Modernizing Utility Vegetation Management with Mobile Technologies

Utility Vegetation Management (UVM) is a vital and ongoing endeavor for electric utility providers. Unwanted vegetation near power lines must be controlled to maintain public safety, prevent related power outages, and avoid powerline-triggered wildfires. However, UVM is costly, often one of the largest line items in a utility's operating budget.

This paper looks at how utilities solve vegetation management problems with modern mobility solutions with a focus on data-driven geographic information systems (GIS) tools that increase efficiency of field services while lowering overall VM costs.

Vegetation Management Challenges

According to **Power Grid**, Utility Vegetation Management (UVM) is often the single largest line item in an electric utility's annual operating budget. The cost of UVM continues to grow, as do trees and shrubs accelerated by torrential rains which can turn to fuel by extended droughts. Vegetation is increasingly encroaching onto rights-of-way of many power companies and can interfere with the equipment and substations that energize them. For larger utilities, the costs of UVM can exceed $100 million USD annually, with the extreme case being the state of California, where despite what seems to be regular vegetation-caused outages, utilities spend over a billion dollars a year just on preventive UVM. California requires utility companies to inspect their facilities on a yearly basis, which is a huge manpower expense. The state spends hundreds of millions of dollars to verify there are no trees within a certain distance of conductors.

UVM is complicated by a number of factors. For example, utilities must meet reliability standards imposed by North American Electric Reliability Corporation (NERC) requiring utilities to manage and maintain minimum vegetation clearance distance between trees and power lines. In addition, utilities typically own thousands of miles of transmission lines in diverse locations ranging from densely populated metropolitan areas to small, rural communities. Tracking of forest and species distribution, climate trends and immediate weather also contribute to a complicated planning environment.

Non-compliance with regulations can have drastic consequences. The aftermath of wildfires that wreak havoc and cause devastation, can have long-lasting negative consequences that resonate for months and years. Outages that result from overgrown vegetation are a leading cause of interruptions at most utilities, leaving customers without vital electric service. In either case, regulatory bodies may impose severe penalties on utilities that fail to adequately manage vegetation that could impact their operations or lead

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Using Technology to Improve Planning and Maintenance

Given the high costs associated with UVM, utilities are looking to technology to help track, monitor and maintain rights-of-way and other critical areas. Some of the newer tools employed to enhance their UVM efforts provide visibility into vegetation resources through geospatial mapping, identification of risk areas and areas of high-fire threat.

A Turn-Key UVM Solution

GSI Forester from GeoSpatial Innovations is a leading vegetation management planning solution that enables utilities to coordinate contractors in the field with managers in the office, saving time and money. Combined with Panasonic Connect TOUGHBOOK® rugged mobile devices, utility workers have a complete UVM solution at their fingertips, even while in the field.

Forester features Environmental Systems Research Institute (ESRI) geographic-based information integration and is hosted on the Microsoft® Azure® cloud platform to help ensure utilities always have the latest version at their fingertips. TOUGHBOOK portability and ruggedness help simplify the UVM process. "Planners can easily identify work to be completed, notify owners and capture e-signatures, as well as assign work to specific crews from their tablets in the field," says Anne Beard, Director, Vegetation Management Solutions at GSI. "And crews can effortlessly mark sites as complete and enter time and equipment usage from the convenience of their handheld TOUGHBOOK devices as well," she adds.

GSI Forester and Panasonic Connect TOUGHBOOK are a perfect pair and together provide a flexible turn-key UVM solution for vegetation management and field work. "The ruggedization, the ability to take TOUGHBOOK devices into any environment we work in from bright sun to storm, even operate the touchscreen through work gloves is a big plus", says GSI's Beard. "TOUGHBOOK devices also stand up to extreme weather conditions. The processors don't slow down even when faced with freezing weather,"

"Fortunately, the use of technology can be a huge money and time saver," says GSI's Anne Beard. Some of the innovations at the forefront of UVM include:

- GIS software that can map vegetation in specific locations
- Imaging solutions including satellite and aerial photography from drones as well as laser-based pulses of Light Detection and Ranging (LIDAR) which uses light to visualize areas of concern more precisely
- Smart tools that utilize machine learning and artificial intelligence (ML/AI) to provide predictive analyses that enable proactive and predictive approaches to UVM, helping to prioritize tasks based on a model that projects which areas of vegetation pose the greatest risk

Why Mobility Matters

Mobile devices are an important part of a UVM solution. Handheld and tablet devices offer increased efficiency over pen-and-paper based vegetation management programs and they enable field workers to take advantage of the information from GIS, imaging solution, and other smart tools.

