



International Wildfire Risk Mitigation Consortium

Program Overview

How Can The Grid Help Prevent Wildfires?

UMS Global Learning Consortia

Confidentiality Statement



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ABOUT US

UMS Group

OVER THE YEARS



VISION

Being the consultant of choice for asset management, performance improvement, industry best practice discovery, and strategic change advisory for the energy sector.

MISSION

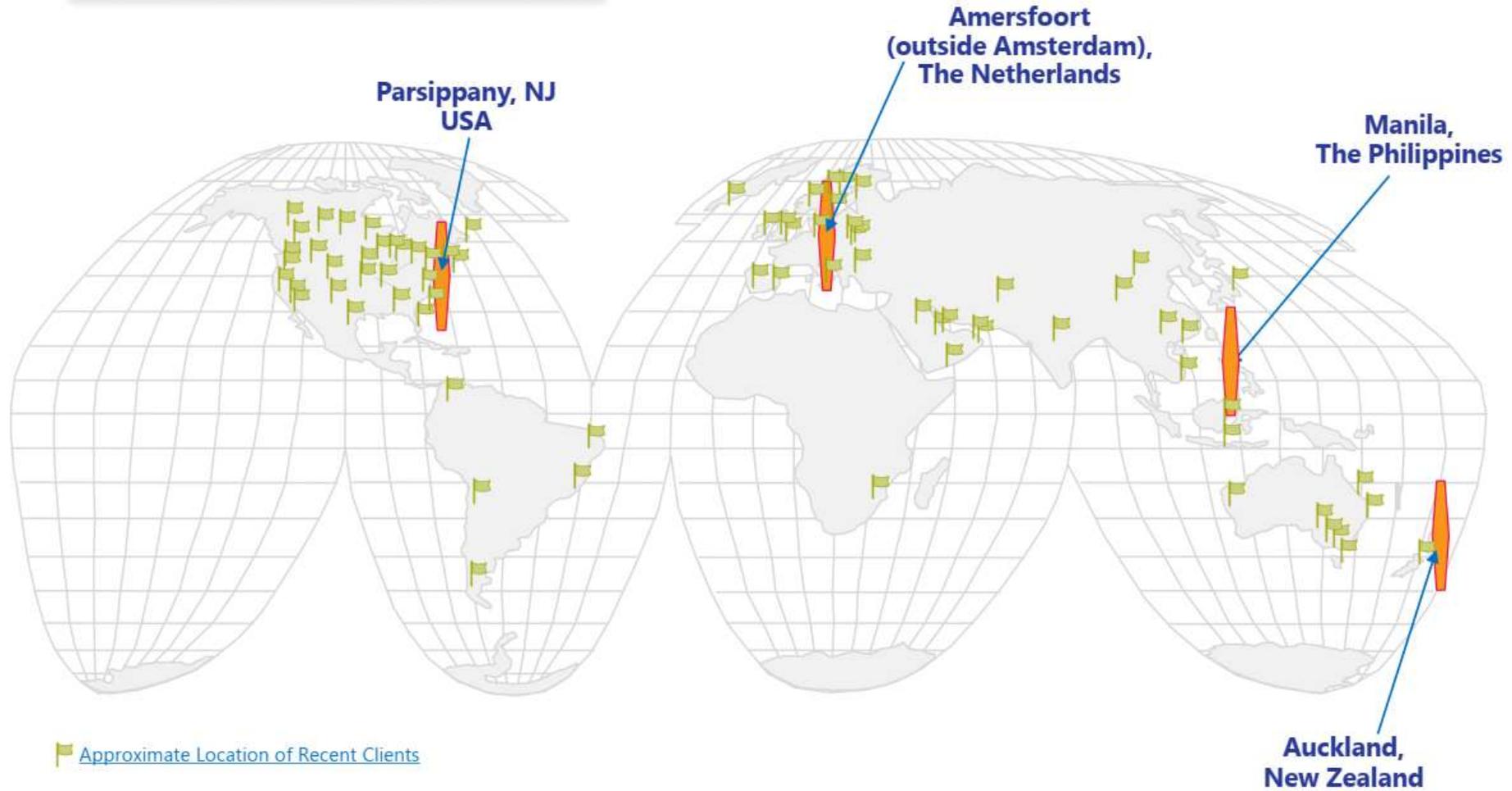
Accelerating the transition to a sustainable energy ecosystem through industry learning, insights, and innovation.

Global Perspective, Local Knowledge and Support

UMS Group is a team of experienced consultants, engineers, programmers, and data scientists specializing in asset management, performance improvement, change management, training, advanced modeling, and tool/application development for utilities and other asset-intensive industries.

We have strong market recognition for thought leadership in asset management and strategic “future-proofing” for the energy transition.

UMS Group Office Locations



What We Do



Consultancy

- Energy Transition
- Strategic Asset Management
- Commercial Due Diligence
- Performance Improvement
- IAM Qualification Training
- Portfolio Optimization
- Wildfire Risk Mitigation



Learning Consortia

- International Transmission Operations & Maintenance Study (ITOMS)
- International Transmission Asset Management Study (ITAMS)
- International Wildfire Risk Mitigation Consortium
- Substation Best Practices Consortium
- International Inspection Insight and Advance Analytics Consortium (IIAAC)
- Glidepath for Coal Consortium
- International Distribution Benchmarking Consortium (IDBC)



Digital Solution, tools and data services

- Spend Optimization Suite (SOS)
- Distribution Reliability Excellence (DR^x)
- Operational Performance Excellence (OP^x)
- Transmission Reliability Excellence (TR^x)
- Data Services

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Mission

To establish and facilitate a system of working and networking channels between members of the global utility community to support ongoing sharing of data, information, technology, and practices, and proactively address the wildfire issue through:



Learning



Innovation



Analysis



Assessment



Collaboration

Vision

A vehicle / platform for collaborative exchanges, joint pilot projects, shared risk and access to new solutions that:

- 🔥 Leverage global experience and ideas, and identify meaningful differences;
- 🔥 Accelerate learning, sharing, and the development of new risk models and mitigation strategies;
- 🔥 Expedite data collection, validation, evaluation, and sharing;
- 🔥 Introduce new technology and advance the deployment of innovative solutions;
- 🔥 Enable members to lead the industry transformation;
- 🔥 Promote good standing with regulators and communities via the development of initiatives based on global best practices; and
- 🔥 Establish global standards that can be leveraged by members to demonstrate a proactive, holistic, responsible approach to risk mitigation.

