



TRIM OPTIMIZATION

**ACQUIRE
ANALYZE
ANSWER**

A predictive modeling platform for vegetation management that uses existing lidar and historical data to identify the relative level of asset risk from trees by quantifying the potential for causing asset damage

VEGETATION MANAGEMENT CHALLENGE

Power outages caused by tree failure are widespread for above-ground electrical grids.

In recent years, vegetation managers have been issued a challenge to enhance their cycle-based trim programs with risk-based trim assessments. Tools & technologies such as lidar are being used to coarsely describe vegetation risk to utility infrastructure. Still, there has remained a gap between these often simple GIS deliverables and implementing the results into complex & multi-faceted vegetation management programs.

TRIM OPTIMIZATION

NV5 Geospatial (NV5G) has developed TRIM OPTIMIZATION, A method to quantifiably prioritize tree trimming activities that accounts for both the risk posed by any individual trees and operational constraints & priorities.

TRIM OPTIMIZATION combines strong data science and modeling practices to assign risk scores to individual trees. The risk score analysis works to identify the relative risk of any given tree by correlating various physical measurements from new or existing lidar with trees that have historically failed and apply those correlations to existing probable trees already listed for removal by vegetation management.

TRIM OPTIMIZATION provides a defensible strategy in how VM Directors determine, prioritize, and assign direction for vegetation management workflow.

TRIM OPTIMIZATION WILL...

IMPROVE DECISION MAKING

Better decisions through better information and understanding of the field assets and environment:

- Establish criteria for prioritizing work
- Proactive vs. Reactive planning
- Defensible strategy
- Accurate work forecasting and resource planning optimization
- Change Detection (post inspection & growth rate analysis in subsequent years)

DRIVE EFFICIENCIES

- Planning resources
 - Justification for resource expansion to reduce risk
 - Determine risk tolerance by resource/operational constraints
- Higher productivity - allowing linemen to work on maintenance activities instead of inspections
 - Faster inventory of assets = faster use of more relevant data
 - Better record keeping for insurance and disputes with public or contractors (Visual records of assets)
 - Traceable, Verifiable Inspection
- Quantitative contractor QC

TRIM OPTIMIZATION APPROACH

Identifying relative risk is an essential factor and decisive rationalization for prioritizing vegetation management to mitigate future outages while maximizing operational efficiency.

PHASE 1: LIDAR DERIVED VARIABLES

By investigating vegetation-caused outages and collaborating with vegetation management experts, NV5G has identified several key attributes that can be modeled directly from high-density lidar data and used to generate a combined lidar risk score. Risk scores do not represent a likelihood of failure. They do represent risk relative to the population of trees surveyed.

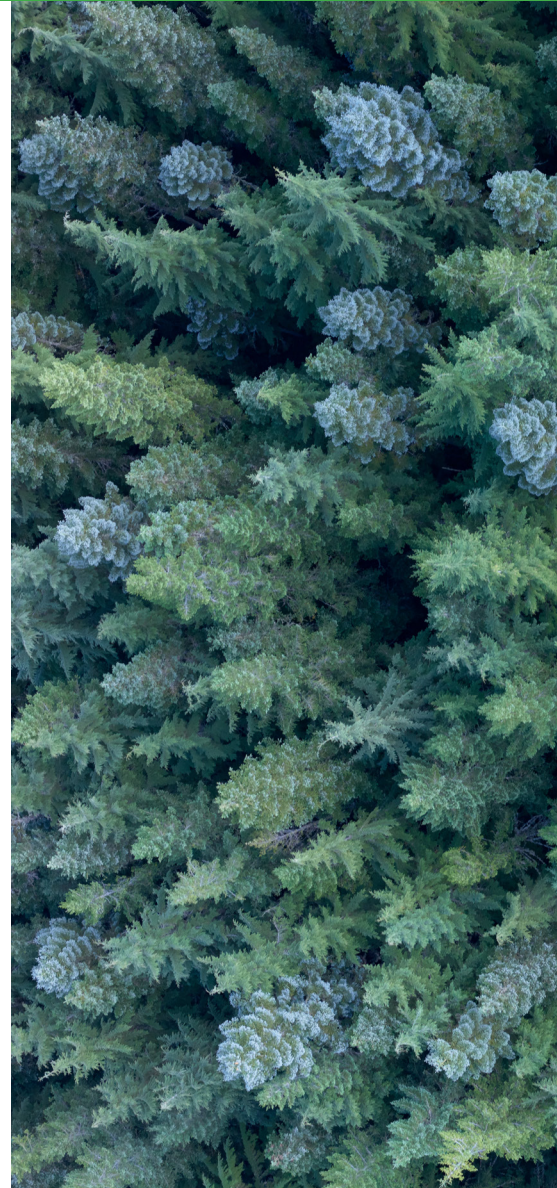
PHASE 2: UTILITY SPECIFIC VARIABLES

NV5 Geospatial can further enhance the applicability of the combined Lidar Risk Score by incorporating customer-specific data where sufficient information exists. This additional analysis aims to characterize the influence of other attributes specific to a customer's service territory. We can extract it from sources such as historic tree failure information and/or expert knowledge.

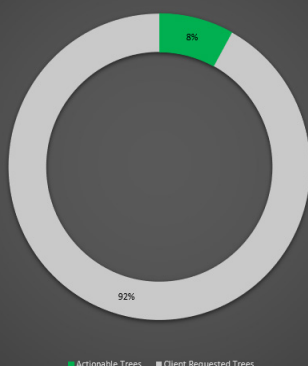
This comprehensive list of risk factors will be quantified on a normalized basis, combined, and then applied to the previously described lidar-risk scores. The final risk scores will provide a quantitative assessment of the combined risk. The relative risk could be an important factor in prioritizing vegetation management mitigation efforts while maximizing operational efficiency.

PHASE 3: TRIM OPTIMIZATION

Once relative risk scores have been quantified, they can be included in actionable work plans. Constraints to achieving maximum risk protection could be specific trim cycles, budgets, the volume of work to complete, the scale of work (tree/span/feeder/grid), geographic sensitivities, and overall risk aversion. NV5 Geospatial employs a contextual design approach to ensure the risk profile and prioritization align with how an end-user in the field would also determine risk and priorities.



Trim Optimization vs Standard VM



For one of the nation's largest electric utility companies, NV5 Geospatial delivered 840k+ VM routine 2020 trees with associated risk scores. Of those trees within high fire threat districts, only 67,826 were within a threat tolerance the utility deemed actionable (aka trees had scores > 90th percentile). So when decisions are being made, only a subset of trees are most critical for managing risk and optimizing resources.