Mobile technology has evolved dramatically in the last five years. So much so, that it is difficult for the layperson to identify what this means, and just how it can benefit the oil and gas industry. The industry has been slow to capitalise on the vast benefits of mobile technology and still, in large, depends on paper and binders to address data.

The pipeline industry has always known that good data on installations can reap both instant and deferred rewards, but good data is burdensome, costly, and difficult to collect and even more difficult to retrieve, share, and use. Now, because of the advancements in mobile technology, this no longer has to be the case.

Echo-Shield has invested three years researching, developing and entering into strategic partnerships to create the Pipetalker system, which it anticipates

The freedom
of integrity management

Layne Tucker, Echo-Shield, USA, Gordon Hockridge, Echo-Shield, Canada, Patrick J. Sweeney II, ODIN RFID, USA, Andre Cote, Omni-Id, USA, and Ron Baker, Altec Inspection, Canada, discuss mobile technology for pipeline integrity management.
will revolutionise the way a company approaches its integrity management obligation to stakeholders, governing codes and regulations, by using a full array of mobile technology.

**Industry problem areas**
The company’s research has identified the issues that most beleaguer industry:

- Communication failure between company departments (silos).
- Data collection, retention and recall.
- Consistent safety practices.
- Consistent procedural practices.
- Availability of procedures.
- Land owner and public relations.
- Risk.
- Material ID and tracking.
- Cradle to grave coverage.
- Inspection.

Integrity management of an asset using a paper system requires a tremendous amount of input and dedication from many sources, leaving it open to errors and omissions. Echo-Shield has made integrity management simple and accurate, and provides an up-to-minute living document of the asset. Liability, risk and costs are reduced, and asset quality is increased.

**Understand the integrity management process before implementing mobile technology**

Pipeline integrity management (PIM) is an umbrella logic that encompasses existing programmes that oil and gas companies are already required to have and implement. Quality control, inline inspection, cathodic protection surveys, and a host of other programmes individually do not characterise integrity management, but they are crucial elements of the integrity management process.

Integrity management is achieved only when all the programmes, or programmes specific to an asset, are used in conjunction with a plan and supported by up-to-date data. The objective of integrity management is to provide a mechanism that will guide a company in constructing, operating, and maintaining and abandoning a pipeline and/or facility for which its infrastructure assets can be assessed for risk, so that prevention and mitigation procedures can be proactively implemented for a safe and increased ‘in-service life’.

"It is not only pipeline owners and operators that can benefit from knowing the existence, location (X,Y,Z), size and other attributes of a pipeline. Engineers, surveyors, and other professionals must take these factors into account when planning or designing other civil projects in close proximity to a pipeline," says James H. Anspach, P.G., Chairman of ASCE’s Codes and Standards Board.

“The real-time ability of a pipe to ‘talk’ to an authorised...
person and communicate its attributes with accuracy and timeliness is a great risk management tool.”

A menu-driven software tool for documentation competency

The Echo-Shield™ Pipetalker system is a menu-driven software tool that runs on both office-based and portable handheld field-friendly devices such as smartphones and tablets. Its open architecture can integrate with a company’s existing GIS system or take advantage of cloud computing scales. It uses GPS, RFID and other hardware tools to track asset attributes; the programme documents construction, maintenance and operational inspections and quality control. It uses military-grade security protocols for data access while defeating natural silos of information. It is designed for both compliance and audit requirements, and for operational efficiencies.

Pipetalk systems allow anyone with a Pipetalker communicator to simply approach a buried pipeline or pipeline riser or valve, press the ‘Query’ button and information on a special tag-like device on the pipe is automatically transferred to the communicator. That information is specific to whatever buried or exposed utility exists at that location. There is no chance of mixed up information because only those tags within the query signal will activate and give up their informations.

The company understands that the mechanism to be used must provide consistency, measurability and should be easily audited. Consistency delivers quality. Measurability delivers assurance. Audit ability delivers accountability and peace of mind. Collectively they deliver due diligence.