Leadership

The program is led by senior utility executives through a formal Executive Steering Committee (ESC) and an independent Executive Strategy Track. UMS Group and its expert partners facilitate the execution of the program.

Approach

- ↪ **Working Groups** meet monthly to discuss topical issues and coordinate their respective contributions to program objectives established by the executive leadership team.
- ↪ **Quarterly Webinars** provide an opportunity for participants to share insights and unique perspectives, and to capture and preserve explicit knowledge and experiences.
- ↪ **Quarterly Executive Steering Committee (ESC) & Strategy Track Meetings** function as an opportunity to provide direct guidance to the working group Chairs, while also opening up dialogue between participant company executives regarding strategic priorities for the program.
- ↪ An **Annual Conference** is conducted to strengthen relationships, report on the progress of participant utilities, and set objectives/priorities for future work.
- ↪ A **Members-Only Web Portal** provides extensive research, presentation recordings, meeting notes, and a secure communications hub.

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Working Groups

Four Working Groups are currently active, with a series of additional webinars related to **Data Management & Governance** and **Stakeholder Engagement** also being held on an approximately quarterly basis.



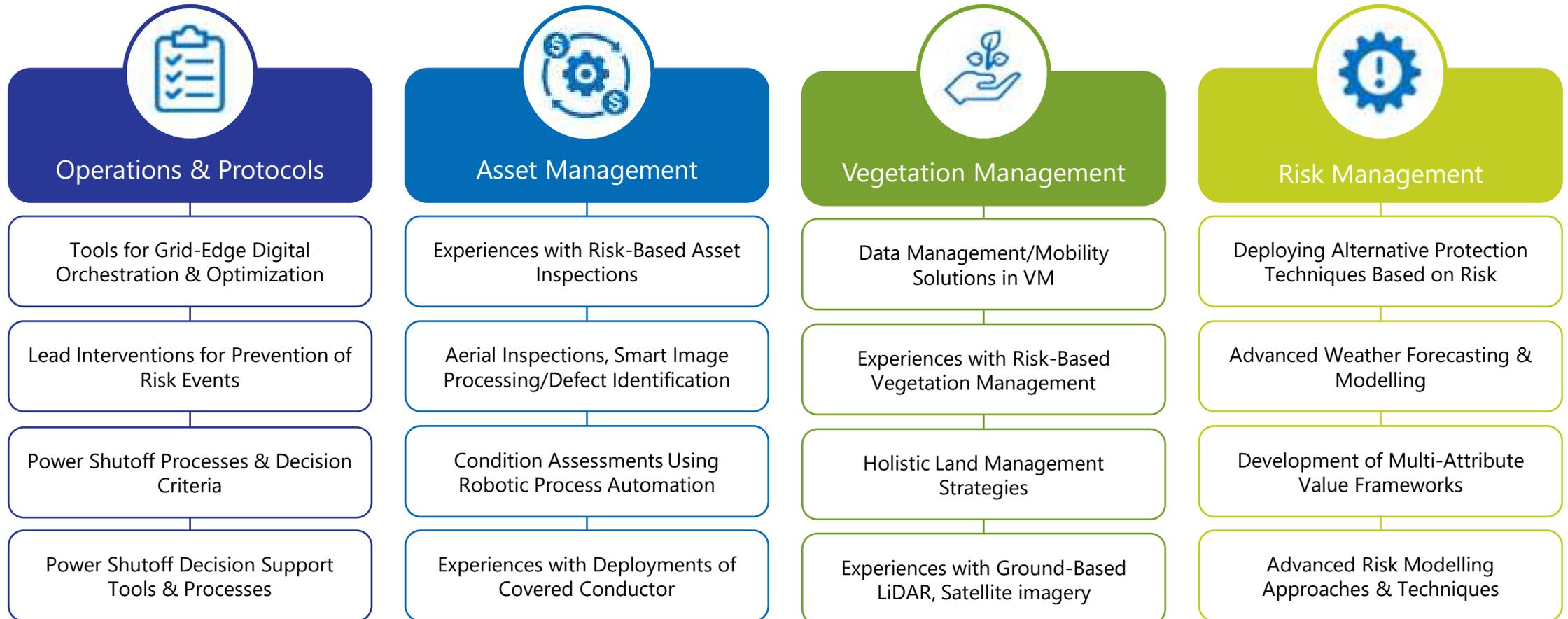
Each working group manages (on behalf of the full peer group) 4 key processes within its primary area of focus:



Working Groups

Working Group discussions cover many different topics and focus areas. Members routinely share their experiences and help to identify industry leading practices. Occasionally, members invite leading vendors who they have worked with to share more information on the products and services they offer in order to improve and expedite decision making for those exploring similar options.

