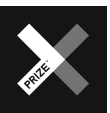# XPRIZE WILDFIRE

WILDFIRE

PG&E

GORDON AND BETTY MOORE FOUNDATION

XPRIZE WILDFIRE AUTONOMOUS RESPONSE TRACK QUALIFIED TEAMS LOOKBOOK

AEROWATCH
BARCELONA, SPAIN

Aerowatch brings together a team whose diverse perspectives are essential for the successful deployment of innovative firefighting technologies: CATUAV; CTTC; Flare Bright; NSL; Pau Costa Foundation; Robotto; SkyCharge.

ABOUT THE SOLUTION

- Our project focuses on the rapid detection of fires using multiple data sources, including aerial and ground sensors, crowdsourced information, fire ecology, and historical data.

- Once a fire is detected, an autonomous network of unmanned systems is deployed to reach the fire within minutes and deliver a suppression agent.

- This network is continuously active in the territory to update relevant data and remain prepared for any emergency.

LEARN MORE: link
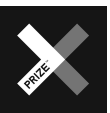
AGNI
DRESDEN, GERMANY

Team AGNI brings together the know-how of TRID Systems and Wildau UAV. TRID focuses on autonomous UAV systems and data analysis, while Wildau UAV is experienced in designing, manufacturing and integrating UAVs.
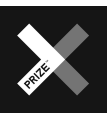
ABOUT THE SOLUTION

- The system comprises two types of autonomous UAVs working in a coordinated swarm.

- The first type includes fuel-powered jets designed to cover vast areas. These are equipped with RGB and infrared cameras, coupled with AI for fast and precise detection of smoke, fires, and other environmental factors.

- The second type consists of large copters capable of carrying substantial loads, such as water, for direct delivery to the detected fires.

LEARN MORE: link
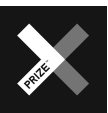
ANDURIL
COSTA MESA, U.S.A.

Anduril is a defense technology company bringing Silicon Valley engineering talent and experienced veterans to pioneer disruptive solutions for the most challenging missions.

ABOUT THE SOLUTION

- Leverages the TRL-9 Roadrunner (RR) solution–a reusable vertical take-off and landing Autonomous Air Vehicle with twin turbojet engines and modular payload configurations that can support a variety of missions.

- Roadrunner VTOL will be released over the fire, much like a return-to-base transition, and extinguish the fire using water saturated exhaust.

- Roadrunner is already fielded with Government partners across the globe.
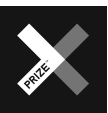
LEARN MORE: link

BAMF DRONES
MOORESVILLE, U.S.A.

BAMF Drones is based in Tidewater Virginia, with members in Colorado, California, and North Carolina.

ABOUT THE SOLUTION

- Fixed-wing VTOL UAV's solve the speed, range, and payload barriers for fighting wildfires.

- Advanced sensors and autonomous guidance enable large flights of small, inexpensive drones to carry effective payloads to targets miles away.

- Distributed networks of pre-staged standalone squadrons-in-a-box allow rapid response to incipient stage wildfires.

LEARN MORE: link

BLACKBEE ROBOTICS
BLACKSBURG, U.S.A.

BlackBee Robotics is a start-up engineering firm based in Blacksburg, VA, with a mission to provide innovative robotics solutions for a variety of industry problems.

ABOUT THE SOLUTION

- FIREWARD (FIre REsponse With Autonomous Reaction and Detection) is an innovative system built to combat wildfires using automation.

- A surveillance tower equipped with cameras monitors the surrounding area 24/7 for signs of incipient fires.

- Upon detection, a nearby "drone in a box" is autonomously deployed to reach the fire site. Using intelligent sensor fusion and onboard compute, the drone navigates above the fire and accurately deploys fire suppressing material.

LEARN MORE: link

FIREWARD Detector Node (AI-Generated)

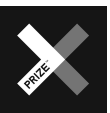FIREWARD UAS (AI-Generated)

FIREWARD Suppressor Node (AI-Generated)

CROSSFIRE
COLLEGE PARK, U.S.A.

