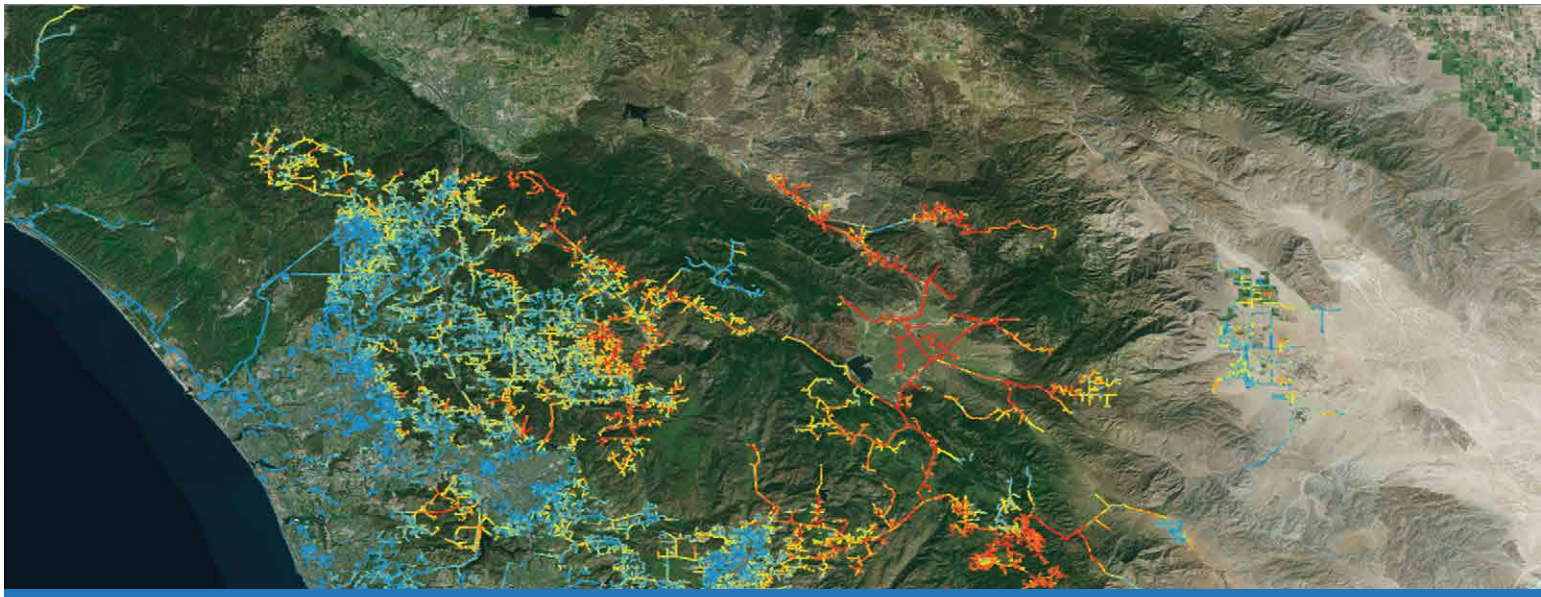
WILDFIRE RISK SOLUTIONS FOR ELECTRIC UTILITY

QUANTIFYING WILDFIRE RISK FOR OPERATIONS AND ASSET MANAGEMENT

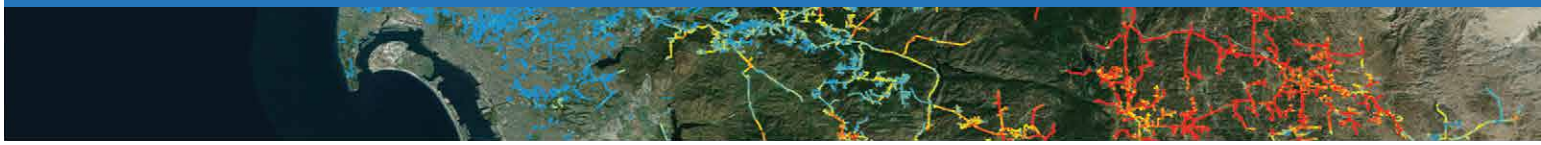
The Problem

The electric utility industry is impacted by wildfires as both a liability and a potential source of damage to critical assets. Energy companies are challenged with reducing wildfire risk and increasing reliability as part of their on-going operations, maintenance and asset hardening activities. By maximizing risk reduction, companies inherently reduce their liability as a source of ignition, and also reduce the potential of damage to their assets, lowering costs, potential outages and impacts to the public.

With a changing climate, wildfires are occurring at an increasing frequency and severity, leading to significant liability for electric utility companies. Enhanced analysis is necessary to properly understand the risk and assess options to mitigate risk on a daily basis. Recent events in California over the past few years are solemn examples of what is possible with climate change.

