

The Strategic Impact of Web-Based Communication on Costs, Schedule, Scope and Quality Across the Design and Construction Life Cycle

*Recent industry studies show conclusively that poor communication between companies is the root cause of risk in the design and construction process, which results in cost, schedule, scope and quality problems. Web-based tools that tie all parties together in a centralized communications platform have proven to be a strategic tool for addressing these issues. **For this reason it is worthwhile for senior executives to invest time to understand and address the situation, and consider proactively implementing a centralized communication solution.***

By Scott Unger
President and CEO
Constructware

A Constructware White Paper – January 2005



Communication. Collaboration. Control.

Introduction

This white paper is written primarily for executives who are not involved in the day-to-day operations of design and construction, but who may have oversight responsibility for capital projects in their organization. The purpose is two fold: 1) to establish clarity about the root causes of the recurring problems experienced by project teams and 2) to point to a practical solution to these problems.

This white paper cites recent industry surveys and the experience of the author and the Constructware team. In recent years, Constructware has helped project teams manage more than \$150 billion in projects and programs. We have found deep systemic problems in the practice of design and construction in the United States that negatively impact the majority of projects built today. These flawed processes create significant unnecessary costs and risks for every participant involved, but primarily for owners.

These systemic problems are not the “fault” of any particular group, profession or industry methodology. The design and construction industry is ‘stuck.’ It is roughly analogous to the American auto industry in the late 1970s, when outdated manufacturing processes and poor quality were accepted as the norm and consumers had few other options. It was not until Japanese automakers upset the apple cart with innovative manufacturing processes, higher quality and lower prices, that “standard” industry practices began to change, eventually resulting in a higher industry baseline standard of quality and value.

Unfortunately for buyers of design and construction services there are no systemic industry changes on the horizon. However, there are new tools (like Constructware) that have proven to be effective in combating the root causes of many of the recurring problems in the industry. These tools provide structured communication, workflows and centralized project documentation so that miscommunication between parties is reduced and each entity is accountable to the rest of the team for their work. These technologies revolve around a simple concept: a centralized, Internet-based communication platform that links all parties together in a real-time environment, regardless of geographic boundaries.

This relatively new approach (seven years of field use in the industry) has proven to be highly effective at reducing the communication disconnects between parties that lead to project cost over-runs, schedule problems, inter-party disputes and quality problems.



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The design and construction industry is burdened with deep, systemic inefficiencies that create substantial unnecessary costs and risks for every player involved in the process. **The root cause is poor communication between companies.** Owners end up paying most for this “status quo” but all parties pay a hidden tax in terms of higher risk and lower margins.

“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.”

FMI/CMAA Fourth Annual Survey of Owners, 2003

The practical solution to this costly, multi-layered communication problem is the new generation of web-based communication and collaboration tools. These tools **tie all parties together in a centralized communications hub, with accountability and transparency.**

1. A Systemic Industry Problem

The design and construction industry in the United States today is burdened with deep, systemic inefficiencies that create substantial unnecessary costs and risks for every participant involved in the process. In almost every instance where there are cost over-runs, excessive change orders, schedule problems, unexpected scope increases or quality and commissioning problems, the root cause can be traced to poor communication between the companies involved in the design and construction process.

Owners end up paying most of the costs for this ‘status quo’ of inefficient and fragmented communication, but all parties pay a hidden tax in terms of higher risk and lower margins. How big is the problem? Some industry studies have estimated that 30% of design and construction costs – excluding hard-dollar “bricks and mortar” materials costs – are wasted due to poor communication and inefficiencies within and between companies.

On a macro level, the costs are staggering. A comprehensive study published in June 2004 by the National Institute of Science & Technology (NIST) estimated that a subset of the communication problem – inefficiencies resulting from the silos of information held by individual companies – costs the industry \$15.8 billion each year.

This statistic does not take into account the big-dollar claims that hit perhaps one out of every 20 projects or programs. Those with industry experience know that a large portion of these claims are due to poor communication between companies and are preventable to a large extent. There may be a tangible event; poor weather, unforeseen site conditions, etc., but the costs and negative impacts mushroom due to poor coordination, communication and accountability.

The practical solution to this costly, multi-layered communication problem is the new generation of web-based communication and collaboration tools (such as Constructware) that have only been available since the late 1990s. These communication/collaboration tools **tie all parties on a project or program together in a centralized communications platform, with accountability and transparency.**

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This white paper can be a valuable resource for senior executives and others who are not familiar with the negative impact of poor communication on project deliveries. The paper shows it's a strategic problem worthy of a strategic solution.

Why Should I Care?

A bit of perspective is in order before we discuss the depth of the communication problem and the impact of web-based tools on cost, scope, schedule and quality. Half of the readers of this paper are all too familiar with the depth of the inter-company communication problem on projects and programs and their negative impacts. They don't need to be convinced.

