



NVIDIA Omniverse

Platform for Collaboration and Simulation

Building Blocks for the Industrial Metaverse

Connect and Develop 3D Pipelines, Tools, and Apps on OpenUSD

INDUSTRY

FORUM

2024

Who's presenting?

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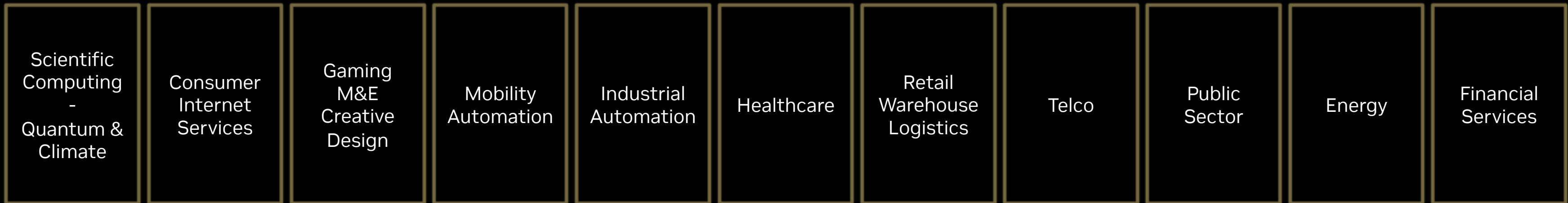
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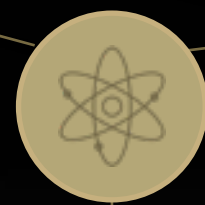
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AI APPLICATION FRAMEWORKS

PLATFORMS



NVIDIA HPC



NVIDIA AI



NVIDIA Omniverse

NVIDIA ACCELERATION LIBRARIES

CLOUD-TO-EDGE
DATACENTER-TO-ROBOTICS

3 CHIPS



RTX



DGX



HGX



EGX



OVX



Super
POD



AGX



GPU



CPU



DPU



NVIDIA AI

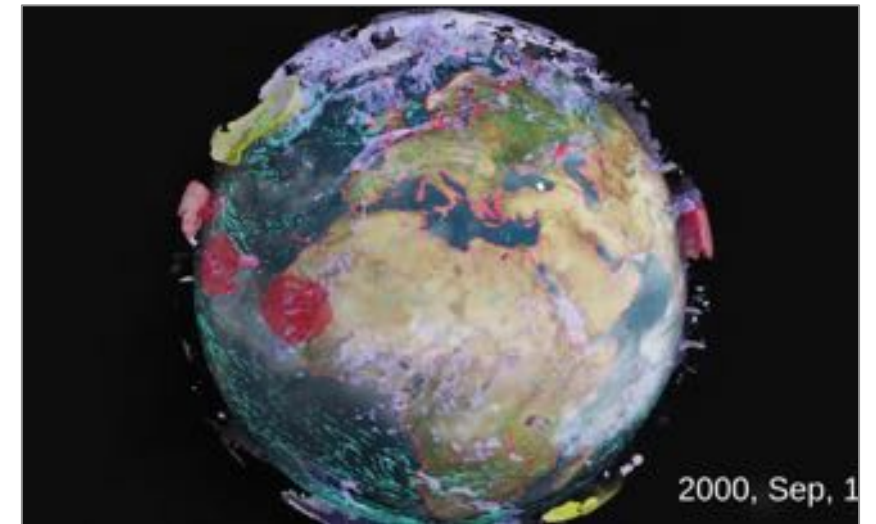
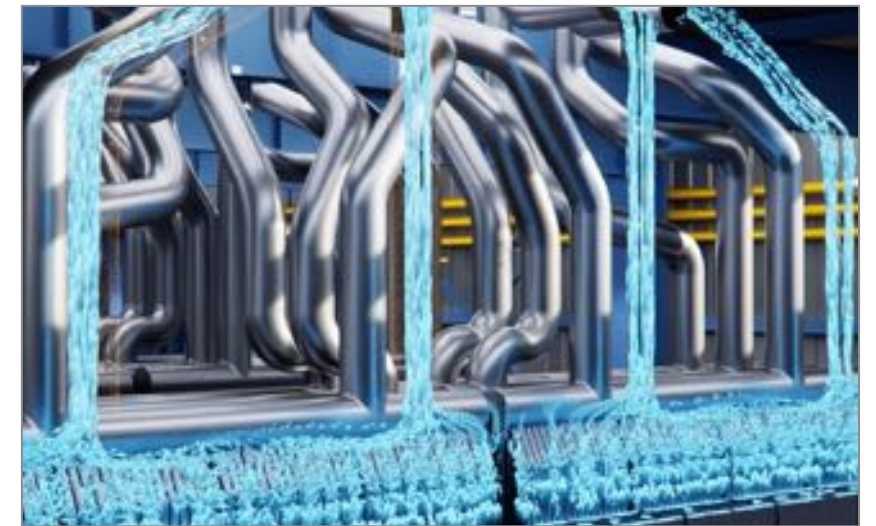


NVIDIA Omniverse



Is this Metaverse? We need to differentiate

The MINI experience brand wants to use virtual worlds to whet people's appetites for new products such as the MINI Concept Aceman