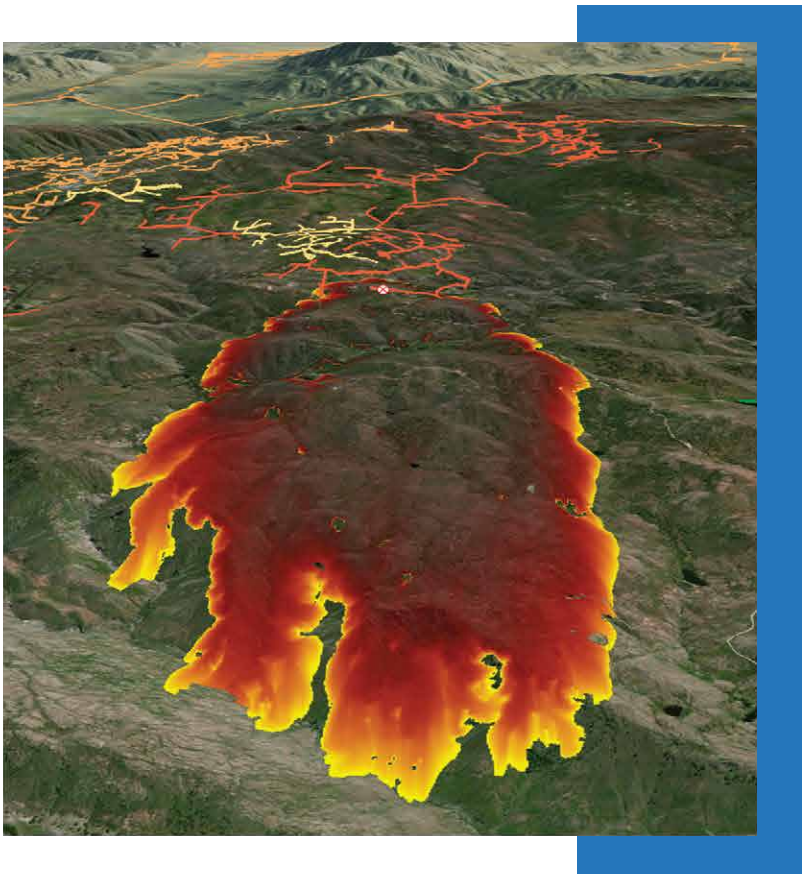


FireCast uses detailed asset characteristics combined with fire behavior simulations to derive risk for each asset. This provides electric utility companies tremendous insight into which circuits may be a concern given specific weather conditions. Assets with the highest risk are easily identified (red) and risk profiles are available for each asset.



The Solution

Working closely with California Investor Owner Utilities, Technosylva has developed and successfully deployed a suite of wildfire risk analysis products that are specifically tailored to meet electric utility needs. These products have been adopted enforce in California providing robust and industry tested solutions to support wildfire risk reduction and mitigation operations. These products are built upon the Wildfire Analyst™ Enterprise platform.



01

FireCast

Proactively forecasting risk associated with electric utility asset ignition sources over a 4 day horizon to provide the information critical for mitigation and operational decision making.

02

FireSim

On-demand prediction of the spread of a wildfire in response to current incidents, or to support proactive planning through “what if” scenarios.