The Echo-Shield Pipetalker elevates PIM to a high level of documentation competency. In addition, field performance and actions would no longer be obscure and lack transparency. The system will have a beneficial impact to company assets by providing an audit of every action, which would be backed up by photographs, video and voice recordings. There are many tools for company employees to use as well, which will enhance safety, time management, organisation, cost, and progress reporting. All tangible data is linked to the asset’s pipe number, material and weld number, QC segments, GPS etc.

With a link to modern technology such as secure cloud data systems, RFID, smartphones and tablets, the Echo-Shield system enables the underground system to report in real-time as one approaches its physical location.

Cradle to grave asset lifecycle

Work units

The Echo-Shields Pipetalker is a unique system that collects and correlates data pertaining to material, personnel, audits, inspections, construction, repairs, reports and mitigation.

A work unit is a method of collecting data from each step in the assets lifecycle. See below examples of work unit headings.

The responsibility of collecting the data lies with the land agent, survey inspector, QC technician, NDE technician, metallurgist or any company designated person, or even a third party worker under the supervision of a company representative.

The data is collected by using the software on a handheld device, such as a tablet that is capable of reading RFID tags, sub-centimetre GPS and Google Earth. The operator would open a major heading, for example, ‘New Pipeline’ and choose a pipeline operation such as ‘joining’ and from there choose welding, mechanical or fusing. All required information for the welding of a joint number will be asked and answers chosen from dropdown menus. The work unit for this joint and weld cannot be closed until the required data has been satisfied. Photographs, video and voice can be added to the joint number. The work unit applications provide consistency and measurability and once completed can be considered a first line audit.

The project manager or designated person, kicks off the integrity management plan by entering information asked for in the work unit ‘New Pipeline’.

If the pipeline is an existing pipeline to be worked on and was not constructed using the Echo-Shield mobile technology system, then management would click on ‘Historical Data’ and enter the asked for information. The information entered will include everything the field personnel would require to complete the project in a safe and timely manner.

For operational use, the production or asset manager would click on ‘Pipeline Status’ and complete the information asked for.
Once the above are completed the information is open to all stakeholders or stakeholders designated by management. The purpose of ‘Pipeline Status’ is to convey to stakeholders and the public what they need to know about the existing pipeline.

The asset (material)
When pipe and material arrives in the field, the items are tagged and a material application (work unit) specific to the item is opened and the field representative, using a handheld device, enters the data asked for from a dropdown menu. The ‘Work’ menu cannot be closed until all questions are answered. This is a fail-safe in the event something may have been forgotten.

There are apps (work units) for the following material types:
- Pressure containment:
- Pipe products.
- Flanges.
- Fittings.
- Valves.
- Vessels.

- Pipeline units (items applied to or attached to a pipeline):
  - Pipe weights.
  - Anodes.
  - Controllers.
  - Actuators.
  - Rock shield.
  - Field joint coating (FJC).
  - Coating field repair (CFR), and more.

The asset (pipeline construction)
There are apps for the following construction operations: personnel qualifications; top soil management (stripping) and grade; welder and joining technician job test; string; join; NDE; ditch excavation (QC segment selection by ditch material type); crossings; pressure testing; test fluid disposal; inhibitor lay down; and more.

The asset (facility construction)
This includes personnel qualifications; top soil management (stripping); welder job test; fabrication; NDE; foundation layout; piling control; P&ID check; line list; equipment transportation and setting; pipe supports; bolt up; pressure testing; test fluid disposal; ROW restoration and drainage; and more.

The asset (operations)
Operations will have the unique ability to instantly obtain the construction data when needed. They will also have photographs, video and audio that will be identified by tag and GPS. The Echo-Shield Pipetalker system effectively solves the communication problem that has existed between construction and operations since the first pipeline was laid.

