HALLIBURTON MANAGEMENT SYSTEM: LESSONS LEARNED DURING DEPLOYMENT AND IMPLEMENTATION

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ABSTRACT

Halliburton quality management professionals were unaware of the challenges that would arise when they implemented a real-time management system in a multicultural, multilingual, global organization.

The Halliburton Management System (HMS) was conceived as a real-time system to help the company meet customer, shareholder, employee and community expectations by integrating efforts to improve quality, environment, health and safety performance, and to meet increasing regulatory requirements. In summary, the system touches every aspect of the company, telling Halliburton people what, why, when, where, and how to do things; who is responsible and who to interact with; how to know when something is done right; and how to make it better.

This paper describes some of the challenges, lessons learned and behavioral changes that resulted when the system was implemented in Latin America.

Leadership and commitment are undoubtedly the main elements that contribute to successful improvement efforts and cultural changes. It is evident that cultural change does not move at the same pace as the system deployment. It is also easy to overlook – and difficult to foresee – the education and training efforts required to help everyone in the company understand and use the system.

INTRODUCTION

In 1996, as an evolution of its quality improvement efforts, Halliburton realized the need to implement an integrated management system that enhanced our ability to achieve the levels of performance expected by all stakeholders. In order to lead the industry in providing solutions to its customers, Halliburton needed to align areas of the company that are interdependent: customer and employee satisfaction, financial performance, service quality, and performance in Health, Safety and Environment (HSE).

Customer expectations were rising. Once satisfied with operational execution, customers now demanded lower costs, improved safety performance, flawless execution of operations, better environmental protection, and effective risk control as well as superior operational results. In addition, customers expected services to be consistent around the globe.

It was also essential to meet shareholder expectations. The industry was witnessing a huge change in the way organizations managed their businesses to meet financial performance expectations and commitments. Managing costs more effectively, increasing productivity and reducing waste were not only necessary for improved performance, but also for survival.

In addition, managers faced new challenges: delivering consistent return on investment, improving equipment utilization and productivity, using materials more efficiently and reducing inventories, and managing risk and reducing liabilities in all areas. It was often difficult to balance these

management concerns with the challenges of meeting customers' and stockholders' new expectations. Nevertheless, it was crucial to long-term success.

Halliburton was not isolated from these realities. In order to meet these challenges, Halliburton needed to ensure consistent, effective alignment of objectives, culture, behaviors and process execution throughout the company. These objectives would require all HSE and quality requirements to be integrated within and across all the different interfaces of the processes.

The solution was the Halliburton Management System (HMS), which would meet international norm requirements, ISO 9000 and ISO 14001, and would be compatible with the E&P forum. The company leadership approved the HMS for deployment. We present the results of this solution in the following sections of this report.

THE HALLIBURTON MANAGEMENT SYSTEM

The fundamental objective for implementing the HMS was, and continues to be, to achieve superior financial performance and employee satisfaction while providing products and services that satisfy customers' business needs, meet or exceed their expectations, and are delivered safely and in an environmentally friendly manner. The management system would focus on performance while ensuring compliance. This ambitious vision continues to face the challenges detailed in this document.

The organization should be viewed as a system of interdependent, connected processes. The system needed to be designed around the way the work is conducted at different levels and across all the organization's interdependent functions. It needed to link to the appropriate interfaces to ensure a seamless execution of processes and the successful completion of jobs. It also needed to satisfy all HSE, quality and regulatory requirements.

In short, the challenge was to provide a management system that could provide continual guidance on everyday tasks:

- What, why, when, where and how to do it.
- Who is responsible and who to interact with.
- How to know we have done it right.
- How to make it better.

HMS Model

The model management process is shown in the HMS wheel, Fig.1. It represents the systematic approach the team adopted to manage and align the organization for customer service and improved performance. The model was intended to apply to the company as a whole and at every level, product or service line, department, region and country. The description of the elements of the model follows.

Leadership and Commitment envelop every aspect of our work. It is represented as the outer ring, as it holds the system together. Mike Davidson expresses it in his book, *The Transformation of Management*[1]: "No process will do it if leadership does not accept responsibility. It is not the process that brings about performance, it is the leadership. Process is a tool of leadership. Leadership is not a component of process."

Purpose provides guidance and focus to all levels and functions of the organization. The mission, values and guiding principles define what is important, the code of business conduct establishes clear ethical expectations and boundaries, and the vision defines the fundamental objectives of the organization. Together, these provide the overarching agenda of the company.

To maintain focus and performance improvement, the system is designed to use a balanced score card based on Kaplan and Norton's[2] scheme – Financial, Customer, Internal Processes, Innovation and Learning – which incorporates measures and indicators for the long- and short- term objectives.

Planning is fundamental at all levels of the organization. It is a systematic approach for translating the company mission and vision into strategies and action plans that respond to the customer, stockholders and employees, as well as to regulatory requirements and changes in the market. The strategies and action plans are developed at the company level. All product and service lines, support functions and business regions align their strategies, ensuring vertical and horizontal unity for implementing the system and achieving the global strategic objectives.

Plans also include risk identification, risk controls and contingency plans to control and mitigate risk.

Organization of people, along with their responsibilities, competencies, and development programs, is an integral part of the management system. Other elements must also be organized for successful implementation of the plan and execution of processes. These include structural functions, methods for communications and document control, and provision for and management of various resources.

Implementation of actions and activities is rolled out according to the plan or other documented processes, such as those focused on meeting performance expectations and complying with HSE and quality standards.

