Improving Operations in the Mining Industry with Business Process Management Technology

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ABSTRACT: This paper reviews the problems of technology adoption by mining companies, including implementing system-wide integration efforts referred to as enterprise resource management (ERP) systems. Adoption of technology has been complicated by the challenge of converting information from paper to digital form, and the need to share data with numerous locations. A system that will pass data back and forth from different functional areas and automatically provide reports at each stage is not yet the norm. Business process management (BPM) software is emerging as the answer to these issues, as well as providing a platform to reduce the dependence on paper-based systems and to facilitate the sharing of information among numerous locations. This paper will conclude with a review of the key aspects of BPM systems that

1 INRODUCTION

This paper's focus is on the use of Business Process Management (BPM) technology to improve operations in the mining industry. It will first look at a problem that is common to every mining company with multiple locations: how to efficiently gather operating data, and then distribute this information in a timely manner to key decision makers. The solution discussed will illustrate how BPM technology and associated service offerings can be combined to meet this need. The paper will also discuss where BPM fits in with the other information technology developments that have taken place in the mining industry over the past ten years, and will suggest additional areas where this revolutionary software can be used to increase efficiency and reduce costs.

2 THE PROBLEM OF TRACKING KEY PERFORMANCE INDICATORS

One of the most challenging problems for managers in the mining industry is how to create a business process that will provide managers with the information on key performance indicators necessary to plan effectively, make production decisions, and increase operational efficiency. A key element is the need for a reporting system that will provide up-to-date operating information on mine production and a way to track the key performance indicators that measure success. The task is not an easy one. The work environment of the mining industry requires that data be gathered under very difficult circumstances, from remote locations, and often from locations several time zones away from headquarters.

The paper will describe a solution to this problem that involves creating a business process that uses technology to automate certain steps in this process as well as a service delivery component that converts information on paper forms into digital data. BPM, the technology that makes all of this possible, is a relatively new with the first commercial products being released within the past four years. An equally important part of the solution is the services needed to digitize its information flow so that the BPM technology can do its work. Mine operational information is still mostly collected on paper forms, and the process of manually assembling this data from various mining locations is cumbersome, inefficient and costly.

3 A POTENTIAL ROLE FOR BPM TECHNOLOGY

BPM technology is an ideal tool to help mining company managers solve this data collection problem. As a web-based technology, BPM can be used as a platform to facilitate the collection of data from multiple mining locations. Because of its ability to specify and implement business rules, it can easily be configured to transmit data to a centralized location where the data can be processed, assembled into useable reports, and then distributed electronically to

any authorized user with access to the Internet. An important first step in this process, however, is devising an efficient way to convert the information contained on the paper reporting forms used at the mines into a digital format.

Managers continue to struggle with this problem for a number of reasons. The collection of production, maintenance, and safety information on a shift-by-shift basis requires that the information be gathered using standardized forms. Additionally, each person recording the information needs to have a common understanding of the data to be collected. This means that, to get the data they need, mine managers need to identify and train one or more of each mining team from each shift not only in what information to record, but also in how to make the proper judgments so as to collect the data in a manner that is consistent across the company's various mining locations.

In addition to ensuring that proper methods are in place for the consistent recording of mine operating data, managers face the additional challenge of how to best to organize and analyze the massive amount of information that would be generated on a daily basis by mid-size and large multi location mining companies. One hurdle to overcome is the lack of staff resources that would be needed at each mine location to collect and interpret the data, and the high cost that would be involved to deploy such support staff. BPM makes it possible to continue to use paper forms, but when completed the forms can faxed to a central fax server location where the data from all locations can be entered into digital forms that were created using the BPM software. Once in digital form, the BPM software can be used to set up business rules to analyze the data and to create reports which can be delivered on a scheduled basis as desired, or accessed on an ad hoc basis using the software's web portal capabilities.

The BPM technology that has emerged over the past four years has created opportunities for its use that go far beyond the operations tracking and monitoring application just described. BPM can be used in any number of ways to reduce costs and improve operations in the mining industry. This paper will now discuss how information technology used in the mining industry has evolved over recent years, describe how BPM technology works and discuss some of the ways that it can be put to use in addition to automating field reporting processes. As background, let's first look at the historical pattern of adoption of information technology in the mining industry, and the problems that companies have encountered in trying to "computerize" their operations.

