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Knowledge Management Improves Performance

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I want to give you my perspective, as the global leader of project controls and estimating for Fluor Corporation, of the knowledge management process adopted by Fluor Corporation and how it is successfully applied in the project controls and estimating arena.

I joined the company over 20 years ago as a senior cost engineer and today am responsible at a corporate level for implementing and delivering world class solutions, work processes, and techniques in the areas of project controls and estimating. My most recent assignment was to the K@W initiative, which was focused on the following elements.

- Design and implementation of an enterprise resource management system (SAP) to provide more timely, accurate, and transparent information.
- Design and implementation of a knowledge management system to better utilize our intellectual capital (this will be the element I will focus on during this presentation).
- Organizational change management to ensure the success of the above initiatives.

Today, we can clearly see how knowledge management will contribute to the viability and profitability of Fluor and our clients in the future—and we believe our capability to deliver knowledge based services is a competitive differentiator. In today's discussion I will talk about how we are transforming the company and how we have arrived at the point to enjoy some early success.

Fluor is America's largest public engineering, procurement, construction, maintenance, and related business services company, which procures over \$6 billion/year.

We maintain a network of offices in more than 25 countries and conduct activities in more than 60 countries on six continents to provide customers in global business and industrial markets with personal service. The company's international workforce of nearly 50,000 professional and craftworkers provides the capability to execute diverse scopes of work on projects both large and small, and the flexibility to staff projects in accordance with project needs.

Obviously, this capability makes our employees our most valuable asset. We have technical experts in dozens of fields, who not only deliver their expertise to clients but set new standards for the industry. In recent years, we've been collecting and leveraging that global knowledge through the use of what we call "knowledge communities," where we contain and share information about

clients, competitors, types of projects, or industry and technical expertise, to give you just a sampling. This enables us to truly function as a global company, not limited to telephone lines or fax machines. Knowledge management has become a strong part of our culture.

Another strong part of our culture and a symbol of pride is our safety record, which is more than 60 times better than the U.S. industry average, making us one of the world's safest contractors. We consistently set the safety standard for the U.S. construction industry.

WORLD PROJECTS

We served as the project manager of the new \$1.4 billion Aladdin Hotel and Resort in Las Vegas. The company was responsible for the project's overall design-build effort, managing up to 2,000 employees over a 28-month schedule, which was completed on time.

Fluor is leading a consortium to develop a more than \$1 billion crude oil upgrading project, known as the Hamaca crude upgrader project, in eastern Venezuela. Known as the largest hydrocarbon deposit in the world, the Hamaca project area is estimated to contain more than 30 billion barrels of extra-heavy oil.

We have total responsibility for a project that will provide a new integrated radio and transmission communications network for the London Underground subway system. We also were instrumental in a variety of financing vehicles on the \$2 billion connect project, including the landmark private funding initiative contract, the development of CityLink's 20-year concession contract, and in sourcing and arranging private capital to finance the project.

Fluor also served as the overall program manager and provided EPC services to double the capacity of Yanpet's petrochemicals complex in Saudi Arabia. Now complete, the complex is one of the largest, lowest-cost petrochemicals producers in the world.

In recent years, the company has successfully diversified its service offering to participate in the full life cycle of capital projects. It also is embracing opportunities created by the Internet and leveraging its core competencies into new ventures that deliver value for multiple stakeholder audiences.

To understand knowledge management we first need to define knowledge.

HOW IS THE COMPANY VIEWED IN THE GLOBAL MARKETPLACE?

Fortune magazine annually ranks us among the ten most admired engineering and construction companies in the world.

- Financial soundness.
- Use of corporate assets.
- Global business acumen.
- Creative solutions.
- Long-term investment value.

Engineering News-Record, the leading industry magazine, consistently ranks us among the top three international design firms and international contractors. The Lotus Beacon Award judged our knowledge management solution, Knowledge OnLine, best in the “Greatest Business Impact” category. We were named a “Top Ten Innovator” by **InfoWorld** magazine. All of these accolades have improved employees’ morale and confidence. This strategy has improved our bottom line, and more importantly, improved our customer’s bottom line.

SO, WHAT IS KNOWLEDGE?

Knowledge is created by increased human input applied to raw data to transform them into information and then knowledge. With additional human input this is further transformed into expertise and finally into wisdom.

Let’s take an estimate as an example to illustrate how raw data are transformed to become information and then knowledge through increased human input.

When we prepare an estimate we require lots of data to complete the task, scope, plot layout, quantities, rates, specs and standards, etc. These data by themselves are meaningless.

When we interpret the data to suit a particular set of circumstances and apply the rates to the quantities to produce the estimate, it becomes information.

