

Communication as a Strategic Tool

Connect People, Information,
and Processes throughout the
Building Lifecycle

Introduction

Organizations undertaking multiple building projects—or even a single, highly complex project—can face communications inefficiencies that create unnecessary and costly delays and disputes. Even as some organizations successfully streamline the communication of project information internally, they still struggle to communicate effectively with their external project team.

In fact, a vast majority of project teams share information the old-fashioned way: phone calls, fax transmissions, courier, word-of-mouth, and written monthly reports. According to *The Economist*, FedEx earns over \$500 million per year just shipping blueprints across the United States. Even as other industries embrace technology and digital communication, traditional analog methods still reign supreme when it comes to the building lifecycle.

Decentralized, paper-based, and ad-hoc information flow contributes to many of the challenges that often plague building projects. A recent survey of some of the world's largest owners by FMI/CMAA found that poor communication between organizations is the root cause of many problems throughout the building lifecycle and has the greatest impact on cost, schedule, scope, and quality of the project.¹

This white paper explores the communications problems facing organizations undertaking large-scale or complex building projects. It then details how implementing a collaborative project management solution can reduce the inherent risks associated with construction projects by enabling all external team members to communicate, collaborate, and share information effectively. Finally, the white paper details how Autodesk can optimize a company's business processes through an evaluation-configuration process tailored to each company's needs.

Complex Communications Landscape

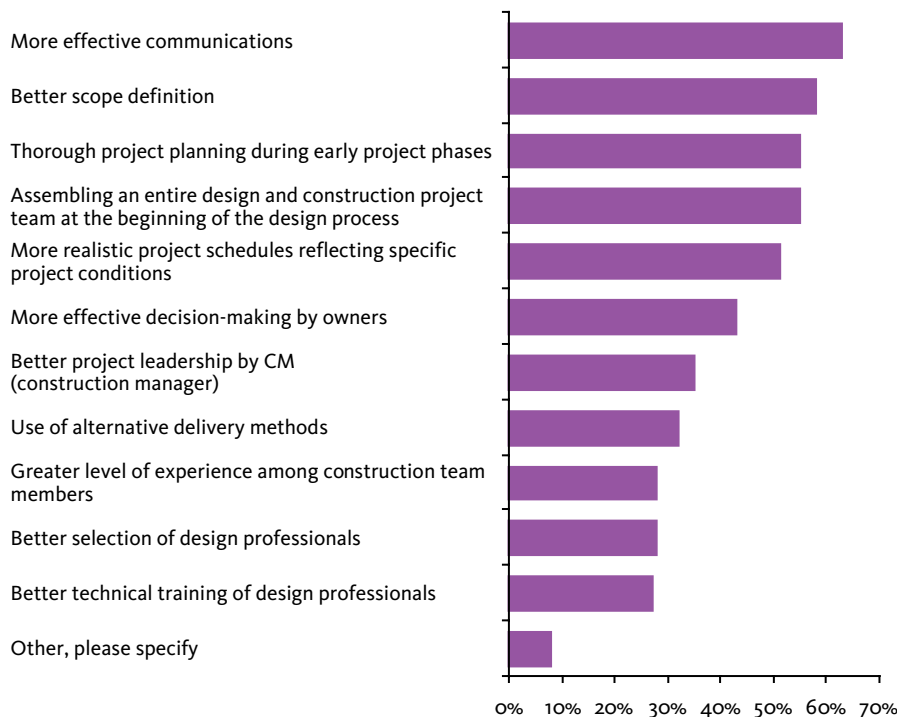
To understand the communications problems that typically hamper building projects, let's look at the communication challenges inherent in three different types of projects: volume-based, highly complex, and distributed. The project portfolio for retail organizations and homebuilders includes volume-based projects—such as developing and operating hundreds of new and existing stores or building several 250-home developments at once. Volume-based projects generate a massive amount of documents and information that must be communicated, reviewed, and archived effectively. Highly complex projects, such as the World Trade Center's Freedom Tower or government infrastructure projects such as the Pennsylvania Turnpike, extend over long periods of time and involve multiple parties that must provide timely feedback on plans and budgets and make decisions based upon accurate, up-to-date information. Finally, distributed construction projects are those with project teams dispersed all over the globe. The owner may be in London, the job site is in Dubai, the contractor in New York, the architect in San Francisco, the engineers in Chicago, and the steel supplier in China. For distributed projects, information must traverse the globe in a cost-effective, streamlined, and standardized way.

