How to prepare for the Building Safety Bill

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Introduction

This white paper is designed to help real estate owners, local authorities, educational authorities, landlords and construction organisations prepare for the Building Safety Bill, set to come into law in Spring 2022.

Experts from across construction have provided insights on how owners, designers, building product manufacturers, main contractors and subcontractors can get ready.

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Foreword

Autodesk, Spring 2022

The Building Safety Bill promises significant change for the UK built environment—from construction businesses and building owners and operators through to insurers and public safety organisations. The government is aiming to "overhaul regulations, creating lasting generational change and setting out a clear pathway on how residential buildings should be constructed, maintained and made safe."

The intention behind the bill is resetting safety standards in the wake of the 2017 Grenfell Fire tragedy and the subsequent Hackitt Review that led to the Building a Safer Future report, with calls for greater checks and balances to prevent similar disasters in the future.

But these changes will go further than safety alone. The regulations have the potential to create a seismic shift in the way that construction is planned and executed. Everybody will have a responsibility to collect, store and share more data, to create a golden thread of information.

For owners of existing buildings, that means creating an accurate, as-built record of facilities as they stand today. For new projects, that means evidence about how work is actually completed—making construction firms even more accountable for the quality of what they build.

The golden thread of information is both:

- the information about a building that allows someone to understand a building and keep it safe, and

- the information management to ensure the information is accurate, easily understandable, can be accessed by those who need it and is up to date.

Department for Levelling Up, Housing & Communities

The changes may be daunting, particularly as the details of the bill are still being finalised. Every organisation—from owners to sole traders—will need tolook at how they can use technology,to meet the new requirements.

But there are tried and tested workflows and tools that can help firms of every size to prepare. Some firms that are just starting out on their digital journeys can learn from those that have been there before.

Importantly, using technology can not only enable businesses to demonstrate their compliance with the Building Safety Bill, but give firms the data needed to improve outcomes like quality, productivity and sustainability.

It's a chance to evaluate how we work and establish best practice in the industry. While the new rules might initially only apply to high-risk residential buildings, care homes and hospitals, it is likely that the regulation will be extended in the future.

And this is also a call to action for construction outside of the UK. Other regions can take learnings from the developments in information management and get ahead to avoid the tragedy of another Grenfell.

It has been an incredibly difficult period. Now is the time to embrace what we learned and lay the foundations for a better industry.

This white paper sets out steps that can be taken today, as well as insights from industry experts. We are grateful to all the contributors–and hope you find the content informative and interesting.

Matt Keen
Senior Industry Strategist, EMEA

Foreword

Mace, Spring 2022

The Building Safety Bill is set to bring significant change to UK construction. This will overhaul regulations, creating lasting generational change by setting out a clear pathway on how residential buildings should be constructed, maintained and made safe. The technical building regulations themselves are not changing, but the way they are being enforced and regulated is with tougher penalties for those who break the rules.

The Bill will create a clear, proportionate framework for the design, construction and management of safer, high-quality homes in the years to come.

Building owners will be required to manage safety risks, with clear lines of responsibility for safety during design, construction, completion and occupation of high-rise buildings.

Building owners will also be required to gather a golden thread of information, with safety considered at every stage of a building's lifetime—including during the earliest stage of the planning process. They will need to demonstrate that they have effective, proportionate measures in place to manage safety risks. Those who don't meet their obligations may face criminal charges.

The Bill will strengthen the construction products regulatory regime, with new requirements to make sure more products are safe, while paving the way for a National Regulator for Construction Products to oversee and enforce the rules.

The Building Safety Bill will significantly improve transparency on all sides. It's true that keeping better records will be resource-intensive, and technology will be a key enabler in meeting the new regulatory requirements. I'd recommend all firms think about a five-year strategy for their digital transformation, and review the guidance in this white paper to evaluate the best approach.

Of course, all this will involve culture change too. But don't let your fears get in the way. The pandemic has proven that people can be very adaptable, if we challenge and support them. This could be an opportunity for all firms to digitally upskill, to make use of the best tools out there, rather than just relying on the brainpower of our people.

Over time, the legislation will force us to become more productive, enable us to be more sustainable and it will help us to be even prouder of what we create as an industry.

Get the basics right today, and we can make construction better for everyone.

Duncan Yarroll
Head of BIM & Digital Engineering

mace

What is the Building Safety Bill?

The Building Safety Bill is a proposed law progressing through UK Parliament. The details of the legislation are still being finalised, but the act is currently expected to be passed in Spring 2022.

The Building Safety Bill aims to give the construction industry "a clear framework to deliver more high-quality, safe homes", with explicit responsibilities on those undertaking design and construction work with tougher penalties for any breaches.

A new Gateway system will be introduced, to ensure building safety is considered at every stage of design and construction. Planning Gateway One, at the planning application stage, has already been enacted, requiring developers to submit a fire statement to the planning authority.