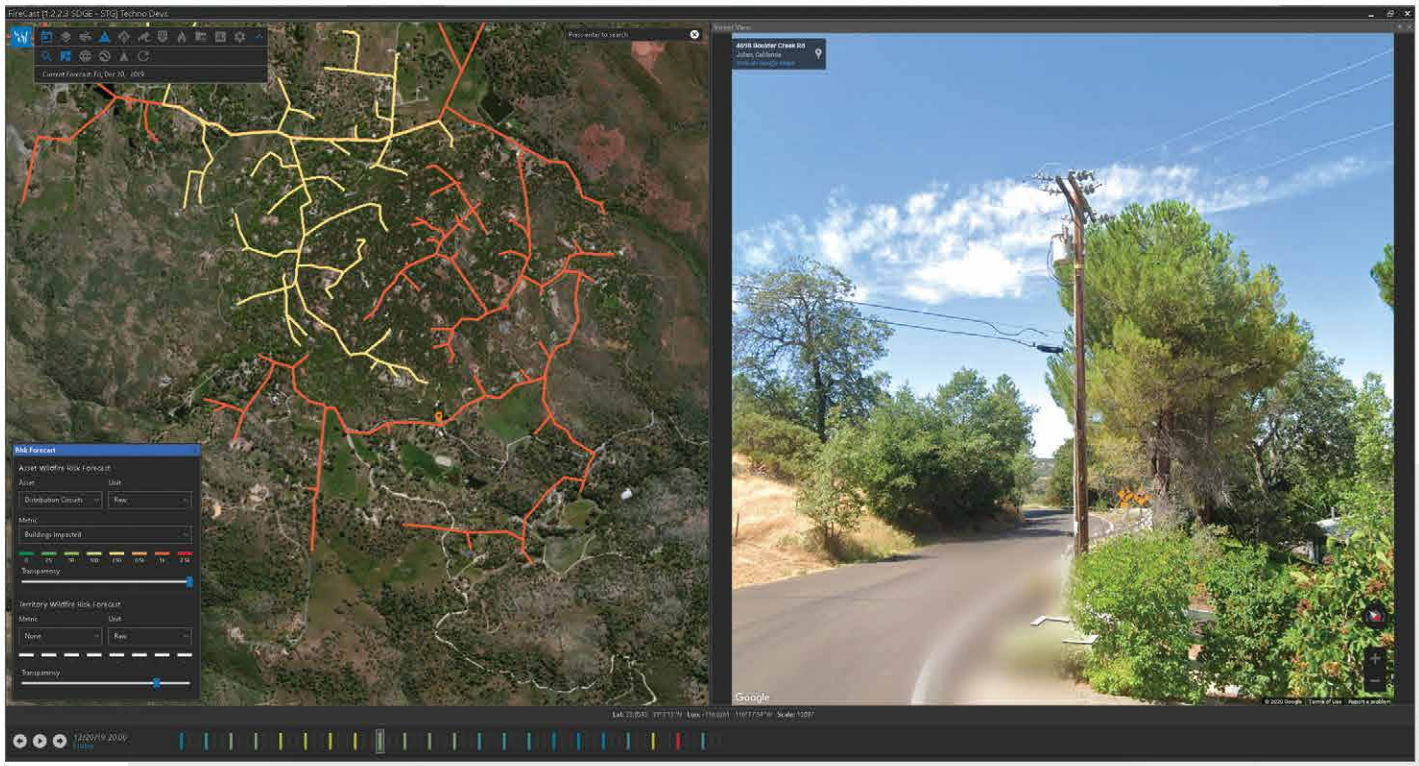
03

Wildfire Risk Reduction Model (WRRM)

Quantifying asset risk and risk reduction through design of different asset hardening and mitigation options.

How Does It Work?

Wildfire Analyst™ Enterprise is a cloud-hosted solution that provides advanced wildfire modeling capabilities quickly and efficiently for a range of company uses. By integrating with advanced weather prediction systems, risk forecasts are generated daily, or more frequently if desired, to identify those assets with the greatest wildfire risk across a 100 hour horizon.



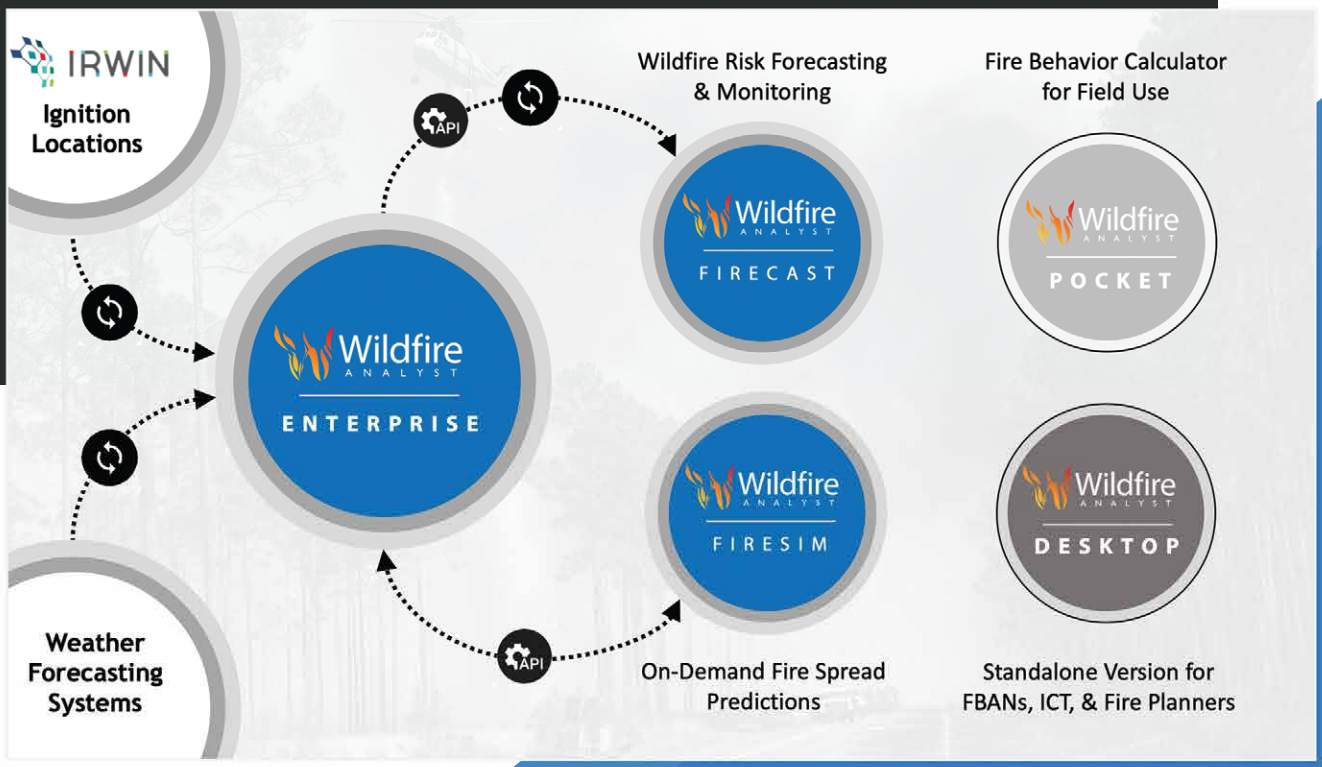
Integration with supplemental tools, such as company weather stations, cameras, agency incident management systems, and Google StreetView provide enhanced operational intelligence to support decision making, especially during weather events.

Weather prediction data is provided hourly for 100 hours each day providing the key data necessary for running hundreds of millions of wildfire spread simulations from each asset. This is typically done every three hours to provide a risk forecast, per asset, for 100+ hours in advance. Impacts from the spread simulations are used to calculate risk metrics applied to each source asset. This results in a risk profile for each asset across time.

Each day a new profile is extended to provide continuous risk metrics for every distribution and transmission asset that is a possible fire ignition source. The FireCast application provides the platform for accessing the risk forecasts.

