Evolving to Meet the Challenges of the Data Revolution

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A revolution is taking place in data storage and connectivity. How will the oil and gas industry evolve to meet these new communications challenges?

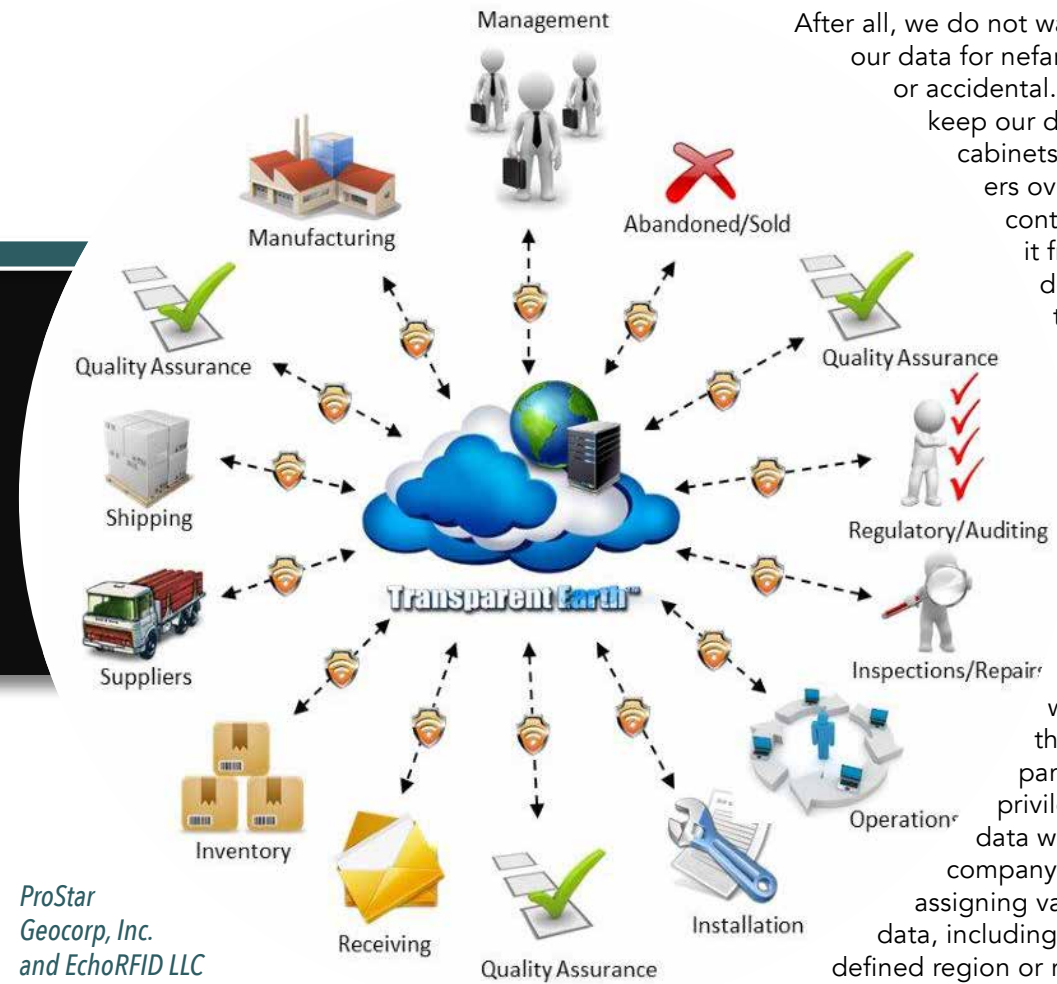by Layne Tucker, CEO - EchoRFID & Steve Slusarenko, CSO - ProStar Geocorp

A not-so-quiet revolution is taking place in our world. We see it every day in our private lives. The connections between cloud servers and our mobile phones and tablets are managing immense amounts of data. That data is pushed on demand to help us stay connected, remain up to date on important events, and to improve the management of our daily activities in today's modern world. Google, Twitter, Facebook, Snapchat and now Uber are all changing the way we communicate, search, purchase, socialize, commute, and locate the products and services we desire. Now this same revolution is coming to the oil and gas industry. Among the leaders of this revolution are ProStar Geocorp and EchoRFID.

Every leap in technology starts with an "Aha!" moment. For the EchoRFID/ProStar solution, this moment was in 2002 while a contractor was ditching for a new pipeline in Northern Alberta and struck an unmarked, unmapped, gathering gas pipeline, resulting in the job being shut down. Layne Tucker, now the CEO of EchoRFID, on hearing of this incident, and being in the pipeline construction business himself as an owner, started thinking of how these types of incidents may be avoided. He wondered how new technologies like GPS Navigation Systems and tablet computers might be leveraged to assist in preventing accidents like this. The "Aha!" came when he realized that the navigation system in his truck that displayed his position on a road map, could just as well display a network of pipelines instead of roads.