Monitoring involves a systematic approach to managing performance improvement by continuously gathering and analyzing information on the different processes. Elements that may be monitored include process outcomes, performance results, the customer voice, progress on implementing the plan, and compliance with regulatory requirements. Monitoring activities include gathering performance information, measurement, observation, inspection, assessment and auditing.

Reviewing progress involves a systematic approach to formally analyze the system performance. Reviews ensure that the system is meeting strategic objectives and the goals established in the score card. They involve analyzing customer satisfaction data as well as data from Halliburton's Corrective Preventive and Improvement (CPI) system.

Change Management is a systematic approach to prioritize opportunities, initiate improvement efforts and manage change within the organization. It is based on the "Plan-Do-Check-Act" cycle.

Continued Performance Improvement

Certain systems are fundamental enablers for the HMS. We will discuss these here in some detail before describing other HMS development efforts.

To maximize the benefits of the system, it is essential to continually gather information about customer perceptions of Halliburton and how well the system performs. An integrated information

system helps reveal issues affecting performance, identify areas of opportunity, capture improvement ideas and share lessons learned. It also enables us to track non-conformance issues so we can take action quickly and initiate solutions.

The HMS team designed two real-time tools to improve processes, standard operating procedures, service execution and customer satisfaction: the Correction Prevention and Improvement (CPI) system and the End of Job Customer Satisfaction (EJCS) survey. These systems were also designed to enable knowledge sharing and to maximize prevention and improvement efforts.

Another real-time system was already being implemented to leverage and improve business management processes. The SAP gives Halliburton the ability to maintain integrated, globally consistent processes that effectively talk to each other across Halliburton's diverse geographic and organizational environments. The SAP also allows for real-time information management.

Correction, Prevention, Improvement System. The Correction, Prevention, Improvement (CPI) system was intended to serve as the "feeder" for HMS processes to formally capture and document improvements to system performance. The system supports efforts to collect information, analyze trends of processes and service execution, report on performance, identify areas of opportunity, share knowledge and best practices, and improve processes and operational procedures. It also quantifies the costs of poor quality. Ultimately, it is the basis for managing change.

The CPI system was designed to manage three processes, each built on the principles of continuous improvement.

Corrective Phase: Provides responses to problems that occur in the performance of work.
Preventive Phase: Identifies actions that can prevent problems.
Improvement Phase: Captures improvement opportunities and identifies innovative products and processes that already exist.

Prompt, effective communication to either take action or share knowledge at the appropriate levels is critical. The CPI system was envisioned to be a Web-based, real-time application that would allow all employees to document opportunities and solutions quickly through simple intranet access.

The CPI system collects a variety of data, including information on processes, solutions, job failures, potential problems, improvement ideas, job log data, nonconformity identified in audits, the cost of poor quality, and issues involving equipment, products and materials. It allows this information to be segmented by customer, process, department, product/service line, geographic business area, and even the source of the problem. Analysis of these trends helps management set priorities and take action to correct, prevent or improve processes. It also allows for benchmarking.

It was necessary to develop a feature that allows users to subscribe to the system based on their expertise or area of responsibility. Such a feature speeds the response to the problem while fostering the ability to share improvement opportunities across organizational lines. When things go wrong, users can quickly transmit alerts or warning messages to prevent problems in other areas.

Essentially, the system was designed to serve as a smart company memory bank. As its knowledge base grew, it would flag issues or problems that previously would have been isolated in different operational areas but, when seen across the spectrum of the company, would trigger actions for improvement.

End of Job Customer Satisfaction. Listening to the voice of the customers, understanding their perceptions, and providing them with quick feedback and solutions are essential features in a system designed to improve service quality. The End of Job Customer Satisfaction (EJCS) survey was designed and developed to obtain feedback on key areas and elements of performance at the well site. Those include personnel, environment, equipment, timeliness, health and safety, job design, and materials and products.

The evaluation system was designed to know if customer expectations are met, exceeded, or not met. The grading system is as follows:

5. Superior performance
4. Exceeded expectations
3. Met expectations
2. Below expectations
1. Poor performance

Customer comments are as important as the grades. These are classified as positive, negative, or mixed.

The EJCS system was designed with the same vision and features of the CPI. Both databases are linked. Again, the subscription feature has proved to be an effective way to communicate quickly for a fast response.

SAP. The SAP is essentially a number of fully integrated modules covering virtually every aspect of business management. It manages information to facilitate the shift from a functional structure to an end-to-end process structure, enabling integrated, globally consistent processes across the entire Halliburton organization. The system's platform allows real-time information management, which supports the Halliburton Energy Services Group's strategic direction.

The SAP was launched in 1997. After some pilot projects, it was deployed globally at the end of 1998 and throughout 1999.

Performance Improvement Initiative: Implementation of a global strategy to improve health, safety, service quality, and environmental performance.

More and more, it became evident to company management that improving performance in health and safety, environment and service quality would require an integrated business strategy. Halliburton's Energy Services Group launched the Performance Improvement Initiative (PII) in late 1997 to focus on those three key areas which are so critical to the success of the company.

Three teams at the executive level were formed to lead and champion the improvement efforts for each area. The teams are responsible for developing strategies and objectives. Mirror teams at the regional and local levels provide resources and assign timelines and responsibilities. Local teams then implement the program and handle reporting. The President's Award was instituted to recognize the operational areas that show superior commitment to performance.

The PII involves executives in the highest levels of the organization with implementing the HMS. Involvment helps drive improvement initiatives – and the motivation to implement them.

