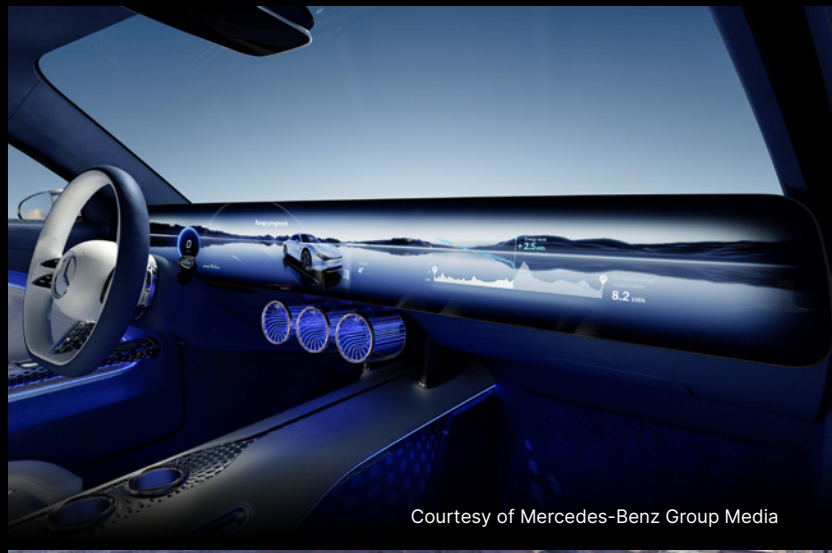
→ PLAYBOOK

Turning connected data into interactive 3D experiences

How to create immersive experiences that drive business results: a practical guide for product, training and field service leaders looking to build interactive simulations from connected 3D data.

Unity®


Courtesy of Cincinnati Childrens Hospital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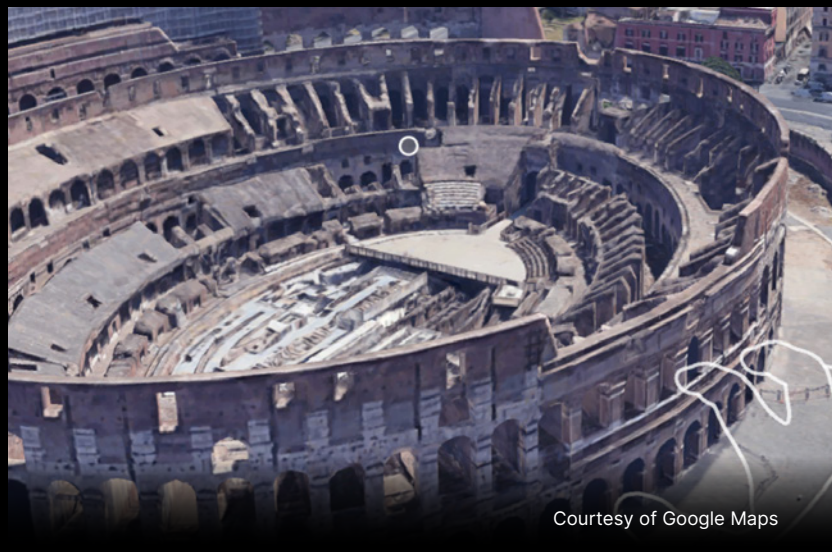
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Introduction

A design review or training simulation rarely fails for lack of data. Most of the time, it fails because the people in the room aren't having the same experience of that data. Engineers bring section views and tolerance stacks, manufacturing shows a snapshot from the assembly line, while product teams show slides to align stakeholders.

There's nothing wrong with these presentations, but they exist in different frames of reference and draw data from different sources. They tell the part of the story that matters only to a specific user role. Your teams might be right in their own frame, but still, important questions linger because not everyone can be certain that the information being conveyed is correct, relevant and up to date.

Put those teams around the same 3D model, and the conversation changes. The assembly moves, tolerance levels breathe, service panels open and issues reveal themselves in seconds instead of days. That way, people can point, test and decide based on the same source of truth.

