



# AI for AEC Leaders

## 2025 Edition

Leverage Artificial Intelligence to  
transform design and build workflows



By **Jordana de Castro Rosa**  
with **Alini Castro Rosa**



# Glossary

A short reference to ensure clarity for all readers

- **AI (Artificial Intelligence)** - A machine-based system that uses data and algorithms to perform tasks that typically require human intelligence. It can learn, adapt, and make predictions, recommendations, or decisions that influence both digital and physical environments.
- **AEC (Architecture, Engineering, and Construction)** - The integrated industry responsible for designing, engineering, and constructing the built environment.
- **Computer-Aided Design (CAD)** - A digital representation of geometry, topology, and product data for use across engineering and production.
- **BIM (Building Information Modeling)** - A digital process that creates and manages information about a building or infrastructure across its lifecycle. It uses intelligent 3D models that integrate geometry and data, enabling collaboration, coordination, and decision-making among architects, engineers, contractors, and owners.

# Glossary

- **Common Data Environment (CDE)** - A CDE centralizes project data, enables real-time collaboration, streamlined workflows, and enhanced project decision-making.
- **Augmented Reality (AR)** - A technology that overlays digital information onto the physical world in real time, enhancing perception and interaction.
- **Virtual Reality (VR)** - A complete virtual substitution of reality, often experienced through headsets.
- **Extended Reality (XR)** - A umbrella term covering AR, Mixed Reality (MR), and VR.
- **MEP (Mechanical, Electrical, and Plumbing)** - The backbone of building services, including HVAC, power, lighting, water, and fire protection.
- **HVAC (Heating, Ventilation, and Air Conditioning)** - The collective term for systems that regulate indoor climate and air quality.

# Glossary

- **LCA (Life Cycle Assessment)** - A systematic method used to evaluate the environmental impacts of a product, process, or system throughout its entire life cycle — from raw material extraction, production, and use, to disposal or recycling. It helps identify carbon emissions, energy use, and other sustainability factors to support better decision-making.
- **Key Performance Indicator (KPI)** - A fundamental, quantifiable indicator of progress, incorporating both leading and lagging measures to inform strategic and operational decision-making. A value that gauge how effectively a company is achieving its key business goals, helping leaders and teams align work with broader organizational strategies.
- **RFI (Request for Information)** - A formal process used in construction projects to clarify, verify, or resolve missing, conflicting, or unclear details in project documents.

# Glossary

- **Return on Investment (ROI)** - A key financial metric that measures the profitability or efficiency of an investment by comparing the net benefits gained against the cost incurred.
- **Internet of Things (IoT)** - The network of physical devices embedded with sensors, processors, and connectivity that enable them to collect, exchange, and act on data.

# Overview

This eBook was created for leaders in the Architecture, Engineering, and Construction (AEC) industry who want to understand how Artificial Intelligence (AI) is reshaping the way we design, plan, and deliver projects. It is a practical and intuitive guide showing how AI can be applied across project stages, how it transforms team collaboration, and how it empowers leaders to prepare for the future.

The 2025 edition brings the latest advancements in AI tools, methods, and industry practices. It provides clear explanations, examples, and insights that make the subject easy to grasp, even for those who are not AI specialists. The goal is to help leaders use AI to improve efficiency, reduce risk, unlock creativity, and gain a sustainable competitive advantage.

# 1 Introduction

## Artificial Intelligence and the AEC

The AEC industry has always evolved through waves of innovation: from hand drawings to CAD, from CAD to BIM, and now to AI. Each leap improved productivity and redefined how we deliver the built environment.

AI is not just another tool. It learns, predicts, and generates on our behalf, transforming how projects are conceived, optimized, and communicated. For leaders, this shift is both an opportunity and a responsibility. Clients demand transparency, regulators push for sustainability, and teams expect guidance. Leadership today means embracing AI as a strategic partner, expanding human capacity, not replacing it.

AI contributes in four main ways:

- **Automation:** freeing teams from repetitive, time-consuming tasks such as clash detection, document classification, and report generation.
- **Prediction:** forecasting delays, equipment failures, or cost overruns before they occur, turning uncertainty into foresight.
- **Optimization:** evaluating countless scenarios (from generative design alternatives to supply chain strategies) to drive smarter decisions.

# 1 Introduction

## Artificial Intelligence and the AEC

- **Augmentation:** enhancing storytelling, visualization, and communication, making complex data persuasive and accessible.

The true power of AI emerges when these four contributions work together across the project lifecycle, creating a continuous flow of insight and value.

In this course, we have organized the content into five modules, each aligned with a critical stage or focus area of the project lifecycle: **Planning, Architecture, Visualization, Engineering, and Coordination**. We encourage you to prioritize the sections most relevant to your role and interests. Each module is designed to stand on its own, but together they form a comprehensive guide for leveraging AI across the AEC industry.

## 2 Planning

### Building smarter foundations

Planning is the foundation of every project, but it is also where most failures begin. Static schedules and outdated forecasts often collapse under real-world complexity. AI transforms planning into something dynamic, adaptive, and resilient.

- **Predictive scheduling** highlights where delays are most likely to occur, based on historical data.
- **Scenario testing** lets leaders explore “what if” situations such as labor shortages, supply delays, or extreme weather, and prepare realistic contingency plans.
- **Resource optimization** ensures people, equipment, and materials are allocated efficiently, reducing waste and cost.
- **Sustainability integration** allows carbon impact and energy performance to be evaluated from the very beginning.

By making planning adaptive and data-driven, leaders shift from simply managing uncertainty to leading with foresight.

## 2 Planning

### Building smarter foundations

#### How leaders can apply today

- **Adopt AI for predictive scheduling** to identify potential delays early, allowing leaders to reallocate resources and avoid costly overruns.
- **Run scenario simulations** for labor shortages, supply chain disruptions, or extreme weather, ensuring resilience and proactive contingency planning.
- **Integrate sustainability metrics** (carbon, water, energy) into planning from the start, aligning project outcomes with ESG (Environmental, Social, and Governance) and regulatory goals.
- **Optimize resource allocation** by using AI to balance workforce, equipment, and materials, reducing waste while maximizing efficiency.
- **Employ AI for demand forecasting and budgeting**, enabling better financial planning and stakeholder confidence.
- **Centralize planning data in a CDE** enriched with AI-driven insights to improve collaboration and transparency across disciplines.
- **Use AI-powered dashboards** to monitor progress in real time, turning data into actionable foresight for strategic decisions.
- **Learn from historical project data** through AI, establishing continuous improvement in planning accuracy and reliability.

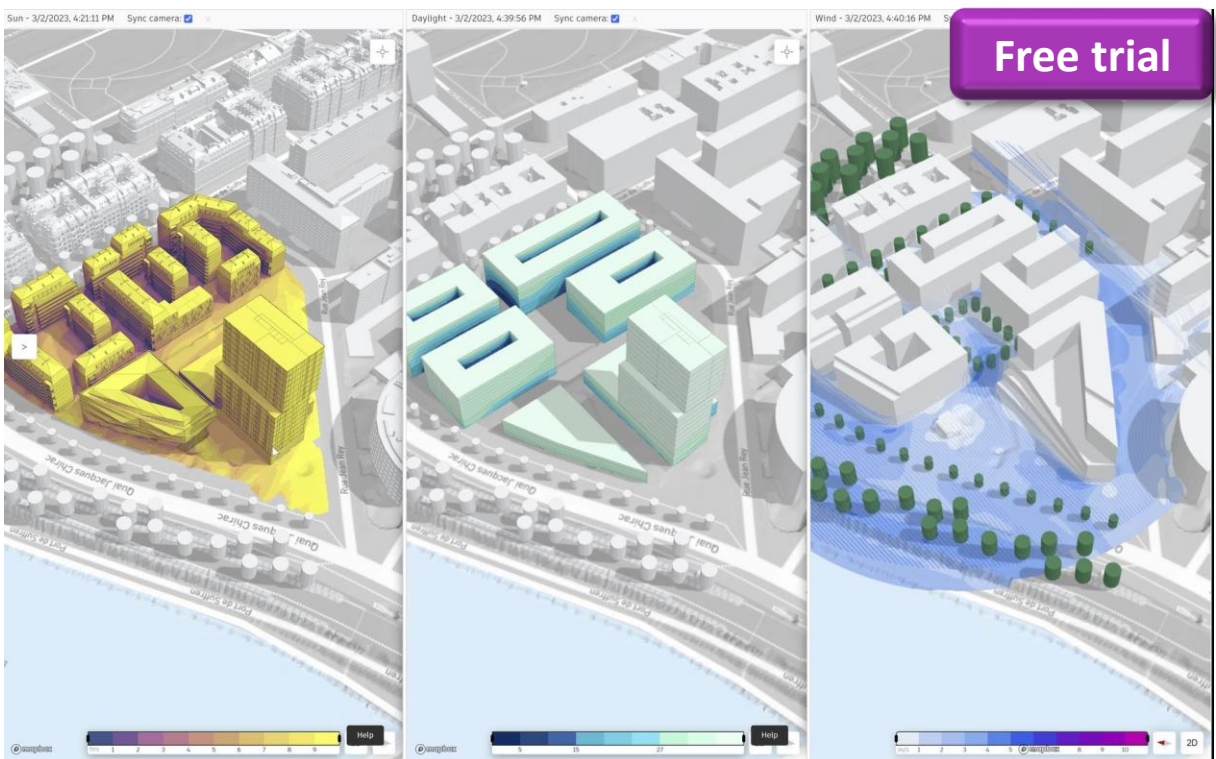
## 2 Planning

### Building smarter foundations

#### Tools

##### a) Forma – [autodesk.com/forma](https://autodesk.com/forma)

Your go-to AI-powered cloud software for data-driven planning and design. Combine Forma with your favorite tools such as Revit, ACC, and more. Architects and designers use Forma to stay ahead of deadlines, remove guesswork, improve teamwork in the cloud, and connect to databases and other design tools, even those outside the Autodesk ecosystem. You can also customize your own extension.



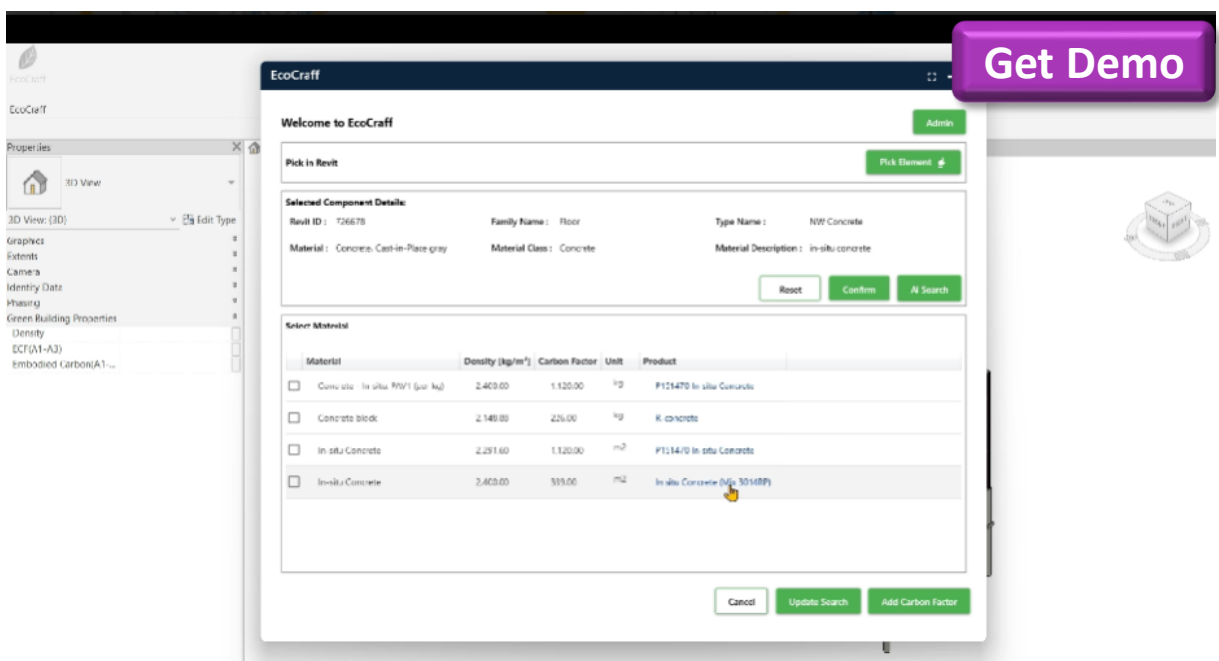
# 2 Planning

## Building smarter foundations

### Tools

#### b) EcoCraff – [ecocraff.com](https://ecocraff.com)

EcoCraff is an AI-powered platform that connects BIM models with real-world material data to help architects and engineers make informed decisions. It enables automated analysis of building elements, providing insights on embodied carbon and promoting sustainability throughout the design and construction process. Available as a Revit plugin.