In all three of these construction categories, communication plays a critical role in a project's success. Poor communication can lead to schedule problems, scope increases, excessive change orders, quality problems, and cost overruns for projects in any of these categories.

¹Annual Survey of Owners 2005, FMI/CMAA

The success of a building project of any type resides in large part in the efficacy of communications throughout the project lifecycle. Picking up the tab for inefficient and fragmented communication time and again, owners overwhelmingly agree that improving communication is paramount to project success (see Figure 1). Echoing the common sentiment of the construction industry, industry reports claim that up to 30% of the construction cost of a building (including material costs) is wasted due to poor communication and inefficiencies within and between companies.²

Which changes will most significantly contribute to improving the quality of the project delivery process resulting in a greater number of successful projects? (Please check all that apply.)



Source: FMI/CMAA Fifth Annual Survey of Owners

Figure 1: Owners identify effective communication as key to project success

The complexity of the communication issue resides not just in the type of project, but in the very nature of building projects. Where all parties involved need to deal with a unique site, they most likely will work together only on that single project. Even the most basic construction project requires that information flow both within and between companies. Internally, executives, project managers, finance professionals, and the legal department create, review, manage, and approve project-related documents, contracts, and information. Once the project is complete, these organizations must also manage and operate all their assets, including maintaining information such as as-built, space plans, equipment information, warranties, and emergency plans. Keeping track of all this documentation, implementing effective business processes throughout the project lifecycle, and facilitating communication across internal teams is a highly complex undertaking.

²The Building Research Establishment and the Building Services Research & Information Association support this assertion.

And yet managing project information internally is only half the battle—usually the easier half. Many organizations find it even more difficult to ensure good communication between all of the companies involved in their building projects. A single project can demand external communications with clients, government agencies, engineers, consultants, contractors, subcontractors, lawyers, surety and bonding organizations, utility companies, maintenance providers, and more.

The Impact of Ineffective Project Communications

Recognizing the impact of poor communication on project results, many companies involved in building design and construction have sought to optimize their internal processes and project controls. Some companies may even have a centralized repository for creating, managing, and storing project documents and information—but they have no way to track and manage information created, revised, or reviewed externally. The sharing of information *between* organizations remains largely unstructured and poorly managed—consisting of a fragmented array of non-standard documents, constantly changing drawing sets, spreadsheets, shop drawings, faxes, and meeting notes. A single project lasting more than 12 months easily generates tens of thousands of document exchanges between multiple parties. Typically, building project teams have no way to track and manage all project communications and information, no standardized reporting, and too much paper-based documentation.

With the massive amount of information passed back and forth between companies at each stage of the design and construction process, this lack of centralized, streamlined communication represents a significant risk. The FMI/CMAA notes, “Poor communication and collaboration is pervasive and impacts each phase of the construction process as well as everyone involved in the process—from owners and construction managers to architects, engineers, and contractors.”³ Building projects suffer from lack of accountability, poor information sharing, and not enough time to resolve problems that arise. For multi-project programs, complex projects, and projects with geographically-dispersed teams, these issues compound program risk exponentially. The bottom line is that project managers and owners lack a holistic view of project progress and issues when there is poor communication and have difficulty keeping the project on budget and on schedule (see Figure 2).

Some owners make the mistake of trying to manage projects or programs using a cost-loaded schedule or schedule-driven project management tool. However, these tools are largely divorced from what is happening in the field. Contractors manually report their progress, or inspectors verify work put in place, which is then loaded into the schedule. While this type of field reporting may provide a relatively accurate account of construction schedule progress, these tools cannot explain why a project is behind schedule. In addition, schedule-based tools touch only a small percentage of the project team. It is not uncommon for subcontractors and others to be completely unaware of the master schedule maintained by the project manager.

Cost Impacts	Time Impacts
Excessive courier and overnight service expenses	Delays in document turnarounds between companies
Printing of paper documents	Need to recreate data between companies
Consumption of resources to compile useful project information	Need to update multiple logs, creating redundant data
Travel expenses	Unnecessary travel

Figure 2: Examples of how poor communication impacts projects

³2003 Fourth Annual Survey of Owners, FMI/CMAA

To resolve the communication issue, owners, architects, engineers, and contractors need to rethink the way they communicate, interact, and share information. Leading organizations are turning to web-based project management solutions, such as Autodesk® Collaborative Project Management, to reduce the inherent risks associated with complex construction projects and ensure projects are completed on time and on budget.