The FireCast applications allows company users to review, query and report the risk data using a 4-D mapping interface (3-D plus time). Forecasts are available for each day. A suite of analytical tools are provided to facilitate query and interpretation of the weather and risk outputs.

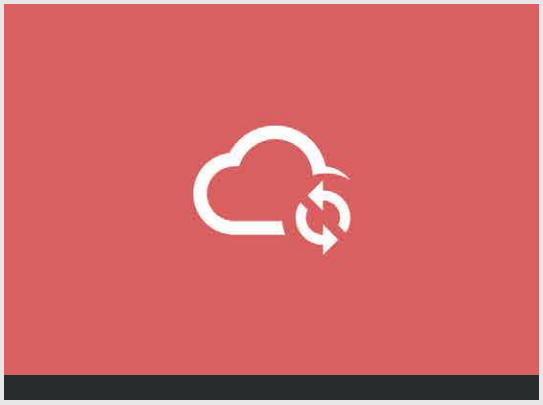
FireCast and FireSim integrate the Wildfire Analyst Enterprise fire modeling capabilities with advanced weather prediction systems and incident management systems. Additional desktop and mobile applications are available for extended attack fire analysis in the field. The product line provides a comprehensive suite of functionality to meet operational requirements of electric utility risk analysis.



Platform Features and Benefits

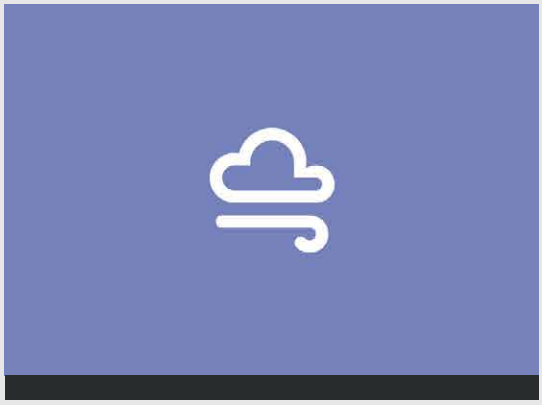
The Wildfire Analyst Enterprise solution is a proven and robust platform that includes many features and benefits that have evolved over several years of successful implementation. These features include bundling key input datasets with battle tested integration as part of a comprehensive customer driven solution.

The solution architecture leverages the latest in cloud-based computing with client-side applications to minimize implementation timelines and complexity. This approach also ensures a secure platform where proprietary data is protected and safe. Technosylva understands the critical importance of keeping electric utility proprietary data secure and protected. Our ISO 27001 Cyber Security certification ensures that all data is secure and used in strict confidence.



Cloud-based Computing Environment

Leveraging commercially available cloud-hosting services to ensure mission critical functionality with no interruption of service that minimizes company capital investment for IT equipment. Facilitates quick implementation timeframes.



Weather Prediction Data Integration

Weather prediction system integration for continuous, forecasted information provides the baseline for deriving daily wildfire risk metrics. Through partnership with the industry's leading weather provider, DTN, fire weather data is a bundled solution.

Spread Prediction to Derive Asset Risk Metrics

Wildfire Analyst™ Enterprise seamlessly integrates advanced fire spread prediction modeling with forecasted weather to determine where fires will spread from asset ignition sources, and quantifies the impacts associated with those ignitions.

Asset Data Integration

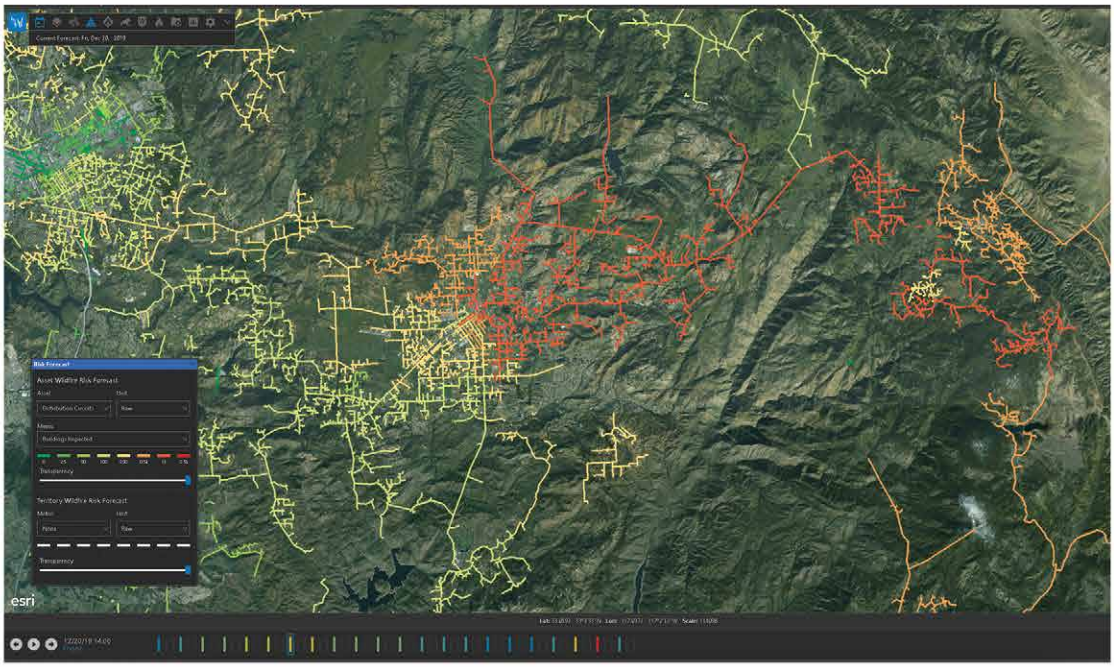
A key element of the solution is the tight integration with company infrastructure asset data. By integrating frequent updates from corporate asset databases the solution ensures that risk calculations are using the latest data representing ground engineering.

