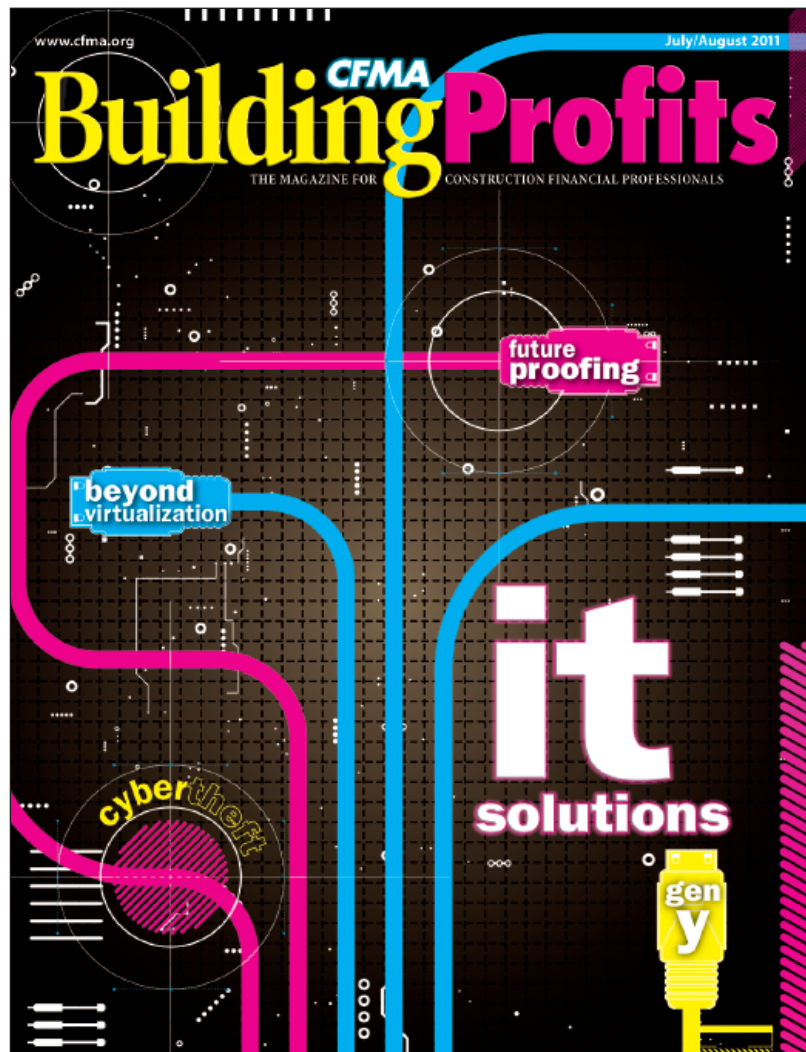


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R E P R I N T



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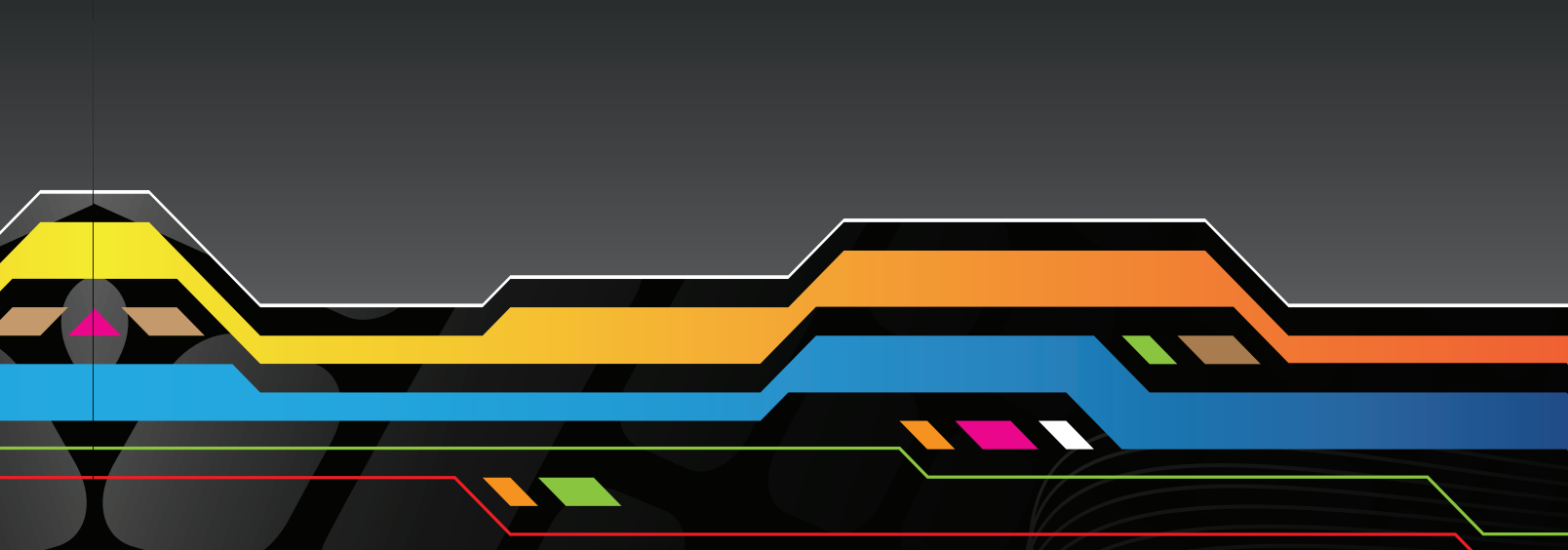
The Source & Resource for Construction Financial Professionals

