

Real-Time Project Enterprise Management in the Energy Business

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The energy industry is a capital projects intensive industry, and the success or failure of any firm depends on how well the company manages its capital projects. Hundreds of billions of dollars are spent on capital projects, yet they display consistent characteristics.

- Margins are razor thin, with very little room for error.
- Most projects are late and over budget.
- The hand-off to the operations and maintenance phase is seldom smooth.

Energy companies conceive and finance these projects, which major contractors engineer and construct. A major exploration and production project will involve a joint venture of multiple owners, including national and major oil companies working with 10 to 20 contractors from about as many as 10 countries from five continents. It is surprising that interaction is even possible under these circumstances. No wonder that cycle time and time to first cash are such big challenges.

Interaction costs are the costs of people and companies interacting to develop the specifications, design, plans, and installation. Interaction means finding it, keeping it, using it, communicating it, and—most importantly—deciding on it. The “it” is all knowledge associated with an individual’s or a firm’s responsibility.

Interaction costs pervade all industries. They account for 51% of total costs in the U.S. economy.¹ The average for one U.S. electric utility business is about 58%. For the petroleum industry, interaction costs may account for over 70% of the total capital expenditure.

There are huge opportunities in addressing these interaction costs and reducing the time to completion of these projects. Owners, producers, contractors, and engineering/construction firms have eked out competitive advantages from economies of scale and economies of scope, but “economies of knowledge”² still elude them.

While current methods of managing projects can deliver marginal improvements, new technologies can deliver magnitude-scale improvements. Fundamental to delivering these huge savings is the use of a Contextual Communications Platform™ (CCP) that enables real-time, cross-enterprise collaboration and consultation for faster and better decision making.

The Importance of Context

The nature of a project is such that decisions have to be distributed. Unlike the manufacturing industry, project decisions are distributed along the project organization that tends to reflect the architecture of the project.

A project has multiple contexts that define it. The contractual context is a structured system of contracts and agreements that define how each company is obliged to perform. The technical context is defined in terms of a hierarchy, or structure, of technical specifications including design and performance details.

The construction context is a structured organization of the scope of work that each participating company is obliged to perform according to the contracts to meet the technical objectives. A work breakdown structure may represent the project management context, or perspective. There is a multitude of other smaller contexts embedded within these contexts.

If represented on a sheet of paper, contexts will look like a company organization chart, or an inverted tree. They are hierarchical, and they follow the axiom that subordinate contexts inherit the properties of the parent.

Contexts are very important in determining the interaction and its costs. The design of the context for every aspect of a project such as contracts, technical, scope of work, and work breakdown directly define the way the project is structured and executed. Every point in this context “tree” is a decision point. Someone somewhere in one of those dozen countries will make decisions at each of these decision points.

Every decision point in turn requires consultation with people and reference to previous best practices and knowledge, which are meaningless without context. A CCP is needed for project staff to make real-time decisions across project organizations.

The Contextual Communications Platform

The project environment needs a multilayered bus that carries data, information, knowledge, and wisdom behind decisions among cross-organizational project participants.

Most firms working on projects use people-network systems for consultative decision making. Many use collaborative methods that communicate just data and information. However, both are inadequate to deliver major savings in time and money without compromising on quality.

There is little reuse of knowledge and “lessons learned” because a critical element, “the context,” has been missing from existing methods of recording them. The wisdom of decisions is based on multiple streams of knowledge, information, and data, all brought together by a context to create taxonomy for a delivered asset.

The telecommunications industry uses a bus that has many layers to transmit voice, video, and data over the infrastructure. However, in project environments, communications needs are far greater.

What is needed for projects is a project bus that includes data, information, and a contextual knowledge layer, connecting all participating enterprises for real-time, consultative decision making. **Fig. 1** depicts the project communications bus.

The Project Communications Bus

This project communications platform (or bus) includes data, information, knowledge, and the wisdom behind decisions. These are made available on a need-to-know basis, in real time, to all members of participating organizations—owners, contractors, and vendors.

