BREAKING
THE
BOTTLENECK

How Technology is
Transforming Commercial Construction

THE ECOSYSTEM OF COLLABORATION

Every commercial construction project is the result of a unique and collaborative ecosystem composed of architects, engineers, owner's representatives, property managers, general contractors and tradesmen. To achieve project goals — most especially completing builds on time and on budget — it's essential that information flow freely and accurately between all parties in real time.

PRE-CONSTRUCTION PHASE

What's Happening?

- Space Acquisition
- Design Development
- Feasibility Study
- Site Plan/Evaluation
- Pre-Procurement

Collaborators

- Owner's Rep
- Architects
- Engineers
- Constructor
- Client

Owner's Cost

- 20%

CONSTRUCTION PHASE

What's Happening?

- Procurement
- Build Out
- Safety Coordination

Collaborators

- Owner's Rep
- Architects
- Engineers
- Constructor
- Client

Owner's Cost

- 60%

POST-CONSTRUCTION PHASE

What's Happening?

- Punch-List
- Inspections
- Commissioning
- Move-In
- Close Out

Collaborators

- Owner's Rep
- Architects
- Engineers
- Constructor
- Client

Owner's Cost

- 20%

Unfortunately, that's not often the case. The construction phase of any build is the most time-consuming, expensive part of the process. **Construction expenses may represent as much as 60% or as little as 40% of the cost to the first building owner.*** Keep reading to learn how one factor – the strategic embrace of construction technology by builders – can result in a meaningful improvement in both timeline adherence and cost controls.

Breaking the Bottleneck = Better Buildings Faster & More Affordably.

* (2017) National Building Cost Manual – 41st edition, Craftsman

Behind the Bottleneck Causes & Costs

CAUSAL ELEMENTS

What's contributing to the bottleneck? The slow adoption of technology by the construction industry is a significant contributing factor. According to the 6th Annual Construction Technology Report from JBKnowledge, construction continues to budget the least for IT compared to other industries. 46.4% of firms allocate less than 1% of total revenues to IT.* **That factor considered, it's not shocking construction is second to last in the adoption of new technology, only narrowly beating out hunting & fishing.**

UNDERSTANDING THE COSTS

What's the financial impact when communications break down? While we can't provide an exact dollar amount, the impact can be illustrated with this thought experiment:

Imagine a scenario wherein the project manager at "XYZ Construction Management" needs dimensional construction drawings for a layout at a project that is mobilizing onsite in the next 2 days.

The drawings were sent in by the architect a day ago. However, the document was accidentally moved to the wrong folder on the internal server, and the project manager can't find it. He looks for the document for about 20 minutes, in which time he gets 3 phone calls with priority interrupts. After taking care of those items, he goes back to look for the document for another 10 minutes, finally finding it.

The project manager then issues the layout drawings to the carpentry subcontractor. However, by this time the subcontractor is closed for the day and unable to dispatch manpower until the following day. The layout itself will take 2 working days and the carpenters will prevent all other trades from performing their work on schedule. At this point, the entire project is about 6 days behind schedule.

Depending on the size and scope of this project, the lost time adds up very quickly for the project, and time equals money. Additionally, if there are any liquidated damages included in the contract, this could greatly affect the profitability of the project as well as the client's satisfaction level from day one.

This is the impact of a misfiled document with 1 trade. Consider that there are generally between 7-10 trades involved with any one build, and it's easy to see how delays escalate and costs increase.

* (2017) The Sixth Annual Construction Technology Report - JBKnowledge

CHANGES IN THE WORKFORCE

The construction industry is characterized by firms that have been around for a long time – 41.1% have been in business for more than 50 years – but the workforce is getting younger. 28.7% of the construction workforce belongs to the Millennial generation*, occupying roles from entry level to senior management.