Fuels and Terrain Data Integration

The latest fuels & terrain characteristics data is used that exceeds any publicly or commercially available data solution. Data is constantly updated to reflect latest conditions with enhancements to facilitate urban encroachment and impact analysis.

Scalable for Small and Large Electric Utilitiy

Technosylva's deployment model accommodates implementation based on the size of company service territory and asset density.



FireCast

FireCast leverages our fire spread prediction modeling capabilities through integration with weather prediction systems to derive risk ratings for electric utility assets on a daily basis. Risk forecasts are produced daily using a 100-hour horizon by employing hundreds of millions of fire simulations for each forecast. Baseline risk outputs are calculated for each individual distribution and transmission asset summarizing the population and buildings impacted for each simulation. Additional fire behavior metrics are also calculated for fire size potential and fire intensity.

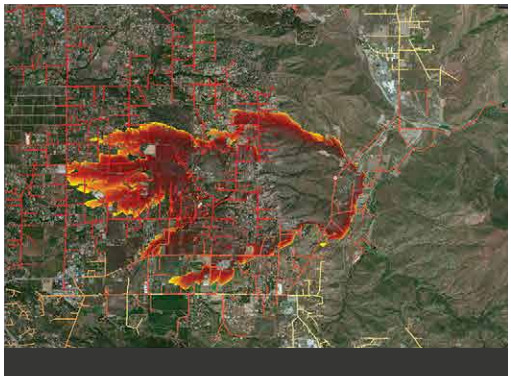
01 Daily risk forecasts for individual distribution and transmission assets that identify those assets with the greatest probability of causing significant impacts should a fire occur.

02 Identifying those assets with highest risk to be considered for Public Safety Power Shutoff (PSPS) should extreme events warrant.

03 Quantifying risk reduction achieved through operational PSPS events, as part of PUC reporting requirements.

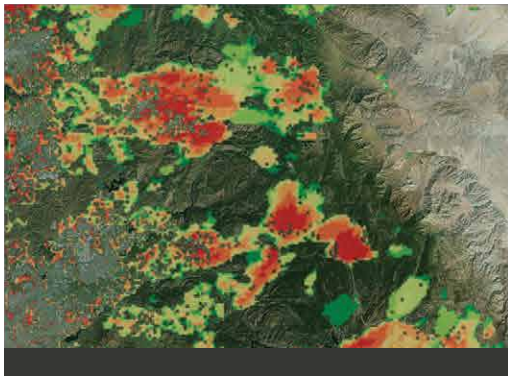
Forecasting Weather and Wildfire Risk for Daily Operational Decision Making

These outputs provide the foundation for risk analysis, through enhanced consequence modeling to quantify safety, financial and reliability metrics consistent with enterprise risk management methods. Risk metrics are assigned back to the potential asset sources providing clear documentation on which assets are of most concern. The integration of fire spread modeling provides information not readily available in the past, and is the key ingredient for distinguishing those assets prime for mitigation. The daily risk forecasts provide the basis for operational decision making, especially when combined with weather criteria and thresholds, for PSPS and other fire mitigation activities.



