

Online Construction Management for Mid-sized Construction Projects

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Executive Summary

Only too often, construction projects are completed months late and millions of dollars over budget, because the right people don't get the right information at the right time.

Over the years, construction managers have looked for ways to address this problem, leading the industry to develop computerized construction management systems. These systems have evolved from desktop and client-server applications to online versions, which allow users to exchange information with each other virtually anytime, anywhere.

Owners and managers of capital-intensive building projects frequently use such systems to control schedules and minimize cost overruns. Most of the better-known systems are targeted at larger projects and bigger construction companies, where the scale of the project often justifies the high cost.

As the Falls Management Institute reported in its January 2003 "*Emerging Owner Trends in Capital and Facilities Program Delivery*" report: "The advent of collaboration tools has helped owners and their suppliers cut time and cost out of the delivery process....These tools have also improved accountability in the process."

Unfortunately, many of these systems are too complex, too difficult to use, or too expensive for construction professionals working on mid-sized projects, who often do not have the IT support needed to use such systems effectively. Yet, in sheer numbers, the market for large projects is dwarfed by the tens of thousands of small to mid-sized projects.

This paper will describe online construction management, analyze the benefits of such systems, and discuss the appropriate criteria for selecting a system for mid-sized projects. The paper will conclude with a description of the Construction Communicator™ system and two examples of how its users are saving time and money.

Online Construction Management

Online construction management systems use web sites to give construction professionals an identical view of the most recent project information. The systems also maintain a date-stamped log of all contract documents such as Requests for Information (RFIs), Construction Change Directives (CCDs) and Architect's Supplemental Information (ASIs), eliminating confusion about whether (and when) users received the information.

Online systems transfer the responsibility for accessing documents to those who need to act on the information, rather than on those who send the information. The systems replace the "send-to-many, read-by-one" communication of email and fax with a "send-to-one, read-by-many" Internet approach.

All users see identical information, making it possible to resolve issues quickly. Decisions are automatically documented online, eliminating the problems that occur when written, faxed or emailed information is not delivered in a timely fashion.

Web-based construction management systems also eliminate the need for onsite staff to expand, reformat and re-send contract-administration spreadsheets, a time-consuming and error-prone process. Online systems provide the user with a simple standardized form to submit data. A superintendent, foreman or project engineer can directly input and send information, in the field, without a high-speed connection or help from the support staff.

Benefits of Online Construction Management Systems

Many construction managers and owners see online construction management systems as a way to improve communication and increase productivity. These professionals recognize the benefits of the better systems:

- **Timesaver** – The project team can get needed information faster, helping them to complete their work in a more timely manner. This reduces workloads and can help control costs.
- **Faster decisions** – The amount of time saved with online systems increases proportionately with the number of different users who have to jointly review, process and approve information.
- **Online “paper trail”** – The entire cycle is documented on the web. Questions and answers are input directly online, helping assure that both are clear. With its immediate access to information and electronic search capabilities, the online system can significantly reduce the time needed to research previous communication and documents.
- **Current information** – Because the information is updated online, there is no out-of-date version to confuse people.
- **Identical information** – Everyone sees identical information. This can be particularly valuable in conference calls when people in different locations need to view information to make decisions. In such cases, new information can even be added online in real time, for everyone to see.
- **Detailed information** – Detailed information is readily available. Better systems allow users to easily toggle between a summary entry in the log and additional detailed information.
- **Project directory** – Online systems typically provide an up-to-date directory that identifies the appropriate points of contact among the project team. Because personnel are sometimes reassigned or change their contact information, an online

directory that maintains current emails and phone numbers helps the project team save time. This is particularly important in case of an emergency.

- **Confidentiality** – Any online business must respect confidentiality. The most effective systems preserve the private exchanges of information between parties to sub-contracts, e.g., between the general contractors and subcontractors, or between the architect and consultants. These systems also assure that the architect has approved the consultant's responses before they reach the general contractor, helping to minimize unauthorized approvals.

Appropriate Applications for Mid-sized Construction Projects

The online construction management systems that are most effective for mid-sized projects focus on a few major processes, e.g., routine and repetitive transactions such as the generation of RFI, CCD and ASI documents.

Depending on the project's size, there can be several hundred such questions and directives, which often involve design changes to solve urgent field problems. If the project is to move along smoothly, the architects and designers need to quickly respond to these questions. With online systems, contractors can get the quick responses needed, keeping delays and cost increases to a minimum.

Effective online systems also make it easy to monitor the cycle of approvals from the architect or designer to the contractor. This helps identify situations where information is delayed and makes the project team more accountable.

Additionally, online systems can store reports, memos and correspondence, although these items are normally secondary to the high-traffic communication areas (e.g., information requests) that keep a project on schedule and help control costs.

Selection Criteria

For mid-sized projects, three of the most important criteria in selecting an online construction management system are ease of use, focus and flexibility.