This playbook is about creating those kinds of experiences. In our previous playbook, we talked about laying the groundwork by building a governed, centralized 3D asset library that imports and preserves hierarchy and metadata. The next step is to turn that data into immersive, interactive experiences that re-create the products you're selling, the simulations you're running or the facilities you're monitoring.

Courtesy of ABB

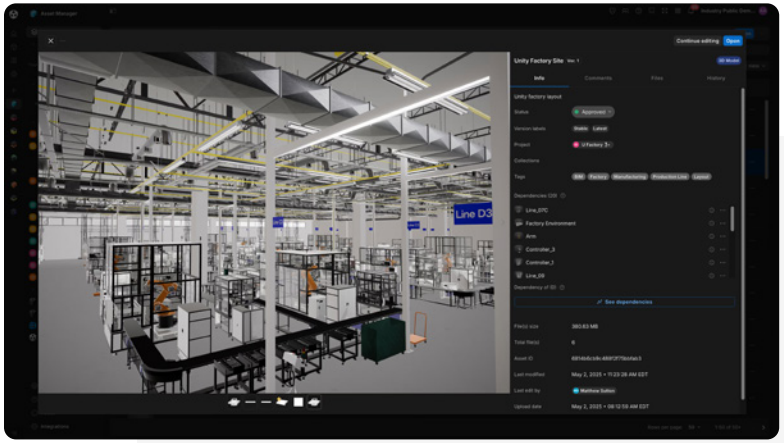
The bottleneck: Connected models, missing experiences

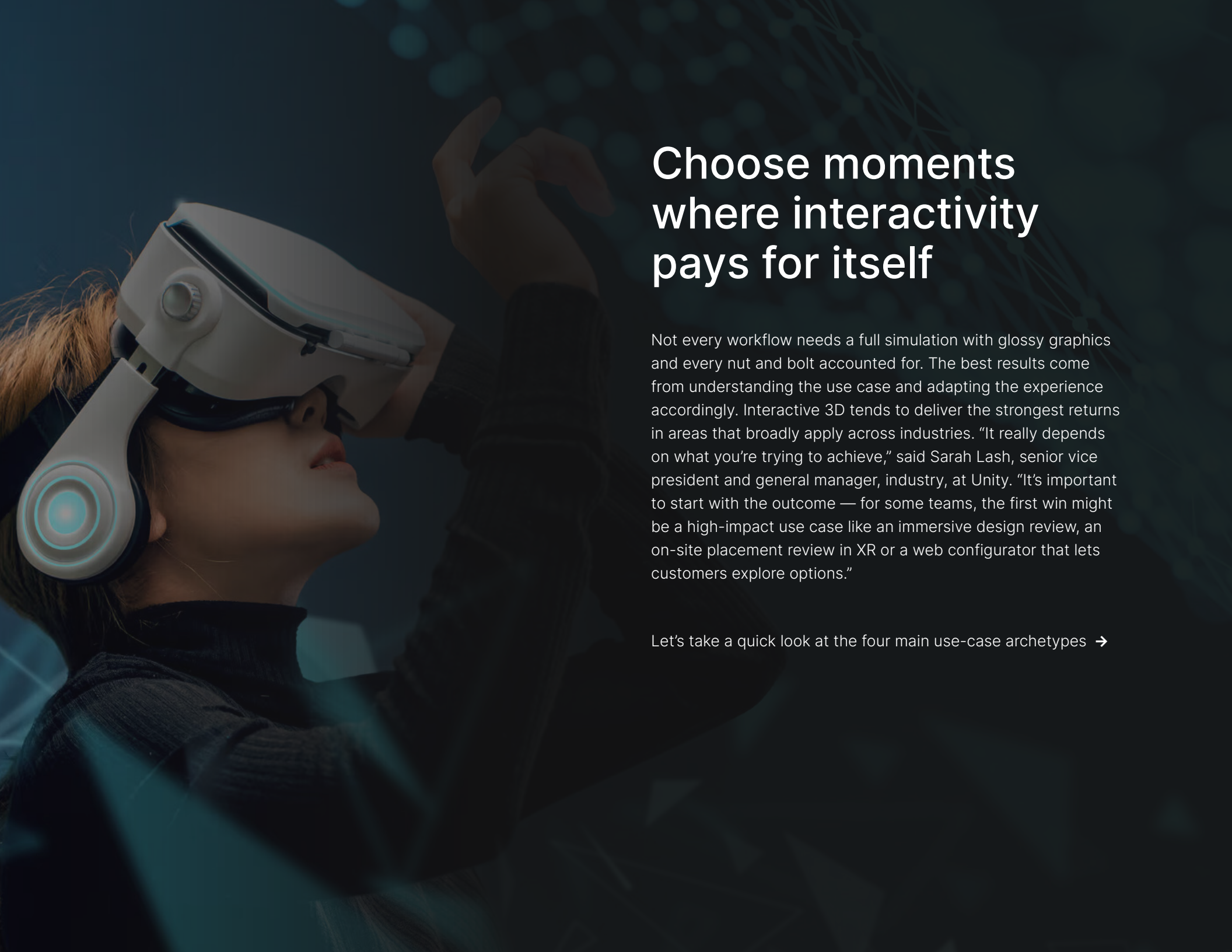
Raw 3D models, no matter how well they're organized, don't create value by themselves. Once you've built your asset library, the next step is to create experiences that give your end users what they need from those models.