For senior executives and other readers who are not familiar with the widespread negative impacts of these basic communication problems, this white paper can be a valuable resource. Senior executives at owner organizations may be experiencing the pain of cost over-runs, scope creep, schedule delays, quality problems, etc., but cannot quite get their arms around the "why" of the situation. This paper is designed to connect the dots, to show that poor communications between companies on a project or program is a strategic problem worthy of a strategic solution.

For this reason it is worthwhile for senior executives to invest time to understand the situation, and consider proactively implementing a centralized communication solution.

The Basic Communication Problem - Defined

The basic communication problem is well documented in a series of national surveys of owners conducted in 2003 and 2004 by the respected industry consulting firm FMI Corporation (FMI), Raleigh, NC, and the Construction Management Association of America (CMAA), McLean, VA. In 2003, the FMI/CMAA Fourth Annual Survey of Owners produced this conclusion:

*"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. **When all of the responses to the survey were tabulated, we noted one overarching theme that stood at the top or near the top of owner concerns, communication.**"*

In 2004, the FMI/CMAA Fifth Annual Survey of Owners again said "more effective communication" is the most

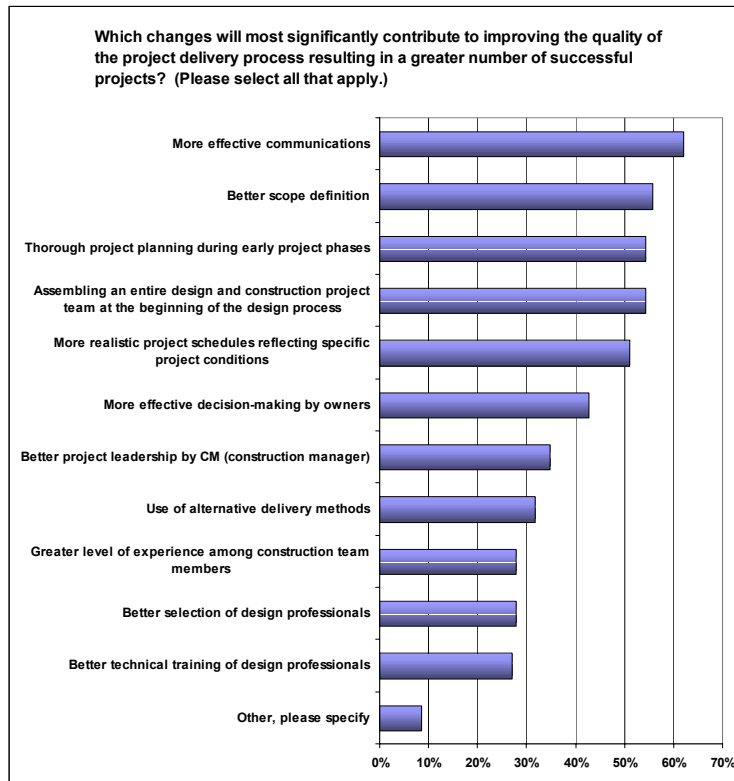


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impactful change owners can make to improve the quality of their project deliveries.

The owner survey found that “more effective communication” is the most impactful change owners can make to improve their project deliveries. The next five most impactful changes are a subset of the larger communication problem.



Source: FMI/CMAA Fifth Annual Survey of Owners

A close examination of the chart above shows that the next five issues on the list are largely a subset of the larger communication problem.

- Better scope definition
- More thorough project preplanning
- Assembling the entire team during the early design process
- More realistic project schedules
- More effective decision-making by owners

All of these issues can be better controlled and managed by implementing centralized, structured communication. This is the value proposition that Constructware delivers to its clients. As the case studies later in this paper show, this is not theory – Constructware has been used on tens of thousands of projects over the last several years with great effect.

This sentiment is summarized by a public sector owner that has used Constructware since early 2001 to manage a complex waterfront redevelopment program in New York City:



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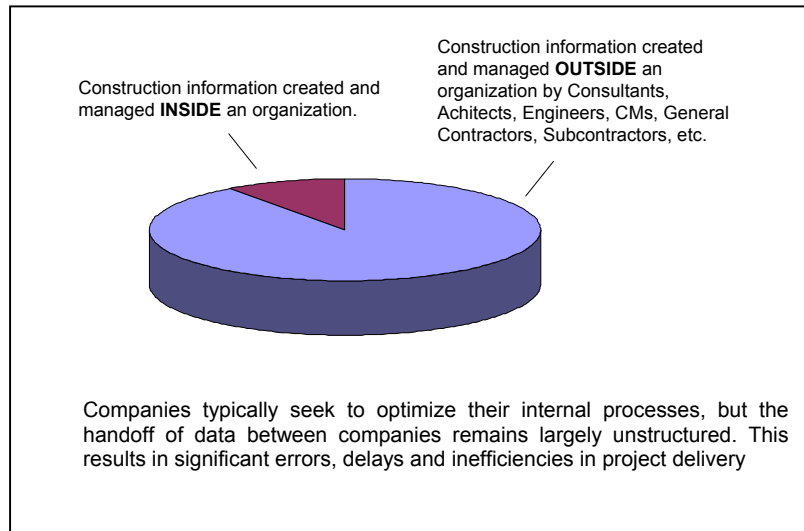
“The positive impact of fast, standardized communication across the project team cannot be overstated. It’s amazing how a relatively small investment in technology can have such a wide ranging impact.”