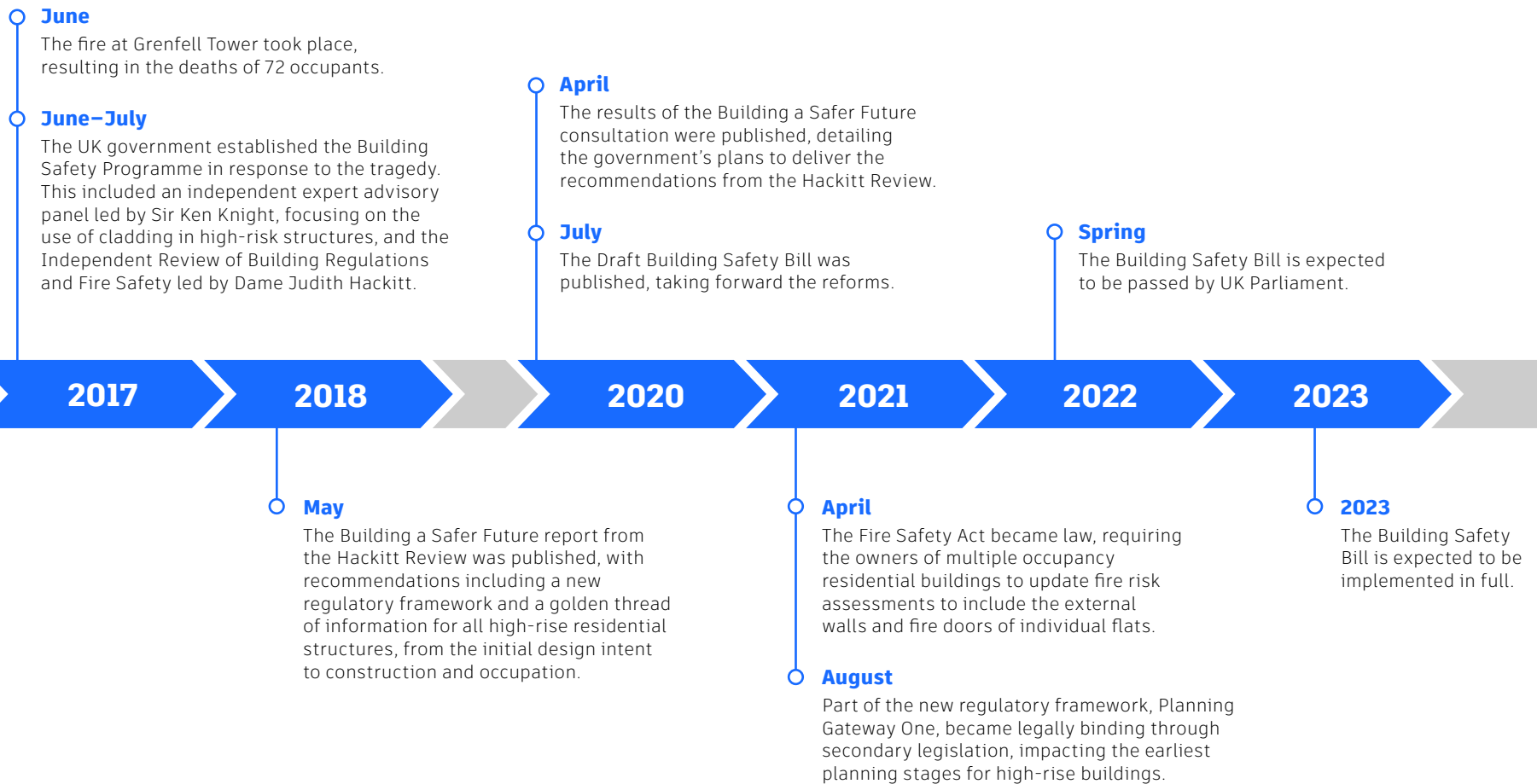Currently the legislation is only set to apply to new high-risk buildings, which are currently classed as high-rise residential buildings (HRRBs), care homes and hospitals at 18 metres or more in height, or at least seven floors. However, discussions are ongoing about extending these criteria.

Existing HRRBs will also be required to develop a golden thread of information which ensures all elements of the construction project are recorded and retained for the lifespan of the building.

Key changes proposed in the Building Safety Bill

- Building owners will need to demonstrate that they have effective, proportionate measures in place to manage safety risks.

- A golden thread of building safety information must be maintained to track key activity and decision making from planning and construction to completion and occupation of each high-risk building project. This golden thread must be maintained in a digital format.

- Building owners will be responsible for ensuring clear lines of responsibility for safety during design, construction, completion and occupation. A Principle Accountable Person will then be responsible for the safety of the building during occupation.

- Dutyholders must be appointed to take responsibility for fire and building safety throughout the building lifecycle and provide the Accountable Person with the golden thread of information.

- A new Building Safety Regulator will oversee the implementation and enforcement of the legislation, with stringent penalties for noncompliance.

- Building owners that don't meet their obligations may face criminal charges. Homeowners can also claim compensation for substandard construction work for up to 15 years, which will be applied retrospectively.

- All developers will need to join the New Homes Ombudsman while a National Regulator for Construction Products is also set to be established.

A Timeline of the Building Safety Bill

June
The fire at Grenfell Tower took place, resulting in the deaths of 72 occupants.

June–July
The UK government established the Building Safety Programme in response to the tragedy. This included an independent expert advisory panel led by Sir Ken Knight, focusing on the use of cladding in high-risk structures, and the Independent Review of Building Regulations and Fire Safety led by Dame Judith Hackitt.

April
The results of the Building a Safer Future consultation were published, detailing the government's plans to deliver the recommendations from the Hackitt Review.

July
The Draft Building Safety Bill was published, taking forward the reforms.

Spring
The Building Safety Bill is expected to be passed by UK Parliament.

2017 **2018** **2020** **2021** **2022** **2023**

May
The Building a Safer Future report from the Hackitt Review was published, with recommendations including a new regulatory framework and a golden thread of information for all high-rise residential structures, from the initial design intent to construction and occupation.

April
The Fire Safety Act became law, requiring the owners of multiple occupancy residential buildings to update fire risk assessments to include the external walls and fire doors of individual flats.

August
Part of the new regulatory framework, Planning Gateway One, became legally binding through secondary legislation, impacting the earliest planning stages for high-rise buildings.

2023
The Building Safety Bill is expected to be implemented in full.

6 key takeaways from
the Building Safety Bill

1. Get ready for change — because it will impact everyone

Although the details of the legislation are still being worked out, it's vital that building owners and operators and construction businesses get ready for change. From local authorities to individual subcontractors and suppliers, the Building Safety Bill will place new obligations on every collaborator in the supply chain.

New projects will need to meet whole new safety requirements, but the biggest impact will initially be experienced by owners and operators of existing buildings. These structures will need to be accurately mapped and checked to comply with the legislation.

Everyone will have to buy in, and there will be strong legislative punch to enforce the changes. Irrespective of your size and scale, understanding what's coming and starting to get ready is critical.

2. Embrace a new mindset for project information

The principle of the golden thread of information will require everyone in the supply chain to maintain a record of every project. That's not to say that every business will need to use advanced modelling tools, but managing internal records in a digital solution will be critical — particularly in the event of an incident or issue in the future.

Being able to identify a faulty or dangerous component that needs to be removed from other builds is essential. Owners of existing buildings will need accurate, as-built models that reflect structures as they stand today — replacing often outdated plans. Meanwhile, new buildings will require a robust record spanning every project milestone. This means every organisation will need to revisit how they collect and store information.

