Along with the tremendous disruptions to business caused by the COVID-19 pandemic, the nation has also been experiencing significant economic hardship along with social and political unrest. Despite the upheaval, utilities have managed to quietly and assuredly keep the lights on while continuing to drive technological advancements and innovation.

L3Harris recently conducted its third annual Unmanned Aerial Systems (UAS) and Transmission and Distribution (T&D) survey, drawing worldwide responses from over 100 executives and professionals from utilities and firms supporting utilities. To continue benchmarking several key industry statistics, we asked many of the same questions as in prior years. New questions were also introduced to capture the quickly evolving state of the industry. Our objective was to explore industry perspectives in greater depth and gain insights into the progress on important topics such as: how utilities collect and use imagery; who performs T&D inspections; and how imagery is being used and shared across organizations.

UAS has long been heralded as a safety-first option for utilities to improve operations. Now that it is proven and widely accepted, virtual inspections and automated analytics are the next logical step. Through the survey, we captured trends and factors influencing the use of drones, helicopters and even terrestrial cameras within the utility ecosystem and value chain.

Survey highlights include:

- Imagery Is Not Only Being Used for Inspections
- An Image Is Worth 1,000 Words
- Mission and Sensors Make the World Go Around
- So, We Have All This Imagery... Now What?
- What’s Next?
IMAGERY IS NOT ONLY BEING USED FOR INSPECTIONS

In 2018 and 2019, survey responses indicated that 40% of utilities were collecting imagery. Today, that number has almost doubled with 70% of utilities reporting the use of imagery for asset inspections, compliance assessments, vegetation management, disaster management and outage management.

There is no disputing that utilities are embracing imagery to aid in their day-to-day tasks. However, separate departments continue to struggle to keep operations and maintenance (O&M) costs low as it is difficult for any single department to implement an enterprise solution that allows all departments to share imagery. As a result, data is often siloed and kept in disparate systems resulting in inefficiencies.

To overcome this hurdle executives (CEOs, CIOs, COOs and CTOs), who are focused on the big picture, long-term goals and global solutions and have the capital budgets and the authority, should roll out innovative and enterprise-wide solutions that serve the needs of all of their employees to drive organizational efficiencies and lower costs.
What artifacts are provided as a part of inspection services?

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>36%</td>
<td>All images collected including annotations highlighting anomalies, severity of condition and recommendations for remediating</td>
</tr>
<tr>
<td>30%</td>
<td>A summary report/dashboard outlining severity assessments across all poles inspected</td>
</tr>
<tr>
<td>29%</td>
<td>A detailed report for each pole with a select set of images to identify specific areas of concern, severity assessments and recommendations for remediating</td>
</tr>
</tbody>
</table>

Who performs the visual inspection?

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>43%</td>
<td>Combination (Utility employee; e.g. lineman, Vendor/Services employee; e.g. lineman)</td>
</tr>
<tr>
<td>30%</td>
<td>Utility employee; e.g. lineman</td>
</tr>
<tr>
<td>18%</td>
<td>Vendor/Services employee; e.g. lineman</td>
</tr>
</tbody>
</table>

AN IMAGE IS WORTH A THOUSAND WORDS

Over 90% of respondents in this year’s survey indicated imagery was being used by utilities or vendors who perform visual inspections on behalf of the utility.

In the past, it was common for a utility to either request a general inspection report that included images, or to ask that images only be captured for specific issues. This new survey indicated that 65% of respondents either wanted all the images captured during the inspection, or a subset of images that include annotations highlighting damage with an assessment of the severity and recommendations for mitigating the risks.

In contrast, 30% of respondents indicated stakeholders only wanted a summary report/dashboard for all poles that were inspected. Through our extensive discussions with utility stakeholders, we have discerned that T&D organizations struggle with wanting to proactively know about all problems, but they don’t have the budget available to address every problem.