Team Crossfire is a multi-disciplinary academic team from the University of Maryland with strong expertise in fire protection engineering, robotics, autonomous systems, and vertical-flight systems.
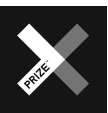
ABOUT THE SOLUTION

The Crossfire solution is based on customized available technologies and features multiple drones (large, long-endurance UAVs as well as small, multicopter UAVs), standard communication and navigation technologies, dual fire detection technologies (thermal and optical cameras), enhanced water-based fire suppression (water containers featuring an innovative rupture and dispersion mechanism), all integrated into a System of Systems using optimization methods, AI and machine learning algorithms.

LEARN MORE: link

DATA BLANKET

BELLEVUE, U.S.A.

A multidisciplinary group of experts with vast experience in Aerospace, Autonomous systems, AI, Computer vision, Comms and Military special operations.
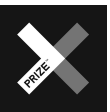
ABOUT THE SOLUTION

- Autonomously detects and suppresses incipient stage wildfires using proprietary AI swarm controller.
- The system plans, controls, and collects data from a swarm of different flying robots with various missions. These include fixed-wing and coaxial drones, which pinpoint and validate the fire, and deliver multiple payloads to suppress it.
- All drones can operate in severe weather and over complex terrain and work seamlessly within the same system.

LEARN MORE: link

DRYAD
EBERSWALDE, GERMANY

Team Dryad consists of experienced engineers and technologists whose mission is to greatly reduce the reaction time for tackling forest fires. Innovation is at the heart of everything Dryad does.

ABOUT THE SOLUTION

- Dryad's vision is to establish an extensive IoT network that enables both public and private forest owners to monitor, analyze, and protect the world's most vulnerable forests.
- Dryad's initial solution, Silvanet, focuses on the ultra-early detection of forest fires, able to spot smoldering fires within minutes.
- By significantly reducing response times, Dryad is playing a pivotal role in preventing forest fires.

LEARN MORE: link
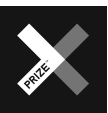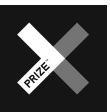
EMBER FLASH AEROSPACE
SANTA CRUZ, U.S.A.

Ember Flash Aerospace, based in Santa Cruz, CA, develops advanced unmanned air systems and integrates data analytics and decision-making tools to enhance situational awareness for disaster response.

ABOUT THE SOLUTION

- Autonomous Detection: Vigilant Detect sensors detect smoke, geolocate the fire, and notify community members and emergency responders.

- Rapid Assessment: Vigilant Phoenix UAS is alerted, rerouted to validate and assess the fire, providing real-time data to dispatch centers and responders.

- Effective Suppression: Using Phoenix data, the system activates the Vigilant Raptor UAS to deploy suppression agents, allowing responders to reach the mostly extinguished fire.

LEARN MORE: link

FIRE FORESIGHT
HOBART, AUSTRALIA

Fire Foresight is a global joint venture between data orchestrator Indicium Dynamics, machine vision provider RoboticsCats, Satellite AI builder Little Place Labs and customer drone builder Taz Drone Solutions.
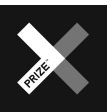
ABOUT THE SOLUTION

- In the Fire Foresight solution, technologies collaborate via the central platform. By collating data from various sources, we ensure machine vision insights, satellite algorithms, and drone feedback mesh seamlessly for a complete response.

- As the challenges related to fires evolve, Fire Foresight's systems are designed to house more data sources and inputs. Big problems demand adaptable solutions. The Fire Foresight Platform, modular in design, ensures readiness for the next innovation.

LEARN MORE: link

FIREFLY
SAN FRANCISCO, U.S.A.

Team Firefly is based out of San Francisco, CA and is a collaboration between Xwing, Trident Sensing and Solaris Suborbital.

ABOUT THE SOLUTION

FireFly is a persistent, autonomous wildfire detection and suppression system that leverages existing technologies for reliable, affordable and safe for at scale operations:

- Retrofit proven attack SEAT (AT-802) with an FAA approved autopilot

- Suborbital surveillance platform (HALE) for persistent, live fire detection and guidance of attack craft to targets

