

# The Strategic Role of IT in Construction



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**Although IT is not a traditional role in construction, technology's influence in construction continues to grow, increasing the demand for IT and the impact they can have to improve construction.**

With the obvious exception of construction IT providers, IT has never been the core business of a construction company. For today's planners, designers, constructors, manufacturers, suppliers, and maintainers, IT provides vital life support, and needs to constantly adapt to new technological trends and changing market conditions. Much has changed with the advent of the web, and digital transformation is becoming a key challenge, shifting construction from file-sharing to being data-centric, and corporate IT will play a key role in ensuring their companies become the disruptors—not the disrupted.

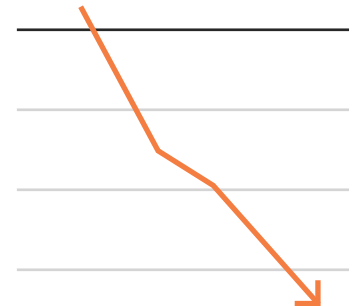
Architecture and engineering were then in their infancy as distinct professions, but during the 19th century, institutions were established to develop industry knowledge and to help new entrants apply that knowledge to new challenges. Designers learned how to make complex calculations and prepare detailed drawings that could guide constructors, and the core skills and knowledge changed only slowly until the late 20th century. Many of today's construction business leaders started their professional education and careers when information was still largely hand-crafted and manually exchanged on paper, with negligible use of what we today describe as information technologies.

However, in under 40 years, construction has—like many other industries—been transformed by new technologies. Paper-based exchange of paper is, in many sectors of the industry, now the exception rather than the rule, and some tasks that were once onerous and time-consuming are now highly automated and conducted in real time. And to support businesses during this Third Industrial Revolution—the Digital Revolution—new support functions became necessary.

Within construction businesses, traditional construction disciplines are now complemented by specialists in telecommunications, computer hardware and software, and the internet.

Thus, in any sizeable construction business, the IT department now features alongside other overhead corporate functions such as accounts, legal affairs, human resources, marketing, and facilities management. Indeed, the IT team often provides vital life support to the work of just about every manager and employee—from the CEO down to the new starter working in a jobsite trailer, from front-of-house reception staff to accounts clerks in the back office—providing both generic office and construction-specific tools to keep all departments running.

#### PAPER-BASED EXCHANGES OVER TIME





01  
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## The third Industrial Revolution

Across most developed economies, construction remains one of the least digitized industry sectors. This is perhaps a remnant of the industry's artisan roots; in the 18th century, for example, one of Britain's greatest engineers, Thomas Telford, started as an apprentice to a Scottish stonemason and later taught himself new skills to lead the specification, design, and management of building projects. Similarly, two of England's earliest contractors started "on the tools": John Mowlem also trained as a stonemason, while Thomas Cubitt was a carpenter before establishing his own building company in 1810. Many familiar names in international construction also have humble origins: Bechtel Corporation, for example, was originally founded by cattle farmer Warren A. Bechtel who started to construct Oklahoma railroads with a team of mules in 1898.



02  
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## Centralization and decentralization of IT

In many mature construction businesses, the IT function grew incrementally and was perhaps initially supervised by staff drawn from either construction disciplines or from other overhead support functions (finance, for example).

However, as IT has grown in importance and cost, firms increasingly appointed specialist IT managers, IT directors, even chief information officers (CIOs), to maintain and improve their digital functions. They were responsible for providing information and communications technologies (resilient and secure hardware, software and connectivity, including data and voice, plus provision of ongoing technical support) to internal colleagues and, sometimes, to other external construction collaborators—for example, to operational teams delivering clients' projects.



As these tasks multiplied, so did the required resources. Many corporate IT departments centralized IT functions, building data-centers, establishing “command and control” corporate policies regarding the provision of IT and communications services, and managing staff, equipment, and budgets to ensure their organization remained efficiently and reliably connected, suitably IT-literate, and secure.

Such was the scale of the investment made in centralized IT, that some organizations became heavily dependent on their IT departments, expecting them to provide all related services. However, the nature of IT provision continued to evolve, particularly with the advent of the internet and, from the mid-1990s onward, the Worldwide Web.