The executive level is also responsible for planning. This responsibility occurs early in the year after leaders review the results and gaps from the previous year. The plans consider the future needs

and requirements of the system. They are then rolled down to the regions and local operations for implementation.

The PII objectives for **health and safety** are to eliminate fatalities, produce visible evidence of safety leadership from all employees, use systematic risk reduction processes to eliminate lost time and recordable injuries, and eliminate vehicle accidents.

The objectives for **environmental** performance include maintaining environmental leadership, identifying top high-risk behaviors, obtaining closure on outstanding assessment and audit observations, tracking incidents and preventing reoccurrence, and managing chemicals effectively.

The **service quality (SQ)** objective is to perform at the highest levels and establish ourselves as the undisputed industry leader in service quality.

The team implemented a structured process to help executives use meetings or conference calls to monitor and follow up on progress as the plans were implemented. Executives can analyze performance and adjust course as required. This process has evolved and improved over the last five years to become more and more effective. Now, monitoring is performed monthly at the regional level, and continues to be a key fundamental process that drives the implementation of this initiative.

A Culture of Prevention: Working Left of Zero

The PII has brought a powerful focus on systematic risk prevention reduction. It has helped Halliburton employees achieve high levels of commitment, participation, and alertness to reduce injuries in all business activities.

To develop a working environment with consistently high alertness and concern for safety, Halliburton has embraced the Risk Management Program and the Behavioral Safety Program.

The Risk Management Program, which assesses and controls risk, is essential to fostering a prevention culture.

Halliburton's Behavioral Safety Program is paralleled in Latin America by the Stop and Green Card programs. The Stop program prevents safety incidents while the Green Card program focuses on preventing environmental incidents. These two programs help identify and eliminate unsafe acts through observation of people's actions and behaviors. With successful management, they have helped instill the behaviors that prevent and thereby reduce the number of accidents and incidents: increased alertness, improved morale, closer team work, better communication and greater trust.

The Stop, Green Card and Risk Management programs interface with the CPI to help capture, measure and analyze information and to track all prevention and improvement plans.

Data analysis revealed a direct correlation trend between the employee's frequent participation in behavioral observation programs, such as the Stop program at DuPont, and the substantial reduction of incident rates. Data collected since 1997 in different geographic areas of Latin America show a remarkable trend of successes on reducing personal and vehicular incident rates.

Over the years, we have made considerable improvements in such areas as training, monitoring, and program maintenance. Today, Halliburton has reached an outstanding 80% involvement of the workforce in the behavioral safety program. Data management for the program has evolved from traditional observation cards and Excel spreadsheets to Web applications. Real-time data has also

driven this success. Management commitment, as well as front-line worker involvement to improve HSE performance, has become a hallmark of Halliburton operations.

HMS DEVELOPMENT

Organized around the elements of the HMS model (Fig. 1), the HMS was designed to work with the support of the enabling systems and programs previously outlined. It was also developed to meet ISO 9000, ISO 14001 and E&P forum requirements.

Documentation

Extensive documentation was necessary to meet specific standards and certification requirements. This documentation is a combination of text and various process diagrams, flowcharts, process maps, and other collateral materials. (Fig.2.)

The **Code of Business Conduct** is a guide for every company employee in applying legal and ethical practices to their everyday work.

The company **policy** provides guidance and sets boundaries for Halliburton managers and others who deliver products and services to customers. It includes regulatory requirements, quality practices, and HSE policies and principles.

Business practices support company policies. They represent underlying performance expectations and guidelines.

Standards further define those elements within the system that affect the final outputs. They give detailed guidance on individual elements and set expectations for meeting requirements.

Process maps illustrate the hierarchy of processes. They include the following:

- Linkage of Process charts, which show the essential organizational processes and are used for viewing the organization as a whole system.
- Mainstay Process diagrams, which show the essential flow of activities and supplement the level of detail in Linkage of Process charts.
- Process Maps, which indicate how activities are performed, illustrate the interface of single or multiple disciplines, identify the sequential and parallel activities within a process and define the specific responsibilities and interfaces for each activity.

Work methods are instructional documents created as needed to provide additional detail to a process map.

Documentation Development

Consistent with our philosophy of developing the system around how the work is done, the first steps in developing the HMS were to define the organization's Top Linkage of Processes (See Fig. 3) and Mainstay Processes (Fig. 4). Different parts of the organization participated in developing and validating the concepts and elements of the system to ensure it would suit their needs.

Using the Mainstay Processes maps, the next step was to develop the minimum standards and requirements for each process. The first priority was the service delivery processes to improve

service quality at the well site. Participants from Halliburton's different product and service lines (PSLs), with the support of the quality professionals, designed the standards and helped to develop the PSL Global Service Delivery process maps. These maps identified activities, sequences, and responsibilities while integrating the records, alerts, work methods, risk information and other data.

The company's software capabilities enabled us to link electronically different activities in the processes to other processes and/or documents. Linkage allowed us to show the interfaces with different departments that existed within the processes and was a great advancement. As the method of relating the "task level" instruction to the larger process improves, employees will have even better access to "what they need, when they need it."

HMS Deployment and Implementation

In 1998, after some pilots in the United States and the Middle East, the HMS, along with the CPI and EJCS, was deployed to the organization through the quality structure. The structured implementation process included training, developing the location manuals, establishing the CPI system and introducing the HMS Performance Assessments.

