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Building the Innovation Infrastructure for California's Utility Wildfire Safety Regime

From utility-by-utility compliance to a well-governed digital commons

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Committee on Utilities and Energy
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SCIL Societal Computing and Innovation Lab

SAN DIEGO SUPERCOMPUTER CENTER

UC San Diego
HALICIOĞLU SCHOOL OF DATA SCIENCE AND COMPUTING







SCIL is a team of over 50 scientists, engineers, technologists and practitioners.

SCIL

The Societal Computing and Innovation Lab

advances scalable solutions to complex societal challenges.

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15 Years of WIFIRE Program in SCIL



- Co-develop solutions with the fire management community
- Integrate cutting-edge science and data into new technologies
- Deliver tools that match the scale and complexity of wildland fire

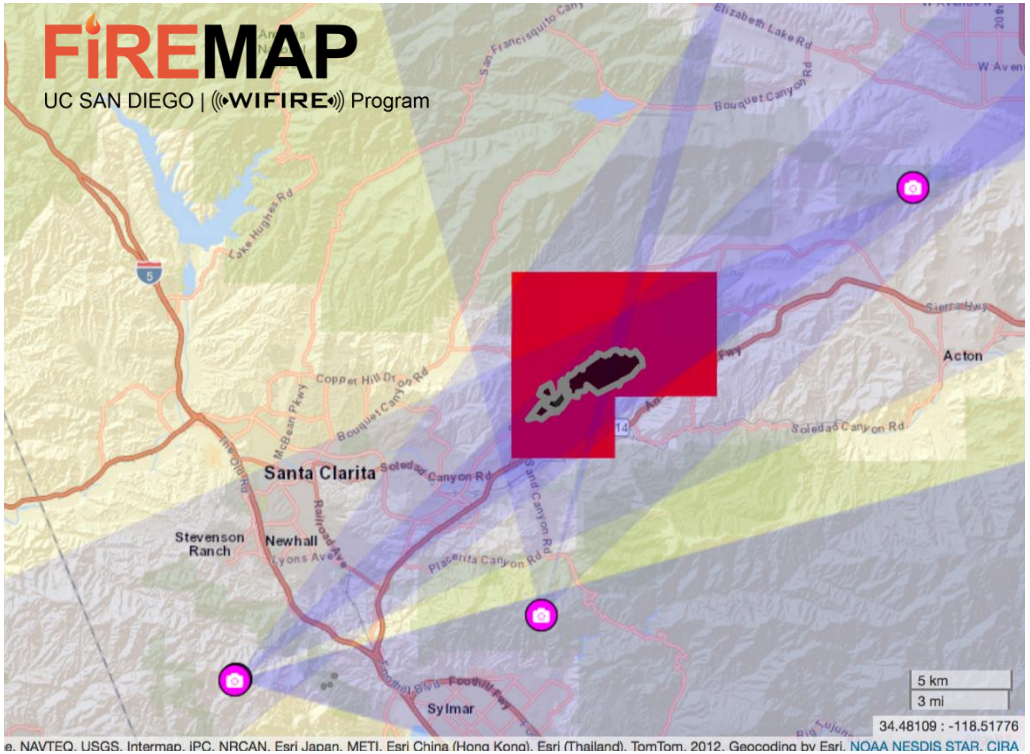
FIREMAP BurnPro3D WxMap Points2Pano

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Our team models every fire across California in near-real time as part of FIRIS

