Automated Price Validation

A White Paper on
Applying Automation and Standards to Improve the
eP2P Process in the Oil and Gas Industry

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Executive Summary

Automated Price Validation (APV) is using information systems to automatically check invoice pricing against the terms of the associated supplier contract. Automating price validation is much more an issue of integrating with and improving the entire Procurement-to-Pay (P2P) business process than a technology issue. Understanding and optimizing the complete P2P process is a prerequisite to automating any part of that process, especially price validation.

APV reduces the operator's overhead by approving and validating invoices for payment with little or no human intervention ("touch-less invoices"). A proper APV process will reduce the number of items that must be reviewed and approved by an engineer. It also provides rapid feedback to suppliers to support the dispute resolution process, shortening the dispute resolution process and reducing operator's costs. Shorter dispute resolution times accelerate billing to joint venture partners. This also increases the real time visibility of working capital for the operator. The structured data required by an APV process provides additional benefits for spend analytics after the transactions have been completed.

Visibility and efficiency in the Procurement-to-Pay process directly impacts an operator's bottom line, especially in times of declining oil prices or increasing costs. Similarly, transparency to joint venture partners and suppliers is also essential. Implementing a repeatable and scalable APV process will improve visibility within the organization, transparency to joint venture partners, and can reduce the operator's cost of price validation by 20% to 80%, depending on product/service category. Operators get greater control over contract compliance and maverick spend with APV.

The unique complexity of the upstream oil and gas industry challenges the ability for operators to realize these benefits. eCommerce standards and best practices have overcome many of these limitations. Using industry standards in the development of an APV process is essential to promote wide adoption among suppliers, and reduce onboarding costs for both supplier and operator.

A successful APV process will show measurable improvements through reducing the number of line items and transactions that require human intervention for validation by the operator. Over time it will reduce the total number of disputes, reducing the amount of staff and management time required to resolve disputes. The APV process will also enhance spend analytics, budget visibility, and joint venture partner billing.

Start at the Beginning

Before initiating an APV project, the operator must first clearly identify business objectives. The first of these objectives should be to optimize the complete P2P process to ensure all areas of the business are aligned, and lines of communication between those areas have been established

In order to identify business objectives, the operator will need to identify all stakeholders. Internal stakeholders will include Procurement, Finance, Accounts Payable, and Operations. Different departments will likely have different goals for an APV project. For example, Procurement may focus on contract compliance, while Accounts Payable may focus on transaction efficiency. Success will depend on the ability of all the stakeholders to communicate with each other and to understand the end-to-end process.

In defining expected benefits, the operator should determine what metrics will be uses to measure these benefits. Measured benefits will vary greatly, depending on the scope of the initial project. Determine what business units, product/service categories, or regions will be in scope for the pilot, and define expected benefits accordingly.

Benefits to external stakeholders such as joint venture partners, suppliers, and vendors will be enhanced by prompt invoice processing and timely, actionable communications regarding any issues that may arise.

Fig 1. Automated Price Validation - Building Blocks

The P2P Process

A complete review of the operator's existing P2P process should be completed before beginning an APV project. See Fig. 2[1] below.