Effective Collaborative Project Management Solution Requirements

An effective Collaborative Project Management solution addresses two issues. First, it must be an easy-to-use solution that enables collaboration and communication across the entire project or program team. Second, it must support the entire building lifecycle, which includes plan, build, and operate phases.

Facilitating collaboration and communication across the entire project or program team requires enabling communication flow up and down throughout teams, regardless of their location or organization. Because different types of users are involved in building projects—from CAD engineers to purchasing personnel—the Collaborative Project Management solution must be easy to use. Organizations that expect their extended project teams to adopt a complicated system will face an uphill battle in convincing all internal and external team members to utilize it.

The Collaborative Project Management solution must also bridge the plan, build, and operate phases of the building lifecycle. Organizations need functionality that works for all project team members and streamlines business processes and communications throughout all phases of the project lifecycle. This translates into providing teams the ability to upload, view, and mark up CAD drawings and pass the documents back and forth in a secure manner. Further, the solution must facilitate construction team workflow and simplify the complex processes involved in managing multiple construction projects. To support the operate phase of the building lifecycle, the Collaborative Project Management solution must facilitate operational management once the buildings are complete. This way, owners can access the information they need to manage and operate newly constructed assets effectively.



Figure 3: Effective project team communication spans the entire project lifecycle and touches all team members

Autodesk Collaborative Project Management solutions meet all of these requirements—they are easy-to-use solutions that enable collaboration and communication across all project teams and the entire building lifecycle. They provide effective collaborative project management for organizations across industries and enable companies to complete building projects on time and on budget. Let's explore why more than 900 companies rely on Autodesk Collaborative Project Management solutions to manage over 150,000 projects and 7 million documents.

Autodesk Collaborative Project Management Solutions

Autodesk brings together best-of-breed Collaborative Project Management solutions to effectively bridge the plan, build, and operate phases of the building lifecycle, enabling the profitable execution of projects and programs. With Autodesk Collaborative Project Management solutions, organizations streamline and safeguard the handoff of information to external team members, solving the problem that plagues so many building projects. Project information is stored in one place, centralizing documents, drawings, communications, contracts, schedules, budgets and forecasts, reports, and more. From pre-design through design, procurement, construction, and operation, Autodesk Collaborative Project Management solutions automate project management processes and streamline communication and collaboration across entire teams throughout the building lifecycle.

Keeping Public Works on Track

Rajappan & Meyer Consulting Engineers, Inc., (R&M)—a transportation project development, civil and structural engineering, and design firm—was tasked with designing a \$300 million light rail project for the Santa Clara Valley Transportation Authority (VTA). The project was incredibly complex, including cable, electrical, civil, structural, drainage, and traffic systems. With many specialized disciplines and subcontractors working together on the project, R&M adopted an Autodesk Collaborative Project Management solution to facilitate collaboration and provide a centralized location for all design information. Using the solution, R&M simplified, centralized, and streamlined collaboration for up to 150 users on more than 2,000 sheet sets. Keith Meyer, a partner at R&M, said, “Multi-disciplinary jobs like the VTA project are probably the most coordination-intensive jobs there are. Autodesk Collaborative Project Management improves the quality of our coordination, which is important from a risk reduction standpoint.”

