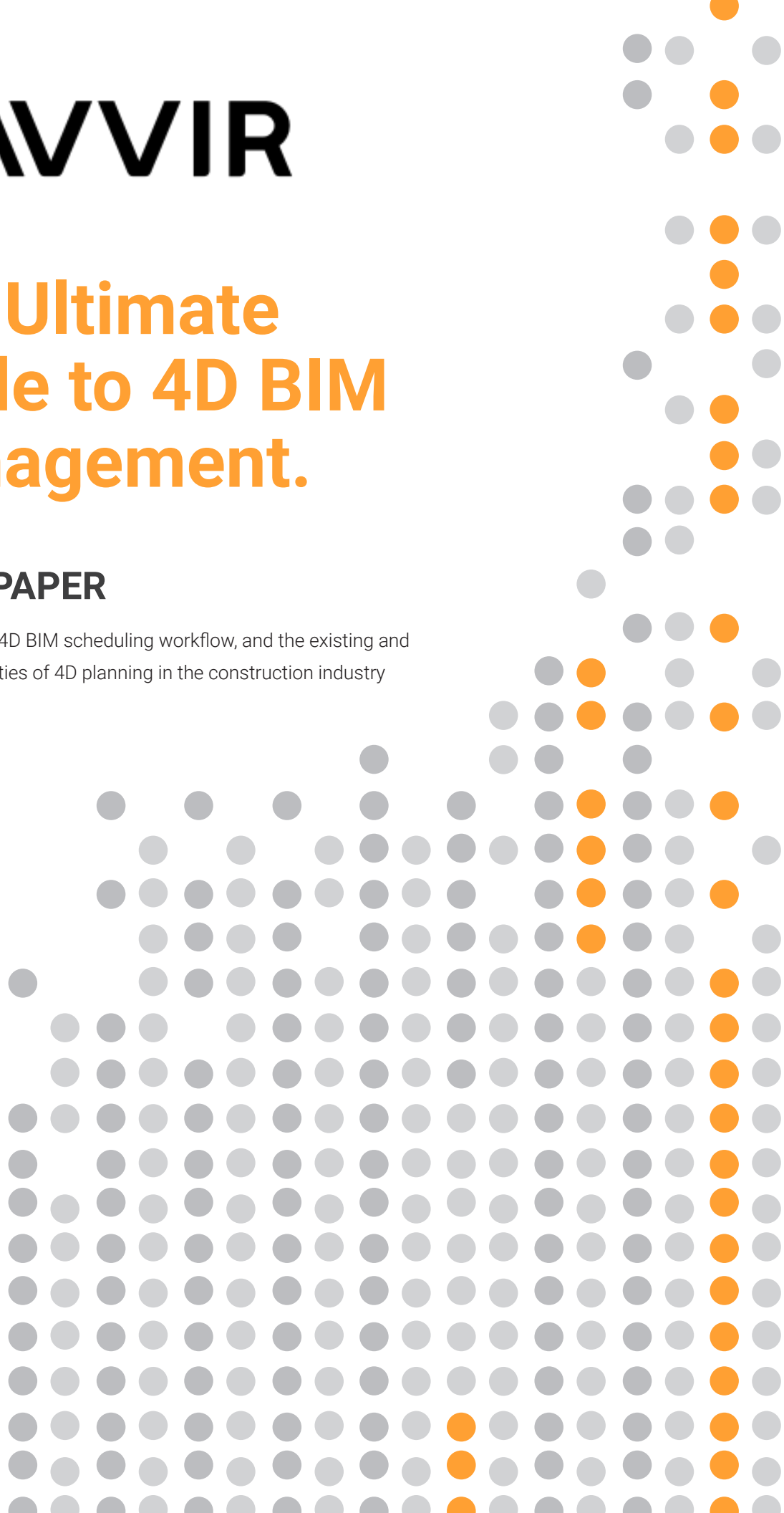




# The Ultimate Guide to 4D BIM Management.

## WHITE PAPER

Implementing a 4D BIM scheduling workflow, and the existing and future opportunities of 4D planning in the construction industry



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# The Ultimate Guide to 4D BIM Management.

The rapid growth in using building information models for project management has led to exciting new opportunities for 4D simulations, project scheduling, and controlling.