The background features a dark grey field with a grid of thin white lines. At the top, there are several thick, horizontal, multi-colored lines in orange, blue, yellow, and red, with some segments having a 3D effect. In the lower-left quadrant, there are several 3D arrows pointing upwards and to the right, in colors of grey, red, blue, and yellow. The text is centered in the upper half of the image.

beyond VIRTUALIZATION

moving from
remote access to
true
collaboration

BY JOHN CHANEY



Once collaboration becomes reality, construction productivity will significantly improve, as project information will be easily available to all participants.

Two things can be said of economic downturns in the construction industry. First, a recovery that follows has roughly the same duration as the downturn itself, and brings the industry close to the level of growth it experienced prior to the downturn (see the next page).

Second, the pressures of more competition for less business change how contractors do business. Previously, contractors that embraced new technologies and ways of getting work done emerged stronger from recessions.

For example, during the recession and recovery of the early 1980s, new approaches emerged in preconstruction (e.g., value engineering) and live construction (e.g., slip forming).

What these and other process and productivity improvements have in common is that they were caused in large part by the pressures of difficult environments.

So, how is construction productivity changing in response to the recent recession, and what new processes and technologies are the agents of change?

Path to Productivity

The construction industry, by nature, has not been able to take advantage of some significant efficiencies that other industries have experienced. Take a look at the exhibit on the next page that compares U.S. construction productivity to the manufacturing sector.

The most common reason that's given for this discrepancy is that contractors lag in adopting new technology and implementing efficient workflows. In response – and in defense of the construction industry – offshoring and outsourcing are generally not options in construction. And, despite growth in

prefabrication options, the majority of the work involved in build-in-place construction must take place at the jobsite.

Another major difference between manufacturing and construction is the concept of the manufacturing assembly line – a smooth transfer of work from raw materials to finished product, which produces dramatic efficiencies.

Similar to a manufacturing line, the construction process has divisions of labor. Architects and engineers apply their unique skills and contractors perform expert trade work. However, it's the “belt” that is missing – the production platform that links all of these unique skills needed to create and complete a construction project.

Enter the idea of construction collaboration. As a general concept, it's hard to argue with the value of collaboration among all construction project participants.

The challenge lies in moving collaboration from a marketing buzzword to a real process within the construction industry. With an economic recovery beginning, how contractors address this challenge will become one of the biggest positive changes to the industry. And like most change today, technology is at the heart of the matter.

Virtual Assembly Line

Unlike many manufactured goods, construction projects are not built under one roof. If construction collaboration is the path to productivity, then a new type of “assembly line” is needed to connect all project participants.

What exactly is passed down this virtual assembly line? Information. Like all industries that are characterized by large, complex projects that involve multiple participants, information is the common thread of collaboration.

TECHNOLOGY'S ROLE SO FAR

The construction industry is no stranger to complex information management, and is not as chronic of a late adopter of new information technology as many believe.

For example, architects and construction engineers were among the first to use CAD/CAM applications, and contractors were deploying construction-specific enterprise software in the 1970s (before the term “enterprise software” was commonly used).