Some recent topics explored & presentations made within the working groups include:



Additional Examples - Recent IWRMC Focus Areas/Discussion Topics

Operations & Protocols

Use of Weather Stations, Cameras, & Fire Modelling to Support Operational & Strategic Decision Making
Deployment & Use of Cameras for Ignition Detection & Real-Time Monitoring (Survey)
Deployment & Use of Weather Stations for Real-Time & Strategic Purposes (Survey)
Use of Fire Potential/Fire Spread Modelling to Support Operational Decision Making
Pre-emptive use of Fire Retardants for Ignition Prevention and/or PSPS Mitigation
Strategies for Adjusting Protection Sensitivity Settings and Disabling Reclosers
Use of Tree Wire/Spacer Cable/Covered Conductor as a Fire Mitigation
Fire Risk Modelling to Support Circuit Disconnection Decision Making

Asset Management

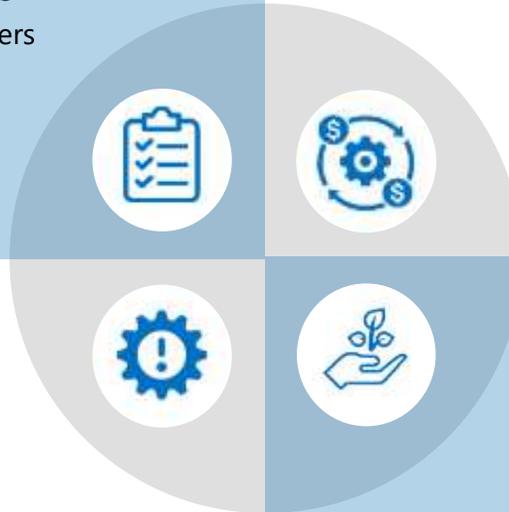
Comparing Covered Conductor vs. Undergrounding as a Fire Mitigation
Fire Start Sources / Defining "Fire Start" (Survey/Benchmark)
Experiences with Failed Conductor due to Corrosion
Use of Tree Wire/Spacer Cable/Covered Conductor
Fire Risk Model Refresh Frequencies
Use of Covered Conductor (Survey)
Candling of Distribution HV Fuses
Failure Mode & Effects Analysis

Risk Management

Fire Risk Index Calculations
Insurance Challenges due to Wildfire Risks
Cost vs. Risk Mitigation from Undergrounding
Incorporation of Fire Suppression into WF Risk Models
Impacts from Climate Change – What is the "New Normal"?
Use of Tree Wire/Spacer Cable/Covered Conductor as a Fire Mitigation
Calculating Organizational Fire Risk Exposure to Support IWRMC Maturity Model
Fire Risk Models - Evaluating Models using Actual Ignition and Consequence Data

Vegetation Management

Hazard Tree Strategies
Defining "Fire Start" (Survey)
Pre-Inspection Practices / Programs
Vegetation Clearance Requirements / ROI
Vegetation Management Resource Challenges
Vegetation Management Software & Analytic Solutions
VM Contractor Insurance Challenges due to Wildfire Risks
Pre-emptive use of Fire Retardants for Ignition Prevention and/or PSPS Mitigation



Overall Program Structure

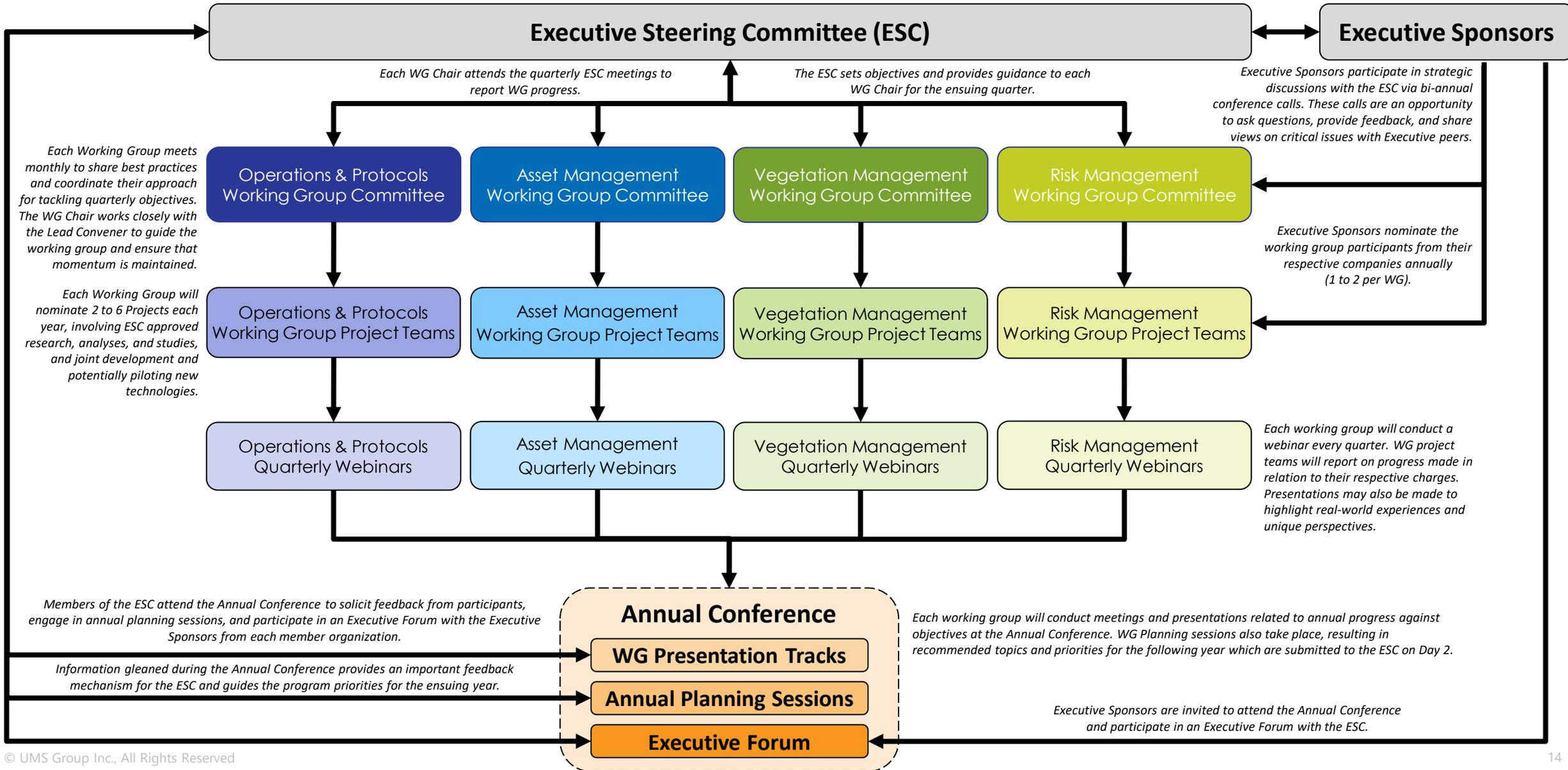


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IWRMC Maturity / Readiness Model

