The Digital Twin Revolution and its M&A Momentum
WINTER 2025

THE DIGITAL TWIN REVOLUTION AND ITS M&A MOMENTUM

A Digital Twin is a dynamic virtual model that mirrors a physical entity, continuously synchronized with real-world data to enable simulation, monitoring, and informed decision-making. This technology is reshaping industries from manufacturing to aerospace by offering end-to-end digital representations of complex systems. By optimizing operations, enhancing efficiency, and mitigating risks, Digital Twins unlock significant value for organizations. With the rise of AI, creating these virtual replicas has become more accessible, enabling companies to monitor real-world counterparts continuously, optimize supply chains, and simulate entire product lifecycles to preemptively address potential issues. In manufacturing, Digital Twins drive improvements in speed, reliability, and cost-effectiveness.

Valued at $12.9 billion in 2023, the Digital Twin market is poised for extraordinary growth and is one of the fastest-growing sectors in the U.S. as it is forecasted to reach $259.3 billion by 2032.[1] This rapid expansion is fueled by the demand for greater efficiency, faster production cycles, real-time data integration, and widespread IoT adoption. As organizations increasingly adopt "digital-first" strategies, the use of virtual prototypes before physical implementation has become a critical driver of operational excellence.

The rapid growth of the Digital Twin market is driving a surge in M&A activity, with recent acquisitions primarily led by strategic buyers. As the sector continues to expand, private equity firms are expected to become increasingly acquisitive, drawn by its exceptional growth trajectory, recurring revenue potential, and opportunities for margin enhancement through advancements in AI. This confluence of factors positions the Digital Twin industry as a prime target for both strategic consolidation and financial investment.

DIGITAL TWIN INDUSTRY FACTS[1]

Market Size: **$12.9 billion**

Growth Rate: **40% CAGR** through 2032

DIGITAL TWIN TRANSACTION MULTIPLES[2]

REVENUE MULTIPLE: 10.5X-14.4X
(see page 13)

[1]Fortune Business Insights
[2]SEC filings, regulatory filings, company presentations, public disclosure, and Colonnade research

THE DIGITAL TWIN SECTOR IS PRIMED FOR M&A

RAPID SECTOR GROWTH
At a projected 39.8% CAGR, Digital Twin companies are some of the fastest growing in the U.S. economy

TECHNOLOGICAL CONVERGENCE
The integration with AI, IoT, robotics drives demand for innovation, fueling M&A to enhance capabilities

SCARCITY OF COMPANIES SPECIALIZING IN DIGITAL TWINS
Scarcity, along with rapid growth, is driving higher valuations in M&A transactions, as acquirers compete for limited but highly valuable assets

DIGITAL TWINS IN THE NEWS: NOTRE DAME REBUILD[3]

The reconstruction of Notre Dame Cathedral, after the devastating 2019 fire, was made possible through cutting-edge Digital Twin technology. Before the fire, a detailed laser scan by Andrew Tallon captured billions of data points of the structure, which, combined with post–fire scans and drone footage, allowed experts to create an intricate 3D model (image below). This model served as a precise guide for the rebuild, enabling the project to meet an ambitious five-year timeline while ensuring historical accuracy and integrating modern safety features.
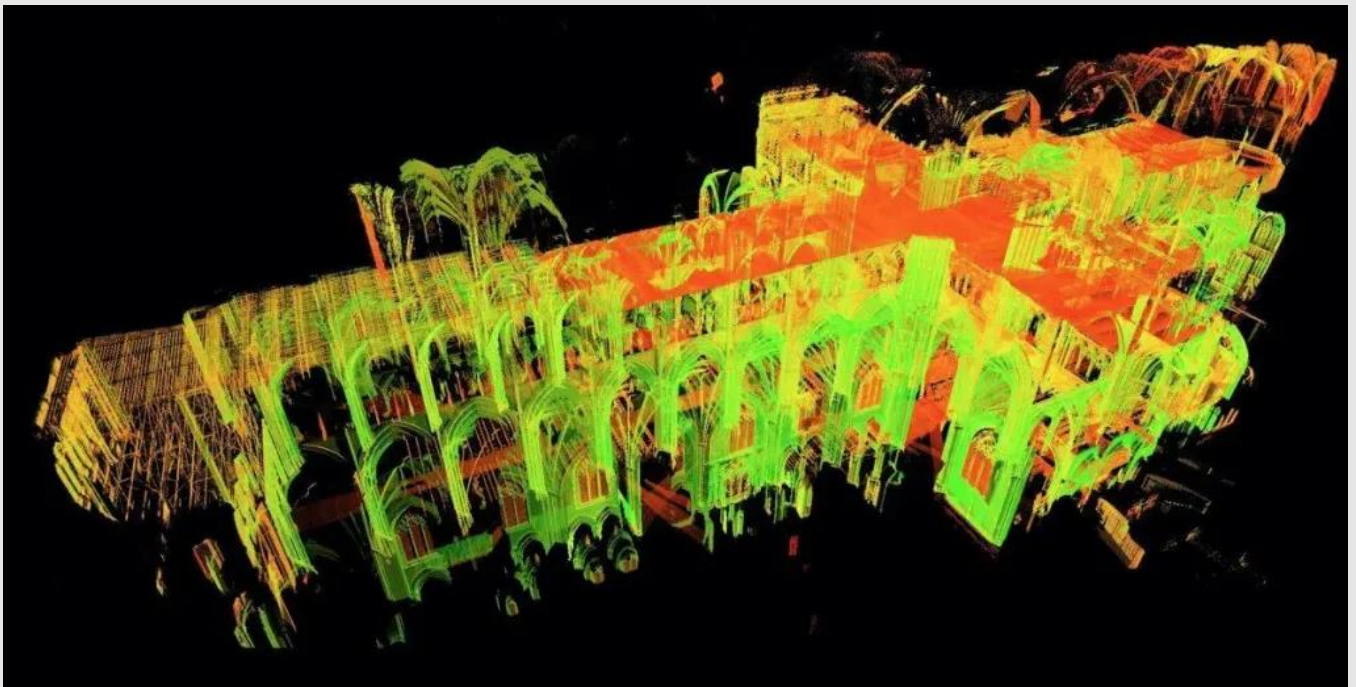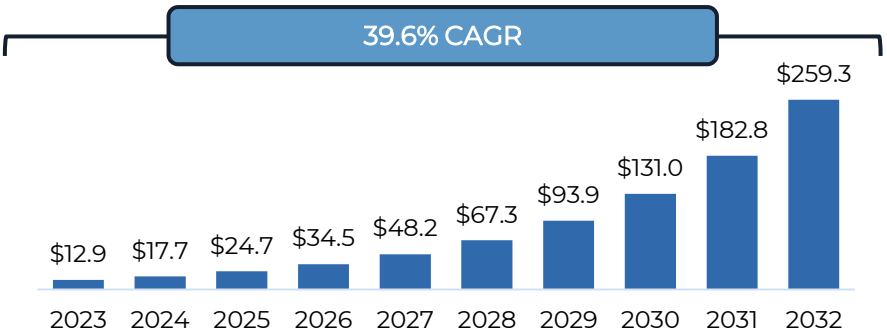