– Marc Boddewyn, ASLA, Vice President, Design & Construction, Hudson River Park Trust

Individual companies involved in design and construction have focused on optimizing their internal processes. But the handoff of information between companies remains largely unstructured. This is where the trouble starts.

2. ‘TRADITIONAL’ TEAM COMMUNICATION VS. WEB-BASED COMMUNICATION

The graphic below illustrates a fundamental point. For years, individual companies involved in design and construction have focused on optimizing their internal processes and project controls. But the handoff of information between companies remains largely unstructured.



When you consider the massive amount of information passed back and forth between parties at each stage of the design and construction process, this is a major source of risk. With this perspective it becomes easier to understand how basic communication – the exchange of data, documents and project information between companies – is strategic to any project or program.

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Traditional Communication Between Companies

With that in mind, let's look at the impact of "traditional" methods of communication across project teams.

Project Level



Communication handoffs between companies typically consist of a fragmented array of non-standardized documents, blueprints, revisions to blueprints, spreadsheets and internal logs, shop drawings, faxes, phone calls and poorly documented meetings.

Project Level

- Each company might be optimized internally
- No standards exist between companies
- Communication between companies is compromised
- Accountability between companies is compromised
- Workflow is compromised
- Costs and risks increase

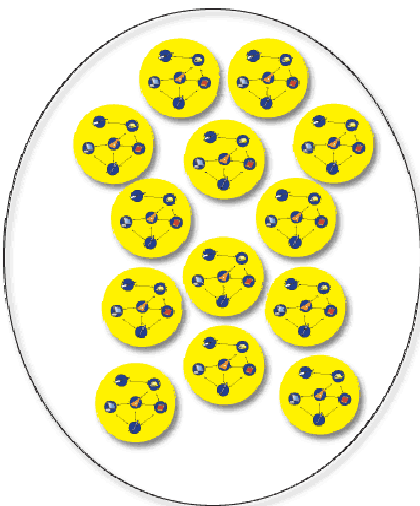
The communication links between these companies typically consist of a fragmented array of non-standardized documents, blueprints, revisions to blueprints, spreadsheets and internal logs, shop drawings, faxes, phone calls and poorly documented face-to-face meetings. A single project with a duration of more than 12 months will easily generate thousands of document "exchanges" between multiple parties. This is where the trouble starts and where the risks lie.

Program Level

Now consider the multiplier or "viral" effect of unstructured communication on a multi-project program.

- Communication risk multiplies
- Documentation risk multiplies
- Accountability decreases
- Inefficiency grows
- Costs increase
- Program risk rises exponentially

Program Level



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Web-Based Solutions Improve Communication

Constructware was designed specifically for intensive inter-team communication and collaboration. Any type of data or document can be uploaded and viewed by other members of the project team. **This has an immediate positive impact on decision making and accountability. These control the risks associated with costs and schedule.**

Constructware has been designed specifically for intensive inter-team communication and collaboration. Any type of data or document can be uploaded and viewed by other members of the project team. Excel spreadsheets, schedules, correspondence, faxed documents, photos and other sources of information are uploaded and available to all parties in a structured way. CAD drawings can be stored, viewed, marked up and routed without the need to load native CAD software on individual PCs. Related documents can be linked within the system and routed to companies that have shared responsibility on an issue. This has an immediate positive impact on decision-making and accountability which controls the risks associated with costs and schedule. Some of the benefits:

- Communication is standardized
- Documents can be exchanged instantaneously
- Documentation is standardized and centralized
- Everyone is completely accountable
- Company and geographic borders are eliminated

Consider this observation from the 2003 - 2004 chair of the American Institute of Architect's Technology in Architectural Practice committee.

"Building owners are demanding a more efficient project delivery process. They want higher quality, lower cost, and shorter schedules. How can better communication help to bring that about? Of all the applications of the Internet in the design professions, none has more wide-ranging significance than Web-based project management. It offers the potential to establish a seamless flow of project based information from player to player, over a project's entire life cycle."

– Jonathan Cohen, AIA, Jonathan Cohen Architects

The conceptual case for web-based tools is clear.

