

Transformation in the construction industry starts with connectivity. This document examines the digital opportunities for construction SMBs as they seek to build their businesses. It is the first in a four-part series exploring how construction SMBs can use digital technologies to build stronger businesses.

Building with Connectivity: How Small and Midsize Construction Organizations Are Taking Work to the Next Level

January 2022

Written by: Jeff Hojlo, Research Vice President, Future of Industry Ecosystems and Product Innovation Strategies; and Katie Evans, Research Director, Worldwide Small and Medium Business Research

Introduction

The construction industry is moving rapidly from analog and paper to digital and automation, where AR/VR, drones, robotics, predictive analytics, and cloud-based technologies are becoming increasingly prevalent on job sites. Transformation is especially evident amid small and medium-sized businesses (SMBs) in the construction industry. In fact, medium-sized construction businesses, defined in this document as those with 500–999 employees, said they plan to dedicate 34% of their total technology budgets in 2021 and 2022 to digital transformation (DX), according to IDC's *2021 Digital Transformation Executive Sentiment Survey*. In addition, 55% plan to increase their spending on digital transformation in 2021 and 2022.

However, while these initiatives can streamline projects and improve collaboration, they also present technical, training process, and resource challenges. Workers must be trained on these new technologies to apply them correctly, and the technologies must be implemented into business processes. This shift also creates massive amounts of data that is often disparate and disconnected. For example, building information modeling (BIM) is rapidly advancing to include cost and project data and is transitioning from 3D and 4D to more sophisticated 5D models. Meanwhile, small and midsize construction businesses often lack continuous collaboration from design to project to owner as well as consistent, reliable connectivity — which is key to executing efficient, safe, quality, cost effective, on-time construction.

The COVID-19 pandemic transformed large and small construction companies, and it's still impacting the industry. Funding dried up, projects were put on hold, and supply chain woes fueled sharp price increases in materials as well as inventory shortages. Additionally, many construction businesses, like businesses in other industries, are still dealing with labor shortages brought on by the pandemic.

AT A GLANCE

KEY STATS

According to IDC research:

- » Medium-sized construction businesses plan to dedicate 34% of their total technology budgets in 2021 and 2022 to digital transformation.
- » And 55% of medium-sized construction businesses plan to increase their spending on digital transformation this year and next.
- » 23% of small and medium-sized construction businesses plan to use AI and robotics to automate, extract, and capture data over the next 12 months. Digital transformation among SMB construction businesses starts with connectivity.

The good news is that connectivity, digital technology, and IoT, when implemented safely and securely, can help small and medium-sized construction businesses address these obstacles. These businesses should strongly consider investing in the following areas to fight industry headwinds and to set themselves up to better compete and grow in the coming years:

- » Wireless connectivity for rapid communication across the job site or sites
- » Collaborative solutions to unify the project team on a single digital platform
- » Fleet management to ensure on-time, high performance wherever the job location
- » Asset management for safety, security, and high performance
- » IoT/sensor solutions to ensure high quality and consistent safety

Construction organizations that invest in digital transformation through connectivity across data, processes, and resources — specifically across the multiple entities working on a construction job site — will be better positioned to deliver high-quality, safe, on-time work in the construction market both now and in the future.

Construction Industry Segments: The Role of the SMB

Small and medium-sized construction organizations are typically contractors, subcontractors, specialty trade businesses, cost estimators, construction management companies, MEP engineering firms, and quality assurance businesses with up to 999 employees. Remodeling, repair, maintenance, and finish work are also included in this segment.

Small and medium-sized contractors could manage smaller industrial or residential jobs or be part of a larger construction team on larger job sites. Large general contractors (GCs) and/or engineering, procurement, and construction (EPC) services firms managing infrastructure projects need to keep such small and medium-sized subcontractors and specialty contractors on time and on budget. Rapid communication via robust connectivity can help facilitate this under any condition during construction of roads, bridges, tunnels, or utilities.