[3]CNN and National Geographic

MARKET SIZE AND INDUSTRY GROWTH

The Digital Twin market reached $12.9 billion in 2023 and is projected to grow at a staggering compound annual growth rate (CAGR) of 39.8%, reaching $259.3 billion by 2032. Adoption continues to surge, with nearly 75% of companies integrating Digital Twin technologies as of August 2024, according to McKinsey.[5] This growth is driven by increasing demand for cost-efficient, real-time data and the ability to optimize operations at scale.
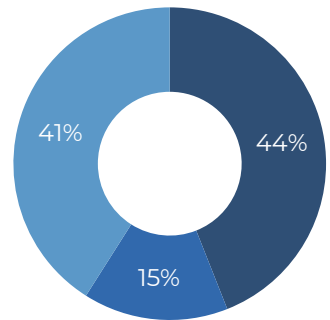
Industries leveraging Digital Twins for predictive maintenance, business optimization, product development, and inventory management are seeing measurable benefits, including reduced inefficiencies and higher returns. While Digital Twin providers are the primary beneficiaries, adjacent markets such as 3D visualization and design software are expected to grow even faster, riding the wave of demand for integrated, technology-driven solutions.

DIGITAL TWINS MARKET SIZE[4]

($ in billions)

39.6% CAGR

Year	Value
2023	$12.9
2024	$17.7
2025	$24.7
2026	$34.5
2027	$48.2
2028	$67.3
2029	$93.9
2030	$131.0
2031	$182.8
2032	$259.3

IMPLEMENTATION[5]

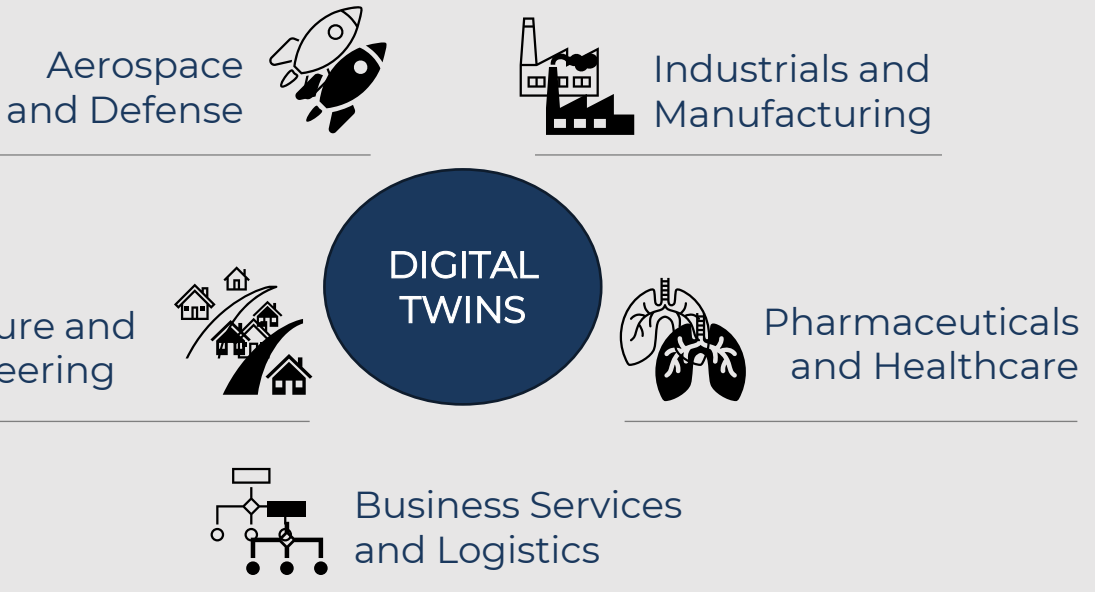- 44% Implemented
- 15% Planning To
- 41% Not Yet