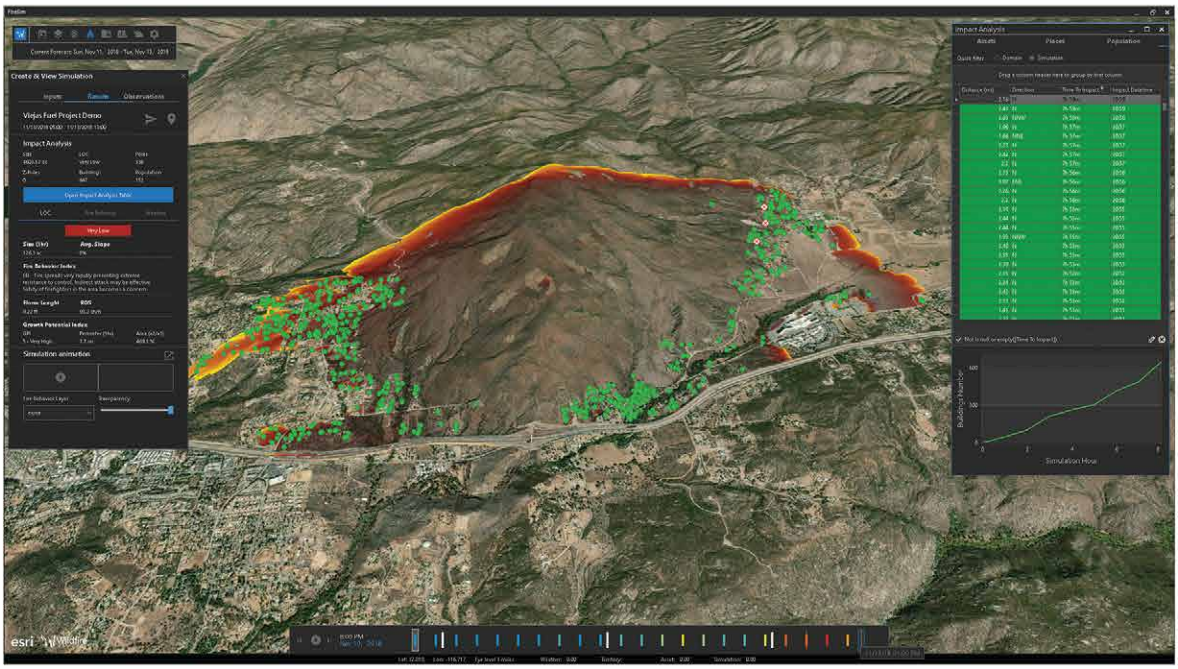
Asset Risk

The primary output assigns the results of millions of fire spread predictions back to the asset ignition sources to provide risk ratings on an hourly basis. This data provides the basis to determine which assets are priorities for mitigation.



Territory Wide Risk

Risk is also calculated continuously across the entire service territory by analyzing spread impacts from regularly spaced ignition points not related to assets. This wall-to-wall risk map provides context for comparison and is ideal for staging crews and equipment.



FireSim

When fires occur, either caused by asset equipment failure, or more commonly through other ignition sources, it is important to quickly understand where the fire is going and what it will impact. FireSim provides an on-demand capability to create a spread prediction and obtain detailed information on potential impacts. Impact analysis includes population, buildings and company assets. This information is critical for infrastructure protection and mitigation response.

01 Detailed population data and building footprints are included in the FireSim model to provide the most detailed definition of potential impacts.

02 Advanced urban encroachment algorithms are applied to ensure that an accurate definition of impacts are calculated with each simulation.

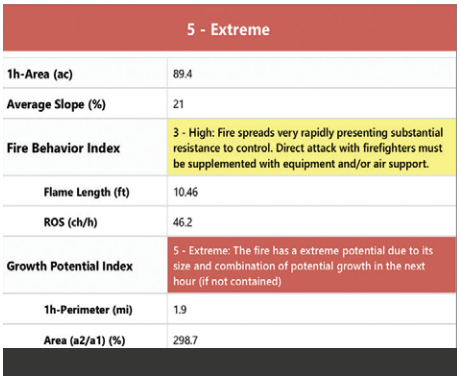
03 FireSim uses surface spotting to replicate embers that occur with certain fuels in specific weather conditions.

On-Demand Wildfire Spread Prediction for Consequence Analysis

Simulations are completed in less than a minute and the outputs can be easily shared via desktop, web or mobile devices. The FireSim Mobile app enables company fire coordinators with the ability to simulate fires while in the field and share with others using the cloud-hosted centralized repository. Information is shared quickly and efficiently while being in the control of those staff most informed about fire behavior and response priorities.

Detailed Report

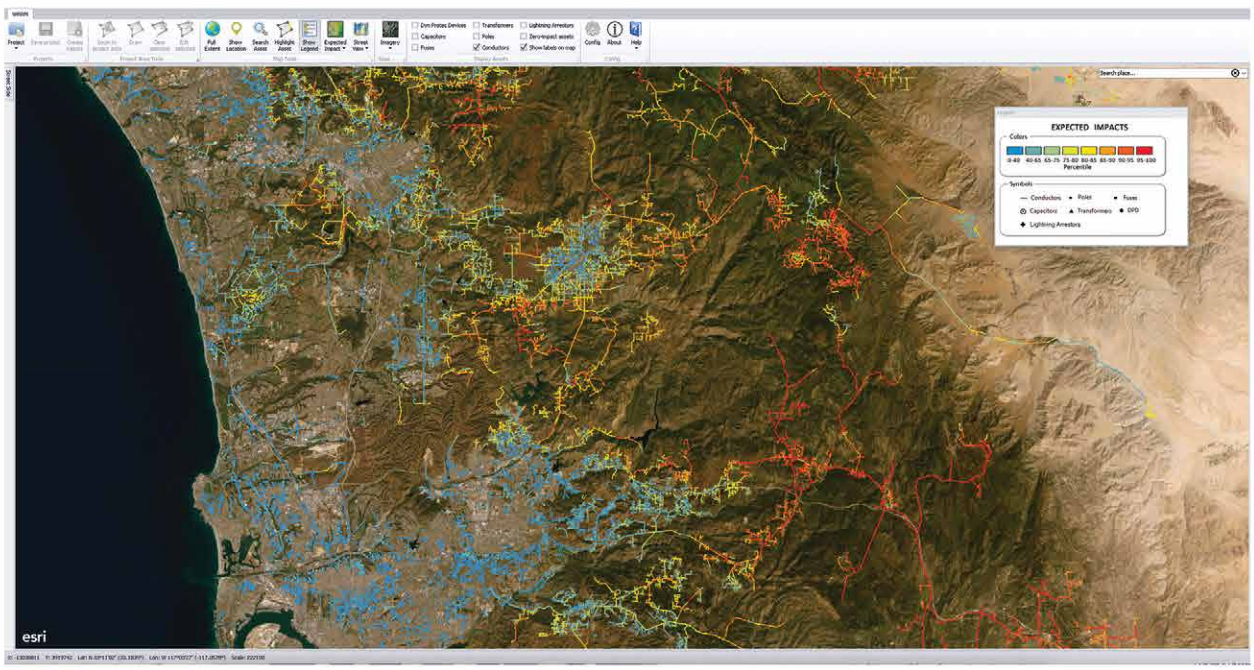
A detailed report is available for each simulation documenting input data, fire behavior outputs, fuels consumption, spread map, and impact analysis.