The screenshot displays the EcoCraff software interface within a Revit environment. A purple button labeled "Get Demo" is overlaid on the top right. The interface shows a "Welcome to EcoCraff" dialog box with an "Admin" button. Below this, there is a "Pick In Revit" section with a "Pick Element" button. The "Selected Component Details" section shows the following information:

- Revit ID: 726678
- Family Name: Floor
- Type Name: NW Concrete
- Material: Concrete, Cast-in-Place gray
- Material Class: Concrete
- Material Description: in-situ concrete

Buttons for "Reset", "Confirm", and "AI Search" are visible. Below this is a "Select Material" table with the following data:

Material	Density (kg/m <sup>3</sup> )	Carbon Factor	Unit	Product
<input type="checkbox"/> Concrete in-situ (F114) (see help)	2,403.00	1,120.00	m <sup>3</sup>	F11470 In-situ Concrete
<input type="checkbox"/> Concrete block	2,140.00	225.00	m <sup>3</sup>	R-concrete
<input type="checkbox"/> In-situ Concrete	2,291.60	1,120.00	m <sup>3</sup>	F11470 In-situ Concrete
<input type="checkbox"/> In-situ Concrete	2,403.00	333.00	m <sup>3</sup>	In-situ Concrete (Eco 3014BP)

Buttons for "Cancel", "Update Search", and "Add Carbon Factor" are located at the bottom of the dialog. A small 3D model of a building foundation is visible in the background on the right side of the interface.

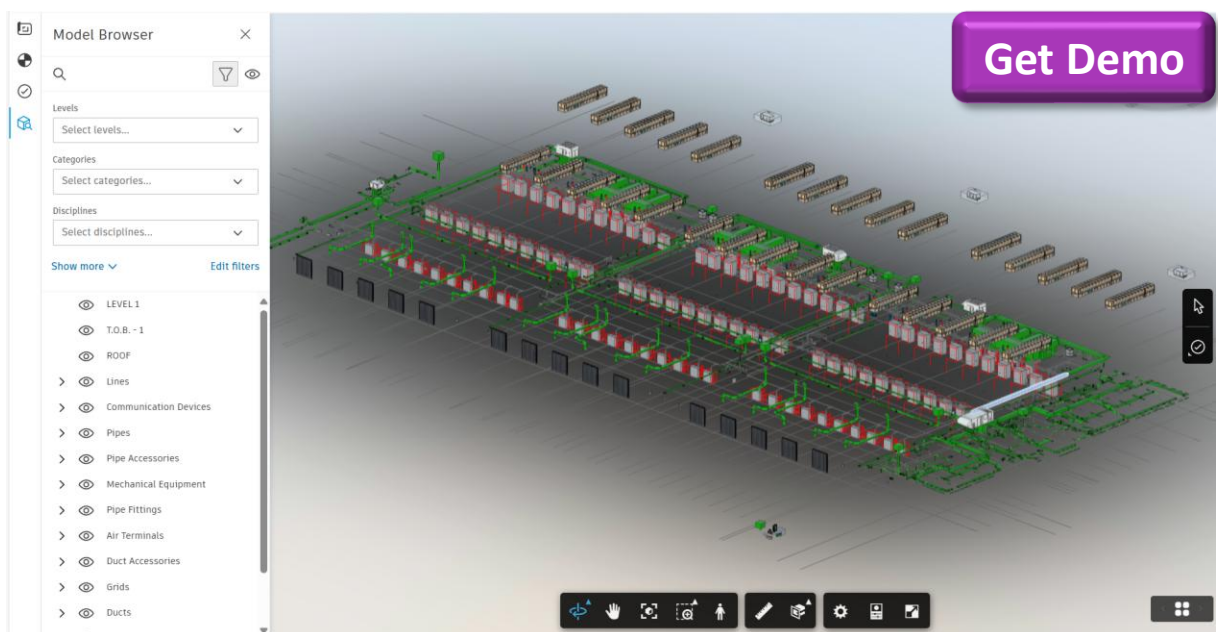
# 2 Planning

## Building smarter foundations

### Tools

#### c) ACC – [construction.autodesk.com](https://www.construction.autodesk.com)

Autodesk Construction Cloud is a platform that unifies construction workflows, allowing teams to plan, design, build, and operate projects more efficiently. It centralizes information in a common data environment, improving collaboration, reducing errors, and enabling decision-making across all stakeholders throughout the project lifecycle. The platform includes multiple services, from clash detection to quantity takeoffs, supporting teams across every project phase.



# 2 Planning

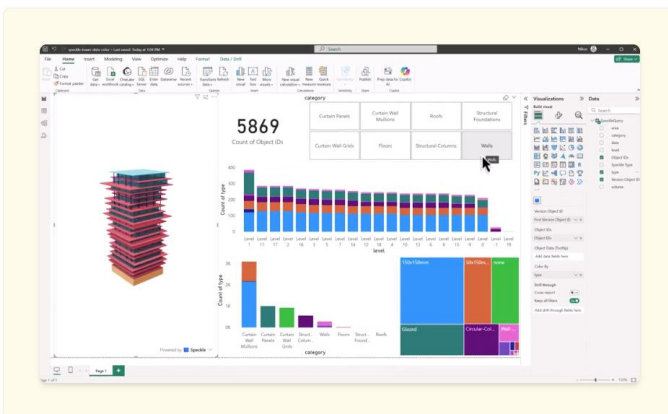
## Building smarter foundations

### Tools

#### d) Speckle – [speckle.systems](https://speckle.systems)

Speckle is an open-source platform for data interoperability in architecture, engineering, and construction. It allows teams to share, manage, and track 3D models and project data in a common data environment, enabling seamless collaboration, real-time updates, and integration across multiple design and analysis tools.

Free trial



### Spot risks before they become problems.

Catch patterns and predict issues you'd otherwise miss. Track materials, costs, and timelines by integrating Speckle models with other data sources.

“

If “data is gold”, then Speckle is the mine. It's where we access our gold!



Jordana de Castro Rosa  
BIM Manager - WSP

# 2 Planning

## Building smarter foundations

### Tools

#### e) BIMcloud – [graphisoft.com/plans-and-products](http://graphisoft.com/plans-and-products)

A solid platform for multidisciplinary design collaboration makes BIMcloud the tool architects and engineers can count on. The latest innovations focus on security and data synchronization.

The screenshot displays the BIMcloud web interface. At the top right, there is a purple badge that says "Free trial". The main content area shows a list of activities for the "00 Company Offices" project. The activities are listed in a table with columns for Type, Size, User, Project, and Time.

Type	Size	User	Project	Time
PLN Backup	2.8 MB	smith	Sushi Bar	2014.04.22 ...
Send	5 Bytes	smith	Sushi Bar	2014.04.22 ...
Receive info	406 Bytes	smith	Sushi Bar	2014.04.22 ...
Receive info	406 Bytes	smith	Sushi Bar	2014.04.22 ...
Load / Reload	126.5 KB	smith	Sushi Bar	2014.04.22 ...
Receive info	406 Bytes	smith	Sushi Bar	2014.04.22 ...
Receive info	406 Bytes	smith	Sushi Bar	2014.04.22 ...
Join	0 Bytes	smith	Sushi Bar	2014.04.22 ...
Load / Reload	126.5 KB	harjeet	Wasabi Club	2014.04.22 ...
Receive info	406 Bytes	harjeet	Wasabi Club	2014.04.22 ...
Receive info	406 Bytes	harjeet	Wasabi Club	2014.04.22 ...
Join	0 Bytes	harjeet	Wasabi Club	2014.04.22 ...

# 2 Planning

## Building smarter foundations

### Tools

#### f) InfraRed City – [infrared.city](https://infrared.city)

AI-driven models that redefine microclimate analysis, making it faster, smarter, and more efficient. The future of climate simulations is here, and it's faster than ever before.



# 2 Planning

## Building smarter foundations

### Checklist – AI in Planning

- Identify baseline project metrics (cost, schedule, carbon).
- Create a Building Information Modeling Execution Plan (BEP).
- Select the tools (Forma, EcoCraff, ACC, Speckle, etc.).
- Run scenario simulation before the design.
- Document lessons learned in the CDE.

# 3 Architecture

## Designing with data and creativity

Traditionally, design teams were limited to testing a handful of alternatives due to time and resource constraints. AI removes these limits.

Generative design engines can now produce dozens of variations in minutes. Each option can be tested against zoning rules, daylight performance, and financial outcomes, giving leaders better insights before costly revisions. Simulations that once required weeks are available at concept stage.

AI also strengthens engagement with clients. With AR and VR, stakeholders can walk through a space before it is built, testing circulation, lighting, and aesthetics in real time. This accelerates approvals and reduces misunderstandings.

AI doesn't replace creativity, it amplifies it. It empowers team with the confidence that every design is innovative, feasible, and sustainable.

# 3 Architecture

## Designing with data and creativity

### How leaders can apply today

- **Integrate AI into early design workflows** to rapidly generate and evaluate multiple design concepts, boosting creativity, expanding exploration, and shortening iteration cycles.
- **Use AI-driven performance analysis** to assess daylight, energy efficiency, acoustics, and carbon footprint, embedding sustainability and comfort into concept design.
- **Streamline design documentation** by automating floor plans, schedules, and data-rich models, freeing teams to focus on creativity and decision-making.
- **Enhance client engagement** with AI-powered AR/VR presentations, creating immersive experiences that accelerate approvals and reduce misunderstandings.
- **Leverage AI for site analysis**, including topography, solar orientation, and regulatory compliance, to make smarter, evidence-based design choices.
- **Establish feedback loops** by learning from past project data, continuously improving design quality, efficiency, and innovation.
- **Apply AI for feasibility studies** through early cost estimation and risk analysis, helping leaders anticipate challenges before construction begins.
- **Collaborate with AI as a creative partner**, using it to explore bold ideas, push formal boundaries, and inspire new approaches to architectural form and function.

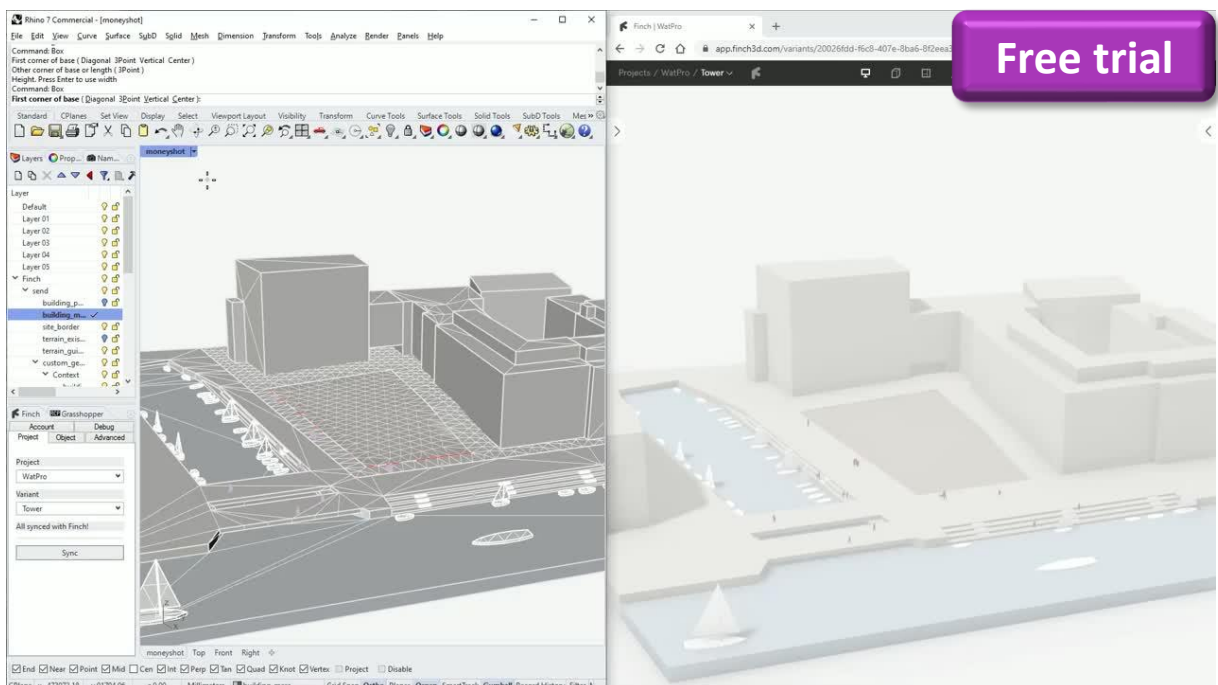
# 3 Architecture

Designing with data and creativity

## Tools

### a) Finch – [finch3d.com](https://finch3d.com)

Finch utilizes AI, graph technology, and advanced algorithms to elevate and challenge your design work, taking it to the next level. It continuously enhances your input, allowing you to achieve the exact design you want – optimized.