Scattered project resources like people, knowledge, and vendor organizations are harnessed by the project communications platform. This is enabled by a contextual communications engine that gives every team member access to all project information on a need-to-know basis in real time.

Additionally, the project communications platform helps in creating a knowledge base for every project, so that project knowledge, data, and information, and the wisdom behind decisions, can be used in production operations and reused in whole or part in new projects.

Importantly, the project communications platform enables globally dispersed organizations to create dynamic, virtual project enterprises with their inherent advantages.

An Example of Contextual Communications

A simple example of the benefits of contextual communications is the automatic sorting, filing, storage, and easy retrieval of voluminous e-mails. Project employees are inundated with person-to-person e-mails coming into a personal account, which need to be forwarded and filed into an appropriate business context. Such tools are so commonly and frequently used in today's work environment that they are actually a significant contributor to information and work overload.³

This is partly due to the volume of e-mail messages, and partly due to the fact that e-mails are not automatically filed according to context (**Fig. 2**). The fact that multiple contexts and subjects may be buried within the e-mail only complicates matters further. Information in the e-mails is not readily available when working on a business decision. Context switching is a very expensive and wasteful exercise, and it forces each e-mail recipient to maintain separate filing systems (folders) simply to keep track of communications.

Contextual communications overcomes the deficiencies of peer-to-peer communications (**Fig. 3**). Employees work, communicate, and respond from within a business context where the business context is the container for all data, information, and past decisions. In the CCP, all communications are automatically sorted by context, filed, and available to anyone who has access to work on a specific business decision or context.

The Project Enterprise

Project enterprises⁴ are temporary economic business entities that come together to conceive, design, construct, and manage complex custom projects. Such entities are fluid, highly networked, goal-driven, self-organizing systems consisting of

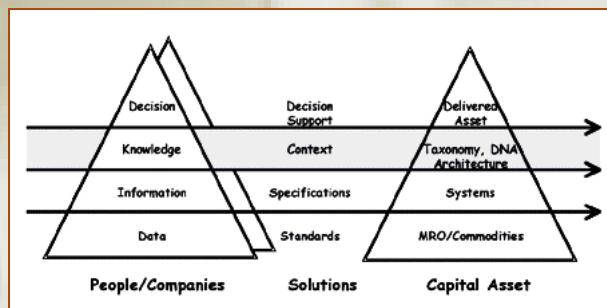


Fig. 1—The Project Communication Bus

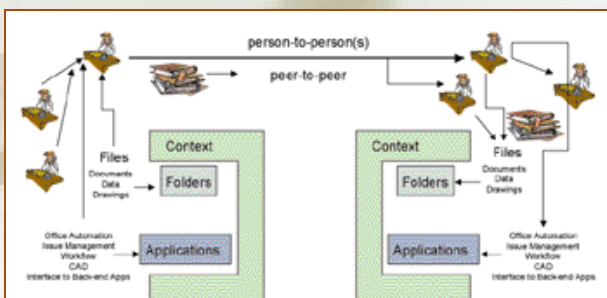


Fig. 2—Business Communications Today
Peer-to-Peer

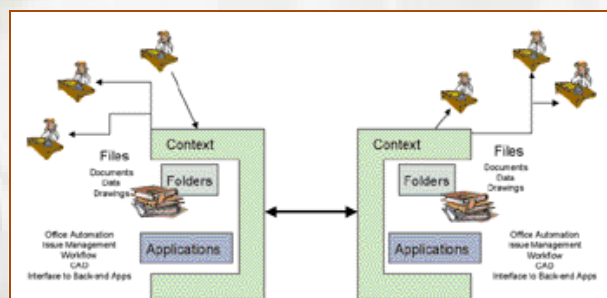


Fig. 3—Context-to-Context Communications

Attribute	Traditional Project Management	Project Enterprise Management
Organization	Internal and local	External, cross-organizational and distributed
Participants	Relatively uniform teams	Diverse teams driven by needs of the phase within the project life cycle
Orientation	Tasks and processes	Deliverables and results
Focus	Planning, scheduling and cost controls	Organizational interactions and knowledge management
Scope plans	Fixed, but subject to frequent scope revisions	Fluid, with the recognition that requirements evolve over time
Collaboration	Sequential depending on organizational structure	Contextual and real-time
Business structure	Self-sufficient and isolated	Interdependent and integrated
Change attitude	Resistant	Recognized
Decision making	Single project leader	Distributed leadership
Execution speed	Low to moderate	High

Table 1—Traditional Project Management vs. Project-Enterprise Management

multiple players—collaborating corporations, their employees, or free agents.