He imagined a navigation system in the cab of a piece of ground-breaking equipment on a ROW displaying the current position of the operator and the location and distance to the nearest buried pipeline that would give an audible warning as the pipeline was approached.

This idea started Tucker down the path of doing countless hours of research on the internet (using dial-up connections in those days) to see what he could find out there to put a solution together. When he realized that there was literally nothing out there, he started to patent his ideas. With support from his father, Gerry Tucker, who was the owner of a pipeline construction company himself, and a family friend Peter Lylick, Layne laid the foundation for the company we now know as ProStar.

The second "Aha!" came when Layne was having a breakfast meeting in 2003 with a software developer as they were discussing requirements relating to pipeline construction and touched on the subject of RFID tags and how they might also provide benefits relating to the gathering and managing of material documentation. Again, Layne realized the potential of RFID, did his homework, realized the need, and started to develop and patent his ideas around the use of RFID technology. This was the beginning of EchoRFID, the firm that was started to promote the use of RFID in the Oil & Gas and Utility industries to capture, retain, and manage documents relating to materials and value adding activities. These two companies, ProStar Geocorp, Inc., and EchoRFID LLC,

ProStar Geocorp, Inc. and EchoRFID LLC are working together to incorporate material management processes using RFID in ProStar's flagship product "Transparent Earth"

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COLLECTING AND PROTECTING DATA

There are now some early oil and gas industry adopters that are using these emerging technologies to integrate departmental silos and create seamless information flow across various divisions and departments. They are capturing, recording, qualifying and analyzing large amounts of data very quickly and displaying that information on familiar-looking dashboards and smart mobile computing devices. This in turn enables operations to be more effective and efficient throughout the planning, design, installation and maintenance lifecycle. It also better protects the asset and reduces downtime and incidents often caused by a lack of accurate and timely information.

Oil and gas operators have legitimate concerns over new technologies. One concern that looms large is data security.

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After all, we do not want others to have access to our data for nefarious purposes, intentional or accidental. As such, we tend to want to keep our data in-house, locked into file cabinets and stored in onsite servers over which we have complete control. Sometimes we even keep it from the people who could do their job functions better if they had access to it when and where it was most needed. However, we do not think twice about doing our banking and investing from our mobile phones or our home computers: these industries have invested heavily into very robust and proven security protocols. We can now do the same with oil and gas data. We are at a point where we can confidently use the same military grade three-part security sign-on and business privilege sign-in steps to access the data we need to do our jobs, with a company administrator controlling and assigning various user privileges for that data, including a specific time and date, a defined region or read/write or read only access.

THE CLOUD

Another concern for businesses is "the Cloud." What does it really mean to be in the Cloud? The Cloud is nothing more than data storage and software on someone else's premises. Cloud servers have several advantages to enterprise on premise data and program storage. Cloud computing allows a company to utilize subscription-based methods of computing rather than license-based ones. Traditional software license deployment requires IT departments to be responsible for items such as databases, servers, server hardware, networking, etc. Running in the Cloud gives you freedom to adapt. Hardware resources are already setup and ready to be deployed. Scaling is simplified because servers can be allocated as the demand for services requires. Costs related to maintenance, patches, upgrades, downtime, customizations, integration and vendor-dependent software and application changes/upgrades are also reduced. Cloud initiatives have accelerated lightweight client access to powerful processing services hosted at remote locations.

FIELD TO OFFICE CONNECTIVITY

Innovative companies are developing new Cloud, mobile, and geospatial technologies that enable lots of data to be captured, stored, organized, and geo-referenced with unprecedented confidence. Geographic information systems (GIS) have of course been around for a long time. For many years, we have been stuck with proprietary platforms that cannot adapt quickly enough to our changing needs and data models, but that has also changed.

How ProStar integrates processes and technologies

A host of extensible mark-up languages (XML) have opened up data exchange to facilitate interoperability between platforms. These include Industry Foundation Classes XML (ifcXML), Building Information Model XML (BIMXML), LandXML, PipelineML, agcXML and TransXML. Each has its advantages and disadvantages. One aspect they all have in common is that they each use XML as their base format which allows automated programs to exchange this data. Utilizing Open Geospatial Consortium (OGC®) standards, including web feature services and web mapping services, removes proprietary restrictions on how data are consumed or presented. We can now go easily between differing CAD and GIS platforms and enjoy the advantages of both.

Another element now in place is the connection of real-time communication between the field worker, the field portable device (smartphone or tablet), the Cloud and the office. Instant visualizations of where assets (such as pipelines) are located—and changes, corrections and additions to data—provide great efficiencies and quality assurance benefits.