In Latin America, the first barrier to overcome was to translate the training, education and system documentation into Spanish and Portuguese. The PSLs appointed team leaders, who worked jointly with the quality professionals to plan, map processes, educate the organization and implement the system.

Training and education on the system concepts and software was a highly demanding, and sometimes underestimated, task. It remains an ongoing and never-ending effort. Training for the HMS and CPI was delivered through formal seminars and Web-based training modules. Each year, the PII service quality initiative includes objectives and actions designed to improve the education we provide to people at various levels of the organization, from new hires to executives.

HMS Implementation Assessments

During the implementation phase, we began using the HMS Implementation Assessment process to evaluate and monitor the progress, cultural evolution and adherence to system requirements.

One goal of the process was to determine the status of the HMS implementation within the PSLs. The process was also intended to provide insight and education on the benefits of the HMS, its elements, and its tools. It would identify gaps and help us develop plans to move the system to the next level of implementation.

This process provided an excellent method for educating management on system requirements. Along with managers who had direct accountability to the assessments, members of the executive team also participated. Their addition added further value to the process.

It became evident that while the system documentation and implementation projects were progressing successfully, changing the organization's culture would be more difficult. Altering paradigms, behaviors and practices was – and continues to be – a major challenge. Cultural change moves at a slower speed than the system development; people simply cannot learn new skills, grasp new concepts, assimilate the documentation, and adopt the formal controls as quickly as we can develop new tools for the system. In addition, the pressures for delivery and achieving other business goals unbalanced the priorities.

At some point, there seemed to be too many initiatives and objectives to digest and implement effectively. Implementing not only the HMS, CPI, EJCS, Tap Root, PPR and others, but also SAP and all the support processes behind the scenes, required a huge paradigm shift for managers and employees alike. Our people had to believe in the systems, get training, and find time to learn and employ all of the tools. Meanwhile, they had to continue delivering services that met increasing requirements.

By 1999, the HMS was implemented to varying degrees across the organization. Through the PII initiative, the company's leadership set higher expectations for management: "The Company will realize incremental gains in service quality and customer service leadership in line with the long-term service quality goal and objective." This decree recognized "the varying degrees of HMS deployment across the globe at this point in time." Business management teams were directed to "adjust and focus their attention and resources to get HMS in place as soon as possible to ensure we maximize the value to all stakeholders."

In Latin America, the organization's service quality goal was to "anticipate and exceed customer expectations while providing safe, environmentally friendly, defects-free delivery of value-added solutions," viewing performance as a whole.

The PII for HSE and service quality spelled out far-reaching objectives. These included the following: deploying the HMS Global Standards and Processes; developing a competency management system; rolling out the enhanced CPI Web-based version; applying the Global Equipment Testing, Radiation, and Explosives Standards; creating and executing a risk identification and reduction program; launching the Vehicle Incident Reduction Plan, systematically identifying and managing environmental hazards; adopting the Chemical Compliance Initiative; and implementing a hazard observation program. A key requirement was for individual performance objectives to include specific items that were aligned with implementing the PII initiatives.

Another requirement was for improvements in the CPI Web-based software to better fit the PSLs' needs and provide greater accessibility. Speeding up communications, which were difficult in many areas of the globe, was a key objective of the PII-SQ initiative.

We also needed a common tool to investigate HSE and service quality incidents and accidents, and to help us find and correct the root causes of the problems. Our solution was to adopt Tap Root™. We first trained the trainers, and then deployed these experts to operational areas around the world to help people learn to use the tool.

In 2000, key objectives were to continue to implement the competency system, field personnel development plans, and maintenance and reliability standards.

That same year, the PSLs began implementing service quality audits. Those detailed audits included well site visits to review safety, compliance and technical aspects of service quality. The results were excellent.

Additionally, to improve measurement and data analysis, the team built numerous reports. Broadcasting these via the intranet facilitated the use of the information.

As the system continued to grow and more people used it, several enhancements became necessary to increase its power and viability and to expand HMS into a more valuable tool. As a management system, HMS was effective in showing interfaces and defining major processes. However, it needed to encompass more comprehensive and changing information. It should provide a level of

detail that was more useful to the workers, relate it to competencies, and ultimately help translate this information into action at the execution stage. In 2000, we implemented an improvement effort to respond to those needs.

In 2001, the PSLs developed the key performance indicators to measure performance at the well site and improve processes, which would improve customer satisfaction. The CPI system was upgraded and a new release was deployed.

By the end of 2001, the organization had adopted the Knowledge Management System (KMS) to uncover and share tacit knowledge that existed within the organization. A pilot program was established and then expanded. Today, most PSLs, maintenance, and purchase and materials departments have established formal collaboration tools to share and manage knowledge. For instance, the materials portal on the KMS Web site has been accessed more than 43,000 times, by more than 2,100 users, who posted more than 1,700 issues. More than 98% of those issues have been resolved, with an average time to respond of 7.8 days. The maintenance collaboration tool has had more than 29,026 visits, 11,000 unique users, 702 issues raised, and a 99% resolution rate. This has proved to be a very effective method for sharing knowledge and obtaining a quick response to issues, problems and unique situations.

In 2002, the president and CEO of Halliburton's Energy Services Group defined "Done Once, Done Right" as the fundamental service quality philosophy across the organization to ensure customer satisfaction. A "Done Right" job is one that meets customer expectations and achieves the job purpose with no recordable HSE incidents, lost time, or cost of poor quality. This achievement is aligned with customer and Halliburton expectations. A "Done Right" Index is an indicator that tells us our effectiveness in delivering "Done Right" jobs.

