PIGGING PRODUCTS & SERVICES ASSOCIATION

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Pigging Industry News

the newsletter of the Pigging Products & Services Association

THE PRESIDENT'S LETTER

By Terry Delasalle, Greene's Energy Group, LLC

It seems that business is booming and looks to get busier. It is a good time for our industry. Everyone I talk to is travelling more and their days are filled with meetings and projects. I hope while everyone is enjoying success they still find relaxing and quality time to enjoy their families, hobbies and whatever makes you happy.

PPSA has many things going on and continues to grow. We would like to welcome the following new members: Shenyang Longchang Pipeline Testing Centre, China, Limpro Nacional Sa de CV, Mexico, Pipeline Cleaners, Inc, USA, Reinhart Hydrocleaning SA, Switzerland, Douglas Batzel, USA, Carlos Thomsem Jr, Brazil and George Batchelor, UK. As you can see, the PPSA continues to grow both in members and in geographic reach around the world.

I look forward to attending the annual PPSA seminar on the 20th November 2013 in Aberdeen, Scotland. Nine papers will be presented by PPSA members followed by the traditional Question and Answer session. To accommodate more delegates this year, we have moved the venue to the Ardoe House Hotel and Spa, Aberdeen. Also new this year is a pre-seminar evening reception, so delegates can network in the exhibition area while enjoying a hot buffet meal and drinks. Hotels fill up quickly so book your seminar place and room early to avoid disappointment.

PPSA attended the Rio Pipeline 2013 Conference & Exposition for the first time this year as voted on by the members. There were 3300 attendees including delegates, exhibitors and visitors. This provided a good opportunity to make new contacts in Brazil and promote the work of the PPSA members. Hundreds of PPSA directories were given out and we hope our members will hear from new customers from these handouts.

The new PPSA directory has been mailed throughout the world over the last few months. If anyone missed out and would like a copy please let PPSA know.

Some important dates are coming up so please mark your calendars for the following: PPSA annual golf tournament on Monday 10 February 2014 at the Black Horse Golf Club, Houston, USA, followed by the PPSA Annual General Meeting on Tuesday 11 February at the Westchase Marriott Hotel, Houston and PPSA will be exhibiting at the PPIM Conference and Exhibition that begins on Tuesday 11, February also at the Westchase Marriott Hotel.

At the February golf tournament in Houston teams will be sent off following breakfast and return to a BBQ lunch, trophy presentations and awards. Everyone is welcome to enjoy a great time as this is an informal fun event. We appreciate and are looking for Sponsors as they are the ones who make the golf tournament a success. Please contact the PPSA for details.

We're also working with a company to provide an e-training course that will be based on PPSA's book, 'An Introduction to Pipeline Pigging'.

Please remember PPSA offers technical enquiry services free of charge and you can also join us on LinkedIn.

Before closing, I want to thank all of the membership for helping to grow PPSA and expanding its reach. I'd also like to thank the PPSA Board for all of their work.

NEW Members

Full

Shenyang Longchang Pipeline Testing Centre, China

Limpro Nacional Sa de CV, Mexico

Pipeline Cleaners, Inc, USA

Reinhart Hydrocleaning SA, Switzerland

Individual

Douglas Batzel, USA

Carlos Thomsem Jr, Brazil

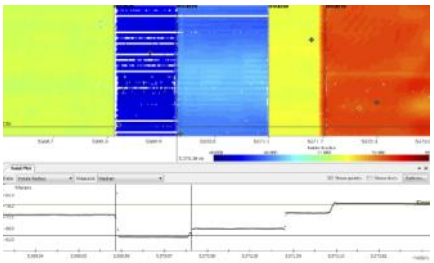
George Batchelor, UK

Overcoming heavy bore restrictions - Quest Integrity Group

The Pipeline Projects Department at a major oil transportation company in Canada planned to inspect a 6-inch sour gas pipeline with conventional in-line inspection (ILI) methods; however, it was determined that conventional ILI methods were not a viable option due to heavy tool damage on gauge pig runs. Some of the pipeline conditions were unknown to the client due to acquisition of the line from another company. The Projects Engineer believed there was a high probability of a significant dent in the pipeline, and that it would be necessary to excavate and make modifications to the line in order to complete an in-line inspection.