2000, Sep, 1

The Industrial Metaverse – Digital Representation of Reality

Representation of products, environments and processes to simulate reality

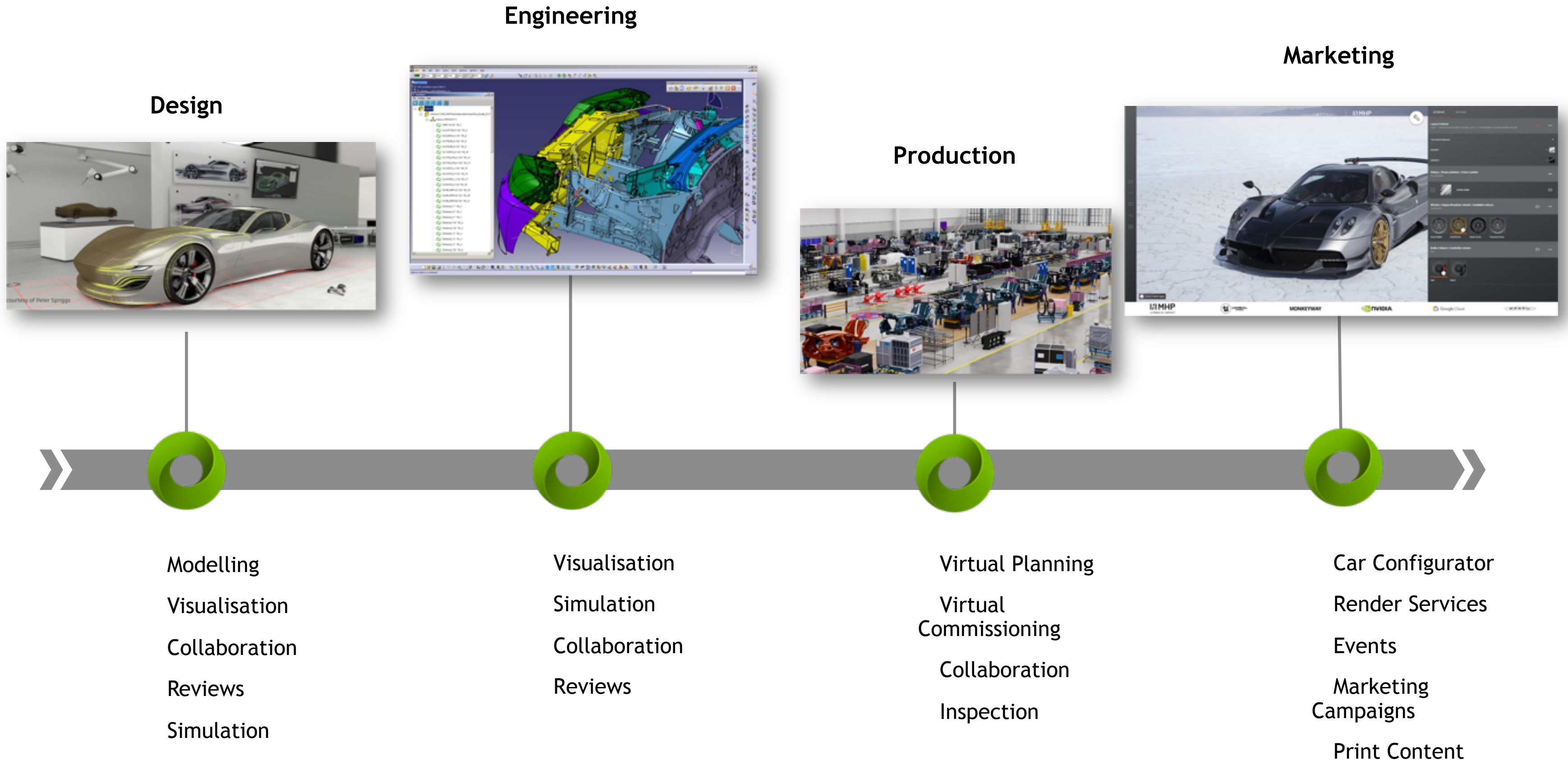
Key Attributes of a Live, Full Fidelity Digital Twin

Enabling Accurate and Trustworthy Virtual Testing, Experimentation and Optimization

			
<p>GROUND TRUTH Single Source of Truth for Virtual Datasets</p>	<p>PHYSICALLY ACCURATE REPLICA Obeys the Laws of Physics</p>	<p>AI-ENABLING, AI-ENABLED Optimized by AI & Enables Training of AI</p>	<p>PERFECTLY SYNCHRONIZED Precision Timed, Perfectly Synced to the Real World</p>