The emphasis on improving service quality led us to provide training and education to management and the PSL field service quality coordinators in 2003. The company also focused on measuring what matters and speeding up the closure of the CPIs. Such focus required new CPI software to further improve the accessibility and speed of data entry, along with some changes in the process for more timely and accurate data entry, better coding and a stronger investigation process.

The People, Performance, Results System and Process

The fundamental purpose of the People, Performance, Results (PPR) system is to align people with the organization's goals and objectives by establishing a common understanding of the organization's performance requirements, setting clear expectations, and achieving agreement on which competencies should be developed or enhanced to better execute the job. In simple terms, it answers "Where are we going?" "What do I have to do?" "How will I succeed?" and "What is in it for me?"

In 1999, the PII executive team required all employees' performance expectations to incorporate and align with the initiative's improvement objectives.

Brazil Project to Achieve ISO/OHSAS Certification – a pilot project for Latin America.

In 2001, Halliburton Energy Services Group's management in Brazil decided to certify Brazil locations in ISO 14001/OHSAS 18001. This decision was in step with Petrobras' strategy to certify all its locations. Halliburton's decision proved to be an exceptional challenge, as it required all PSLs to align their pace and direction in implementing and improving the HMS.

As a result of the certification processes, however, we enjoyed improvement in all critical HMS processes and procedures. Certification had a positive effect not only on HSE and service quality performance, but on the implementation of the whole system.

The leadership met and developed a plan to drive the pilot project to successful conclusion. The plan included the following:

- Develop, adapt and align all HMS processes and procedures to meet legal, customer and company requirements, along with ISO 14001, OHSAS 1800, and ISO 9001-2000 requirements, across all PSLs and functions. This step required every area to participate in defining the common processes and controls that would be implemented. It also entailed a great deal of work to design additional processes that would make the system effective.

- Educate and train management in ISO/OHSAS requirements and where they fit in the HMS.

- Perform a pre-ISO/OHSAS audit to detect the gaps and deviations of the HMS; develop strict action plans to bring those findings to a quick closure.

- Conduct a management review meeting to analyze the system and develop an action plan to bring all procedures and processes up to standard, and to obtain the commitment needed to launch the processes in all areas.

- Implement the action plans to close the gaps identified in the management review meeting.

- Establish a rigid monitoring process led by the management representative (Halliburton's country vice president) to ensure the action plan's timely implementation.

- Perform an internal audit to validate the effectiveness of the actions implemented and to check compliance with ISO and OHSAS requirements.

Once this process was completed satisfactorily, the next step was to request Bureau Veritas Quality International certification company to perform the final audit. The certification was issued in September 2002.

This process took 18 months. The successful results have led Halliburton in Brazil to pursue ISO 9001-2000 certification in Brazil. Our operations in other Latin American countries followed this example to implement similar processes.

Challenges and Barriers to Implementation

Halliburton encountered many challenges and barriers while implementing an integrated, real- time, and global management system that not only focused on performance but also met compliance requirements.

The People Challenge. Working in more than 60 countries, each with its own regulations, operational environment, language and cultural barriers, provided a real challenge. People's expectations were changing. The system required them to adopt new behaviors, learn new skills, and accept new paradigms that would allow their activities to be integrated within the processes to meet technical, HSE and quality requirements.

We underestimated – or failed to imagine – the massive requirements for education and training. People needed to understand the system, learn how to use its tools, and keep up with the increasing number of regulatory, HSE and operational standards. As an example, in Brazil**,** the HSE training requirements alone for just one of the product line's engineers reach 135 hours. That is for 33 mandatory HSE training programs. A cementing operator requires 46 mandatory HSE training programs adding up to 185 hours. A mechanic requires 120 hours for 30 programs.

The total number of HSE training hours delivered in Brazil over the last three years reached 31,050 in 2003. That is equivalent to 10 365-day man years. It requires a huge investment and effort to plan, coordinate, deliver, track and improve this much training.

Training in HSE was just the beginning. At all levels, people had to develop new skills for process design, mapping, documentation and improvement. They had to grasp new concepts, such as customer service, risk management, root cause investigation and prevention. They had to learn how to use new tools, methods and systems, including CPI, EJCS, PPR, SAP, and others. And they had to acquire expertise in financial systems, software for data manipulation and analysis, and many other areas of knowledge. Training remains a never-ending effort that requires a seemingly bottomless investment of time and resources.

Complicating this challenge was the need to share processes, documents, working methods and other timely information in many local languages. In Latin America, for instance, it was necessary to translate everything into Spanish and Portuguese. We also needed to receive users' feedback in English in order to react quickly with adequate support.

The Technology Challenge. Implementing a real-time management system and its supporting information systems around the globe required a vast network of people with advanced skills, hardware and software. Such a network was necessary in order to enter and handle enormous quantities of data, share the information and documents attached to the system, and broadcast real-time feedback.

Halliburton needed to integrate many types of information from customers as well as internal sources. Diverse systems needed to talk, analyze and correlate information about everything from financial and technical operations to human resources and customer satisfaction. This very challenging effort is continual.

Redundant data entry became a real issue. Different subsystems require the same information, but when they are not integrated, people are forced to duplicate data entry. Duplication reduces productivity and increases the chance of inaccurate data. Halliburton continues its efforts to eliminate these problems.