5 - Extreme	
1h-Area (ac)	89.4
Average Slope (%)	21
Fire Behavior Index	3 - High: Fire spreads very rapidly presenting substantial resistance to control. Direct attack with firefighters must be supplemented with equipment and/or air support.
Flame Length (ft)	10.46
ROS (ch/h)	46.2
Growth Potential Index	5 - Extreme: The fire has a extreme potential due to its size and combination of potential growth in the next hour (if not contained)
1h-Perimeter (mi)	1.9
Area (a2/a1) (%)	298.7

Initial Attack Assessment

Fire behavior and growth characteristics are used to calculate an initial attack assessment (IAA). The IAA identifies whether the fire is likely to escape initial attack. This metric rates the seriousness of each fire providing a ranking of concern.



WRRM

As part of the normal course of designing and maintaining an overhead electric system, electric utility engineers and designers endeavor to regularly analyze circuits to plan hardening and rebuilding projects in order to reduce wildfire risk and increase reliability. These risk reduction projects vary widely in cost, complexity, duration and distance. WRRM is a custom risk reduction analysis application that combines millions of fire behavior simulations with proprietary asset data, to quantify risk from each asset and calculate potential risk reduction for asset replacement.

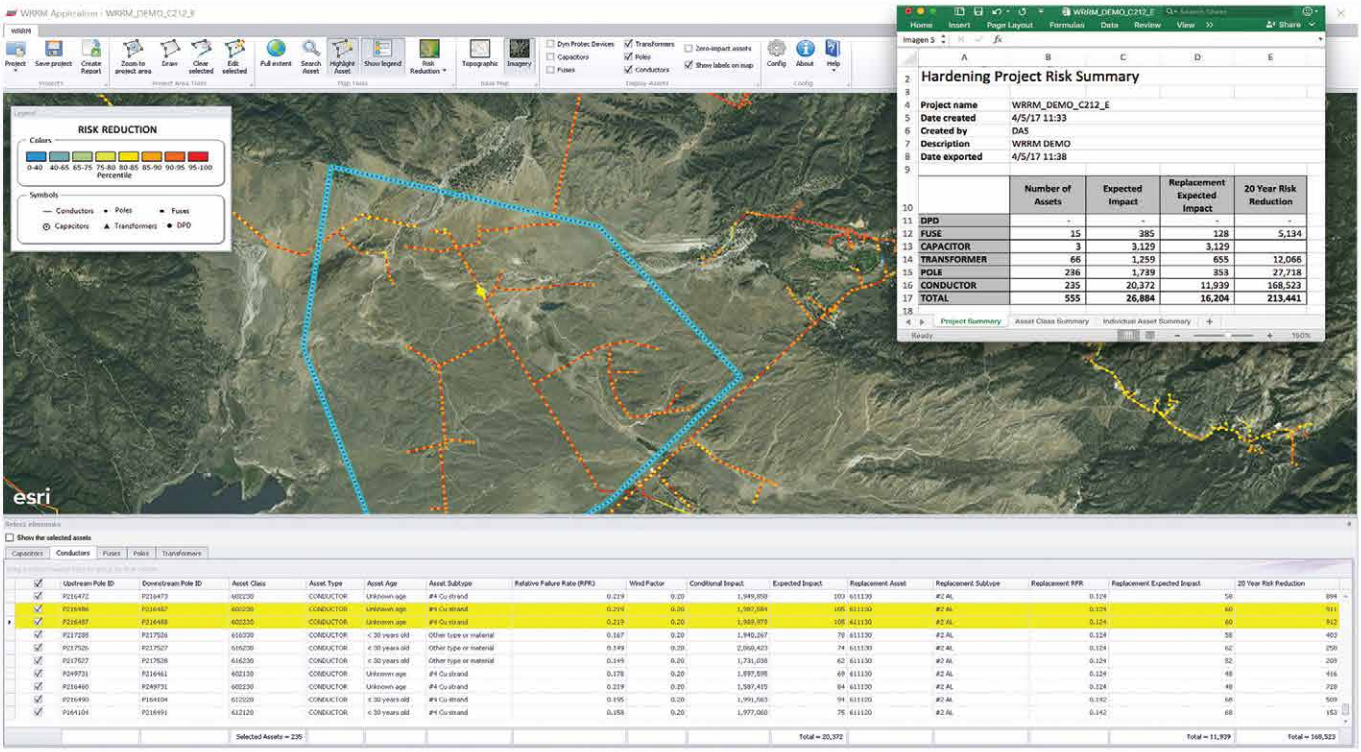
01 WRRM integrates equipment failure and ignition probability data for assets with individual spread predictions to determine which assets are most likely to failure and cause significant damage.

02 Tools are provided to help engineers to design mitigation projects which maximize risk reduction by focusing on those assets with the highest expected risk.

03 Detailed risk reduction reports are generated for each planned hardening project quantifying risk at the individual asset, asset type and circuit level.