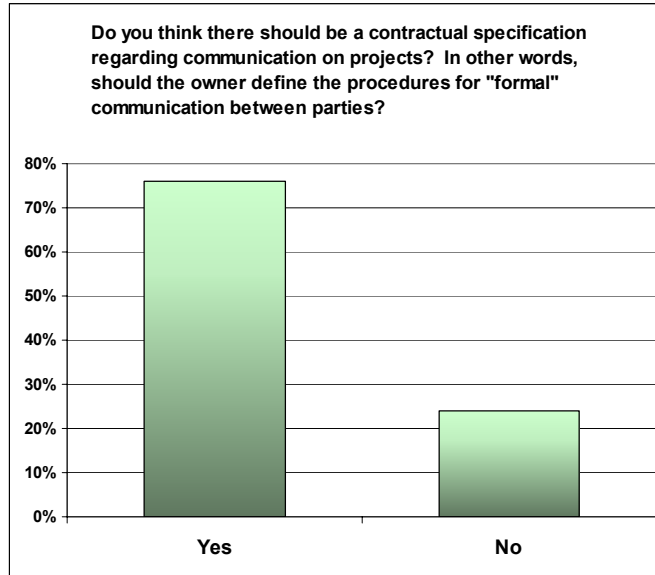


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Some Owners have begun to mandate policies and procedures for 'official' communication between members of the project team in conjunction with use of web-based tools. An overwhelming majority of Owners in the 2004 FMI/CMAA survey thought this was a good idea.

Recognizing the basic communication problem, some owners have begun to mandate policies and procedures for 'official' communication between members of the project team, in conjunction with use of web-based tools. The vast majority of owners in the FMI/CMAA survey agreed this was a good idea. In essence, this amounts to contract language outlining how communication between team members will be conducted.



Source: FMI/CMAA Fifth Annual Survey of Owners

Web-based tools produce significantly higher Return on Investment compared to other software because they have such a widespread positive impact across the project or program team. Our clients report a five to ten times return in direct costs from Constructware.

3. UNIQUE BENEFITS OF STRUCTURED COMMUNICATION ACROSS TEAMS

It is important to understand the relative cost benefit of web-based tools. Put simply, these tools produce significantly higher Return on Investment compared to other software investments because they have such a widespread positive impact across the project or program team. Some of these benefits are tangible and can be measured, others such as risk reduction, improved quality, and reduction in disputes, are more elusive but are nevertheless significant.

Sizing the Problem

How 'big' and 'costly' is the communication problem? Consider these elements...



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While the hard cost savings are significant, clients tell us the impact of Constructware on intangible factors such as “seeing the big picture,” “getting our arms around the entire process,” reduced disputes, more accountability, improved decision making, etc., is far more important.

- How many documents are exchanged on a construction project? (Drawings, modifications, change orders, RFIs, submittals, transmittals, meeting minutes, etc.)
- How much is spent on unnecessary travel or overnight / courier services?
- What is the impact of delays in document turnaround between companies?
- How much time is wasted recreating data between companies involved in a project?
- How much time is wasted updating multiple logs?
- How much time is wasted in Owner/Architect/Contractor (OAC) meetings just establishing the ‘facts’ of an issue as opposed to dealing with the substance of the issue?
- How many reporting “standards” exist among the various companies involved? How long does it take to compile useful project information – and is this information even *available*, let alone practical to obtain?

These impacts vary based on the size and complexity of the project or program. In general, our clients report a five to ten times return in direct costs from implementing Constructware. As a rule of thumb, the more widespread the use of Constructware across the project team, the higher the return on investment.

To help size these hard costs, Constructware has developed a Return on Investment Analyzer that helps companies quantify the hard costs of poor communication. More information is available at Constructware’s website.

Now consider these less tangible impacts:

- What is the value of accurate, timely information on key decisions?
- Conversely, what is the impact of outdated or incomplete information on decision-making?
- How do you measure reductions in scope creep, because the design and construction team were better able to coordinate in real time during design development?



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Web-based systems must have three crucial elements to deliver their value proposition across the project team.

- The emphasis must be on communication and collaboration across the entire project or program team.
- Functionality must span the entire design and construction process.
- The solution must “work” for the construction team.

If the construction team does not see a solution as helpful to their work processes, they're not going to use it. And if the solution doesn't work for the construction team, it's not going to work for the owner.

- How do you measure reductions in change orders that never happened – due to better coordination of specialty trades during the preconstruction buyout phase?
- How do you measure the impact of increased ‘accountability’ when companies perform more responsibly because their actions are more transparent to the rest of the team?
- How do you measure the impact of centralized information on reductions in disputes?
- What happens to quality when a team is in sync and on schedule, as opposed to engaged in finger pointing based on miscommunication?