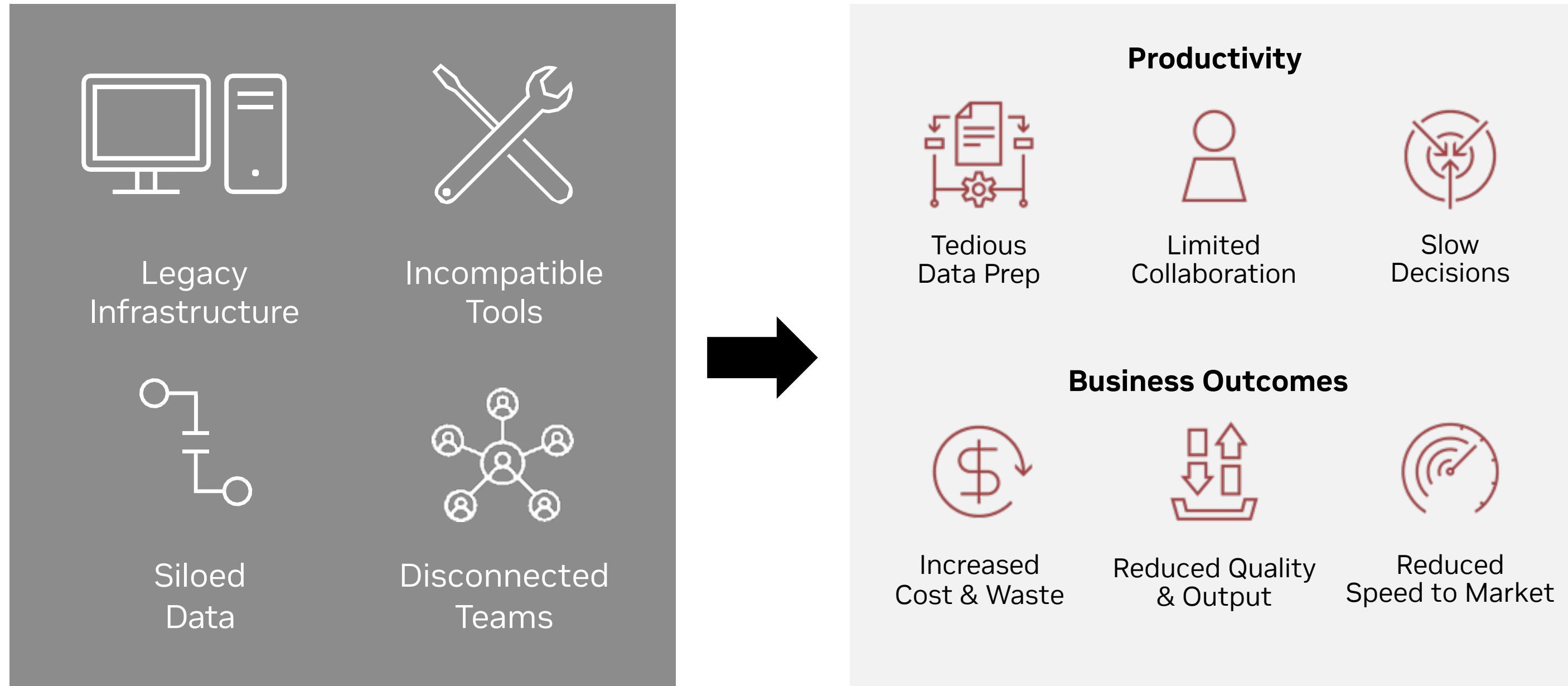
Product Development Workflow

USD reinvents the Design – Engineering - Marketing workflow and collaboration



Primary Challenges in 3D Workflows

Impacting Productivity & Business Outcomes



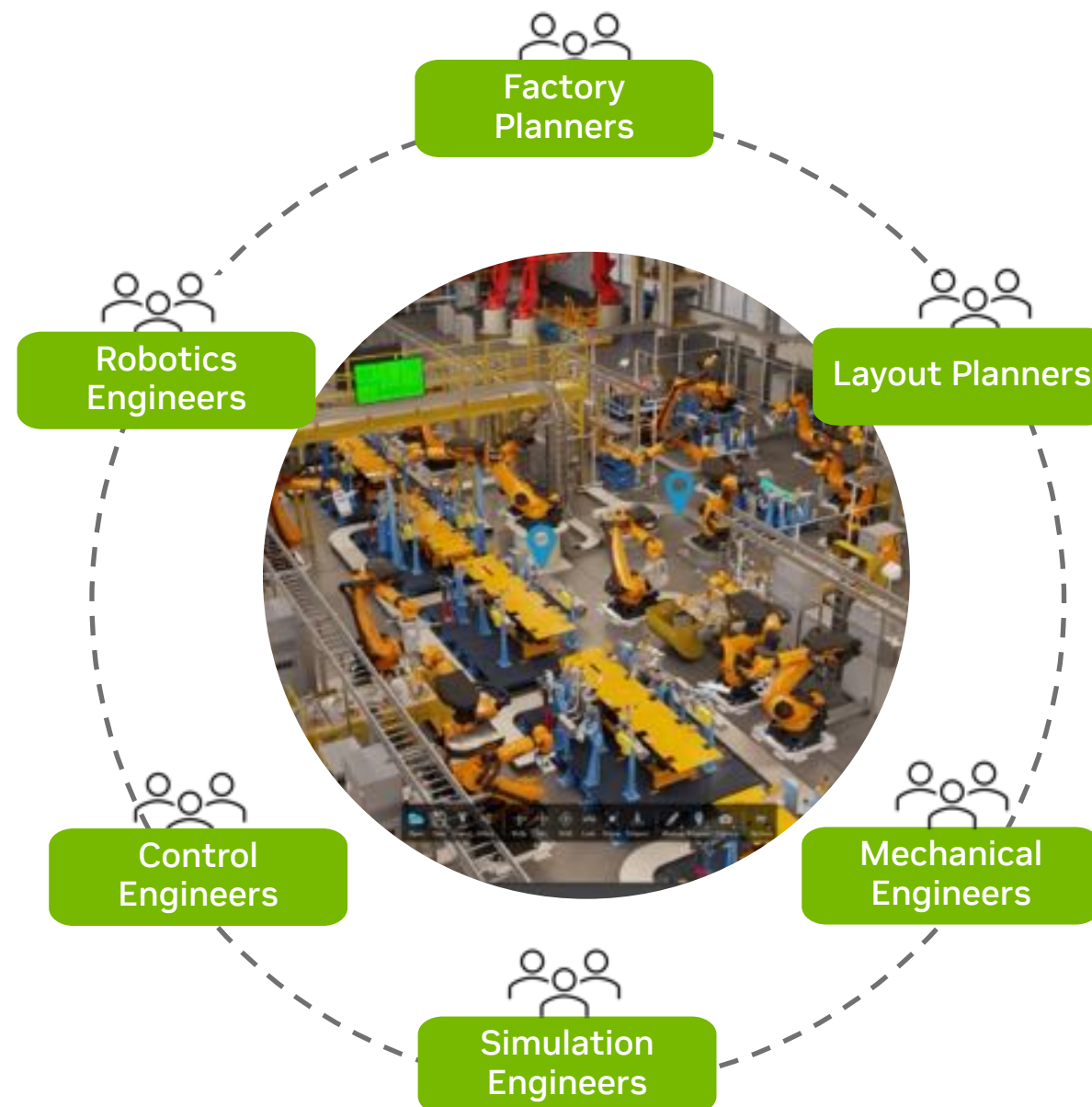
Build a Single Source of Truth from Planning to Operation



Existing Data

- Structure
- Layout
- Equipment
- Process & Metadata
- Product
- Logistics
- Robotics Animation
- Point Cloud

Omniverse Unified Asset



Integration & Planning

- Facility Design & Layout
- Process Simulation
- Clash Detection / Avoidance
- Material Flow
- Worker Safety & Ergonomics
- Point Cloud Visualization
- Process / Production Planning
- Robot Path Planning



Operations

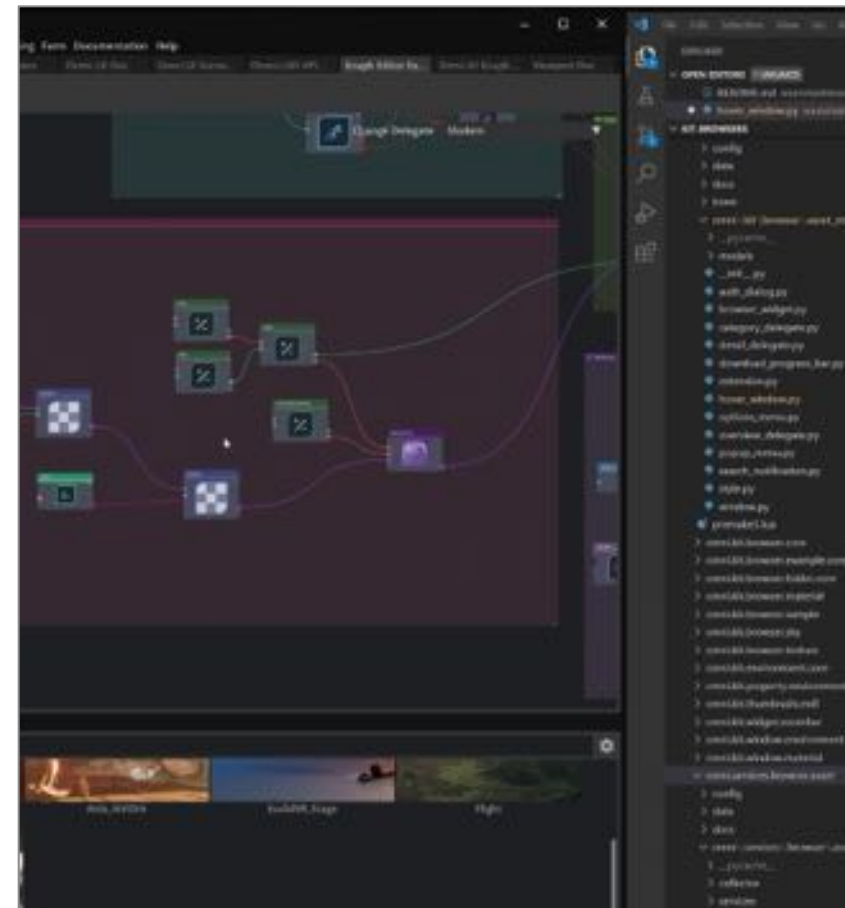
- Defect Detection
- Predictive Maintenance
- Worker Training
- Process Optimization
- Robotics Training
- Robotics Orchestration
- IoT Simulation
- Lighting Optimization