Here are some common sources of friction at this stage:

- People have different expectations from the same model: Engineers expect functional fidelity, while trainers need clarity and realism to teach procedures, and customers want engaging visuals that are easy to understand.
- Static outputs don't convey moving problems: Screenshots and slide decks don't show things such as midmotion clashes or awkward tool paths, and sequence errors show up only when you step through the motions or run the task manually.
- All-or-nothing realism: If you're going for maximum detail on XR headsets, frame rates will tank, leading to uncomfortable experiences. Strip away too much detail, and you risk losing trust. Instead of debating aesthetics, focus on what must be accurate for the use case at hand.
- Inconsistent experiences across devices: What runs smoothly on a workstation might stutter on a headset or mobile device. Things such as excessively high-res textures, demanding-shaders or unbaked lighting aren't easy to fix just before a live demo or training simulation.

These issues all share a common theme — a lack of a shared, hands-on view. By treating the model as a starting point rather than a deliverable, you can focus on the desired outcome and design accordingly for that audience and device.





Choose moments where interactivity pays for itself

Not every workflow needs a full simulation with glossy graphics and every nut and bolt accounted for. The best results come from understanding the use case and adapting the experience accordingly. Interactive 3D tends to deliver the strongest returns in areas that broadly apply across industries. “It really depends on what you’re trying to achieve,” said Sarah Lash, senior vice president and general manager, industry, at Unity. “It’s important to start with the outcome — for some teams, the first win might be a high-impact use case like an immersive design review, an on-site placement review in XR or a web configurator that lets customers explore options.”

Let’s take a quick look at the four main use-case archetypes →

1. Training and simulation

An effective simulation can dramatically improve learning outcomes and safety, but they depend on immersion, accuracy and trust. A well-built training simulation exposes the correct sequences, the feel of consequence and the reasoning behind each step. For example, if you use a simulation to train a forklift or crane operator, load sway and momentum train judgment in a way that video never can. In maintenance tasks, realistic access paths and real-time feedback on errors help new technicians gain the confidence they need to work productively and, most important, safely.