It is easier to pose these questions than to answer them. But our clients consistently tell us that these impacts are far more important than the quantifiable “cost saving” benefits of web-based systems.

Three Basic Requirements of Web-Based Tools

Three crucial elements are needed for web-based systems to deliver their value proposition across the project team. These are:

Emphasis on communication/collaboration across the entire project or program team. Communication of many types must flow up and down throughout the project or program team (data, documents and project information) in order to facilitate improved communication. At the same time, ease of use for different types of users is key. A system that is too complicated will not gain traction. For example, you would not expect every member of a project team to use a CAD based system (too complicated, lacking built-in workflow, lacking construction phase functionality) or a scheduling-based system (too complicated, lacking in project document management capabilities). You want a system that can act as an easy-to-use communications platform for the team, but has deep functionality in specific areas.

Functionality must span the entire design and construction process. The biggest breakdowns in communication typically occur between members of the design team and the construction team. As such, you need functionality that works for both groups and streamlines workflows and communications throughout the design and construction life cycle. The solution must have the capability to ‘speak both languages.’ This means the ability to upload, view and mark up



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Constructware provides deep levels of functionality for the construction team, because this is where the rubber meets the road. Project success or failure depends on the tens of thousands of information transactions that result in materials arriving on site and work being put in place.

If you want to truly control your project outcomes, as an owner the path inevitably leads to understanding the details of the construction process. You may only want to see summary reports of the activity, but the detail is there if you need it.

Some Owners or Program Managers attempt to manage projects primarily through scheduling tools. These do not address the communication problem between companies and do not document the progress details. Therefore they have limited ability to explain the “why “ of “Why are we behind schedule?”

CAD drawings and pass these documents back and forth in a secure manner and that these documents can be intelligently linked to other documents related to specific issues such as correspondence, meeting minutes, RFIs, submittals, progress photos, pay applications, etc.

The solution must work for the construction team.

This is a ‘must have’ area of emphasis that is often misunderstood. The bottom line is that the details of the construction process are where the rubber meets the road. Success or failure depends on tens of thousands of transactions of information that result in materials arriving on site and work being put in place. If the construction team does not see a solution as helpful to their work processes, they’re not going to use it. And if the solution doesn’t work for the construction team, it’s not going to work for the owner.

It is much better to have subcontractors and contractors inputting ‘real’ field data into a system that they *use to do their jobs* than to force another administrative task on them (double reporting in their own systems and in the owner’s system).

Constructware provides these deep levels of functionality for the construction team. This has resulted in some owners saying, “This is a contractors tool.” To that we say, “You bet.” As an owner, if you want to truly control your project outcomes, the path inevitably leads to understanding the details of the construction process. One of Constructware’s unique value proposition is that it provides this detail to owners via the actual construction process. You may only want to see summary reports of the activity, but the detail is there if you need it.

By way of contrast, it is not uncommon for owners or program managers to attempt to manage projects or programs primarily through a cost-loaded schedule or a schedule-driven management tool. The fundamental flaw in this approach is two-fold. First, these tools are to a great extent divorced from what is happening in the field. Contractors manually report their progress, or inspectors verify work put in place and this is loaded into the schedule. While diligent field reporting can provide relatively accurate accounts of schedule progress, schedule-based tools have very limited ability to explain the “why” of “Why are we behind schedule?”



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A Solution that spans the full design and construction process and is *used* by the companies doing the work will be far more helpful to an owner than tools that only skim the surface or only address part of the process.

In Constructware, there is a rich record of all the communications that have taken place up and down the line, from meeting minutes to correspondence, RFIs, etc. Project schedules are a part of the picture and are readily available, but more importantly the actual field conditions -- the details of where the project stands -- are there as well.

Second, schedule-based tools touch only a small percent of the project team. It is not uncommon for subcontractors and others to be completely unaware of the "Master Schedule" held by the Program Manager -- the information is not communicated to the team in a meaningful way. Contrast that with Constructware, where the emphasis is on structured communication and accountability across the team.

If you know the 'why' of a situation, not just "Houston we have a problem," you are in a much better position to make the right decisions that lead to better project outcomes. A solution that spans the full design and construction process and is *used* by the companies doing the work will be far more helpful to an owner than tools that only skim the surface or only address part of the process.

Many design and construction firms have adopted web-based tools to improve their project deliveries and competitive advantage. In that sense the ground has already been plowed for owner deployment of these tools.

Adoption is Ramping Up Throughout the Industry

The good news is that a significant number of owners, recognizing the same problems described in this paper, have successfully implemented web-based solutions across their capital facilities programs. Equally significant, many design and construction organizations have adopted these tools to improve project deliveries for owners, and to differentiate themselves from the status quo. In that sense, the ground has already been plowed for owner deployment of web-based systems.