The client contacted **Quest Integrity Group** to inspect the line using InVista™, an ultrasonic ILI tool for difficult-to-inspect and unpiggable pipelines. Because of the tool's large collapse factor, it successfully navigated this sour gas line despite heavy bore restrictions. The InVista tool captured 100% of the interior and exterior pipeline data and Quest Integrity provided the client with a complete data set for the line including wall thickness changes, bend locations and inner radius profile within 30 days.

InVista identified 5 wall thickness changes in one 20-foot section of the pipeline. These changes ranged from 0.864 inches (21.95 mm) to 0.265 inches (7.1 mm). In addition, the tool successfully navigated and inspected the two joints present in this section. It was noted these joints accounted for the tool damage that occurred on previous gauge tool runs instead of a significant dent.



Inner radius and axial view of heavy wall piping.

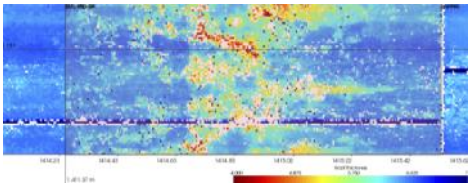
A full API 579-1 / ASME FFS- 1 2007 Fitness-for-Service assessment was conducted utilizing the high-quality inspection data provided by the InVista tool. The data was analyzed for wall thinning and anomalies such as corrosion, denting and ovality using LifeQuest™ Pipeline software. The Remaining Strength Factor (RSF) and Reduced Maximum Allowable Operating Pressure (MAOPr) were also determined for the line. Below is an inspection summary:

- 130 external metal loss anomalies were individually identified.
- Wall loss at 58.0% was identified in one section of the pipeline.

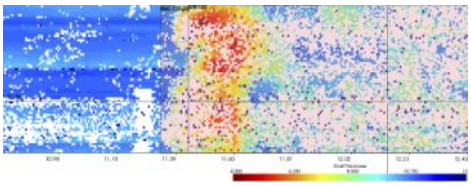
FREE TECHNICAL INFORMATION SERVICE

Contact PPSA's members and panel of advisers to answer your questions about pigging and pipeline integrity at:

ppsa@ppsa-online.com



2D and 3D views of external metal loss.



2D and 3D views of wall loss

The client did not have to excavate or make any line modifications in order to complete the inspection, saving time and money. The inspection and assessment pinpointed specific areas of degradation, allowing the client to make the necessary repairs and return the line to service quickly. In addition, InVista confirmed the cause of the gauge tool damage. The Projects Engineer was very pleased with how quickly Quest Integrity executed the project and delivered the data, allowing them to make confident, timely decisions for the pipeline.

CDRiA's CRACKSONIC 500

CDRiA Pipeline Services Ltd introduces the CRACKSONIC 500. Application of ultrasonic technology to monitor the pipeline condition is a very effective method that ensures high reliability and accuracy of defect detection. There are two approaches offered here by the ultrasonic technology. They both form the basis for UT and UCD inspection.

The UT inspection has been designed to measure the wall thickness on the entire surface of pipelines. This is the primary inspection method and detects metal loss and other anomalies with their surfaces larger than the detectability threshold. The measuring is done with normal transducers, i.e. transducers emitting an ultrasonic beam in the normal direction (perpendicular) to the pipeline wall surface.

A separate group of defects includes cracks, scratches, etc. where their length is their main feature and they do not create the right reflector surface for a standard ultrasonic beam. Hence they are not detected during the UT inspection.

Failures caused by cracks result from repeated pressure fluctuations or surges, that may lead to leak tightness loss or longitudinal cracks. These events are unexpected and can be prevented only by prior detection of cracks in the wall of the pipeline. For this purpose, UCD inspections are recommended. They involve angular transducers, that emit an ultrasonic beam at the appropriate angle to the normal. Selection of the correct angle ensures the wave passes in the steel wall at 45º, as shown on the Fig. 1.

In such conditions, a crack in the wall is detected as an echo and the echo's amplitude is dependent on the depth of the defect.