IWRMC members have collaborated on the development of a Utility Wildfire Risk Mitigation Maturity/Readiness Model. The purpose of the model is to better understand the current state of the global utility industry in relation to this existential threat, and to assist each utility in building their roadmap for continuous improvement and prudent risk mitigation investments.

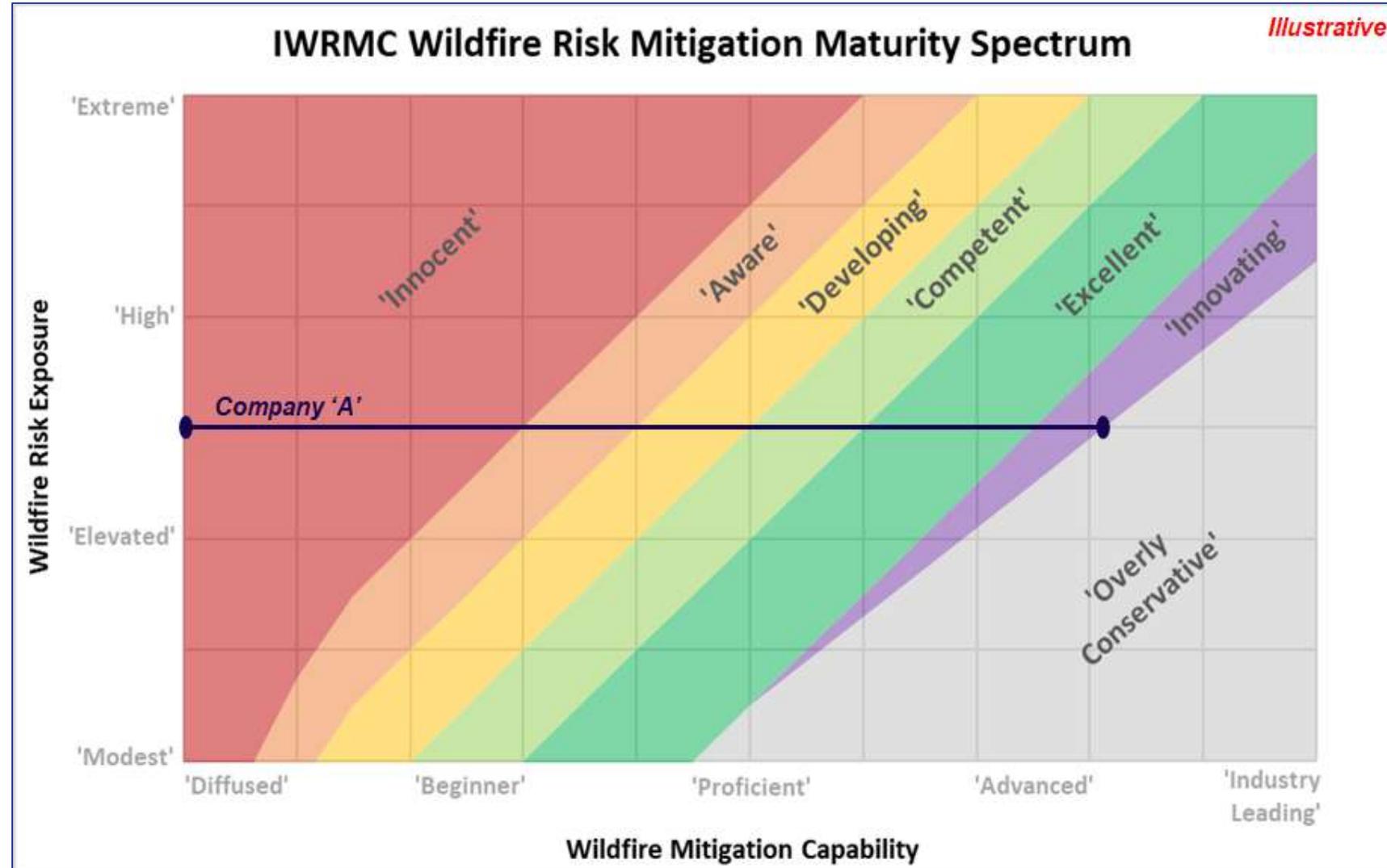


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IWRMC Vendor/Technology Leaderboard

IWRMC members have also established a Vendor/Technology Leaderboard to assist with and accelerate the evaluation and procurement process for advanced wildfire risk mitigation technologies. The leaderboard captures experiences and formal ratings from member companies, organized by relevant technology domains. This data is never shared with vendors.

