Real-Time Project Enterprise Management

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Summary

Trillions of dollars are spent each year on projects. Yet, whether constructing an offshore platform or a manufacturing plant or developing software, almost all projects are characterized by cost inefficiencies and delays. These are due to slow and error-prone decision making. The virtual "project enterprise" is fragmented organism, held together by a loose coalition of tens, hundreds (if not more) of companies that come together for the duration of a project. Today, there are no geographic boundaries to participating in "project enterprises".

Unlike production enterprises, project enterprises are unique in their decision-making process, which is distributed across multiple organizations around the world, and at multiple layers.

What is sorely lacking is a solution that enables <u>all</u> members, of <u>all</u> project organizations, at <u>all</u> layers, to access and communicate <u>all</u> relevant data, information, <u>and</u> knowledge in real-time, for faster and better decisions.

To improve project cycle time and costs, without compromising on quality, the industry needs a practical Contextual Communications Platform that enables real-time, cross-enterprise collaboration and consultation, for faster and better decision-making, distributed across the Project Enterprise- owners, producers, partners, contractors, and vendors.

Some major US and European Energy companies, and Information Technology firms have already embarked on initiatives to garner the value of this technology, to the ultimate benefit of their shareholders and stakeholders.

Introduction

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 & 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 ten to twenty contractors, from about as many as ten countries from five continents. It is surprising that interaction is even possible under these circumstances. No wonder, cycle time and time to first cash are such a big challenges.

Interaction costs are the cost 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 US economy[1]. The average for one US electric utility business is about 58%. For the petroleum industry, they 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 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 in a sheet a 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 contextual communications platform is needed for project staff to make real-time decisions across project organizations.

The Contextual Communications Platform

The project environment needs a multi-layered bus that carries data, information, knowledge, and wisdom behind decisions among cross-organizational project participants
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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 (or DNA) 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. Figure 1 depicts the Project Communications Bus.

The Project Communications Bus

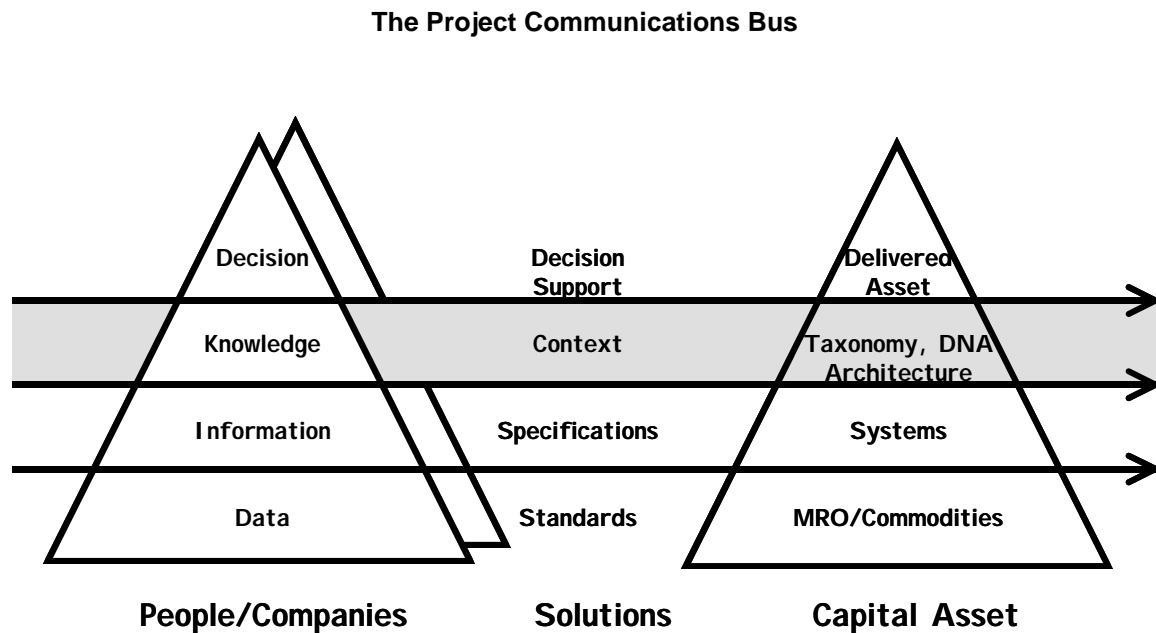| People/Companies	Solutions	Capital Asset
Decision	Decision Support	Delivered Asset
Knowledge	Context	Taxonomy, DNA Architecture
Information	Specifications	Systems
Data	Standards	MRO/Commodities