The volume of information continues to expand, along with standards, procedures and processes. Expansion requires increasing storage, control and administration. We also demand faster and faster access in order to share best practices and other information in real time. Job failures or problems, solutions, and lessons learned are no longer limited to the location of occurrence, because we make them known globally to customers in a matter of seconds. Rapid dissemination helps prevent problems from recurring, but it also increases our technology requirements.

These technology challenges must be met. Delivering the right data to the right people at the right time is fundamental to achieving the great improvements we expect in performance. Therefore, our processes for reporting, analyzing and interpreting data undergo continual improvement.

The Organizational Challenge. Our task was to establish the HMS across a massive global corporation that encompassed first six, and then eight different PSLs, along with eight company-wide support functions and the business development organization. These were organized geographically around changing business and market areas, each with its own independent requirements, service types and operational standards.

The challenge was to create a common platform, language, and standard approach to implementing and improving processes. Every segment of the company had to put aside differences, let go of their legacy systems, change their embedded practices and embrace new methods.

Today, all PSLs continue to improve the HMS under a single platform using the same fundamental tools. They also have the flexibility to develop certain non-standard tools that are more appropriate to their specific needs.

Nevertheless, the challenge continues. Rearranging the organizational and geographic structure of a company is an ongoing reality in today's world.

The Integration of Health, Safety, Environment, and Operational Standards and Controls

Historically, HSE and operations functions have had separate standards, processes and procedures. Now the customers, the company and the community demand a different mindset. New behaviors, approaches and standards are necessary to minimize risk and reduce impacts on people, the community and the environment. These must respond to all expectations in an integrated form. Segregation is no longer possible.

Besides integrating these factors internally, it is also necessary to incorporate external customer and regulatory requirements. For instance, ISO 9000, ISO 14000 and API standards must be incorporated seamlessly into all activities, including the training and development process.

In many cases, multiple HSE incidents and job operational failures can be traced to the same fundamental root causes. The CPI analysis shows that the system behaves the same way as the traditional HSE pyramid. A fatality is the tip of the iceberg. Underneath, there are tens of thousands of unsafe acts. In the same way, an operational "fatality," such as losing a well or a contract, comes after several thousand small, seemingly unimportant incidents.

RESULTS

Implementing the system has produced significant behavior changes and performance improvements. Processes that integrate service quality and HSE requirements are fundamental to meeting customers' and Halliburton's expectations. Today's operations personnel consider HSE part of their jobs.

The commitment and efforts of the Latin America operations, and the improvements that resulted, have been recognized with the President's award for safety and environmental excellence.

Two countries have achieved ISO 14001/OSHA certification; others are on the path for this certification and ISO 9001-2000. The certification has positively affected the whole system. It also serves as the basis for accelerating implementation in other locations and achieving certification in all standards.

In the arena of service quality, we have reduced customer dissatisfaction by 32 percent in 2003 alone. Feedback received from customers at the end of jobs is also showing a positive trend. The cost of poor quality has been reduced by almost 50 percent over the last three years.

The demand for education and training as we implement the system globally is enormous. The number of training hours in Brazil has almost tripled during the last three years.

Safety performance continues to improve measurably, year after year, in Latin America, as well as globally.

CONCLUSIONS

In order for a comprehensive management system such as the HMS to be implemented successfully, it is fundamentally important for users – and especially managers – to accept the new concepts and systems and to realize their value. Without this appreciation, the journey from adopting the concept through the stages of learning, using the system and reaping its advantages will be painful and inconsistent.

The importance of each users's appreciation for the management system was a lesson learned by the professionals responsible for quality in Latin America: no matter how good the system is and how much value it may bring, users must internalize that value to a certain extent before they can start using the system as designed. Therefore, the education and awareness process is key and should not be underestimated. The better the understanding, the faster the system can be implemented and results maximized.

The pace at which the culture and practices change to enable implementation of the system does not match the speed of deployment. Paradigm shifts, behavior and practices change at a speed that cannot be predicted by the system's drivers and designers.

Experience in Latin America demonstrated the speed of change in many cases. Managers and users accepted our new ways at different paces – some by conviction, some by seeing results, and some by pressure from top management. The speed of cultural change and adherence to the system varied across geographical areas, PSLs and departments within the organization.

Implementing a system such as HMS requires massive technology resources as well as a new set of skills and thinking. It takes a great effort to gather the incredible amount of data that is necessary. A few years ago, all information was noted on the tally book. Each job entailed one or two reports. Today, the number of records for a job may add up to six or seven pages. Transforming and integrating data into meaningful information, then analyzing and interpreting this information, is an area for ongoing improvement.

Improvement in management's planning, monitoring, and follow-up processes is key to maintaining focus. These improvements were evident in the strict, continuous monitoring process during the Brazil pilot. It applies to implementing the plan and improving performance results as well. In the past, managers tended to focus on a few financial indicators. Today, the number of indicators has grown along with the requirements; therefore, the monitoring and review processes have evolved to require greater efforts.

Despite these challenges, the proven rewards of the program are well worth the effort.

