XYZ™

BUILD IT
RIGHT,
FIRST TIME

/// THE **ROOT CAUSES OF**

REWORK
IN CONSTRUCTION

XYZREALITY.COM

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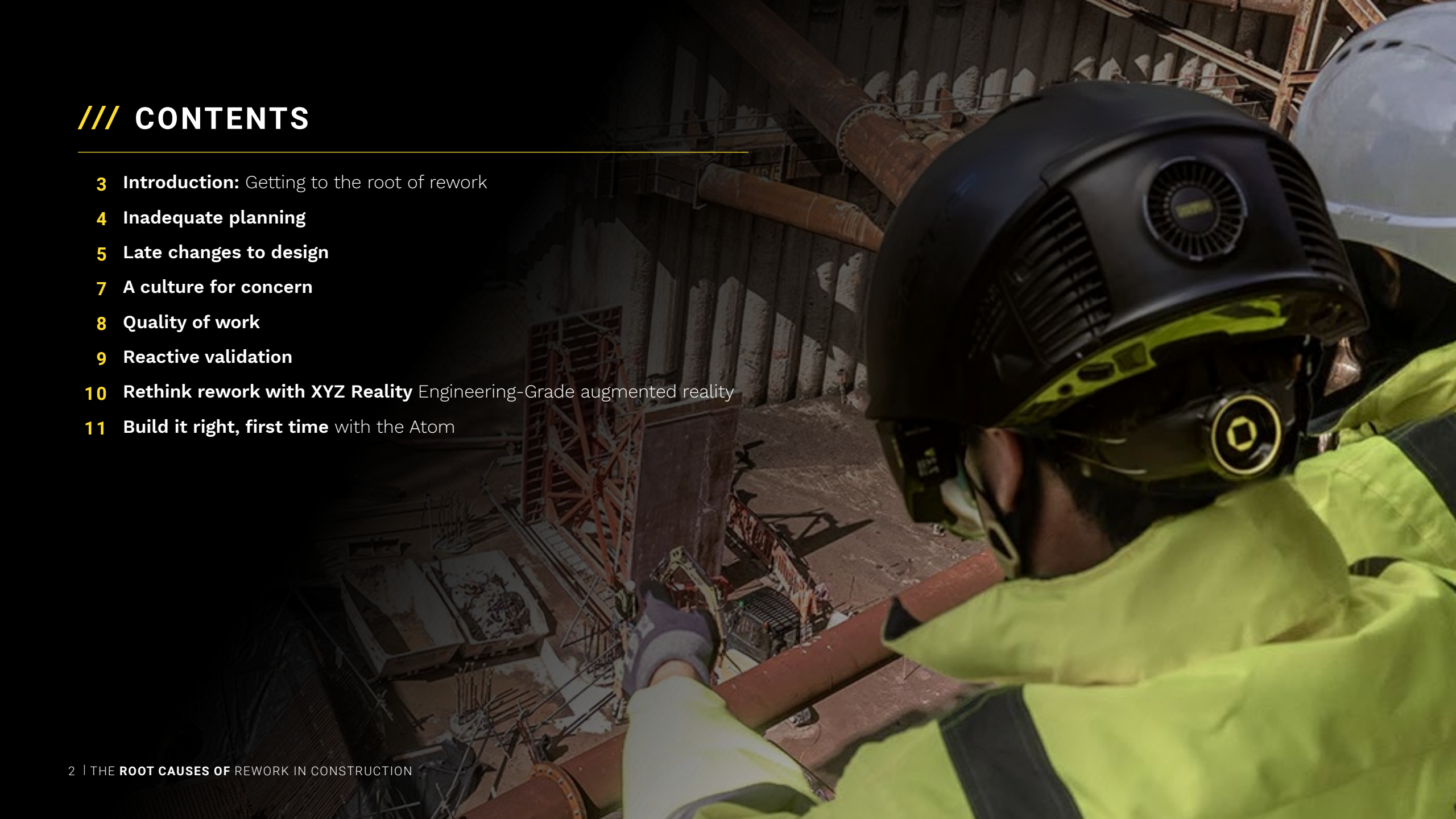


/// INTRODUCTION

GETTING TO THE ROOT OF REWORK

Error and rework in construction have been the subject of scrutiny for years. Despite this fact, despite the figures and insights that so many studies have generated, there is very little consensus on the true scale of the issue.

Estimates of rework tend to range between 5% and 30% of project costs. Towards the top end of that range, one of the most comprehensive and reliable pieces of rework research (GIRI) puts the figure at 21% (GIRI - Strategy for Change).

