**WHAT WE HAVE LEARNED FROM USING**

**SLAM IN CHALLENGING ENVIRONMENTS**

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**Abstract**

Simultaneous Location and Mapping (SLAM) has been integrated with geophysical sensors and deployed at munitions response sites to replace robotic total stations (RTS) and real-time kinematic (RTK) positional systems in environments that do not have a clear line of site at ground level or to satellites, respectively. SLAM deployment has resulted in increased field efficiency and data quality in densely vegetated and global navigation satellite system (GNSS) denied environments, but there have been many lessons learned in the process. For instance, adjustments to point cloud collection techniques and processing parameters were made to ensure positional measurement quality objectives (MQOs) were being met throughout the entirety of each cloud. This presentation will also discuss the quality control (QC) tools and procedures that were implemented to reduce the risk of rework and the processing techniques that yielded the best results for munitions response geophysical applications. Weston Solutions has deployed SLAM in a variety of environments ranging from dense vegetation with steep slopes to open flat terrain with buildings at the edge of the point cloud. Overall, our experience demonstrates that SLAM is the preferred approach for areas where line of site is an issue, and where GNSS signals are unreliable. However, traditional positional equipment may be preferable depending on specific site conditions. Traditional positioning equipment can be less expensive (and more readily available) than SLAM for surveying wide-open environments, residential properties, or even tree farms where vegetation is planted in uniform rows.