The operator should identify and correct any bottlenecks or issues in the current process. Automation can enhance the process, but it will not fix a broken process. A process such as Procurement-to-Pay touches many areas across many functions. Understanding these touch points and validating the end-to-end process flow can improve efficiency regardless of the level of automation introduced. The improved process must have the commitment of all stakeholders involved so that it will be carried forward into the day-to-day production environment, not just during the pilot phase
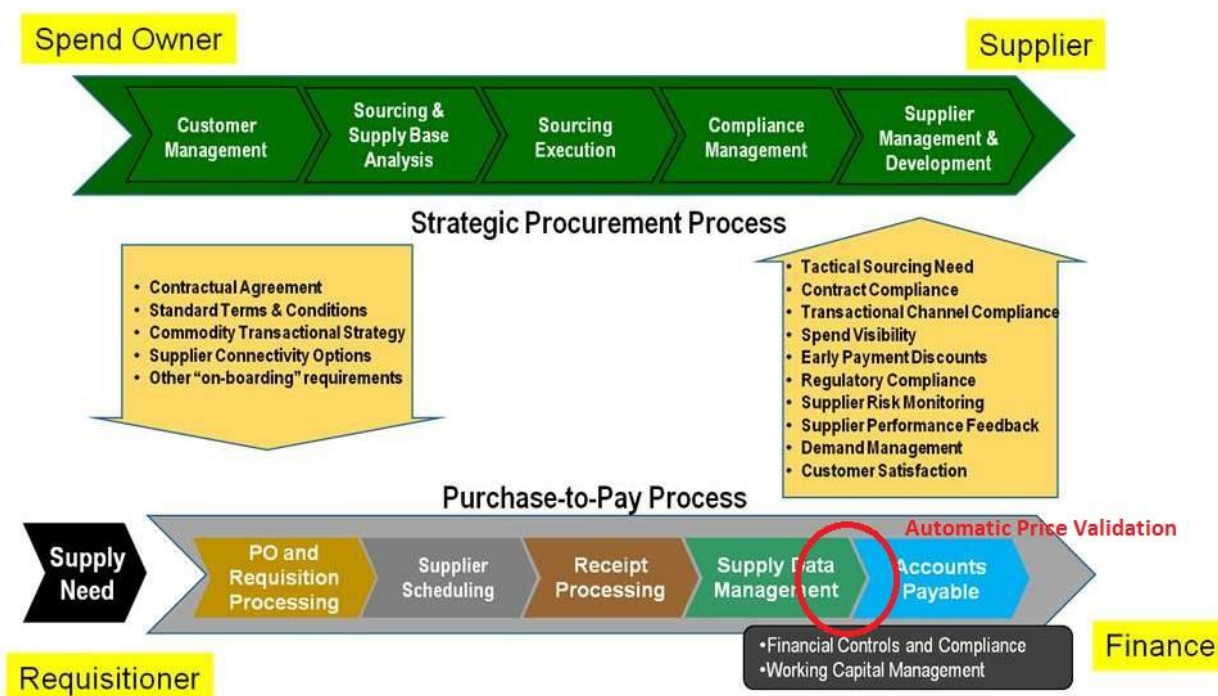

Fig 2. Automated Price Validation within the P2P Process

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[1] "Improving Finance and Procurement Collaboration", Bryan DeGraw, The Hackett Group, March 21, 2013

Systems Supporting the P2P Process

Once the operator has defined the business objectives, it is time to take a look at current information system capabilities.

While the <u>process</u> of Procurement-to-Pay is the most critical, and usually the most difficult to change, the operator needs to understand the current system technology landscape which supports P2P. There may or may not be a gap between current capabilities and those needed to accomplish the goal of Automated Price Validation.

The first system to examine is contract management. Depending on the operator's ERP system, contracts may be stored as outline agreements, or in some other form. Typically, pricing information is either loaded into the outline agreement or validated against the contract terms and stored separately. It is important to consider APV when negotiating contracts and loading them to the ERP system. Operators and suppliers should negotiate contract terms that can be reflected on the suppliers' price sheets and invoices. There should be little ambiguity as to how prices are determined. If there are pricing variables such as temperature and depth, the operator and supplier should work to ensure this variable can be included on both the price sheet and invoices.

After the operator determines how to store and access contract data, the operator should decide how to store and access the price sheet information received from suppliers. Typically, the supplier will provide a price sheet containing their item numbers, descriptions, prices, and any pricing criteria related to complex pricing. Operators and suppliers should minimize the number of pricing criteria data elements provided. You only need enough information to uniquely identify each possible price for the same item. The primary key for each price sheet row must be unique, based on contract number, item number, and pricing parameters. When the supplier begins invoicing against this price sheet data, the invoice will need to contain all the components the operator needs to construct this primary key.

Before the operator loads the supplier price sheet data, it should go through an approval process so that the contract manager can validate the prices against the terms of the contract. A major benefit of this approval process is that the operator will need to directly reference contract terms only once and not with each invoice.

When the operator's contract management and price sheet management systems have been designed, the accounts payable invoicing processing should be examined. The invoice approval and processing system must have access to the stored price sheet data. The operator may choose different approval workflows

depending on invoice amount, product/service categories, or other parameters. For example, invoices over a certain dollar amount may require additional approval steps.