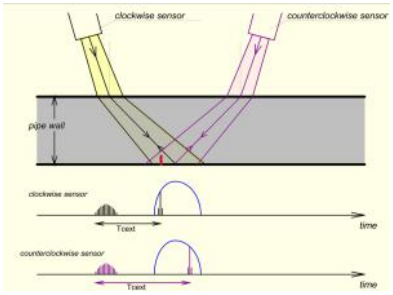
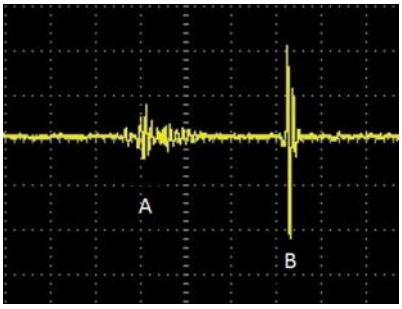


Fig. 1. UCD inspection principle using two ultrasonic transducers emitting in two opposite directions



A – echo from the pipe surface
B – echo from a crack
Fig. 2. The actual ultrasonic waveform emitted by one transducer

The UT and UCD methods mentioned above are most effective and efficient when used simultaneously in a single tool. This is the case of CRACKSONIC 500 intelligent pig launched by CDRiA in 2013.

Fig. 3 presents a standard configuration of CRACKSONIC. It consists of two measurement modules, each on a side of the electronics module.

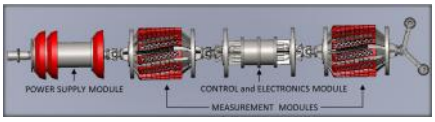


Fig. 3. Cracksonic intelligent pig in a standard configuration

In both measurement modules all the normal and angular transducers are spaced. In the UCD method, half of the angular transducers emit an ultrasonic beam towards the circumference, clockwise, while the other half of the transducers emit in the opposite direction. E.g. 192 normal transducers and 2 x 192 angular transducers were applied in CRACKSONIC 500 intelligent pig (20'') . With such a number of transducers, the circumferential resolution of the tool is 8.2 mm.

Two reports are generated after the inspection with CRACKSONIC tool: an UCD report on cracks and a report on metal losses and other objects having width x length dimensions. Thanks to good circumferential and axial resolution, the quality of the UT report is not different from the quality of the report from a simple UT inspection.

CRACKSONIC 500 (20") intelligent pig is a complex and autonomous inspection platform. With approximately 600 ultrasonic transducers it offers approximately 200 hours of uninterrupted pipeline inspection. In addition, CRACKSONIC performs continuous crude oil pressure and temperature measurements, as well as 3D pipeline XYZ locations.

The first survey run of the CRACKSONIC 500 is planned in late 2013.

Innospection Ltd's subsea inspection in Australia

Innospection Ltd has successfully completed its first subsea pipeline inspection offshore in western Victoria, Australia.

As a part of the Offshore Inspection Repair Maintenance Project, Innospection was approached by the client to inspect several sections of the offshore gas pipelines suspected of having top-of-line corrosion, predominantly in the section of pipework from the wellhead to a distance of approximately 500m downstream.

Having extensive experience in subsea inspection in the North Sea on pipelines with similar anticipated corrosion at the 10:00 to 2:00 o'clock position, Innospection was able to readily offer a solution.

The inspection objects were the 12" pipelines downstream of each inline tee and the 6" tie-in spools with wall thicknesses of 18.1mm and 11.0mm respectively. All inspection objects were externally coated with 2.5mm three-layer Polypropylene material. The pipelines were located at a water depth of approximately 70m. The inspection of the subsea pipelines was performed using the MEC-Combi Crawler. In areas of the pipelines near the tie-in spools unreachable by the MEC-Combi Crawler due to its size, a smaller marinised MEC M-PS150 Scanner was available. Both scanners utilise the advantageous fast scanning technique SLOFEC^{TM} for the inspection.

After being deployed by ROV and brought into position at the predetermined circumferential position on the pipelines, the hydraulic drive unit enabled the MEC-Combi Crawler to crawl along the pipelines at an average speed of up to 10m/min while scanning.

Information on internal and external defects in terms of size, severity of wall loss and locations were achieved. Additional absolute wall thickness measurement of the pipelines using the built-in Ultrasonic probe was also performed, which was also targeted for the verification of the SLOFEC findings.

The results show excellent signal to noise ratio which confirmed the high detection capabilities of the MEC-Combi Crawler with limited preparation of the pipes.