All integrity management reports are linked to the pipeline and easily recovered. There are apps for the following operations tasks: personnel qualifications; TDG log; TDG manifest; pipeline suspension or abandonment; vessel data gathering; pressure safety control valve data gathering; meter and meter run data gathering; ASME non-pressure equipment integrity report; ASME pressure equipment integrity report; routine pigging report; ROW inspection; incident report; spill report; valve inspection and maintenance; tank inspection and maintenance; cathodic survey; cathodic monthly report; change request; management of change; engineer assessment; mitigation report; mitigation summary; product analysis; fire and gas inspection and calibration;
meter calibration; pipeline — station shutdown installation inspection; pressure control and protection inspection; control and instrumentation verification; and more.

The asset (existing pipeline inspection and repairs)
Due to the world’s ageing pipeline infrastructure, inspection and repairs have been drawn to the forefront of risk and importance. It is critical that the data collected is accurate, complete, and easily accessible.

There are apps for the following inspection and repairs: personnel qualifications; top soil management (stripping); welder and joining technician job test; stringing; joining (steel, plastic, compound pipe); cut outs (care and control); metallurgist report and recommendations; repair methods (pressure containment repair sleeves); NDE (the NDE report app should be used by the NDE technician); pipe excavation; crossings; tie-ins; pressure testing; and more.

The asset (optional supporting applications)
The following apps (work units) are more related to safety and cost control. Echo-Shield has the technology to upload existing company documents at the request of a client.

► Construction safe work permit.
► Operations safe work permit.
► Ground disturbance permit.
► Purchase order.
► Change order.
► AFE and cost control.
► Critical task planning.
► Field inspection report.
► Progress meeting report.
► Project punch list, and more.

Visualise and recall utility location and character attributes from any device, anytime and anywhere
Echo-Shield LLP and ProStar, Inc. have integrated Echo-Shield RFID Pipetalker technology with ProStar’s proprietary Transparent Earth™ to allow Echo-Shield’s PIM system to manage, maintain, and visualise utility location and character attributes on virtually any wireless field device. ProStar systems are implemented with cloud and mobile technologies including Google Maps Engine and Android-enabled technologies, and are designed for seamless cost-effective integration with Echo-Shield RFID technology and PIM needs. This allows better business decisions to be made both in the field and in the office, in parallel or in series, leading to streamlined work flow processes, enhanced worker productivity and safety. Military-grade security keeps data access and transactional changes safe.

The visualisation and recall examples of Echo-Shield’s PIM system that are shown in Figures 4 – 6 are provided on ProStar’s Transparent Earth™, enhanced by Google. ProStar is an existing licensee of Google Maps Engine. This allows the company to integrate the Google Maps Engine platform and functionality to power its utility asset management and damage prevention solutions. As a Google Maps enterprise customer, ProStar works closely with Google to continuously enhance its own customer offerings based on the latest mapping and Android-enabled technologies.

Summary
Since mobile technology is such a powerful tool, governing bodies will expect it to be integrated into every company in the oil and gas industry. To be able to comply with all the regulations and codes today, there is little choice but to seek an alternative from the old paper and pencil system. What a company must decide is who will provide the best bang for a dollar. A few suggestions to assist in choosing a system:

► The system should be compatible with the existing system.
► The system should be able to support an asset with a cradle to grave philosophy.
► The system should be able to support QC, inspections and audits.
► The system should be seamlessly compatible with Pipeline Open Data System (PODS).
► The system should perform on a global basis.
► Choose a mobile technology company that has the credentials and experience to provide a smooth, painless and cost-efficient transition to the ultimate in mobile technology.

In the past, integrity management and data collection was looked upon by industry with a frustration that caused prohibitive consequences. Neither was a company’s integrity management obligation well defined. Echo-Shield looks forward to a future where integrity management is well defined and technological innovations continue to inspire, facilitate and guide changes in the industry.

Note
Please note that Echo-Shield is in its third year of system construction and the software is not commercially available at this time. The company fully expects to have the Pipetalker system up and available in the very near future. Also, the company is open to any suggestions that may enhance its service to the industry.

Author note
Patrick J. Sweeney II is the author of RFID for Dummies.