Open



Unlock Collaborative,
Nondestructive
Workflows and Data
Independence

Extensible



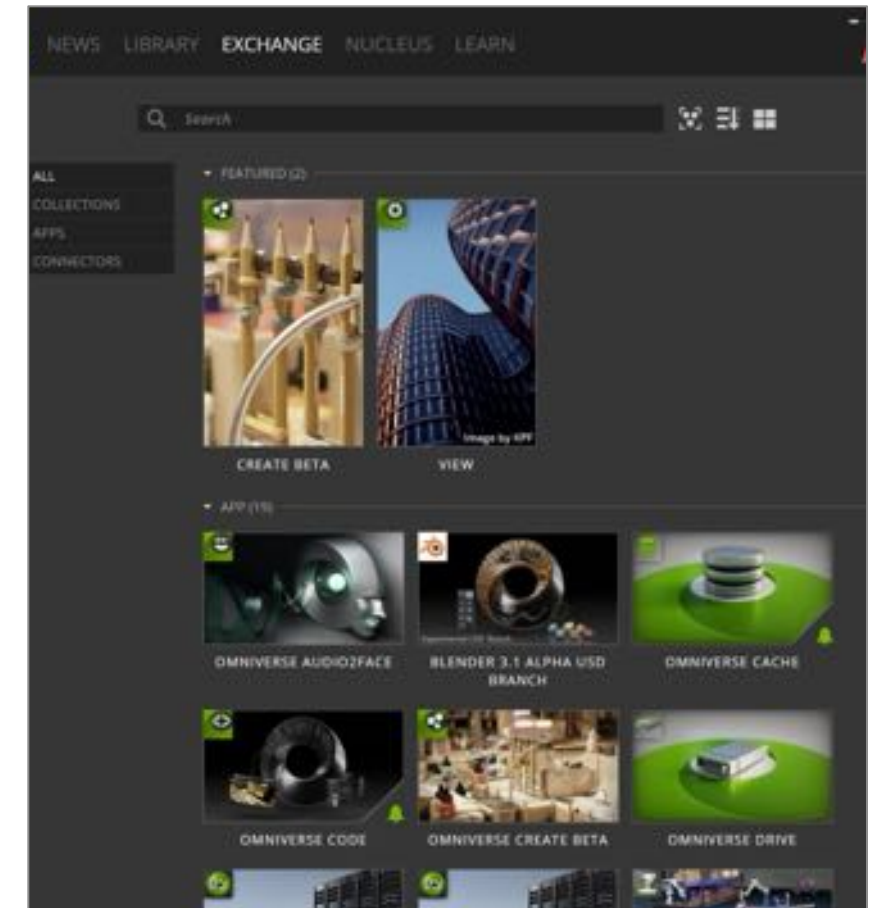
Develop Custom
Pipelines and
Feature-Independent
Apps and Microservices

Scalable



Harness Scalable
Computing Architecture for
Complex Simulation and AI
Workloads

Connected



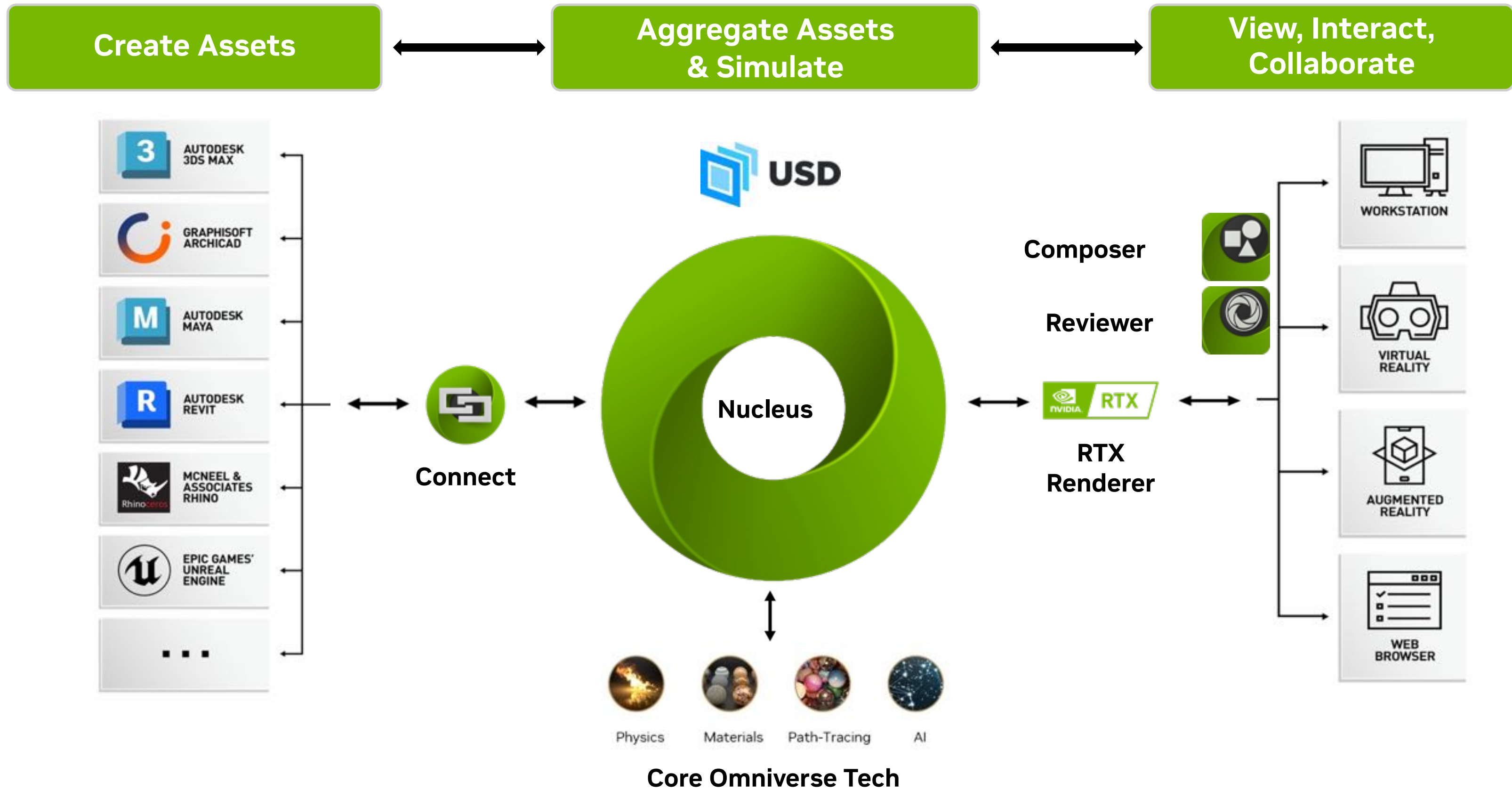
Connect to
Expanding Ecosystem
of 3rd Party
Apps and Tools

