sharing unified access to extensive collections of data, and future pipelines to share sensor and satellite data with the community. The Wildfire Commons also brings the capabilities of ML, AI, and reproducible science culture through JupyterHub through FireForge.

There are trends within the practitioner community to demonstrate and validate fieldwork with more models, providing feedback for researchers to help improve models through real-world use. Additionally, as more research emerges, the Wildfire Commons can be a place where data should link to the research findings. For instance, a map of building footprints with structure separation distance can have research, codes, and standards related to Gollner, Gorham, IBHS, NIST, NFPA, IWUIC, etc. Continued integration with FAIR and DOI norms in research would further enable the Wildfire Commons to drive good practice within the community.

Priorities for Next Phase of Working Group

Priority #1: Identify 3-5 Highest Priority Areas

Identify the three to five highest priority areas for the Wildfire Commons to help facilitate innovation through hackathons/challenges, pathfinders, case studies, and workshops with the global community working towards solutions.

Priority #2: Create Innovation Opportunity Matrix

Execute a systematic assessment of current wildfire management challenges to identify and prioritize the most critical innovation gaps where the Wildfire Commons can have maximum impact. Develop an innovation opportunity matrix to identify innovation gaps by impact and feasibility.

Priority #3: Design High Impact Community Collaborations

Develop and implement a series of focused data challenges, hackathons, and collaborative workshops that directly address high impact innovation gaps in priority areas.