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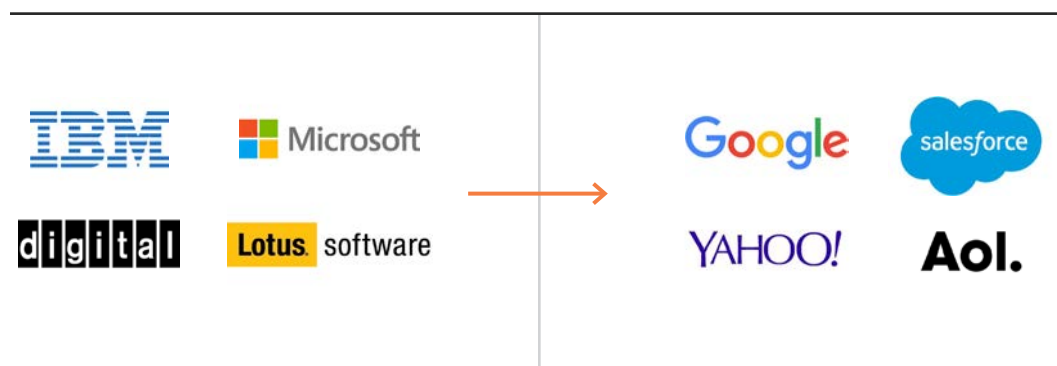


Software that once needed to be loaded onto individual machines could now be provided over local—or wide—area networks, personal backups of files were replaced by shared network drives, files could be sent as email attachments, and corporate communications could be managed via intranets, extranets and the web.

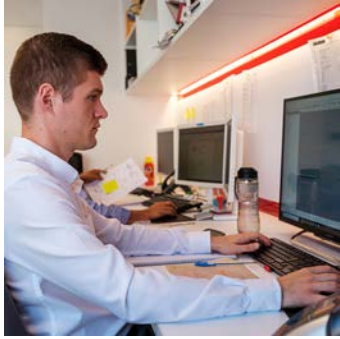
In some cases, this started to free what were still mainly desktop warriors from dependence on their IT departments. The emergence of Software-as-a-Service (SaaS) applications delivered via a standard web browser, for example, enabled project managers to commission low-cost, shared online environments they could implement immediately for project-related document and drawing management on a pay-as-you-go basis.

The late 1990s and early 2000s were therefore an uneasy time for many corporate IT professionals. Their allies among the familiar giants of IT hardware and software provision (IBM, DEC, Microsoft, Lotus, etc), were being challenged by new suppliers (Google, AOL, Yahoo!, Salesforce, etc) whose focus was on managing information rather than providing technology.