4 TECHNOLOGY ADOPTION STAGES

As with most other business sectors, the early uses of technology in the mining industry started with the development of customized databases and applications for accounting purposes and then later for production and inventory control. More re-cently, information technology has been employed in developing customer relationship management (CRM) systems, sophisticated software that is designed to track the status of each contact made with every prospect and customer. Success with CRM systems, however, has not been universal. One of the biggest hurdles has been getting salespeople to enter the data into the system. This is a common problem for all companies and not limited to the mining industry. Another more technical problem is that the CRM software and the accounting software often exist as stand alone silos of data that are not connected with each other. Getting data into and out of these systems often requires some form of manual clerical effort. More recently, to address this problem some companies have embarked on implementing in one form or another expensive integration efforts that are referred to as enterprise resource planning (ERP) systems.

5 ENTERPRISE RESOURCE PLANNING SYSTEMS

While these investments in technology have cre-ated some improvement in operational efficiency, the goal of ERP advocates to fully integrate all key functional aspects of a mining company has remained elusive. Although the results have been disappointing, the problem with these ERP systems has not been the software itself, but rather the need to customize the software to fit the unique business processes that typically exist within each company. Companies trying to implement a one size fits all ERP system have found themselves facing the daunting task of first embarking on the task of re-engineering each of their business processes to reflect the hard-wired ERP software structure.

ERP implementations carry significant costs for an organization. The upfront license costs and the ongoing yearly maintenance costs are not inexpensive. In addition, the need to re-engineer business processes can be internally disruptive and push other needed projects further down the priority list. Implementation times are often months longer than expected. And, future modifications often require costly customization.

6 IS YOUR INVESTMENT IN TECHNOLOGY PAYING OFF?

Because of these type problems, the return on investment in information technology products has not always met expectations. The first step in turning less than satisfactory results around is to make a candid assessment of your IT environment. Despite past experiences, worthwhile business process improvements are achievable, but senior managers would do well to ask some basic questions. For example, with respect to a CRM system, does the marketing and sales staff fully use the software? Can employees from every key functional area within a company access information in digital form for each of its customers and prospects? Another question is whether a company's technology investments have resulted in lowering its operating costs or have its costs increased? The goal of using technology to improve efficiency often fails due to the need for more than just software as the solution. A good example of this point is the field reporting system discussed above. To be fully efficient, the first step was to find a way for paper-based operating information to be converted to digital form. An investment in technology is paying off if managers have better information now than before, and if they are better able to focus more on the company's core business activities than before.

7 WHY THERE ARE PROBLEMS

One of the reasons that technology has not yet resulted in universally superior business process improvement is the great amount of information that still resides in paper form. As long as data and documents remain paper-based, the information they contain remains locked in filing cabinets or sitting on desks awaiting action that may or may not come in a timely manner. With paper-based processes, managers must work extra hard to stay on top of every transaction and every due date, rather than being able to manage by exception.

Unfortunately, most people are still more comfortable working with paper. For long documents, most people prefer to read a paper version rather than an electronic version. Having documents in a digital, web-based database, however, provides an organization with significant opportunities for cost savings in terms of improving collaboration among internal as well as external parties. Information storage and retrieval costs can also be substantially reduced. The challenge is to find ways of easily getting data and documents into digital form. The tasks of doing this is often dropped into the lap of professional staff and business unit managers whose time is better spent having others perform these clerical tasks, not to mention an aversion to performing computer based data entry tasks. A good example of this is the difficulty faced by organizations in getting sales and marketing personnel to take the time to enter information on prospects and customers in order to keep current the company's expensive CRM system. Most sales professionals take written notes while in a meeting or on a phone call with a prospect, but resist taking the time to enter this information so that it can be part of a digital database. Yet without somehow finding a way to get this information entered, the others in an organization with a need to know are left to setting up highly inefficient processes for information sharing.