# 3 Architecture

Designing with data and creativity

## Tools

### b) Archistar – [archistar.ai](https://archistar.ai)

Archistar eCheck uses AI permit review to reduce permit approval times, increase quality of submissions, and enable transparent compliance reporting.



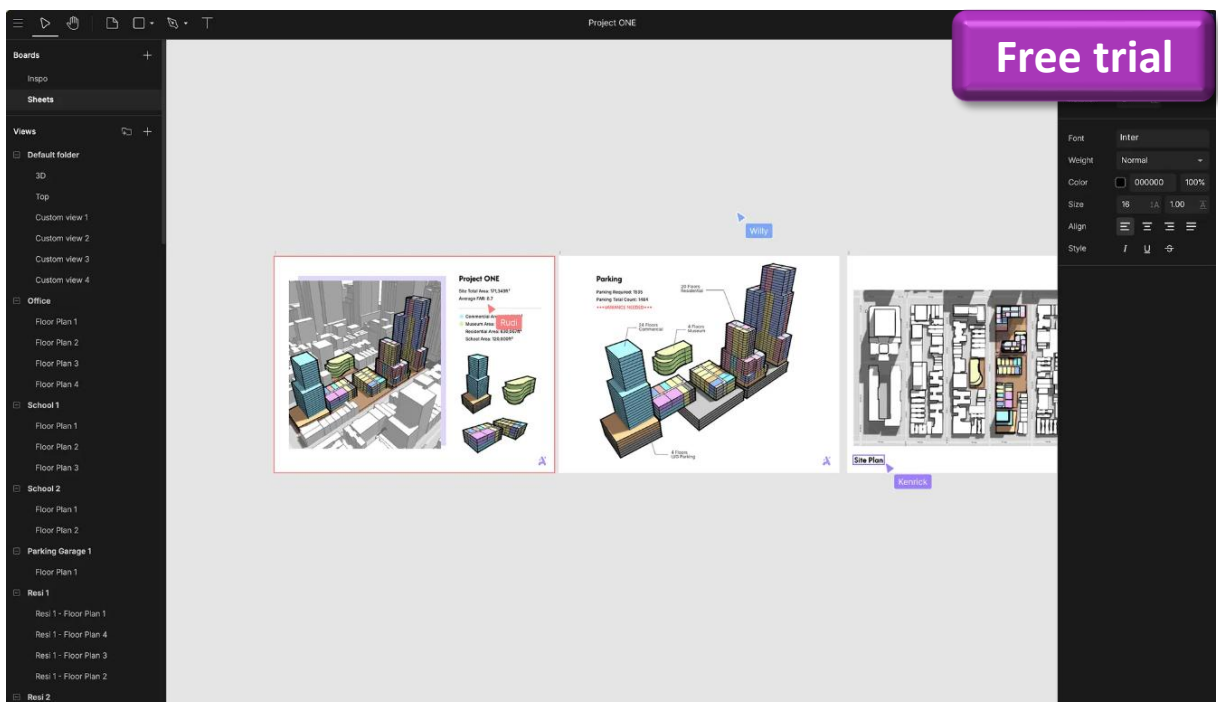
# 3 Architecture

Designing with data and creativity

## Tools

### c) Arcol – [arcol.io](https://arcol.io)

Arcol is a collaborative design platform for the AEC industry that streamlines early feasibility studies by combining modeling, real-time metrics, and presentation tools in one place. It helps architects, developers, and contractors make faster, data-driven decisions while keeping all stakeholders aligned.



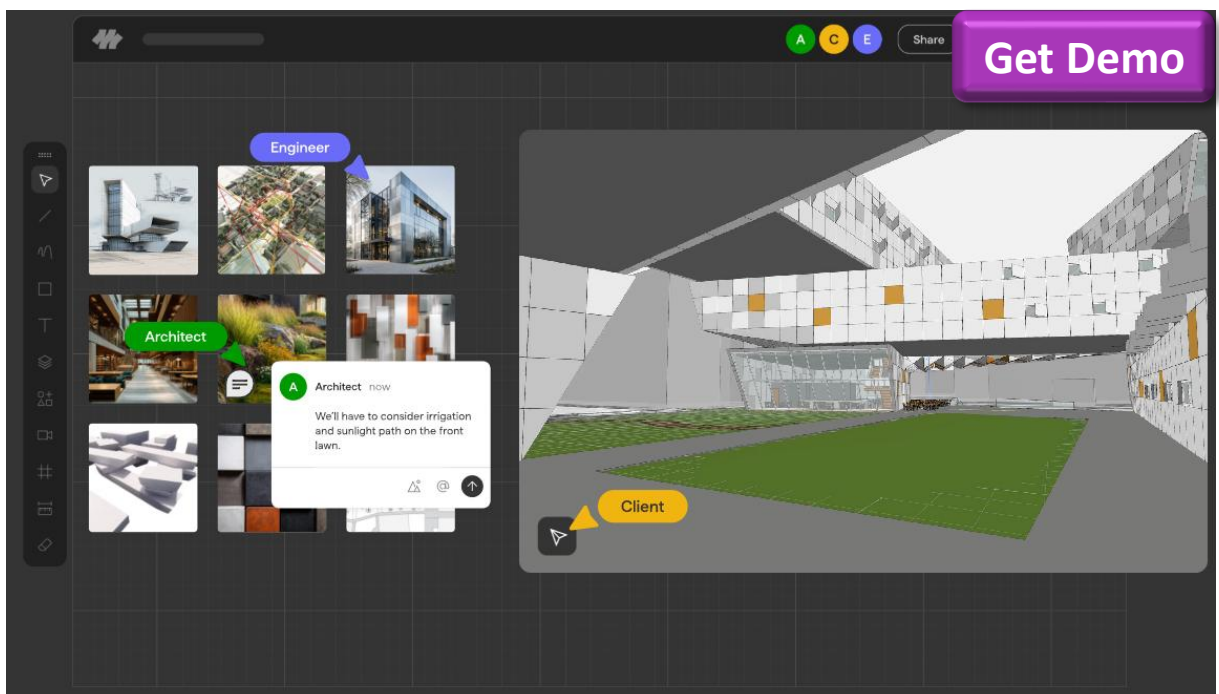
# 3 Architecture

Designing with data and creativity

## Tools

### d) Motif – [motif.io](https://motif.io)

Motif is a cloud-based collaboration platform for the AEC industry that lets teams work together in real time on design ideas, avoid version control headaches, and share feedback seamlessly. It also features architecture-focused AI rendering and live syncing with tools like Revit and Rhino, enabling instant updates and easy presentation of design work.



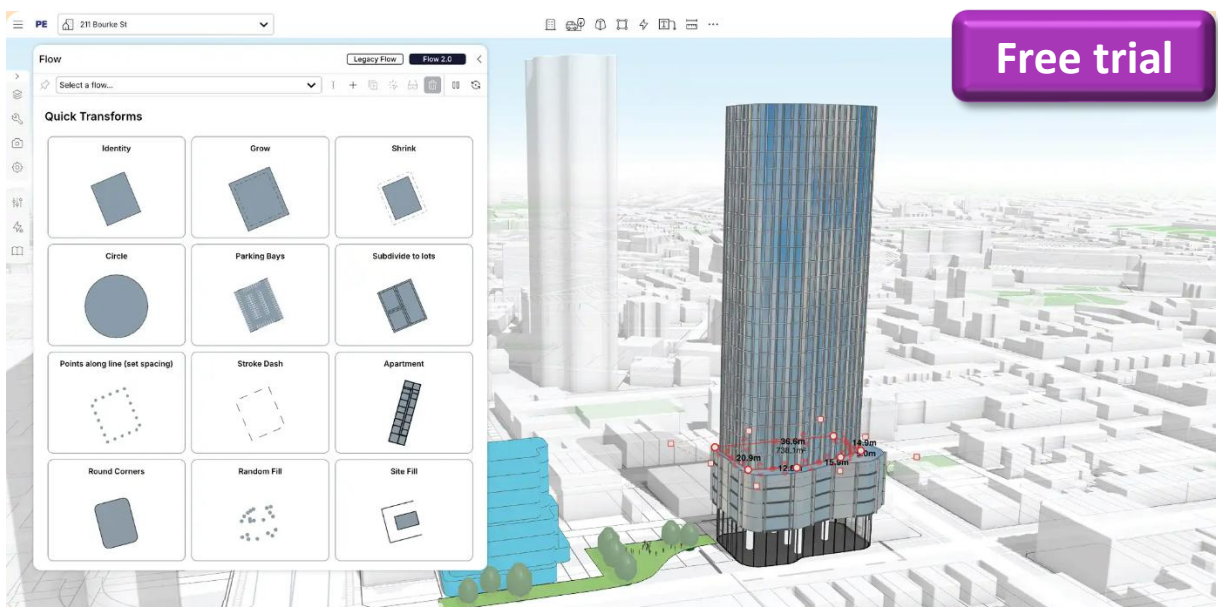
# 3 Architecture

Designing with data and creativity

## Tools

### e) Giraffe – [giraffe.build/platform](https://giraffe.build/platform)

Giraffe replaces scattered tools and endless spreadsheets. Go from fragmented workflows to an integrated platform that lets you make evidence-based decisions fast.



# 3 Architecture

Designing with data and creativity

## Tools

### f) Hypar – [hypar.io](https://hypar.io)

Hypar is a cloud platform for generating buildings that makes it easy to publish, distribute, and maintain your building design logic. Rather than requiring web development skills to scale and deliver your design logic, Hypar lets you concentrate on what you want to get done while the platform creates the interface for your audience and provides computation, visualization, delivery, interoperability, and access control for your functions.

The screenshot displays the Hypar web interface. On the left, a sidebar contains the following information:

Function Id	
site-developer	
Input	
Target Area	191000.000
Location	[{"Type": "Feature", "geom": ...}]
Output	
Total Square Footage	89281.35737065342
Total Floors	29
Building Height	148
Number of Masses	29
Selected	
Nothing selected	
Execution	
Id	9f5849f-1f0f-4bd7-99e...
Date/Time	Nov 18, 2018 7:05:42 pm
Elapsed	2.435 sec.
Download	
<a href="#">json</a>	

The main area shows a 3D architectural model of a building with a blue base, a purple middle section, and a yellow top section, situated on a map. The map includes street names such as PERSON BLVD, SELMARINE DR, and ARINA FWY. A purple button in the top right corner reads "Free trial".

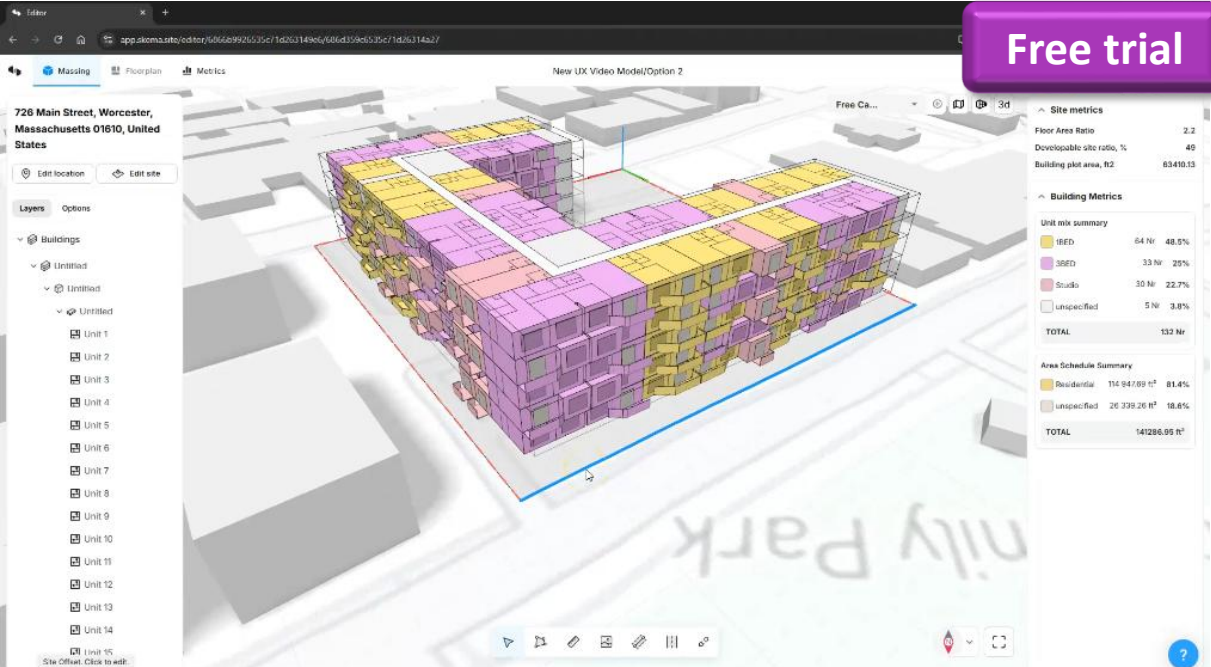
# 3 Architecture

Designing with data and creativity

## Tools

### g) Skema – [skema.ai](https://skema.ai)

Targeted at the schematic design phase, Skema converts project briefs into functional layouts automatically. This tool ensures that early design stages are more aligned with client expectations and regulatory requirements.



