XPRIZE
WILDFIRE

EXECUTIVE SUMMARY EXECUTIVE SUMMARY EXECUTIVE SUMMARY EXECUTIVE SUMM

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Globally, we are increasingly witnessing wildfires that burn bigger, at a higher intensity, and are more likely to sprawl out of control. These large and so-called Extreme Wildfire Events (EWEs) are nearly impossible to suppress. While they may only be 3% of fires, they drive over 80% of total associated fire-damages.

These damages are increasingly destructive and costly. Global wildfires burn a total area of over 350 million hectares (865 million acres) every year, an area equivalent to the size of India and double the annual area burned just 40 years ago. In the European Union (EU), economic losses amount to over $3.3 billion and are expected to rise to $5 billion. In Indonesia, the devastating fire season of 2015 cost nearly 2% of the country's GDP. Beyond devastating direct losses, disruptions to communities and businesses drive even more costs, frequently referred to as the economic burden. In the U.S., the total economic burden is estimated at between $125 and nearly $350 billion annually.

Perhaps even more devastating is the toll taken on lives. The 2018 Camp Fire, the U.S.'s deadliest in a century, killed 86, the 2018 Attica Wildfires of Greece killed 102, the 2017 June and October wildfires in Portugal, killed over 100, and the 2009 Black Saturday bushfires, Australia's deadliest ever, killed 173. But it does not end with direct fatalities. Intense wildfires' effects last long after the flame is out and may linger for a lifetime as they degrade air quality. Global estimates suggest that every year around 340,000 people die prematurely from fire-related particulate matter, which can be carried long distances. A study out of Stanford even suggests that the effects of wildfire smoke cause changes to the very genetic codes of children, potentially leading to a weakened immune system for life.

Beyond the devastating facts and figures though lies new psychology that is at the core of this problem: we have come to accept these devastating fires as the normal. We believe that catastrophic Mega Fires are unstoppable, that homes will burn, lives will be lost, and deadly fires cannot be stopped.

Preferred Future State

But what if we refused to accept that these devastating wildfires are inevitable? Can we allow ourselves to dream of a brighter future? Every XPRIZE is focused around a Preferred Future State. This is a target, a Northstar, for our prize to calibrate towards. This is NOT the end state of the competition, but our prizes are designed to unlock innovation that, if properly nurtured, sets humanity on a path towards the Preferred Future State in a short period of time after the prize.

FOR XPRIZE WILDFIRE, OUR PREFERRED FUTURE STATE IS THE FOLLOWING:

A FUTURE WHERE ALL INCIPIENT WILDFIRES ARE DETECTED WITHIN SECONDS OF IGNITION, WHERE FIRES THAT COULD DEVASTATE COMMUNITIES ARE SUPPRESSED BEFORE THEY CAN GROW AND WHERE NON-THREATENING ONES BURN SAFELY. IMAGINE A FUTURE WHERE FIRE PLAYS ITS VITAL ROLE IN ECOSYSTEMS, WHILE LIVES AND HOMES ARE PROTECTED--A FUTURE WHERE HUMANITY AND FIRE SUSTAINABLY AND SAFELY CO-EXIST.

Core Problems

We have identified five core problems that are keeping our Preferred Future State from being realized and will continue to do so for the foreseeable future, absent major changes.

01 SHRINKING RESPONSE TIME

The time firefighters have from ignition to suppress a fire, before it escalates into a major fire event, is already very short for the most extreme fires--and the changing climate and shifting population patterns are making it shorter.

02 ACCURATE AND PRECISE DETECTION

In many cases, accurate and precise detection of the fire delays resource mobilization until it's too late. For example, cutting edge satellites can currently only indicate whether there is a fire in a 1km by 1km square area, a detection not precise or accurate enough to deploy resources rapidly and efficiently.

03 ACCESSIBILITY

In other cases, a fire might be detected quickly and precisely, but the location of the fire (in say a deep valley or on a steep hill) means that delivering resources within the timeframe needed to suppress a fire before it escalates is nearly impossible.

04 EXTREME CONDITIONS

Extreme weather and environmental conditions are increasingly more common as the Climate Change unfolds and are, in fact, a double problem. Firstly, they lead to more extreme fires and spread fires more quickly. Secondly, they make responding to fires and delivering suppression materials or other fire attack maneuvers more challenging.