Courtesy of I-CAR

WHAT TO AIM FOR →

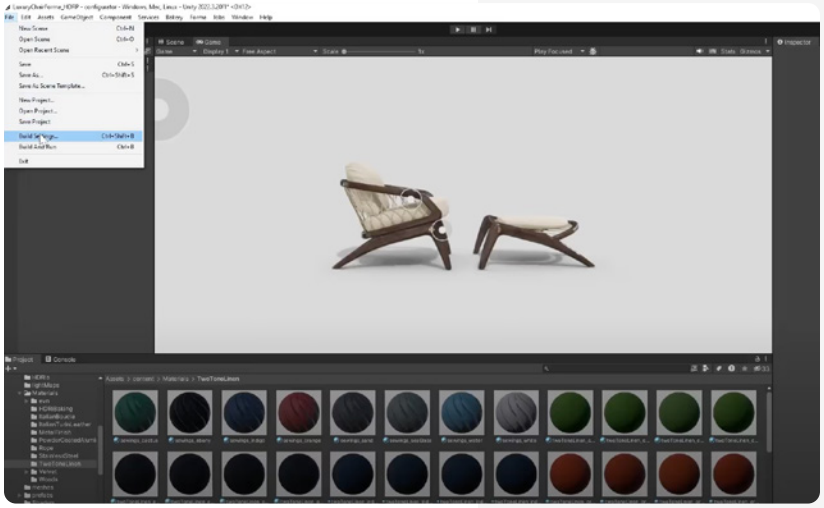
Believable and accurate behaviors relevant to the particular training scenario. Clear visual cues and stable frame rates on the target headset or tablet are much more important than aesthetics, although the simulation does still need to reflect the real-world environment or object.

Courtesy Specto Medical AG

2. 3D collaboration and design reviews

In design reviews, interactivity turns debate into meaningful demonstrations, or at least it should. This high-payoff use case allows engineers, designers and stakeholders to review designs in real-time 3D, allowing them to catch errors earlier and iterate faster. Reviewers should be able to switch between variants, move parts through their full motion to see if anything clashes and cut away layers to check clearances in context. Smarter decisions come a lot faster when everyone's looking at the same thing, at the same moment, from the same point of view. Visual polish is typically optional here, but realistic motion and accurate details are not.

Courtesy of Facebook Reality Labs



WHAT TO AIM FOR →

Accurate sizes and movements, such as those showing how far parts travel without colliding, are paramount. You might also include simple risk toggles, such as turning off guardrails and enabling self-service modes to reveal issues and worst-case scenarios.

Courtesy of Mercedes-Benz Group Media

3. Human-machine interface operations

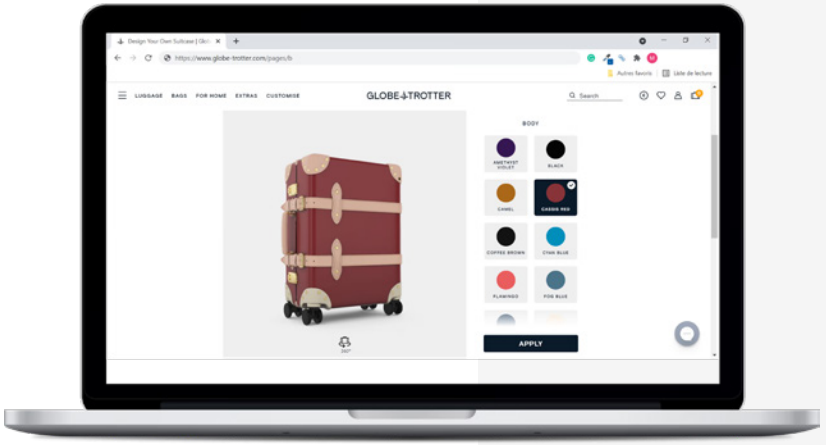
Whether it's an assembly line control screen or an in-vehicle display, clarity is most important in HMI applications. Operators need to know what's happening now and what they should do next, so lightweight 3D tends to win in these cases. Moreover, many embedded systems, which users interact with via an HMI, have limited graphics processing, so high visual fidelity isn't usually technically feasible anyway. Other factors, such as responsiveness and legibility, are nonnegotiable, because when situations change, operators may have only seconds to respond. Any lag or hard-to-read UI elements can result in errors, downtime or safety incidents.