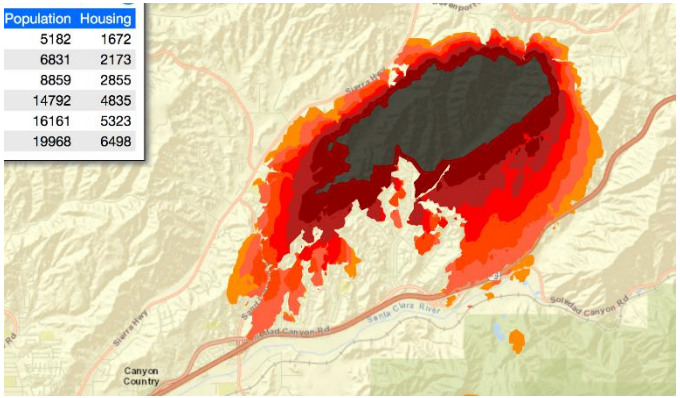
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Cal OES
GOVERNOR'S OFFICE OF EMERGENCY SERVICES





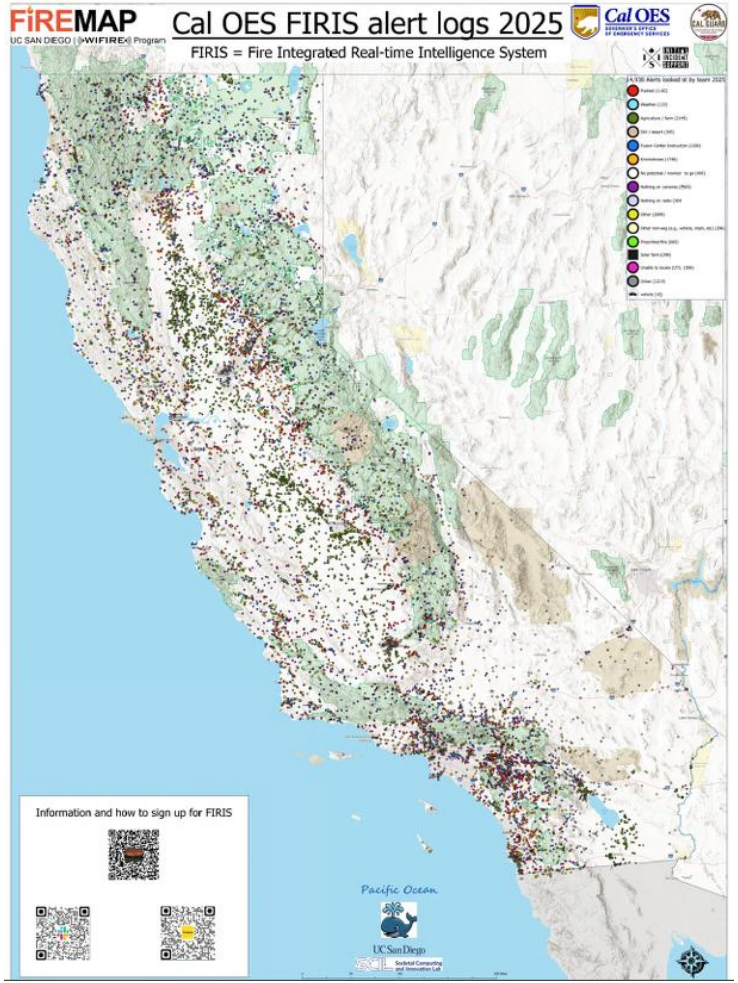
Population	Housing
5182	1672
6831	2173
8859	2855
14792	4835
16161	5323
19968	6498



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In 2025, there were 14,938 alerts reviewed by modelers and 1,182 fire models pushed to local fire firefighters through CALOES.



Cal OES FIRIS alert map, 2025 — WIFIRE Fire Integrated Real-time Intelligence System



Growing from a research prototype to a statewide program meant that reliability, staffing, training, and long-term partnerships were as essential as the computational workflows themselves.