Wildfire Risk Reduction for Asset Hardening and Mitigation Planning

The WRRM software encapsulates the modeling results into an operational tool that allows electric utility engineers to quantify risk reduction that will be achieved from different planned hardening projects and options. Using the WRRM application, engineers can evaluate and rank each project to determine the amount of fire risk reduction it would obtain as a result of completing any particular project. This allows them to determine where the greatest benefit can be obtained, while optimizing investment in their infrastructure. This ensures the company meets all Public Utility Commission regulations on hardening risk reduction projects while at the same time ensuring the company exceeds stakeholder, community and industry obligations.



About Technosylva

Technosylva is a wildfire technology company that specializes in operationalizing fire science. With offices in La Jolla, CA and Leon, Spain we provide worldwide services that integrate fire modeling software with business operations to meet the specific requirements of fire management agencies, electric utility, and commercial customers. Our Wildfire Analyst Enterprise platform solutions, FireCast, FireSim and WRRM, tailor our fire spread prediction services to meet the unique requirements of the electric utility and energy industry.

Our solutions have been adopted by California's largest Investor Owner Utilities, Pacific Gas & Electric, Southern California Edison and San Diego Gas & Electric, providing a robust, proven solution that meets the most demanding environment for wildfire risk in the US. Supplemented by our selection by the California Public Utilities Commission to assess PSPS events, this ensures incorporation of both regulatory and IOU operational priorities and capabilities. In addition, the State of California's authoritative fire agency has recently selected Wildfire Analyst Enterprise as the only qualified vendor from 130+ submissions to their request for innovative ideas problem statements. This endorsement ensures a comprehensive solution that is guaranteed to meet your needs, leveraging the success and customization of previous customers.

Get In Touch

Reach out today to obtain a demonstration of our solutions and allow us to become better informed about your needs. At Technosylva, we love to solve problems and craft solutions.

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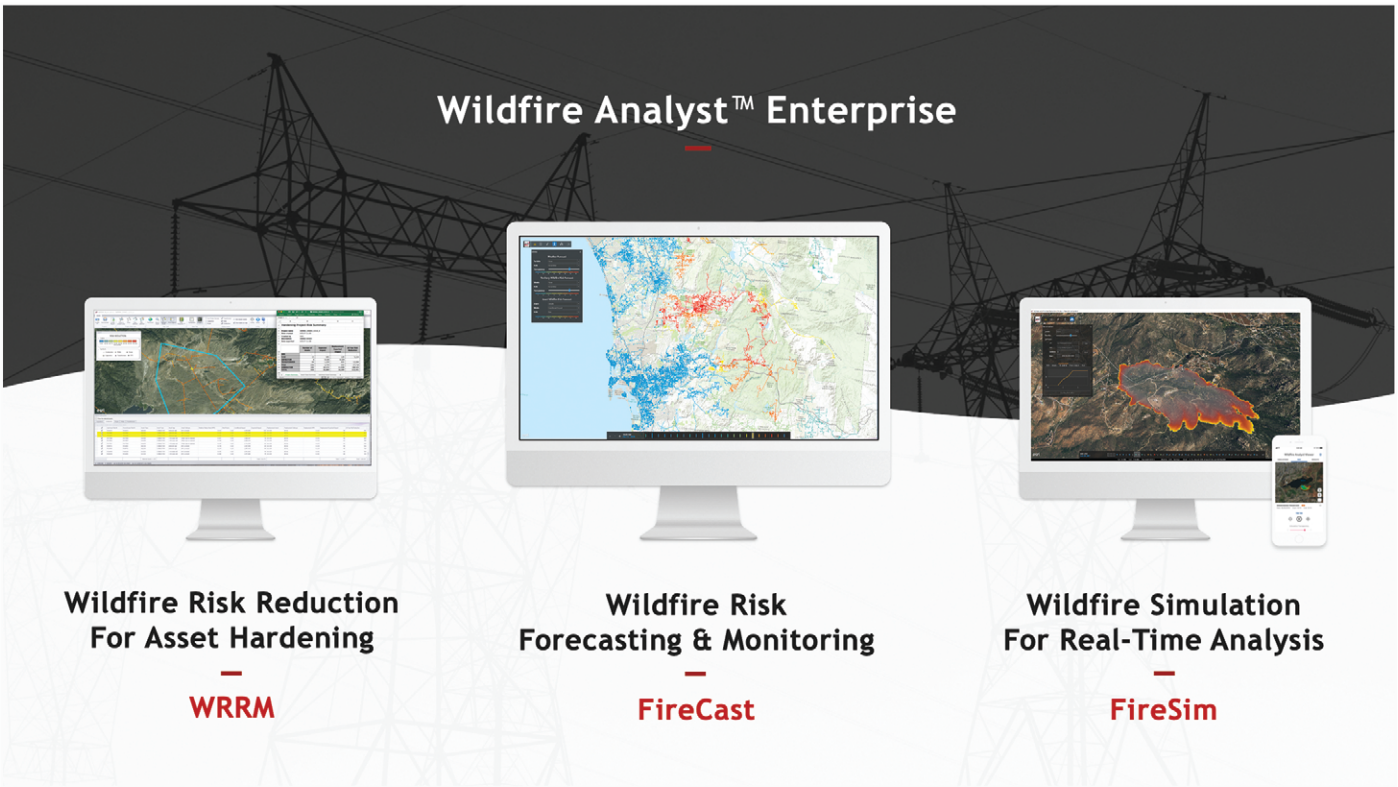

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