- Dual layer sensing strategy - HALE & attack plane - for robust, overlapping fire detection and precision delivery of suppressant
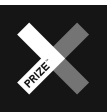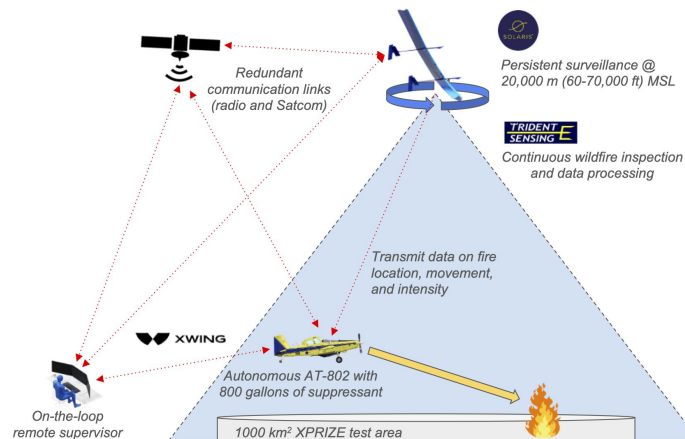
LEARN MORE: link

Figure 1: Concept for FireFly's autonomous fire detection and initial attack.
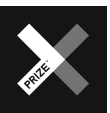
FIRESWARM SOLUTIONS
SQUAMISH, CANADA

FireSwarm Solutions Inc, of Squamish, Canada, unites experts in engineering, fire management, flight automation, regulations and drone tech to create a fully autonomous aerial wildfire response system

ABOUT THE SOLUTION

- FireSwarm delivers autonomous, heavy-lift drone swarms for rapid, precise wildfire suppression in an end-to-end solution positioned to not only succeed in the XPRIZE Wildfire challenge but also to revolutionize wildfire management by harnessing the power of machine learning, ultra heavy-lift (UHL) drones, autonomous flight technology, and logistics.

LEARN MORE: link

Katherine Baer
Operations Coordinator

David Thanh, COO
Fire + Emergency Management Expert, Technical Lead

Alex Deslauriers, CEO
TEAM LEAD Aerospace + Solution Architect

Chris Gillen
IT + Cyber Security

Melanie Bitner
Marketing + Communications

Russ Halliday
Programmatic Lead

Dustin Wales
Regulatory Frameworks

Sean Spryszak
Solution Architect

Jean-François Pominville
Overwatch Drone Expert

Jacob Lagercrantz
Technical Director + Pilot

Benoit Germain
Overwatch Drone Expert

Max Drougge
Heavy Lift Drone Expert

Claes Drougge
Heavy Lift Drone Expert

Lois Connor
XPRIZE Wildfire Project Manager

FIRE SWARM™ SOLUTIONS

XPRIZE WILDFIRE | TEAM

FLAMEJACKETS
ATLANTA, U.S.A.

The FlameJackets are based out of Georgia Tech (Atlanta) and consists of approximately 60 students and faculty. FlameJackets are partnered with Cobra Aero of Hillsdale, Michigan.
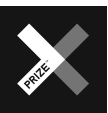
ABOUT THE SOLUTION

- Our solution is unique that we are flying a hybrid drone that carry significant payloads and/or have extended range. Our first prototype is powered by a 33cc 2-stroke generator that weights just a few pounds and is capable of keeping the drone in the air for nearly 24 hours. In another configuration, the drone can have payloads exceeding 50 pounds.

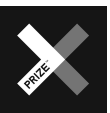LEARN MORE: link

GATORX
GAINESVILLE, U.S.A.

The Gainesville, FL, USA based GatorX team consists of an autonomous detection/suppression solution from Fire Neural Network, SwissDrones, Archer Aviation, NVIDIA, SWIR VS, Satlantis, and N5 Sensors.

ABOUT THE SOLUTION

- Using satellite imaging, Fire Neural Network (FNN) High-Risk-Lightning sensors, N5 smoke sensors, and FNN's/NVIDIA's AI expertise can autonomously detect the location of hotspots.

- The FNN FireBird drone (flying up to 100 mph) and SWIR cameras can verify the hotspot with AI video analysis, ensuring it is not a decoy fire.

- Then SwissDrones/Archer Aviation eVTOL drones are triggered to transport the patent-pending Suspended Autonomous Fire Extinguisher to eliminate the fire autonomously.

LEARN MORE: link

GREEN TECH INNOVATION
MONTERREY, MEXICO

Green Tech Innovation (GTI) from Monterrey, Mexico, collaborates with Instituto Tecnológico y de Estudios Superiores de Monterrey (TEC) for UAV design and Universidad de las Américas Puebla (UDLAP) for simulations. Mentors include experts from SOPFEU, NASA, and AI labs.

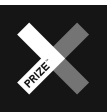**ABOUT THE SOLUTION**

- The solution combines advanced drone technology with AI-driven data analysis to identify and predict fire outbreaks.