If we now add the basis of estimate, assumptions, and exclusions, we transform the information into knowledge.

We then take the base estimate and apply our expertise to assess the risks and determine the appropriate location factors, contingency, escalation, etc. based on our experience to determine our best commercial offering.

We then compare the new estimate to historical data for like plants and confirm the validity of the offering. We apply the knowledge we have gained of the client’s requirements, competitor information and prevailing market conditions. This reapplication of knowledge is how we gain wisdom.

SYMPTOMS OF AN ORGANIZATION IN NEED OF KNOWLEDGE MANAGEMENT

So why did we adopt knowledge management? Even before knowledge management became an “in vogue” consultant offering, we knew that the power of people sharing knowledge results in value to our clients. Being engineers, for years we have

employed different “tools” to help leverage our knowledge—to some success. The problem?

- Discipline groups worked in silos, not sharing information.
- Being globally dispersed resulted in numerous redundant solutions—reinventing the wheel.
- We never truly leveraged the power of the collaboration globally.

To compound the problem, any captured knowledge existed in “disjointed systems.” It was not sponsored and stewarded. We never knew what the best knowledge was, when it was last updated, if it were still relevant, and how we could leverage it to get the best results for our clients and the highest margins for our shareholders.

Further, the late 1990s were hard years for the EPCM business. Increased commoditization of engineering services forced our margins lower. There were layoffs. The knowledge of 20 and 30-year lead engineers was walking out the door. What could help sustain Fluor in this cyclical marketplace, in bad times, as well as strengthen our foundation when the good times came back around? We needed to leverage our expertise globally.

Sound familiar?

EXECUTION EXCELLENCE— PULLING IT ALL TOGETHER

So, after a series of studies done by both internal groups and external consultants, we came up with the following goals.

- Leveraging our collective knowledge to create value for our clients, our company, and our shareholders.
- Increasing the company’s knowledge base as a means to achieve organizational effectiveness.
- Fostering opportunities to repackage our corporation’s intellectual capital into new products or services with high client perceived value.
- Unlocking the latent talent, creative solutions, and capabilities to compete and create a sustainable competitive advantage.

The best way to meet these goals was to implement a company-wide knowledge management program. In mid-1999 we did just that.

KNOWLEDGE MANAGEMENT: LEVERAGING PEOPLE AND EXPERTISE

We embarked on a process of engaging our workforce in realizing the power of knowledge and of understanding that the sharing of our expertise made the company stronger than our individual contribution. We encouraged and rewarded knowledge sharing behaviors and addressed the cultural changes required to change from “knowledge is power” to “knowledge sharing and reuse is the key to success.”

The ready availability of information around the globe 24 hours a day 365 days a year has led to faster problem-solving and greater responsiveness to our clients.

We have been able to disseminate best practices to our less mature offices and new acquisitions in a much faster and effective manner.

This has enabled us to increase our opportunities for innovation and leverage our collective intellectual capital.

KNOWLEDGE MANAGEMENT

Fluor's total implementation of KM has transformed the company through improving our ability to attract, train, develop, and retain new employees, bringing them up to high levels of technical and business competencies much earlier in their careers. KM is now integrated into our recruitment brochures and is a part of new employee orientation. Our people development programs have been expanded to better recognize expertise, knowledge sharing, and collaboration behaviors.

We have also turned one company's junk into another's treasure. A maintenance client was trying to stretch their 30-year-old control system for another 15 years of service. The original vendor of the parts was no longer in existence, and getting the system repaired was extremely difficult. The client asked us for help. The manager visited the control systems community forum and asked for advice. The result surfaced within 24 hours: a contact at another client power station that was in the process of replacing this type of control system with one of more modern design. The client was happy to sell off the old equipment. The resume of one of the original engineers who built/maintained the instruments, and who was looking for work was discovered.

This is just one example of the benefits that are a direct result of active participation in the knowledge-sharing experience:

- increased collaboration and improved access to lessons learned enabled by the knowledge-sharing environment;
- improved ability to design-to-market by leveraging our experts, their expertise, and resources;
- enabling access and reuse of design principles and best practices on projects around the world; and
- increased technology and innovation competency.

Knowledge management work processes, tools, infrastructure, and support systems have already provided an increased ability to identify, pursue, and execute complex projects globally, and apply the best engineering and design practices to clients we serve across the world. Having instant access to the corporation's experience and technical expertise, our members provide clients with improved, more robust designs, increased speed to completion, higher capital effectiveness, and technology innovation. Even with the success we have achieved and the momentum we are building, we know we are merely at the beginning of what is possible when full cultural transformation is complete.

WHAT IS KNOWLEDGE ONLINE?