WHAT TO AIM FOR →

Use lightweight 3D models that render instantly on the target hardware. Simplified meshes, prebaked lighting and high-contrast materials reduce performance demands and ensure the models remain readable in typical HMI use cases.

4. Customer experience and configurators

Customers spend more time and decide faster when they can interact with a product they're interested in virtually, such as spinning it around, zooming in, changing options or even dropping it into their own surroundings with augmented reality. Trust comes from having fidelity where it matters, so materials and lighting need to be realistic, and moving parts should behave as they do in real life. Nonetheless, while customers appreciate glossy visuals,they certainly don't want choppy frame rates or long loading times.



Courtesy of SmartPixels

WHAT TO AIM FOR →

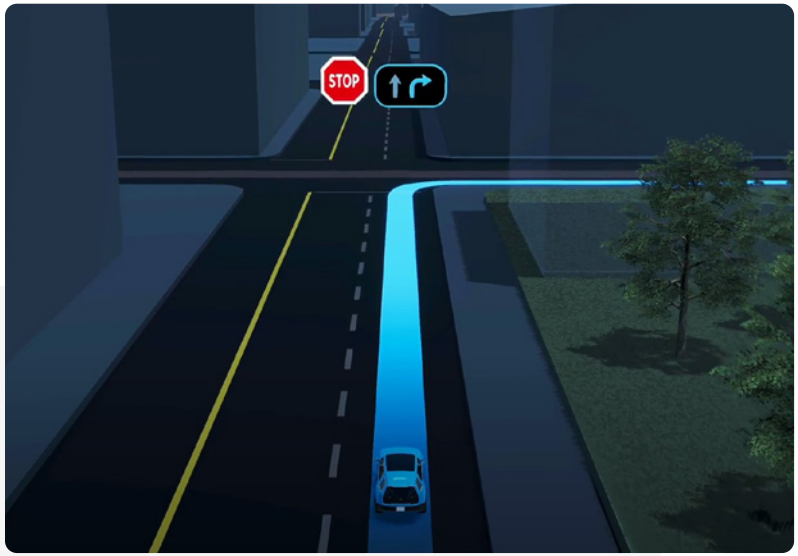
Prioritize what matters most to the customer experience, the so-called "hero" surfaces, named so because they're critical areas of detail — such as glass, metals, paint or fabrics. Fast-loading times on midtier devices are also important, so consider using multiple levels of detail.

Courtesy of Audi & Govar Studios

For best results, start with a single scenario within one of the above archetypes. Build out the use case most important for the target audience, and then you can expand using the same connected 3D models later on to serve other archetypes and use cases.

Design for truth, but build for performance

Confidence and trust come from two things: The scene should look right, and it should behave just as it would in the real world, albeit on the devices the end user actually has. To make your 3D experiences convincing and usable, it's best to take a layered approach: visuals, interaction and integration.



Courtesy of TomTom

1. VISUALS:
Tune for "minimum viable realism"

Finding the right level of visual detail for a given experience is one of the harder aspects. You want to give your end users the best experience possible, but you also need to accommodate the devices that will convey those experiences. On one hand, low-quality visuals can fail to carry enough meaning. On the other, poor frame rates result in experiences that feel unresponsive and less immersive.

Avoid overengineering visuals by making something more photorealistic than it needs to be. You don't want to spend weeks building out ultradetailed textures for an internal training experience designed to run on midrange VR headsets, for example. Trainees might not even notice the extra polish anyway, but they'll certainly notice performance lags. Overengineering also happens if teams import every nut, bolt and internal component from a CAD assembly into a real-time scene, even if those details aren't visible or even needed for the experience.