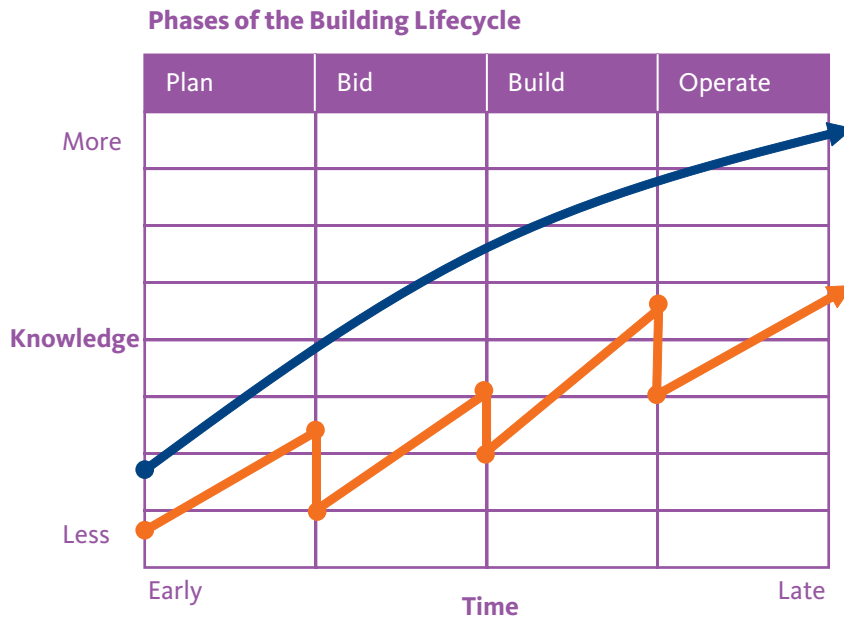


Figure 4: Collaborative Project Management solutions, represented by the blue line, deliver more consistent results than traditional methods of handing-off information throughout the project lifecycle

Designed to be interoperable with the design, desktop, enterprise resource planning (ERP), and mobile solutions organizations use everyday, Autodesk Collaborative Project Management solutions connect people, information, and processes, helping project teams get productive faster. The solutions cover the following project management processes:

- Document Management
- Design Management
- Bid Management
- Construction Management
- Cost Management
- Operations Management

Document Management

Autodesk Collaborative Project Management solutions enable organizations to centrally organize, manage, and track all project related documents, contracts, and information to mitigate the version control risks inherent in construction projects. Version control functionality preserves a record of all document revisions. Users can track and manage multiple document versions, add comments, and send notifications when new versions are created.

File locking keeps documents secure and helps project teams avoid unintended mistakes. Access to documents is controlled, ensuring that only one person can edit a document at any given time. Team members can easily keep tabs on what is happening with documents with activity tracking and audit trail functionality that gives team members insight into who is doing what and on which documents. Organizations gain complete visibility using Autodesk Collaborative Project Management solutions, so project managers can track who accessed, edited, uploaded, and downloaded any document—and when.

Design Management

By streamlining the review of conceptual and schematic designs, documents, and information with Autodesk Collaborative Project Management solutions, organizations ensure that all team members are up-to-date with the latest plans and specifications. Project members can view and mark up drawings, maps, and models without the original design creation software, so even non-CAD users can stay on top of design reviews and edits. Notifications ensure that everyone is always informed.

Whenever someone uploads a drawing or makes changes to a design, they can instantly notify project team members. Team members can also maintain the integrity of drawings and communicate their intentions with layer and Xref Management. When team members upload DWG files to Autodesk Collaborative Project Management solutions, they decide which xrefs to include.

Bid Management

Whether an organization manages a handful or hundreds of bid cycles each year, Autodesk Collaborative Project Management solutions help prepare, distribute, and award bids efficiently—helping to drastically reduce bid cycle times. With Autodesk Collaborative Project Management solutions, organizations can record their efforts to solicit bids from small business enterprise (SBE) certified vendors and organize bidder qualifications and information on each scope of work to ensure that they have bids for all aspects of a project. Organizations streamline the bidder selection process by printing reports and quickly notifying bidders of changes online.

With Autodesk Collaborative Project Management solutions, organizations monitor the status of bid selection with dashboards and reports and keep the bidding processes on track by sending notifications and reminders to bidders. They can download bids into Excel for automated analysis and calculate an estimated project budget. Once it has chosen a vendor, an organization can extract the award values to their ERP system and in seconds create a contract or purchase order based on the scope of work. Organizations that use Autodesk Collaborative Project Management solutions for their bidding processes report reductions in their bid cycle times by as much as 70%.

Construction Management

Autodesk Collaborative Project Management solutions simplify the complex processes involved in managing multiple or complex construction projects. Contractors can log onto one central, on-demand system to create, find, and view design and construction drawings, construction management forms, and other project documents at any time from any place. With executive and personal dashboards that are updated in real time, Autodesk Collaborative Project Management solutions help prevent the information bottlenecks that cause people in the field to wait for answers, rather than building assets. Using the project dashboard, project managers can make sure that the right people turn around RFIs, review submittals, and resolve exceptions quickly. Automated alerts notify team members when issues need their attention or documents need reviewing.