Table 1 summarizes the differences between traditional project management and project-enterprise management.

Currently, participating companies manage phases within the overall life cycle as a series of independent (external or internal) projects. This often results in increased delays with associated cost implications because information generated in one or more independent projects must be reworked for use elsewhere. Considerable effort is required simply to communicate information across inter- and intraorganizational boundaries in a manner that preserves relevant context.

Further, effective risk management is hampered because identified risks may be buried in documents generated within an isolated project. Alternately, risks may be propagated across the landscape of participating companies in such a manner that appropriate mitigation strategies are developed without a full understanding of implications across the enterprise.

Additionally, many companies do not effectively use knowledge gained during various projects because organizational learning and knowledge is scattered, isolated, incomplete, and/or unstructured. Finally, evolving requirements demand continual attention to scope management with contractual implications across multiple projects that are independently managed.

All of these issues can be addressed effectively only if key project stakeholders move beyond a focus on individual projects and adopt a more holistic, encompassing systems view (i.e., the project enterprise). Adoption of this view requires a focus on managing organizational interactions and the development of a structured knowledge base that has increasing value as the enterprise evolves into operations and over the long term as a strategic tool for future enterprises.

Benefits of Project Enterprise Management

A project enterprise management solution (PEMS) has dramatic impact at the user level and the corporate level from concept to commissioning to ongoing operations and maintenance. The underpinning of such a solution will be on solving some very fundamental issues and “pains” for employees at the user level and to make them more productive to deliver benefits to the corporation.

BENEFITS TO USERS

Managing an Avalanche of E-mails and Messages

Users typically receive thousands of e-mails during the course of a project. Managing them for future use is a major nightmare. Contextual communications takes away the user's aggravation of figuring out the context of every e-mail sent or received and determining the exact file to store it in for future retrieval. The same is true of conferencing, too.

Additionally, every e-mail or message received in a project-enterprise environment is placed alongside all the pertinent information—such as specifications, drawings, data sheets, tables, documents, and many more pieces of information associated with that context. Similarly, when working on a context, all the messages and past communications are available along with the data sheets, documents, drawings, and project specific data such as cost, schedule, risks, and issues.

Knowledge at Fingertips

At the user level, data, specifications, data sheets, drawings, and all information related to every detail of the project are tied to the project detail and are at the user's fingertips. They are not distributed in many different computer platforms and software packages, but are a few button clicks away. There is no rekeying of information from one computing platform to another.

A dramatic improvement will be the way legacy projects are reused and modified. Access to these, too, is through a few button clicks. When an older project is imported, all contextual information associated with each detailed element of that project comes into the current environment. Again, the user is not scampering around looking for data and information. This solution goes along to fulfill the “create once, use often” philosophies that are prevalent at all firms.

Additionally, when projects are completed, and the production enterprise is ready to go online, operations and maintenance personnel find the initial stages fraught with misinformation. This solution makes this transition quite painless because all project information from every stage is captured, easily accessed, and interpreted to the minutest detail.

Work on Multiple Projects

Many members of a project enterprise are simultaneously involved in several virtual project management teams, each addressing different projects. Their role in each of these virtual teams may vary significantly due to the idiosyncrasies of each project and the evolution of their responsibilities as each project moves through its various phases toward completion.

One major hurdle for any potential project team member is that he must usually come up to speed on the particulars of that specific project (charge his own internal “data bank”) before he can be effective as a member of a particular project management

team. Moreover, he must continually update (or recharge) his own internal “data bank” in order to remain effective as the project progresses and evolves.