3. The onus will be on owners, so know what to ask for

Arguably owners face the biggest challenge from the Building Safety Bill, especially if they aren't already on a digital transformation journey. It will be critical to have systems in place to receive, and then manage and maintain, project data throughout the operational life of an asset.

That can't be racks of drawings or folders of paper stuck in a cupboard. Owners will need to consider the best way to structure information — for example, in a common data environment solution — to ensure that it's as easy to manage and access as possible.

6 key takeaways from the Building Safety Bill (cont.)

4. Prepare for skills shortages by investing in people

We will need to see a skillset shift across the construction industry to meet these new regulatory demands. There simply aren't that many people with the skills and availability to help. Businesses will absolutely need to invest in staff to prepare for the potential avalanche of demand.

5. Interoperability is critical for effective information management

Although we'll see a step change in information management, there are actually lots of different ways of meeting the regulations, sometimes using existing technology in new and creative ways.

The way that we connect these different technologies and approaches together will be critical, potentially leveraging a technology platform to ensure data can be transferred and collated seamlessly.

6. Embrace the positives— this will be a turning point for quality and sustainability

It's important to recognise that these are extremely positive changes overall. It's not only about trying our utmost to avoid another horrific incident like the Grenfell Fire, but cascading information across the industry, to enable us to fix things that might be faulty or at risk.

Access to more detailed digital information can also help construction businesses ensure the quality of their work—while increasing efficiency and highlighting ways to boost productivity across the organisation. Digital solutions offer construction businesses and owners many benefits and opportunities that contrast with the inefficiencies of traditional processes and familiar technologies.

The impact for existing buildings

All existing occupied high-rise residential buildings will need to be registered with the Building Safety Regulator, ahead of the Building Assessment Certificate process.

This involves the Principle Accountable Person sending key documentation showing how building safety risks are managed and residents are being kept safe.

Existing buildings need to create and maintain a golden thread of information, which will be the responsibility of the Principle Accountable Person.

What do I need to do?

Owners
Develop, maintain and update the golden thread of information for the building, which must reflect the current condition of buildings, rather than the original design. Creating an as-built record will be critical, as typically existing records will be significantly out of date.

Complete works to comply with new safety standards, which will vary significantly from building to building. Follow regulatory advice on components such as aluminium composite material (ACM) cladding with unmodified polyethylene fillers, which if present should be removed.

The golden thread of information
The golden thread of information is intended to ensure that the people managing high-risk buildings have access to all the data they need to protect residents' safety. It's a means of maintaining accurate information on each development from the initial planning and design stages right through to ongoing operations and renovations – so will require input from every stakeholder in the building's lifecycle.

The golden thread will need to contain the information produced for the building's registration and certification, safety case, mandatory occurrence reporting and resident engagement, as well as the data produced for new builds through the Gateway process.

Importantly, the Building Safety Bill will require that the golden thread is kept in a digital format to make it accessible and easy to update. The Bill has not mandated a particular software or tools – but ensuring that the information and workflows can be easily integrated and accessed will be key.

Quickly capturing existing buildings

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We have already started to witness the impact the new Building Safety Bill is going to have on audiences across the construction world from owners to local authorities, landlords and real estate owners.

The number of existing high-risk buildings for which accurate as-built plans exist is unbelievable low. Therefore, there is a huge requirement for building owners to quickly capture these conditions before they can then start to review the need for any modifications to be made to the current conditions from the cladding to fire safety components.

The process to capture these as-built conditions is not onerous. Initially a site survey would need to be conducted with a scanner and drone to record everything both internally and externally. The scanner would then output the data digitally in the form of a point cloud. Using point clouds whilst extremely accurate, can be difficult to work with as file sizes are often enormous and can take a high degree of skill to interpret.

Meshing software like PointFuse changes all of this as it automatically converts the points to surfaces reducing the file sizes dramatically from Gigabytes to Megabytes, allowing large volumes of data to be shared easily across the project team. After converting the data to a segmented mesh model, you can select and classify groups of objects in PointFuse which can easily be published to downstream modelling and project management software at the touch of a button, ensuring a connected common data environment.

Whilst initially this new Building Safety Bill will result in a lot of extra work either in capturing accurate as-built records, or the need for a lot of changes across workflows, there are benefits all can take from these changes. In addition to ensuring high-risk buildings are a lot safer for their inhabitants, it should also lead to improved efficiency across all stages of the built lifecycle, delivering projects faster and at reduced budgets.

In our experience, organisations typically save around 70% of their workflow budget when introducing this kind of digital integrated solution. Not only are processes much faster, but the workflow can be managed by a more junior team and it enables the information to be reviewed in 'real-time' enabling better decision making across project teams.

–Steve Salmon
CEO
PointFuse

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The impact for new projects

Planning Gateway One

Already legally binding, Planning Gateway One has introduced a new requirement into the existing planning application process. Developers will be required to submit a fire statement to the planning authority, setting out the fire safety considerations specific to the development. The Health and Safety Executive will also be a statutory consultee.

What do I need to do?

Owners
Provide a fire statement, including the approach to fire safety, the site layout, emergency vehicle access and any consultations conducted relating to fire safety.

The impact for new projects

Planning Gateway Two

Before building work starts, applicants will need to demonstrate how their proposals comply with the building regulation requirements and the strategies that will be put in place during construction to support compliance and minimise building safety risks.

This will include outlining how the competence of individuals working on high-rise buildings will be evidenced and the plans for change management during the project.

Gateway Two is a stop/go decision point that must be passed before the development can proceed to the next stage.

What do I need to do?

Owners
Provide information to the Building Safety Regulator, including full plans for the development and information on how the new dutyholder competence, golden thread and mandatory occurrence reporting requirements will be met.

Main contractors
Support the owner's submission with details on the information strategy that will feed into the golden thread of information. The golden thread should contain the information needed to demonstrate compliance with specified building regulations. Share details of how the information will ultimately be transferred to the owner/operator.

Also provide plans for supporting the mandatory occurrence reporting requirements and evidence for the competence requirements. Outline the strategies for managing compliance during construction, including change management.

Subcontractors
Follow the main contractor's information strategy for creating the golden thread of information, as well as providing evidence for the competence requirements.

The impact for new projects

Between Gateways Two and Three

There will be ongoing requirements throughout the construction phase. Importantly, the Building Safety Regulator will carry out inspections during construction, which might include visits to the site or requesting information like the golden thread. The regulator will also be able to take tests or samples of building materials by cutting open building work if required.