Finally, system integration capabilities should be examined. How will supplier data from price sheets and invoices enter your system? Most likely, this will be partially determined by the suppliers' capabilities. One type of integration will not usually fit all suppliers. The operator may need a supplier portal, file upload capability, and system-to-system integration options to connect to most suppliers. System integration is the most automated and error-free method, but not all suppliers have this capability. Data entry through a supplier portal requires the least IT sophistication from the supplier, but has a higher error rate because manual data re-entry is required. File upload, where the supplier manually uploads a standard file format (Excel or XML, for example) can be a good compromise between the two methods but still require a manual process. Ideally, the operator's data processing should be the same regardless of how supplier data enters the system.

When determining which suppliers to select for the initial APV pilot, the operator will need to consider the supplier's IT capabilities as well. Determine which suppliers can provide invoice data in electronic form and then if the same group can provide price sheet data in electronic form. The operator needs to provide an integration options that meets the supplier's capabilities in his market. The operator should determine what product/service categories will benefit most from APV, and which supplier will make the best candidate for the pilot phase. Gathering this information from suppliers will help the operator prioritize suppliers for post-pilot implementation phases. Usually, that means the high-volume key suppliers are at the top of the operator's list.

Once suppliers are segmented and pilot trading partners are identified, remaining suppliers can be on boarded in phases based on their integration capabilities. Integration phases can run concurrently with the onboarding of suppliers using a portal or file upload system.

Advances in 3rd party network capabilities now give more integration options for suppliers and operators. Regardless of the method by which the supplier loads data to the service provider, that data can be delivered to the operator through a standard integrated connection.

The Contract

Automated Price Validation is infinitely easier and more successful when contracts are structured with price validation in mind. The more focused the contracts (region, field, product/service category, etc.), the easier it will be to create and maintain the associated price data. Price sheet approval for price changes associated with broad contracts can be time-consuming and may result in invoice disputes based on unclear terms or prices. Similarly, the more complicated the pricing parameters in a complex pricing environment, the more difficult it is a) for the supplier to provide all the pricing parameters on invoice line items and b) for the operator to validate and approve the price sheet data against the contract terms. Clearly defined terms reduce the chance for disputes caused by applying invoices to vague contract terms. A clearly stated effective date for a contract makes the transition from one contract to another more seamless, reducing the chance for disputes caused by applying invoices to the wrong contract.

For the initial pilot, the supplier should either select existing contracts that will fit the APV process, or use new contracts that meet those criteria. Keep in mind that the operator should use a representative range of product/service categories to measure the different levels of effectiveness that APV will provide. This will help focus future phases on areas that will provide the most improvement.

All interactions between operators and suppliers, including contracts, should use international standards where they are available. These standards include standard currency codes, United Nations Economic Commission for Europe (UNECE) units of measure codes, and United Nations Standard Products and Services Code® (UNSPSC®) product classification codes, where appropriate. Trading partners may use proprietary units of measure and classification codes behind their firewall, but these should be mapped to these industry standards for transaction documents. This makes onboarding and integration more easily repeatable for all trading partners.

The Price Sheet

Supplier price sheets in the upstream oil and gas industry are specific to individual contracts within an operator's business. As a result, an operator will need to manage a number of price sheets, even for a single supplier. The supplier, in turn, is producing and maintaining a number of individualized price sheets. With complex pricing capabilities, the number of items on a price sheet may also increase. One product or service may have several prices depending on the circumstances in which it is used.

This price sheet data volume can quickly become unmanageable if standardized documents are not implemented. The use of an international standard, such as the Petroleum Industry Data Exchange, Inc. (PIDX) XML Price Sheet format, simplifies

this process. An operator only needs to support a single format for all price sheets from their suppliers. Suppliers only need to produce a single price sheet format for all their customers. The use of standardized document formats throughout the Procurement-to-Pay process increases adoption by all trading partners, and reduces the time and effort required to onboard new trading partners.

When implementing an APV process using price sheet data provided by suppliers, do not expect 100% automatic validation. Many situations, such as 3rd party charges and unusually complicated pricing scenarios, will make it impossible to reach this unattainable level. Remember the Pareto Principle (the 80/20 rule). The first 80% of improvement can be achieved with the first 20% of effort. Conversely, you'll expend 4 times that effort attempting to automate the final 20%.