Digital Twin technology is accelerating the transition to Digital 5.0, driving innovation in sectors from supply chains to healthcare and smart cities. By enabling industries to overcome inefficiencies, optimize processes, and generate new revenue streams, the technology is unlocking significant value and positioning itself as a cornerstone of future industrial growth.

[4]Fortune Business Insights
[5]McKinsey & Company

KEY TRENDS IN THE DIGITAL TWINS INDUSTRY

1 The Interconnection of AI and Digital Twins

2 Bridging Industry Expertise With Technological Mastery

3 Expanding Use Cases Across Industries

4 Robotics Growth Will Be Driven By Digital Twin Technology

5 Rapid Adoption of Predictive Maintenance

As capital investments and demand for Digital Twins grow, the following five industries will innovate and grow alongside the transition into Digital 5.0.

Aerospace and Defense

Industrials and Manufacturing

Infrastructure and Civil Engineering

DIGITAL TWINS

Pharmaceuticals and Healthcare

Business Services and Logistics

1 THE INTERCONNECTION OF AI AND DIGITAL TWINS

AI is transforming the capabilities of Digital Twins by seamlessly integrating and analyzing data across a company's entire ecosystem. By connecting disparate information systems and providing a unified view of operations, AI enables the creation of more sophisticated virtual replicas. Taken further, generative AI elevates Digital Twins to a new level—empowering them to run processes, learn from outcomes, optimize operations, and continuously iterate for improvement.

Despite the novel industry, two of the largest players, Siemens and NVIDIA, are partnering, instead of competing, leveraging Gen AI to transform Digital Twin technology. This advancement accelerates the transition into Digital 5.0 and creates significant opportunities for new entrants in the growing Digital Twin market, as businesses rely on partnerships with leading providers with industry knowledge, or technological capabilities.

NVIDIA's Omniverse Cloud is a platform–as–a–service, providing developers with tools to build and deploy industrial metaverse applications via Gen AI.
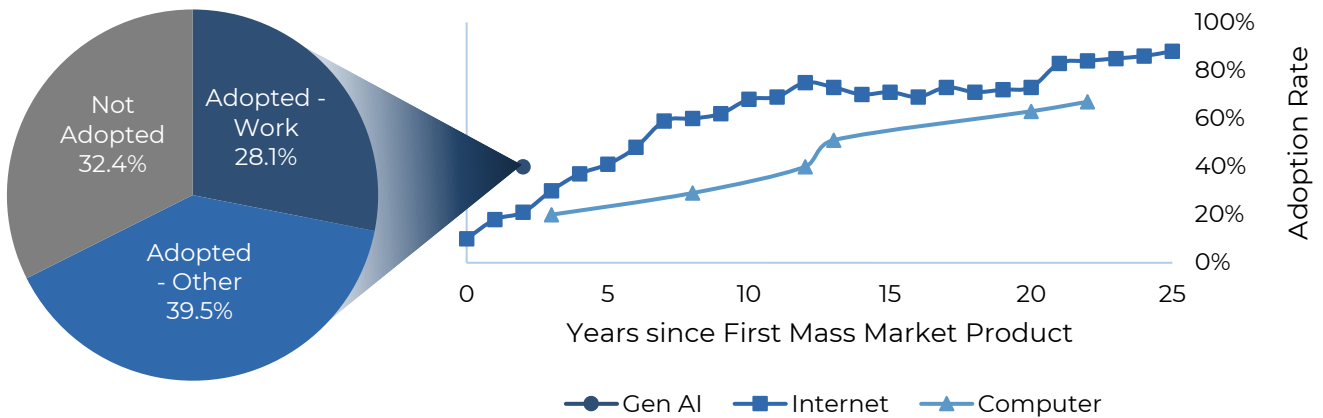
GEN AI ADOPTION RATES[6]

($ in billions)