Millennials use technology in every aspect of their life, and they expect to be able to do so in the workplace. In a study conducted by Microsoft and Survey Monkey**, 93% of Millennials said that access to up-to-date technology was a determining factor in choosing a workplace. Nearly half of surveyed Millennials said sub-standard technology would cause them to seek employment elsewhere. ***

- The Brookings Institute reports that 75% of the workforce will be Millennials by 2025.****

- Current construction technology has a significant role to play in attracting & retaining talented, qualified employees.

- Adopting appropriate technologies provides a meaningful, actionable opportunity to improve the construction industry workforce.
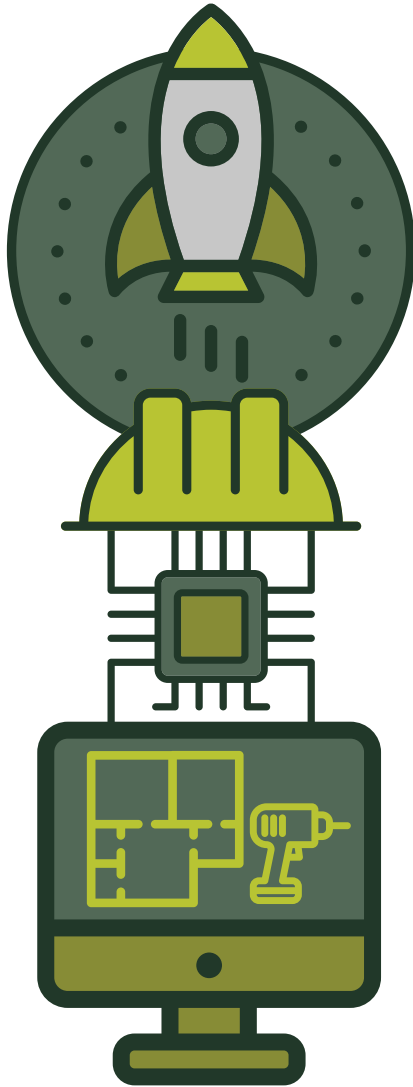
* (2017) The Sixth Annual Construction Technology Report – JBKnowledge
** (2016) Millennials are Shaking Up Workplace Communication – CIO, White, Sarah K.
*** (2016) Dell & Intel Future Workforce Study Global Report – Penn Schoen Berland
****(2014) Brookings Data Now: Millennials – Brookings Institute

NEW OPPORTUNITIES IN TECHNOLOGY

Outside of a few accounting systems tuned to construction, the construction technology industry barely existed ten years ago. Those platforms are still in use but have been slow to invest in new collaborative and document control technologies. That situation has changed dramatically, as multiple firms are stepping up to fill the needs of underserved general contractors and building professionals. Pitchbook reports that venture capitalists have invested more than $900 million into the construction technology industry in the first 8 months of 2018.*

As a result, a flood of new construction technologies, including upgrades to existing platforms and products, can be expected. Given the construction industry's historic pattern of reluctance to adopt new technologies, products and platforms that already have an established presence in the construction industry may have some advantage in terms of further market penetration. However, this advantage may be fleeting as the ranks of Millennial employees, unencumbered by brand loyalty, become more involved in evaluating and selecting the technologies their companies use.

PLANGRID & PROCORE:

Which New Emerging Platform Will Achieve Market Dominance?

At this early stage, a few companies have emerged to take leading roles in the developing field. PlanGrid and Procore are currently battling for market share and targeting the mobile-visual experience while offering access-control and promoting collaboration. Both companies are growing their software features to incorporate what the other does best and are competing head-on.

* (2018) The Top 12 VC Investors in Global Construction Tech – Pitchdeck, Olsen, Dana

THE CONSTRUCTION TECHNOLOGY LANDSCAPE:
A Quick Review

While it's beyond the scope of this report to address every tool currently in use in the construction industry, there are a few key technologies that are impossible to ignore. Autodesk, Sage100, Sage300 (aka Timberline), Prolog, Procore and PlanGrid each serve a distinct role critical to the building trades, with some overlap in terms of functionality and features. However the three current leaders Autodesk, Procore, and Plangrid are currently struggling for market dominance, and are even beginning to venture into ERP integrations to gain an upper hand. Late in 2018, it was announced that Autodesk had acquired PlanGrid for $875 Million in an effort to accelerate its field efforts beyond the project management tools it currently offers. This play advances Autodesk in tying the architecture and construction process closer, threatening Procore's market share.