When less quantifiable costs are added to the mix, a bleak picture starts to look worse. For example, unnoticed or 'latent' lapses in quality can undermine the performance and lifespan of a finished building, while rework causes damage to morale, commercial reputations and the environment.

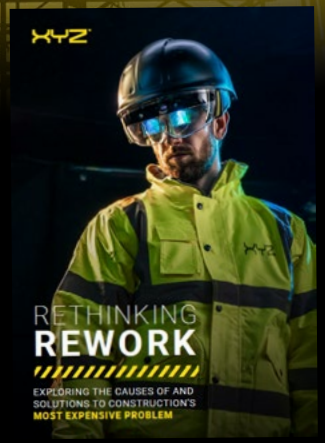
Considering that the industry operates on average profit margins of 4% before tax, and has mounting economic, labour, material and environmental pressures to contend with – ignoring rework simply isn't an option.
We may not know the full financial implications of rework but we do know one thing for certain: the costs are unsustainably high.

So how can designers, contractors, BIM managers and all the other stakeholders working on the ground start to rectify their industry's most expensive problem? First, they must understand its root causes.

/// REFRAMING REWORK:

AN $18 BILLION OPPORTUNITY

BASED ON THE MOST CONSERVATIVE ESTIMATES OF REWORK, **HALVING ERROR-BASED SPEND FROM 5% TO 2.5% OF PROJECT COSTS WOULD BE WORTH A STAGGERING $18.25 BILLION** TO THE INDUSTRY EACH YEAR.



FOR MORE INFORMATION ON ELIMINATING REWORK

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OUR FREE, INDUSTRY LEADING WHITEPAPER NOW

/// INADEQUATE PLANNING

Fail to plan, plan to fail. Inadequate planning has been identified as the single biggest, most expensive cause of rework. From a granular task-based level, right up to failures at the project-wide level, poor planning results in the most frequent instances of error as well as some of the most expensive mistakes.

POOR PLANNING RESULTS IN:

- **Misapplication of skills and talent.** For example, ensuring that the right people with the right skills are available at the necessary times to keep the project on schedule.
- **Inadequate supervision.** A lack of foresight can mean that unqualified personnel end up carrying out work beyond their capabilities without the support they require from senior team members. Often, supervisory resource is focussed on the most visible aspects of a project, rather than those that carry the greatest risk.
- **Neglected inspections.** A failure to allocate sufficient time to track progress and quality inevitably leads to missed opportunities to correct errors quickly.
- **'Can do' culture.** Somewhat counterintuitively, 'can do' attitudes can actually do more harm than good. For example, if trades commence tasks before fully thinking them through or before designs are complete, the likelihood of works going awry greatly increases. Poor planning feeds the 'can-do culture' and therefore contributes to costs and disruption.
- **Material or product procurement delays.** If the right materials are not available when they are needed, trades are forced to either wait and risk delay, or plough on with a makeshift solution. Both choices can bring significant costs.

> **"GOOD PLANNING AND CLEAR, CONCISE AND RELEVANT INFORMATION-FLOW IS ESSENTIAL TO GETTING THINGS RIGHT."**
>
> *- CONTRACTOR'S PERSPECTIVE*

/// LATE CHANGES TO DESIGN

Late changes to design are a frequent source of rework. They often mean that perfectly good construction must be undone to rectify design-based errors already actualised. Not only is this a waste of materials and labour, but it also delays project delivery, causing financial losses for both the owner and the contractor.

Late changes to design may occur for any number of reasons. For example:

- Indecisiveness from the design team or client
- Material or product shortages driving demand for alternative solutions at the point of installation
- Unsuitable design work arising from a lack of knowledge or proficiency. Design errors may lead to clashes or structural flaws being exposed later in the project.
- A lack of early co-ordination between design and construction teams
- Time and cost pressures driving error in design
- Using 2D design as the ‘source of truth’ on a project. Our 3D reality is impossible to capture effectively in 2D design and is therefore likely to result in design errors that require last-minute rectification.

Poor communication of design is another design-based issue that commonly results in error. For the same reasons as late design changes, poorly communicated design work can have a catastrophic impact on quality, deadlines and project budgets.

As with late design changes, poor communication of design may arise due to time and cost pressures, or a lack of proficiency. However, more frequently it is attributable to antiquated tools and processes that leave too much room for interpretation or allow vital information to fall through the gaps.

