Emerging Technologies Revolutionizing How We Imagine Infrastructure
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ABSTRACT TEXT: “Big Data” is the new economic force. Reports suggest that nearly 90% of the data ever created has been generated within the last few years. Now more than ever, the pressure is on to capture and capitalize on the vast amount of information available to glean better, faster, and more actionable insights. The infrastructure and facilities management industries need to capitalize on this data to manage assets in such a way to achieve lowest total life cycle cost, maximize the investment of every infrastructure dollar, and ensure mission resilience.

The first phase of moving into autonomous infrastructure management is automating and accelerating data capture. Unmanned aerial systems, affixed with various sensor platforms, can semi-autonomously, and eventually autonomously, collect a myriad of different imagery types to capture visual, thermal, LiDAR, hyperspectral, and ground penetrating radar data. This data can reveal infrastructure defects, roof leaks, topography, material types, and sub-surface anomalies respectively. On the interior of facilities, rapid inventory and baselining techniques can be coupled with technologies such as mobile LiDAR backpacks for simultaneous imagery capture. Fixed sensors placed on critical infrastructure can then monitor assets continuously and provide real-time sensor data on your most mission critical assets.

Autonomous analytic techniques can then simultaneously be performed to assess the imagery and data captured. Machine intelligence algorithms can be developed by training computers on imagery of infrastructure and identifying objects, defects and anomalies of importance so that the algorithms can learn and eventually perform inspections on collected imagery without human interference.

After data is captured and analyzed in an expedited manner, various visualization platforms can be utilized to enhance decision making through contextualized data aggregation, modeling and simulation capabilities. We visualize at the enterprise, campus, facility, and component level to address the myriad of stakeholder data applications. For instance, 25,000 plus facilities with millions of collective data points can be visualized simultaneously, organized by mission dependency index, and displayed based on their condition index. Iterations of investment scenarios can be run over 30-year time spans to understand the degradation of massive asset and infrastructure portfolios.

Current practices for infrastructure inspection and data collection do not generate the volume, variety, and velocity of data necessary to guide effective decision making for cost-effective investments that align with mission priorities. Innovation with emerging technologies will make doing more with less a reality.