- By utilizing real-time satellite data and deploying autonomous drones equipped with thermal cameras, GTI aims to provide immediate alerts and actionable insights to firefighting teams, along with the deployment of fire combat UAVs.

LEARN MORE: link

ISRAEL AEROSPACE INDUSTRIES (IAI) AUTONOMOUS SYSTEM
TEL AVIV, ISRAEL

The IAI Autonomous System team, carefully picked for the challenge, is a consortium of IAI, Singular Aircraft, Aerotor, INFRA, Technion, Creomagic and Agora, each contributing its expertise and experience.
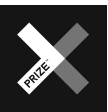
ABOUT THE SOLUTION

- IAI relies on a fully autonomous solution based on advanced centralized autonomous C2 center, multiple highly efficient quadcopters for scanning and fire detection, large capacity firefighting UAV, SWIR sensor tailored for long distance wide coverage fire detection and advanced AI algorithms to maximize prediction of detection and to minimize false positive detections.

LEARN MORE: link

METAPHOTONIX
ORINDA, U.S.A.

Based out of Silicon Valley, Metaphotonix builds instruments of light with programmable meta-materials to manipulate and energize our world. We are minds bending light – literally.
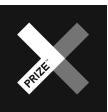
ABOUT THE SOLUTION
Metaphotonix is perusing the radical idea that wildfires can be discovered and suppressed remotely, at the speed of light, with light alone.

- Metaphotonix will leverage electronic warfare techniques to discover wildfires with quantum-enhanced light detecting a fire-modified light-spectrum.

- Metaphotonix will also seek to extinguish fires without water, by using intense light beams to repeatedly detonate the atmosphere, by ion-based avalanche breakdown, and extinguish the fire with the resulting acoustic shockwaves.

MetaPhotonix: Firefighting with Structured Light
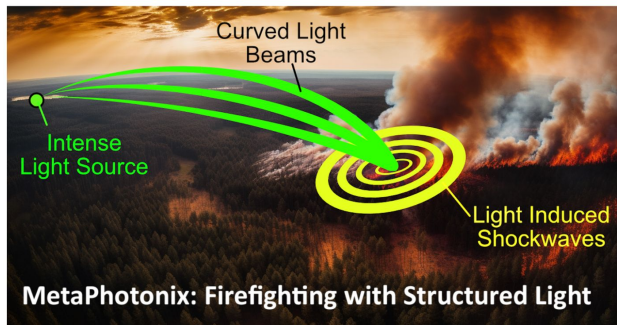
Detection & suppression is by millimeter-wave light that can pass through atmosphere and smoke. Curved beams of light probe the ground for Doppler broadened formaldehyde (and other) emissions due to high temperature. Then pulsed energy detonates atmosphere repeatedly to extinguish found fire.

LEARN MORE: link

N5SHIELD
ROCKVILLE, U.S.A.

Team N5SHIELD is based out of Rockville, Maryland and is lead by N5 Sensors, Inc. N5SHIELD hopes to end devastating impacts of wildfires, while ensure positive impact to the environment.
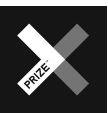
ABOUT THE SOLUTION

- Utilizing ground based sensor network, artificial intelligence and satellite image analysis to detect and locate fire in minutes

- Deploy autonomous suppression capabilities.

- Verify and monitor for re-ignition.

LEARN MORE: link

OPTECT - OPTICAL DETECTION
BATH, UNITED KINGDOM

Team Optect is based in England, UK and is a collaboration between Optect (UK), specialists in flame detection and Sonic Fire Tech (US), leaders in infrasound based fire suppression.
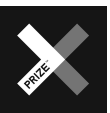
ABOUT THE SOLUTION

- Airborne sensors will be deployed during critical wildfire conditions to detect fires as small as 1-2 meters. Ground-based sensors will maintain a base level of coverage in less dangerous conditions.

- High-speed autonomous VTOL UAVs will transport ground robots to the fire site. These UAVs navigate safely to deploy robots using a cable system. Ground robots with sonic fire suppression tech extinguish fires with high-intensity infrasound waves, operating continuously for long periods.

LEARN MORE: link
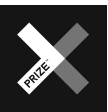
PYR-STOP
BRISTOL, UNITED KINGDOM

Pyr-Stop a dynamic team of engineers based in Bristol, UK, united by a common goal – leveraging their skills to combat the growing threat of wildfires.