What do I need to do?

Owners

Follow the statutory change management requirements if any deviations from the building control approval are proposed, by notifying the Building Safety Regulator and waiting a set time period before proceeding. Building control approval will be needed for major changes.

Architects

In the cases of any changes to the original design, the architect will support the owner in meeting the statutory change management requirements by providing all information required by the Building Safety Regulator.

Main contractors

Support the golden thread of information by developing and maintaining robust building information, which can be handed over to the owner at Gateway Three. Plans and data must accurately reflect the as-built building. Follow the mandatory occurrence reporting requirements and competence requirements throughout the build.

Retain samples of all building materials in an accessible location for review by the regulator as required, along with the appropriate datasheets, specifications and testing data.

Subcontractors

Provide robust, as-built information to the main contractor, to be handed over to the owner at Gateway Three. Support compliance with the mandatory occurrence reporting requirements and competence requirements throughout the build.

The impact for new projects

Planning Gateway Three

When the building work is complete, applicants must demonstrate how the work complies with the building regulation, to ensure the building is safe to occupy. This includes retaining plans and documents from the golden thread of information that reflect the as-built building.

Gateway Three is a stop/go decision point that must be passed before the development can proceed to the registration and occupation of the building. It will be possible to partially complete this gateway, with a series of stop/go points.

What do I need to do?

Owners
Provide information to the Building Safety Regulator, including as-built plans and documents, which must have been handed over by other stakeholders. Once Gateway Three has been completed, the building must be registered with the Building Safety Regulator for occupation, which is a separate process. The golden thread of information needs to be handed over to the Principle Accountable Person, who is responsible for the occupied building.

Main contractors
Hand over the golden thread of information to the owner, including plans and documents that reflect the as-built building. Information should be accurate, good quality and up to date.

Subcontractors
Support the golden thread of information, by ensuring that data is accurate, good quality and up to date when it is handed over.

The wider consequences of the changes

Owners gain opportunities

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Arguably owners face the biggest demands from the legislation, especially if they are at a relatively early stage in their digital transformation journey. But on the other hand, owners will gain far greater control over their data than ever before, which can lead to significant benefits for long-term operations – such as the chance to improve sustainability, reduce operating costs and undertake renovations more easily.

Owners can benefit from establishing their information requirements ahead of the legislation, so they know what to ask for at the start of every project. The most effective approach will be identifying what will deliver value in the long-term, as well as meeting short-term needs.

–Matt Keen
Senior Industry Strategist, EMEA
Autodesk

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A culture change for main contractors

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Many main contractors have been looking to improve the quality and the depth of the information they provide to owners for some time. But the new regulations will require an even greater level of transparency. This added visibility may be uncomfortable, while organisations may be wary of delays created by the new Gateways. However, the changes will help contractors to build right first time – ultimately reducing delays, costly rework and waste, as well as improving on-site safety.

Greater information-sharing can support better relationships with clients and collaborators, while there's the opportunity to use data to identify productivity improvements. By embracing the changes and using technology to ease the more onerous requirements, main contractors can use this as a chance to become more open and effective.

–Matt Keen
  Senior Industry Strategist, EMEA
  Autodesk

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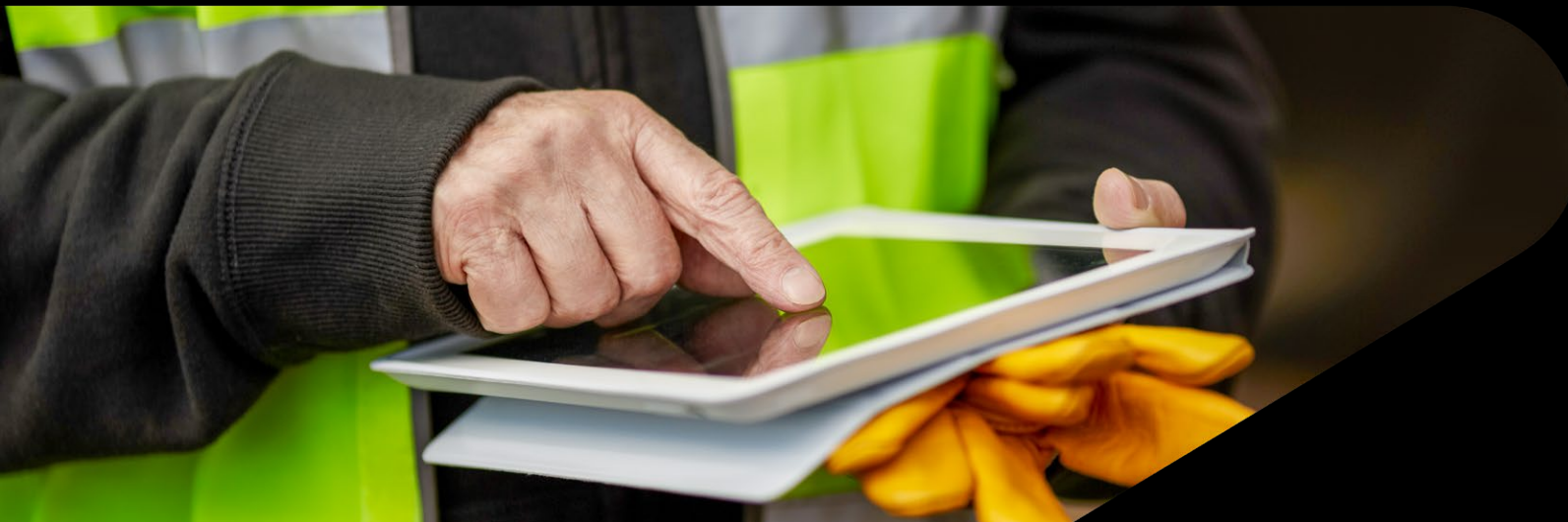
A step forward for subcontractors

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The Building Safety Bill represents a fundamental shift in the way we operate, and will require cultural and behavioural change—including amongst subcontractors. But right now, large proportions of the industry aren't ready, and there's a risk that many companies will wait until ten minutes after midnight when it's too late.

All subcontractors need to get prepared, and find out how their world is going to change. That means providing good evidence that your workforce is properly skilled to deliver, and that work is completed and compliant.