Both large and small construction organizations need rapid connectivity and the ability to communicate quickly to share large amounts of data and complex digital models remotely and achieve consistent, high levels of safety and quality. For each construction segment, there are multiple technology initiatives for the SMB to consider, as listed in Table 1.

TABLE 1: *Construction Segments and the SMB's Role*

Construction Segment	SMB Role	SMB Initiatives Powered by Connectivity
Residential: Single-family home, multifamily home, condo	General contractor (GC), construction manager for the site in concert with a collection of subcontractors (other SMBs)	<ul style="list-style-type: none"> • Wireless • Collaborative solutions • Fleet management
Institutional/commercial: Office buildings, shopping malls, private school or university, private hospital, government	Could be the GC, more often playing a supporting role as subcontractor or specialist (EPC services firms could be within this SMB sphere.)	<ul style="list-style-type: none"> • Wireless • Collaborative solutions • Fleet management • Asset management • IoT/sensor solutions
Industrial: Office buildings, shopping malls, private school or university, private hospital, government, chemical plants, power plants	Typically supporting as subcontractor or specialist (EPC services firms could be within this SMB sphere.)	<ul style="list-style-type: none"> • Wireless • Collaborative solutions (could be part of the GC's collaborative environment) • Fleet management • Asset management • IoT/sensor solutions
Infrastructure: Cell towers, pipelines, railways, telecom, public school or university, municipal or county buildings, state land	Typically supporting as subcontractor or specialist (EPC services firms could be within this SMB sphere.)	<ul style="list-style-type: none"> • Wireless • Collaborative solutions (could be part of the GC's collaborative environment) • Fleet management • Asset management • IoT/sensor solutions

Source: IDC, 2021

IDC's research consistently shows that SMBs invest in digital technology to "level the playing field" so that they can both compete and collaborate with larger organizations. This is particularly important in the construction industry, which includes a wide variety of players with different levels of expertise, knowledge, and capacity, as well as large, midsize, and small organizations. We see most organizations, large or small, start with investments in cloud infrastructure and applications, improving mobility, big data analytics, and connectivity. However, connectivity is the foundation for all these digital technologies as well as for more advanced technology strategies and investments such as predictive analytics, digital twins, IoT, robotics, and drones.

Construction SMBs need connectivity first to achieve their more lofty digital goals. A good portion do have more advanced technology goals. For example, 17% of construction SMBs list connecting sensors and/or devices (smartphones, tablets) to analyze data as a technology priority for the next 12 months, according to IDC's *Worldwide SMB Survey*. Reliable connectivity that enables collaboration, communication, and data processing ensures safety, security, quality, and high performance and also lays the groundwork for projects that are completed on time and within budget.

Considerations for the Construction SMB: Take a Use Case Approach to Digital Transformation

IDC asserts that during digital transformation, it is critical for any organization to take a use case approach. Construction SMBs should ensure that new technology adds value and that employees are trained on and encouraged to use it. We advise construction SMBs to focus their digital transformation projects on the specific use cases that support their businesses today and in the future.

Table 2 outlines four key DX programs and associated use cases. The programs are overall connectivity, safety and security; digital transformation technologies, and IoT connected asset data.

TABLE 2: **Digital Transformation Taxonomy for Construction SMBs**

Program	Use Cases
Overall Connectivity	<ul style="list-style-type: none"> • Real-time, wireless collaboration across the job site, site to office, and site to site • Connectivity in any situation — inclement weather, underground, through concrete, across rooms and miles • Sharing of project or BIM data via wireless networks • Collection and management of data for digital twins for easier owner handoff • 3D models/surveying, AR/VR — job instruction, collaboration with design/engineering • Need for bandwidth when moving to 4D and 5D BIM (inclusive of 3D + cost + project info) — for building models and landscapes • Quality assurance — some of these scans could be large files that need to be shared across the team • Video collaboration and analytics — engineers and design teams can review progress/refer to blueprints/design for compliance and quality assurance from home office
Safety and Security	<ul style="list-style-type: none"> • Safety standards compliance (OSHA, PPE) — always a key focus and a crucial risk for construction companies to mitigate • Asset and material tracking remotely through digital twins and predictive data models • Fleet tracking and management — critical for SMBs to ensure high performance of their workforce and deployment to multiple job sites • Digital and physical security — as companies move to digital, cybersecurity threats become more prominent; physical security remains crucial to ensure job site assets are protected • Monitor worker location and safety via IoT and/or video cameras to ensure safety standards are followed • Site safety — video monitoring and analytics to ensure safety such as proper safety gear is worn correctly/safety alerts; increased automation can improve safety; improved site security monitoring for issues such as damage or theft