05 SILOED INDUSTRY

Firefighting is a siloed industry, which presents two distinct, though overlapping, problems. Firstly, the fact that the landscape of who responds to fires is siloed (across different local, state, and national actors) means that responding to fires effectively and in a coordinated manner is challenging. Secondly, innovation itself is siloed. Innovators tend to work on one piece of the puzzle (detection or response or suppression), making it more difficult for these innovations to work together to solve the overall problem.

Prize Description

XPRIZE Wildfire is a three and a half year long prize, with two years of post-prize scaling impact activities. It is focused on creating autonomous systems, for the rapid, precise detection and suppression of dangerous wildfires before they become major fire events. In final testing, the winning team will autonomously detect a fire anywhere in a defined 1,000km2 area, featuring challenging terrain, and suppress it within 10 minutes, leaving any decoy fires untouched. In earlier milestone testing rounds, teams will have to prove the safety and efficacy of their systems, including performance in challenging environmental conditions.

Final Testing

The 10-minute time requirement is calibrated to be at least 4X better than current, best-in-class response times for fires. This will help with Core Problem 1 around shrinking response time windows.

By requiring teams to monitor a large area (and respond quickly), we are driving innovations on Core Problem 2 around accurate and precise detection.

By creating a testing grid that has steep terrain, we are driving innovations on Core Problem 3 around accessibility.

We will subject teams to rigorous wind testing and other types of testing to ensure these systems can function safely and effectively in extreme weather conditions (Core Problem 4).

We will also require teams to develop integrated solutions that can go from detection all the way through to successful suppression, thereby addressing Core Problem 5.

Prize Purses

XPRIZE Wildfire will feature three different types of prize purses as outlined below:

01 GRAND PRIZE
for the final winner.

02 MILESTONE PRIZES
for remaining teams ahead of the Semi-Finals and Finals:

- An initial Milestone Prize to the 30 teams making it through the white paper submission round (half payable at the award, and the second half contingent on teams making it to the next round of testing)
- A second milestone prize to the five teams making to the Final Round of testing (half payable at the award, and the second half contingent on teams making it to Finals)

03 BONUS PRIZES
will be awarded to acknowledge breakthrough achievements, apart from the Grand Prize, and to incentive teams that might have a significant part of the solution, across three categories:

- Accurate, Precise, and Rapid Detection (regardless of ability to suppress)
- Fast Response in Steep Conditions (regardless of how long it takes to detect)
- Wind Bonus Prize (comprised of two equally weighted challenges to withstand high wind and deliver suppression materials in high wind)

Judging Criteria

For this prize, the most important judging criterion, the one that the Grand Prize will be awarded on, is the time elapsed from ignition to full suppression of the wildfire and any subsequent spot fires. This will encompass quick, accurate and precise detection as well as rapid response and full suppression.

Additionally, other criteria that will be tested throughout the competition include:

FULLY AUTONOMOUS INTEGRATED SOLUTIONS
From detection to response and suppression, the solutions' abilities to operate autonomously will be tested. These autonomous systems must feature a safety requirement known as "Human-On-the-loop" autonomy. This means the solutions must be capable of operating successfully without human input during the test (participants may provide input when training their systems), although humans will be supervising the testing and can abort or override if problems arise.

SMART DETECTION
The ability of solutions to autonomously recognize and not respond to False Positives such as water vapor, clouds, or low-intensity, non-moving fires will be a key part of the testing process.

SAFETY
Teams' solutions must not introduce harm in their operation or delivery (i.e., by striking anyone with a drone or a dangerous suppression material delivery mechanism). Additionally, the teams' solutions (particularly if they innovate with a new chemical retardant), must be non-toxic, based on current standards.

FUNCTIONALITY IN HIGH WINDS
Teams' solutions will be tested to assure ability to function in 30km/h (20mph) and evaluated for the ability to withstand even 100km/h (60mph) winds, both in terms of ability to fly or operate in this environment, as well as ability to deliver suppression materials in these difficult wind conditions.

FUNCTIONALITY IN COMPLEX TERRAIN
Teams' solutions will have to demonstrate the ability to function effectively in steep or otherwise difficult terrain, via the final testing.

CONNECTIVITY
Firefighting operations are comprised of many moving pieces, making communications essential to success. Experience has shown that at times, connectivity is lost to the extent of paralyzing operations. Thus, teams must exhibit two types of connectivity in their systems.

