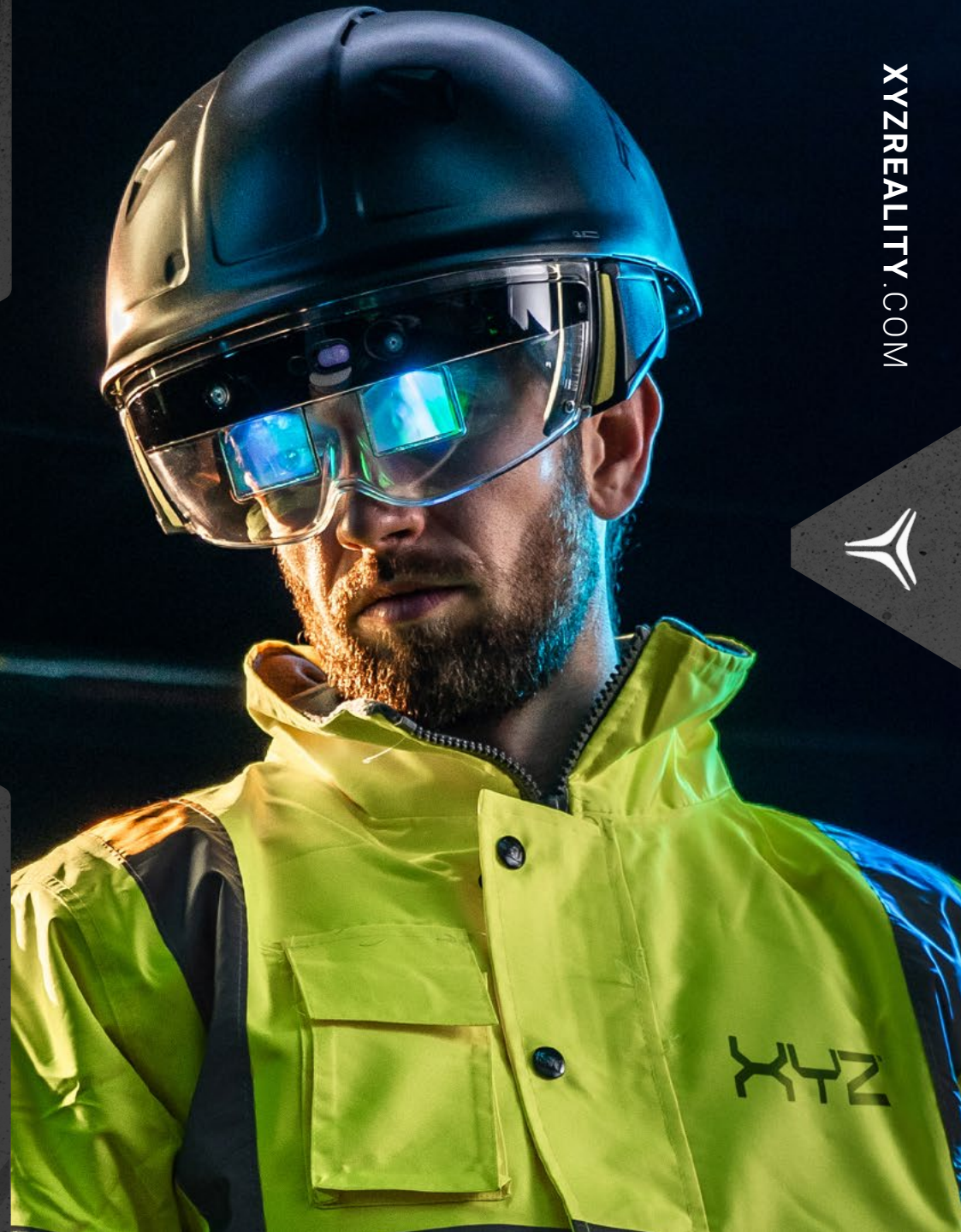




BUILD IT
RIGHT,
FIRST TIME

/// REWORK:
THE SOLUTIONS
TO CONSTRUCTION'S
MOST EXPENSIVE PROBLEM



In our last e-book, *The root causes of rework in construction*, we examined the reasons why avoidable error occurs with such devastating frequency in construction. In this e-book, we look at the ways error and its associated rework costs can be eradicated.

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/// INTRODUCTION

THE SCALE OF THE PROBLEM

The scale of construction's rework problem simply cannot be ignored.

Conservative estimates place the amount wasted on error and rework at 5-9%¹ of project costs. Frame this wastage within the more robust figures of the Get It Right Initiative (GIRI), which estimates that 21% of all costs arise from avoidable error, and the picture looks even worse.

For an industry that works on tight profit margins of around 4% before tax³ and faces a host of other threats including material and labour shortages, something has to change.