However, there is valuable information to be obtained, even from line items that cannot be automatically validated. For very complex pricing scenarios, suppliers can include the item number with a zero price, indicating that the item price must be manually validated. This helps the operator identify items that must be manually validated. The items may be off-contract items (e.g. the item number is not found in the price sheet data) or they may be on-contract but price data is not available. The operator's invoice approval work flow should account for these different situations and route the invoices accordingly.

When consuming price sheet data from the supplier, there is an opportunity to enrich the data to enhance the value of the process and connect to other process like inventory control, etc. The operator may want to map supplier item numbers to an ERP service master, or map UNSPSC classification codes to internal GL accounts. Since enriched price sheet data correlates to the invoice line items produced by the supplier, the operator can gain added benefits, such as improved spend analytics, long after the individual transactions are completed.

When building and using supplier price sheet data, the price sheet's effective date should be utilized. Suppliers can provide updates ahead of their effective date, to allow time for approval[2] before they begin invoicing against the new prices. The APV process should be able to apply the appropriate price information based on this effective date.

Another point of potential failure involves the precision (number of decimal places) used in price sheet data and on invoices. Often the supplier will provide prices with a different level of precision than the operator uses. The supplier's data should use consistent levels of precision between price sheet and invoice, and the operator should validate using a tolerance allowing for small rounding differences. These

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[2] PIDX Price Sheet Syndication Business Process Guidelines recommend a price sheet approval time of two weeks or less.

differences arise when supplier and operator use different rounding methods, one rounding each line item and the other rounding the total. The cost of chasing a few pennies' difference on an invoice is not worth the cost of resolving a disputed invoice.

The Purchase Order

In the upstream oil and gas industry, detailed purchase orders are the exception rather than the rule. More typically, either no purchase order is generated or a spend limit purchase order is issued. This is because of the non-explicit purchases common in upstream. Operators purchase a result, not a list of items and quantities. The items and quantities required to obtain this result are not known until the work is actually done, unlike explicit purchases such as MRO.

In cases where a detailed purchase order is issued, the line items on that purchase order should come from the price sheet data (which may be stored in the outline agreement). In this way, the PO can be populated with the supplier's own item number, which will reduce confusion and errors.

When no purchase order is created, a detailed purchase order can be created or back-filled after the fact using validated line items from an electronic field ticket or invoice. The operator's ERP system may require PO detail in order to do a three way validation between PO, field ticket, and invoice. Many times that detail of the items consumed is only known when the work is performed and first becomes available to the operator upon receipt of a field ticket or invoice.

The Invoice

For the same reason standard document formats should be used with price sheet data and purchase order, they should be used with the invoice. The PIDX XML Invoice format is a global standard specifically designed for the oil and gas industry[3].

Generally, the party receiving an eCommerce document, such as a price sheet or invoice, is responsible for providing the implementation guide for that document. Even within standards such as PIDX, there is room for variation in the implementation process. The implementation guide should specify which data elements are mandatory, but should not prohibit the population of valid data elements which will not be consumed. When suppliers can send fully populated documents to all their customers, it promotes shorter implementation times between operators and suppliers. Operator and supplier should work together to ensure consistency between the price sheet and the invoice, including price precision, units of measure, and complex pricing parameters.

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[3] One word of warning: There have been several versions of the PIDX Invoice released over the years. The operator and supplier must agree on the version to be used.

Operator and supplier should also ensure that supporting documentation is delivered with the invoice, either through an integrated connection or file upload process. Typically, scanned images of paper field tickets and 3rd party charges are attached to the electronic invoice by the supplier and remain with the invoice through the operator's approval workflow, and any subsequent audits. Standardized transmission, routing, and packaging protocols (TRP's) can facilitate the delivery of invoice and supporting documentation in a single message. The two TRP's approved by PIDX (AS2[4] and RNIF 2.0[5]) support sending XML documents and attachments as a single message.

Finally, the invoice validation work flow will consist of at least two parts: the APV process, and the manual work flow. The APV process must have access to the correct price sheet data, and manual approval work flows should accommodate 3rd party charges and other items that cannot be validated (the 20%).

When an invoice fails the APV process, the manual work flow should be engaged so that valid exceptions, such as 3rd party charges and complex priced items, can be manually approved without going through the dispute resolution process. Multiple work flows may be implemented depending on the controls that the operator wants to enforce. For example, additional approval levels may be required for large invoices, or invoices from new suppliers.