The screenshot displays the Skema AI software interface. The main view shows a 3D architectural model of a building with a unit mix summary and site metrics. A purple button labeled "Free trial" is overlaid on the top right. The interface includes a left sidebar with a project location and a list of units, a central 3D model, and a right sidebar with site and building metrics.

**Free trial**

**728 Main Street, Worcester, Massachusetts 01610, United States**

**Site metrics**

Floor Area Ratio	2.2
Developable site ratio, %	49
Building plot area, ft <sup>2</sup>	83410.13

**Building Metrics**

**Unit mix summary**

1BED	64 Nr	48.0%
3BED	33 Nr	25%
Studio	30 Nr	22.7%
unspecified	5 Nr	3.8%
<b>TOTAL</b>	<b>132 Nr</b>	

**Area Schedule Summary**

Residential	114 047.69 ft <sup>2</sup>	81.4%
unspecified	26 339.26 ft <sup>2</sup>	18.6%
<b>TOTAL</b>	<b>141286.95 ft<sup>2</sup></b>	

# 3 Architecture

## Designing with data and creativity

### Tools

#### h) TestFit – [testfit.io](https://testfit.io)

TestFit is a real estate and building design platform that automates the tedious steps in the deal process. By optimizing the feasibility process with rapid iterations and accurate data, we aim to help you build what the world needs, faster.

The screenshot displays the TestFit Alpha software interface. The main window shows a 3D architectural model of a building on a site. A data overlay in the foreground provides the following information:

TOTAL EUI		EUI BREAKDOWN	
45.0	kBTU/sqft/yr	cooling	3.19
		heating	7.99
		lighting	7.08
		equipment	12.86
		fans	3.98
		pumps	0.69
		hot water	9.24

The interface also includes a project sidebar on the left with a list of items (zoning, deal, units, building, garage, verticals, Amenity) and a 'donut site' section with 'Override from Preset' options. The bottom right corner shows a 'Testy - Apartments' dropdown, a 'refresh projects' button, the 'cove.tool' logo, and an 'ENERGIZE!' button. A 'reset analysis' button is also visible.

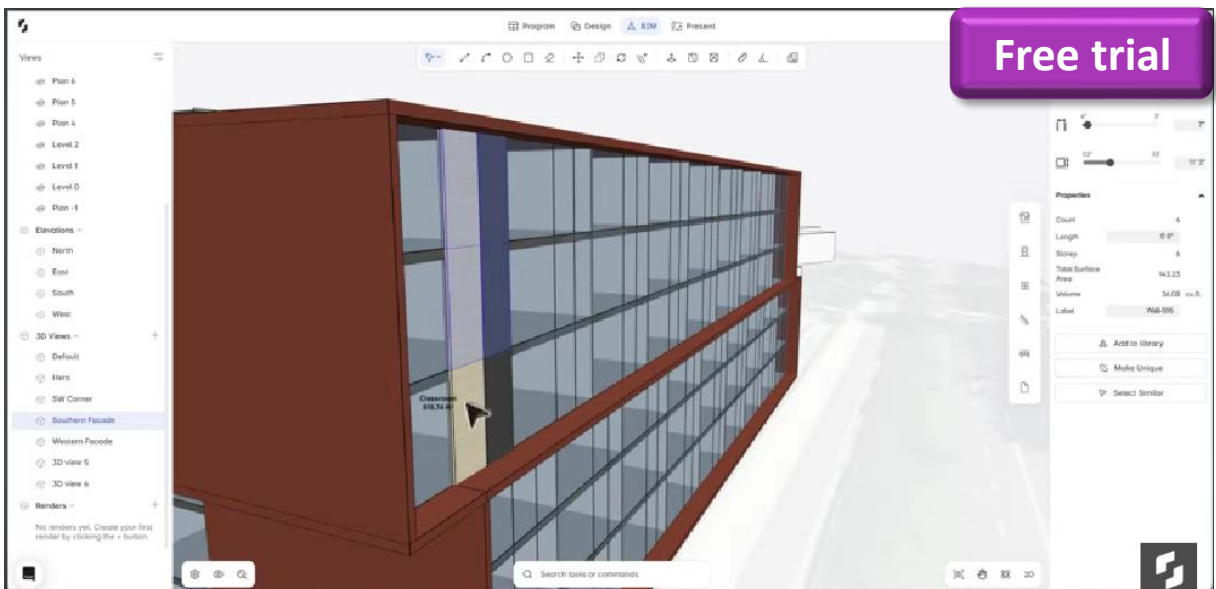
# 3 Architecture

Designing with data and creativity

## Tools

### i) Snaptrude – [snaptrude.com](https://snaptrude.com)

Snaptrude is an AI-powered early-stage building design platform that helps architects and designers go from program brief to BIM-ready models with minimal friction. It combines tools for prompt-based design, live area/program validation, modeling, presentation & collaboration all in one workspace.



# 3 Architecture

## Designing with data and creativity

### Checklist – AI in Architecture

- Integrate AI into early-stage design to quickly generate and compare multiple concepts.
- Run AI-driven performance tests (daylight, energy, acoustics, carbon footprint) during concept design.
- Automate documentation tasks (floor plans, schedules, BIM data) with AI tools.
- Establish feedback loops using AI to learn from past projects and improve outcomes.

# 4 Visualization

## Bringing ideas to life

Visualization is one of a leader's most powerful communication tools. Data and models mean little if stakeholders cannot clearly see what is being proposed. AI turns complex information into visuals that inspire, persuade, and align teams.

- **Real-time rendering** instantly transforms BIM models into photorealistic images.
- **AI-powered dashboards** translate performance, cost and carbon data into visuals understandable by investors, regulators, and communities.
- **Immersive AR and VR experiences** allow stakeholders to “walk through” projects, building trust and alignment early.

By making the idea visible, AI reduces uncertainty, speeds approvals, and strengthens collaboration across all levels of a project.

# 4 Visualization

## Bringing ideas to life

### How leaders can apply today

- **Employ AI for rapid concept visualization**, generating multiple design options quickly for internal reviews and client presentations.
- **Use AI-powered rendering tools** to transform ideas into real-time, photorealistic images and animations, accelerating stakeholder understanding.
- **Leverage generative visualization tools** to test lighting, circulation, and space use scenarios early, reducing costly revisions later in the process.
- **Integrate AI into AR/VR platforms** to create immersive project experiences, allowing clients and communities to “walk through” spaces before construction begins.
- **Translate complex performance data** (such as carbon, energy, or costs) into intuitive AI-powered dashboards that enable informed decision-making.
- **Enhance collaboration with AI-driven storytelling**, making project data clear and persuasive for both technical and non-technical stakeholders.

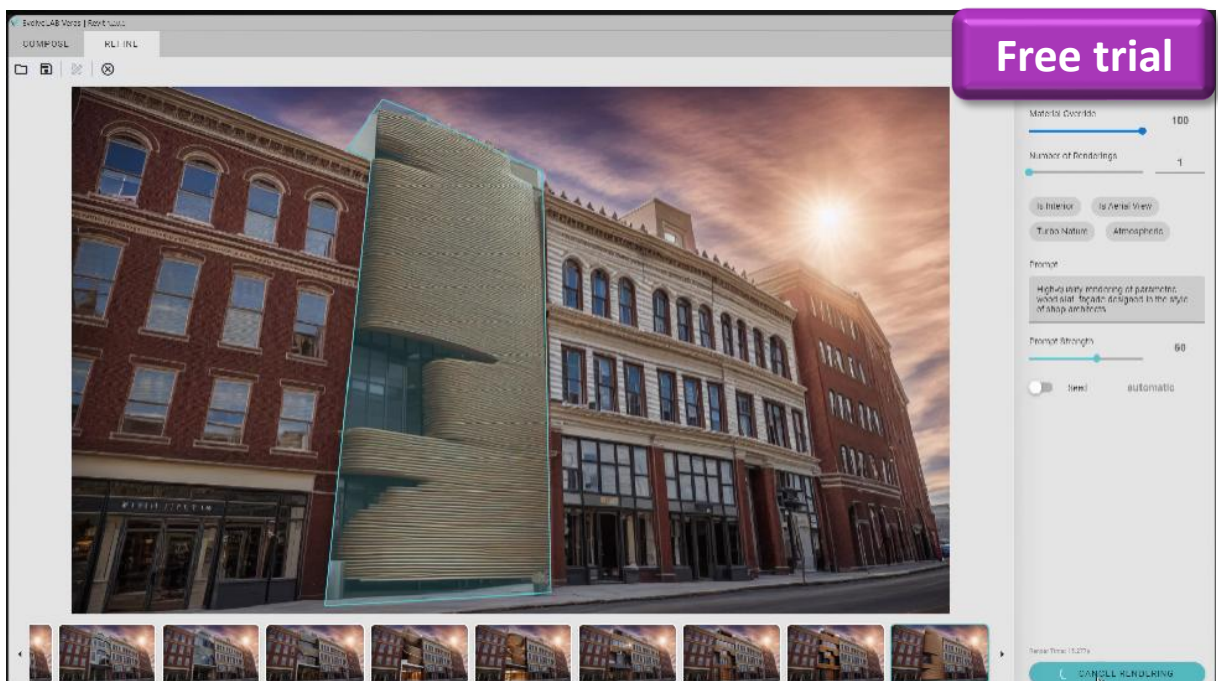
# 4 Visualization

Bringing ideas to life

## Tools

### a) Veras – [evolvelab.io/veras](https://evolvelab.io/veras)

Veras is an AI-powered rendering app seamlessly integrated with popular design tools such as Revit, SketchUp, and Forma. It is super easy and practical to use directly within the tools designers already work in, making visualization way faster and more inspiring. However, editing the AI generated images can be challenging.



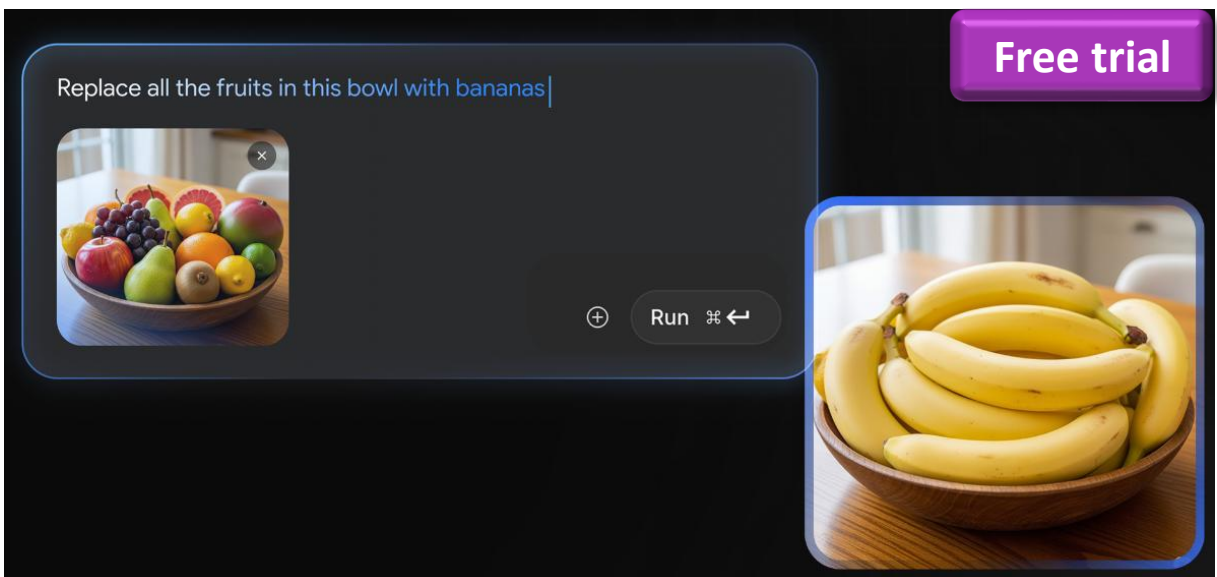
# 4 Visualization

Bringing ideas to life

## Tools

### b) Nano Banana – [gemini.google.com](https://gemini.google.com)

Nano Banana is a newly launched model on Google AI Studio for image generation and manipulation. It already stands out as the best AI image generator for maintaining consistency across scenes, solving one of the biggest challenges in AI visuals. For example, the same house stays constant even when you change environments or camera angles.