ABOUT THE SOLUTION

■ Early wildfire detection and extinguishing through a fleet of drones, and fixed observation points.

■ Every unit is specifically designed and built with a view towards dedicated roles.

■ The wider system is commanded and controlled by a central system, while allowing for autonomous agility when it comes to tactical mission objectives by utilising the latest visual detection algorithms and decision matrix techniques.

LEARN MORE: link
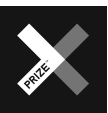
RAIN
ALAMEDA, U.S.A.

Founded in 2019, Rain adapts military and civil autonomous aircraft with the intelligence to perceive, understand, and suppress wildfires.

ABOUT THE SOLUTION

- Rain adapts autonomous aircraft with a Wildfire Mission Autonomy System, enabling aircraft to autonomously perceive, understand and suppress ignitions.

- This system enables autonomous aircraft to be prepositioned based on wildfire risk, to integrate with a variety of early wildfire detection methods, and to ultimately respond within minutes to incipient wildfires.

LEARN MORE: link
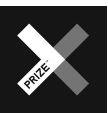
RAINDROPS
TRONDHEIM, NORWAY

RAINDROPS is a student-led collaboration between the Norwegian University of Science and Technology (NTNU, Norway) and Brigham Young University (BYU, USA), with the option of including new partners.

ABOUT THE SOLUTION

- RAINDROPS explores the potential of using a team of uncrewed aerial systems (UAS) for autonomous wildfire suppression over large areas with rapid response times.

- The envisioned solution combines two classes of UAS, namely those tasked with observation and fire detection and those tasked with fire suppression.

- Through a system-of-systems approach, RAINDROPS shall enable scalable wildfire response across geographical environments.

LEARN MORE: link

RAINDROPS is a student-driven initiative to develop a system of aerial robots for autonomous wildfire detection and suppression.

RANGAIR
BEAVERTON, U.S.A.

Team Rangair is a startup based out of Beaverton, OR, USA. The team bring expertise in technology innovation, wireless networking, software development, regulatory compliance, and scientific research.
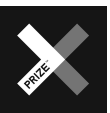
ABOUT THE SOLUTION

- Rangair's solution integrates VTOL UAVs with an overwatch payload includes high-res cameras, ML algorithms, and a proprietary wireless comms platform; and a suppression payload that delivers targeted suppression under the tree canopy.

- Rangair's proprietary Airborne Broadband network ensures real-time situational awareness and accurate delivery of suppression agents.

- The system's modular design allows for cost-effective, scalable deployment.

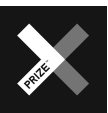LEARN MORE: link

SKYSPEC

TOKYO, JAPAN

Based out of Tokyo and Mumbai. Led by two XPRIZE Alumni, this diverse team includes Engineers, Environmentalists, UI expert & Research professors from combustion & thermofluid fields

ABOUT THE SOLUTION

- Drone Reconnaissance: Precisely locate and validate the nature of the fire.

- Dual Solution Deployment: Fire Extinguishing Balls: Biodegradable foam shells containing dry powder extinguishant for rapid flame suppression. Cellulose-based Gel: Eco-friendly, water-soluble gel with water-like viscosity forms a protective barrier against flames.

- Final Mitigation Stage: More drones sprinkle water to wash away the gel and help the forest recover

LEARN MORE: link
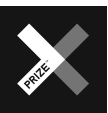
TEXAS-SOTON
AUSTIN, U.S.A.

Team Texas-Soton is based out of Austin, TX and is a collaboration between The University of Texas at Austin, University of Southampton, University of Edinburgh, TU Delft, and Texas A&M Forest Service

ABOUT THE SOLUTION

- A heterogeneous set of uncrewed autonomous UAV systems equipped with various sensors will use state-of-the-art motion planning and data processing algorithms to cover the large area, detect wildfires, and coordinate the suppression.

- High performance suppression drones will carry sufficient suppressants at high speeds to suppress incipient fires.