With Autodesk Collaborative Project Management solutions, construction teams are able to maintain consistent documentation with standard and custom construction forms. They also increase accountability by taking advantage of history and audit trails to view who has done what—and when. Owners and team members can track progress across extended construction teams, even globally. And with exception reporting, team members can quickly identify the areas that need their attention.

Cost Management

Managing project costs is also easier with Autodesk Collaborative Project Management solutions. Organizations can enforce standard cost management practices for tracking and forecasting expenditures for individual projects or across multi-project programs. They can set up budgets and job cost ledgers that mirror the structure of their existing accounting systems, set custom budget codes, and track and report costs by program or project level. Autodesk Collaborative Project Management solutions introduce standards that help organizations control and accurately forecast costs while working with existing workflows.

Autodesk Collaborative Project Management solutions also streamline cost documents in a number of other ways. As a cost event moves from one party to another, relevant data—such as contact names, addresses, and change order numbers—is automatically transferred into documents, reducing manual data entry. To facilitate easy routing of cost documents, such as budgets, bonds, purchase orders, and contracts, organizations can set up project-specific default routing so that documents are automatically forwarded for review and approval based on defined parameters.

Operations Management

Once a building project is complete, Autodesk Collaborative Project Management solutions help owners keep buildings operational by enabling them to share detailed building information with vendors, employees, potential tenants, and property managers. With Autodesk Collaborative Project Management solutions, owners can store all their building-related documents—such as contracts, warranties, as-builts, and maintenance schedules—in a single, accessible, and secure web-based location. Using custom information pages, organizations can manage and track information about any site and map the location and track the status of maintenance projects. With equipment information, locations, specifications, and manuals all centrally managed and accessible, workers have the information they need to maintain built assets.

When people need to review, approve, or contribute to operational projects, Autodesk Collaborative Project Management solutions notify them automatically. Notifications, alerts, and reports keep everyone on schedule and operations running smoothly. Approval workflows automatically route documents to the right person, right away, so that staff can start work on new operational projects or move forward with changes on existing projects.

By adopting Autodesk Collaborative Project Management solutions that encompass project management processes throughout the entire building lifecycle, organizations connect people, information, and processes; increase their productivity; and optimize their project communication,

collaboration, and control. The easy-to-use Autodesk Collaborative Project Management solutions standardize and automate business processes for efficient collaboration and work with a configurable, intuitive interface. By minimizing traditional, paper-based processes, organizations reduce delays, paper-based business expenses, and errors on their building projects.

Making the decision to adopt an Autodesk Collaborative Project Management solution is only the first step towards realizing the immense benefits offered by enhanced project collaboration. Autodesk works closely with each organization to optimize implementation. Let's take a brief look at how this works.

Optimizing Business Processes

Autodesk has developed a proven four-phase methodology for helping organizations achieve positive results from their Autodesk Collaborative Project Management solution: assessment, configuration, deployment, and optimization. In the assessment phase, business process consulting experts work with organizations to understand their goals and current business processes, identifying whether any process improvements exist. This activity is undertaken with configuration of the Autodesk Collaborative Project Management solution in mind. In this phase, Autodesk experts set some baseline goals for benchmarking purposes and define the scope and overall roadmap for the solution's success.

Once Autodesk has assessed the organization's business processes, the configuration phase begins. With the organization's input and goals in mind, Autodesk utilizes best practices to set up the Autodesk Collaborative Project Management solution in a way that is optimal for the organization. The objective is to align the solution with organizational practices, supporting project and program-related business processes as much as possible.

In the deployment phase, Autodesk trains select end users on the solution and delivers customized training guides and other relevant documentation. Organizations provide feedback to Autodesk on their use of the system so that Autodesk can fine-tune it before organization-wide rollout. The final optimization phase makes changes based on the initial feedback of organizational users and rolls out the system broadly. If new features, users, or projects are needed, plans are defined for benchmarking and receiving support and the entire four-phase process repeats.