Budget Estimate

The estimated overall purse and operations cost for this prize will be between $20 and $25 million dollars. Key drivers of the cost will be safety protocols and personnel for final testing. Based on preliminary conversations with potential partners, we are optimistic that some of this could be donated in-kind by testing agencies. Final budgets will be determined in consultation with the title sponsor (or title sponsoring group) and will be based on signed partnerships at that time.

For more information, visit xprize.org

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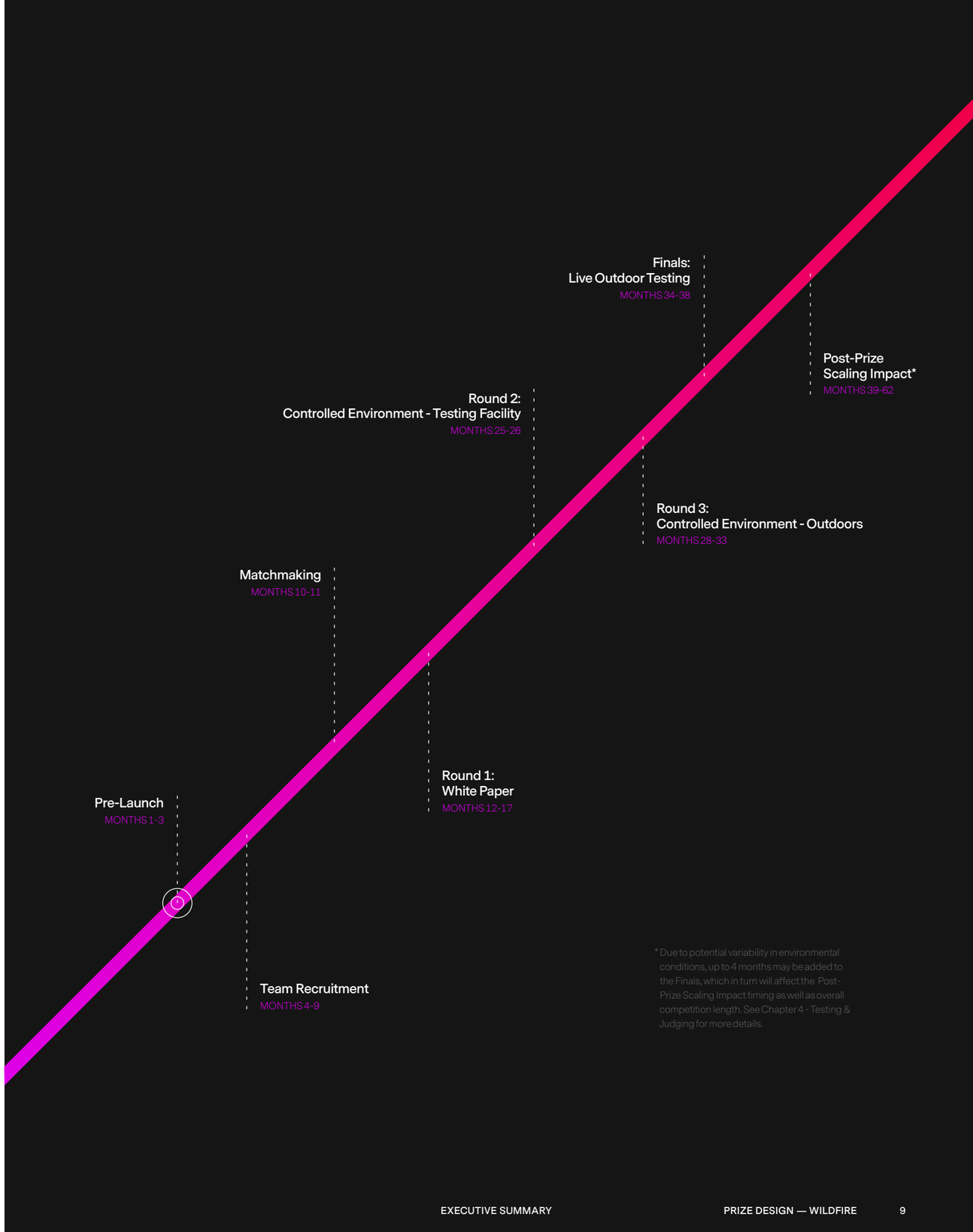

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