NVIDIA Omniverse Enterprise

Core Platform Pillars

How Omniverse Enterprise Works

Create, Aggregate, Collaborate



Universal Scene Description (OpenUSD)

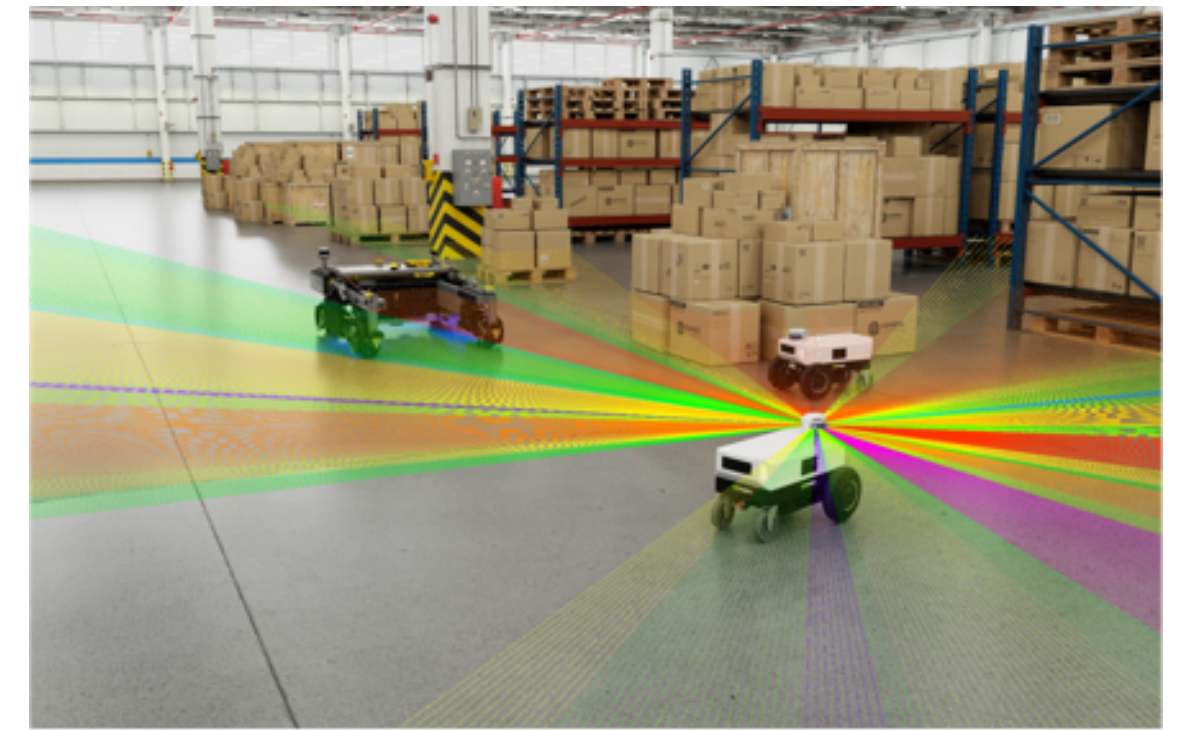
More than just a file format



Connects Tools, Data



Enables Collaborative, Non-Destructive Workflows



Connects Devices, Humans, AI Agents

Massive Attention on USD

NVIDIA & Omniverse Positioned as Clear Leaders



*“Nvidia has long used OpenUSD as part of its push toward **“metaverse” applications**, virtual spaces parallel to the real one that simulates reality where people can interact, work and play. In particular, Nvidia has been working on support for the **industrial metaverse** with the concept of digital twins, fully **virtual digital assets that reflect real world objects** in every detail including their physics.”* - Kyt Dotson, [SiliconANGLE](#) (U.S.)

*“It’s significant that Apple is onboard as they get into VisionOS, and that NVIDIA is there with everything from mobile gaming to **high-end industrial applications**. **And of course with NVIDIA you get the Omniverse platform**, and Autodesk and Adobe deliver lots of the key creative tools.”* - Peter Kirn, [CDM](#) (U.K.)

*“**NVIDIA’s active participation will bring strong technical support to the alliance**, and this cross-industry collaboration will accelerate global cooperation on OpenUSD technology, paving the way for the future of the 3D world **and industrial digitization**.”* - Shuo Mao, [ZDNet](#) (China)

Advanced Tools and Technologies

Foundational Platform Components

NUCLEUS



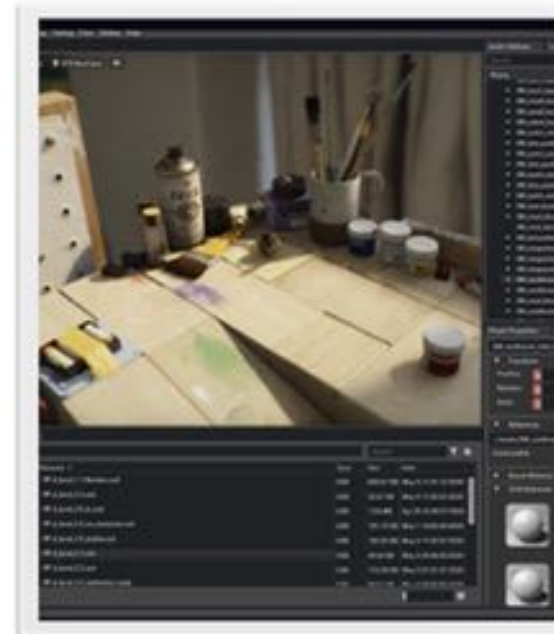
Source of truth

CONNECT



Coupling

KIT



Application API
User experience

SIMULATION



Physics / AI

RTX RENDERER






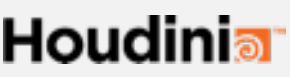
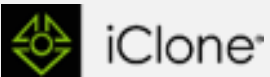
