Supporting that golden thread of information will require the use of digital technology, which in turn will enable subcontractors to keep up with the requirements of business today. Many subcontractors will be able to access and use valuable information for the first time, opening up potential benefits and avoiding disputes with clients, and supporting them to become more efficient as a business.

There will be significant financial implications for the firms that don't adjust to the Building Safety Bill: not only through penalties from regulatory bodies, but the clients and insurers that will refuse to work with them. That small percentage of the industry that will not adjust will be squeezed out.

But on the other hand, a huge benefit of the new regulation is that we will see culture change and a greater commitment to professionalism. There's also likely to be a move away from bad practices like starting construction while design is still underway, an incredibly unproductive and costly way of working. We can move towards standardisation and design for manufacture and construction (DFMA), improving how we do things. And by creating a better industry, we'll in turn attract the new and diverse talent we need.

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–David Frise
  Group Chief Executive Officer
  Building Engineering Services Association

Architects as Duty Holders

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During the design of buildings or their modifications, Architects and other Professional Designers become duty holders of the golden thread of information. Their services include the responsibility of ensuring compliance with building regulations as well as managing structural and fire safety. This will entail a greater focus on demonstrating compliance, identifying proposed non-conformities with mitigations, and referencing standards and regulations for future review.

The enhanced scrutiny that the golden thread of information demands will require a change in behaviour to avoid complacency in how these obligations are fulfilled. Attention to detail and full transparency will become more important than ever, but at the same time facilitate closer working relationships with the client and other stakeholders, particularly if the right information sharing tools are put in place.

–Marek Suchocki
EMEA Global Business Development Executive
Autodesk

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The role of Building Product Manufacturers

Building product manufacturers have a formative role in how buildings are experienced. It is critical they help Architecture, Engineering & Construction (AEC) professionals and owners navigate the many solutions available to them, and understand how their products work and perform.

More accountability is expected from building products manufacturers following the new Building Safety Bill, particularly in three key areas.

1. Traceability of product information
Building owners will need access to accurate, detailed information about the building materials used throughout the building lifecycle. To meet this requirement, Building Product Manufacturers must firstly ensure the accuracy of their product data and compliance with regulations, then provide easy-to-access, well maintained and up-to-date digital information to all stakeholders, in support of the golden thread.

2. Process enhancements for more integrity
Manufacturers will require a rigorous change management system and need to clearly communicate when existing products are improved, or new products are introduced.

To ensure that products are used in a way that meets regulations and to avoid uncompliant product substitutions, manufacturers should be more transparent in marketing their product limitations to designers and contractors.

3. Continuous research and development
Both incremental improvements and disruptive innovation are critical for building product manufacturers to increase residents' protection. Manufacturers are expected to conduct additional testing protocols to further validate performance and safety claims, while investing in fire safety innovation.

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> These capabilities will require a strong level of digitalisation, from methods like Building Information Modelling to Product Information Management, improving how people manage data and processes.
>
> Building product manufacturers can take advantage of organisations such as the Construction Products Association which provide expertise to drive the adoption of digital technologies. Ultimately, this will improve manufacturers' outcomes and lead to a smarter, safer built environment.
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>
> **–Marie Olivares**
> Senior Industry Manager–Building Product Manufacturing, Autodesk

How technology can help

The core capabilities to meet the Building Safety Bill

Technology will play a core role in enabling organisations to meet the Building Safety Bill's requirements – and fundamentally improving how they work. There are some capabilities that will be core to compliance, and others that will enhance workflows and add value.

Common Data Environment (CDE)
This is a process supported by technology to ensure the quality of information during the asset lifecycle and can provide a secure, accessible place to store all buildings data, plans, photos, forms and certificates. A good CDE solution will include approval controls and an audit trail to help with sign off procedures of documents and certificates. For those new to the world of CDEs, remember less is more. It's not about complex configuration with a multitude of features and functions, but about flexibility in application, with ease of use aligned to standards such as the UK BIM Framework.

Scope definition
During preconstruction, this function can be used to take a list of items from the specification, allowing contractors, subcontractors and design teams to manage any changes in materials or assets and ensure they meet the required specification.

Construction management software
As well as supporting collaboration between stakeholders, a construction management platform can be used to evidence compliance during the build phase. With mobile applications, it's possible to upload data from the site as proof, as well as viewing documents, models or drawings, videos and photos, and supporting trade to trade handovers.

Field data collection
There are multiple technologies available for collecting data in the field, from platforms that digitally mirror existing processes through to the cutting-edge

reality capture tools that are springing up in the market. One example is using camera footage to create a timestamped video record that can be overlaid with model-based information. Collecting data in a structured way, then verifying and collating the information, is key. Using construction management software that's compatible with a range of technologies will help.

Cost management
This workflow can link issues and RFIs to cost change requests, creating an audit trail and approval history.

Issue management
This function enables the tracking of issues and risks, both during design and on-site, with data such as who is responsible for fixes and evidence of remedial work. A robust issue management system will enable escalation of issues to RFIs and cost change requests for better auditability.

Reality capture

This is a process of scanning and capturing any site or building, combining measurements and imagery. It can combine several alternative data sources including laser scanners (terrestrial and/or airborne) and photogrammetry. The scanners create a point cloud file which can then be translated into a 3D model.