## Introduction

The rapid growth in the fields of project management and building information modeling (BIM) has led not only to the enhancement of design, construction methodology, and operation of facilities, but also to generating new and exciting opportunities for 4D simulations, project scheduling, and controlling.

This guide discusses the advantages of implementing a 4D BIM scheduling workflow, and the existing and future opportunities of 4D planning in the construction industry.

As more commercial and civil project owners embrace progress tracking to maximizing project value, the use of BIM in project management has become widespread for managing project schedules.

First presented is the primary concept of 4D-BIM with its possible applications and capabilities in construction planning.

Also, we highlight barriers to adoption and solutions to leveraging 4D BIM and its extensive value-stream during each phase of a construction project.

Finally, we look to the near future as 4D BIM will become a more accessible way to help construction managers improve their management performance and efficiency of work.

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# What is 4D BIM?

## Combining the traditional project schedule with a 3D model.

### Understanding 4D BIM.

4D BIM combines a traditional project schedule with a 3D model to allow teams to visualize and analyze how a project will be constructed.

Today, linking the project schedule and BIM can be done manually or automated via a number of software solutions.

This can be achieved by associating a schedule activity ID with a BIM element or linking the sources dynamically via Industry standard classification systems like Masterformat and Unifomat.

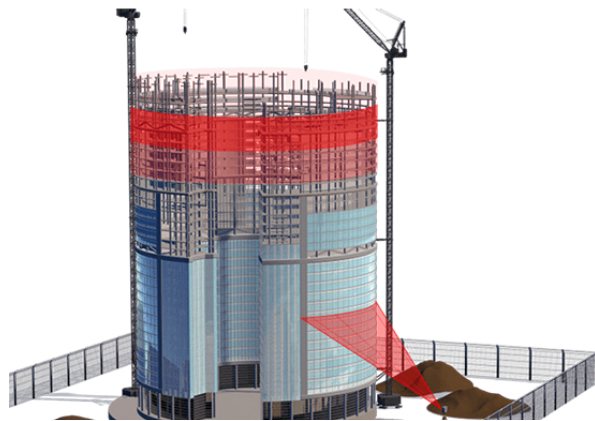
### How is 4D BIM being used today?

Many top general contractors are implementing 4D BIM as a control process to mitigate project risk.

Yet, when discussing 4D with top VDC professionals, there is often some level of acknowledgment that the simulations and analysis are often “for show” only and mostly used for marketing materials.

Most 4D BIM simulations are simply a visual representation of the project schedule - utilized to win a project bid and never referenced again during construction - even when scheduling issues arise.

This represents a missed opportunity for contractors to leverage 4D BIM to keep projects on schedule and maintain a single source of truth.



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A 3D model allows teams to visualize how a project will be constructed. 4D BIM takes this a step further and combines the project schedule to help monitor progress.

# Barriers of Adoption and Usage.

The two largest barriers to adopting and maintaining 4D BIM are a lack of interoperability between software and the manual process involved with production tracking.

## Problem 1: Data exchange between BIM and schedules is not seamless.

The first issue relating to 4D BIM is a lack of interoperability between software programs, which leads to a lack of standard data structure.

Historically in construction, project schedules and BIMs are authored by two completely separate groups of people. The skills required to produce each data set are very different and it is not a reasonable expectation that a project schedule containing 1000s of line items and a project BIM containing 1000s of BIM elements will be able to seamlessly map 1:1.

**Solution 1:** Contractors can utilize a standard classification system such as Unifomat or Masterformat to map BIM elements and project schedules. Project execution plans should standardize how these codes are applied across models, schedules and schedule of values.

Enabling a seamless data exchange between BIM and project schedules requires the adoption of standard classification systems like Unifomat or Masterformat.

These standard systems will enable much easier 4D integration.

In addition, standardizing units of measurement for the purposes of quantity take offs will allow for more granular progress monitoring. Model components should align with how the object will be physically constructed and billed for, so that there can be consistency between model, schedule, and schedule of values.

For Example, many UK based organizations are starting to utilize standards set forth under **NRM** because it provides a standard set of measurement rules and essential guidance for the cost management of construction projects and maintenance works.

## Problem 2: Production tracking is a highly manual.

### Solution 2: Avvir Progress 4D

Track Progress and Stay on the Critical Path. The Avvir algorithm statuses each and every BIM element as Built or Not-Built based on a sophisticated comparison of the point cloud data or 360° Mobile Ready 3D Viewer Photos to the BIM models.