FIREMAP
UC SAN DIEGO | WIFIRE Program

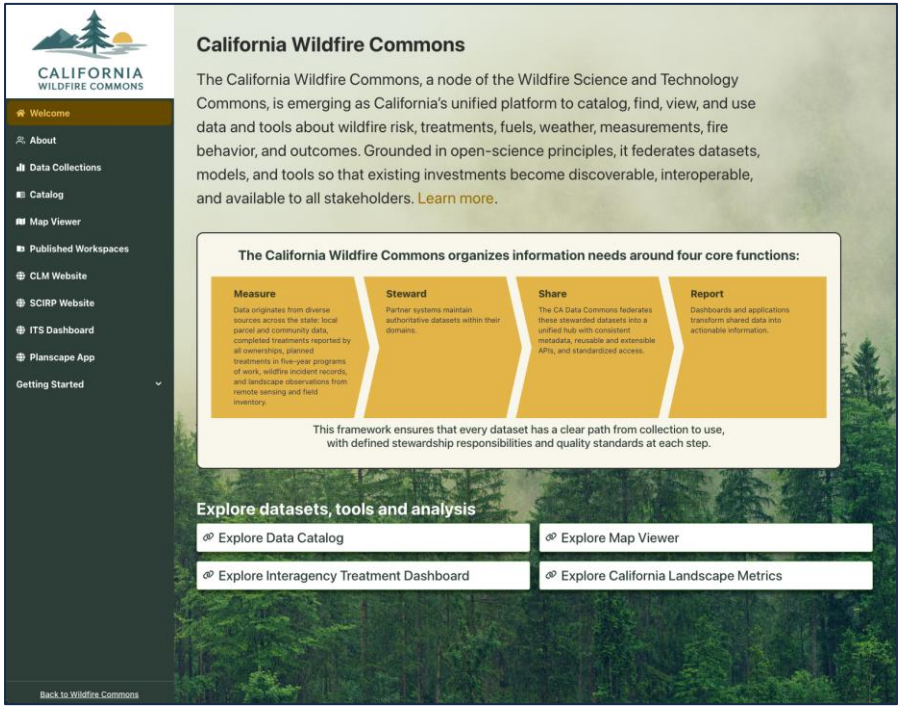
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Lessons Learned from WIFIRE

We need to enable the collective capacity with a digital innovation infrastructure.

WILDFIRE SCIENCE & TECHNOLOGY COMMONS

https://www.wildfirecommons.org/



california.wildfirecommons.org

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California has made significant investments in wildfire safety.

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Digital assets these investments produce beyond physical infrastructure improvements

- Infrastructure & vegetation data
- Weather, fuels & fire history
- Ignition & fire-spread models
- Inspection & mitigation records
- Costs & risk-reduction estimates
- Science and AI models & tools

Are we building in a way that allows us to learn collectively from these investments?

Resilience

Better anticipation, mitigation, coordination and response through shared scientific knowledge.

Affordability

Transparent costs and benefits, less duplication, investments compared on consistent evidence.

Science & AI Readiness

A trusted, interoperable environment where new analytics, simulation and AI can be integrated, tested, validated and used.

The opportunity: make them shared, well-governed public-interest innovation infrastructure

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From Compliance to Collective Learning

1
In place

Can we measure what utilities are doing?

Largely yes: Energy Safety reviews wildfire mitigation plans, CPUC reviews costs; Utilities submit quarterly GIS, activity, target and cost data.

2
Partial

Can we independently determine what works, where, and at what cost?

Needs comparable evidence, documented assumptions, reproducible methods and qualified independent evaluators.

3
The gap

Can one organization’s innovation benefit the rest of California?

Needs shared infrastructure, not disconnected organizational solutions. This is where a commons extends today’s regime.