Another significant problem is the way information technology has evolved. Databases that were created to store information related to one functional area within an organization such as accounting or mining production tend to stand alone as separate silos. Moving information from one functional area to another is not an easy task. The result is that when information needs to be exchanged it often requires a person from one area to communicate across departmental lines by fax, email, or phone. Information exchanged must then be keyed into the other database resulting in more inefficiency. While all of this may not seem significant with respect to any one person or activity, when taken as a whole across all functional areas within an organization, the potential for cost savings could be huge.

8 ACHIEVING BUSINESS PROCESS IMPROVEMENT

Paper is the worst enemy of achieving success with business process improvement initiatives. The first step has got to be to convert information that is now stored in paper form into a digital format. When this happens, a whole new level of process improvement becomes possible. Moving away from paper is not easy, but there are some strategies to follow that will make it somewhat easier to achieve this goal. One is to look at where the paper origi-nates. Any forms or documents now in paper form that originate within an organization should be digi-tized so that paper is never used during the creation of a document. Paper generated outside of the or-ganization is the real challenge, but not one that can't be overcome. It should be pointed out, how-ever, that there is no downside to merely printing out a digital document to make it easier to read. The problem develops when paper documents make up a key link in a business process. There are several ways to make an organization paperless, without try-ing to force outside third parties to adopt a paperless approach. One is to be sure that any information coming into the organization from outside be either faxed in or scanned in to a web server equipped to receive it in digital form. Any critical information would then be

transcribed and validated at either a centralized back office run by the company or out-sourced to a back office location operated by a third party provider.

A second step toward increased business process efficiency would be to provide document repositories and other informational databases that could be accessed with a web browser from any location with Internet access. A great deal of time is now spent searching for paper files stored in filing cabinets. Added to this are the costs for the office space needed for onsite storage or the costs for putting information in an offsite document warehouse, as well as the costs in terms of money and time to retrieve information.

As complex entities, organizations spend significant resources communicating internally and externally with vendors, partners, regulators, and customers. Email and the ability to attach Word and PDF documents has certainly been an improvement over sending hard copy documents by mail and fax. Email, however, is only a partial solution. Emails facilitate quick communication both internally and externally, but the information they contain still need to be filed and stored for later use. Two storage options are available. Users can create electronic files within their email program, or print out the emails and file them with the other related paper documents. Neither solution is very efficient.

A fourth issue is probably the most critical, and that is the need to automate an organization's business processes. In most companies, the flow of data and documents still involves paper and some form of manual activity. Most business processes still require people to use email, fax, or phone, and often involve the keying in of the same information more than once. The opportunities for increasing efficiency by automating these processes are enormous, and there is now a technology solution available that can make this possible.

9 BUSINESS PROCESS MANAGEMENT SOFTWARE

There are now several firms that offer BPM software products. Each product has its own unique features and user interface, but what they have in common is the ability to automate almost any business process regardless of industry or functional area.

What makes this technology revolutionary is the ability to map and configure any business process without the need to write custom software code. BPM software gives the person who is automating the process a user interface with a drag and drop toolbar with all of the programming already done and working behind the scenes. What used to take weeks and months of software development time can now be done in hours. And changing a process once built and implemented is no longer a time consuming and expensive task. Most BPM software also allows for ease of importing and exporting data from other databases and legacy systems. This means that disparate databases and application systems can now "talk" to each other. As a result, the potential for business process improvement with the advent of BPM technology has never been greater.

10 HOW BPM WORKS

One of BPM's strong advantages is that there is no need to re-engineer a business process to fit a pre-set structure typically required with various en-terprise resources planning systems. BPM replicates rather than replaces a firm's current business proc-esses. The first step in automating a business proc-ess is to use the BPM software to create an organiza-tional chart, define the various roles in the organization, and designate the individuals who fill those roles. With BPM, individuals can be reas-signed and new people assigned these roles without having to redesign system. With roles defined, the next step is to use the BPM tools to map and config-ure the various activities that make up the business process. BPM allows these activities to be organ-ized in the sequence that is normally followed.

Each step in a process usually has some activity that needs to be captured in a digital form. The BPM software has a toolbar component that can be used to design or replicate the existing paper forms associated with each activity in the process. At this point, the business rules associated with each step in the process can be specified and configured. The process is now ready for deployment. Those users who are part of the process will receive an email notification with a hyperlink that takes the user automatically to their electronic "to do" list.