Pie chart:
- Not Adopted 32.4%
- Adopted - Work 28.1%
- Adopted - Other 39.5%

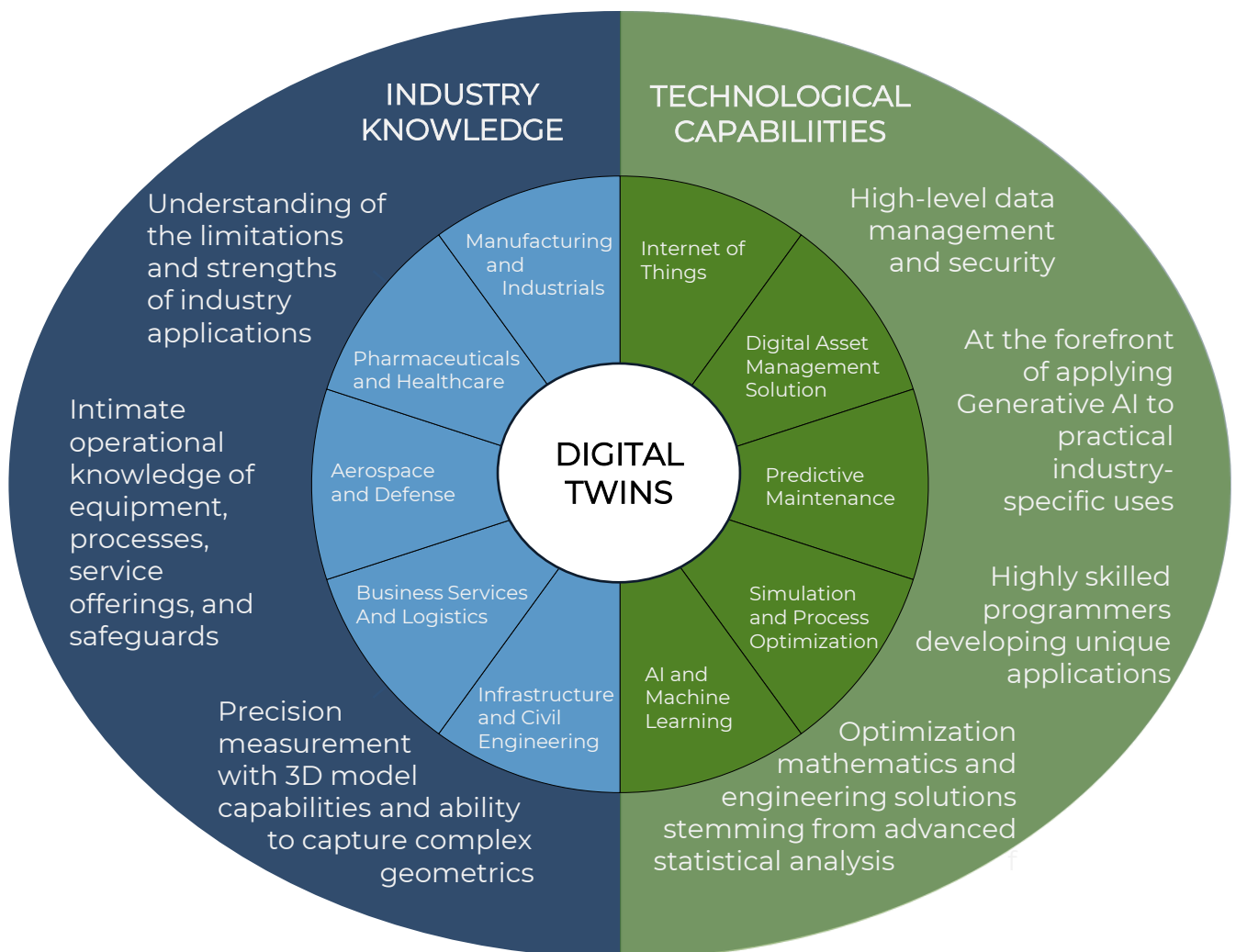Line chart — Adoption Rate vs. Years since First Mass Market Product (Gen AI, Internet, Computer)

AI doesn't just monitor Digital Twins; it reacts to and enhances them. Through large-scale data analysis, AI extracts patterns from corporate datasets and feeds them into Digital Twins to refine simulations and decision-making. This dynamic relationship between AI and Digital Twins creates a powerful synergy, allowing organizations to achieve unprecedented levels of efficiency, agility, and innovation. Together, they represent a critical convergence of technology, driving the future of intelligent operations.

[6]FRED

2 BRIDGING INDUSTRY EXPERTISE WITH TECHNOLOGICAL MASTERY

The success of Digital Twin technology lies in seamlessly integrating deep industry knowledge with cutting-edge technological expertise. These two elements work in tandem to ensure accurate modeling, real-time responsiveness, and effective problem-solving in mission-critical scenarios.

Companies leveraging both industry-specific insights and robust technological foundations are best equipped to handle unexpected challenges and complex projects. Digital Twin firms that have successfully transacted in the market often demonstrate this dual expertise, making them valuable partners for organizations seeking reliable, scalable solutions in high-stakes environments.
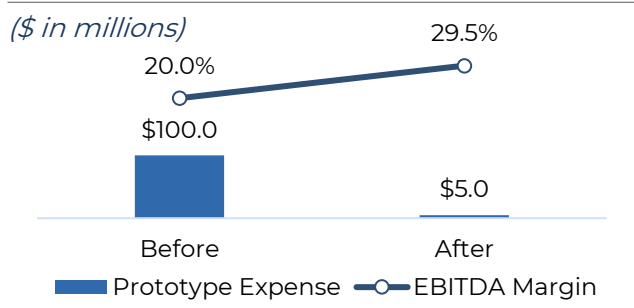

INDUSTRY KNOWLEDGE

TECHNOLOGICAL CAPABILIITIES

Understanding of the limitations and strengths of industry applications

Manufacturing and Industrials

Internet of Things

High-level data management and security

Pharmaceuticals and Healthcare

Digital Asset Management Solution

At the forefront of applying Generative AI to practical industry-specific uses

Intimate operational knowledge of equipment, processes, service offerings, and safeguards

Aerospace and Defense

DIGITAL TWINS

Predictive Maintenance

Highly skilled programmers developing unique applications

Business Services And Logistics

Simulation and Process Optimization

Infrastructure and Civil Engineering

AI and Machine Learning

Optimization mathematics and engineering solutions stemming from advanced statistical analysis

Precision measurement with 3D model capabilities and ability to capture complex geometries

4 ROBOTICS GROWTH WILL BE DRIVEN BY DIGITAL TWIN TECHNOLOGY

Robotics, a $41.2 billion market, is an ideal Digital Twin application, driving M&A activity.[10] Digital Twins can enable precise simulation and predictive maintenance, reducing downtime by 50.0% and capital costs by 4.0%, or nearly $1.0 million[11].