Field workers can stay connected to the office while accessing real-time data and applications, such as work orders and maps, no matter where they are, and capture data as they complete the work. Specific applications include:

- Dispatch and coordination of crews; issuing change orders in real-time when necessary, saving unnecessary trips to field locations
- Planning and electronically sharing UVM orders work ahead of time, so that when crews arrive they already have plans in hand – whether crews are contractors, employees, or both
- Simplifying follow-up audits by automatically collecting information gathered in the field and transmitting it back to the office and third-party audit firms
- Bringing together layers of information including GIS data, LIDAR, satellite imagery, and vector to present a holistic picture of infrastructure, conductors, and vegetation as part of a comprehensive UVM plan
- Capturing imagery and data layers to feed predictive analytics tools that can help prevent vegetation from posing risks in the first place

The impact of mobile devices on UVM can be dramatic. "Mobile vegetation management solutions can drive up UVM productivity, drive down costs and reduce overall risk," says Chad Hall, Strategic Account Manager for Panasonic Connect, Utility & Enterprise Mobility. "Furthermore, utilities are repurposing data collected from mobile devices in their UVM program to power machine learning and artificial intelligence software that can help predict problems before they occur," he adds.

How can a utility quantify the benefits of mobility in their UVM programs? "It is difficult to predict what prevention of vegetation-caused interruptions will save a utility over time," says GSI's Beard. "However, we know that if you never maintain your vehicle, for example chances are, it will break down far sooner than expected. It's similar with trees – you have to efficiently manage vegetation, or you run the risk of having increased numbers of outages or worse, the increased risk of wildfire," she adds.

Panasonic Connect TOUGHBOOK Solutions

Many utilities rely on Panasonic TOUGHBOOK rugged mobile devices—to power UVM and other utility applications. When combined with GIS or UVM software, these devices provide a complete solution that offers field and office UVM personnel:

- A choice of form factors including notebooks, 2-in-1s, tablets and handhelds, built rugged to the most stringent military specifications and with GPS standard on every model
- Rugged design from the ground up. TOUGHBOOK mobile devices are 72% more reliable over other rugged devices based on comparing device failure rates[1]—it's not a consumer-grade device tucked into a rugged case
- Support for Windows® and Android™ operating systems
- Devices that operate in extreme weather like bright sun or torrential rain, and touchscreens that work equally well with bare or gloved hands
- A decades-long history of integration with leading UVM software providers like GSI Forester (see Use Case sidebar on page 2)
- A dedicated professional services team that has deep industry expertise, and who can help you select the perfect combination of hardware, software and services and assist with deployment, kitting, and vehicle mounts and installation
- Imaging solutions including satellite and aerial photography from drones as well as LIDAR which uses light and radar to visualize areas requiring service more precisely
- Smart tools that utilize machine learning and artificial intelligence (ML/AI) to provide predictive analyses that enable proactive and predictive approaches to UVM, helping to prioritize tasks based on a model that projects which areas of vegetation are at greatest risk

Keyboard Optional
TOUGHBOOK G2

Keyboard Optional
TOUGHBOOK 33

TOUGHBOOK A3

TOUGHBOOK®

Bottom-Line Benefits

With rugged mobile devices and mobile UVM software, utility teams can access real-time information to better execute maintenance programs, track progress, and file reports in the field, eliminating the need to return to headquarters. In addition, those same mobile devices can be used to capture data in the field, even from drones, which can greatly expand visibility and help identify risks early—preventing excessive damage from vegetation, reducing operational costs and minimizing community impact.

For more information about how Panasonic mobile solutions can help utilities become more operationally efficient, explore our **TOUGHBOOK for Public Utilities page** or visit the **Resource Center**.

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[1] Compares actual data for TOUGHBOOK computers to data gathered by IDC on consumer and rugged laptops, tablets, and handheld devices and reported in The Case for Deploying Rugged Devices in Your Organization. IDC (November 2021).

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