Even invoices that are rejected and go through dispute resolution are processed more efficiently because of the detailed pricing information available to both the operator and the supplier. Additionally, the reduced number of invoices requiring manual approval makes the entire process more efficient. Actionable feedback to suppliers during dispute resolution will further reduce the number of disputes over time.

The Pilot

First, the operator should select a supplier with whom to pilot. Selecting a supplier with experience in providing electronic price data and invoices will shorten the implementation time and reduce the number of variables affecting the success of the pilot.

When planning the pilot, select a small number of product/service categories that represent the transactions between the pilot trading partners. Some of these will offer more "bang for the buck" in terms of process improvement. Covering a small range of outcomes will help the trading partners focus future phases of the implementation on areas likely to see the most improvement.

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[4] Applicability Statement 2, defined by RFC4130
[5] RosettaNet Implementation Framework Version 2.0

Select representative contracts from that supplier that cover the selected product/service categories and are also structured to support price sheets and electronic invoicing, as described above.

The operator should work closely with the supplier during the pilot implementation. An experienced supplier can be very valuable in helping avoid implementation mistakes that others have made.

Measuring Success

In order to measure success, the operator will need baseline metrics. Measure the effectiveness of the current manual validation process for the contracts selected (or similar contracts) by identifying average time to approval and number of disputes. Any improvement can be measured against these baseline numbers.

When the pilot is underway, capture these same metrics along with number of line items automatically validated, percent of total line items validated, and percent of invoice dollars automatically validated. The improvement against the baseline metrics should correlate to these new measurements. Higher number of items automatically validated should show the most reduction in average time to approval.

Different product/service categories will behave differently. Categories with high numbers of complex priced items may see less improvement that other categories. In all cases, it will take several months to see the full benefit, as invoice data catches up with the new price sheet data (See Fig 3 below[6]).
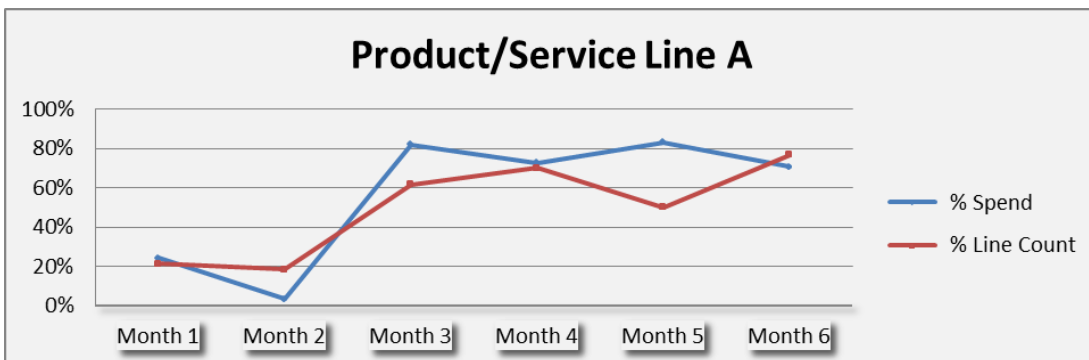

Fig 3. Example of Increased Rate Validation over Time

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[6] From PIDX International Europe Presentation, 15 September 2010

The Roll Out

Once the pilot has been in production long enough to show meaningful benefit to the business, the operator needs to plan the roll out.

Suppliers should be segmented by their capabilities, their transaction volume, and their importance to the operator's business. Different weights may be assigned to each of these characteristics depending upon business objectives. For example, the operator could target high transaction volume suppliers first, or key suppliers first. The operator's integration capabilities and those of the suppliers may also be a limiting factor. See Fig 4[7] and Fig 5 below for different views into supplier segmentation. Typically, there is overlap between the top tier "key" suppliers and the high transaction volume suppliers. These are good candidates for the pilot and early roll out phases.

Set a roll out schedule that is consistent with business objectives and resources, and repeat the steps performed in the pilot, including gathering baseline metrics. Keep in mind that the schedule needs to be coordinated between operator and suppliers. Suppliers' other commitments, such as ERP upgrades, may impact scheduling.

Set a logical cut-off point within the supplier community, remembering the 80/20 rule.