Before it can fix the rework problem, construction must first identify why the problem exists. Inadequate planning; late changes to design; poor communication; cultural, attitudinal and leadership shortcomings; and a lack of necessary technical skills have all been used to explain why error is such a rampant drain on resources.

In this e-book, we examine the practical steps you can take to resolve these issues.

CONSERVATIVE ESTIMATES PLACE THE
AMOUNT WASTED ON ERROR AND REWORK AT
5-9% OF PROJECT COSTS

**GLOBAL
CONSTRUCTION
WAS VALUED AT**
\$7.3
TRILLION IN 2021

**THE INDUSTRY
COULD BE
THROWING AWAY**
\$365
BILLION EVERY YEAR

GET IT RIGHT INITIATIVE (GIRI) ESTIMATES THAT
21% OF ALL COSTS
ARISE FROM AVOIDABLE ERROR

/// INVEST IN SKILLS AND KNOWLEDGE

If contractors lack the proper experience or knowledge to effectively carry out their duties, error is inevitable. It is important to note that individual mistakes caused by a lack of technical proficiency are rare. However, such mistakes do sometimes occur and can be extremely costly.

Investing in proper training for your project teams is therefore a crucial part of eradicating error-based rework. This is especially true as the industry endures a critical labour shortage because, quite simply, skills are in short supply.

Research shows that contractors who invest in training programmes regularly reduce rework costs between 11-22%.⁴

BEYOND PROVIDING NECESSARY TECHNICAL SKILLS, TRAINING CAN ALSO PREVENT REWORK BY HELPING YOUR TEAMS:

- Make better decisions in the field
- Communicate more effectively
- Understand the wider context of the project
- Deal with change
- Supervise and support co-workers

**TRAINING
PROGRAMMES
REGULARLY REDUCE
REWORK COSTS BY**

11-22%⁴

/// LEAD BY EXAMPLE

A culture of indifference to quality has been identified as another significant cause of error in construction. Since culture is established by senior leadership, it is senior leadership that must take responsibility for motivating project teams to take pride in the work they deliver.

In its research, the Get It Right Initiative (GIRI) found that companies with 'strong leadership committed to eliminating error' consistently achieved better results than those without.

SENIOR LEADERS CAN SUPPORT THEIR TEAMS TO MINIMISE ERROR BY:

- Providing training and awareness programmes.
- Establishing reward schemes for error reporting and accurate, high-quality work.
- Identifying and investing in processes and tools that help ensure quality.

“THE BEST EXAMPLES OF GOOD PRACTICE COME FROM THOSE COMPANIES THAT HAVE EFFECTIVE SENIOR LEADERSHIP INTEREST IN QUALITY AND THAT BUILD AN EFFECTIVE CULTURE”

– GIRI



/// ADOPT AN EFFECTIVE QUALITY MANAGEMENT SYSTEM (QMS)

Quality management systems set a framework to help organisations identify, track, rectify and learn from errors so that they can be prevented from recurring in the future. Although applicable to all kinds of activities in all kinds of sectors, a QMS is especially important on a construction project, where designs are complex, processes are inter-reliant and where a huge number of individuals must collaborate to successfully deliver.

Software makes implementing a QMS more straightforward and user-friendly and can help to automate many elements of inspections and reporting. The best QMS software can integrate seamlessly with your other technologies. For example, the partnership between XYZ Reality and Autodesk combines augmented reality representations of your 3D model with Autodesk's Construction Cloud® solutions, allowing contractors to visualise issues in the field in millimetre accuracy and manage them accordingly.

79%
**OF CONSTRUCTION
COMPANIES**
REPORT EITHER 'GOOD' OR
'EXCELLENT' RESULTS FROM
THE IMPLEMENTATION
OF A QMS⁶

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



DOWNLOAD OUR FREE WHITEPAPER NOW



/// FOCUS ON DATA

Understand the problem and you are halfway towards the solution. This is as true of rework in construction as it is of any other problem anywhere else. But to understand the impact of rework on your projects – to be able to demonstrate its cost, or how much your chosen course of action is saving – you need data. Data is the bedrock of factual information. Without it, your assertions are guesswork and your decisions are speculative.

With the appropriate data to hand, your construction company will be able to strategize effectively to bring the cost of rework down and even prioritise your efforts on the actions that will yield the biggest, most financially rewarding results.

/// ALIGN PROJECT TEAMS EARLY ON

Siloed thinking is a major contributor to error and rework, especially if it creeps in from the outset of the design phase. Without collaboration and insight from trades during planning, both hard and soft clashes during construction are inevitable because designers cannot foresee how the project will unfold from a practical perspective.

‘Collaborative planning,’ a concept rooted in the lean construction movement, helps to align project teams early on. It utilises the full extent of stakeholder experience and

expertise across a comprehensive range of disciplines and captures this knowledge within the design to ensure smooth delivery with minimal errors.