BPM allows administrators and managers to track and monitor the status of every transaction in a process. Some BPM products have a built-in simulation tool that allows planners to do "what if" analysis to identify and cure potential system bottlenecks. All of the data entered is running on a relational database, and thus can be easily retrieved for analysis purposes. Managers find that one of the important uses of a BPM system is that it makes possible the establishment and tracking of performance standards. Reporting also becomes easier since BPM systems come with a variety of reporting options including the ability to pre-schedule the automatic delivery of desired electronic reports.

11 BENEFITS OF BPM

The advent of BPM has raised the potential for companies to significantly improve their operations and lower their costs of doing business. In terms of

developing automated systems, what used to take weeks and months to do can now be done in hours, and at a much lower cost. Modifications to existing processes can be done without the previous high cost in terms of time and resources. The greatest benefit is in the increase in productivity and the resulting reduction in staff costs to perform those tasks that have now been automated. Organizations are finding that BPM saves them money in numerous ways, from eliminating the need to re-key data numerous times to the ability to retrieve data and documents via a web browser rather than from costly to maintain and highly inefficient paper-based filing systems.

Another benefit is faster cycle times resulting not only in reduced staff costs but also in better customer service and increased satisfaction. With BPM, transaction time limits can be set so that any bottlenecks are automatically escalated to the manager responsible for the process.

BPM tools are designed so that business rules are embedded in the process. Participants in a process are required to follow these business rules in order for a given transaction to move forward. Compliance with company policies and government regulations thus becomes easier to enforce and manage. With BPM's strong reporting and tracking capabilities, managers at all levels now have a tool by which to develop performance standards and the metrics by which to measure success. The net result is better information on which to base decisions.

12 BUSINESS PROCESS FULFILLMENT

BPM also makes possible additional cost savings by facilitating business process fulfillment by third parties whose have lower cost structures. BPM not only provides efficiencies by removing some of the manual steps in a process, but because it is a web-based solution BPM also makes it possible for any activity in a process to be performed at whatever location offers the lowest cost alternative. Thus, once a company has implemented a BPM solution, it then has the option of moving to the next level of cost savings by outsourcing those portions of a process that involve clerical or administrative tasks that can be performed at locations with attractive cost structures.

Coriendo refers to this as "process partnering". Key components of the process are still performed by our customer. The company's staff still initiates, controls, and monitors those steps in a transaction that are critical, but other portions of the process such as data entry, cleanup, or validation are performed by the Coriendo staff thus resulting in cost savings for the company.

13 POTENTIAL USES OF BPM IN THE MINING INDUSTRY

Mining companies could benefit in at least four areas from the use of BPM technology. As shown with its ability to automate field-reporting systems, BPM can help improve operations and maintenance by providing managers with up-to-date operational information. It can also help foster better collaboration and coordination between sales, production, and shipping. It can be used to automate the resource management function. A fourth example would be in BPM's ability to improve environmental, safety, and regulatory compliance systems.

14 OPERATIONS AND MAINTENANCE

Mining companies are highly dependent on the reliability of the equipment and vehicles used for mining and transportation of their products. BPM can play a key role in determining how successful a company's O&M efforts are in maximizing the uptime of machinery and vehicles used in mining, handling, and storage. BPM can be used to automate the record keeping for each vehicle and piece of equipment, keeping track of warranties, and planned maintenance schedules. Breakdowns and unplanned repairs can be monitored and best practices established for operating each unit.

BPM can be used to quickly and efficiently set up a cost effective repository for operating manuals and engineering drawings. This would allow access to participants from any department in the company as well as outside parties who have been given permission.

15 LINKING SALES, PRODUCTION, AND SHIPPING

BPM offers a relatively inexpensive solution to the problem of keeping sales and marketing person-nel informed as to production schedules and output. For example, coal producers need to focus on meet-ing customer requirements for specific sulfur con-tent, BTU levels and other specs. To be effective, marketing staff needs access to accurate and up-to-date production and inventory information on a wide variety of product specifications.

While marketing reps for coal companies sell to a relatively few customers, marketing reps in other mining industries may benefit from using BPM to automate the sales lead development process. BPM can be used to track and monitor the numerous contacts with prospects and customers. Unlike other contact management applications, however, BPM provides much more than just a history of the contacts that have been made with a customer.

