Trimble

How the Constructible Process Will Transform 2020

The Trimble Constructible Process is a new vision aimed at moving the industry forward. It is a concept shared at Trimble with centralized motivation, and it's driving the development of our solutions. The time-tested best practices will be used to help uncover new building project efficiencies. By following these constructs, your firm can ensure your next project is executed as smoothly as possible.

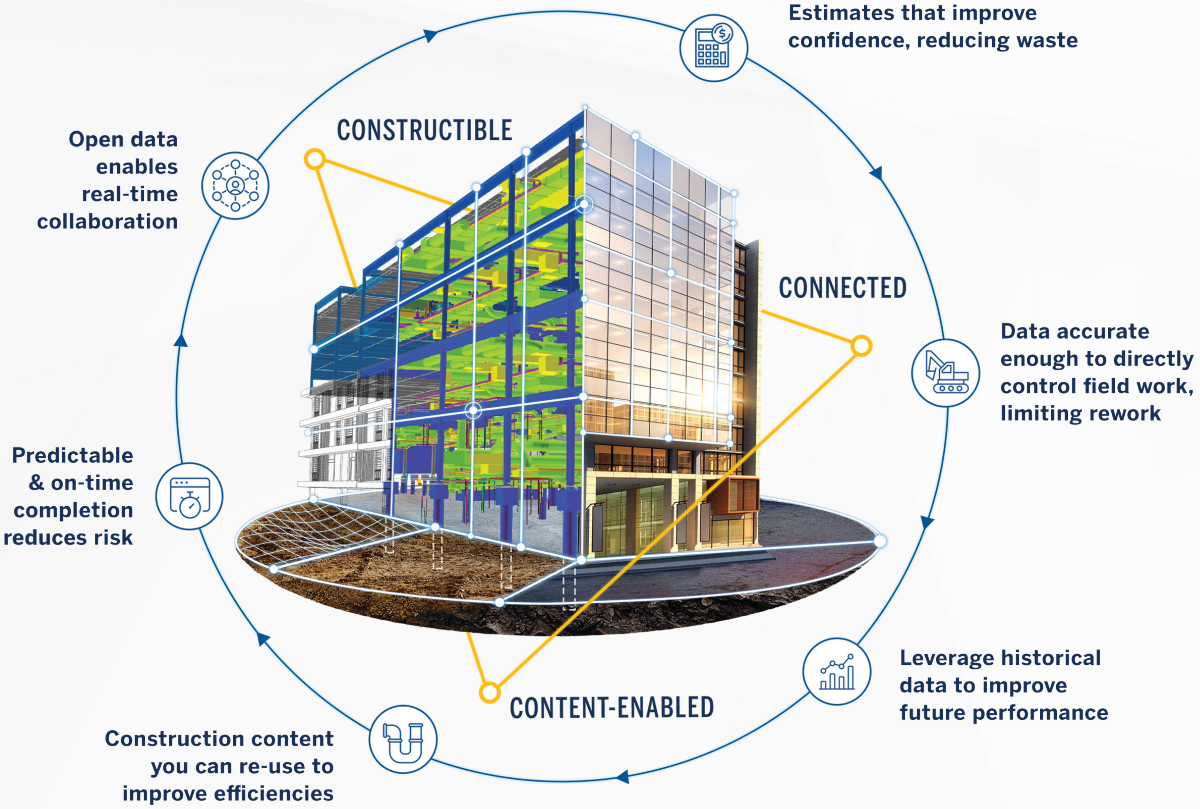
The Constructible Process is made up of three central concepts:

1 All phases and trades are **CONNECTED**

2 Models and workflows are **CONTENT-ENABLED**

3 **CONSTRUCTIBLE** models drive smarter workflows

Let's explore each of these elements in greater detail to better understand how the Constructible Process helps streamline construction throughout all phases of a project, and then explore how this process will influence the digital transformation of the construction industry.



Connected

Your next project is only as successful as the sum productivity of all of the players. Construction efficiency, profitability, and timeliness depend on the cohesion of all project stakeholders — a delay at any point in the workflow can easily compound and snowball into a substantial setback.