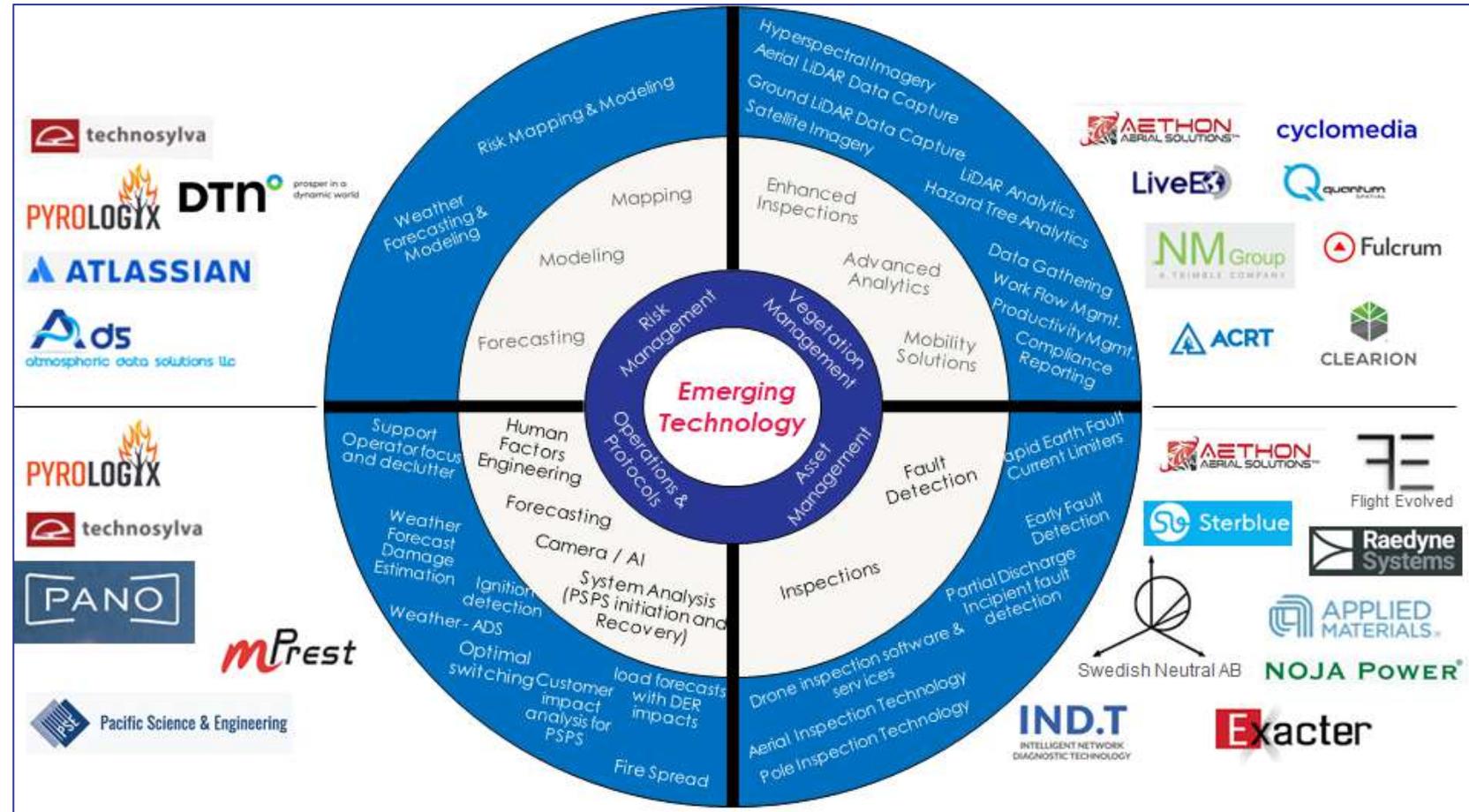


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Hazard/Strike Tree Benchmarking & Best Practices Study

Background / Problem Statement

- **Climate change is resulting in** erratic vegetative growth rates, greater tree health stress levels, and **greater overall wildfire risk from tree strikes**.
- Consequently, **Vegetation Management spending is increasing** for most utilities, and many have already undertaken initial efforts to define the scope of their hazard/strike tree problem.
- However, fully addressing / **removing all potential strike trees is prohibitively expensive** for most companies. In the case of electric distribution, narrow right of ways and the proximity of trees to lines means that utilities have potentially hundreds of thousands, or even millions, of trees with strike potential at any given moment.
- Therefore, once an accurate inventory of potential strike trees is constructed, **a significant challenge remains in quantifying and differentiating the level of risk** posed by this substantial population, and in the **formulation of strategies to efficiently mitigate this risk** to an acceptable level.

Proposed Solution

- Collect and contextualize a **full suite of effective and ineffective hazard/strike tree mitigation practices and associated technologies** in use around the industry today. This includes:
 - **Quantitative benchmark comparisons** to assess the state of the industry (and each member's current state with respect to it) regarding hazard/strike tree approaches and overall performance in terms of risk reduction and costs.
 - Contextualization via **direct interviews** with IWRMC members, non-IWRMC utilities, and vegetation management experts outside of the utility industry.
- Throughout the project, **research from existing bodies of work** will be compiled and organized to provide a robust knowledgebase and to support our determinations - academic studies, white papers, conference presentations, regulatory filings, published technology pilot results, etc.
- Novel insights and best practice approaches will ultimately be compiled into **detailed reports and a strategic reference document**, along with **supporting databases and case studies**, which may be used to develop tailored strategies and tactics for effective hazard/strike tree risk mitigation within specific types of operating environments.

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Current Members

Executive Steering Committee Members



Current IWRMC Members



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Key Issues / Topics

- **Asset Undergrounding**
 - Risk Mitigation Effectiveness
 - Cost vs. Benefits
 - Vs. Covered Conductor
- **Climate Resilience**
 - Moving Beyond Wildfire Risk Silo
 - Grid Hardening
 - Remote Grids, DER's
 - New Risk Areas
 - Community Resilience
- **Insurance Strategies**
- **Regulatory Strategies & Relationships**
- **Stakeholder Engagement / Customer Expectations**
- **New Technology Opportunities**
 - Situational Awareness Tech
 - Cameras
 - Weather Stations
 - Direct Customer Querying
 - Line / Pole Sensors
 - AI / Machine Learning
 - Ignition Detection
 - Image Processing
 - Data Connectivity Modeling
 - UAV's
 - Downed Conductor Detection
 - Rapid Earth Fault Current Limiters
 - Early Fault Detection (EFD)

Questions?