- The overall solution will use a combination of edge computing, radio links, and user interfaces to achieve accurate and speedy detection and suppression
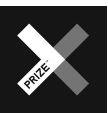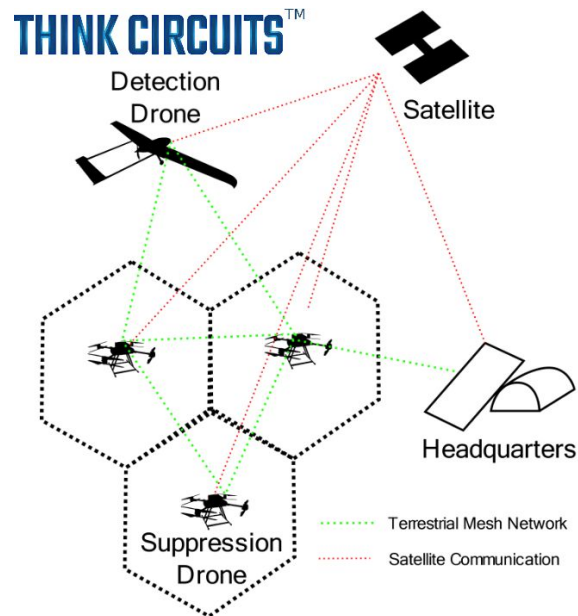
THINK CIRCUITS
OAKLAND, U.S.A.

Built in the San Francisco Bay Area as an R&D firm comprised of PhD and M.S. graduates from Berkeley, MIT, and Stanford, with 60+ years of industry experience serving clients in robotics and consumer electronics.

ABOUT THE SOLUTION

- The solution uses detection drones employing a proprietary fire detection package utilizing radio-frequency and visual sensor fusion to provide rapid localization and discrimination of fires.

- Suppression drones are stationed in low-maintenance drone towers to ensure 10-minute delivery of suppressant within determined "fire-exclusion" zones.

- An agentic AI framework (AIDEN) provides superior robustness to unstructured environments in single drone decision making and multi-agent coordination.

LEARN MORE: link

THINK CIRCUITS™

Detection Drone

Satellite

Headquarters

Suppression Drone

- - - Terrestrial Mesh Network
- - - Satellite Communication

WILD-FLYER
HUNTSVILLE, U.S.A.

Based out of Huntsville, Alabama, U.S.A., Wild-Flyer is formed by Modular Aerospace as a mission and platform for special missions.
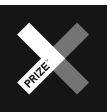
ABOUT THE SOLUTION

■ The system includes a "Wild-Flyer Swarm" of multiple high-altitude vehicles with sensors and deployable low-speed glide vehicles.

■ The system operates from a central location ("Wild-Flyer Nest") for ground maintenance, takeoff, and landing.

■ The system provides an integrated communications network for itself which will be available to other stakeholders.

LEARN MORE: link

WILDFIRE QUEST
SAN JOSE, U.S.A.

WildfireQuest is a highschool team located in the heart of the Silicon Valley. Led by industry professionals and boasting a diverse skill set, we offer an innovative approach to wildfire management.
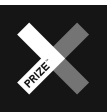
ABOUT THE SOLUTION

- WildfireQuest uses a symphony of convergent and dependent ground, aerial, and spaced based technologies.

- Our multimodal detection system offers redundancy and greater accuracy when differentiating wildfires and decoys.

- To maximize drone area coverage, we employ a bullseye attack strategy ensuring all fires are detected. Custom drones utilize advanced path planning combined with unique structural qualities to maintain battery life and ensure a successful mission.

LEARN MORE: link

WINDRACERS ENVIRONMENTAL
## SOUTHAMPTON, UNITED KINGDOM

Windracers Environmental unites makers of the ULTRA UAV (Windracers) with experts in avionics (Distributed Avionics), swarming (Uni Bristol), AI-imaging (Uni Sheffield), and firefighting (Lancashire).

ABOUT THE SOLUTION

- Windracers Environmental has designed a swarm of ULTRAs (long-endurance high-payload UAVs) capable of continuous operation over large areas.

- The swarm of ULTRAs will autonomously deploy over the areas to search, detect fires using on-board AI-based image processing, and coordinate to deliver their extinguishing payload directly onto the fire.

- A human-centric interface allows for monitoring of the swarm, and if needed human intervention, based on firefighting expertise in the team.

LEARN MORE: link
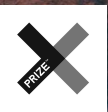
WANT TO KNOW MORE?

To learn more about the Qualified Teams or how you can support XPRIZE WIldfire please email:

wildfire@xprize.org

Join the movement · in · ▶ · ⊙ · X · f · xprize.org