Figure 1

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 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 KnowledgeBase 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 emails. Project employees are inundated with person-to-person emails 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 (Figure 2). The fact that multiple contexts and subjects may be buried within the e-mail only complicates matters further. Information in the emails is not readily available when working on a business decision. Context switching is a very expensive and wasteful exercise, and forces each e-mail recipient to maintain separate filing systems (folders) simply to keep track of communications.
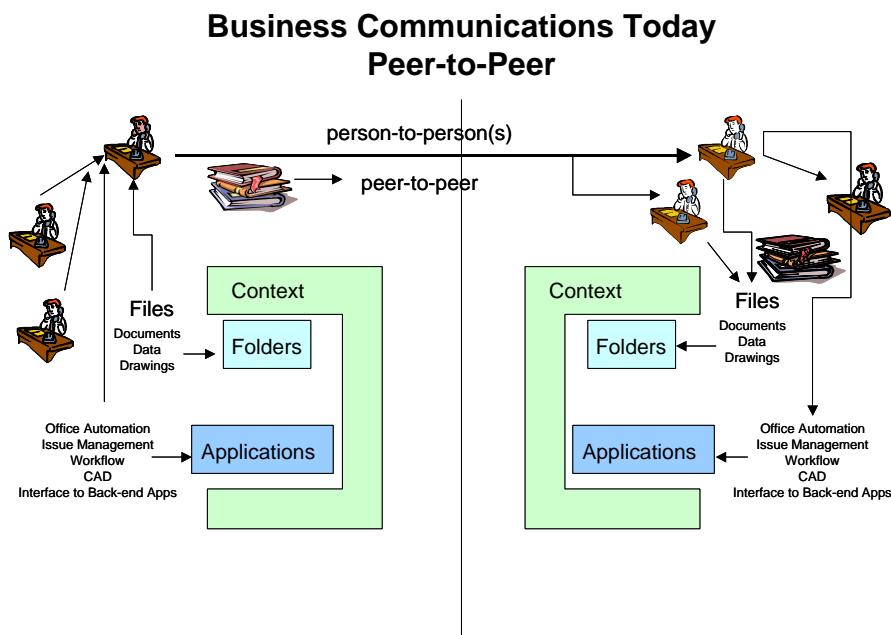

Figure 2- Peer-to-Peer Communications

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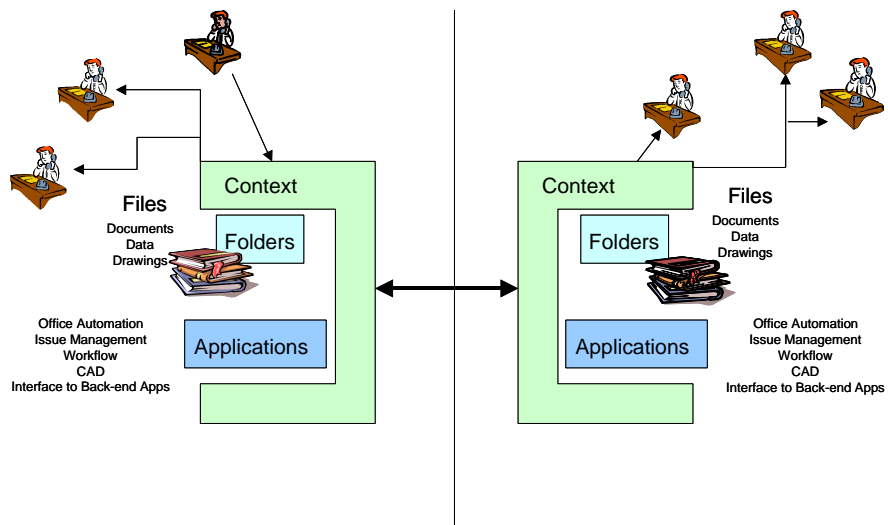
Context-to-Context Communications

Figure 3- Context-to-Context Communications

The Project Enterprise[4]

Project Enterprises 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 multiple players- collaborating corporations, their employees or free agents.

Table 1 summarizes the differences between Traditional Project Management and Project Enterprise Management.

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 lifecycle
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	Inter-dependent and integrated
Change Attitude	Resistant	Recognized
Decision-Making	Single Project Leader	Distributed leadership
Execution Speed	Low-to-moderate	High

Table 1

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 re-worked for use elsewhere. Considerable effort is required simply to communicate information across inter- and intra-organizational 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 Emails and Messages

Users typically receive thousands of emails 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 email sent or received, and determining the exact file to store it in, for future retrieval. The same is true of conferencing too.

Additionally, every email or message received in a Project Enterprise environment is placed along side all the pertinent information- such as specifications, drawings, data-sheets, tables, documents and many more- 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 Finger Tips

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 a few button clicks away. There is no re-keying 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 a long 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 on-line, 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, and is 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 Project Management 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 they must usually come up to speed on the particulars of that specific project (charge their own internal "data bank") before they can be effective as a member of a particular Project Management Team. Moreover, they must

continually update (or recharge) their own internal "data bank" in order to remain effective as the project progresses and evolves.