Mesh models

This software solution converts point cloud data into 3D models. Scanners capture the as-built conditions and output this data in the form of a point cloud which is often a very large data file. Meshing software converts the points to surfaces which depicts the key content as images in the mesh model whilst reducing file sizes by around 90%. This data can then be easily output in various industry standard data structures that enables it to be easily manipulated and accessed across project teams via common design or viewing applications.
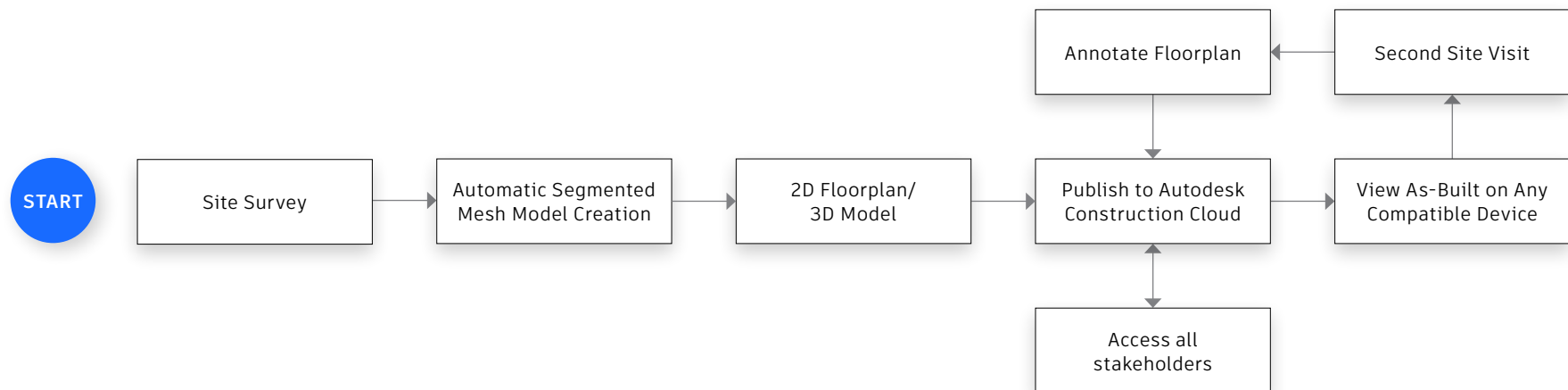
Application Programming Interfaces (APIs) for reporting

Often sitting beside the scenes, APIs connect different programmes or software together. APIs can help with reporting, using tools such as PowerBI, both during construction and following completion. This can in turn enable organisations to identify areas to improve efficiency.

How technology can help

Here is a sample workflow, illustrating how information can be created and shared with easy to use digital tools.

START → Site Survey → Automatic Segmented Mesh Model Creation → 2D Floorplan/3D Model → Publish to Autodesk Construction Cloud → View As-Built on Any Compatible Device

Publish to Autodesk Construction Cloud → Annotate Floorplan

Annotate Floorplan ← Second Site Visit

View As-Built on Any Compatible Device → Second Site Visit

Publish to Autodesk Construction Cloud → Access all stakeholders

Benefitting from BIM

Building Information Modelling (BIM) is a collaborative process for managing every stage of a project's life cycle which provides access to the same data for all stakeholders, meaning it is a powerful tool for meeting the regulations. BIM-based workflows are cloud-based, with information updated in real-time, and available to every stakeholder as needed.

This can support the close collaboration of all parties required in the Building Safety Bill.

Importantly, a higher level of diligence during design and preconstruction can mitigate risk during construction and operations. BIM provides a platform to share information and coordinate it better to create a collaborative working environment during these periods. BIM is not a new concept and is mandatory in the UK for government projects, with governments around the world taking a keen interest in its implementation.

There are a number of tools that support BIM-based workflows, without requiring every company to develop a full 3D model. The sample workflow shown incorporates most steps and processes you would need to implement BIM methodology on a project.

How technology can help

The importance of interoperability

Data management will be key for meeting the requirements of the Building Safety Bill. At the heart of the new legislation are changes in how information is created, shared and maintained, to prove that buildings are safe and help operators protect residents throughout its lifespan.

All collaborators on a project, from designers to contractors, will need to maintain a local electronic audit trail, rather than relying on owners to hold the data. Digital tools can support this, with many available that are easy to use, efficient and fit into existing workflows, as shown in our example workflow.

Businesses have a wide range of choice, given that the legislation doesn't specify a particular software or tool. But key consideration is interoperability – between different teams and different companies. Throughout projects, information from these stakeholders will need to be shared and collated into the golden thread of information.

Using data platforms that easily integrate with others will be important to ensure that data records can be slotted together. It is also worth checking that it is easy for the data to be accessed across the different project stakeholders, considering not only interoperability but file sizes to ensure that this doesn't create a sticking point.

At the company level, choosing open data platforms will help to ensure interoperability with other systems. During data handover, alongside native model formats, open standards such as buildingSMART's IFC can be specified to provide confidence in future use through guaranteed interoperability.

Digital strategies for subcontractors

Many subcontractors may be at an earlier stage in their digital transformation journeys than larger construction organisations. However, digital technology will be necessary to not only meet the new safety requirements, but to meet all the requirements of business – as otherwise firms will be unable to maintain their competitiveness or even participate in certain projects.

Technology can seem daunting, especially to smaller firms. But my advice would be to overcome the fear that you're the only person in the room who doesn't know what's going on. Start by learning the terms of digital construction; it'll be much easier,

and you'll learn you can do many of the things you want to, at a much lower cost than you might think.

Working with people that you know – including major contractors – can be hugely helpful for working out where to start. There are plenty of opportunities to get support. And importantly, remember that your employees do use technology a lot in their day to day lives, without needing to take a course on every app. People will adapt to digital tools, and your business will become more attractive to new recruits and clients as a result.

David Frise, Group Chief Executive Officer at Building Engineering Services Association

Digital transformation:
Lessons from Mace

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Technology is constantly changing and the possibilities for construction are huge. The key for businesses is to start with the basics and get the "unsexy" stuff right as the starting point in your digital transformation.

At Mace, when we were exploring how to create a golden thread of information on each project, we decided to take a couple of steps back and begin by standardising how we operate across projects.

We looked at our digital infrastructure and the technologies used on projects, right down to data standards and naming conventions, to ensure that everything was consistent from team to team. It's important to avoid introducing too many different technologies. Picking out the right digital platforms, and sticking with them for at least five years, is really valuable.

Another core part of this process is encouraging people to understand the principles and basics of digital construction. To create the right standard of information, Mace engaged with all players to convince them of the importance of the initial data entry points.

Ultimately, the success of any technology is getting people to embrace its use and invest in the training. The industry needs to create a safe environment for people to learn and ask questions, so they can use these tools to do their jobs better.

Once you get these basics right, you can start looking at other capabilities and move forward. It has been a valuable engagement for us. We can now happily give our clients full visibility of what we have built, which benefits everyone.

–Duncan Yarroll
  Head of BIM & Digital Engineering
  Mace

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How technology can help

Adding more value beyond the regulation

As well as compliance with the regulations, organisations can benefit significantly from considering their approach to technology as a whole, to see where tools can improve outcomes like efficiency, productivity and sustainability, as well as strengthen relationships with other stakeholders.