ROBOTICS MARKET SIZE[10]

($ in billions)

17.7% CAGR

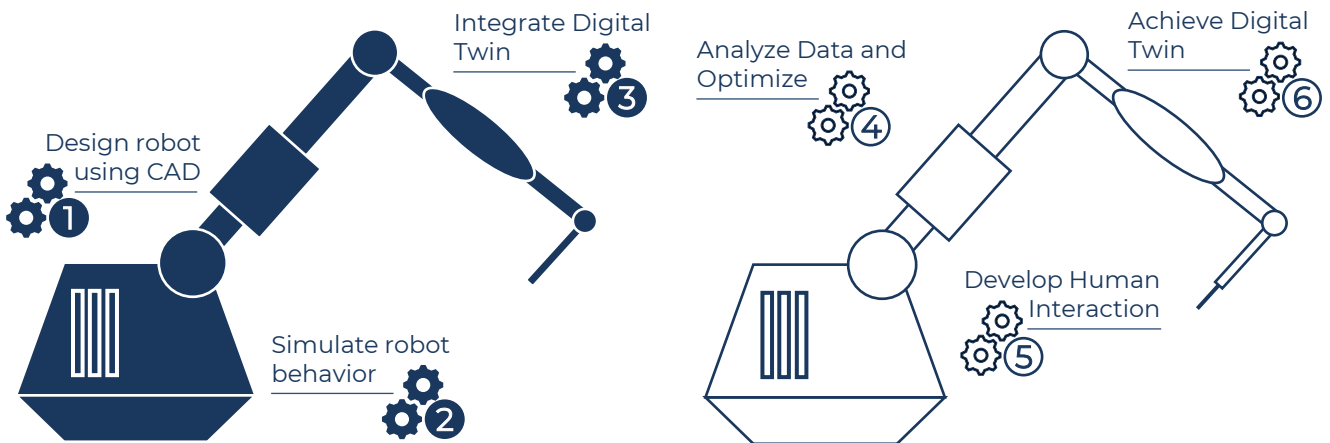| 2023	2024	2025	2026	2027	2028	2029	2030
$41.2	$48.3	$56.7	$66.6	$78.4	$92.5	$109.2	$129.1
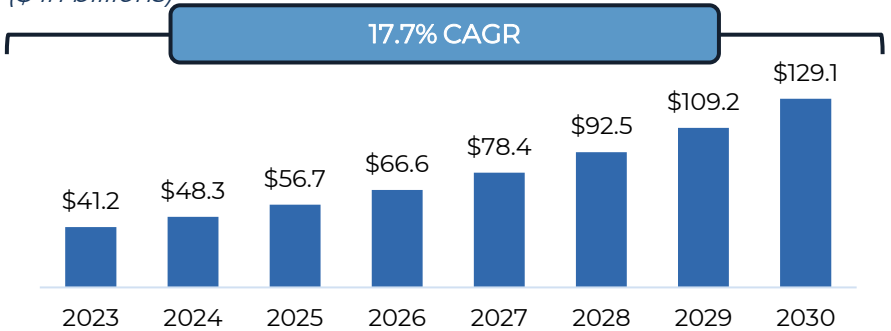
How does it work? Robotics work by integrating real-time sensor data with virtual models, enabling accurate simulation, allowing for predictive analysis and performance optimization.

Implementing Digital Twins to existing robotics costs $50 to $200 thousand, including maintenance. Advanced features like AI modeling will likely increase costs. **How much does it cost?[12]**

IMPLEMENTING DIGITAL TWIN TECHNOLOGY TO ROBOTICS

Integrate Digital Twin 3

Analyze Data and Optimize 4

Achieve Digital Twin 6

Design robot using CAD 1

Develop Human Interaction 5

Simulate robot behavior 2

It takes three to six months to implement a Digital Twin into existing robotics systems, reducing equipment downtime by 50.0% and capital investment by 4.0%[11]

5 RAPID ADOPTION OF PREDICTIVE MAINTENANCE

Predictive maintenance is a key application of Digital Twins, allowing early issue detection to minimize downtime and disruptions.

In industrial and manufacturing operations, Digital Twins enable owner–operators of oil and gas refineries to minimize inefficiencies and reduce waste. These companies allocate "inefficiency budgets," funds specifically reserved to address anticipated unplanned downtime caused by equipment failures.