> *While the evolving collaboration tools of recent years (like PlanGrid and Procore) are excellent for document control, it will be interesting to see how the ERP systems plan on catching up. I think an integrated platform that brings the best of cost management and document control/collaboration will bridge the communication gaps that can often occur between project teams.*

- Joseph Bolano, Regional Director of Healthcare & Project Management, Colliers International

Autodesk

- Used primarily by architects to digitally model & edit new buildings, interiors, or design features.

- Overlays indicate timing & location of all trade work.

- Alerts for potential conflicts between trades, allowing architect to edit model toresolve issues. The rest of the model will update according to these changes.

- Allows constructor to assess constructability quickly and efficiently.

- Increases productivity compared to traditional means.

PlanGrid

- Used to access and edit project drawings on mobile devices, including smartphones and tablets.

- Users, including subcontractors, architects, engineers, etc. can mark up, add notes, and add photos to crucial portions of project drawings.

- Helps eliminate communication errors & streamlines construction process.

- Document storage features include RFI, Submittal, and Field Report modules.

- Allows for real time revision from anywhere in the world.

Procore

- Used to store, and work on, key project documents such as drawings, submittals, RFIs, and meeting minutes.

- Allows for collaboration with other project team members, including subcontractors, engineers, etc.

- Allows for real time revision from anywhere in the world.

- Ensures latest document revisions are available to all relevant parties.

- Integrates with ERP (accounting) systems.
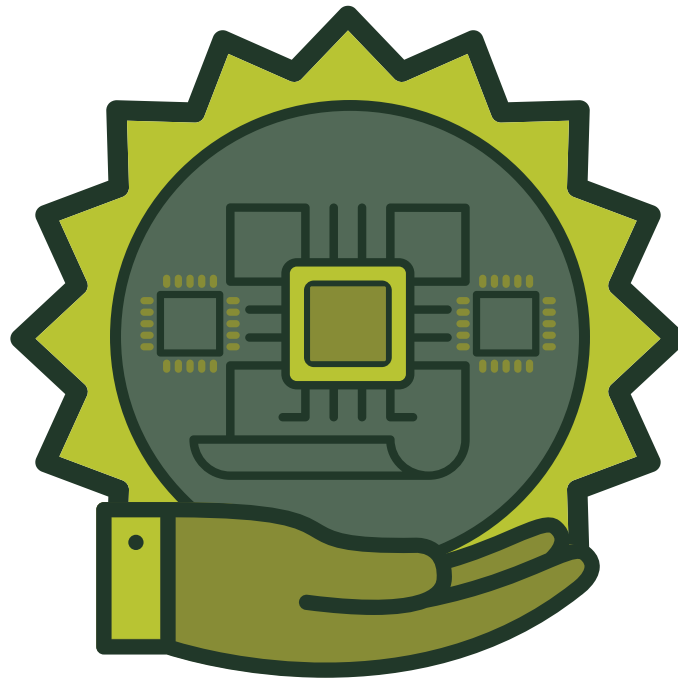
BREAKING THE BOTTLENECK:
Adopting New Construction Technology

It's not a matter of "if" construction firms are going to adopt new technology; it's a matter of "when." As architects and owner's representatives become more accustomed to working with these tools, the expectation that constructors will do likewise will be widespread.

It's important to understand that adopting a new technology isn't an instant process. Even firms with a higher-than-average number of digital natives among their employees will need to devote time and resources to preparing their team to make full use of the technology appropriately.

Larger architectural firms tend to be aggressive adopters of technology, with Autodesk, including the AutoCad suite, having the widest industry penetration. With the influx of venture capital funding into similar tools for the construction industry, a significant opportunity exists for constructors to improve their processes and break the bottleneck.