HALLIBURTON MANAGEMENT SYSTEM STRUCTURE

HMS Alignment

Leadership Commitment and Accountability
HES Business Practices Model
Mission
Vision
Policy Management
Alignment of Goals, Standards and Priorities

Planning

- Process
  - Quality Planning
  - Maintenance Planning
  - Reliability Planning
  - Developing Reliability Goals
- Contract Review
- Risk Management
- Risk Analysis
- Service and Product Design
  - Design Input, Output, Review, Validation
- Obtaining Material, Products and Services
  - Customer Property
- Performance Measures

Organize

- Organizational Structure
- Responsibilities
- Resources
- Management Representative
- Communication
- Document Issues, Control and Revision
- Training and Training Records
- Competence

Implement

- Process Documentation and Responsibility, Service Standards
- Receipt of Purchased material, Products and Services
- Preservation of Products and Material
- Maintenance Implementation

Monitor

- Obtain Feedback with EJCS and CPI
- Performance Measurement
- Inspection Activities
- Records
- Calibration for Accurate Measurements
- Service Identification and Traceability
- Nonconformity
- Internal Assessment /Audits

Review

- Corrective Action
- Design Improvement
- Assessment of Risk Reduction Measures

Management of Change

- Management Review
- Change Management
- Prevention / Improvement
- Model for Operation Improvement
- Managing Improvement Efforts

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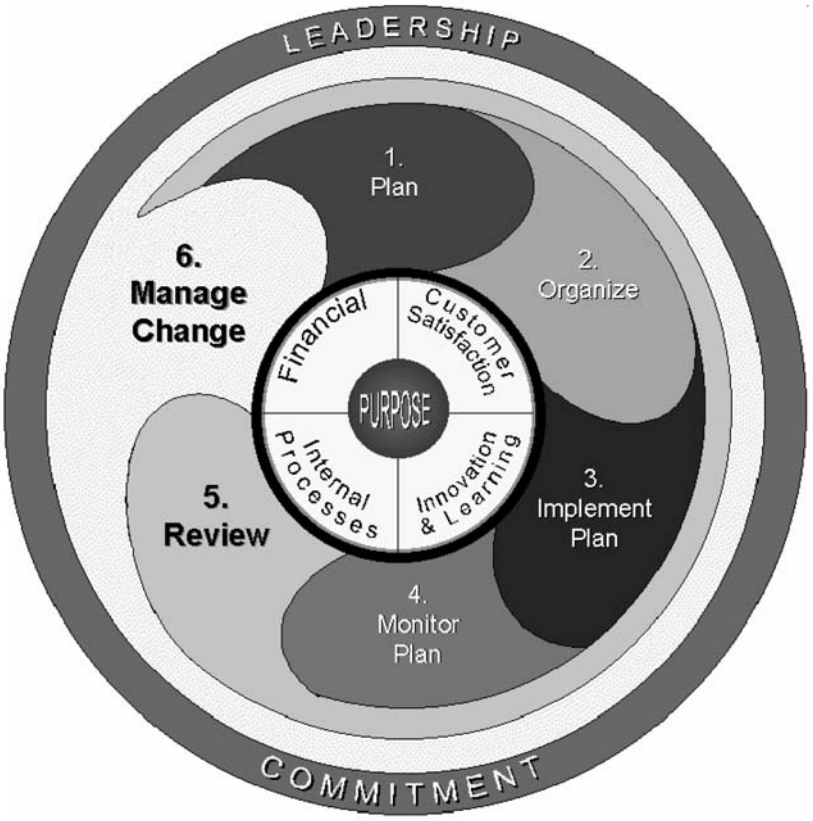