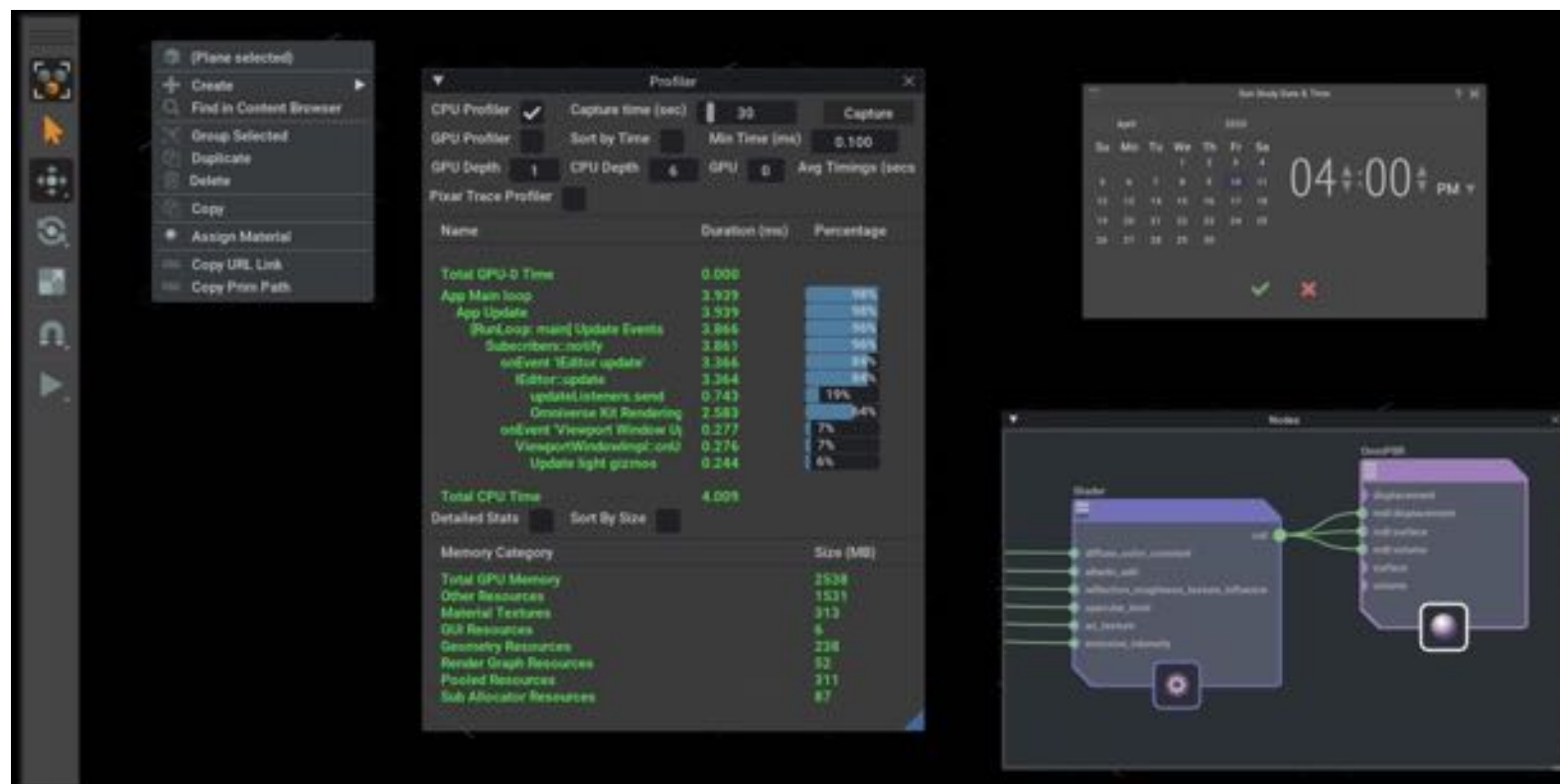
Virtual Sensor



Connect to Omniverse with USD

Many Ways to Connect, Baseline is USD Ingest

BI-DIRECTIONAL NUCLEUS CONNECTION	Updates shared between 3 rd party tools and Omniverse after a single export/import. Live sync available for some connectors.	ENTERPRISE SUPPORTED	    
		BETA	  
UNI-DIRECTIONAL NUCLEUS CONNECTION	Updates reflected from 3 rd party tool to Omniverse but aren't shared back. Material conversion supported. Live sync available for some connectors.	ENTERPRISE SUPPORTED	      
		BETA	      
USD INTERCHANGE	Similar to uni-directional. Allows for USD or texture export.	BETA	     
	Conversion to USD via direct import or third-party app.	EXPORT AND IMPORT	        
		IMPORT	3D PDF, 3DS, 3DXML, ACIS, Alembic, CATIA V4, CATIA V5, Collada, DWF, DWG, E57, IFC, IGES, Inventor, JT, LXO, MD5, NX, Parasolid, PRC, PRO/E, ShapeNet, Solid Edge, SOLIDWORKS, STL, STP, U3D, URDF, VDA-FS, VRML, X3D



Omniverse Kit & Kit Extensions

Easily Build Advanced 3D Tools, Services, Applications

- > Extensible platform, modular, flexible, open
- > **Omniverse Kit** – SDK to build extensions, apps, microservices
- > **Omniverse Extensions** - the building blocks of Omniverse Apps
- > Provide over 300 extensions as source
- > Majority written in Python
- > Provide app templates to build-your-own

ASSEMBLIES

APPS		MICROSERVICES	
USD COMPOSER	USD PRESENTER	FORMAT CONVERTER	DEEPCONVERT
MACHINIMA	ISAAC SIM	THUMBNAILS	BATCH
AUDIO2FACE