While imagery has the ability to provide a more robust view of the status and health of a utility network, it is essential to establish guidelines so stakeholders can prioritize those insights to efficiently and effectively direct efforts to mitigate the greatest risks to safety and reliability. By incorporating imagery into a utility’s standard operating procedure, imagery can be shared amongst experts across the organization for additional insights. Sharing imagery is a more cost-effective solution than sending additional crews out to the field, or even worse, encountering an outage that could have been prevented. To accomplish this goal, it is not just enough to collect images, but the imagery must be organized and easily accessible to stakeholders throughout an organization.
MISSIONS AND SENSORS MAKE THE WORLD GO AROUND

It was no surprise that nearly half of respondents (48%) are using RGB cameras to capture imagery and perform visual inspections. Data collection procedures range from flying around structures for visual inspections to flying parallel to the lines looking for catastrophic damage. Missions fluctuated between gathering cursory information to detailed inspections that either collected images from all angles or focused on specific areas of structures such as the pole tops. Nearly all respondents selected multiple responses indicating they are flying more than one type of mission.

Almost a quarter of respondents are using 2D stereo pair and point cloud data for vegetation insights. Some 17% are using hyperspectral or multispectral cameras to gather more advanced remote sensing insights such as thermography or potentially understanding vegetation health. Nearly 14% are collecting orthomosaic images for site planning. Combining sensors and performing dual collects in a single flight provides additional insights. For example, collecting both LiDAR and orthomosaics will provide insights about the digital elevation of the terrain surrounding a structure.

Nearly 40% of all structures are flown once a year and 28% are flown every three years. Most utilities conduct some type of cursory inspection once a year suggesting that drones are being integrated into the annual inspection routine as well as a becoming a fundamental part of more detailed inspections every three years.
WE HAVE ALL THIS IMAGERY, NOW WHAT?

While we know utilities continue to collect imagery, nearly 60% of utility employees said they were not aware of imagery being stored in a centralized data management system.

When the latest and most relevant imagery cannot be easily found, the result often leads to organizational inefficiencies and increased costs that range from duplicating efforts to making decisions based on incomplete/old data; all of which puts the organization at risk. Imagery isn’t just valuable for looking for damage, it is incredibly useful when trying to understand how structures vary from “as designed” to “as built”, assisting in reliability and compliance assessments, performing site planning and storm preparedness.

Moving imagery from departmental silos to an enterprise-wide solution that organizes imagery and can be easily accessed by various stakeholders in an organization is clearly low hanging fruit for CIOs and aerial departments. Immediate benefits include reducing costs, making more informed decisions and reducing liability.

WHAT’S NEXT?

Over the past year, we have seen a considerable uptick in the number of utilities collecting and using imagery to gain insights for things such as inspections, compliance assessment, vegetation management, site planning and outage management. While imagery has typically been available to only a small group of stakeholders within an organization, we are seeing more and more stakeholders benefit from imagery captured in the field.

Imagery is a key component in leading the digital twin revolution which will create a virtual model of the network. By pairing the virtual and physical worlds together, utilities can analyze data and monitor systems to head off problems before they occur and prevent downtime. Digital twins are an effective tool for simulating use cases and planning for the future.

We anticipate the use of imagery in the next few years will extend well beyond a standard RGB camera. LiDAR sensors are advancing every day and getting smaller and lighter and costs continue to drop thanks in big part to the self-driving car initiative where LiDAR sensors are used for navigation, collision detection and autonomous driving. Smaller and lighter sensors offer the possibility of combining multiple sensors (imagery and LiDAR sensors co-registered) as a single payload on a drone which we believe will become the norm and pave the way to 3D inspections.

We are also seeing more and more satellites being launched with higher resolutions and lower price-points. Images collected by satellites provide multispectral insights that will deliver an affordable and comprehensive picture of the areas surrounding a network including vegetation health.

With O&M budgets under constant pressure, gaining a C-level sponsor is essential to adopting an enterprise-wide solution that stores and organizes imagery that stakeholders can easily access. While having data in a centralized data repository is a key step, larger cost saving efficiencies will result when analytics are folded into the mix. This is when organizations will move from a centralized repository into an intelligent imagery system that will integrate analytics and provide automated insights that can integrate into existing operations (EAM, GIS, WFM) and workflows.

For more information about L3Harris utility solutions, please visit:

www.L3HarrisGeospatial.com/Utilities