Underengineering visuals can be just as detrimental, however, especially when it comes to customer-facing experiences. For instance, a product demo that uses low-poly models and blurry textures isn't just going to look bad to customers — it can also hurt confidence and trust by representing the product in a poor light. Underengineering also includes missing details that affect understanding, such as a training simulation that omits an important warning label or safety guard the user needs to see. If end users don't trust the simulation or get confused when they view it, chances are it's too far detached from reality.

It's best to aim for minimum viable realism — in other words, the minimum level of visual fidelity you need to achieve the desired outcome. Decide what must remain exact to inform or influence decisions, whether it's materials, shapes, lighting cues or anything else. Start with a small scene communicating function and quality, and preserve geometry where it carries meaning. Then test the experience on your weakest target device, only adding detail when you have the extra frames to spare.

> "Not everything needs to be hyperrealistic. Photorealistic streaming gets very expensive, but if you reduce realism by just 20%, a lot of people aren't going to see the difference. Dial it back to what's 'enough,' and spend frames where it matters."
>
> Henning Linn
> Senior Director, Industry Customer Success, Unity

Courtesy of Travancore Analytics

2. INTERACTION:
Make experiences feel real

In most industry use cases, interaction is more important than visual realism. That means creating 3D experiences that obey real-world rules such as gravity, collisions and fluid dynamics. Of course, this also adds complexity and computation cost. Training outcomes, for example, depend on real-world behavior, but mimicking that behavior with prebaked presets alone is hard to fake. For instance, if you're training a new hire to operate a crane, your simulation must accurately convey things such as weight sway, friction and momentum.

In other cases, complex physics can be overkill. If, for example, you just want to simulate what happens when a door opens and closes in a product demo, a simple animation will suffice. It will look the same every time, but that's not an issue if you don't need variability. After all, a customer doesn't need to see what might happen if the hinge fails. An engineering team, on the other hand, probably does.

For best results, use physics selectively, applying them only where they add educational or experiential value. For everything else, where variability isn't required, use simple scripted animations, becausethey're far less computationally demanding.

For instance, a training simulation on device assembly might need to show screw-tightening with physics so that parts collide as they do in the real world, while noncritical movements, such as a panel sliding open or an indicator light turning on, can use a prescripted animation.

> "Let's say you have a demanding use case like a driving simulator. In this case, you might pair Unity's real-time visuals with a dedicated physics simulator. To keep frame rates high without sacrificing realism, you can use simple animations when determinism isn't needed."
>
> Henning Linn
> Senior Director, Industry Customer Success, Unity

3. INTEGRATION:
Keep your creations moving

A static model becomes a powerful 3D workspace once it's made interactive and connected to contextual data. The goal is to reflect reality in the moment that matters, such as approvals in design reviews, service paths to check for issues before release or specific operations during a training simulation. To give context and meaning to your otherwise static models, you can integrate data from other, non-3D sources.

In many industrial settings, one of the most impactful integrations is real-time IoT or sensor data that feeds directly into the 3D experience. For example, integrating IoT telemetry from an assembly line on a shop floor means simulations can convey current temperatures, speeds and pressures. In training and R&D applications, this real-world telemetry, gathered from connected sensors, boosts operational awareness and decision-making.

Other valuable integrations include enterprise systems such as product life cycle management, ERP and maintenance databases. By connecting your 3D models to these data sources, you can consolidate knowledge and greatly enhance collaboration, reducing much of the back and forth involved in areas such as design approvals or service requests. For instance, imagine opening a model in your asset database and instantly pulling up its maintenance history and inventory status directly from your ERP system.

There are also more industry-specific integrations. For example, in oil and gas, construction, or smart city planning, you might integrate geographic information system and map data, allowing you to overlay your 3D models on real-world map coordinates or add BIM data into geospatial context to help stakeholders see projects in situ. Utilities and energy companies might overlay SCADA telemetry and weather forecasts onto a 3D model of a wind turbine or substation. Logistics and warehousing might integrate real-time traffic data and heat maps to reveal congestion and so forth.