Digital Transformation Technologies	<ul style="list-style-type: none"> • Robotics — key to automating the job site, augmenting construction to enhance productivity and safety; SMB companies providing advanced robotics to support areas such as 3D concrete printing, rebar installation, inspection • Drones — enable faster and more accurate data collection; such forward-looking, innovative technologies are well received by workers who can grow along with an evolving SMB • AR, VR, and mixed reality — facilitate improved collaboration, help train new workers, aid in project troubleshooting, assist with task compliance • AI and predictive analytics — speed data processing from multiple sources; analytics can predict quality, safety, timing, or financial issues; help businesses tap into historical data to spot and analyze trends • 5G — the foundation for fast and reliable data processing • 3D/4D/5D* BIM — central hub for data storage, large model size demands robust processing power; provides visual collaboration, verification, and communication at every stage of the construction life cycle <p>*4D and 5D BIM still emerging/a future initiative, but SMBs need to be working toward this</p>
IoT Connected Asset Data	<ul style="list-style-type: none"> • Fleet management solutions to manage and dispatch drivers, monitor behavior and equipment, lower costs through proactive services, and better manage multiple projects and job sites • Monitor resources, build progress, building/infrastructure, and project quality • Provide insights, analytics, and visualization through faster data collection and a constant stream of real-time data • Improved design through clash detection during construction • Improved project scheduling and resource allocation • Reduce material/equipment theft through monitoring and tracking • Enable collection and consumption of data at the edge (on the job site), leading to greater productivity during construction and improved maintenance and asset performance during the operational/post-construction phase • Ability to build historical views of asset, process, and operational data to inform future projects • More efficient engineering changes — faster execution of field change requests, issued back in digital forum to expedite • Digital twins* — virtual model of assets for the collation of historical and real-time data for owner handoff post-construction and ongoing operations <p>*Digital still emerging/a future initiative, but SMBs need to be working toward this</p>

Source: IDC, 2021

The digital use case of construction SMBs will vary from job to job, but these businesses must be prepared for any scenario, whether residential, institutional, industrial, or infrastructure. The four DX programs — overall connectivity, safety and security, digital transformation technologies, and IoT connected data — complement one another and work together to optimize productivity, enable remote operations, and facilitate automation. Making the investment in digital technology and putting the connectivity, security, and data solutions in place that enable the SMB to thrive also provide organizational benefits.

It is well known that the construction industry struggles to attract new workers to its ranks, largely because jobs in other technology-centric industries pay more, are lower risk, and are abundant. As digital technology becomes pervasive for

construction SMBs through technologies such as the cloud, AI, drones, and automation, the existing skills gap will narrow, and a new set of modern skill requirements will evolve. These new digital skills will rely less on manual labor and more on digital and technology knowledge and data analytics, as well as design, project, and construction virtualization. A whole new generation of construction professionals and construction SMBs will be born.

The Future: Technology Investment Plans for SMBs in Construction

Many large construction organizations have already embraced digital transformation initiatives with exciting and encouraging results, and the movement is now rapidly accelerating with SMBs as well. SMBs will need to quickly adopt the technology that larger companies use to secure new business as subcontractors. Key future technology areas of focus for SMBs include 5D BIM, digital supply networks, autonomous robotics and drones, and digital twins.