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UMS Group Contribution to Program Success

In UMS Group's Role As Facilitator Of The IWRMC, UMS Group Provides Ongoing Support To Minimize The Workload Of Participants While Putting Forward A Program That Offers Maximum Insight And Value. This Support Takes Several Forms:

Working Group Facilitation

- ✦ Scheduling of monthly working group meetings, quarterly webinars, and any other required meetings
- ✦ Coaching / supporting the Working Group (WG) Chair to prepare for and facilitate all working group meetings
- ✦ Assisting the WG Chair and Secretary to compile & distribute meeting minutes and action items following each meeting
- ✦ Organizing and conducting ad hoc research & analysis on behalf of the working group, as requested by the WG Chair
- ✦ Conducting interviews of WG members to identify innovations / potential best practices for consideration by the WG Chair for webinar presentations
- ✦ Attending quarterly Executive Steering Committee meetings in support of the WG Chair

Program Administration

- ✦ Maintenance of Participation Agreements and NDA's
- ✦ Maintenance of Governance Documents – Records Retention, Membership Requirements, Antitrust, etc.
- ✦ Managing governance issues on behalf of the Executive Steering Committee
- ✦ Maintenance and Administration of IWRMC Web Portal
- ✦ Invoicing, billings/expenses tracking, etc.
- ✦ Developing marketing materials and actively promoting the program to utilities around the world

Program Management & Continuous Improvement

- ✦ Liaising between working groups, and between the working groups and the Executive Steering Committee
- ✦ Monitoring and managing progress against both working group and IWRMC program goals and objectives
- ✦ Compiling working group-specific feedback & insights to support continuous improvement of the program and the development of an annual report

Research & Intelligence

- ✦ Providing a routine Research and Clearinghouse function by populating the IWRMC Web Portal and providing new material notifications
- ✦ Topics: Risk Mitigation Plans, Regulatory Filings, Publicly Available Risk Models, New Technologies, etc.
- ✦ Sources: Trade press, regulatory websites, academics involved in risk mitigation, governance groups/organizations, vendor websites, industry forums, etc.

Annual Conference (Typical Schedule)

1

DAY ONE

Recent Wildfire Lessons Learned

What worked? What didn't? What will you change going forward?



OP



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2

DAY TWO

Regional Reports

A discussion of emerging regional challenges (US / AUS / CA / SA)

Joint Sessions
(All Working Groups)

Executive Session / Strategy Forum

Open discussion and annual planning for executive sponsors



OP



AM



VM



RM

3

DAY THREE

Technology & Innovation

Highlighting new and emerging technologies and innovations from around the world



OP



AM



VM



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4

DAY FOUR

Working Group Planning

Working Group-specific planning for 2022 and beyond (incorporating feedback from Executive Sponsors)



OP



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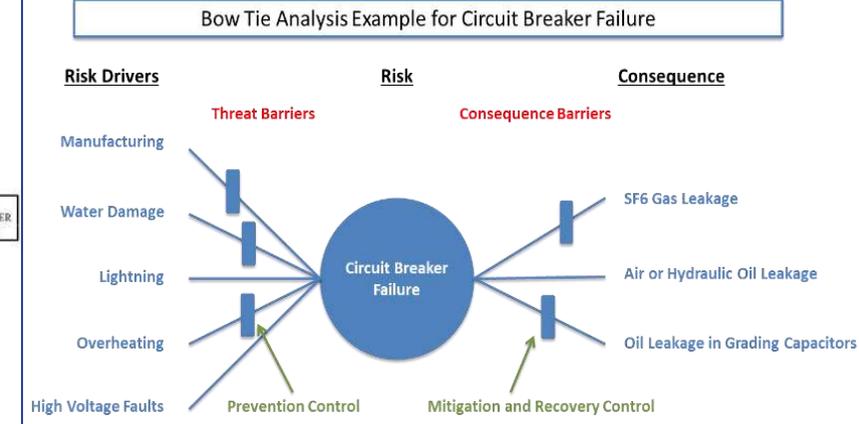
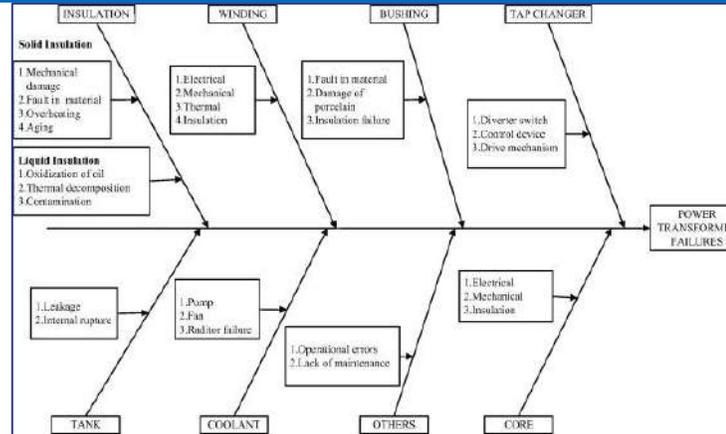


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Examples of Topics Being Explored

Advanced Risk Modeling

- Shared data for enhanced predictive power
- Demonstrable accuracy for stakeholder assurances
- Component level failure models to feed:
 - Risk strategies,
 - Evolution of design standards, and
 - Operability assessment models (i.e. Line removals and readiness for return to service)
- Tuned to transmission realities, not retreads from Nuclear community



$$\text{Wildfire Risk} = \text{Probability of Failure} \times \text{Probability of Ignition} \times \text{Probability of Spread} \times \text{Consequence of Fire}$$

Wildfire Risk Determination

Steel Tower Example		Illustrative Probabilities (in process of sourcing data)			
Component	Circumstances	Probability of Failure	Probability of Ignition	Probability of Spread	Consequence of Fire
Conductor	Failure drops energized line on ground	Depends on location and availability of fuel	60-100%		
Steel Structure Member	Cross member		0-10%		
	Leg member		40-75%		
	cross arm member		50-80%		
Insulators	1 string per Phase		100%		
	2 strings per Phase		40-65%		
	3 strings per Phase		20-45%		
Splice	If lets conductor drop		80-100%		
	If aluminum melts/drops	Depends on ambient and wind speed	10-30%		
Damper			0%		
Etc...					