AN OWNER'S REPRESENTATIVE'S OPINION

Technology is impacting every facet of the building industry. With automation on the rise, these industries can now do more with less; increasing profitability and managing risk more effectively. Some of the areas technology is having a significant effect on include:

Discovery/Strategy:
The ability for Big Data collection and analysis through automated capturing and processing of key metrics increasingly influences the design phase to allow for more intelligent decision making.

Documentation:
Use of various BIM platforms are already in full swing to include real time multi-discipline design exchange, coordination, clash detection, energy modeling, vertical transportation modeling, and more.

Bid/Negotiation/Construction Administration:
The complete management of budgeting, cost estimation, document processing, tracking and record keeping has greatly improved accuracy and predictability in project scheduling and delivery.

Conceptual Design:
A.I. and a myriad of smart simulation and environmental analysis tools shape up the design for base building and even interior design to get a better grasp on human behavior patterns, as well as how the environment within and without the building can be optimized for various conditions.

Regulatory Aspects:
Major city Building Departments have rolled out, or are in the process of rolling out, cloud services and electronic application/document processing systems that have greatly reduced the processing time despite exponential increase in the number of applications and relative complexity of the work and code compliance. This greatly reduces the bottleneck for all project team members.

**-Babak Ghezelayagh,
Director, Jones Lang LaSalle**

CASE STUDY:
Talisen Construction Corp's PlanGrid Experience

One of Talisen's key precepts is a dedication to adapting to the ever-changing environment and innovating new processes to offer our clients top-notch service. Technology plays a large part in this philosophy, and PlanGrid is one of the tools we use to better optimize our performance on every project.

The fact that PlanGrid allows drawings to be accessed and edited on mobile devices was very exciting to our team, who are very often on the move and in locations where a desktop computer is more of a nuisance than a benefit. Given that keeping projects on schedule is always a top priority, and that eliminating communication errors with subcontractors is a meaningful method of cost control, we began evaluating PlanGrid in the fourth quarter of 2017.

PlanGrid was adopted into our workflow in the beginning of 2018 after a successful trial period. Recently, we surveyed key users to determine their satisfaction with PlanGrid. In addition to providing insights on a rated scale, users were given the opportunity to make comments, which they availed themselves of. Here are the key points:

- 80% of respondents found PlanGrid to be very user friendly.

- Collaborating with other users, both internally and with external users—such as architects and sub contractors – was consistently satisfying, with more than 75% of users reporting they were either satisfied or very satisfied.

- When asked what aspects of the job were made easier by using PlanGrid, accessing and editing construction drawings was the top answer, followed by RFIs, Submittals, and communication with team.

Comments From Our Users:

> *Enjoy the ease of being able to access drawings in the field.*

> *A great central repository for drawings and plans.*

> *When it comes to document management and file sharing, it works perfect.*

FROM THE CLIENT'S POINT OF VIEW:
A+E Networks

On the project level, digitized document management seems like something the overall industry would really benefit from. The concept that everyone connected to a project can log into one place to see all documents (or just those they are authorized to see) would be a project organization changer – any updates, changes, etc. would all be in real time."

- Denise Strong
VP Office Services and Facilities, A+E Networks

KEY TAKEAWAYS FOR THE CONSTRUCTION INDUSTRY

The evolution of construction technology will impact every party involved in designing, constructing, and managing properties. The strategic use of construction technology can streamline the construction process, eliminate costly communication errors and delays, and result in greater efficiency and project profitability.

Architects and owner's representatives who are dedicated to maximizing the profitability of their projects will undoubtedly begin considering construction firms' prowess with relevant technologies when awarding jobs. Additionally, having the best technology in place will help construction firms attract and retain the best talent.

All of these factors combined are critical components when you're building for the tenant of the future. Talisen Construction Corp has found them to be vital in our mission of building New York City's best possible tomorrow, today.