> **According to the 2017 McKinsey Report on Construction Productivity**, "The higher-productivity large-scale half of the industry is not immune to the low productivity of the other half. Large-scale players routinely subcontract to smaller specialized players, and, in the **United States, the productivity in civil, industrial, and buildings including trades subcontractors drops by 12, 26, and 28 percent**, respectively. Therefore, any action to boost sector productivity needs to apply to the entire supply chain and to both parts of the market—each of which lags behind manufacturing in its productivity."

This study suggests that in order to boost productivity and truly enable a connected team, changes must be applied to the entire supply chain. This is why the 'connected' C is so crucial to the constructible process.

Anyone who has worked in the industry long enough knows the dynamics that lead to disconnected workflows. It's natural for construction phases to remain insular, but it's important to break down these communication barriers and encourage enhanced project collaboration. Being connected is your greatest defense against the prevailing inefficiencies that stem from data silos.

Two ways to improve connection among teams is to:

1. Leverage tribal knowledge from your most skilled workers

2. Utilize historical data from past projects, and democratize it across teams.

This ensures the wealth of knowledge is easily accessible by those who need it. This can be done through a shared database that all relevant team members have access to.

Of course, sharing knowledge doesn't happen overnight. Eliminating communication barriers can be done in a number of different ways. Enhanced coordination workflows allow multiple stakeholders to collaborate within and review models to avoid clashes. Engineers can update models fast as team members are reviewing, and each project stakeholder is able to see the updated models. They are even notified of the changes in real time.

Taken a step further, improved inter-operational connections are automating the building process. Constructible models now directly drive the digital fabrication process. With sophisticated machine control and robotics in the field, models developed by engineers are now directing the earthwork and layout in the field. Civil contractors, MEP trades, and layout teams no longer need to recreate any building data because instructions for the work to be performed are driven directly by approved and shared models.

How This Is Changing Construction Workflows

The Constructible Process helps to unify phases by making 3D models more universal and collaborative. In a connected workflow, if each project team member has access to the same model, they are able to see exactly what other team members are seeing— or only what they need to see. With the amount of data available in a model, some disciplines only need to see what is relevant to them, so information can be hidden or displayed as-needed. This eliminates the misinterpretation or overload of information.

With basic measurements, component specifications, installation instructions and visual representation of the 3D model — the Constructible Process facilitates connectivity by establishing a crucial common-ground on which all stakeholders can **collaborate more effectively**.

The best thing you can do to improve jobsite connection is to integrate a suite of tools that support one another. Look for technology partners you can trust to ensure workflows and data seamlessly integrate and that you will receive full support across every stage of your workflow.

Content-Enabled

As you start to understand the Constructible Process, you will realize the inherent interconnectedness of the 3 C's. This next step, for example, is closely related to the above point in that it is the data-rich components that help ensure building designs can be built into reality.

Designers and engineers save time developing detailed and comprehensive models by incorporating digital content that mirrors physical components available to specialty trades on a project. That content can be either designed in-house, or purchased through 3rd-party suppliers.

> According to the 2018 *Impact of Technology Implementation on the Construction Industry Study* by ViewPoint, "**generally, more firms report that they have an in-house IT director/manager responsible for managing their data**."

With the vast amount of data involved in a building project, most firms actually hire someone to manage, maintain, and update their database of content. But this simply isn't necessary with the constructible process. Because manufacturers' supply-chains and components can be updated without notice, sourcing content from libraries that are updated frequently and managed for you is a more cost effective option.

Constructible Content includes more than just visual accuracy. Components can be further enriched with data to help define attributes of physical objects with actionable information such as weight, performance, and installation detail. The primary value of Constructible Content simplifies the development of comprehensive models for each trade and makes construction data more useful in feeding downstream work processes.

When models are supported by real-world data, the plan is brought out of abstraction and grounded in reality. Constructible Content removes the guesswork, eliminating room for interpretation, so there is no confusion about what a component is, how it performs, where it goes, or how it should be installed.