Ultimately, once you have a connected CDE, it's possible to enable downstream workflows off the back of it. There are many other digital tools that can enhance workflows across the building's lifecycle, providing value rather than simply ensuring compliance. Many of the features and benefits outlined below would be leveraged by incorporating the example workflow shown, therefore providing an even greater return on the investment in technology:

- **Design authoring tools:** Creating a 3D Building Information Model, with property and asset data associated with all objects and assets in the building. By following the outlined workflow that incorporates intelligent segmented meshes, asset information can easily be added to the files as part of the standard process.

- **Coordination tools:** Managing designs from multiple disciplines, these tools can enable you to identify clashes and challenges before reaching site, avoiding rework and fixes which may compromise quality and performance and increase costs. By following our suggested workflow process incorporating intelligent meshing software, it's possible to classify objects and then compare the as-built with the design to easily run clash detection before reaching site.

- **Take off tools:** Automated quantification of assets and materials during preconstruction, to support more accurate estimating.

- **Digital twins:** A rich digital model of an asset, holding information that supports efficient operations and future renovation works. Analysis tools can then be used to identify how changes in the building might impact energy consumption, for example. Following the suggested workflow would ensure the basis for a digital twin with the accurate as-built model into which real-time data can then flow bi-directionally.

Even relative newcomers to digital transformation can take significant steps forward by looking at what other companies have done and working with technology partners to explore the options available.

By establishing best practices today, companies can not only meet the needs of the Building Safety Bill, but also prepare themselves for future trends in the industry alongside changing social or legislative demands.

Closing remarks

Cast Consultancy, Spring 2022
What is clear from this paper is that the industry has an imminent structural shock about to sweep over it. The building safety agenda sits alongside other current big picture drivers of change facing the construction industry, whether it be decarbonisation, resource scarcity, or need for improved consumer redress and public confidence.

In the light of the cumulative effect of all of this it would be a mistake to think that the proposed changes will just happen and the industry will 'muddle through' as it always does.

If the regulations are to be properly applied and policed, the need for a more transparent and outcome led process combined with greater digital provenance of what the industry actually delivers for its customers is going to act as a further filter on the available industry competent capacity to deliver high risk buildings.

Beyond regulatory reform, the private insurance and financial underwriting markets are going to increasingly force the market to either change how it delivers or, in the worst case scenario, actually stop delivering certain projects as reducing appetite for risk and a need for better assurance starts to shape what can actually be delivered by an industry that has historically failed to modernise.

It is also likely that it is the insurance market which will make the true impact of some of the principles in the Building Safety Bill play out on a much broader front than simply 'high risk buildings.'

The stakes are therefore very high here. Beyond the absolute imperative of improved life safety, these changes will impact on the core future sustainability of design and construction businesses.

It is very clear that the route to improved outcomes in a market where we have a declining skills base is to invest in human capital, winning the war for increasingly limited talent (whilst recognising we will not be able to recruit our way out of a declining labour force), ensuring the right culture is established and that the right skills are trained, deployed and supervised.

Alongside this the key enabler is increased appropriate use of technology to augment and automate processes and workflows and overcome the resource quantum and competence constraints we will continue to face.

The approach to technology adoption has to be practical, deliverable and capable of being dispersed at scale into the hugely fragmented supply chain that makes up the industry.

That will drive an agenda of affordable and intuitive hardware, combined with digital data platforms that need to be increasingly inter-operable across proprietary boundaries.

If we can attack the problem on both fronts – both people and technology – then we stand a chance of being fit for purpose as an industry.

Mark Farmer
CEO

Cast

Appendix

Our contributors

Mark Farmer, CEO, Cast Consultancy

Mark is a Founding Director of Cast, with 30 years' experience in construction and real estate. He is a recognised international commentator on industry and policy related issues. Mark authored an influential 2016 independent government review of the UK's construction labour model, 'Modernise or Die'. In 2019 he was appointed as the government's Champion for Modern Methods of Construction in Housebuilding. Mark is a member of the Construction Innovation Hub Industry Board, the Construction Leadership Council Senior Advisors Group, a board member for Construction Scotland Innovation Centre, national co-chair of Constructing Excellence and is a trustee of the MOBIE educational charity. Mark is an honorary professor at The University of Salford's School of Built Environment and holds honorary doctorates from the University College of Estate Management and the University of Wolverhampton.

David Frise, Group CEO, BESA

A former nuclear submariner, David worked in building engineering services contracting as an M&E contractor for 25 years, before branching into renewable energy systems. He has served as a non-executive board member of Summitskills, the Construction Products Association and as chair of the BIM group at the Specialist Engineering Contractors. He was chief executive of the Finishes and Interiors Sector FIS representing the fit out industry for seven years. David has a long association with BESA and in 2018 was appointed Chief Executive. He is a frequent speaker on competence and compliance, energy efficiency, system integration, low carbon initiatives, the future of the sector and the gap between design and performance in buildings.

Matt Keen, Senior Industry Strategist, Autodesk

Matt is a Senior Industry Strategist at Autodesk focusing on Construction. His primary remit is to identify and provide insight into the key construction markets for Autodesk and ensure that the market requirements are translated into actionable plans for the wider Autodesk team. Matt's focus is on ensuring that Autodesk's portfolio of construction products and solutions enable their customers to achieve their desired business outcomes. He is a passionate advocate of construction technology and cloud transformation and has previously worked with many of the UK and Europe's largest contractors in defining their digital transformation strategies. Before Autodesk, Matt worked for the contractor Willmott Dixon and is a Member of the Chartered Institute of Building.

Marie Olivares, Senior Industry Manager – Building Product Manufacturing, Autodesk

Marie Olivares is responsible for the Building Product Manufacturing strategy at Autodesk. She gathers industry insights impacting manufacturers who serve the Architecture, Engineering and Construction market. She is passionate about helping these manufacturers transform and grow through the adoption of digital technologies. Specifically she supports their business opportunities around BIM (Building Information Modeling) and digital construction.

Steve Salmon, CEO, PointFuse

Steve is a seasoned technology general manager who has worked in both software and hardware technology businesses, starting with a software and service company that helped businesses get on to the internet, through the mobile phone revolution and latterly a consumer electronics solution to keep vulnerable children and adults safe. The common theme has been early adopter industries where technology has been the catalyst to change and improved profitability. Having led a number of businesses to a sale Steve joined Pointfuse three years ago to develop a very interesting and unique software technology into a solution that enhances existing workflows in the construction industry.