Expected value

- The expected number of failures* is given by

$$E\{N_i^c(m, p)\} = (\lambda_i^c(m, p) \times RF_i^c(m, p)) \cdot T$$

where,

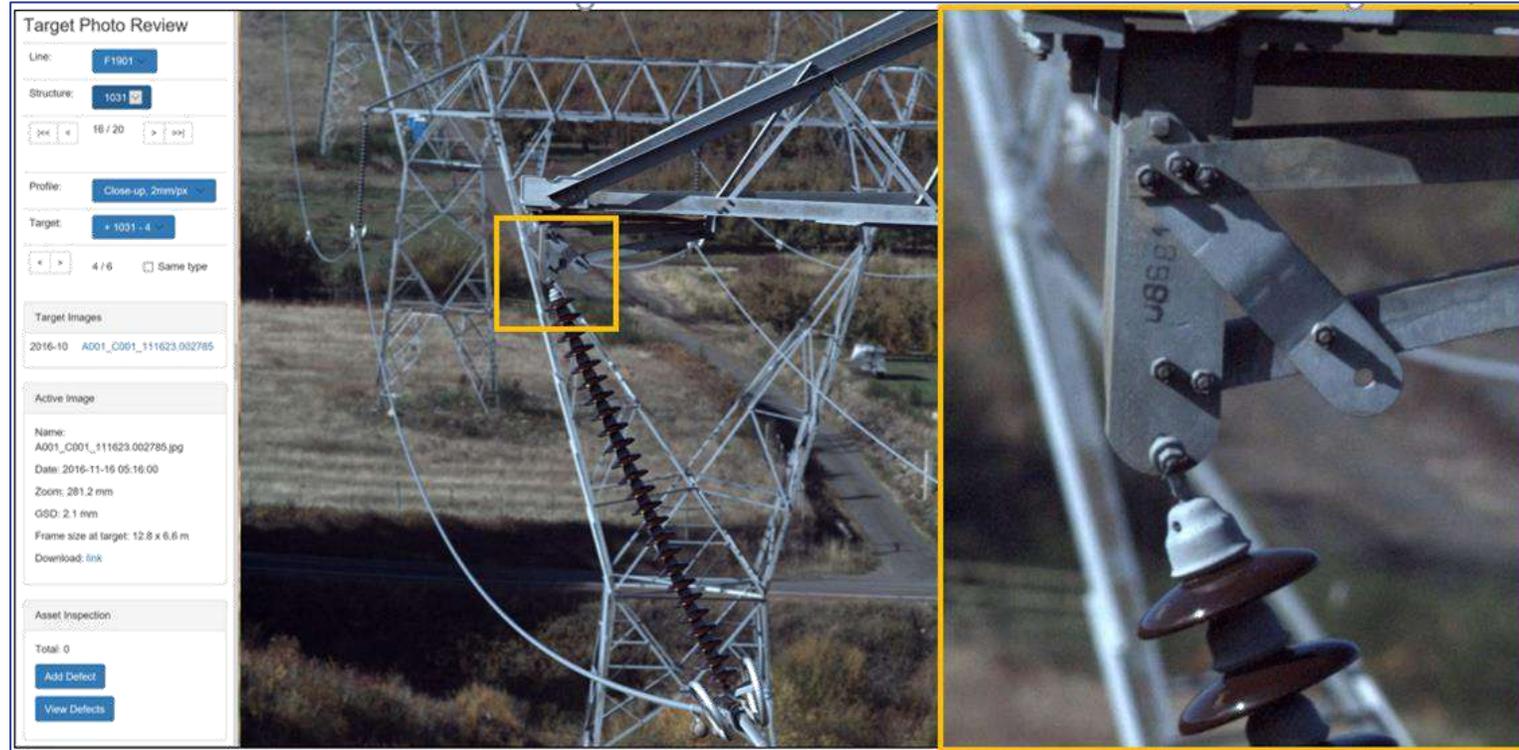
$$\lambda_i^c(m, p) = 0,9 * r_i^c(m, p) + 0,1 * \frac{\sum_{Lu \in L(u)} r_{Lu}^c(m, p)}{\#L(u)}$$

$$r_i^c(m, p) = \frac{f_i^c(m, p)}{T \cdot LE} \quad RF_i^c(T) = d_i^M * \alpha_{i,c}^M$$

* FP and E are computed for year-ahead

Aerial Inspections

- Optimum use of drones in substations (safe approach distances, 3D models, etc.)
- Helicopters “at speed” with targeted HD image capture
 - 1mm resolution from 100m distance
 - 50 to 60 times the daily production of drones
 - Less weather sensitivity
 - Consistent image window facilitates year-on-year trend analysis
- Optimum Inspection practices and frequency



Examples of Topics Being Explored

Community Engagement and Support

- Remote / Microgrids & distributed energy
- Community outreach, public awareness, and communications efforts
- Disaster & emergency preparedness planning
- Public Safety Power Shut-offs & service restoration strategies
- Fire evacuation studies & analytical models
- Deployment of high-definition livestream cameras
- Partnerships with public entities and first responders



First Notification: 2 Days Ahead

If weather conditions warrant a possible PSPS, we will notify potentially affected customers.



Third Notification: Power Shutoff

When weather conditions confirm the decision to shut off power, we will send a notification to impacted customers.