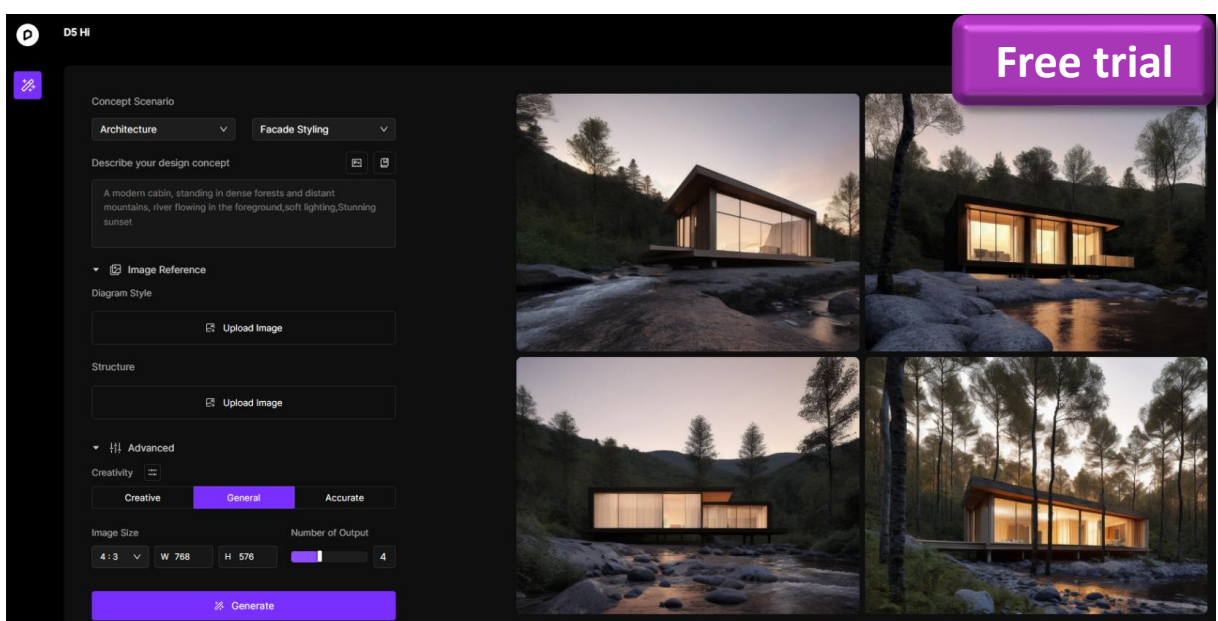
# 4 Visualization

Bringing ideas to life

## Tools

### c) D5 Render – [d5render.com/ai-rendering](https://d5render.com/ai-rendering)

D5 Render is a Chinese real-time rendering platform, famous in Asia and expanding to other markets. It uses AI to quickly create high-quality, photorealistic visuals, helping architects, designers, and visualization artists turn 3D models into immersive images and animations while streamlining reviews and presentations.



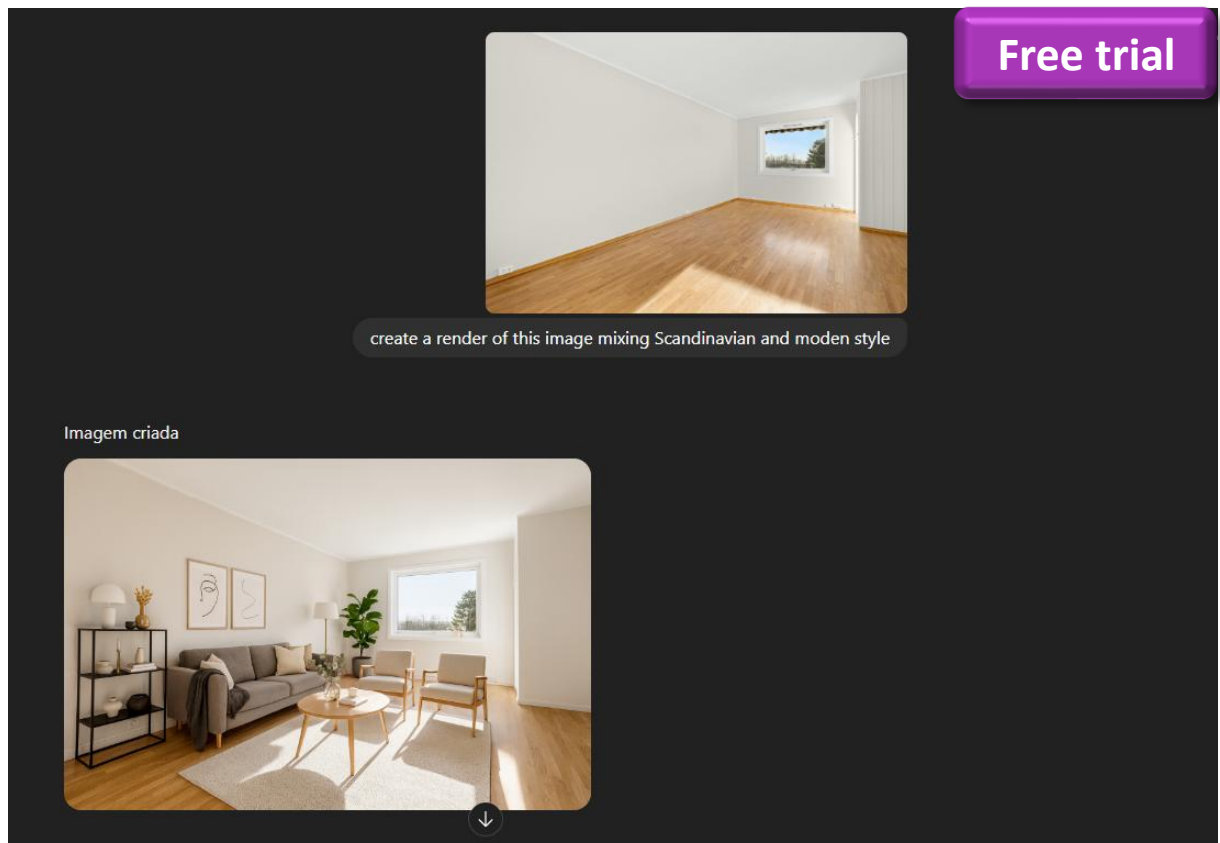
# 4 Visualization

Bringing ideas to life

## Tools

### d) ChatGPT– [chatgpt.com](https://chatgpt.com)

ChatGPT can assist in project visualization by generating ideas, drafting descriptions, and producing concept explanations. It helps architects, designers, and teams communicate design intent, explore alternatives, and streamline planning through interactive, text-based insights and guidance.



The screenshot displays a dark-themed interface for a visualization tool. At the top right, there is a purple button labeled "Free trial". In the center, a square image shows an empty room with white walls, a wooden floor, and a window. Below this image is a text input field containing the prompt: "create a render of this image mixing Scandinavian and moden style". Below the input field, the text "Imagem criada" is displayed. At the bottom, a larger square image shows the resulting visualization: a furnished living room with a grey sofa, a wooden coffee table, a side table, and a window, all in a modern, minimalist style. A small downward arrow icon is visible at the bottom center of the generated image.

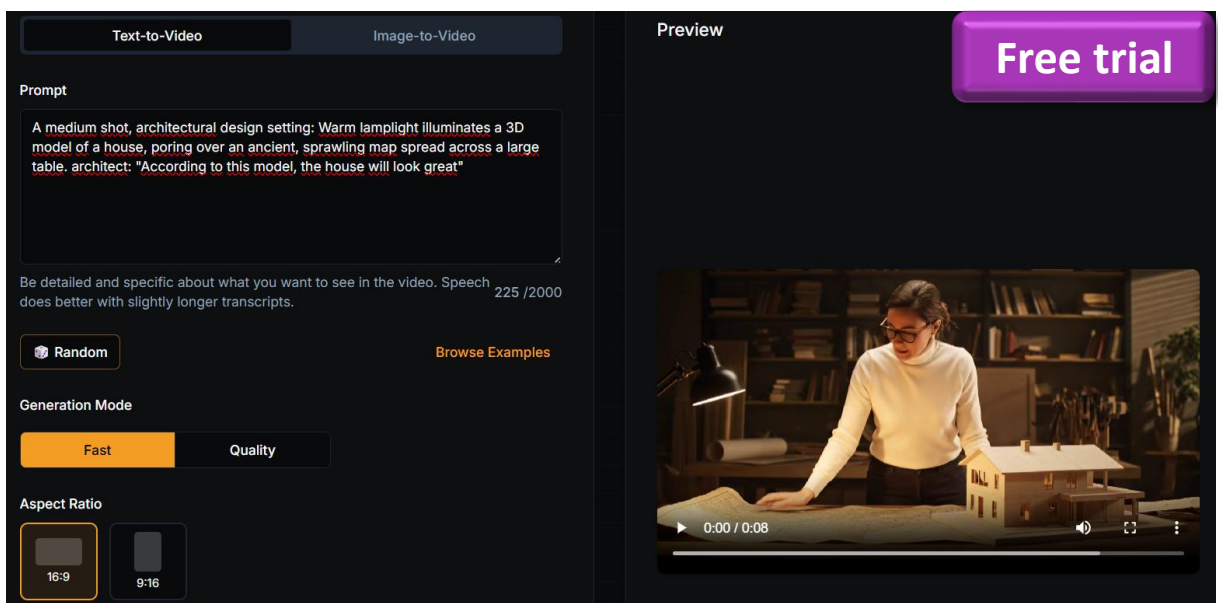
# 4 Visualization

Bringing ideas to life

## Tools

### e) Veo3 – [veo3.ai](https://veo3.ai)

Veo3 is an AI video generation tool with realistic sound, enabling architects and designers to create project videos with perfectly synced audio. It can add dialogue for narrated walkthroughs, ambient sounds like city noise or nature, and even interior sound effects, making design presentations and client experiences more immersive.



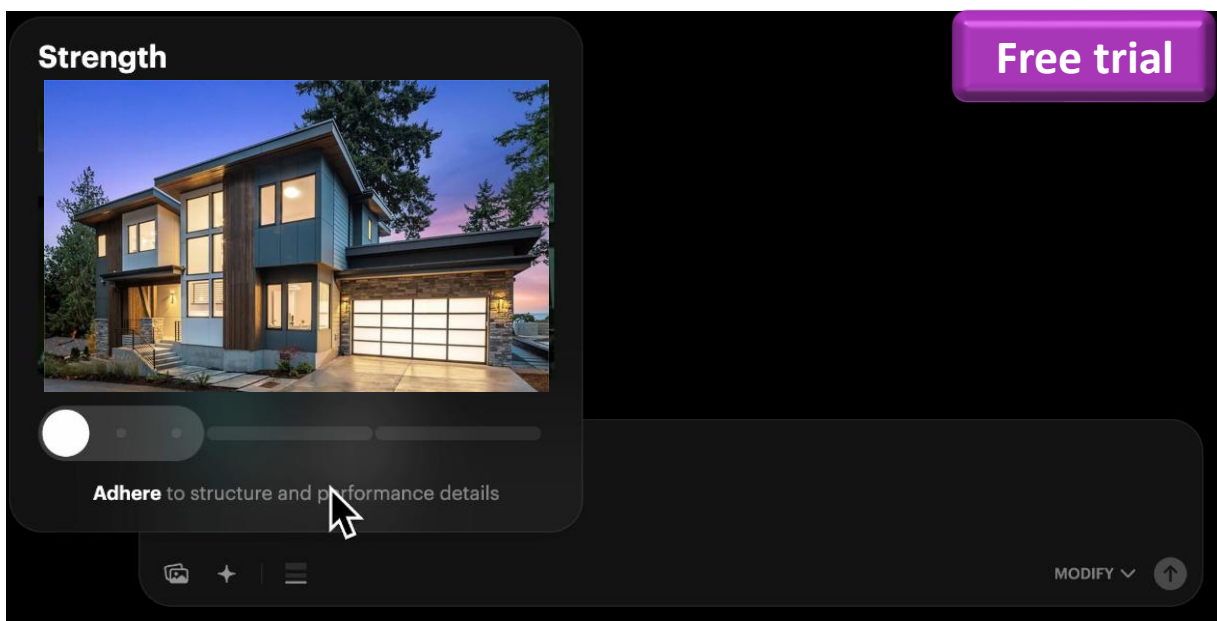
# 4 Visualization

Bringing ideas to life

## Tools

### f) Luma AI – [lumalabs.ai](https://lumalabs.ai)

Luma AI is an AI-powered platform that transforms, images, 3D models and environments into photorealistic videos, interactive visualizations.