For example, 75% of general contractors with annual revenues above \$250 million are using project collaboration software to some extent, according to the "IT Survey for the Construction Industry (Fifth Edition)," released in June 2004 by the Construction Financial Management Association (CFMA). The survey found that Constructware is the most widely used Project Collaboration Solution among general contractors of all sizes, with more than double the market share of the next software vendor.



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A significant number of design and construction firms think owners are unwilling to pay for these tools. What's needed is strategic leadership from owners – a readiness to “engage” and willingness to consider paying some or all of the costs of deployment across their project teams.

As a result, in any regional market area you'll find construction managers and contractors, architects and engineers who are familiar with Constructware and are ready to use it. – with owners that perceive the value and are 'ready' to engage in a program of structured communication.

What is needed then is strategic leadership from the owner organization – owners that perceive the value of structured communication and are ready to shake up the status quo to achieve better project deliveries.

This is a key issue. Why? One stumbling block to wider adoption of these tools is the perception that some owners are unwilling to pay for them. A rough rule of thumb is that Constructware costs roughly 1/10th of one percent of the overall cost of a project or program (varies depending on size), covering both the software and implementation/training for the project team. In other words, implementing Constructware on a \$50 million project would be in the range of \$50,000.

Depending on your perspective, this may seem like a lot of money or an unexpectedly pleasant surprise. From my own experience as a contractor for 20 years, I can understand the cost concerns that owners have at the start of a project or program.

Many of our owner clients have decided it's in their interest to include the cost of the system including training and implementation in their project budget. Having seen the benefits, they consider structured communication a “must have” priority, because it plays a disproportionate role in project success.

Nevertheless, there is no more important investment you can make, dollar for dollar, to ensure overall project success. Countless projects end up with significant cost over-runs far in excess of 1/10th of one percent. These types of “unexpected” costs can be avoided through improved communication and ultimately, as these solutions become ubiquitous, owners will see significant reductions in delivery costs.

Many Constructware owner clients have come to the conclusion that it is decidedly in their interest to include the cost of the system including training and implementation as a line item in their project budget. This typically includes all of the major companies on their project or program team. These owners have experienced the benefits. They see the investment as a 'must have' priority.



4. CASE STUDIES

Tens of thousands of projects have been completed using Constructware over the last several years, with substantial positive impacts. Following are three case studies and several briefs with links to case studies on Constructware's website.

Healthcare

Memorial Sloan-Kettering Cancer Center, New York, New York

Project: Twenty-three story, 692,000 sf state-of the art cancer research center on an extremely tight site on Manhattan's East Side.

Challenge: This was by far the largest project in MSKCC's history. The owner wanted to better control and coordinate the design phase (more than a dozen design consultants), and also wanted to have meaningful input during design from multiple stakeholder groups within MSKCC.

Solution: With Constructware as the communications platform for the evolving design, A/E team leaders went from schematic design to construction documents in just 14 months. Equally important, the Program Manager, CM and MSKCC's stakeholders were directly involved in the design - weighing cost decisions, design intent, long-term facility maintenance issues, constructability factors, and site issues. The benefits of collaborative design were clear to everyone. Client since June 2002.

"For us, the benefits of Constructware are clear and compelling - all the design disciplines were in sync and everyone knew the latest iteration of the "big picture. It also allowed us to seek out the best design talent in the country because geographic borders were no longer an issue. As an owner we're happy to provide these tools to the project team because it results in better project delivery."

- George Mejias, Director, Design and Construction, Memorial-Sloan Kettering



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Education

Newark Public Schools, Newark, N.J.

Belmont-Runyon School of Visual & Performing Arts/Science & Technology

Project: New, high-end \$28 million pre-kindergarten through 5th grade elementary school. The 120,000-SF, two-story replacement facility includes a number of aesthetic and student-learning enhancements.

Challenge: Multi-prime contract management; schedule recovery related to land acquisition delays, severe winter weather; unique design and materials.

Solution: NPS proactively implemented Constructware, contractually requiring its use for the last four prime contractors selected. All parties actively used Constructware, including the architect and associated subconsultants. All project information, including job correspondence, meeting minutes, requisitions, schedules, RFIs, meeting notifications, sketches and submittals, were posted and tracked in Constructware.

“Initially, we chose Constructware because we wanted to create accountability among team members. We had many entities to manage on this project, and we wanted to prepare for potential legal issues surrounding the property’s purchase. Constructware provided many benefits beyond project documentation. Through instantaneous communication we eliminated traditional delays. The system helped us, as the owner, create a collaborative environment for everyone involved, with outstanding results for the end product.”

“Our experience on Belmont-Runyon showed us that Constructware’s benefits apply as much to small renovation programs as to large, new construction projects.