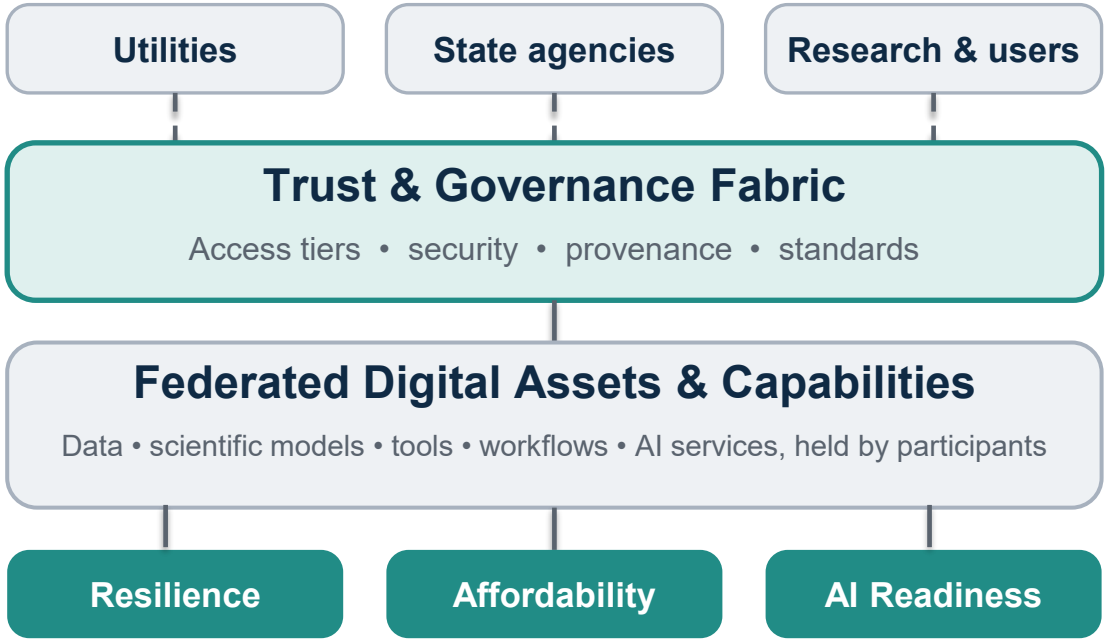
Reporting for compliance is not the same as interoperable, reusable, validated capability.

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Opportunity: A Utility Wildfire Digital Commons

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Federated and governed: complementary capacity where participants retain their own systems, maintain their operational responsibilities and share&steward approved assets using established shared standards, trusted access, and interoperable capabilities.



WHAT IT IS NOT

- ✕ A single centralized database
- ✕ A mandate to publish sensitive data
- ✕ Another proprietary platform

TIERED ACCESS

Public
Open information & summaries

Approved
Research & regulatory access

Controlled
Sensitive operational data

Precedent: *existing confidentiality rules; CEC's Energy Data Analysis Program for controlled analytical access.*

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Five Principles for a Commons

Public-interest stewardship

Not necessarily public ownership, but clear rights to discover, evaluate and reuse ratepayer-funded assets.

Interoperability over centralization

Common interfaces, metadata and semantics on top of utility-controlled operational systems.

Governance as an enabler

Classification, access, IP, provenance, validation and cybersecurity designed in from the start.

Measured effectiveness

Affordability via evidence: compare mitigation options, quantify uncertainty, weigh cost against risk reduction.

Scientific accountability

Models and AI independently testable and explainable continuously; humans oversight for safety decisions.

The shared infrastructure itself must also be evaluated for its operating cost and demonstrated benefit.

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A phased path toward a Commons…

Start with what exists and prove value through a pilot before expanding.

Short-term

Digital Asset & Access Assessment

- Inventory data, models, tools, workflows and sharing agreements
- Map standards, interoperability gaps and confidentiality limits

Medium-term (6-12 Months)

Multi-stakeholder Governance Pilot

- Energy Safety, CPUC, CEC, CAL FIRE, utilities, universities, ratepayers
- Define access tiers, standards, evaluation protocols

Continuously

Launch a Federated Commons

- Use cases: ignition risk, vegetation management, mitigation cost-benefit
- Measure reproducibility, cost and usefulness

Move from utility-by-utility mitigation to an ecosystem that learns collectively, so every investment builds shared capability for safer, more affordable, AI-ready solutions.

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