Marek Suchocki, EMEA Global Business Development Executive, Autodesk

Marek Suchocki is a Global Business Development Executive focused on data standards and digitisation within the AEC industry. He holds a degree in Civil Engineering, is a Chartered Engineer, Chartered IT Professional, Fellow of BCS, Fellow of the ICE and a Member of CICES. He sits on the CICES Geospatial Engineering Practices Committee and represents Autodesk at the UK BIM Alliance and Digital Twin Hub. He is on the British Standards B555 committee and is their nominated representative to CEN for working groups on Common Data Environments (CDE), BIM for Infrastructure and the IOT/1 Digital Twin mirror committee. Within buildingSMART he is on the UK & Ireland Management Committee, the International InfraRoom Steering Committee, and Chair of the InfraRoom Project Steering Committee.

Duncan Yarroll, Head of BIM & Digital Engineering, Mace

Duncan is a 25+ year veteran of the built environment, and has spent the last 21 years with Mace Group. Duncan has been heavily involved in project delivery in the Mace Construct Engine for 17 of those years. For the last four years Duncan has operated within the Group Technical Services team supporting the four growth engines (Develop, Consult, Construct & Operate) with delivering the group business strategy. Duncan is Head of BIM and Digital Engineering, supporting the business' digital transformation programmes. Duncan drives the measurement, capture and analysis of productivity data and sits on the Innovation board driving innovation to improve service excellence.

See the Future of Connected Construction

construction.autodesk.com

Our industry requires solutions that connect their information, teams, and technology—breaking down data silos and disconnected processes that hinder true transformation. As we navigate the ever-present push to do more with less, we need to uncover new ways of working, enhance connected digital workflows, and incorporate advanced analytics. To support us on this journey of transformation, we must lean into tools that connect construction—from design to plan, build, handover, and operations.

Built on a unified platform and common data environment, Autodesk Construction Cloud is a powerful and complete portfolio of construction management products that empowers main contractors, speciality trades, designers and owners to drive better business outcomes. Autodesk Construction Cloud combines advanced technology, a unique builders network and predictive insights to connect teams, workflows and data across the entire building lifecycle.

While the industry experiences unprecedented transformation, our mission remains the same: to help construction teams meet the world's rapidly expanding building and infrastructure needs while making construction more predictable, safe, and sustainable. And we've remained steadfast in our promise to deliver the industry's most compelling solutions, connecting data, teams and workflows from the field. This is our commitment to connected construction.
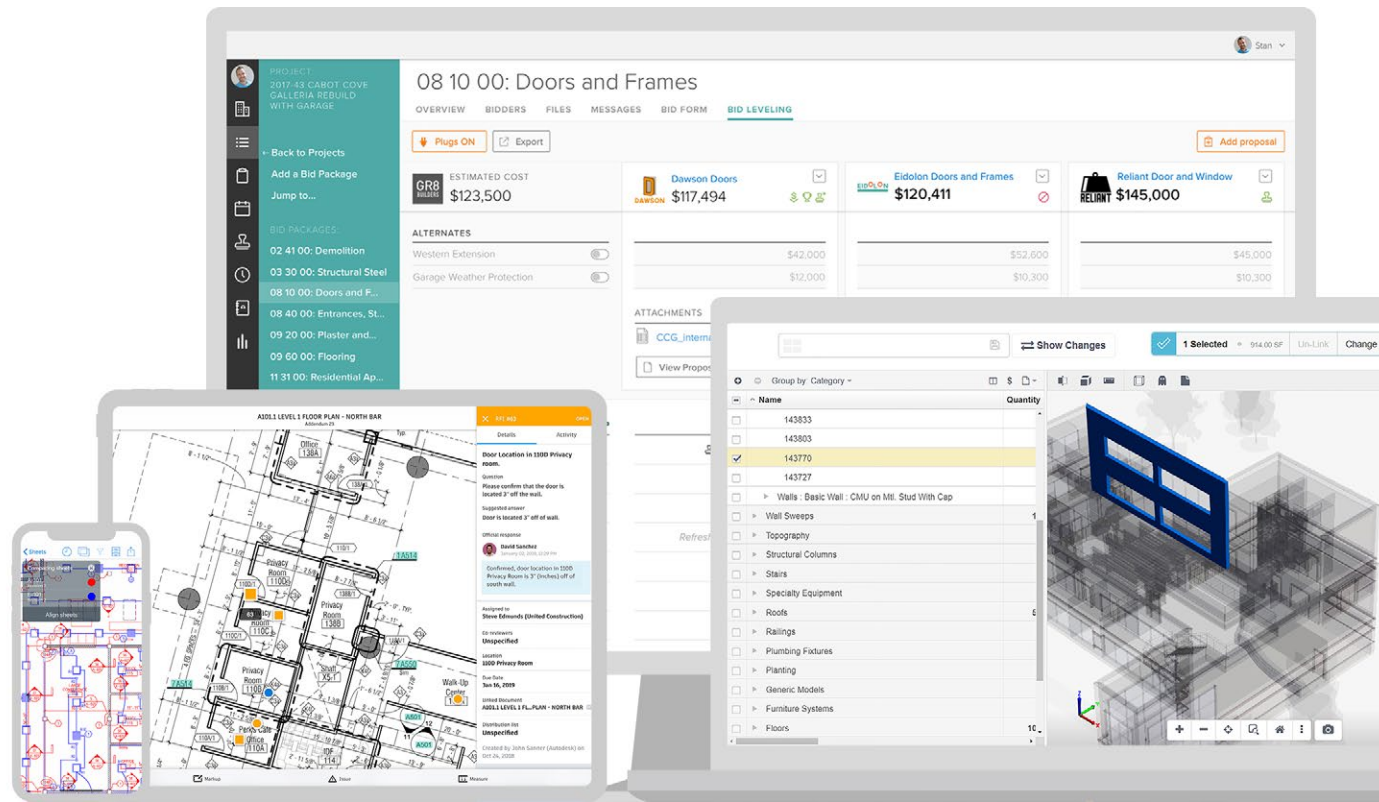
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