And, over the past decade, the evolution and delivery of electronic data in standardized formats through Building Information Modeling (BIM) has significantly changed how many companies work with construction data. BIM represents significant advancement in the quality and quantity of information available to all involved in preconstruction.

Yet, it has not had the same significant impact on the fundamental ways project participants work together. What's missing? A standard way to share and pass rich, sizable data among project participants and a way to translate the collaborative work from preconstruction into live construction.

The solution requires technology capable of extending and translating complex, shared information outside of a company's four walls.

From Virtual to Real Collaboration

Real assembly lines do not stop midway through production. To take construction productivity to the next level, technology must serve as a foundation for sharing information from start to finish – from design to completion.

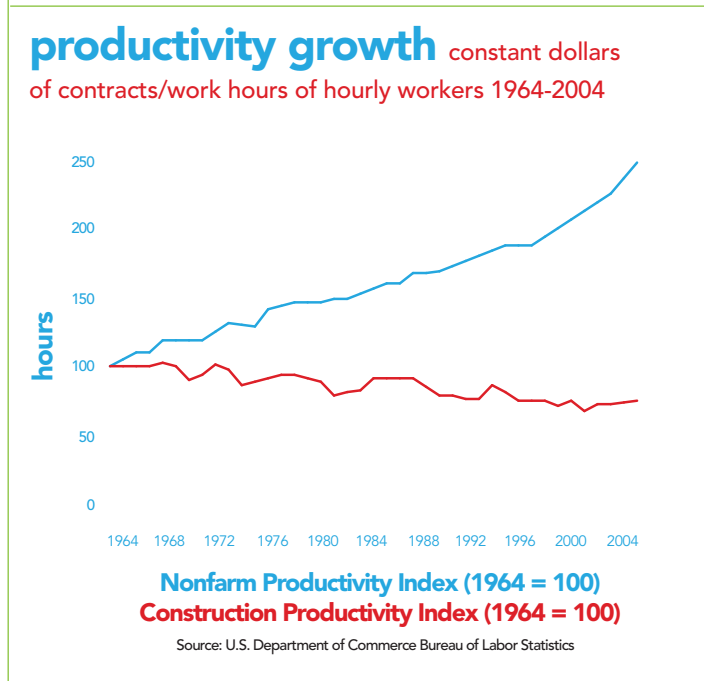
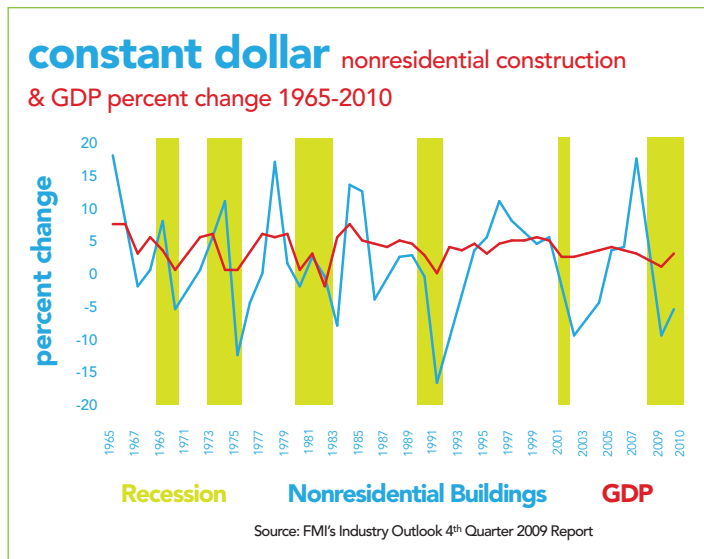
Enterprise software systems deliver data integration between the office and the field. While these applications can be integrated and improve internal productivity, they are not built to be common data-sharing platforms between companies.

Even though BIM offers a new standard for multi-dimensional data, it does not provide a standard method of data sharing. These technologies are necessary, but not sufficient for creating an environment of real collaboration.

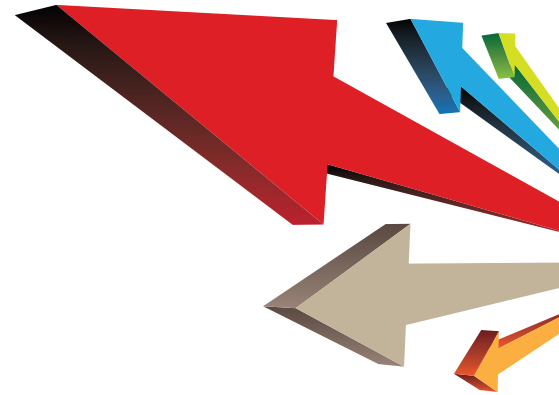
INTERNAL & EXTERNAL SHARING

Moving toward collaborative construction means finding secure and effective ways to share information internally with remote employees and externally among project partners. Solutions for both have existed for some time, but have significant limitations.