Developed by Innospection, the MEC-Combi Crawler supports the inspection and lifetime assessment of subsea structures ranging in size and complexity from small diameter risers through caissons and pipelines, to platform legs and flat surfaces like ship hulls. The capabilities of the MEC-Combi Crawler have once again been confirmed with this successful subsea pipeline inspection in the Australian waters.

Innospection's MEC-Combi Crawler

CPPI's 48inch EMAT Crack Inspection Pig

The 8th China International Pipeline Exhibition (Interpipe 2013) was convened in Langfang, PRC in September 2013. The first 48inch EMAT Crack Inspection Pig of **CPPI**, which is newly developed with intellectual property, was unveiled at this exhibition.

The 48inch EMAT Crack Inspection Pig has been designed for the second West-East gas pipeline, which is the long-distance cross country gas pipeline in China.

The device is designed with 8 electromagnetic ultrasonic probes in the front and back respectively to cover the entire circumference area. The probe can generate the ultrasonic guided waves propagating circumferentially and detect the axial crack that exists in the pipe walls. The device is equipped with a speed control system and can run smoothly in a large flow rate natural gas pipeline and is also equipped with a pipeline mapping system to provide pipeline integrity service for the pipeline client. The maximum working time for a single run is up to 200 hours, which is satisfied with the station spacing requirements of the second West-East gas pipeline.

CPPI's 48inch EMAT Crack Inspection Pig

Weatherford conducts offshore ILIs in Angola

In 2011 **Weatherford P&SS** was awarded a contract by **Cabinda Gulf Oil Limited (CABGOC)** – Chevron's wholly owned operating unit in Angola – to conduct in-line inspections on the operator's 160 offshore pipelines, each with varying conditions such as high temperature, pressure, and speed. The primary objective was to maintain a constant presence on-site of tools, engineers and spares to meet challenging conditions despite visa issues with the engineers and customs issues with the tools, all within the operator's inspection window.

Using an eastern hemisphere operational base as a coordination location, Weatherford assembled and mobilized the tools from Aberdeen, UK, to Cabinda, Angola. This cooperation between both bases ensured continuous tool coverage. Weatherford used its own on-site facilities to create a work-shop to house the tools and spare parts and to perform maintenance; the close proximity enabling Weatherford personnel to move tools and engineers offshore with less than 24 hours' notice.

To accommodate the various pipe sizes—Multichannel Caliper (MCC) tools, ranging from 8 to 24 in., and Magnetic Flux Leakage (MFL) tools, from 20 to 24 in.—Weatherford personnel had to adapt the tools on-site. New MCC tools were manufactured: 8-in./10-in., 16 -in./20-in., and 24-in./28-in. Prior to the launching of the MFL, Calipers were run through the pipelines to confirm the minimum bore and the operator had to make the decision on-site whether to run the MFL tool.

To date, Weatherford has conducted a total of 50 inspections: 45 x MCC and 5 x MFL.

Utilizing Weatherford's high-resolution MFL technology and efficient mobilization of personnel and tools enabled the operator to assess 50 of the operator's 160 offshore pipelines to date, provide valuable information pertaining to the condition of the pipelines, and inform their future maintenance plans. The continuous tool/engineer coverage enabled the operator to meet the demands of the inspection program and maintain the scope of the overall operation.

SIG Services LLC's Recon Geophone G1

The Recon Geophone G1 is a pig tracking device for tracking cleaning and smart tool pigs through the pipeline. Multiple units and personnel can be placed along the line section while leap frogging from one tracking location to the next. It is an effective and inexpensive way to assure the pigs make it from launch to receive.

The G1 is the smallest dual geophone in the pipeline industry. The Recon package is equipped with a 3" x 6" geophone in a shock proof case, two 20 ft. cables with waterproof stakes, headphones, a car charger, and contained within a water proof case. It contains a 5.7 vdc rechargeable lithium ion battery with a life of 24 hours.

The G1 with its durable touch pad has a separate Sensitivity and Volume control for filtering out background and static noise. This will help tracking the cleaning or smart tool pigs through the pipeline. With this type of filtering it has allowed the G1 to hear pigs at a much further distance, under all types of tracking conditions.