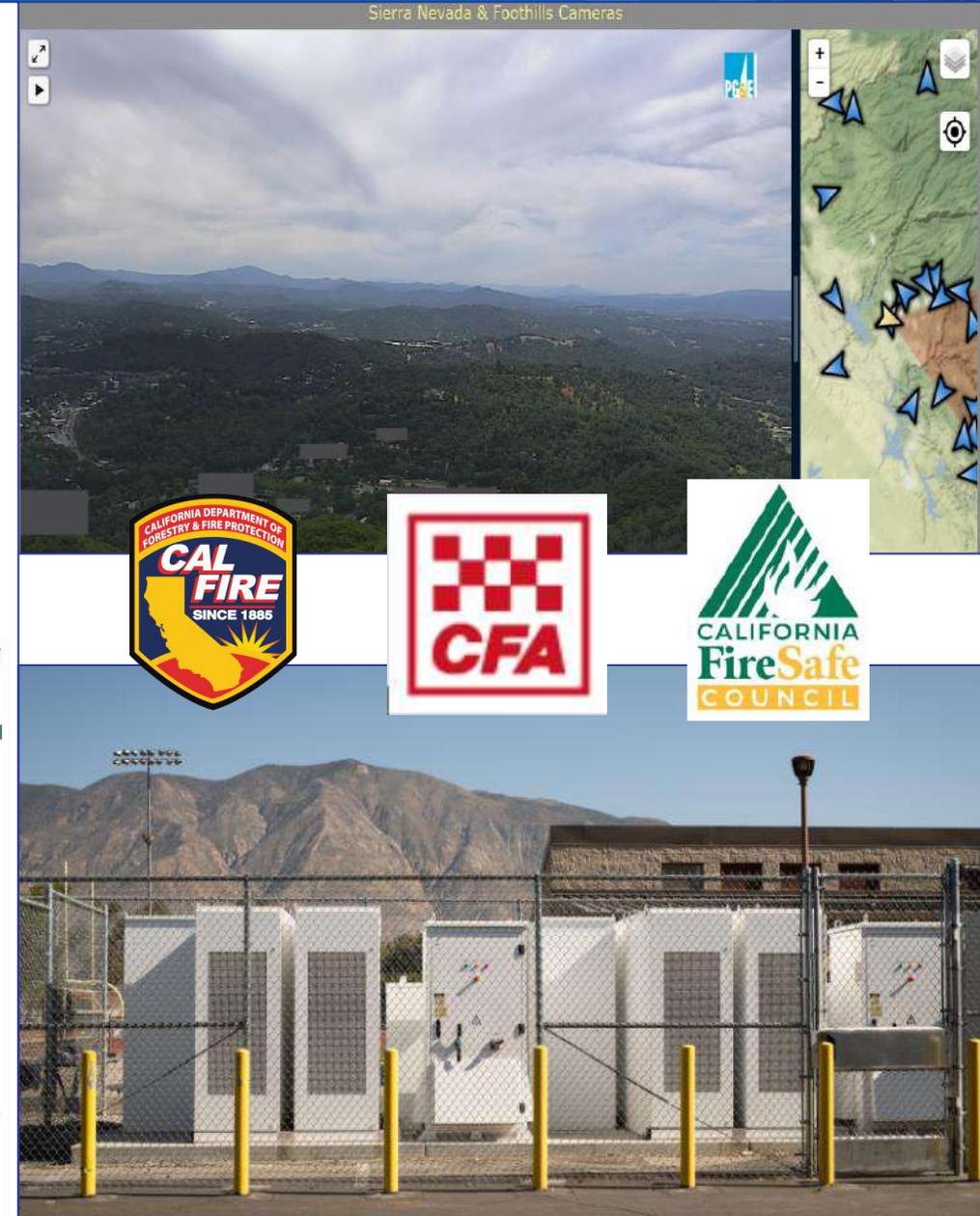
Second Notification: 1 Day Ahead

If weather conditions persist, we will notify impacted customers again.



Fourth Notification: After Restoring Power

After weather conditions return to safer levels, our field teams will check to make sure that power can be safely restored. We will send a notification telling impacted customers that power has been



Other Topics & Ideas

Public opinion influencing strategies

Key messaging and experience in shaping opinion:

- ↳ Expanding utilities' legislative / regulatory authority to take appropriate risk mitigation action regarding vegetation management, land access and maintenance of customer assets.
- ↳ Re-establishing external credibility and trust and building capability to influence public opinion and drive public policy toward effective and sustainable multi-lateral solutions.

Insurance strategies

Educating insurance providers, how to optimize coverages, translate risk reductions into savings on premiums. (Experience suggests that such savings may pay for participation in the forum and far more.)

Technology strategies

Best technologies, best vendors, interdependencies/synergies, etc.

- ↳ Best applications for each technology / greatest sources of leverage
- ↳ Key limitations of each vendor and technology

Ideas for how to use this situation as a catalyst for driving improvements in:

- ↳ Culture / awareness
- ↳ Data governance, analytics, decision support
- ↳ Line organization accountability for efficiency and effectiveness

Operationalizing short-term fixes into long-term organizational changes

Program Web Portal

The Members Only Web Portal is available to participants, providing access to:

- Industry Research & Analysis
 - Annual Risk Mitigation Plans
 - Academic Research
 - Case Studies
 - Interesting and Topical Articles from Respected News Sources
 - Recent Conference Presentations
 - Public Data from Utilities & Regulators, such as Risk Maps
 - Regulatory Frameworks and Approaches
- A Secure Confidentiality Hub – participants can share documents, insights, feedback, etc. in a secure environment.
- Program Calendars – provides up-to-date information regarding meetings, webinars, etc.

The screenshot displays the IWRMC web portal interface. At the top, the header includes the consortium's name and a 'Not following' status. A navigation sidebar on the left lists various sections. The main content area is divided into several sections: a 'Welcome' banner with a background image of a power line tower, a 'News & Updates' section featuring three news items with images and titles, and a 'Calendar' section with three event cards for April 17, 18, and 27. A 'Quick Links' section on the right lists several working groups and a walk-through video.