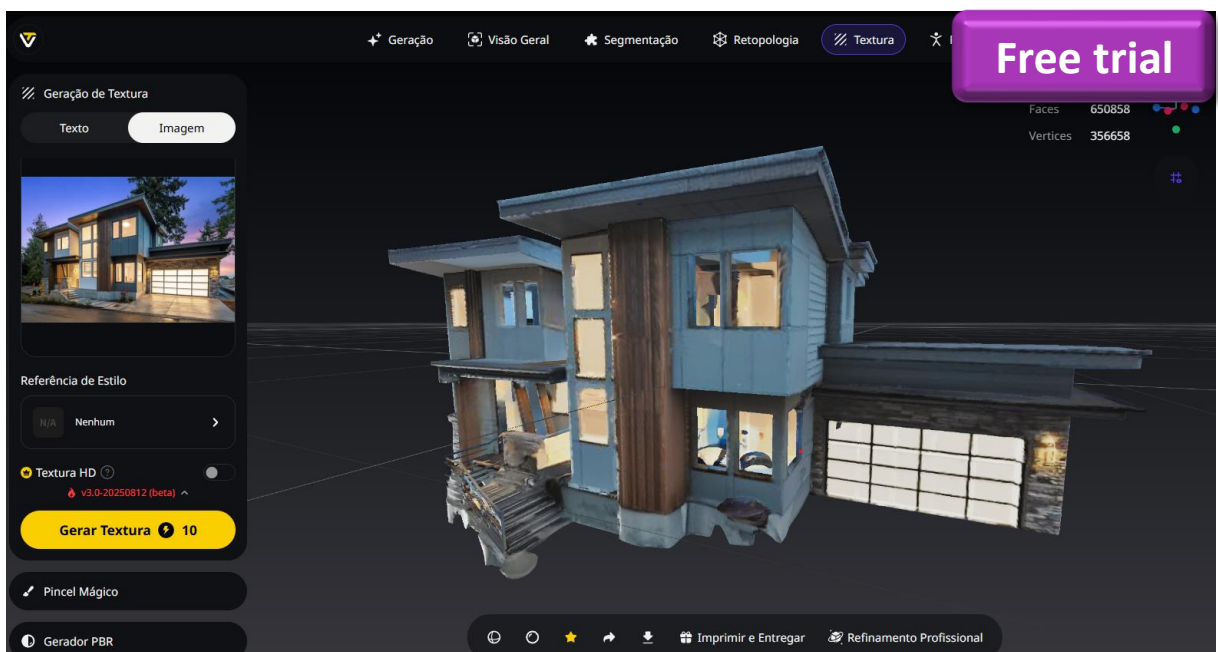
# 4 Visualization

Bringing ideas to life

## Tools

### g) Tripo – [studio.tripo3d.ai](https://studio.tripo3d.ai)

Tripo is an AI-powered 3D modeling platform that generates detailed 3D assets from simple prompts or images. For architects and designers, it makes creating 3D assets such as furniture, site elements, or context models fast and practical, helping populate architectural projects with realistic components and speeding up design visualization.



# 4 Visualization

Bringing ideas to life

## Checklist – AI in Visualization

- Generate photorealistic renderings and animations directly from BIM models with AI tools.
- Create immersive AR/VR experiences for clients and stakeholders.
- Use AI-driven generative models to test lighting, space use, and circulation.

# 5 Engineering

## Strength, systems and performance

Engineering ensures that architectural visions can stand, function, and endure. Structural and MEP systems are both cost drivers and sustainability factors. AI enhances both, giving leaders more control over safety, efficiency, and long-term value.

- **Structural design:** AI optimizes reinforcement and material use, simulates performance under load or extreme conditions, and predicts durability and maintenance needs.
- **MEP systems:** AI supports the automated design of MEP circuits, reducing manual effort and improving accuracy across mechanical, electrical, and plumbing layouts. It can detect clashes in real time, right-size HVAC and electrical systems, optimize energy performance, and integrate carbon analysis into decision-making, helping teams deliver safer, more efficient, and more sustainable building services.
- **Predictive maintenance:** Sensors combined with AI prevent failures and reduce downtime after construction.

Together, these applications ensure projects are structurally sound, energy-efficient, and reliable long after delivery.

# 5 Engineering

## Strength, systems and performance

### How leaders can apply today

- **Apply AI to structural simulations** early in concept design, testing performance under load, seismic events, fire, and climate extremes.
- **Use AI to right-size MEP systems**, ensuring HVAC, electrical, and plumbing are efficient and coordinated.
- **Optimize material usage** with AI-driven design, reducing costs and embodied carbon while improving safety and durability.
- **Embed predictive maintenance strategies** in design by linking AI to sensors, reducing downtime and operational costs post-handover.
- **Automate repetitive engineering tasks** (schedules, clash detection, calculations) to free engineers for high-value analysis.
- **Integrate AI with sustainability goals**, connecting engineering design directly with LCA and performance modeling.
- **Leverage AI for constructability analysis**, identifying risks and inefficiencies before construction begins.
- **Promote data-driven decision-making**, using AI as a tool to unify structural, MEP, and architectural decisions under one analytical framework.

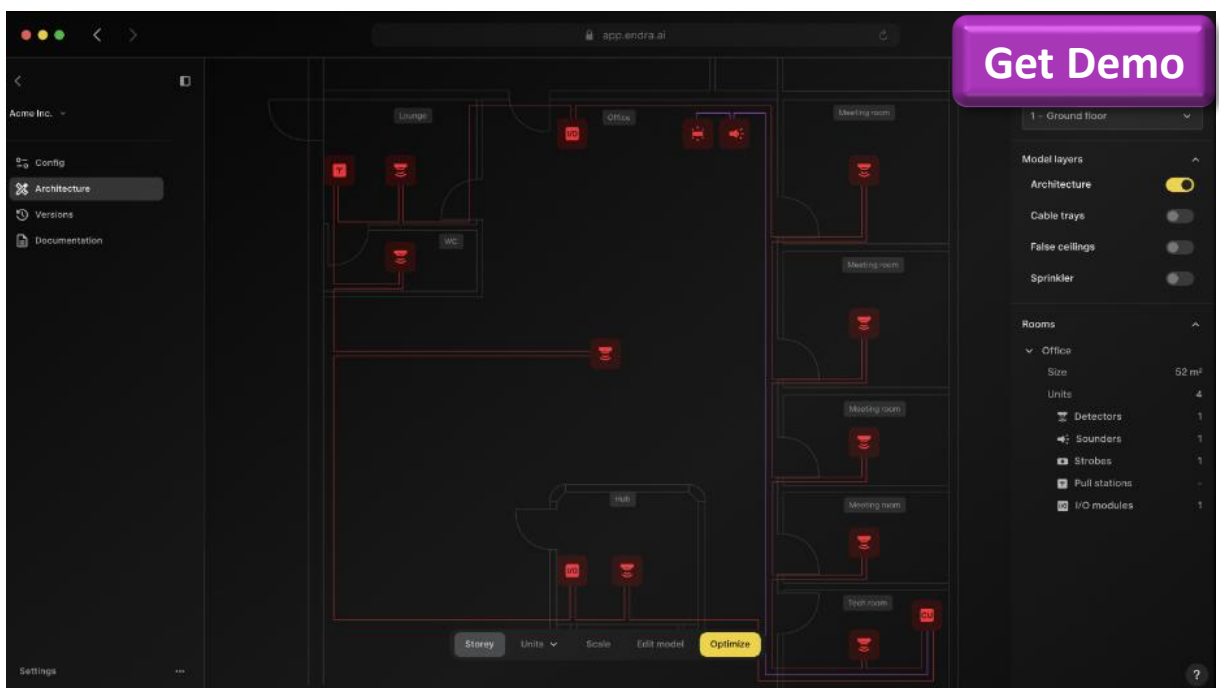
# 5 Engineering

Strength, systems and performance

## Tools

### a) Endra – [endra.ai](https://endra.ai)

Endra is an AI-powered platform for MEP (mechanical, electrical, plumbing) engineering that automates the creation of documentation like shop drawings, riser & wiring diagrams, load & battery calculations, all while enforcing code compliance. It aims to simplify workflows for both junior and senior users by offering automatic generation from model inputs, streamlining edits and collaboration, and reducing what might take hours to minutes.



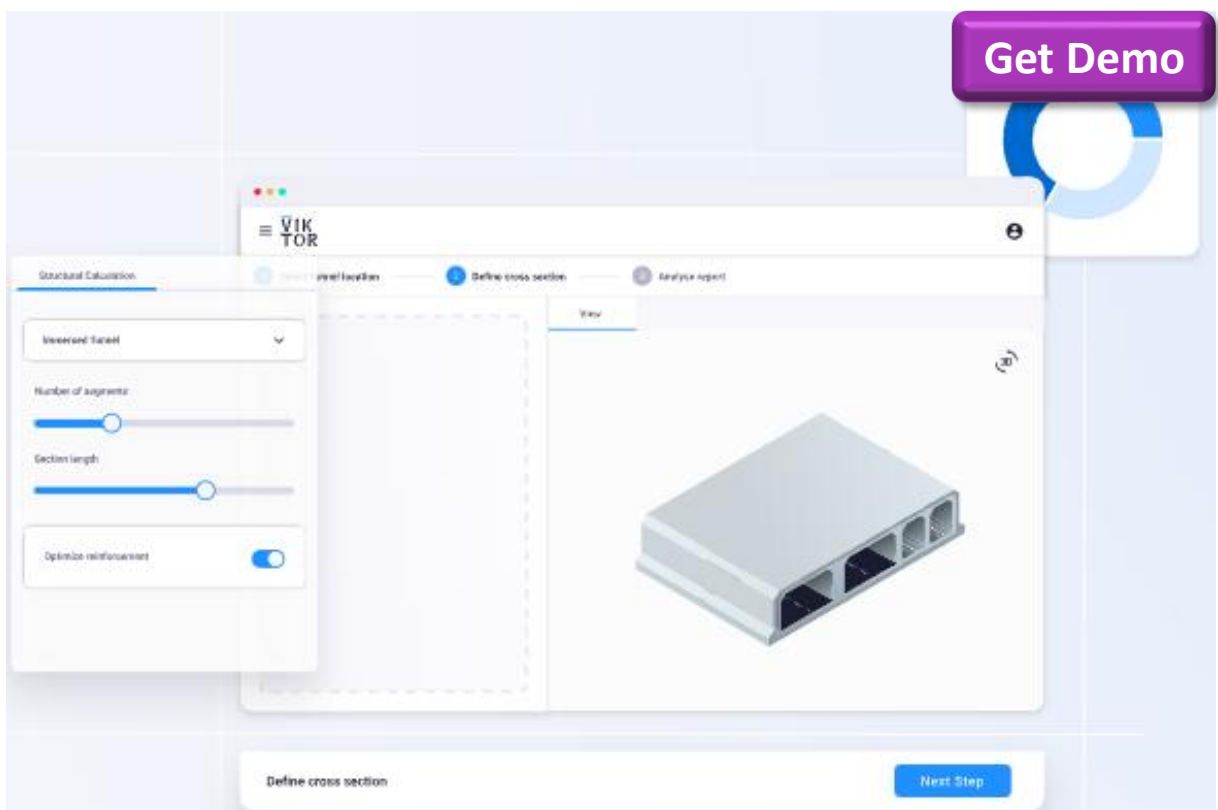
# 5 Engineering

Strength, systems and performance

## Tools

### b) Viktor – [viktor.ai](https://viktor.ai)

VIKTOR is a platform for engineering and construction firms that enables engineers to create and share custom web apps. Automate your work, collaborate, and deliver better designs in less time.