SIG Services LLC's Recon Geophone G1

NDT Systems & Services opens Global Data Analysis Center in Mexico

The new operational unit will serve as the company's global hub for analysis of pipeline data gathered by pipeline inspections worldwide. A team consisting of more than 50 analysts will analyze inspection data that are predominantly captured with ultrasonic technology, which is used to detect corrosion or cracks in liquid pipelines. Quality control and report production will be maintained at **NDT** sites in the US, Germany, Malaysia and Dubai.

"Best inspection data quality and fast report delivery are NDT's top benchmarks", says NDT Systems & Services President Wolfgang Krieg. "The Global Data Analysis Center enables us to efficiently respond to our customer's onshore and offshore pipeline integrity requirements by significantly reducing delivery times."

'Non-piggable' pipeline inspections by 3P Services

3P Services has recently completed a number of projects which add to their history of inspections of "non-piggable" pipelines.

Two 48" marine terminal lines, located in India, were successfully inspected using a bi-directional Magnetic Flux Leakage (MFL) tool, which was especially designed and assembled for this project. The lines include two risers at jetty trestles, two Single Point Moorings and an interconnector.

In France, **Société du Pipeline Sud-Européen** is conducting a pipeline rehabilitation project for several 34" pipelines, connecting a large depot and an oil import terminal. Some years ago, an epoxy mix was applied in selected locations at the bottom of the line as an internal repair. 3P Services' inspection, an industry first, utilizes a combo tool incorporating three types of 3P sensor technology – Short Range Distance, Direct Magnetic Response (DMR) and MFL. This tool is not only capable of measuring internal and external metal loss but also of detecting and sizing internal metal loss underneath the epoxy repair layer. Pigging operations included both winch pull through and pump through propulsion.

While rather rare in the industry, inspecting through an internal layer is not new for 3P Services. A 20" brine pipeline, which includes an internal concrete coating, was recently inspected in Germany. The DMR tool deployed detects and measures metal loss on the inner surface of the carrier pipe underneath the concrete layer as well as defects or damage to the internal concrete layer. This inspection is the latest in a series of re-inspections.

STATS Group's isolation at gas terminal in Belgium

Pipeline engineering specialist **STATS Group** has completed an isolation project on behalf of **Interconnector UK Ltd** to facilitate valve remedial works at the Zeebrugge Onshore Gas Terminal in Belgium.

Interconnector required a double block isolation to provide safe worksite conditions to allow change out of a 40" pig trap valve during a planned shutdown.

To minimise production impact the pipeline landfall valve, which is 1km away from the pig trap valve, was closed to provide the primary isolation against 80 Barg of gas pressure.

STATS utilised a 40" Tethered Tecno Plug to provide a secondary isolation.

Prior to deployment a client witnessed factory acceptance test was conducted in a purpose-built test fixture.

The Tecno Plug was deployed to location past the pig trap valves and barred tee. The 1km of pipeline between the Tecno Plug and the pig trap valve was opened to vent by utilising the valve bypass arrangement with a 6" open vent.

The Tecno Plug™ was set at location using a hydraulic system via the umbilical and an annulus test was performed to verify the integrity of the primary and secondary seals. Both seals were independently tested and monitored for 12 hours and once the verification period was completed, the isolation certificate was issued. With the Tecno Plug™ providing a verified isolation the valve was rigged away.

On completion of the valve maintenance, further umbilical management was carried out to allow the valve to be repositioned. After the valve was replaced and integrity confirmed, the Tecno Plug™ was unset and retrieved back into the pig trap for demobilisation, allowing the pipeline to be re-pressurised and normal operations to continue.

STATS Group's 40" Tethered Tecno Plug

ROSEN develops inspection tool for Nord Stream

Nord Stream has concluded a comprehensive inspection of the internal condition of its pipelines. A measurement tool with a length of about 7m and a weight of more than 7 tonnes was sent through the pipeline from Russia to Lubmin, Germany, propelled by gas pressure. On the 1224 km route the inspection pig collected high-resolution data on material integrity.

This was the first time a pipeline of this length and a wall-thickness of up to 41 mm has been analysed in this way. For the inspection run, a device with one of the strongest magnetic fields was developed by **Rosen Inspection Technologies** in Lingen, Germany. The "intelligent Pig" combines an array of electronic sensors, that screen the material integrity and the geometry of the pipeline. The Pig collects over one Terabyte of data on its way from Russia, recorded at a rate equivalent to 12 Megabits per second, 30 times faster than cellular data networks. The high-resolution measurement technology can detect the smallest changes in the condition of the pipelines. The exact geographical position of the pipelines is also documented. The first evaluation of the results confirms that the pipelines have moved only minimally while operated under full pressure and that no corrosion or deformation has occurred.