In most normal people, this need to update information and maintain their internal "data bank" is a significant barrier to a multi-tasking Project Enterprise approach. The Project Enterprise Management solution facilitates the access of information, describing the current status of any project such that a normal individual does not have to attempt to retain anywhere near 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

Project Enterprise Solutions 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, better risk and issue management, and many more. 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 that are still there are substantially younger and less experienced.

The seasoned "experienced" personnel that typically anchor such organizations are fewer and fewer. The Project Enterprise Management Solution 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 quicker 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, to construct a multi-billion dollar project using two to four prime contractors from the US, Europe and Korea.

It is common for these prime contractors to sub-contract 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 24x7 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 from concept through execution and operations 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 financial, economic, contractual, coordination (between contractors and EPCs, vendors), environmental, governmental, labor and many more.

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 to 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 can also be used to redirect and optimize of project processes and resources throughout the value chain.

Bob Peebler calls it "Economies of Knowledge". In his white paper, "The Virtual Oil Company: The Capstone of Integration", 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 and partners, and communicate, with a shift towards networked forms of business.

The main benefit in the impact of this technology is that employees could 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 improving 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 but when it is put into a medium like documents, emails, data is frozen and cannot be used any more.

It is analogous to an engineer getting an XL spreadsheet via email, and a fax of the same XL 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, and when you add documents one of top of another, you create a glacier- a 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.

Leverage e-marketplaces

Data-centricity also allows capital projects to leverage e-marketplaces. At present, MRO, catalogued parts and some standardized project components, flow through portals like Trade Ranger, and others. The flow of projects though these portals increases the universe of suppliers, reducing costs.

Lean Projects

Similarly, the concept of lean manufacturing can be replicated, of course, with modifications. Collaboration between owners and contractors on engineering, procurement, construction, and delivery issues delivers 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- together focused on drastically reducing waste.

The aggregate profitability of the oil company sector is about seven percent, and that of the service sector is about four percent[2]. The real enemy is the eighty-nine percent of costs of the combined sectors.

Digital Project Archives

The life span of a project is not measured in months nor years but in decades. The Project Enterprise Management Solution, 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 via 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 a new one- where a project is managed within the context of the project enterprise, to enable real-time, consultative decision-making.

Project Enterprise Management, enabled by the Contextual Communications Platform, promises to be vibrant and dynamic, inclusive rather than exclusive, to the benefit of all players and stakeholders in the enterprise, and to the final consumers.

Orchestra^TM- The Project Enterprise Management Solution

PointCross' solution Orchestra^TM provides all individuals, at all layers, in all participating organizations, real-time access to all relevant project information and contextual knowledge, during the duration of their participation in a project.

When individuals at all layers of all organizations have all the relevant contextual knowledge, information, and data at their fingertips, better decisions are made faster, and projects can be delivered faster, under budget, without compromising on quality.

Orchestra^TM incorporates many important features to manage the project enterprise for quality, time and costs. Foremost is a "project bus" that carries not only all data and information but also contextual knowledge to all participants, on a need to know basis, for faster and better decisions.

Additionally, to assure quality projects, Orchestra^TM helps to clearly outline all project objectives, not just engineering but also health, safety and environment, contractual, legal, and financial, in detail, and to continually map people, and participating organizations to these objectives.

This significantly improves the quality and speed of project owners' communications and interactions with contractors. Similarly, contractors benefit by a deeper understanding of owners' requirements and scope changes, and quickly develop economically sound, responsive solutions.

Integrated in Orchestra^{TM} is also a suite of project applications such as resource estimation, specifications and data, risk management, issues management, communications, and document management, for effective, real-time contextual communications and decisive work processes.

A simple example of how Orchestra^{TM} tackles daily inefficiencies in project execution is the manner in which it addresses email communications. The sheer volume of peer-to-peer email communications has now become a hindrance to fast execution of projects. The joke of the day going around the office has the same priority as an email that says that a $68 million project is at risk.

To make Internet communications event-driven, and to be an integral part of real-time work processes, Orchestra^{TM} integrates a 'smart' email and conferencing system. It sorts and files emails to the appropriate project context detail, whether an objective, requirement or a response. This eliminates email clutter, and the drudgery of sorting by priorities, and filing them for future retrieval and use.

Besides delivering "faster, better, cheaper" projects, Orchestra^{TM} creates an invaluable knowledge warehouse during the project execution process, which can be reused in future projects, and during production operations, for the lifetime of a project- again, reducing cycle time and costs.

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