- **2D plans in a 3D world:** 2D rendering lacks the fidelity of 3D models and is therefore open to misinterpretation by the contractor in the field
- **Version and document control:** If site teams are working off different documents and design versions, errors are inevitable. Siloed information-sharing (think email, WhatsApp or the ultimately fallible medium: paper) is the most likely source of informational discrepancies

> **"THE QUALITY AND TIMING OF DESIGN INFORMATION WE RECEIVE FROM THE PROFESSIONAL TEAMS IS AT AN ALL-TIME LOW. WHETHER TRADES ARE NOT APPOINTED EARLY ENOUGH TO HELP THEM FINISH THEIR DESIGNS, WHETHER THEY ARE NOT GIVEN ENOUGH TIME TO COMPLETE THEIR JOBS… I'M NOT TOO SURE."**
>
> *- CONTRACTOR'S PERSPECTIVE*

/// A CULTURE FOR CONCERN

'Culture' is a broad term but it essentially boils down to the attitudes, beliefs and habits of project stakeholders. The wrong type of culture – whether in a team, an organisation, across a project, or throughout an entire industry – is bound to drive down quality and drive up costs.

Construction companies and project teams are just like any other teams in so far as the leadership sets the tone for the culture around them. Therefore, where cultural attitudes lead to rework, the problem can often be traced back to those at the top.

For example:

- Poor working conditions can demotivate teams resulting in substandard quality.
- Excessive time and budget pressures lead to corners being cut, which result in error and rework. Ironically this means that projects ultimately end up costing more and taking longer.
- A general lack in pride for the craft may spring from a lack of recognition for a job well done.
- Failure to implement better ways of working can result directly from leadership policy, or from failures to inspire support for innovation across the team.

> **"THE CULTURE OF BUILD IT FOR THE LOWEST PRICE IN THE LEAST TIME WITHOUT REALLY KNOWING WHAT THE FINAL DESIGN WILL BE… THAT'S THE REAL PROBLEM. WE NEVER HAVE TIME TO GET IT RIGHT… WE ALWAYS HAVE TIME TO PUT IT RIGHT."**
>
> *CONTRACTOR'S PERSPECTIVE*