Previously, Nord Stream had already examined the external condition of both pipelines. This external visual and instrumental inspection of the pipeline was conducted via remotely operated vehicles followed by a support vessels. The results of the internal and external inspections form the baseline data for regular inspection cycles in the coming years.

Smith Flow Control's custom-built operating panel

Smith Flow Control has manufactured a custom-built operating panel that enables a client to control a sequence of actuated valves. The operating panel can be used in a wide variety of applications that involve the use of actuated valves, for example to launch or receive a pig.

The panel works as a communication and proofing system to improve efficiency and safety. A typical application often includes two interlocked key units to isolate power to the panel and ensure a specific sequence of operation.

Smith Flow Control's custom-built operating panel

Using the panel, the operator can select to close the valves. Red LED lights prove that the valves have reached their fully closed position. When all valves are closed, the operator can isolate the panel by removing the 'A' Key. The 'A' key is entered into the solenoid key unit and only when the safety and automation system confirms all valves are closed, a permissive signal is sent to energise the solenoid and release the 'B' key. This allows the operator to safely continue the mechanical interlocking sequence, for example, to manually unlock a pig trap door to load or unload a pig. It is designed to meet strict safety guidelines.

TDW uses Multiple Data Set tool with SpirALL

T. D. Williamson performed an inline inspection using its Multiple Data Set (MDS) inspection tool with SpirALL® MFL (SMFL) technology in the UK for **Valero Energy Ltd** (Valero).

The inspection was carried out in a 16-inch, 9.94 mile (16 Km) pipeline that runs between the Pembroke Refinery and Waterston in Wales. The refinery has a total throughput capacity of 270,000 barrels per day (BPD), including 220,000 BPD of crude, and 50,000 BPD of other feedstocks. The refinery is one of the largest, most complex refineries in Western Europe. It makes products, including gasoline, diesel fuel, kerosene, liquefied petroleum gas and petrochemical feedstocks. Valero owns and operates the Mainline Pipeline and associated feeder pipelines, which range from 10-inch to 16-inch, and total 289 miles (466 Km).

With such a high volume of throughput and an inability to experience downtime, it is imperative to Valero that it maintains its network at the highest standards. To do this, they require constant comprehensive assessments of their assets. The purpose of this particular inspection was to utilize a single inspection vehicle to rule out or identify various threats. The TDW MDS tool would allow Valero to effectively accomplish its goal.

"TDW's advanced ILI technology effectively provided Valero with enhanced characterization of numerous pipeline integrity threats, with a single platform," said Chuck Harris, Manager -Strategic Commercialization for TDW.

The TDW MDS ILI tool features Deformation, axial Magnetic Flux Leakage (MFL), patented SMFL technology, Low Field MFL (LFM) and XYZ Mapping. Combining multiple datasets in a single inspection closes the gaps inherent to individual technologies. For example, axial MFL is unable to detect anomalies that are located within the same magnetic field orientation. These include geometries such as axial grooving and slotting; i.e., crack-like anomalies and preferential seam corrosion located in the long seam. SpirALL MFL technology was designed to locate anomalies with these narrow characteristics. Additionally, by combining both axial and SpirALL MFL, distinguishing between volumetric and planar or crack-like anomalies becomes clear.

Jee Ltd offers new oil and gas courses

Jee Ltd, a leading independent multi-discipline subsea engineering and training firm, has unveiled its extensive course schedule for 2014.

New courses on offer include two oil and gas focussed courses, Engineering of Flexibles gives an expert level of understanding of flexible risers and flowlines and Pigging and Plugging provides a comprehensive understanding on the utilisation of pigs and plugs to perform a variety of operations.

To fulfil the recent and expected demand of its 2014 training courses, Jee has recruited a further five new tutors bringing the total to twenty. Each tutor has in-depth experience within their dedicated topic.

As part of the programmes, delegates can choose from public and in-company courses in key locations globally or opt to partake in the programme online, giving ultimate flexibility. On completion, each industry-recognised course will provide attendees with a complete understanding of the studied topic.