Figure 5: Proven methodology to achieve results

Managing Project Complexity

The multi-year, \$420 million project to transform five miles of West Manhattan's waterfront docks into parks and public spaces consisted of hundreds of small construction projects in several phases. Complicating matters, legislation demanded that many contracts be broken down into specific disciplines, resulting in a veritable flood of RFIs, contracts, and paperwork from different vendors. Tasked with managing the extremely complex building program with minimal staff, The Hudson River Park Trust adopted an Autodesk Collaborative Project Management solution. The Trust mandated by contract that all firms use the solution and took proactive steps to train users, ensuring successful communication flow with nearly 200 outside consultants, agencies, and third-party vendors. Thanks to its Autodesk Collaborative Project Management solution, the Trust stayed on track and delivered the first segment of the park in 2003 and several additional projects in 2005. In addition, with Autodesk Collaborative Project Management, RFIs and submittals got done faster; vendor response time for RFI submittals increased by 20-50%.

By examining an organization's core processes, Autodesk experts are able to reduce the steps and time required to complete tasks involved in building projects, increasing the return on a company's investment in an Autodesk Collaborative Project Management solution. For example, if a current process takes eight steps, Autodesk experts may be able to identify redundancies and inefficiencies and thus eliminate three steps, reduce cycle times, and increase productivity. The real advantage to organizations results from the hundreds of times each of these optimized processes occur on any given project.

Business Benefits of Effective Collaborative Project Management Solution

Adopting an effective project management solution like Autodesk Collaborative Project Management helps companies save time, money, and resources at both the project level and the organizational level (see Figure 6). Organizations may save 30-60% of time typically spent communicating project progress, complete projects up to 5% sooner, and save 20-50% of time spent on administrative tasks.⁴ In an effort to capitalize on these benefits, organizations are adopting Collaborative Project Management solutions in greater numbers. For example, 75% of general contractors with annual revenues above \$250 million use some project collaboration software.⁵



Figure 6: Benefits of an effective collaborative project management solution

Getting Everyone on Board

Once an organization has committed to improving both internal and external communications it is tasked with getting its vendors and partners to use an Autodesk Collaborative Project Management solution on all of its building projects as well. One way to do this is to define accountability on a project through a contractual obligation called a Communication Specification. Autodesk helps its customers define a project's communications specification during implementation of an Autodesk Collaborative Project Management solution.

⁴Study by Pricewaterhouse Coopers published in the FMI/CMAA Sixth Annual Survey of Owners 2005

⁵Survey for the Construction Industry (Fifth Edition) released by the Construction Financial Management Association

A Communication Specification sets clear goals and objectives across the project team, including all organizations involved—from design and construction firms to owners and subcontractors. By implementing a Communication Specification, organizations bind all parties early in the request for proposal (RFP) process and set the stage for standardized, streamlined, and technologically-enabled communications, business processes, and practices.

A Communication Specification could, for instance, require all parties to utilize an Autodesk Collaborative Project Management solution for all project management processes in the building lifecycle. More importantly, the Communication Specification would commit all parties and established roles, responsibilities, standards, communication protocols, and project management methods early in the process. For example, the Communication Specification would outline business processes, a step-by-step procedures guide, and required standards for all parties to follow. By having all parties agree to the Communication Specification in the RFP stage, interaction among all internal and external project team members across the entire project lifecycle are codified, increasing accountability and productivity on the project.

Conclusion

As every owner or contractor knows, it is nearly impossible to keep projects on schedule and on budget when project teams are not communicating effectively. With increasingly complex projects, globally dispersed project teams, and voluminous project portfolios, organizations simply cannot rely on decentralized, ad-hoc, and paper-based communications methods. Only by implementing a Collaborative Project Management solution that spans the entire building lifecycle and extends to all internal and external project team members can organizations begin to turn around error-prone, resource-consuming communication situations that plague many building projects. With an effective solution such as Autodesk Collaborative Project Management, organizations improve communication, reduce project cycle time, and increase productivity. With these types of results, what project team can afford not to implement an effective Collaborative Project Management solution?

About Collaborative Project Management

Autodesk Collaborative Project Management solutions—Autodesk® Buzzsaw® and Autodesk® Constructware®—delivered on-demand, enable the effective management of all project-related communication, information and business processes across the plan, build and operate phases of the building lifecycle. Our purpose built, collaborative document, design, bid, construction, cost and operations solutions help organizations meet their most immediate needs, then take an incremental and integrated approach to optimizing business processes across their project teams, organizations or value chain. By connecting people, information, and processes, our customers are able to increase productivity, and optimize project and program performance.

For more information about Collaborative Project Management please visit us at <http://www.autodesk.com/experiencecpm>.