In addition to providing the contact data base information, it also allows the sales and proposal process to be automated so that proposals are easier to prepare. The process can also be structured so as to automate the inclusion of key personnel from different departments in providing input on cost and production data as part of the proposal development. Key managers can also be included in the contract review step. The process can also be automated to create an invoice once a sale has been completed and then feed this information into the company's general ledger.

Because of the integration features of BPM products and the ability to import and export information from almost any digital system, BPM systems can be used to link into the operating systems of third party carriers thus enabling account reps to be on top of the latest delivery information for their customers. Imagine the value for the producer and customer alike of being able to integrate into a rail carrier's train or car tracking system and linking production scheduling with their pick up or delivery schedule!

16 RESOURCE MANAGEMENT

BPM can be a critical tool for managing a mining company's core assets, its real estate and mining rights. The real property management process can be automated so that deadlines for lease renewals, options, etc. don't slip by unnoticed. Related matters such as tax payments and timbering agreements can be tracked and any invoices automatically sent out per the agreements in place.

As in the case of managing O & M documents and drawings, BPM can be used to create a document management system for storing the documents associated with the acquisition and disposition of real estate. The system can also be used to enable collaboration among the numerous parties who are involved in the negotiations associated with a real estate purchase or lease agreement. A key feature of BPM is its ability to provide document version control so that the numerous internal staff and outside parties always are working on the most current document.

17 ENVIRONMENTAL, SAFETY, AND REGULATORY COMPLIANCE

Compliance is an equally critical area for mining companies. The environmental permitting process is just one example of where BPM can be used to bring about business process improvement. It typically involves the collection of large amounts of data, the use of third party consultants and labs, and the preparation of huge amounts of documentation. BPM can be used to automate the document flow during the permit preparation stage, and provide a common platform for all of the entities involved in the process to collaborate.

Companies today face a wide range of compliance requirements including environmental, safety, and, in the case of public companies in the United States, the recent Sarbanes-Oxley accounting and audit standards. BPM is an extremely helpful tool to address these requirements since it provides a date and time stamp for every piece of data or document entered. And in the case of Sarbanes-Oxley, it provides the highly structured processes required by that law.

18 IMPLEMENTING A BPM SOLUTION

As discussed with respect to field reporting systems, it is important not to overlook the service aspects that need to be present for a successful BPM implementation. Companies should consider the benefit of using a solution provider who can deliver both BPM software and also the array of related services that will result in a successful implementation. For example, a full service business process solution firm such as Coriendo, LLC, can help companies implement a BPM solution in several ways. An important first step is to pull together the key players in a process, develop a consensus on what the process flow should be, and then document the process. At that point, the solution provider can use the BPM tool to map and configure the process in a way that reflects what the company wants.

As discussed earlier, another major problem is the need to convert paper based data and documents into digital form so that the maximum benefits of automating business processes can be achieved. This is a real struggle for most companies and also one of the biggest barriers to achieving greater efficiencies. Once a company's flow of paper documents has been converted into digital format, it can then take advantage of automating and contracting out those clerical and administrative portions of a process that can be done at a lower cost by a third party provider. This becomes especially valuable when this would free up highly paid staff whose time is better spent on more productive activities, or when it solves the problem of heavy workloads associated with seasonality issues. By making it possible to contract out certain portions of a business process, BPM makes it possible for companies to convert fixed costs to variable.

In addition to improving mining related core functions, BPM can be used to make improvements in the other business processes in such functional areas as purchasing, human resources, legal, and accounting. One of the most valuable aspects of BPM is that it can be implemented on an incremental basis. An organization can begin with automating just

one process and then move forward one process at a time rather than embarking on an enterprise wide deployment.

In the final analysis, however, possibly BPM's most important contribution is its ability to provide management with better and more up-to-date information. Bottlenecks get identified before they become major problems. Anything that can be quantified and measured can be set up as part of a performance report and delivered automatically to decision-makers on a set schedule. The trend to-ward business process automation is very much still in its early stages. In a year when fuel costs have soared and raw materials like roof bolts have tripled in price, great opportunities still remain for mining companies to achieve new levels of business process productivity in the years ahead.