- William Parrish, Director, Office of Design and Construction, Facilities Management Department, Newark Public Schools.



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Government

Hudson River Park Trust, New York, New York

Project: Multi-year \$380-million program to transform five miles of West Manhattan's waterfront docklands into a series of parks and public spaces. The program consists of hundreds of small, phased projects in seven segments. The 550-acre parkland extends from Battery Park in lower Manhattan to West 59th Street.

Challenge: As a public entity with limited resources, the Trust must simultaneously manage an extremely complex building program with a small staff, (two architects and one engineer) while demonstrating professionalism in order to maintain public support and funding. The Trust typically manages more than 180 separate projects at a time involving hundreds of specialty contractors and vendor/suppliers, as well as 100+ consulting engineers, marine, environmental and architectural firms.

Solution: Constructware solved two key issues for HRPT: 1) the need for an internal enterprise application for managing the program, and 2) streamlining external communication and document-centric workflows between the dozens of entities involved in the design and construction of the Park. Constructware was successfully deployed during the first segment of the Park, replacing a manual tracking systems consisting of a mix of emails, spreadsheets, Word documents, faxes and phone calls. These "traditional" program management tools were labor-intensive and created the potential for poor communication, disputes and inefficiencies in design, procurement, construction and program management.

There are roughly 250 users of the application, of which roughly 175 are logging in daily as phases of the program and individual projects go forward. Utilization is high due to two factors: 1) use was mandated for all firms by contract, as part of the bidding process and 2) HRPT took proactive steps to adequately train users. The Trust successfully opened the first of seven phases of the park in the summer of 2003, and a second phase began at the northern-most section of the Park in summer 2003.

The Park has received several awards and national recognition for its deployment of Constructware. This includes Second Place in New York City's 2004



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“Excellence in Technology” awards, which fielded entries for the most innovative technologies used among all New York City agencies. In October 2004, the New York State Archives awarded the Trust its “Award for Excellence” in local government archiving, for use of Constructware.

“The positive impact of fast, standardized communication across the project team cannot be overstated. It’s amazing how a relatively small investment in technology can have such a wide-ranging impact. Constructware is playing a key role in our ability to deliver the Park to the public on time and on budget.”

“A lot of documents need to flow through an approval process before the work is done, and Constructware helps us track that approval process. We can keep track of who has seen what, who has signed off on what, when they did so, what’s on time and what’s late.”

– Marc Boddewyn, ASLA, Vice President,
Hudson River Park Trust

Drastically Reduced Need for IT Resources:

“Constructware’s hosted approach is ideal for us. There is no way we could make an application like this available to so many parties if we had to support it ourselves. New users are up and running and contributing to their projects in no time.”

– Michael Breen, P.E., CIO, HRPT

Cost Effective Centralized Archiving of Project Records:
“As a state agency, we’re required to archive much of what goes on at the jobsite and keep it for an extended period of time. Constructware stores our documents electronically offsite in a much more secure and cost-effective way than the traditional ‘box and store’ approach. The state archive has told us we are one of the leading agencies in meeting state requirements.”

– Michael Breen, P.E., CIO, HRPT



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5. CLIENT BRIEFS

Indianapolis Public Schools, Indianapolis, IN

10-year, \$832 million dollar Capital Improvements Program for the state's largest school district. The work covers 78 schools, including renovations, expansions and a number of new (replacement) schools. Client since 2001.

California Dept. of Transportation, Headquarters Building, Los Angeles, CA

\$167 million headquarters for the California Dept. of Transportation in Los Angeles. The project (completed in fall 2004) not only won critical praise for its innovative and striking design, but was completed in such a dispute-free and timely manner that local L.A. newspapers editorialized: 'if only Caltrans could complete highway projects in such a timely manner.'

San Juan Unified School District, Sacramento, CA

Multi-year \$350 million building program for the 10th largest school district in California. More than 250 individual projects have been completed or are in progress, with another 150 planned for 2005-2006. Client since May 2003.

National Oceanic and Atmospheric Administration (NOAA) Satellite Operations and Data Processing Centers, Suitland, Maryland

\$50 million, 245,000 sf new satellite operations and data processing center that will serve as NOAA's base of operations. The facility is 90% below ground. Constructware proved to be a key communications tool between the design and construction team when significant site dewatering issues arose early on, and for coordination between the site team and owner stakeholders at the U.S. General Services Administration and NOAA.

The Collaborative Innovation Center at Carnegie Mellon University, Pittsburgh, Pennsylvania

\$28 million, 133,000-SF dry-lab research facility on a tight site in an active university campus setting. Construction Manager P.J. Dick mandated that subcontractors report through Constructware, which significantly improved coordination and resolution of design issues and for daily coordination of work on the tight site. Multiple owner stakeholders were able to monitor the project progress through Constructware.