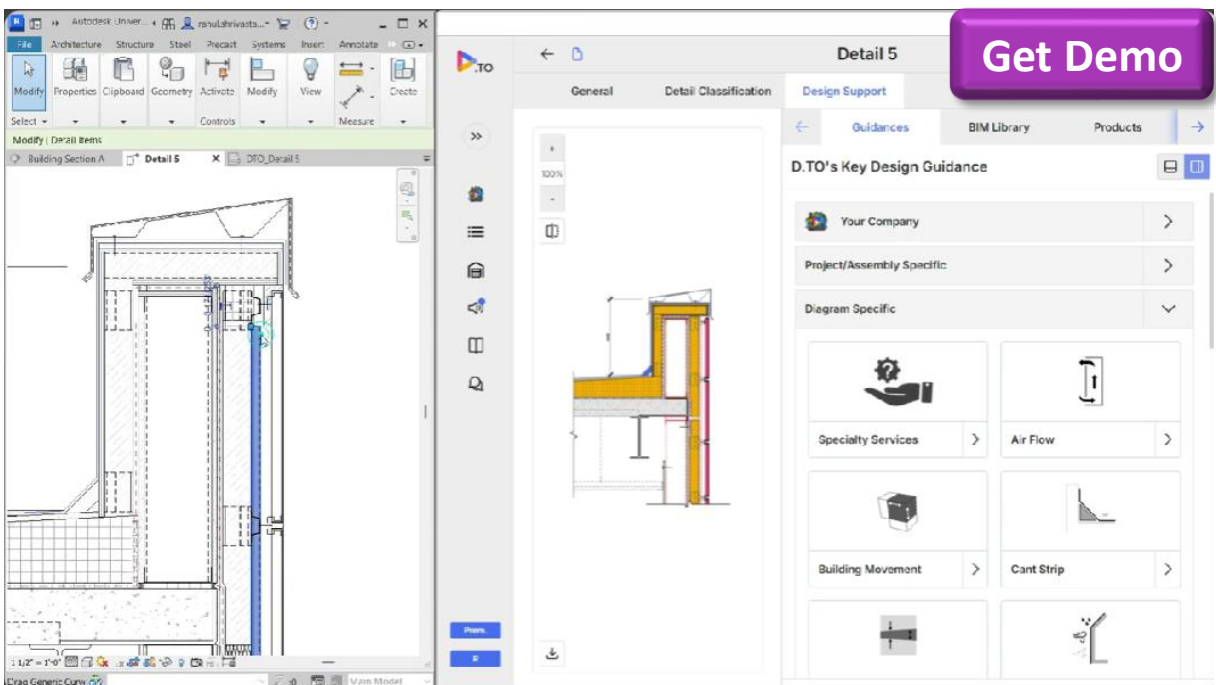
# 5 Engineering

Strength, systems and performance

## Tools

### c) D.TO – [dtoaec.com](http://dtoaec.com)

D.TO provides designers with a unified solution for guided building assemblies, documentation, and product specifications. Fully embedded into your design canvas and workflow, our platform simplifies Design Development and streamlines Construction Documentation.



# 5 Engineering

Strength, systems and performance

## Checklist – AI in Engineering

- Validate models against sustainability and safety KPIs.
- Use AI to test extreme conditions (fire, earthquake, storms).
- Establish predictive maintenance protocols with clients.

# 6 Coordination

## Aligning people, data and design

Coordination is where disciplines converge, and also where projects often fail. Miscommunication, missing data, and late discovery of conflicts are some of the costliest problems in construction. AI transforms coordination from reactive problem-solving into proactive alignment.

- **Clash detection** with AI automating the solutions can reduce costly late changes.
- **Dashboards** provide leaders with project health indicators and risks before they escalate.
- **Automated documentation** generates RFIs, reports, and change orders, reducing administrative burden.
- **Immersive coordination platforms** allow distributed teams to collaborate as if they were in the same room.

With AI, coordination becomes less about fixing mistakes and more about preventing them, strengthening trust, communication, and efficiency across stakeholders.

# 6 Coordination

## Aligning people, data and design

### How leaders can apply today

- **Implement AI-powered clash detection** to surface conflicts in real time, preventing rework and costly late-stage revisions.
- **Use AI dashboards** for continuous project health monitoring, identifying risks and bottlenecks before they escalate.
- **Automate routine documentation** such as RFIs, submittals, and change orders, reducing administrative overhead.
- **Adopt immersive coordination tools** (AR/XR/VR with AI) to align distributed teams as if they were co-located.
- **Leverage AI-driven semantic search** in CDEs to quickly find relevant project data, saving time and reducing errors.
- **Set up AI-supported collaboration protocols**, ensuring information consistency across contractors, engineers, and designers.
- **Analyze communication patterns** with AI to identify gaps or risks in collaboration workflows.
- **Build a culture of proactive alignment**, using AI not just to detect errors, but to anticipate and prevent them before they occur.

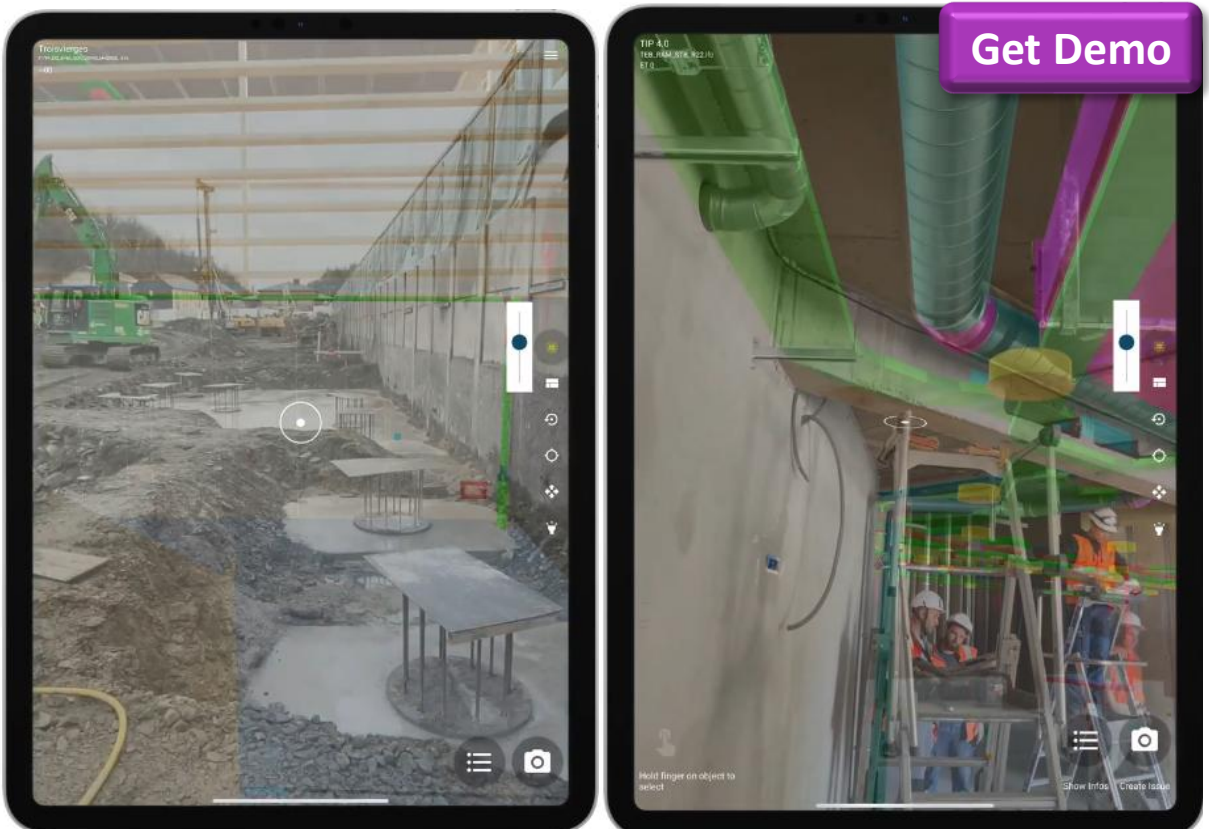
# 6 Coordination

Aligning people, data and design

## Tools

### a) Gamma AR – [gamma-ar.com](https://gamma-ar.com)

Gamma AR is a platform that uses augmented reality for architecture and construction projects. It allows designers and stakeholders to explore models in real time, enhancing project communication, collaboration, and decision-making throughout the design and review process.



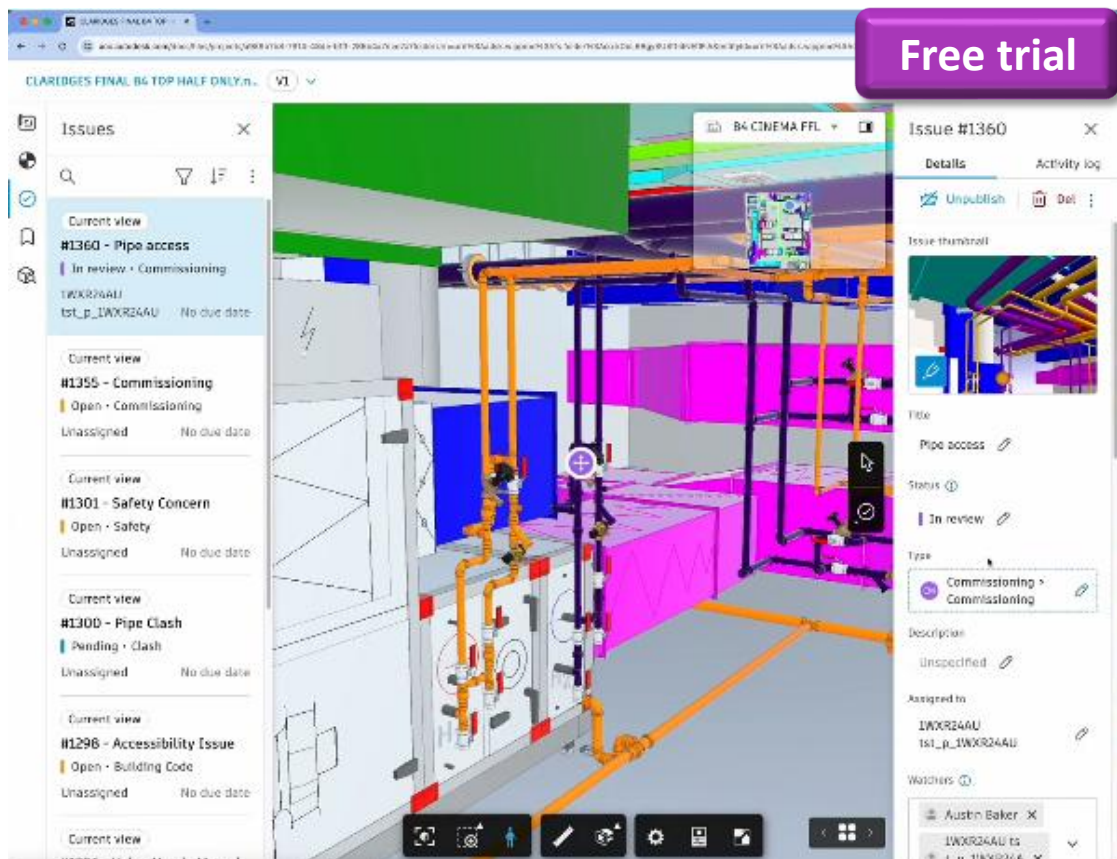
# 6 Coordination

Aligning people, data and design

## Tools

### b) Workshop XR – [autodesk.com/products/workshop](https://autodesk.com/products/workshop)

Autodesk Workshop XR: Streamline your design reviews in extended reality (XR). Collaborate inside your projects in real-time to catch costly errors and enhance spatial understanding - all connected to Autodesk Construction Cloud (ACC).