At this point I need to emphasize that Knowledge OnLine and knowledge management are not synonymous. KM is the process, KOL is the tool that supports this process. KM is not about the tool, it is about work processes and the leverage of our people and knowledge.

We have used our Knowledge OnLine tool to harness historical databases of explicit knowledge housed in barely managed, scattered, and noncategorized databases into a single-source knowledge base of consistently tagged, intentionally managed knowledge that is easily retrieved and globally applied.

SO WHAT'S IN IT FOR EMPLOYEES?

The sharing of our collective knowledge, best practices, and experiences has enabled our employees to perform their jobs more effectively. They now have access, via the communities, to global experts with many years of specialist experience. This enables them to develop their skills much more quickly and helps them fulfill their long term ambitions.

They no longer have to know who the expert is and where he resides or whether the office is open; they simply post their questions in the community and quickly get the response they need.

It has also helped bridge the gap between the many diverse cultures within the corporation and improved collaboration and dialogue with geographical dispersed peers.

An additional benefit has been the provision of a framework for recognizing and rewarding individual capabilities and contributions.

SO WHAT'S IN IT FOR US?

A knowledge-sharing environment is leveraging the collective knowledge of its members, enabling us to

- enhance the skill sets of all members;
- provide optimal solutions to our clients;
- accelerate the pace of innovation;
- improve our overall business performance; and
- deliver value to our shareholders.

WHERE ARE WE GOING IN THE WORLD OF PROJECT CONTROLS AND ESTIMATING?

We believe that by shifting our emphasis from just "doing things right" to "doing the right things" we can also transform our employees from being simply project controllers or estimators into being true project controls or estimating leaders.

We see the potential for a huge delta increase in value through significant savings and efficiency within these new entrepreneurial categories.

HOW KNOWLEDGE MANAGEMENT IS APPLIED IN PROJECT CONTROLS AND ESTIMATING

Knowledge management has enabled us to provide a “one stop shop” for all of our project controls and estimating needs. We have been able to bring together our best practices, procedures, and go-byes into one consolidated database readily accessible to all employees throughout the world.

It is also a good collaboration tool. We have been able to communicate our problems in one region and seek responses from experts wherever they reside.

We have been able to improve the management and development of our employees and create and monitor career paths and identify training requirements. We have also created a personnel roster to track our global resources to know and leverage our expertise to provide the right resources to support our projects in a timely manner.

We have also identified several success stories where the use of the knowledge management process has enabled us to save time and therefore money for ourselves and our clients. The sharing of our experience with our clients and competitors in each region has also assisted us in producing professional and competitive bids.

The availability of information has helped us educate new employees in our work processes and practices and bring them up to speed quickly. It also helps us get a quick start on our projects.

LEVERAGING PROJECT CONTROLS AND ESTIMATING KNOWLEDGE AND EXPERTISE

Obviously, with any initiative such as this we need a formal process and assigned responsibilities to ensure that the information in the communities is meaningful, useful, and kept up to date.

This is achieved by appointing knowledge community managers who are accountable for the knowledge content and for stewarding the process.

In addition to this we have identified our experts in all of the project controls and estimating techniques. We have identified subject matter experts (SME) for each of our work processes who have become the owners of the process and responsible for the integrity of the knowledge and for ensuring that the forum topics are directed to the appropriate expert for response.

A measure of our success is the global reach of the membership. In the project controls and estimating knowledge communities we have a total active membership of 2,200. Of these, 1,000 of the members are in the project controls and estimating disciplines. All of our SBUs, offices, and countries where we have a presence are well represented, in addition to many of our jobsites.

PROJECT CONTROLS COMMUNITY HOME PAGE: JUST ONE OF 38 THRIVING COMMUNITIES

Now let's take a look at the home page for the project controls knowledge community. On the left are the search and navigation menus. On the right is the quick access to the most frequently used sections of the community. Across the top are the tabs that contain the various types of knowledge, the submission process, and the “my space” and administration tabs. These sections of the homepage are in a common format regardless of the community.

The center section of the home page is free form and is at the discretion of the particular community managers to use their creative talents to make the home page attractive.

Of particular interest is the “my space,” which is used to contain a personal profile of the user, which is then accessible to other members of the community. This contains contact numbers and address, a summary of the member's expertise and experience, and the list of communities to which the member belongs.

All of the information is accessible to all members unless a community wants to protect sensitive information and restrict it to certain groups by means of password protection.

Access to the administration tasks restricted to knowledge managers and the community leaders and is used for statistics on the use of the community. This helps to measure the success of the community and track activity. It also tracks membership statistics and engagement by SBU, office, or region.

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