For most people, this need to update information and maintain their internal “data bank” is a significant barrier to a multitasking project-enterprise approach. The PEMS facilitates the access of information, describing the current status of any project such that an individual does not have to attempt to retain the same amount of data or information to be an effective team member as he normally would have to do.

This is analogous to the difference between the use of minimally configured computers as terminals (same as members of a virtual project management team in a project enterprise) to interface with a computer system; in this case, the terminal computers store and retain very little of the data that they handle. Compare this to a distributed computing system where the central computer dishes out information to fully functional computers (members of a traditional project management team), which are designed to store and retain all of the information that they require to operate.

BENEFITS TO CORPORATIONS

A PEMS can deliver very compelling benefits to corporations such as shortening cycle times; reducing project costs; harnessing global project resources; creating project knowledge base; superior estimation, budgeting, and control; and better risk and issue management. Each one of these in isolation can deliver major financial benefits to a firm.

Harness Dispersed Global Resources

The absolute size of energy companies and contractors has dropped over the past few years under the pressure of competition and market expectations. At the same time, the average level of experience has also diminished due to retirements, forced and unforced. There are fewer people overall to manage projects, and those who are still there are substantially younger and less experienced.

The seasoned “experienced” personnel that typically anchor such organizations are fewer. The PEMS allows the “experienced” to be more efficient and therefore cover more projects. It allows leveraging the capabilities of their better people by enabling them to cover more ground more effectively. As well, it helps the younger, less experienced people move up the learning curve more quickly toward an acceptable level of coverage and oversight on projects.

Moreover, there is a short supply of resources in North America and Europe. It is now commonplace for a major European oil company to enter into a joint venture with a national oil company in Africa and construct a multibillion dollar project using two to four prime contractors from the U.S.A., Europe, and Korea.

It is common for these prime contractors to subcontract the detail-engineering effort to back-office services from India, Philippines, or eastern Europe and employ installation contractors and vendors from other parts of the world. Connecting all these partners to create project enterprises is central to the design of this solution.

The Project Enterprise Management Solution

Global resources, irrespective of where they work, need to blend into the work stream fast. The corporate project knowledge becomes an excellent source for fast-paced training without significant time spent on orientation and training on best practices.

An additional impact is on organizations whose employees are “mobility-strapped.” Some may not have the inclination to be relocated and disrupt their families, while others may not have the resources to relocate. PEMS reduces the need to mobilize the work force and to disperse it globally.

Superior Project Estimation, Budgeting, and Control

PEMS has application during each phase of a project, during the front-end development as well as execution of a project. Estimation and budgeting tools that are an integral part of the PEMS help maintain continuity in assumptions, costs, and expenditures in all phases of a project—concept, execution, operation, and maintenance—through every iteration of negotiations, and with multiple payment methodologies.

Better Risk and Issue Management

There is a multitude of risks in a project enterprise, and any one of these can torpedo the financial results of a project in the short term and the long term. These risks are not restricted to technology alone but also to financial, economic, contractual, coordination, environmental, governmental, and labor issues.

In the current document-centric environment, these risks burgeon and swell in their severity with changes during the course of the project and operations. Moreover, lessons learned from legacy projects are lost in an ocean of paper or trapped in the minds of employees who resolved them.

Identification and mitigation of risks and issues are critical dimensions of effective project management. A number of tools are available to identify risks and issues in traditional project management offerings. However, these tools are either not integrated into a common management platform or provide only a document-based approach for identifying risks and issues. In both instances, there is little connection with the context of the work element for the identified risk.

The PEMS has the inherent capability to highlight risks for every project element and associate several dimensions to it. These dimensions include the probability of the risk, severity of risk, methods and effectiveness of mitigation, status (resolved or unresolved), assignment of responsibility, and an associated risk value.

Creating visibility of risks and their financial implications are important control mechanisms to keep the project on course to its completion and during operations. The created knowledge is also available in the future during production operations and new projects. They then become part of the firm’s best practices, empowering the user during early stages of a project.

Issues and actionable items rising from each review are handled in the same way as risk.