How This Is Changing Construction Workflows

Content-enabled modeling helps experts, at any phase of the project, better understand the designer's intent for the completed structure. This empowers those less familiar with the design process to become more involved and collaborative earlier on in the construction workflow.

When you partner with a **managed content provider**, Constructible content becomes even more powerful. A partnership of this sort helps you get more out of content-enabled models by ensuring the ever-changing content components are consistent, understandable, and up-to-date:

- **CONSISTENT:** When you partner with a managed content provider you gain access to an extensive, ever-evolving, library of constructible content. Since the partner is managing all that content, estimators, detailers, and project managers can rely on the same library, simply dipping in and retrieving what they need when they need it. There's never going to be ambiguity or duplication of efforts.

- **ACCURATE:** Another perk of using a library of managed content is that you can trust that information is accurate and current. It's common for designers and detailers to use custom components in models, but this means that any manufacturer changes to a component will quickly render a model inaccurate. Constructible content is updated automatically, behind the scenes, so you know that model data is relevant and up-to-date without having to spend time double- and triple-checking each component. This helps to save time, money, and effort by avoiding unnecessary reworks.

- **UNDERSTANDABLE:** Most importantly, you want to be sure models make sense to everyone involved in the building process. Ambiguity, missing metadata, and other issues can lead to errors and rework, creating lengthy delays and even missed deadlines. A managed content provider ensures component specifications are current, consistent, and data-rich, so models remain relevant and feasible throughout all phases.

Content-enabled models help to streamline construction workflows. When building models are supported by a robust, curated, and repeatable library of detail-rich data, stakeholders can better integrate all phases of construction, including estimating, detailing, fabrication, installation, and building.

Constructible

While the previous points uncover new efficiencies in their own respective ways, the constructible aspect of the process involves buildability. Connectedness and content-enabled models enable the tangible, construction improvement of constructibility. Having a truly constructible model and workflow means that you are able to physically build a vision into reality— reaching far beyond simply a beautiful design.

Constructible models include all of the detail needed to build and fabricate. Details such as the position, size, and thread-count of bolts, the precise location of welds, the camber of steel members, and the gauge of materials are all critical elements of constructibility that need to be articulated early and shared with teams that will be affected by these decisions. At the end of the day, workflow improvements don't amount to much if they can't truly yield better project execution.

In a recent ConTech study by JB Knowledge, contractor respondents said that even though they have a VDC (Virtual Design & Construction) staff, **only 36% of their active projects involve BIM.**

Furthermore, confidence amongst respondents in the ability to maximize BIM decreased from a score of eight in 2017 to a score of seven in 2018. With this reduced confidence from the previous year, there is no better time to educate future generations and train our crews to move beyond BIM.

How This Is Changing Construction Workflows

The Constructible Process demands that BIM data is accessible and useful to the crews working in the field. When it actually comes time to break ground, workers can use constructible building data and models to make sense of all aspects of the plan in relation to how it will be built.

The benefit of Constructible models and workflows doesn't start and end with builders. All stakeholders can benefit from Constructible data because it offers detailed insight into how each component is to be built and therefore, how they will interact with other adjacent components. This opens up collaborative potential between those in the field and those in the office, and empowers all project phases to better diagnose issues early before any physical production begins.

Constructing the Future of the Industry

The Constructible Process greatly increases the efficacy of BIM. But, the utility of this new approach extends far beyond design. The Constructible Process makes BIM accessible and understandable to all stakeholders in all phases of a project which helps construction teams better execute projects on time and on budget.

By integrating every phase and person involved in a building project — from the architect's initial concept to the final punch-list, projects benefit from enhanced utilization of project data.

Development of Trimble's hardware, software, services and support all share a single vision of the **Constructible Process**. With a commitment to enhancing projects with improved connectivity, constructible content, and powerful, constructible modeling, Trimble is helping to create construction workflows that unify people and processes.

To learn more about how Trimble is helping to stimulate the digital transformation that will lead the construction industry into the future, **take a look at our new site**.