In the oil and gas sector, these inefficiency budgets account for approximately $34.0 billion or 5.0% of total annual expenditures, highlighting the significant opportunity for cost savings through the adoption of Digital Twin technology.[13]

$34.0 billion
inefficiency budget[13]

PREDICTIVE MAINTENANCE ACROSS INDUSTRIES

How a Digital Twin enables predictive maintenance for selected companies	Identify when parts will fail in advance via simulation	Monitor performance of heavy machinery in real time	Monitor and maintain spacecraft for human–led or robotic–led missions	Monitor and maintain a fleet of jet engines with a digital counterpart	Create a virtual replica of an entire production process

Digital Twins enhance both predictive and corrective maintenance, with corrective maintenance addressing issues that arise after a failure. Maintenance costs escalate significantly when multiple attempts—second, third, or fourth fixes—are required to minimize downtime. Improving the first-time fix rate (FTFR), the percentage of instances where a single repair fully restores operations, is crucial. Digital Twins dramatically boost FTFR, reducing downtime and potentially saving millions of dollars in operational costs.

[13]Fortune Business Insights and Colonnade estimates

A DEEP DIVE: INDUSTRIALS AND MANUFACTURING

WHY USE DIGITAL TWINS?

Digital Twins are purchased to accurately capture and visualize facilities in 3D, enabling improved maintenance, planning, and decision-making by providing precise, up-to-date digital replicas of the physical space

HOW DO DIGITAL TWINS REDUCE COSTS?

Digital Twins replace physical prototypes

Digital Twins:
- Reduce inspection and maintenance costs
- Lower energy costs
- Reduce rework and material waste
- Mitigate risks of accidents and reduces downtime
- Reduce penalties

WHAT IS THE IMPACT ON PROFITABILITY?

Inefficiency & wasted funds and unplanned events decrease with Digital Twins, improving clients' profitability, averaging a 2.0-4.0% net income margin , or $1.0 Billion[14]

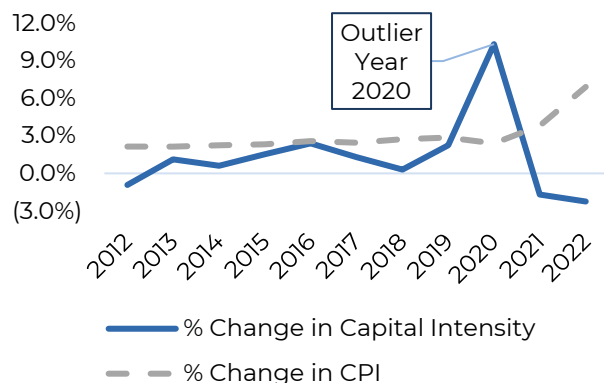+3%

5.0%   8.0%

Before   After
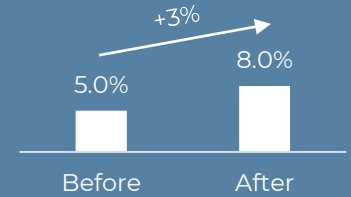
Leveraging IoT, AI, and robotics, the industrials and manufacturing sectors benefit from Digital Twins with real-time process optimization, the ability to improve supply chain monitoring and lifecycle management, and the acceleration of prototyping. As such, human-centric machine collaboration is growing rapidly.

The industrials sector has experienced a period of falling capital intensity, the amount of assets required to generate revenue, despite high levels of inflation.

Manufacturers beat overall inflation with the change in capital intensity, despite rising materials costs.
— Despite the increased need for debt service capital, 60.0% of capital is still allocated to production, making Digital Twins affordable and primed for the transition to Digital 5.0[16]

CAPITAL INTENSITY INDEX[15]

Outlier Year 2020

12.0%
9.0%
6.0%
3.0%
0.0%
(3.0%)

2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

—— % Change in Capital Intensity
- - - % Change in CPI

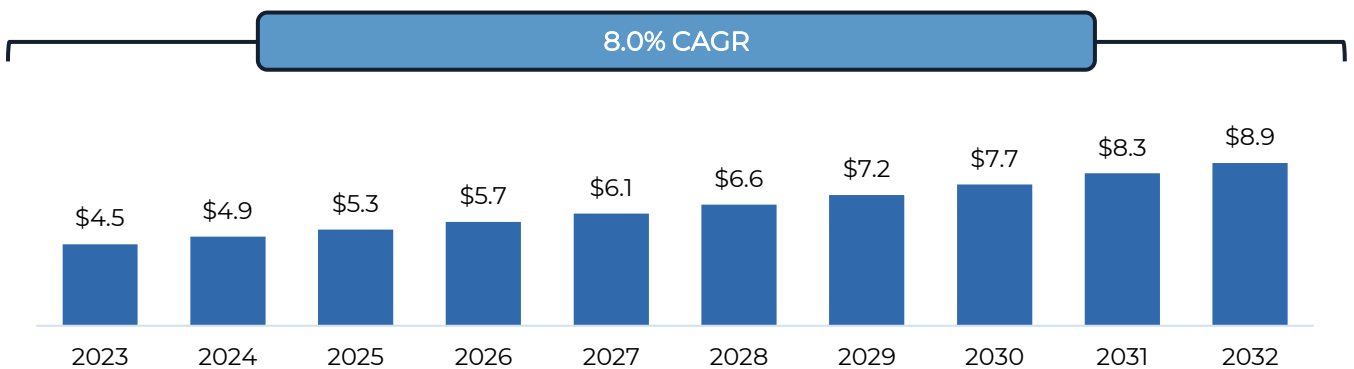[14]Fortune Business Insights and Colonnade estimates
[15]FRED
[16]Colonnade estimates