- **Ease of use** – The system must be intuitive and easy to use. It must mirror the way the construction team has communicated for years and not require the teams to learn a new way to communicate. It must employ familiar formats for presenting information.

If users can virtually teach themselves with little or no training, they are more likely to try a system and discover its advantages. With a complex system that uses unfamiliar ways of presenting information, team members are likely to reject the system and revert to more traditional, labor-intensive (and costly) methods.

- **Focus** – An online system should focus on the areas where it can make the most difference (e.g., routine, repetitive tasks). A system that does a few tasks well is of much more value to the smaller construction team than one that attempts to do many things (and often does them poorly).
- **Flexibility** – The online system needs to be flexible enough to accommodate projects using the traditional structure (architect, general contractor and subcontractor) as well as jobs with multiple prime contractors who provide and receive information without overall control from a general contractor.

Construction Communicator

The Construction Communicator online system (www.constructioncommunicator.com) is designed to help construction managers, architects, contractors and consultants get timely information to keep small to mid-sized construction projects on track.

This web-based application automates the American Institute of Architects (AIA) contract administration process that the industry has refined over many years.

Specifically, Construction Communicator helps architects and contractors post and answer questions and other information, and allows the construction manager to easily view, coordinate and help resolve outstanding issues.

For example, using the system's intuitive online forms, the architect can send an instructional ASI to clarify a drawing. At other times, the contractor can send a time-critical question (e.g., an RFI) to the architect, who can answer directly or route it to a design consultant before responding. The architect can submit a response to the web for all team members to see. For quality assurance, the system preserves the consultant's response as confidential information.

The entire process typically takes a few hours. Using traditional methods, this type of communication can take days, even weeks.

The logs are updated in real time and all users see identical information. Users can easily toggle between summary and detailed information. Automatic calendars track the elapsed response time.

Additionally, documents can be easily uploaded for use in the system, providing a single interface for distributing drawings, schedules, meeting agenda and the like. Finally, Construction Communicator can link to other web services, such as CAD drawing managers and web cams for remote viewing of site conditions.

By providing an overall view of the information flow, Construction Communicator helps the construction manager to minimize the bottlenecks that occur when individuals do not receive or respond to emails, faxes or voicemail.

In short, Construction Communicator concentrates on the practical aspects of the project where it can have the greatest impact on the schedule and budget.

As Anna Toncheva, senior analyst of International Data Group (IDG), a market-research firm headquartered in Framingham, Massachusetts, said: “At a period when IT investments are concentrated on the pragmatic problem-solving side of corporate computing, the need for frequent and easy communication among employees, subcontractors, design consultants and customers has made knowledge-management solutions an indispensable requirement in this industry. Construction Communicator can help to facilitate much of the communication that takes place during a construction project, and ultimately to facilitate project management. We would expect this application to have a positive impact on the bottom line in the construction industry.”

Case Studies

Construction Communicator is helping private, public and not-for-profit entities save time and money. Here are two examples.

Challenging Expansion and Restoration of an Historic Library – After the 1989 Loma Prieta earthquake, the 1928 Berkeley (California) Central Library required a seismic retrofit. This provided the impetus to begin a planned modernization and expansion program that needed to retain the “look and feel” of the historic art deco structure.

This \$21 million project, which was designed under the Secretary of the Interior’s guidelines for a building on the National Register of Historic Places, posed some unusual challenges. For example, the foundations of adjacent structures had to be underpinned; the original structure had to be seismically retrofitted; and a state-of-the-art building management and telecommunication system installed. Additionally, unforeseen conditions required changes in design details.

Over the course of the project, the Construction Communicator online systems logged several hundred RFIs and submittals. Required changes were identified and approved, often within a few hours. This contrasts very favorably with the traditional turnaround time of several days.

As Dan Garcia, who used the system throughout most of the construction process, said: “Construction Communicator really helped us reduce our contract administration time. We liked the fact that the team members could directly input questions and answers themselves; the project manager didn’t have to reinput them. The logs were updated automatically, so we didn’t waste time in meetings reconciling them. And as soon as the RFI questions and answers were posted on the web, everyone could see the same information.”

The estimated total construction costs as of April 2003 were within a 10 percent margin of the original price, very acceptable for a complicated historic restoration with seismic retrofitting.

Tight Schedule for Below-ground Gymnasium – Crystal Springs Uplands School, a private school in the San Francisco Bay Area, was replacing its gymnasium, almost doubling its size. Because of environmental concerns in its upscale neighborhood, the 40,000-sq.ft. gymnasium had to be below ground. For various reasons, construction was delayed three months, starting only in late summer. This posed the risk that the excavation would not be completed before the rainy season.

Using Construction Communicator, the project met its original opening date in spite of an unseasonably heavy “100 year storm.” The planned construction work was completed within the original construction and contingencies budgets.

Summary

Construction personnel involved in mid-sized projects can gain a great deal by using the right online construction management system. By identifying the target processes and applying appropriate selection criteria, the team can use such a system to increase efficiencies, reduce workloads and lower total costs.