EXTENSIONS

ASSET IMPORT/EXPORT	ANIMATION TOOLS	RIVA	...
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CORE EXTENSIONS

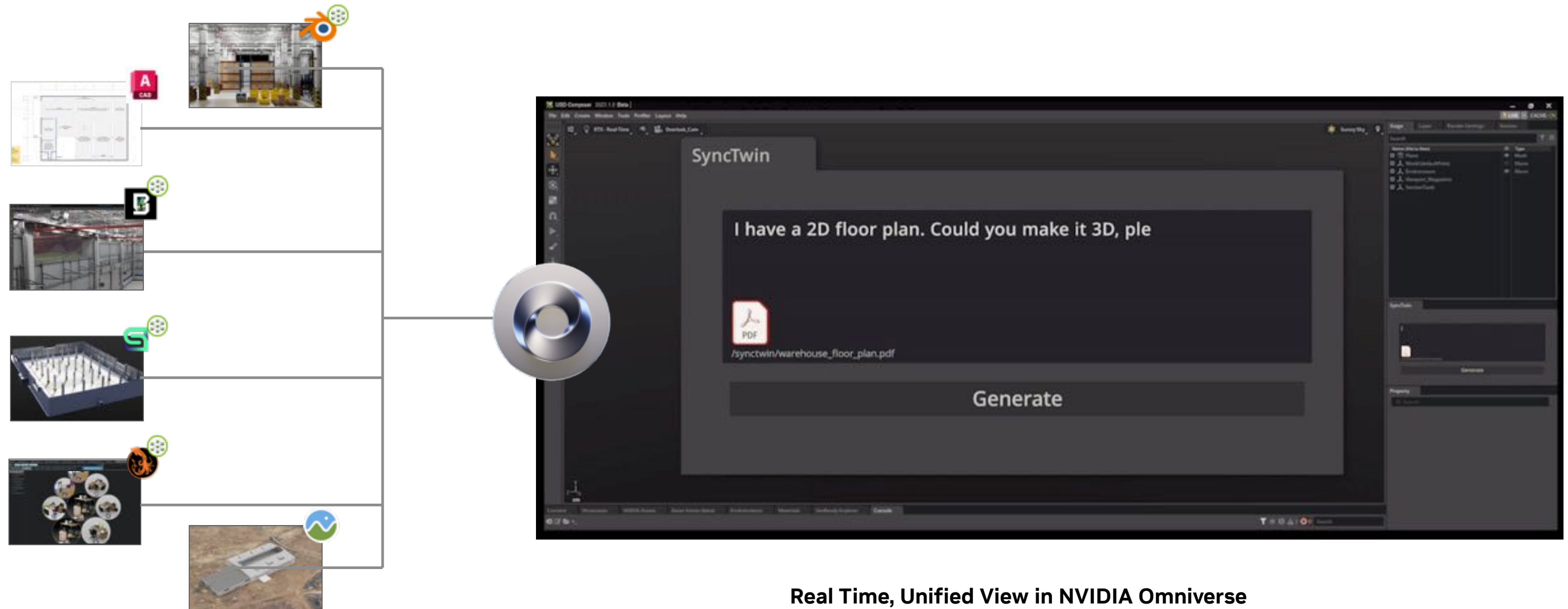
CONTENT BROWSER	MESH TOOLS	TEXTURE TOOLS	...
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OMNIVERSE KIT

USD	PHYSX 5	OMNIUI	PYTHON
RTX	OMNIGRAPH	NUCLEUS CLIENT	...