A DEEP DIVE: INDUSTRIALS AND MANUFACTURING (CONT'D)

Digital Twins rely on the marriage of scanning and Gen AI. The laser scanning industry is large, with $4.5 billion of market size in 2023, projected to grow at an 8.0% CAGR over the next eight years. Nearly all users of industrial laser scanning could benefit from converting their data into Digital Twins.[17]

LASER SCANNING MARKET SIZE[17]

($ in billions)

8.0% CAGR

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
$4.5	$4.9	$5.3	$5.7	$6.1	$6.6	$7.2	$7.7	$8.3	$8.9

SPOTLIGHT: INDUSTRIAL MEASUREMENT SOLUTIONS ("IMS")

A leading innovator in Digital Twin technology for the industrial sector, IMS integrates proprietary software and AI with precise laser scans to create live, actionable Digital Twins of oil and gas refineries, machinery and equipment, and medical facilities. Because of IMS's Digital Twins, emergency response and turnaround, Piping and Instrumentation Diagram validation, rework and material waste, and facility construction are improved, enabling millions in cost savings, reducing clients' Operating Expenses per Million Barrels.

[17]Market Research Future

A DEEP DIVE: INDUSTRIALS AND MANUFACTURING (CONT'D)

Digital Twins in industrial and manufacturing applications rely on precise laser scanning conducted in advance. This technology captures the geometry of physical objects and environments by emitting laser beams to measure distances, producing high-density 3D point clouds that represent scanned surfaces with remarkable accuracy. The resulting data is instrumental in quality control, reverse engineering, facility management, and the creation of Digital Twins, providing a foundation for accurate modeling and comprehensive analysis of industrial assets and spaces.

Tesla harnesses Digital Twin technology to revolutionize its production processes, creating virtual models of vehicles to optimize assembly lines and improve operational efficiency. Each car is paired with its own Digital Twin that collects precise data, which enable precise monitoring and adjustments, reducing waste, enhancing quality control, and ensuring production meets high demand without compromising quality. By relying on Digital Twins, Tesla can refine processes, achieving greater efficiency, improving upon its innovation in vehicle manufacturing.

CASE STUDY: EMERGENCY AND TURNAROUND[18]

When a large fire broke out at an oil and gas refinery, IMS remotely assisted in identifying safe egress routes for personnel, helping to save lives. IMS's dimensionally accurate scans enabled shop fabrication of the damaged equipment to begin immediately, even while the site remained closed and inaccessible to the owner-operator.

IMS helped the facility resume operations four months ahead of schedule, preventing substantial revenue loss.

$120.0 million in lost revenue prevented[18]

[18]IMS

M&A IN THE DIGITAL TWIN INDUSTRY[19]

M&A activity in the Digital Twin industry is on the rise, driven by the sector's rapid expansion and its significant growth potential. With a limited number of players operating in this space, competition for acquisitions is intense, pushing valuations to premium levels. These high valuations underscore the transformative potential of Digital Twin technologies and the substantial market opportunities they offer. As investors and strategic acquirers seek to establish or expand their foothold in this burgeoning industry, the volume and value of deals are expected to continue climbing, reflecting confidence in the sector's trajectory.

	TARGET	BUYER	PRICE ($ MM)	ENTERPISE VALUE / Revenue	EBITDA	TARGET DESCRIPTION
Nov 2024	Altair (NASDAQ:ALTR)	Siemens (OTCMKTS:SEIGY)	$10.6	14.0x	31.0x	Provider of Digital Twins, engineering, and design
Oct 2024	FuturMaster (Cathay Capital)	Sagard NewGen	N/A	N/A	N/A	Provider of AI and Digital Twins
Sept 2024	Cesium	Bentley Systems (NASDAQ:BSY)	N/A	N/A	N/A	Provider of Digital Twin technologies
April 2024	Matterport (NASDAQ:MTTR)	CoStar Group (NASDAQ:CSGP)	$2.0	10.5x	NM	Provider of Digital Twin technologies
Jan 2024	ANSYS (NASDAQ:ANSS)	Synopsys (NASDAQ:SNPS)	$32.6	14.4x	42.7x	Developer of simulation software
Oct 2023	Animated Insights	Clockworks Analytics (Carom Growth Partners; SE Ventures)	N/A	N/A	N/A	Provider of infrastructure Digital Twins
Aug 2023	Blyncsy	Bentley Systems (NASDAQ:BSY)	N/A	N/A	N/A	Provider of model simulation solutions
Aug 2023	Strategic Technology Consulting	Arcfield (Veritas Capital)	N/A	N/A	N/A	Provider of Model-based systems engineering ("MBSE") and Digital Twin technology
July 2023	XLDyn	Altair (NASDAQ:ALTR)	N/A	N/A	N/A	Provider of MBSE and Digital Twins
May 2023	Gafcon Digital	Anser Advisory (Accenture)	N/A	N/A	N/A	Provider of infrastructure Digital Twins

[19]SEC filings, regulatory filings, company presentations, public disclosure, and Colonnade research

DIGITAL TWINS CONCLUSION

The Digital Twin industry represents a cornerstone of technological advancement, offering transformative capabilities across sectors such as industrials and manufacturing, pharmaceuticals and healthcare, business services and logistics, infrastructure and civil engineering, and aerospace and defense.