## THE EVOLUTION OF SOFTWARE







03

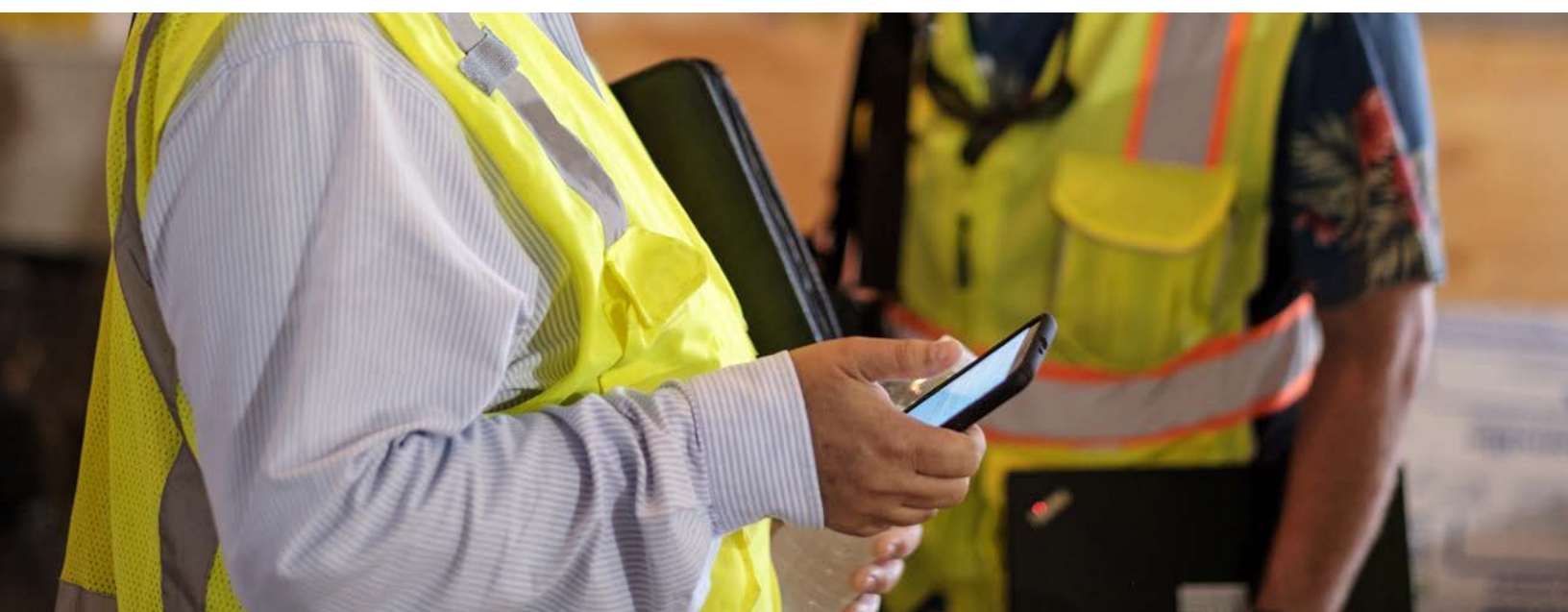
## Information-as-a-Service

New web-enabled business models allowed start-up businesses to create new information management services that could dramatically accelerate key business processes—in many cases, by centralizing provision “in the cloud.” IT departments might argue, for example, that they could use Microsoft’s SharePoint to create a viable alternative to a construction document management Software-as-a-Service, but they faced multiple major hurdles.

- + First, the start-ups were applying sector-specific expertise to replicate industry processes and workflows, and these couldn’t be easily recreated using a generic platform like Sharepoint.
- + Second, SaaS start-ups specialized in cloud delivery of their core service, and could ensure a reliable, resilient and secure service, underwritten by a service level agreement, that could not be recreated using most corporate data centers.
- + Third, in such a highly contractual, often adversarial and litigious industry, a construction business simply might not be trusted by third-party project partners to host their data.
- + Finally, SaaS vendors know that their customers and project partners use multiple software applications, and so are adept at reliably integrating solutions into an ecosystem geared to industry-specific needs: connecting field point solutions to construction management and then providing business intelligence reporting, for example.

As well as the shift to the cloud, construction information increasingly needs to be accessed across multiple devices. Historically, most construction hardware/software usage was office-based (whether in company offices or site accommodation), but particularly since the advent of consumer-friendly smartphones and tablets, employees—especially those on site—increasingly want applications and data that they can use anytime, anywhere, and across any device. And sometimes they may want to use their own devices and apps, so some IT departments have also had to develop and maintain BYOD (bring your own device) policies and procedures.

Conventional computing devices are also now being augmented by new hardware, ranging from low-cost RFID tags and Internet of Things (IoT), sensors and smart meters, through virtual, augmented and mixed reality (VR, AR, MR) headsets and immersive ‘caves’, to 3D printers, laser-scanners, drones, robots, and autonomous vehicles. And construction industry discussions—echoing those in other more digitally advanced sectors—are also extending to the emerging technologies such as machine learning, artificial intelligence, and blockchain, among others, which form part of what is sometimes called [the Fourth Industrial, or Machine, Revolution](#).



Underpinning the more immediate changes is the gradual shift away from working in the 2D paper-based media once familiar to people like Thomas Telford and Warren Bechtel toward working in a model-based environment. Increasingly important in the world's more developed economies, Building Information Modelling (or Management), BIM, is part of an ongoing digital transformation of processes in the built environment.

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Using BIM, assets are conceived, planned, designed, fabricated, assembled, commissioned, and then operated and maintained using rich model-based data—not just 3D information, but enabling processes relating to 4D (time), 5D (cost), and to long-term sustainable asset management. At handover stage, future owner-operators will no longer receive an archive of documents and drawings, but a “digital twin.”