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Fast Read:

University of Alabama at Birmingham, North Pavilion Hospital, Birmingham, Alabama

\$152 million, 10-story 885,000-SF state-of-the-art replacement hospital. Agency Construction Manager Brasfield & Gorrie managed the work of 37 subcontractors using Constructware. From the beginning of the preconstruction process, all project information was stored and tracked in Constructware, including meeting minutes, drawing logs, RFIs, submittals, transmittals and punch list items.

Kansas City International Airport, Kansas City, MO

\$120 million+ renovation of three terminals at Kansas City International Airport. The comprehensive “gut and rebuild” program included numerous design changes after construction started to meet post-9/11 federal security standards. Constructware was used by the general contractor and 50+ subcontractors to rapidly communicate design changes and coordinate fieldwork – all while keeping the terminals in operation.

For owners, Web-based tools represent the most practical, low cost and readily available solution to the communication risks and problems of the design and construction process.

5. CONCLUSIONS / SUMMARY

A recent survey of more than 120 owners from all sectors of business and government confirm that there are serious, systemic problems in the delivery of design and construction services in the United States. Individual design and construction firms are often extremely competent and have been selected by an owner – based on their capabilities and track record. The major problems on projects universally can be traced to miscommunication between these parties.

Web-based communication/collaboration tools, which have been available to the industry since the late 1990s, have proven to be extremely effective at minimizing these issues. Eighty percent of respondents to the FMI/CMAA survey agreed that these tools can “reduce costs and disputes” on projects. More importantly, a growing body of credible field evidence on projects and programs large and small has proven that these tools have a strategic impact, particularly when used to integrate the entire project team.

For owners, web-based tools represent the most practical, low-cost and readily available solution to the inherent communication risks and problems of the design and construction process. Owners have tried over the last decade to improve processes in many

Fast Read:

Marshalling the collective will to implement a strategic communication solution is without a doubt a challenge. But many other owners and project teams have overcome the "status quo" arguments and are reaping the benefits.

The solution is ultimately about leadership. You don't have to know that much about the processes of design and construction to know that they need serious improvement. **This is one area where you can and should make a difference.**

ways. Some owners have tightened up contract specifications and legal terms to drive performance of design and construction teams. Some have engaged in extensive pre-qualification, partnering sessions, new delivery methods, etc. All of these may be helpful, but the basic problems remain and continue to grow.

Executives typically do not consider these issues, for various reasons. For one there is a "glass ceiling" within the industry about the value such tools can play in solving strategic business problems. Most upper level managers in charge of real estate and capital construction have difficulty making the connection between the systemic problems they encounter on their projects and the strategic role that structured communication solutions can play in improving the process.

Second and most importantly, marshalling the collective will to implement a strategic communication solution is without a doubt a challenge. This is particularly true when the status quo is so deeply entrenched. ("Why change - We've been doing it this way for 20 years?!") Executives will encounter pockets of resistance from their constituencies both inside and outside their organization. ("That's what you hired me for.") Some architects will say that from a legal and liability standpoint they cannot share their work in such a collaborative manner. Some construction managers may say these tools are not necessary – they can manage the process for the owner using their own tools. An owner's project manager may find it difficult at first to get a contractor's subcontractors on board, again for different reasons.

But other owners and project teams have overcome these 'status quo' arguments. These tools are working for a significant number of owners, architects, engineers, and contractors. Or as ENR pointed out in an October 11, 2004 cover story titled *Web-based Tools Excel at Empowering Project Teams* – "Web based project collaboration software has come of age."

The solution then is ultimately about leadership. You don't have to know that much about the design and construction process to know that it needs serious improvement. This is where executives who oversee capital facility functions within their organizations can provide strategic leadership. **This is one area where you can and should make a difference.**



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About the Author

Scott Unger is co-founder, President and Chief Executive Officer of Constructware

Scott Unger is a nationally recognized leader in the field of Information Technology in the construction industry. With more than 20 years of experience, he is a featured speaker at national industry conferences such as the A/E/C Systems Show, and the annual conferences of the Construction Users Round Table and the Construction Management Association of America. He has authored several articles and white papers on technology trends in the industry, and speaks at numerous local and regional gatherings each year. He formed Constructware in 1994 after serving more than five years as a technology consultant to the construction industry, developing customized project management software. Constructware introduced the construction industry's first Internet-based project management, collaboration software application in late 1997.

Mr. Unger's background includes extensive construction operations experience. During the 1980s and 1990s he was co-founder and president of Nix-Unger Construction, Inc., a commercial subcontracting firm in Atlanta. Mr. Unger is a long-time board member and 2005 Chairman of the Associated Builders and Contractors, Georgia Chapter. He graduated from Tulane University with a B.S. degree in Computer Engineering and now serves on the Board of Advisors for the School of Engineering.

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