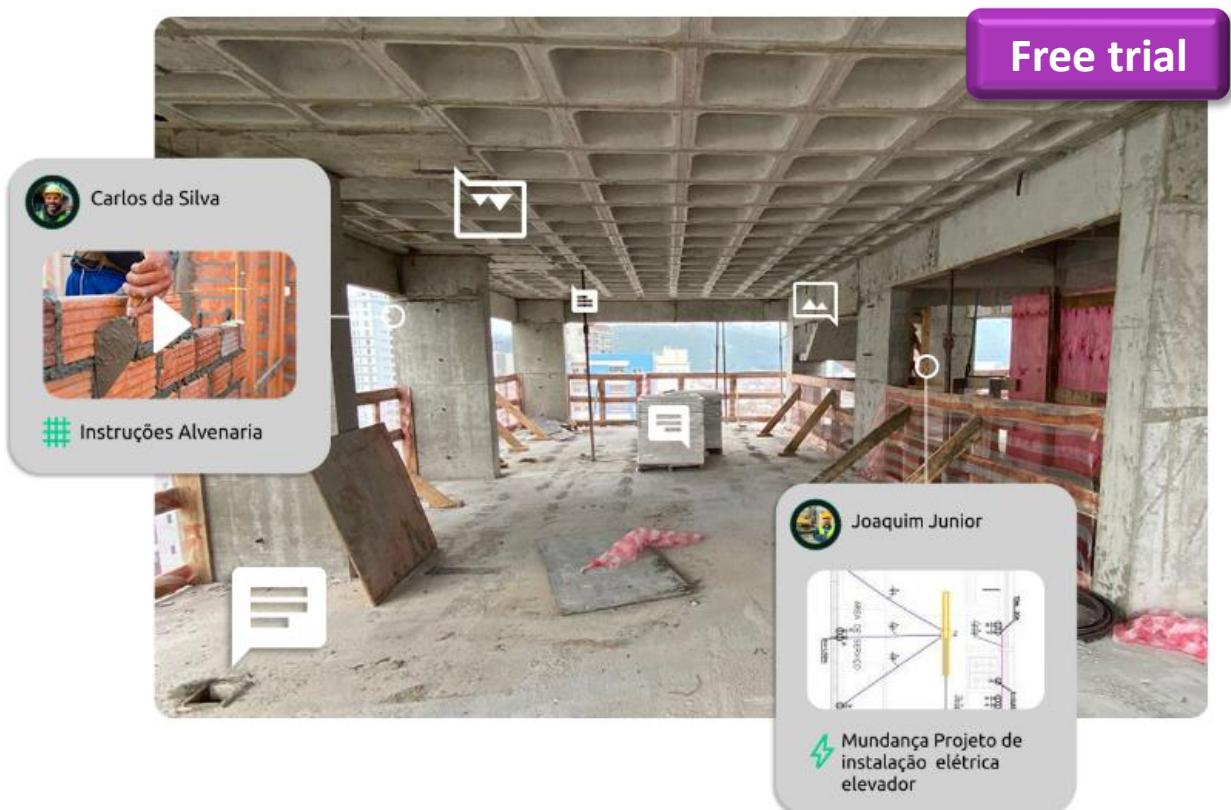
# 6 Coordination

Aligning people, data and design

## Tools

### c) Syncker – [syncker.com.br](https://syncker.com.br)

Syncker Workspace is a collaborative environment that integrates the office and construction site. It helps field teams visualize projects and instructions overlaid on reality and enables the insertion of localized quality notes.



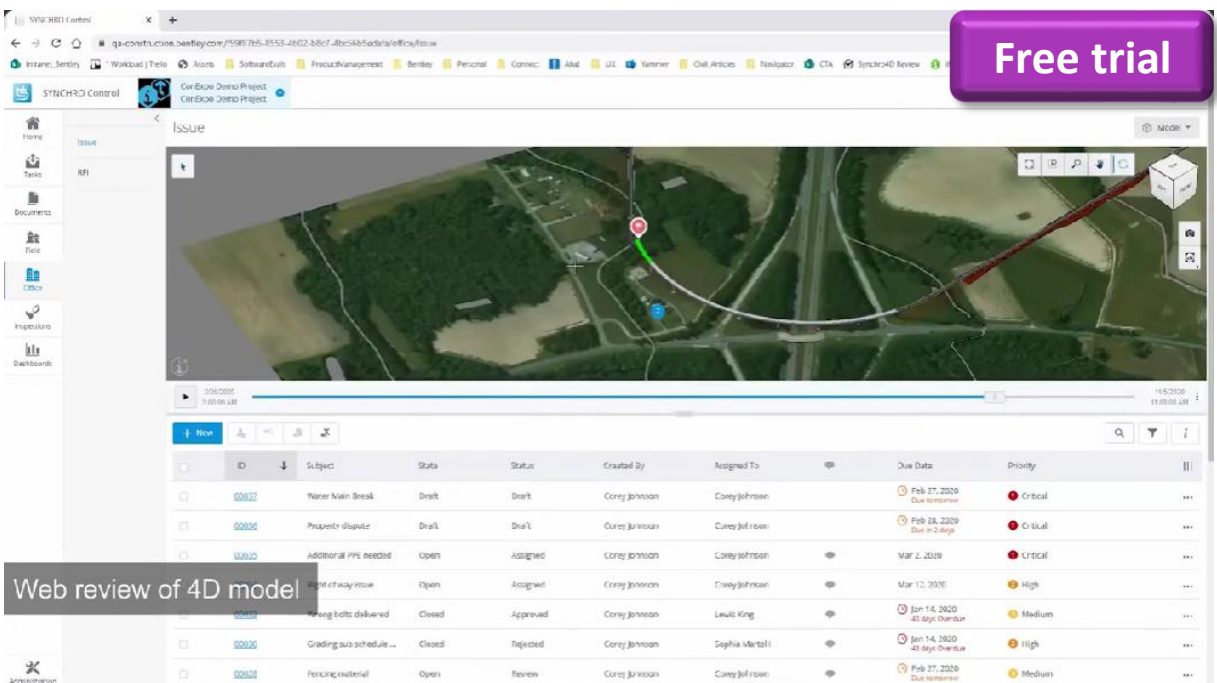
# 6 Coordination

Aligning people, data and design

## Tools

### d) Synchro – [bentley.com/software/synchro](https://www.bentley.com/software/synchro)

Synchro by Bentley is a construction management platform that uses 4D scheduling, modeling, and visualization to optimize project planning and execution. It enables teams to simulate construction sequences, track progress, and coordinate resources, improving efficiency, reducing risks, and supporting data-driven decision-making throughout the project lifecycle.



The screenshot displays the Synchro software interface. At the top right, there is a purple button labeled "Free trial". The main area shows a 3D aerial view of a construction site with a red line indicating a path or schedule. Below the view is a table of tasks with columns for ID, Subject, Status, Status, Created By, Assigned To, Due Date, and Priority.

ID	Subject	Status	Status	Created By	Assigned To	Due Date	Priority
00007	Water Main Break	Draft	Draft	Corey Johnson	Corey Johnson	Feb 17, 2020 Due tomorrow	Critical
00006	Property dispute	Draft	Draft	Corey Johnson	Corey Johnson	Feb 18, 2020 Due in 2 days	Critical
00005	Additional PPE needed	Open	Assigned	Corey Johnson	Corey Johnson	Mar 2, 2020	Urgent
00004	Request of stay issue	Open	Assigned	Corey Johnson	Corey Johnson	Mar 12, 2020	High
00003	Wrong bolts delivered	Closed	Approved	Corey Johnson	Lewis King	Jan 14, 2020 41 days Overdue	Medium
00002	Grading and schedule ...	Closed	Rejected	Corey Johnson	Sepha Martini	Jan 14, 2020 41 days Overdue	High
00001	Permitting material	Open	Review	Corey Johnson	Corey Johnson	Feb 17, 2020 Due tomorrow	Medium

A text box in the bottom left corner of the screenshot reads "Web review of 4D model".

# 6 Coordination

Aligning people, data and design

## Tools

### e) Revizto – [revizto.com](https://revizto.com)

Integrated Collaboration Platform. From real-time coordination to automated clash detection and issue tracking, Revizto keeps all stakeholders aligned throughout the entire project lifecycle.





# 6 Coordination

Aligning people, data and design

## Tools

g) **Worlds** – [worlds.io](https://worlds.io)

The Worlds AI platform is revolutionizing how companies leverage video cameras and sensors to automate their daily operations. Its advanced capabilities and flexible architecture enables users to address a wide range of challenges throughout the enterprise.



# 6 Coordination

Aligning people, data and design

## Checklist – AI in Engineering

- Validate models against sustainability and safety KPIs.
- Implement AI clash detection in weekly project reviews.
- Use AI dashboards to track project health and identify risks early.
- Automate RFIs, reports, and change orders with AI tools.
- Standardize collaboration protocols with AI to ensure data consistency in the CDE.
- Monitor communication flows with AI to detect gaps and prevent coordination failures.

# 7 Future

## Preparing leaders for the next era

The AEC industry is entering its most profound transformation yet. AI is reshaping not only how we design and deliver projects today but also what our cities, buildings, and societies will look like tomorrow.

- **Near Term (0–12 months):** Quick wins and measurable ROI. Pilot AI in planning, design, and clash detection. Establish governance and security policies. Train teams in prompt engineering and AI literacy.
- **Mid Term (2–3 years):** Scaled adoption. Digital twins connected to IoT sensors. Predictive models for carbon, cost, and safety. AI integrated into procurement and supply chains.
- **Long Term (5–10 years):** Transformation of industry models. Robotics automating on-site tasks. Circular design powered by AI for reuse and recycling. Entire cities planned with AI that integrates economics, environment, and human behavior.

# 7 Future

## Preparing leaders for the next era

Future leaders must excel in three areas:

- **Culture of learning:** encouraging experimentation and rewarding curiosity.
- **Balancing tools with people:** investing in both technology and human skills.
- **Ethical leadership:** ensuring data privacy, transparency, and fairness.

The future is not about AI replacing professionals, it is about professionals using AI to expand their vision, amplify their impact, and deliver projects that are greener, safer, and more resilient.

## 8 Quiz

Test your leadership knowledge

### Question 1

Which is NOT a key application of AI in planning?

- Predictive scheduling
- Resource optimization
- Manual drafting

C - Manual drafting is a traditional process, not an AI-powered. AI planning automates, predicts, and optimizes.

### Question 2

In architecture, AI primarily helps leaders by:

- Replacing creativity entirely
- Generating multiple design options
- Eliminating BIM requirements

B - AI augments creativity by expanding alternatives, but does not replace creativity or BIM standards.

## 8 Quiz

Test your leadership knowledge

### Question 3

In execution, AI contributes by:

- Real-time site monitoring and quality control
- Replacing project managers
- Eliminating contractors

A - AI supports project managers but does not replace them or contractors.

### Question 4

Future leaders in AEC must prioritize:

- Outsourcing planning to machines
- Ethics, sustainability, and continuous learning
- Limiting AI to IT departments

B - Responsible leadership requires guiding technology with human oversight.

# 9 Conclusion

## Leading with AI in AEC

Artificial Intelligence is here to stay, and its impact on AEC is undeniable. The real question for leaders is not whether to adopt AI but how to embrace it responsibly and strategically.

Leaders who use AI to empower teams, engage clients, and prioritize sustainability will deliver stronger outcomes. AI is not replacing leadership, it is amplifying it. The next generation of AEC will be shaped by those who choose to lead with vision, responsibility, and innovation.

# 10 Contact

## Let's Connect

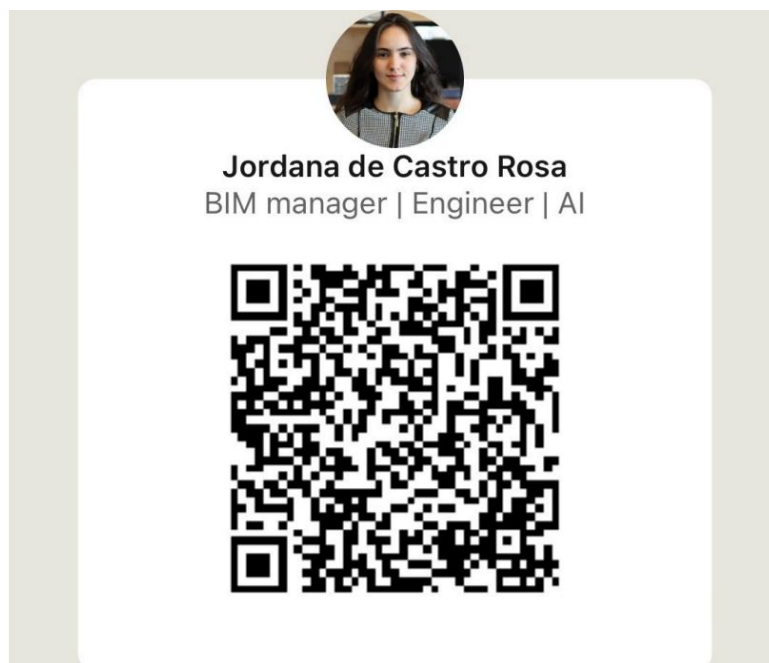
This eBook is part of an ongoing conversation about the future of AEC. I would love to hear your perspective, learn about your challenges, and exchange insights. Let's build this future together.

If you know of any technologies or initiatives that deserve attention, please share them with me.

**LinkedIn:** [jordanarosa](#)

**Website:** [jordanarosa.com](#)

**Email:** [jordana@ecocraff.com](mailto:jordana@ecocraff.com)



Let's build the next chapter of AEC with AI together.