- Review Measured % Completed vs Planned % Complete on a trade-by-trade and area-by-area by area basis to stay on schedule.
- Look forward and anticipate when a critical path milestone is upcoming.
- Avvir Progress 4D data and analysis is flexibly viewed in many ways – whether an S-Curve 4D dashboard, within PowerBI or directly onto your project schedule so that you can view the data intuitively in a custom report.

Avvir accepts schedule updates throughout the project life-cycle to ensure our baseline analysis is always up to date.

AVVIR® Progress Summary		Customer	Project	Week of		
		Demo Project	Project 01	10/04/2021		
Gypsum Board Overall Status (Installed / Total)		Total Progress - Detailed Breakdown				
444106 SF / 1291313 SF		Components	FLOOR 2	FLOOR 3	FLOOR 4	Total
<b>FLOOR 2</b>		Bottom Track (LF)	46%	87%	44%	60%
		Top Track (LF)	75%	88%	29%	55%
	47151 SF / 394839 SF	Fire Caulking (LF)	35%	87%	30%	51%
<b>FLOOR 3</b>		8in Stud (SF)	27%	83%	23%	47%
		4in Stud (SF)	35%	87%	4%	42%
	372473 SF / 439069 SF	6in Stud (SF)	27%	79%	15%	42%
<b>FLOOR 4</b>		Flat Strap (LF)	14%	82%	10%	37%
	24482 SF / 457405 SF	Gypsum Board (SF)	12%	85%	5%	34%