## Setting strategic IT direction

Today's smart construction IT managers and CIOs, therefore, need to be able to juggle multiple roles and responsibilities, and to work closely with other teams, both internally and externally, to help businesses grasp the opportunities of digital transformation. This will involve a shift from short-term tactical or legacy approaches based on current capabilities and collaborative capacities to a more strategic perspective where digital competence forms part of the firm's competitive edge.



### Legacy

More often than not, firms will have legacy systems that are no longer fit for purpose—many construction businesses are instinctively cost-conscious and risk-averse, and as a result the construction industry has historically under-invested in IT. There may be a temptation for users to stick to what they know—it ain't broke, why fix it?—but what works today may not be suitable for the business to compete tomorrow.

A related challenge is legacy thinking. Construction is necessarily a conservative and risk-averse industry; it is fragmented and prone to short-term working in “silos.” BIM and other digital changes, however, demand greater collaboration across disciplines and between companies, with shifts toward longer-term commercial relationships. In the 2020s, construction CIOs will need to be strategic leaders, helping identify technology partners and applying IT to support efficient value-adding processes that keep their companies lean and competitive.



Neil Pearce, CIO at UK national builders merchant Travis Perkins, drove a transformational shift from legacy systems to digital services.

*Interviewed by Computer Weekly*, he said:

**“We’ll have a much more efficient business—one that’s able to attract and retain people because we’ve got a better set of systems and processes. We’ll be at a point where we’re making use of our digital capabilities to create much better services for our customers.”**



## Strategy

Clearly, then, IT is no longer an ancillary consideration for construction businesses. Whatever their size and sphere of operations, 21st century construction firms need to be digitally connected and to have a long-term strategic view of how IT will sustain their businesses. For some businesses with historic roots in pre-digital times, making the shift to incorporate digital thinking into business strategy and executive decision-making can be challenging, but—in the face of potential disruption by existing and new competitors—it will be a necessary change.

This is not a “big bang” change requiring major investment. It can be tackled through a progressive and often repeated cycle of steps.

- + Assess your organization’s current levels of digital competence (in the UK’s Construction Industry Training Board’s October 2018 [digital upskilling report](#), its skills pyramid ranges from non-users of technology at the bottom to “skilled innovators” at the apex).

- + From this starting point, identify where you want your business to be in terms of its digital assets, skills and capabilities, and by when (think SMART: are the objectives specific, measurable, achievable, relevant, and time-based?).
- + Align the company's digital ambitions with the company's HR and business strategies—adapt these if necessary and then keep them aligned and realistic (for example, recruitment, retention, reward, and training policies will need to reflect the strategic digital needs of the company, while marketing and business development may be focused on opportunities that will help the company build its digital competence and competitiveness).
- + Identify simple steps to make progress. An initial step may be to trial a new technology on a small internal project, and then—if that is successful—on a project involving external stakeholders, so that you can also understand the impacts on their business processes and people.
- + Share details of successful pilot projects internally and externally (especially with customers and supply partners) and look for opportunities to integrate solutions so that information is efficiently and securely managed and connected, and people and processes are adapted accordingly.
- + Constantly monitor how changes to people, processes, and technologies might deliver mutual benefits with customers and supply chain partners through improved information flows, business transaction efficiencies, and value added to projects.

05

## Be a disruptor—not disrupted

IT is no longer “a necessary evil.” Today it provides vital support to the daily working of just about every construction business, from the sole-trader or SME needing information out in the field and rapid contact about new business, to the leaders of multi-national corporations wanting real-time reports on core business metrics. But it has also increased in importance. IT was often initially applied to automate and accelerate laborious and time-consuming traditional processes, but the advent of BIM and other technologies means we should be questioning the continued effectiveness of those processes and of the deliverables they generate.

As digital transformation starts to take hold, businesses cannot stick to doing things how they’ve always done them. Doing so runs the risk of being overtaken by more agile, digitally competent, and highly connected competitors. By helping develop a digital vision for their firms, IT leaders can help businesses meet today’s challenges and build a digital platform for that business to be even more competitive tomorrow.



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