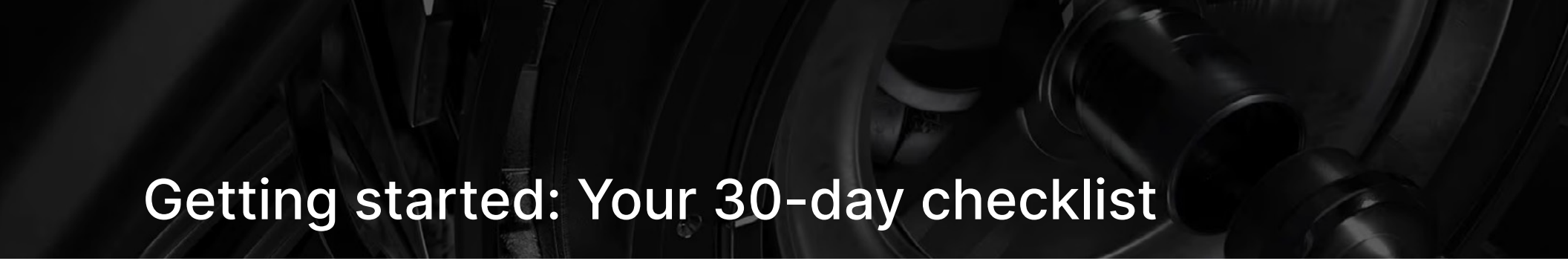
> "With Unity, you can easily integrate IoT data using industry-standard protocols like MQTT (Message Queuing Telemetry Transport) or OPC UA (Open Platform Communications Unified Architecture) into a simulation — whether it's a temperature overlay, live foot or vehicle traffic, or anything else."
>
> Henning Linn
> Senior Director, Industry Customer Success, Unity

4. DEMONSTRATE:
Reinforce stakeholder trust

No matter how well-crafted an experience, teams also need to measure outcomes that show proof of value. For example, you might measure training outcomes with KPIs such as time-to-competency or error reduction, collaboration by design review cycle time, and CX by conversion metrics. To capture these outcomes, teams might use simple usage logs, step completion or interaction frequency. For best results, pick one primary KPI per project and establish a baseline you want to target.

Teams also need confidence that their builds will stand the test of time, hence the value of long-term support commitments such as Unity's 3-year LTS. These provide stability, updates and expert guidance so enterprises don't feel as though they're experimenting in isolation. Confidence also comes from being able to tap into a community of thousands of other practitioners across industries for collective knowledge and open-source tools and assets.

> "Going forward, we're working on a no-code, web-based platform called Unity Studio that will allow nontechnical users to pull assets to create basic scene builds and simulations so that training managers, artists and plant managers can also create immersive applications without having to turn to developers."
>
> Sarah Lash
> Senior Vice President and General Manager, Industry, Unity



Getting started: Your 30-day checklist

Once your assets are imported, optimized and governed, the final step is putting your new system into daily use. Then you can quickly prove the value of a unified 3D asset library by creating the immersive experiences that drive real business results — whether it's for training, product development, customer experience or anything else.

Here's a quick recap of what you can do in just 30 days or less:

1. Inventory your data sources and their owners.
2. Select one or two representative models to pilot.
3. Determine which metadata fields to preserve.
4. Test the import to optimize your publishing cycle.
5. Set up your access controls and audit trails.

In our next playbook, we'll explore how to turn connected data into interactive 3D experiences — real-time experiences that enhance training programs, elevate product development, delight customers and more.

Are you ready to connect, create and deploy immersive experiences for your industry? Unity Industry provides a comprehensive suite of tools for training and guidance, 3D design collaboration, CX, XR, and HMI backed by three-year long-term support and a massive developer community.

Start your real-time 3D journey today!

GET STARTED →

About Unity

Unity [NYSE: U] offers a suite of tools to develop, deploy, and grow games and interactive experiences across all major platforms from mobile, PC, and console, to extended reality. For more information, visit unity.com

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