There are several processes, tools and technologies which can support collaborative planning and advanced coordination. For example, federated building information models can be backed-up with clash detection software and visualised in situ via augmented reality.



/// COLLABORATE THROUGH BIM

In a 3D world, it simply doesn't make sense to work from 2D plans. This is because of the informational gaps inherent in 2D design and the interpretational leaps that must be taken to convert a 2D drawing into a three-dimensional reality. Put simply: 2D design invites errors, which in turn incur costs to put right.

To avoid error, "builders need access to project information and the ability to easily apply it to their activities directly on the jobsite," says James Cook, Director of partner integrations at Autodesk. Building information modelling (BIM) makes that possible by digitising comprehensive project information and linking it to a 3D model.

Progress is being made all the time to enhance the accuracy, detail and interoperability of building information, and construction companies must continue to explore new opportunities presented by BIM if they are to successfully stamp out error and rework.

Through Engineering-Grade Augmented Reality, XYZ's Atom headset now allows stakeholders to see the latest 3D model on site in millimetre accuracy and to make model updates in real time as the project unfolds. Not only does the Atom enable unparalleled BIM collaboration across the project, it negates the industry's dependency on fallible 2D drawings in the field.

/// COST SAVINGS THROUGH BIM⁷

40%
REDUCTION IN
UNBUDGETED PROJECT
CHANGES

10%
SAVINGS OF
CONTRACT VALUE
DUE TO CLASH DETECTION

7%
TIME SAVINGS



/// ADOPT AUGMENTED REALITY

Though it may sound new-fangled, augmented reality (AR) technology was first developed way back in 1968. Since then, it has come a long way, moving beyond the confines of exploratory academic study into the realms of useful commercial application.

AR is already well established in industries such as gaming, retail and healthcare but the earliest attempts at applying the tech in construction were largely unsuccessful. This was down to the fact that hardware was being repurposed for the building site where it lacked the durability, usability and accuracy to bring sufficient benefits.

XYZ Reality's Atom headset has changed all that. Designed specifically for construction, the Atom is the world's first Engineering-Grade AR solution. It taps into the site coordinates and uses laser positioning to place holographic depictions of the 3D model within the site in millimetre accuracy.

What this means is that operatives in the field can literally see where installations are supposed to be positioned and where works are being conducted out of tolerance. This paves the way for proactive validation: a ground-breaking new approach to the construction process that has the power to eradicate error and rework altogether.

/// PROACTIVE VALIDATION

– A GAMECHANGER FOR THE INDUSTRY

Until recently, a costly, complex and time-consuming laser scanning process was the only sure-fire way to ensure what was built matched what was designed with sufficient accuracy. The biggest flaw of this approach was that it was entirely reactive; it did nothing to prevent errors from occurring in the first place. Issues are only flagged once the works are complete, and the costs are incurred. This process also takes weeks and even months to garner results.

Proactive validation turns this linear 'build-check-put right' model of construction on its head. Using the Atom, designers and site teams can collaborate throughout the design and build phases to coordinate and validate works as they progress, thus ensuring that projects are delivered right first time.

ATOMIC POWER:
USING THE ATOM,
CONSTRUCTION
COMPANIES HAVE
SUCCESSFULLY REDUCED
REWORK COSTS TO
**AS LITTLE AS 1% OF
PROJECT COSTS.**



/// BUILD IT RIGHT, **FIRST TIME** WITH THE ATOM FROM XYZ REALITY

The Atom loads hyperscale 3D models on-site and connects with the site coordinates to display the design in millimetre accuracy via Engineering-Grade Augmented Reality. This allows for:

/// **ADVANCED COORDINATION:**

Bring site teams into the coordination process early and make real-time design changes in the field.

/// **REAL-TIME VALIDATION:**

Spot errors before or during installation and eliminate rework.

/// **BUILT-IN QUALITY:**

Prevent errors and clashes in the field. Build it right, first time.

/// **REAL-TIME MODEL UPDATES:**

Convert the design model to the as-built model as works progress without additional delays and overheads





“The Atom makes it so easy to see what’s going on in the field, and to show everybody – contractors and clients alike – how things will look when complete.”

- Gary Marshall, Civil Engineering Partner, Cundall

“The Atom is ground-breaking. 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”

- Diarmuid O’Sullivan, Construction Director, PM Group

“Early engagement with XYZ and your teams on-site is key for a successful project. We’re now getting the levels of accuracy that we need.”

- Mark Carroll, Project Manager, Jones Engineering

**WANT TO KNOW MORE ABOUT REWORK,
HOW IT IS IMPACTING YOUR COMPANY
AND HOW YOU CAN CONTROL IT?**

DOWNLOAD OUR WHITEPAPER, *RETHINKING REWORK*, NOW >>>





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