Connect Generative AI 3D Workflows with Omniverse

3D & Generative AI Tools



Real Time, Unified View in NVIDIA Omniverse

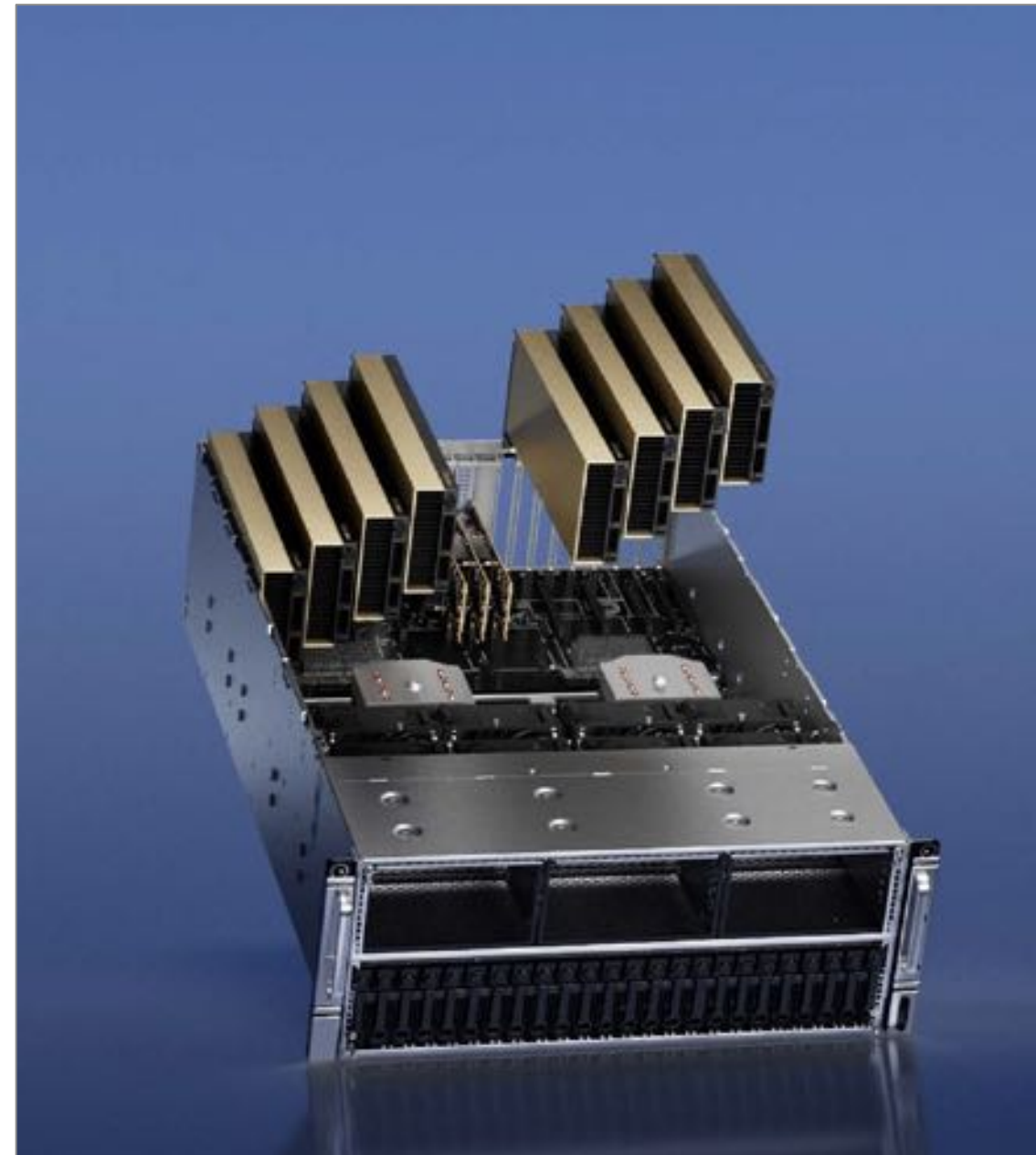
Omniverse Runs on NVIDIA RTX

NVIDIA-Certified Systems Optimized for Omniverse Workloads



RTX WORKSTATIONS

Desktop: RTX 6000 Ada 1-4x GPU
Mobile: Up to RTX 5000 Ada Laptop GPU



NVIDIA-Certified Servers

1-8X GPU
L40S / L40 / L4 / A40 / A10



NVIDIA OVX

High Performance, Scalable Reference Architecture
L40S / L40 + CX7 + BF3

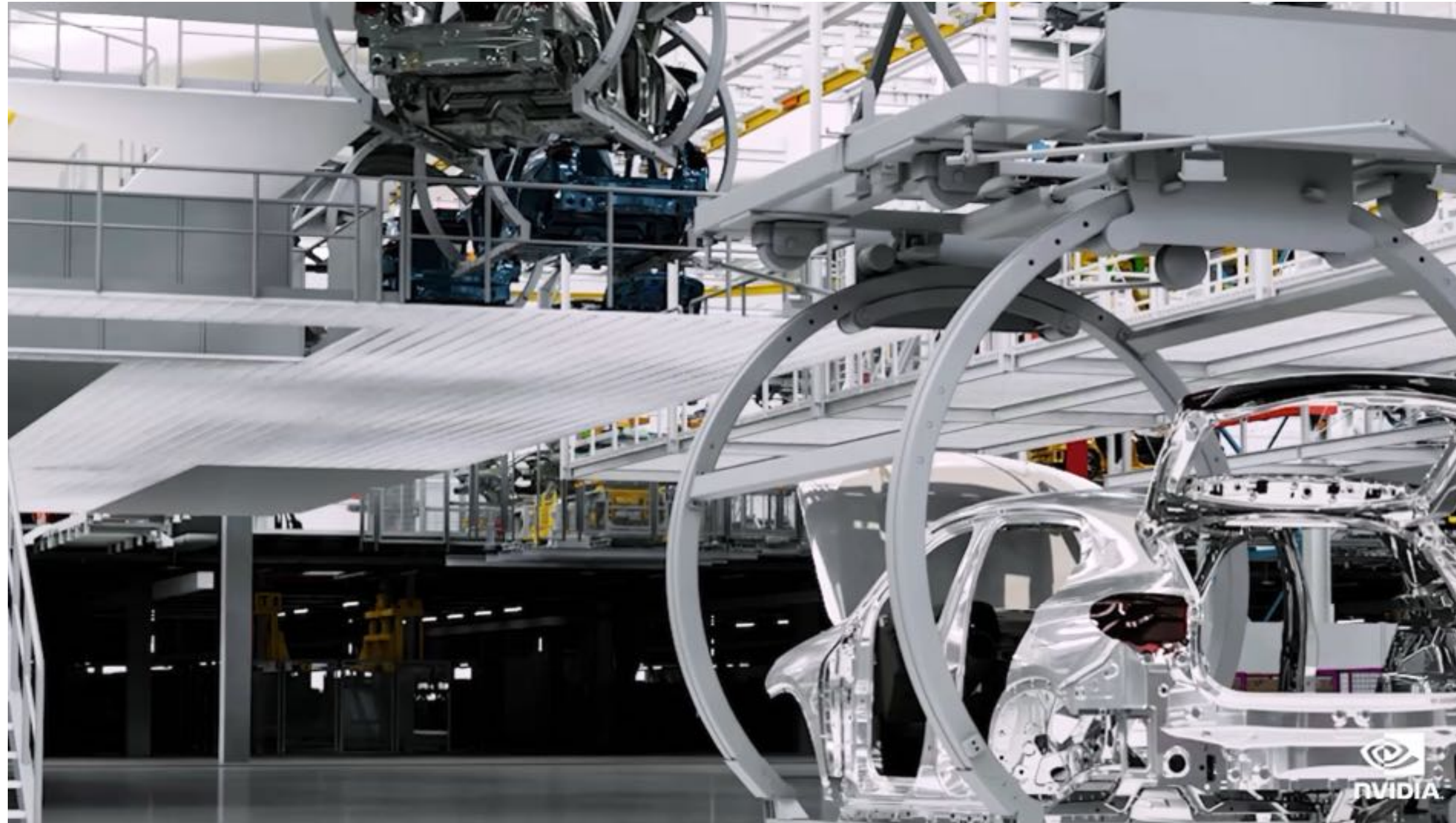
BMW
GROUP



ROLLS-ROYCE
MOTOR CARS LTD



TAKING virtual factory planning to the next level



*“For the first time, we are able to have our entire factory in simulation. **Global teams can collaborate using different software packages like Revit, CATIA, or Point Clouds to design and plan the factory in real-time 3D.** The capability to operate in a perfect simulation revolutionizes BMW's planning processes. These new innovations will reduce the planning times, improve flexibility and precision, and at the end produce **30 percent more efficient planning processes.**”*

Milan Nedeljkovic, BMW AG Board Member for Production

Industries Racing to Digitalize with NVIDIA Omniverse

Amazon Robotics

Warehouse & Supply Chain Automation



BMW Group

Automotive Manufacturing



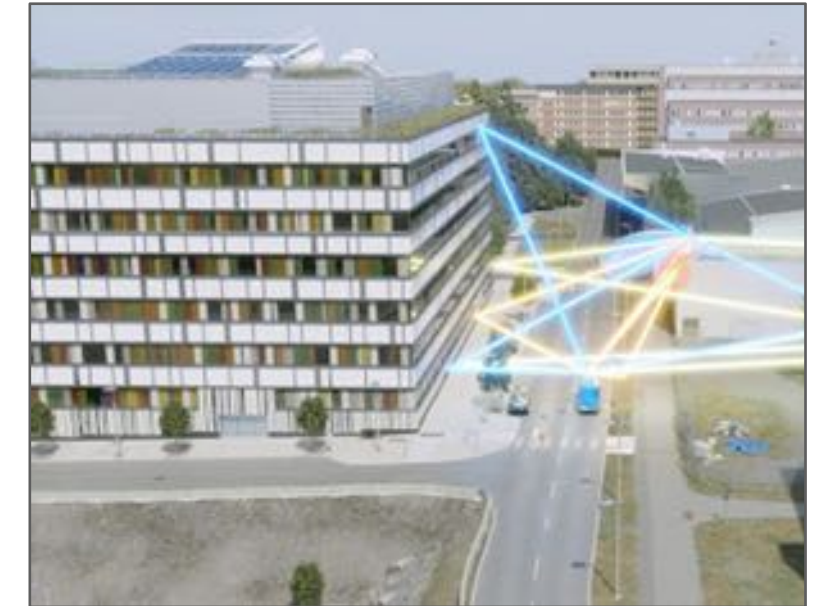
Deutsche Bahn

Autonomous Railways



Ericsson

5G Network Simulation



KPF

Architecture, Construction,
Engineering



Pegatron

Electronics
Manufacturing



Siemens

Industrial
Automation



WPP

Digital Advertising,
Consumer Experiences





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