Traditional survey techniques that used to be costly, relegated to specialized personnel and required extensive processing, are now being augmented with sub-meter (and with RTK-centimeter) accuracy in the X,Y plane with no post-processing of the data. New equipment and technology are constantly evolving.

NEW TECHNOLOGIES:

Technology is pervasive in our lives. We now do vast amounts of business using new computing technologies. Only forty years ago, we had to physically go to our local bank where we would line up to see a teller and hand them a passbook where our transactions were recorded. The mere act of making a withdrawal meant waiting for a bank to open, driving to the bank, waiting in line, performing the transaction, and then driving back. Now with current technology, banking takes seconds using mobile and cloud-based technologies, and no one thinks twice about it. Technology has totally transformed how we do our banking. Now, by leveraging the same advances in technology that banks use, we are able to record, track, trace, and recall every transaction in our system with the same accuracy and the same ability to retrieve the details and verify the results. These technologies have the potential to transform some areas of the Oil and Gas business too. Here are some examples at some new technologies that may offer us an opportunity to improve our lot:

Precision GPS Receivers

These can now produce survey grade maps at less than a tenth of the cost of traditional surveying and enable the display of this data in real time via Bluetooth connectivity with a mobile device.

One such product now on the market is the BlueStarGPS™. BlueStarGPS is designed specifically for use with mobile devices, including smartphones, tablets and notebook computers. BlueStarGPS is a standalone receiver with Bluetooth™ technology that provides interoperability between the BlueStarGPS and other devices such as cable and pipe "locating" tools. This technology was adopted from forestry industry applications where conditions are harsh, mostly remote, and often with severe canopy cover. BlueStarGPS offers both GPS and GNSS options in a rugged, lightweight and low cost package.

BlueStarGPS was designed specifically with sub-meter mapping and data collection performance specifications. It squeezes accuracy utilizing SBAS corrections including 3-channel, parallel tracking SBAS' operated by the Federal Aviation Administration, the European Geostationary Navigation Overlay Service, the Multi-functional Satellite Augmentation System (Japan) and the GPS aided Geo-Augmented Navigation System (India).

The strength of BlueStarGPS is in not only providing sub-meter precision in real time, but its ability to maintain accurate positioning when the SBAS signal is obstructed. In fact, this receiver can maintain sub-meter accuracy for up to 40 minutes after the loss of a differential correction source signal. This means that you can use BlueStarGPS under trees, around buildings and in rugged terrain where other receivers can fail to deliver.

Bluetooth Capable Location Tools

These tools can now communicate with hand-held computing devices to capture location information and integrate it with GPS information to produce highly accurate electronic maps of underground infrastructure.

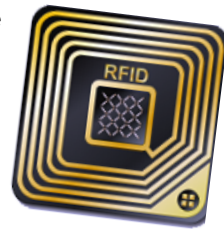*ecom/Samsung Rugged Tablet*

Mobile Computing Devices

Rugged computers and mobile devices such as tablets and smartphones allow the capture and dissemination of information in real time. Today, $1500 will get you an intrinsically safe tablet that can be dropped, submerged, subjected to extreme temperatures, and keep on working through it all. These devices will bind the GPS and location tool information and send it over a secure network to the portal where it is used to update the project database.

Radio Frequency Identification "RFID" Tags

These provide access to specifications, maintenance records, installation information, and location (track and trace) history. Because the information is bound to the physical asset, there are no concerns about associating the wrong records to the asset. Data held in the RFID tag could be used to auto-populate

forms and inspections reports and eliminate the chance of errors introduced by manual data entry.

PROCESSES AND STANDARDS:

With the help of these new technologies, the everyday processes and standards listed below will help drive positive change in all areas of the damage prevention industry.

Subsurface Utility Engineering (SUE)

SUE as a discipline was created to support construction and maintenance activities on linear assets. SUE is intended to improve the knowledge base prior to the start of construction in order to reduce redesign and delays due to conflicts with existing assets. Incorporating SUE into the engineering and construction disciplines is one area that will offer major benefits to these businesses.

Open Geospatial Consortium Standards

This allows the sharing of information regardless of the source system or software used to create the information. This allows for plug and play data sharing and will be a major benefit to data integration during mergers and acquisitions.

CSA S250-11 "Mapping of Underground Utility Infrastructure"

ASCE 38-02 "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data"

CSA Z247-15 "Damage Prevention for the Protection of Underground Energy and Utility Networks"

SUMMARY

Advances in technology have presented utility industries with a new set of tools to provide improved management and access to critical information throughout the enterprise. The recent changes in the market have provided an opportunity to review and refine current business practices and use new technological tools to support much needed business process improvements. Those firms that seize this opportunity will be able to improve their ability to share this information with stakeholders in real time, assure safer operations, and ensure compliance with regulations. The reduction of manual data entry and the ability to review data entered in real time makes the information more timely, accurate and reliable, reduces costs and risks, and improves the bottom line.