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Locating Technology

TECHNOLOGY WILL CHANGE THE NATURE OF UTILITY LOCATING AS WE KNOW IT

With new infrastructure going in the ground every day on top of old facilities, we know that the old ways are now becoming a liability, and we need to change our attitudes, behavior and processes to obtain the results that we want.

by Steve Slusarenko, CSO - ProStar Geocorp and Layne Tucker, Founder of EchoRFID, Co-Founder of ProStar Geocorp

A Decade of Dedication, Realizing a Vision

Layne Tucker had a vision for the standardization of material tracking, traceability and verification for oil, gas and other utility assets on a global level. He spent a decade assembling industry veterans and technology experts to develop a global system for a full life cycle cradle to the grave process for material and construction task management to include integrity data retention in real time georeferenced. In this data chain of custody of "What, Who, When, and Where," all components throughout the system can be traced above or below ground. It all must begin with electronic management of material manufacturing information conjoined with construction, RFID tag and task qualification in real-time with built-in business rules.

The preferred industry standard would be to RFID tag the components at the point of origin. Until that happens, we can still do the process at the laydown yards and point of delivery onsite. Huge material management savings will be realized, and industry experts feel it would bring ten to fifteen percent more value to the asset. This process would automate compliance in real-time for project managers and greatly enhance integrity management and public safety.

In the last two issues of *American Locator*, we relayed a bit of history on how technology that was originally developed for other purposes was recognized as providing potential for elevating damage prevention as a discipline, and how this technology is being applied today to enhance locates and bring significant value to the infrastructure owner. In this article, we will provide an understanding of how it is inevitable that RFID technology, in concert with precision GPS receivers, the cloud and mobile devices will eliminate line strikes by excavation equipment and boring/tunnelling machines.

Background: ProStar's Transparent Earth Software provides major improvements to the locate process, providing traceability and verification through robust data capture and mapping capability

Transpa

Where are We Now?

The locate technology and locate process has not really changed in the last 20 years. The devices are improved, the technicians are better trained, but "putting paint on the ground" to identify the location of buried utilities is still the basic idea. The current process still involves a lot of manual steps and coordination of work, and usually involves complex workflows to request and create tickets, identify and notify affected utilities, review the ticket notifications, and clear them or assign them to a technician who is then dispatched to the excavation site. Once at the site, the locate technician meets the excavator, performs the locate and provides a positive response back to the one-call center. Discrepancies that are found in the field often go unreported due to the extensive manual effort needed to identify, measure, sketch and submit the paperwork into the office to be forwarded to the utility owner.

ProStar's Transparent Earth software that is offered on the cloud, certainly provides major improvements to the current process and adds value by providing robust data capture and mapping capability that removes any impediments to getting all of the data captured during the locate back to the utility owner. Of interest is not only the reduction in time to capture, document, and submit the data, but also a major reduction in the effort to review the submission, quality assure the data, and upload the new data into the database to correct (or confirm) asset location information in the system of record.

Where are We Going?

We are at the point now where we have self-driving vehicles on our roads, self-driving trains and elevated transit systems, and we are okay with that because we know that at the end of the day, they will save lives and prevent damage. Virtually every major vehicle manufacturer is either building autonomous vehicles or looking at building them. Even the way that most of us use personal vehicles may change, so rather than owning two or three personal vehicles, we will hail one using an app and just pay for the service. Just like the automotive landscape is changing, the same shift will occur in the way that locates are performed and the way that damage prevention is managed.

The ultimate goal of these changes will be to provide the tools, processes and data needed to ensure that human error is entirely removed from the damage prevention equation. We can take the underground utility damage prevention process as we know it today and create a system that is every

bit as revolutionary and promising as the self-driving automobile. To do this we need to use some of the same technologies and techniques that are used by Honda, Ford, GM, Tesla and others to support the use of autonomous vehicles.

At the end of the day, we will have developed a system where line strikes by large excavation equipment is virtually impossible. Imagine having a system that will allow us to drive over a pipeline if the bucket is above grade, but will prevent us from digging within the prescribed buffer zone. In fact, it will display our current position and orientation relative to the buried and surface facility infrastructure on a map display, issue an alert as we approach the line, and stop the machine from crossing over the line if we are overweight or attempting to excavate within the "no dig" zone. The system could record exactly who was digging, record the exact time and precise location every 15 seconds, and send that information to the database as part of the project records.

How Will We Get There?

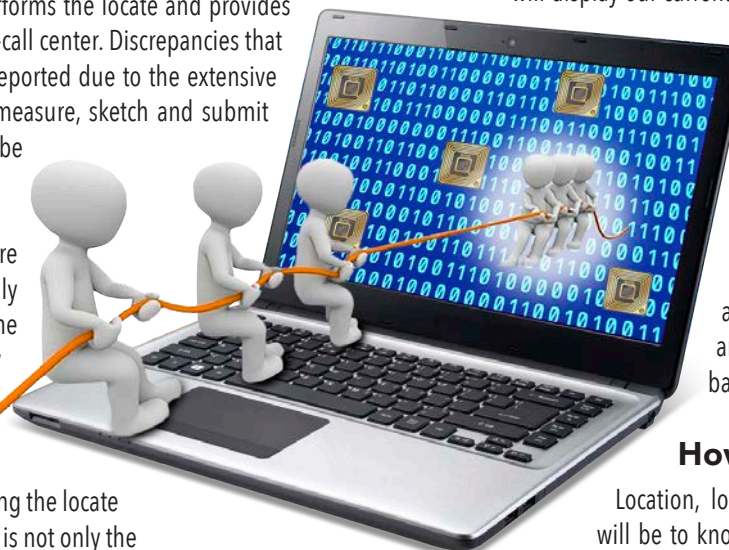
Location, location, location. The first requirement will be to know exactly where everything is. Google, Here and others are creating very accurate maps using LiDAR point cloud technology. Vehicle manufacturers are adding simultaneous localization and mapping (SLAM) into vehicles to provide location specific situational awareness, especially as it relates to pedestrians and moving hazards, and to make up for lack of situational details in maps and sensing tools. For both buried infrastructure and heavy equipment, only the exact location of each is required, however, there may be opportunities for SLAM as it relates to the position of nearby personnel and the speed and direction of the equipment and any attachments:

Mapping

In the context of damage prevention, the subsurface infrastructure will need to be accurately mapped and depicted. Excavation equipment will need to be accurately located with the additional requirement of knowing the exact 3D location of cutting bits on blades, or teeth on excavator and backhoe buckets that will present a hazard to the facility infrastructure.

GPS and EGCS

To achieve the needs related above, we will need a real-time precision GPS unit on the cab, an excavator grade control system to register the location of the blade/bucket/auger/ripper, a display unit in the cab, information on the equipment, and the accurate location and orientation of the facilities.



Lead your team into the future with RFID



The EchoRFID ProStar Solution

RFID Technology

The identification of the buried facility will be required so that the nature of the infrastructure is known, as will be the specifics of the excavation equipment and attachments. RFID would play a major role here where it could be used to provide the meta-data needed to understand the specifics of the machinery and the buried facility and even identify the operator to ensure that they are qualified to operate the equipment.

Logic

Once the specifics of the equipment is known, software will prevent or allow the traversing of the buried facility based on weight and allowable load limits. Logic will decide if the bucket or blade is allowed to dig based on the buffer zones provided by the facility owner, and will even prevent unauthorized use of the equipment.

What's In It For Me?

This is the basic question that everyone wants to know. Let's look and see who benefits and how that benefit is realized.

For the public (the party that ultimately pays the bill for locates), the answer is obtaining assurance that the infrastructure buried near their homes, schools, businesses and public places is known, protected and well managed so that they are kept safe. This of course is the primary motivation to perform utility locates—preserving the safety of the public, workers and the environment. As consumers, they will see utility rates and product costs go down and a result of better asset management practices by the infrastructure owners.

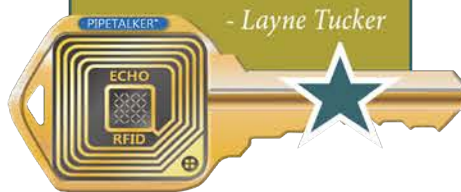
For the utility infrastructure owner, the elimination of preventable risk events will reduce insurance premiums and operating costs. In the near term, the benefits may take some time to realize, but over time, especially with new construction, the ability to track, trace and identify infrastructure will reduce liabilities and ensure that records are accurate, complete and verifiable. The current utility locate process will be enhanced to provide accurate data to allow updating of outdated records and bring them into compliance while eliminating the need to do locates of those facilities in the future.

For the one-call center, the ability to aggregate accurate records and depict centerline information in design ticket requests will help its members reduce costs when deciding where to place new infrastructure. In addition, in the future, once the assets are registered as being accurate in accordance with engineering standards such as ASCE 38-02, the requestor may be sent an electronic manifest based on the dig site identified in the ticket request.

For the locate service providers, the near future will likely mean more work as more information will be gathered during the locate process. These enhanced locates will mean that more work will be required to register the location of existing infrastructure to allow owners to update their records. Longer term, the locate technicians will become more oriented towards

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- Layne Tucker



RFID Technology - The Key To Traceability

capturing “as-built” data on new construction under the auspices of a registered professional. Locate companies will also be used to perform depth of cover and leak surveys, and provide the data back to utility owners.

For the contractor, the ability to enter an electronic ticket request and receive a map back showing the location of the buried utilities, along with the precision and pedigree of the data, will ensure that the work is not unduly held back. If a locate is required due to the accuracy of the mapping data provided not meeting specifications, the locate technician will be able to find the assets and provide an electronic manifest to the contractor in addition to doing the traditional mark-outs.

For the regulator, the system will provide for the capture, storage and retrieval of documentation required by legislation and provide a basis for consistent reporting such as the DIRT report produced by the Common Ground Alliance.

Summary

Someone once said, “If you do what you’ve always done – you get what you’ve always gotten.” With

new infrastructure going in the ground every day on top of old facilities, we know that the old ways are now becoming a liability, and we need to change our attitudes, behaviour and process to obtain the results that we want.

We are seeing locate tool manufacturers making their devices GPS capable and providing Bluetooth technology to allow the communication between smart devices. We see GPS receiver manufacturers such as BlueStar that are now doing post-processing in real time right in the receiver to eliminate delays. With the Internet of Things (IoT) becoming more and more pervasive, we see people’s expectations changing every day. They want information, and they want it now.

In the future, the engineer will be able to request a one-call ticket, receive the ticket, and decide where to place the new infrastructure all in the same day. In the future, the contractor will be able to place a one-call ticket request, receive the ticket in the same day, and proceed with the work. In the future, an equipment operator will be able to start his or her machines and see a moving map of their exact position and the precise location of all buried assets nearby, all in real time. We can and will achieve this, and we are well on our way.



GPS units range from centimeter to sub-meter accuracy in real time

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