Even though remote employees can access company data and applications through virtualization technologies (that allow them to connect to and emulate their computing environments at work), this solution still requires:



Like all industries that are characterized by large, complex projects that involve multiple participants, information is the common thread of collaboration.



- Client and server software to be present and running in their work or a hosted environment;
- Special access software on whatever client they are using remotely; and
- IT implementation and management.

External partners can share data through such programs as Drop Box or Microsoft's SharePoint, but these solutions only provide a common location for data. This is not to say that the ability to remotely access data and applications, as well as store and share information, is without value.

However, with the potential for all project participants using different applications to process the data differently, a collaborative work environment cannot be realized.

ENTER TRUE CLOUD COMPUTING

Although virtualization and data-sharing Websites are often represented as "cloud solutions," they are only intermediate steps toward the much more open and accessible environment that exists when internal and external users can access both applications and data from anywhere, with any device that connects to the Internet.

The "cloud" is not a solution in and of itself. Web-based computing offers a ubiquitous platform upon which both data and applications can be available to groups with a common interest or goal.

What does this mean for construction collaboration? All project participants, from owners to subcontractors, can access project information regardless of the device or application used. But, simply tapping into data is not collaboration.

The final technical piece of the collaboration "belt" is the delivery of common applications used by all the project participants.

There are many applications available for the different phases of construction. A contractor has hundreds of choices when it comes to the type of bidding, estimating, or project management software packages to use.

This is a healthy, competitive situation and not likely to change any time soon. But, how can a common set of applications ever be found?

The answer lies in the realization that there need not be a common set of applications for *every* project – simply a common set for *each* given project. As participants work together to bid on and build a job, they tap into both a common set of data and a common set of applications. Both are delivered using the Web as a platform, so there aren't any requirements other than Internet access.

To make this scenario realistic, software providers are challenged to go beyond cloud-based applications – they must create applications for the different phases of construction that can be used with little or no training. Construction project participants who have never used a particular application must be able to log on and start working immediately.

If this seems like an impossible task, consider the Apple iPad as an example. This sophisticated piece of consumer electronics is ready to use out of the box with virtually no instructions – a feat made possible because this very characteristic was integral to every part of the product's design.

This is why virtualization alone (making complex applications remotely accessible) cannot deliver true collaboration. The applications that will enable construction collaboration must be written (or rewritten) with true collaboration in mind from the outset. They must be built with accessibility and ease-of-use in mind for the new environment of cloud computing.

The assembly line concept that has provided the manufacturing industry with nearly a century of productivity growth can indeed be applied in the construction industry.

In this case, the “line” is the world’s largest communication platform – the Internet – and the stations along that line consist of Web-based applications built for different project groups to use without any instruction.

There is some degree of speculation involved in stating that this is the technology path along which the industry is moving, but the growth in Web-based applications is clear. The move away from virtualization and toward cloud computing is underway (see below).

Changing Technology, Changing Investment

Construction is fundamentally different from other industries because it’s more event-driven than process-driven. The events are the construction projects that involve different groups of people who use, share, and manipulate a common set of data and then move on to a new event – often with different participants.

All companies can, and will, continue to use their preferred software for their business needs. But, when they work with others to design, bid, estimate, and build, they will begin to use shared applications and data more frequently.

The IT model in the construction industry is moving toward a hybrid of purchased business management applications and subscribed Web-based services. The days of software in a box may ultimately be numbered, but not for some time. And, the often-heralded “death of the PC” may be true, but also not anytime soon.