Fig. No. 1 HMS Model

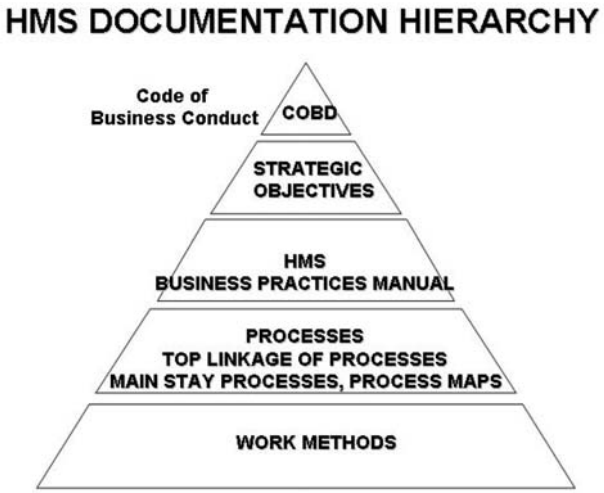

Fig. No. 2 HMS Documentation Structure

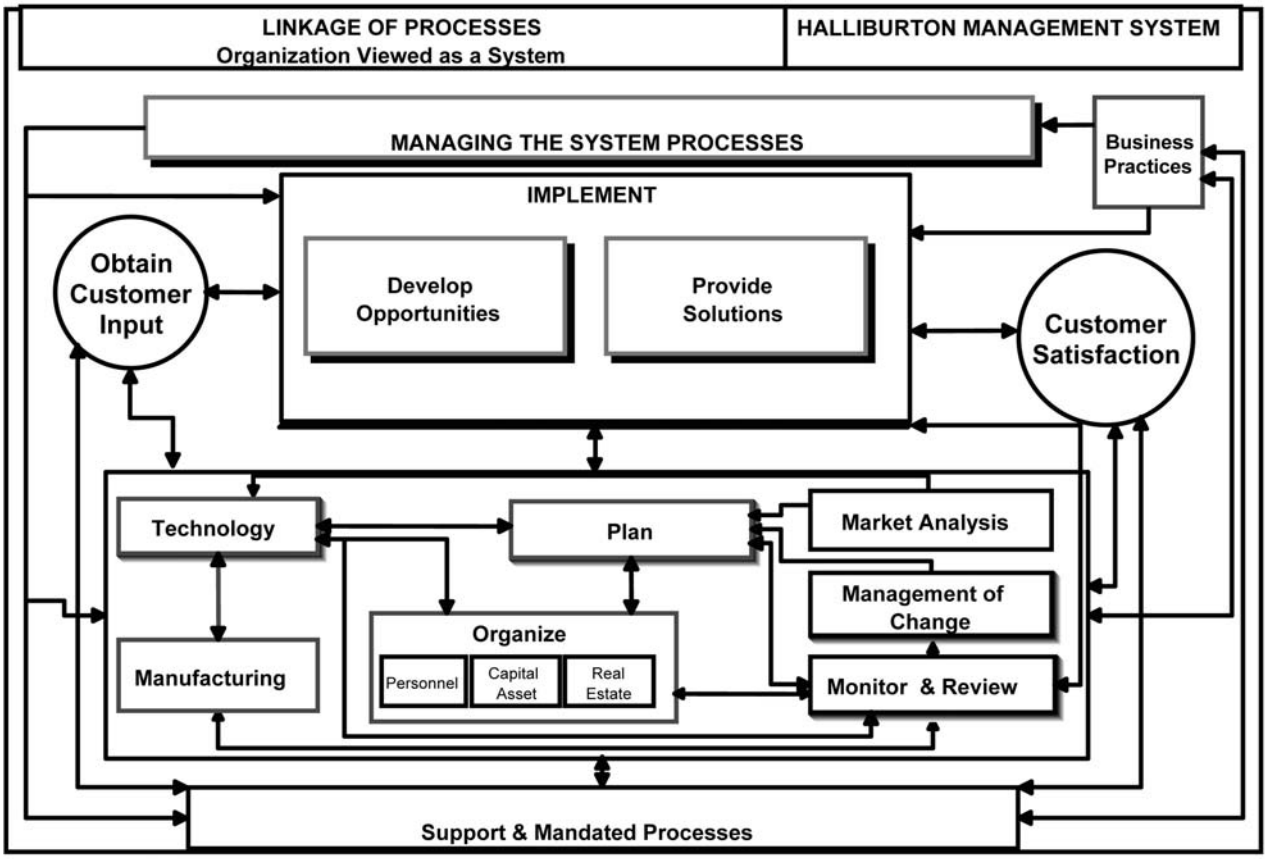

Fig.2 HMS Top Linkage of Process

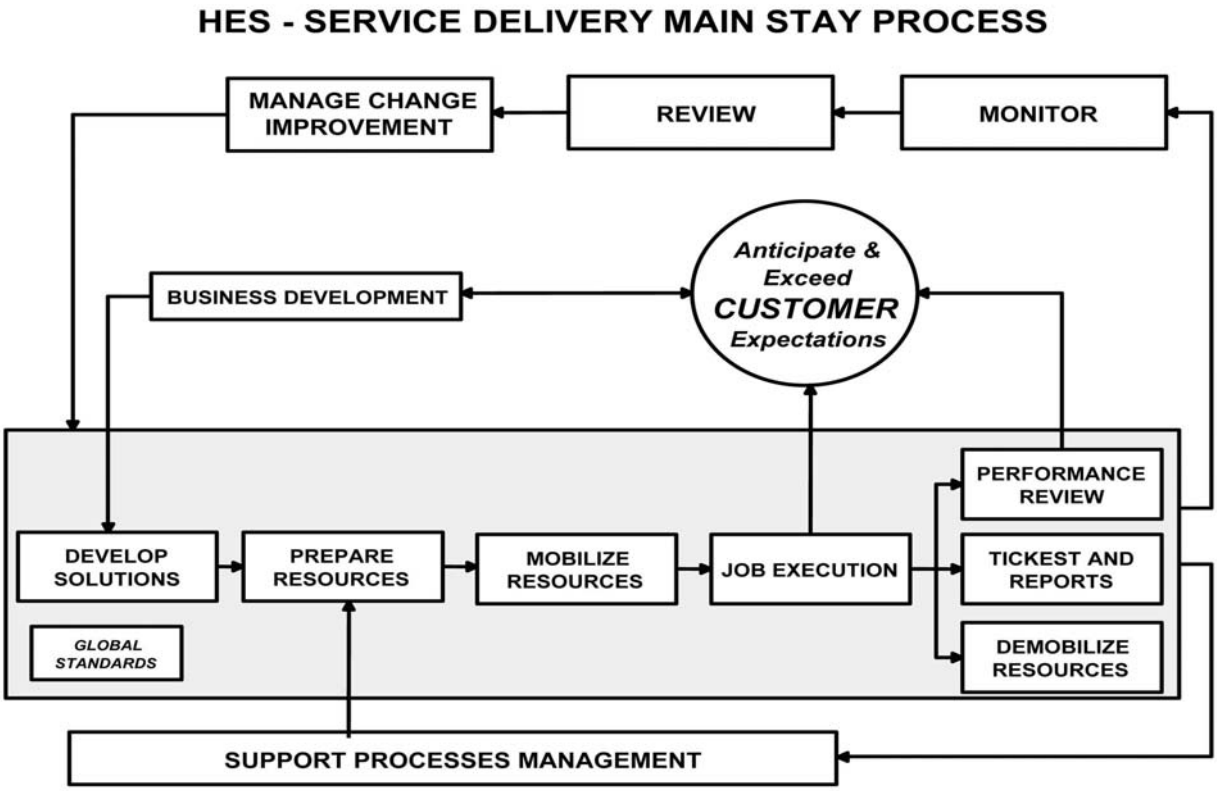

Fig. 3 Service Delivery Process

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