With a market value of $12.9 billion in 2023 and a forecasted CAGR of 39.8%, the market is expected to reach $259.3 billion by 2032. This growth is fueled by the convergence of advanced technologies like IoT and Gen AI, as well as increasing adoption of Digital 5.0 principles, including sustainability and resilience.

Mergers and acquisitions activity has surged, driven by rapid market expansion, technological convergence, and the scarcity of niche providers, as major players like Siemens, Synopsys, and Dassault Systèmes strategically acquire niche providers to enhance interoperability and expand use cases.

APPENDIX
A HISTORY: INDUSTRIAL REVOLUTIONS AND THE DIGITAL 4.0 TO DIGITAL 5.0 TRANSITION[20]

The Industrial Revolution transformed industry and society, starting with mechanization powered by steam engines (Industry 1.0). Later phases introduced the combustion engine, steel production (Industry 2.0), and the integration of electronics and computers (Industry 3.0), laying the groundwork for modern industrial systems.

Industry 4.0 integrated IoT and AI to enhance automation and connectivity. Now evolving into Industry 5.0, companies focus on human-centric, sustainable practices through Digital Twins, which optimize systems and improve resilience.

Industrial Revolution

1765 — Otherwise "Industry 1.0," the first industrial revolution introduced mechanization

Industry 1.0

1765 – 1869 — Application of mechanization in agriculture and energy, with the invention of the steam engine paving the way for modern energy

Industry 3.0

1969 – 2010 — The emergence of nuclear energy, electronics, and computers

Industry 2.0

1870 – 1968 — What we know as modern industrials, the combustion engine led to the development of steel, chemical synthesis, and the telephone

Industry 4.0

2011 – present — The introduction of the internet and its evolutions with virtual reality and artificial intelligence, which is still developing today

Industry 5.0

2021 – present — The culmination of additive manufacturing and collaborative robotics signal the start of Industry 5.0

Industry 5.0, or Digital 5.0 as it pertains to non-industrial applications, builds on Industry 4.0 by integrating sustainability and human-centric values into daily operations. Digital Twins play a key role, offering tools to optimize operations, predict disruptions, and enhance system resilience. By enabling advanced collaboration between humans and machines, they drive smarter, more sustainable industries, forming the backbone of this transformative era.

[20]Institute of Entrepreneurship Development

COLONNADE HAS EXTENSIVE TRANSACTION EXPERIENCE

pathward®
has sold its premium finance division to
HONOR CAPITAL
The undersigned acted as exclusive financial advisor to Pathward
COLONNADE

Mavsign™
was sold to
18 76 PARTNERS
The undersigned acted as exclusive financial advisor to Maverick Document Signings, Inc
COLONNADE

crystalfusion
was sold to
APCO HOLDINGS
COLONNADE

STONEMARK
was sold to
IMPERIAL PFS®
COLONNADE

AGILE PREMIUM FINANCE
A Division of Valley National Bank®
was sold to
fIRST
first financial bank
COLONNADE

Reynolds &Reynolds™
acquired
XZILON®
COLONNADE

STREAMLINE RECON
was sold to
SolutionWorks
COLONNADE

Reynolds &Reynolds™
acquired
AGWS
COLONNADE

SECURITY PREMIUM FINANCE, INC.
was sold to
NATIONAL PARTNERS
COLONNADE

HOUSEMAX FUNDING
raised capital from
HUNT
COLONNADE

CAPITAL PREMIUM FINANCING™
raised capital from
COPLEY | EQUITY | PARTNERS
COLONNADE

openroad LENDING
was sold to
CLARION CAPITAL PARTNERS, LLC
COLONNADE

gotoPremiumFinance
Solutions for the Insurance Industry
raised capital from
BMO Harris Bank
COLONNADE

Peoples BANK
acquired
NORTH STAR LEASING COMPANY
COLONNADE

SKYAUTO PROTECTION
was sold to
FORTEGRA®
COLONNADE

CALTEX
was sold to
SPECTRUM AUTOMOTIVE HOLDINGS
COLONNADE

MILESTONE MARKETING SOLUTIONS
was sold to
SPECTRUM AUTOMOTIVE HOLDINGS
COLONNADE

TRIUMPH PREMIUM FINANCE
was sold to
Peoples BANK
COLONNADE

smart autocare™
was sold to
TiptreeInc.
COLONNADE

TFC TECHNOLOGY FINANCE CORP.
was sold to
KINGSBRIDGE HOLDINGS
COLONNADE

HIMSS Analytics
was sold to
DEFINITIVE HEALTHCARE
COLONNADE

CAPITAL PREMIUM FINANCING™
raised capital from
Ameris Bancorp®
COLONNADE

CDEC
was sold to
WINTRUST
COLONNADE

NATIONAL PARTNERS
was sold to
WebBank
A STEEL PARTNERS COMPANY
COLONNADE

E A I
was sold to
Unigraphics Solutions, Inc.
COLONNADE

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