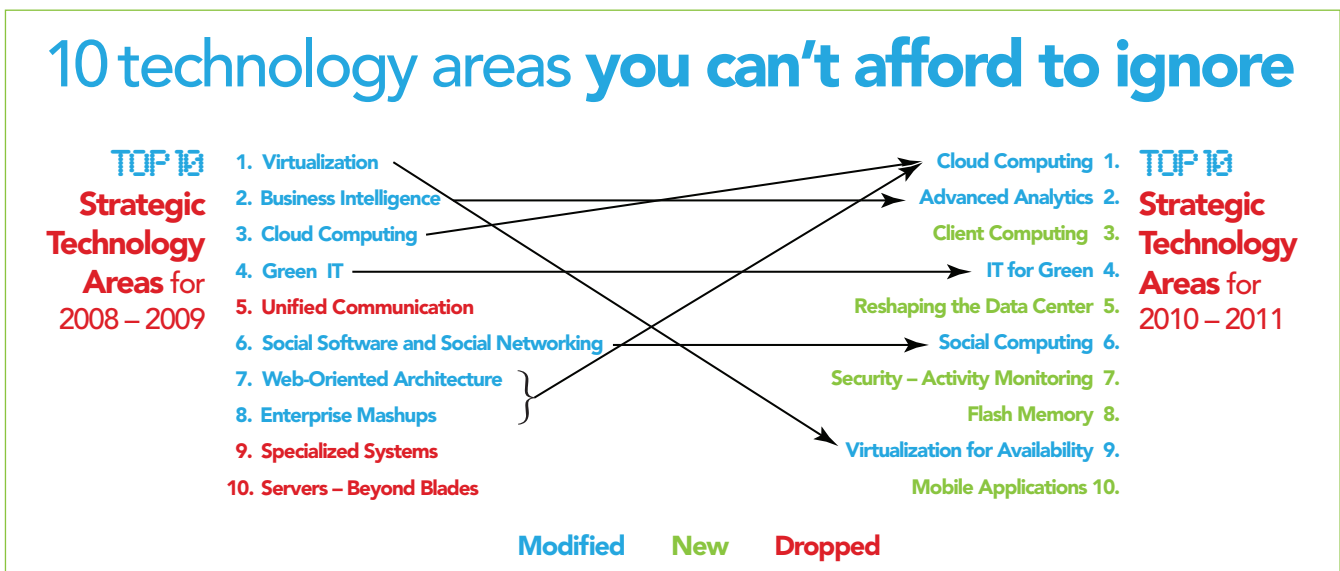
Contractors still need to make capital investments in hardware, software, and IT support for the foreseeable future. However, there are three things that CFMs and IT managers should keep in mind as the industry adopts Web-based software services:

CONNECTIVITY

Be aware of your company’s bandwidth usage patterns at all locations. There are online tools that provide some idea of overall bandwidth use, but a measurement over time with a network analyzer is the best way to know the exact state of Internet connectivity.

Today, 5-10 megabits per second (Mbps) is common for small-to medium-sized businesses, but upload and download bandwidths are not the same, with upload speeds almost always significantly lower.

There is no magic bandwidth number, but if a company is already pushing existing download or upload limits, then the trend toward more Web-intensive computing stresses the need to invest in additional bandwidth.



HOSTING OPTIONS

As more Web-based applications are delivered, more client software will be replaced with browser-based application access. In this “zero-client footprint” environment, how to host the software will become a decision point.

Many applications (particularly those that are event- or transaction-oriented) will lend themselves to a pure cloud deployment. However, many contractors may choose to keep certain applications in-house or at a third-party hosting vendor of their choice. The key is to engage software vendors that support multiple deployment models and, therefore, offer multiple options.

VENDOR ROAD MAPS

A yellow caution flag should go up if a vendor of mission-critical software does not have a plan for migration to Web-based deployment, or at least toward support of hosted services. Running traditional “thick-client” enterprise software means maintaining more powerful and, therefore, more expensive client hardware.

If most of a company’s business software migrates to a hosted or Web-based environment, then it might be forced to maintain and regularly upgrade computer resources based on just one or two software applications that require the traditional client-server deployment.

Seek vendors that know where they stand in support of hosted or cloud-based deployment, and that realize that the “thicker” the client portion of their software, the more difficulty they will likely have in moving to a true zero-client footprint model.

Conclusion

The construction industry is approaching a tipping point in IT that holds great promise for productivity and carries many changes, which means true collaboration will one day become reality.

Most contractors will go with enthusiasm, and some will go kicking and screaming; either way, history shows that the construction industry will adapt to the changing environment by adopting new technologies. ■

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He is involved in all aspects of the development of Spectrum Construction Software and works closely with Dexter + Chaney’s construction clients throughout the U.S.

John is an active member of CFMA’s Puget Sound Chapter, a former member of its Board of Directors, and a former chairman of its Academic Scholarship Committee. He frequently writes articles on topics relevant to construction financial professionals.

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