Top Tier – Strategic Alliance/Partnership – Top handful of suppliers that are critical to the success of a business and with whom collaborating programs are in place governed by executive sponsorship
Middle Tier – Critical Relationships – Those hundreds of suppliers that are critical to sustaining the day-to-day operations across an organization yet which may not be participating in a collaborative end product (Global or Regional, Direct Suppliers)
Foundation Tier – Local suppliers critical to a small portion of Operations and those thousands of suppliers who have a purely transactional relationship (Local MRO, Indirect)

Fig 4. Supplier Segmentation by Importance

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[7] "Segmenting Your Suppliers – in Electronic Purchasing",. Chris Welsh, Digital Energy Journal - November - December 2007
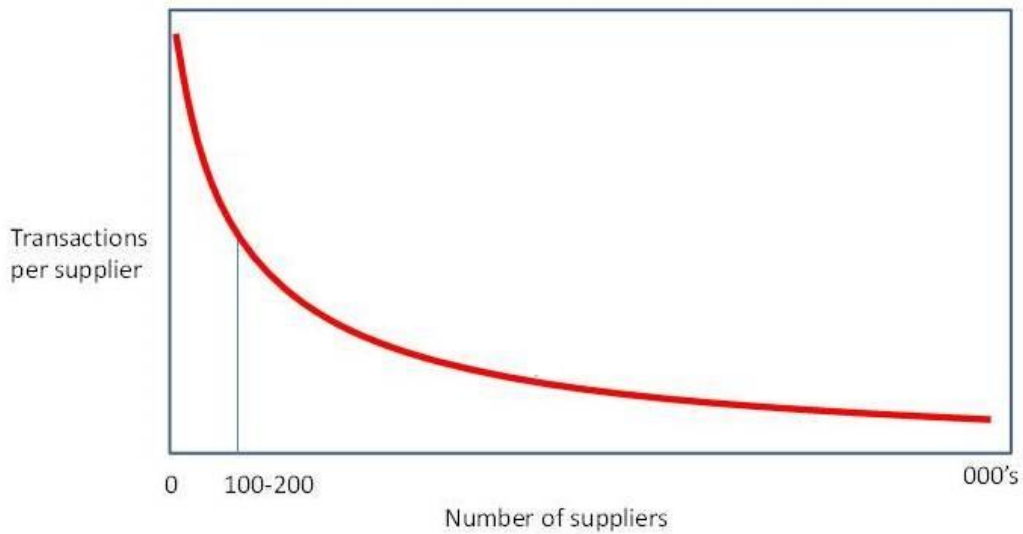
Fig 5. Supplier Segmentation by Transaction Volume

Monitor Effectiveness

Plan to regularly report the measurements taken after the pilot phase. Reporting those measurements to internal stakeholders and suppliers can help identify other areas of improvement or flag new issues that may occur. For example, a decrease in number of items automatically validated may indicate a process change with either the operator or the supplier.

Summary

The Automated Price Validation process is built within a well-constructed P2P process. Understanding and optimizing the complete P2P process is a prerequisite to automating any part of that process, especially price validation. **Remember -- automation will not fix a bad process.**

Automated Price Validation reduces the operator's overhead by approving validated invoices for payment with less human intervention. Engineers need only examine the exceptions rather than every line item. This increases the real time visibility of working capital for the operator. It also provides rapid feedback to suppliers to support the dispute resolution process, shortening the dispute resolution process and reducing operator's costs. Shorter dispute resolution times accelerate billing to joint venture partners. The structured data required by an APV process provides additional benefits for spend analytics placing more spend under active management.

Visibility and efficiency in the Procurement-to-Pay process directly impacts an operator's bottom line. Transparency to joint venture partners and suppliers is also essential. Implementing a repeatable and scalable APV process within an optimized Procurement-to-Pay process will improve visibility within the organization, transparency to joint venture partners and suppliers. Operators get greater control over contract compliance and maverick spend with Automated Price Validation.

Using industry standards in the development of an Automated Price Validation process is essential to promote wide adoption among suppliers, and reduce onboarding costs for both supplier and operator. Consistent use of industry standards within an APV implementation makes the process repeatable, scalable, and maintainable.

A well-planned, phased implementation will quickly show measurable value to the operator, suppliers, and other stakeholders.

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