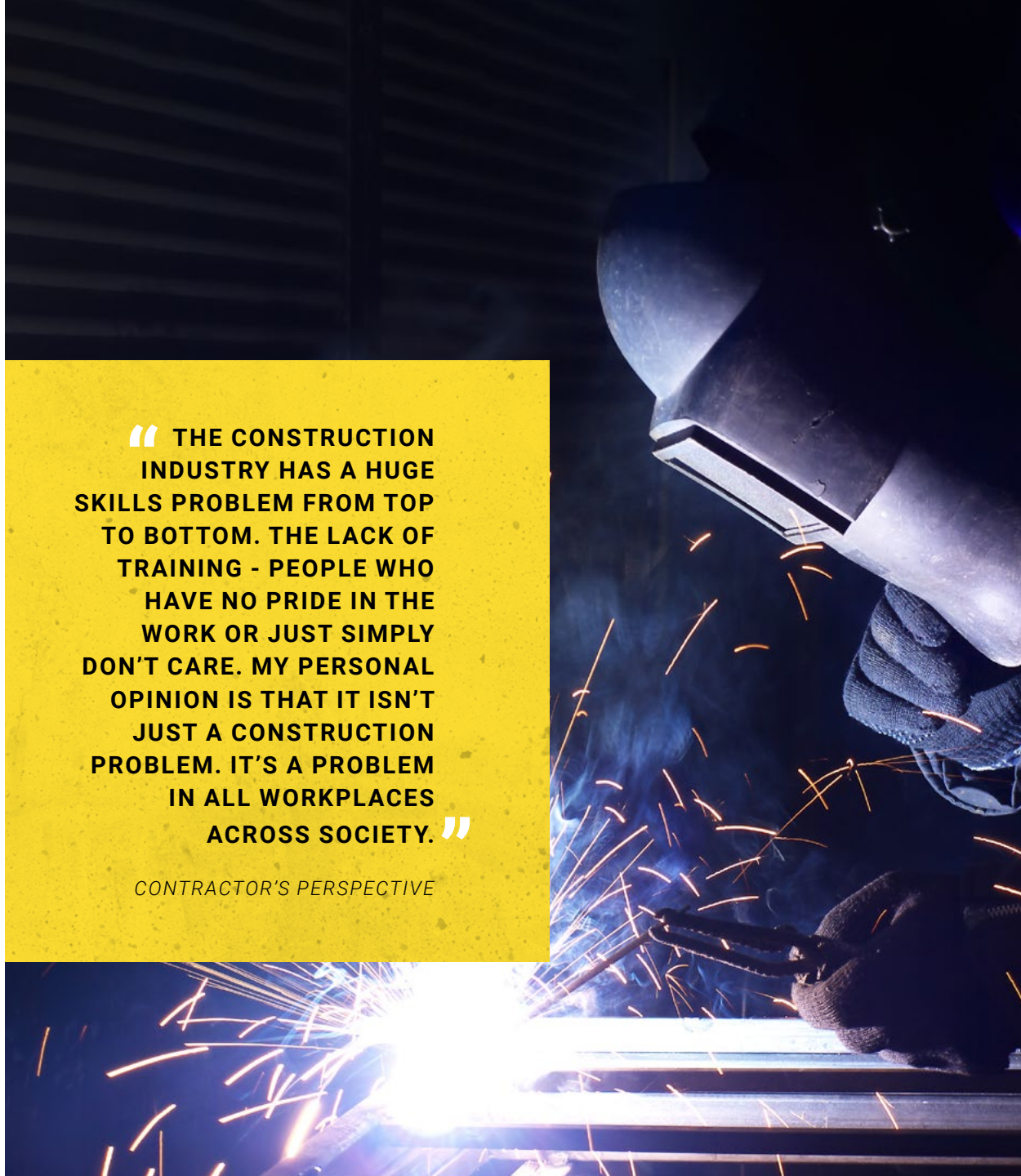
/// QUALITY OF WORK

When contractors lack the proper training, experience or knowledge to effectively carry out their duties, error is inevitable. Sadly, with 64% of local construction markets reporting a skills shortage in 2021 (conexpoconagg.com), human error on-site is currently more likely than ever.

However, it should be noted that in most cases, construction errors do not occur because of a lack of technical proficiency. More often, shoddy work can be attributed to a lack of proper supervision or a lack of contextual knowledge of the project, such as not knowing how deviations from the design will impact subsequent works or building performance.

Other sub-causes may include:

- Inadequate training
- Inadequate quality management systems (QMS)
- Location issues relating to survey or measurement errors



“ THE CONSTRUCTION INDUSTRY HAS A HUGE SKILLS PROBLEM FROM TOP TO BOTTOM. THE LACK OF TRAINING - PEOPLE WHO HAVE NO PRIDE IN THE WORK OR JUST SIMPLY DON’T CARE. MY PERSONAL OPINION IS THAT IT ISN’T JUST A CONSTRUCTION PROBLEM. IT’S A PROBLEM IN ALL WORKPLACES ACROSS SOCIETY. ”

CONTRACTOR’S PERSPECTIVE

/// REACTIVE VALIDATION

Identifying the root causes of error and rework is a worthy endeavour. After all, understand the problem and you are halfway towards the solution.

But what if our industry has been looking at the problem from the wrong perspective all this time? What if the most obvious root cause of rework has been hiding in plain sight? Reactive validation, the standard approach to dealing with error, is fundamentally flawed.

This process – to build, check, then make right – corrects error rather than preventing it. It can deliver projects built within tolerance of the design, but not without significant rework costs and delays.

Validating the results of laser scanning and then conducting rework or updating the as-built model can take weeks, even months on complex projects, and the whole process represents a cost that the industry can ill afford.

/// RETHINK REWORK WITH XYZ REALITY

ENGINEERING-GRADE AUGMENTED REALITY

The Atom, the world's first engineering-grade augmented reality headset, has been designed specifically for construction and flips the validation process on its head. For the first time, it introduces the concept of proactive validation.

It works by positioning hyperscale 3D models against the site coordinates and displaying the design as an augmented reality hologram to millimetre accuracy. This allows designers, surveyors, contractors, project managers or inspectors working in the field to literally see where each element of the building belongs and then perform their duties accordingly.

Based on data gathered across a 23-week period, the average number of observations, issues and validations made each week with The Atom are 13, 12 and 3.5, respectively. Extrapolate that for the entire year and continual use of the atom could easily yield 676 observations, 624 issues, and 182 validations on a single project.

/// BUILD IT RIGHT, **FIRST TIME** WITH THE ATOM

“The Atom is ground-breaking,” says Diarmuid O’Sullivan, Construction Director at PM Group. It allows us to move away from a reactive approach to tackling errors to a more proactive way of working, solving problems before they actualise as a cost.”

WANT TO KNOW MORE ABOUT THE CAUSES OF AND SOLUTIONS TO CONSTRUCTION’S MOST EXPENSIVE PROBLEM?

DOWNLOAD OUR FREE WHITEPAPER NOW

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