# What is the value of 4D BIM?

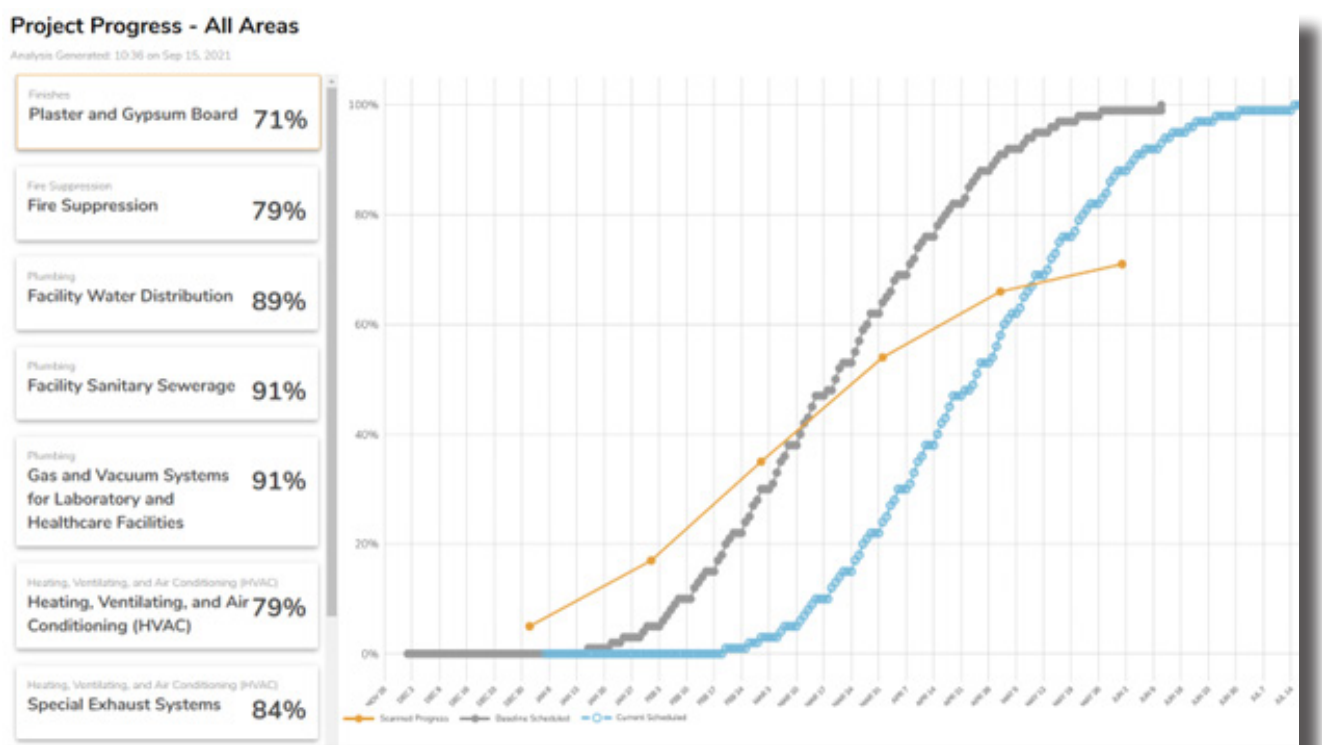
## Tracking Project Progress

When we can see a visual representation of how a *project has progressed* measured against the *planned project schedule*, we can easily identify opportunities for improvement.

Visualize and communicate complex schedules effectively to key project stakeholders.

The Project Progress report below clearly illustrates the progress of areas installed against the planned project schedule. These areas can be drilled down into specific components for unprecedented insight at the click of a button.

4D BIM leverages the existing model to measure completed construction against the project schedule increasing the value of the modeling process.

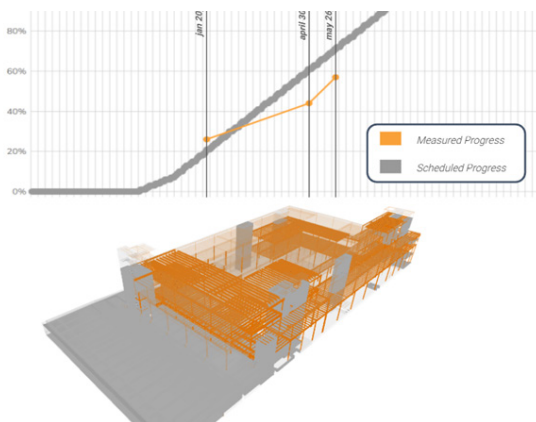


# How can 4D BIM be valuable at each stage of construction?

The value of 4D BIM is illustrated through the entire construction life-cycle.

The Avvir algorithm removes the manual work typically required to produce and maintain a 4D view of Progress.

BIM elements are automatically statused as Built or Not-Built based on a sophisticated comparison of the point cloud data or 360° Mobile Ready 3D Viewer Photos to the BIM models.



The Avvir platform shows BIM elements as Built or Not-Built combining the BIM model and project schedule to help monitor progress.

## Pre-Design

Evaluate the feasibility of the project - especially if you are working around unique constraints such as completing construction in an occupied building.

## Design Development

Facilitate communication of the design and general plan for construction to impacted stakeholders. For example - utilize your 4D BIM to communicate impact to local jurisdictions like zoning departments or city councils.

## Contractor Bidding

A 4D BIM can help contractors become intimately familiar with the project scope and demonstrate realistic project schedules because all components must be accounted for.

## Construction

Evaluate reality of project site vs. planned project schedule. Avvir PROGRESS 4D helps you track progress and stay on the critical path throughout the project life-cycle to ensure the baseline analysis is always up to date.



# What is the future of 4D BIM?

## Predictive analytics will revolutionize construction.


Most 4D BIM simulations are simply a visual representation of the project schedule. While this is valuable in its own right, to truly uncover a return on your investment in 4D, you need a software solution that can provide predictive analytics based on real-time project information.

*For example - if one activity like concrete pours is delayed, what is the impact to the critical path?*

In addition, many construction typologies are so repetitive that there are opportunities to


simply plug in a few project metrics and ask technology to optimize your project schedule and provide options that weigh cost and time.

In the meantime, we must be able to answer very basic questions about the impact of today's progress on tomorrow's goals. As demand for construction services rises, maintaining high levels of operational efficiency and productivity is crucial. Avvir's 4D BIM Progress tool can help businesses innovate and save significant time and money on every project.



76% of construction contractors report using building information models (BIM) on projects.  
- *GlobalData, 2019*

76%



39% of contractors stated that owners required the use of BIM on their projects.  
- *Design Build Network*

39%



## About Avvir




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The Avvir platform harnesses the power of reality capture data to automate progress tracking, QC, and create As-Built BIM. Focus on solving issues, not finding them.

*Avvir - A new level of analysis for the built world.*



### Get in Touch!

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