Connectivity itself is critical, now and for the future. SMBs should determine when 4G is enough to do the job well and when 5G is necessary and can add value. There are many possible 5G use cases, and SMBs should examine their current business and their needs and goals to determine which use cases to adopt. Connectivity lays the foundation for more advanced digital technology, facilitating AI, mobile, and robotics. These advanced technologies are just now starting to gain traction with construction SMBs. According to IDC's 2020 *Worldwide Small and Medium Business (SMB) Survey*, 15.5% of construction SMBs (1–999 employees) are using AI and robotics to automate, extract, and capture data and 23% plan to use such technologies in the next 12 months. IDC believes these figures will only increase.

Deploying digital technology in construction shouldn't be limited to the largest contractors, EPC service firms, owners, and operators. SMBs need more than just a radio for basic communication; they should explore using software/AI/video analytics to integrate data from multiple sources to help speed access to information and facilitate faster decision making, which will help companies stick to deadlines. This investment will enable SMBs to compete and collaborate through technology and attract a new worker base interested in using digital technology. Such investments can also improve vendor relationships and thus increase the job win rate of SMBs.

Concluding Thoughts

The construction industry is rapidly adopting digital technologies for communication, collaboration, innovation, safety, quality, and speed. Construction SMBs play a primary role in residential construction and a critical supporting role at large industrial or infrastructure sites. Without this ecosystem of providers in the construction space, each with different levels of expertise, it would be difficult for any construction job to be completed on time. Connectivity, whether 4G, 4G LTE, or 5G, is the foundation for advanced capabilities such as robotics, AR/VR, drones, 5G, or predictive analytics. Rapid connectivity ensures reliability, productivity, safety, and quality. It is a fundamental capability for any construction organization to have, and it is where digital transformation should begin. Digital transformation, rooted in robust connectivity and a use case approach to technology investment, will soon no longer be an option but a requirement for SMBs to advance and evolve in the rapidly changing construction industry.

Rapid connectivity ensures reliability, productivity, safety, and quality. It is a fundamental capability for any construction organization to have, and it is where digital transformation should begin.

About the Analysts



Jeff Hojlo, Research Vice President, Future of Industry Ecosystems and Product Innovation Strategies

Jeff Hojlo leads one of the nine new Future Enterprise practices at IDC — the Future of Industry Ecosystems. This practice focuses on three areas that help create and optimize trusted industry ecosystems and next-generation value chains in discrete and process manufacturing, construction, healthcare, retail, and other industries: shared data and insight, shared applications, and shared operations and expertise.



Katie Evans, Research Director, Worldwide Small and Medium Business Research

Katie's core research coverage includes identifying and supporting the unique, evolving needs of the very small, small, and medium business technology buyer. Katie has a strong, SMB-focused research and writing background, having covered SMBs in the retail and ecommerce space for over 12 years.

MESSAGE FROM THE SPONSOR

Today's businesses agree the status quo isn't cutting it. That's why T-Mobile for Business uses unconventional thinking to help construction businesses solve real-world challenges, work smarter and grow faster. Our nationwide 5G network, combined with our solutions, helps businesses stay connected and productive where work happens. We've reimaged customer experience with a team of experts empowered to find solutions in the moment. And we offer first-class benefits that help customers spend less and innovate more, like 5G with every plan. Nobody else offers network, support, and value – without any trade-offs.

Check out 5G devices, coverage, and more at <https://www.t-mobile.com/business/construction-management-services>



The content in this paper was adapted from existing IDC research published on www.idc.com.

IDC Research, Inc.
140 Kendrick Street
Building B
Needham, MA 02494, USA
T 508.872.8200
F 508.935.4015
Twitter @IDC
idc-insights-community.com
www.idc.com

This publication was produced by IDC Custom Solutions. The opinion, analysis, and research results presented herein are drawn from more detailed research and analysis independently conducted and published by IDC, unless specific vendor sponsorship is noted. IDC Custom Solutions makes IDC content available in a wide range of formats for distribution by various companies. A license to distribute IDC content does not imply endorsement of or opinion about the licensee.

External Publication of IDC Information and Data — Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.

Copyright 2021 IDC. Reproduction without written permission is completely forbidden.