Superior Knowledge Management

At the corporate level, over the course of time, the benefits of learning can be dramatic. Knowledge is accumulated in several

ways—across the phases of a single project and from one project to others in the companies' universe. This accumulated knowledge, combined with the contextual search engine and other information technologies, creates the framework for a user-friendly, global corporate-knowledge base. This knowledge base also can be used to redirect and optimize project processes and resources throughout the value chain.

In his white paper "The Virtual Oil Company: The Capstone of Integration," Robert Peebler calls it "economies of knowledge." He writes, "Sheer size and 'economies of scale' will no longer ensure competitiveness, as they did in the industrial age. Only those corporations that achieve 'economies of knowledge'—regardless of size—will be able to compete effectively in the information age. In other words, the core competencies of such organizations will depend directly on the knowledge that resides in the heads of their interconnected people and their ability to capture that knowledge in dynamic information systems." Elsewhere he states, "As energy companies begin to capture this type of knowledge more routinely, individual learning curves and project cycle times will shorten dramatically."

Dramatically Reduce Costs

PEMS, with its contextual collaboration engine, has the potential to reduce interaction costs dramatically. It will help create new ways to organize project teams, partners, and communication with a shift towards networked forms of business.

The main benefit in the impact of this technology is that employees can do their jobs in less than half of the time they currently spend.¹ Intermediaries' traditional role of helping buyers and suppliers "search and communicate" will greatly diminish, yielding further savings to participants in the project enterprise.

Improve Project Processes

Besides learning improvement processes, the inherent capability of the data-centric foundation to create concurrent processes is another benefit from a corporate productivity perspective. In the engineering industry at the outset, data liquidity exists when it is put into a medium such as documents and e-mails.

It is analogous to an engineer getting a spreadsheet via e-mail and a fax of the same spreadsheet. One can work on the former, go into details, and add to it. With a fax, the engineer has to assume and interpret in isolation. Additionally, when you trap data in a medium, you freeze it. When you add documents on top, you create a glacier-sized volume of documents that move very slowly through project enterprises.

In a data-centric world, producers and contractors work concurrently with "information-in-progress" rather than waiting on documents to be completed. Drawing analogies from the manufacturing sector, the contribution of concurrent project processes and workflow can be significant.

Reuse of Legacy Projects

Inherent in the design is the ability to use all or part of legacy projects to improve processes and reduce cycle time. "Create once, use often" is the creed of many organizations, and this solution enables implementation of this philosophy.

Data-centricity also allows capital projects to leverage e-marketplaces. At present, catalogued parts and some standardized project components flow through Web-based portals. The flow of projects through these portals increases the universe of suppliers and reduces costs.

Similarly, the concept of lean manufacturing can be replicated with modifications. Collaboration between owners and contractors on engineering, procurement, construction, and delivery issues presets benefits for the short term. However, a larger picture is to combine forces to pursue a common enemy—waste in the entire system. PEMS enables owners and suppliers to work on the same side of the transactional fence focused on drastically reducing waste.

The aggregate profitability of the oil company sector is about 7%, and that of the service sector is about 4%.² The real enemy is the 89% of costs of the combined sectors.

Digital Project Archives

The life span of a project is not measured in months or years but in decades. The PEMS, when used from the concept stage, has the potential to be the repository of all project information and knowledge for multiple generations of the plant or facility. The advantages to a corporation are immeasurable.

Customer Adoption

PointCross has deployed a smart, rapidly deployable PEMS—an Internet-based suite of integrated business applications explicitly designed to meet the requirements of a project enterprise. These applications allow participants (owners, contractors, and vendors) to collaborate and consult, in real time, by the use of a clear, logically structured data-centric environment that is tied with integration pathways into existing information infrastructures.

Market leaders, including several Fortune 100 energy companies, have already embarked on initiatives to garner the value of this technology to the ultimate benefit of their shareholders and stakeholders.

The old model of managing "just projects" is on the verge of giving way to managing projects within the context of the project enterprise, to enable real-time, consultative decision making.

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