

GUIDE

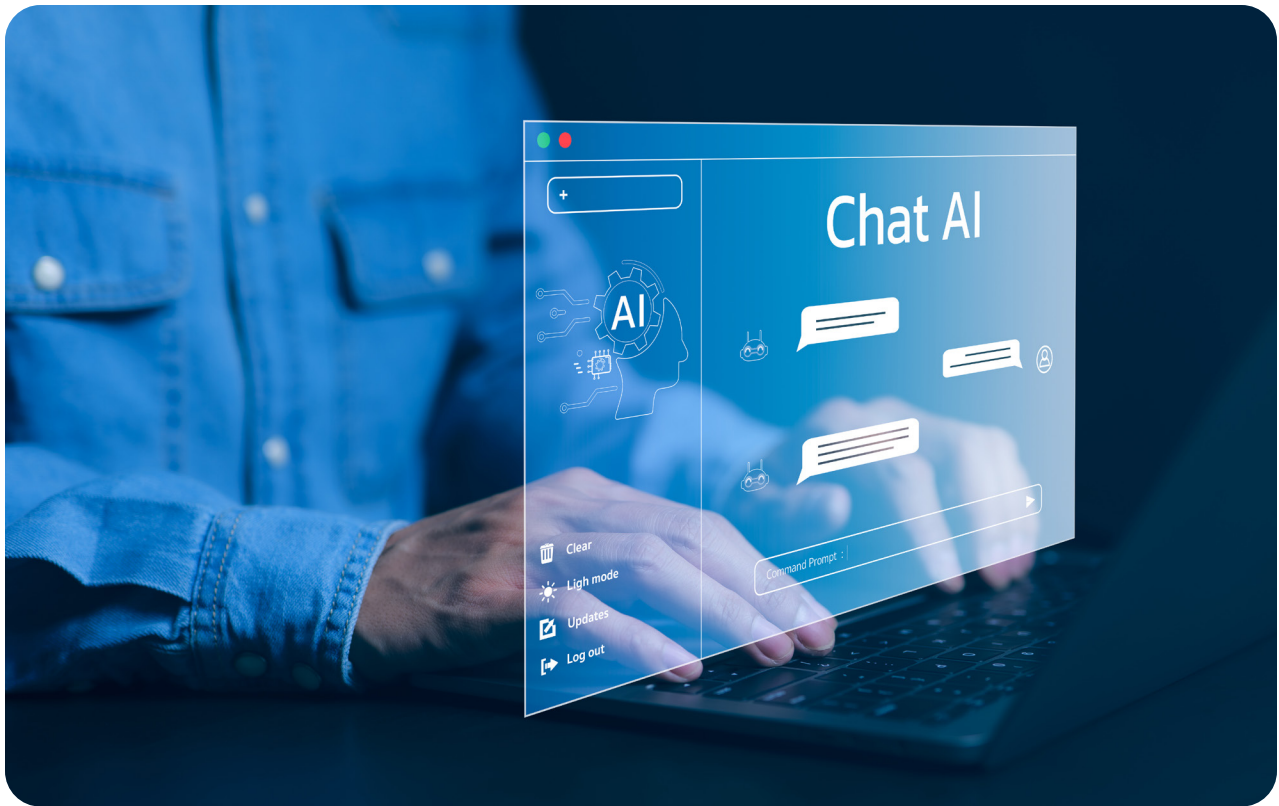
# Analyzing AI: Experts Weigh In on Artificial Intelligence in Manufacturing



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## Part I: Introduction

The explosion of progress in artificial intelligence (AI) that has occurred over the past year and a half has touched every aspect of our lives — from work to shopping, social interactions, and beyond. OpenAI's late-2022 announcement that its large language model (LLM), ChatGPT 3, was ready for use and available to all catapulted the technology into the public eye. Conversations about AI's potential to transform daily life and business operations alike have only accelerated in the intervening months.

Generative AI (genAI) models that can automate writing, research, and analytics tasks have dominated the public's attention to date, thanks to their ubiquity, flexibility, and accessibility. Still, genAI's compositional acumen (though impressive) only hints at what AI (and its close cousin, machine learning [ML]) technology can or will be able to do in the coming years. Emerging fields like cognitive, emotion, reactive, and other branches of the AI tree all promise to drive further progress for businesses across sectors.

## Levels of AI

<i>Realized</i>	<i>Theoretical</i>	
<p><b>Artificial Narrow Intelligence (ANI)</b> “Weak AI”</p>	<p><b>Artificial General Intelligence (AGI)</b> “Strong AI”</p>	<p><b>Artificial Superintelligence (ASI)</b> “Super AI”</p>
<p>All of today’s AI tools fall into this category. These tools:</p> <ul style="list-style-type: none"> <li>• Perform specific, repetitive tasks.</li> <li>• Are trained on a specific reference set.</li> <li>• Can “learn” to refine outputs based on feedback and patterns (machine, deep, and reinforcement learning or natural language processing).</li> <li>• Mimic cognition through programmed parameters but do not “understand” the meaning of their outputs.</li> </ul> <p>Examples include:</p> <ul style="list-style-type: none"> <li>• Smart assistants and chatbots (like Siri).</li> <li>• Large language models (like ChatGPT).</li> <li>• Demand forecasting tools.</li> <li>• Recommendation engines (like Netflix or social media suggestions).</li> </ul>	<p>Yet to be fully realized, data scientists working on AGI models aim to recreate human cognition. True AGI models:</p> <ul style="list-style-type: none"> <li>• Apply concepts or skills across domains without formal training.</li> <li>• Think abstractly, understand emotions, and have a sense of self.</li> <li>• Consistently pass the Turing Test.</li> <li>• Recognize context, causes, and effects.</li> <li>• Engage with the outside world through sensory inputs.</li> </ul> <p>Some current projects hint at what AGI might one day achieve. Examples include:</p> <ul style="list-style-type: none"> <li>• Self-driving cars.</li> <li>• Expert systems (like those used to recommend medical treatment plans).</li> <li>• IBM’s Watson.</li> </ul>	<p>The step after AGI, ASI models remain far out of reach, and many experts question whether the technology is even possible. Given enough computing capacity and power, these tools would, theoretically, outperform human cognition because their capacity would not be limited by the size of the human brain.</p> <p>Critically, if achieved, true ASI models/computers would be able to self-improve and expand their cognitive capabilities without human interaction.</p> <p>For this reason, experts also debate whether it’s wise to pursue ASI at all, warning that a true ASI could expand its capabilities beyond human control and bring about unintended and devastating consequences.</p>

While computer scientists and mathematicians are pursuing more advanced applications — like artificial general intelligence and artificial superintelligence — manufacturers are busy exploring Narrow AI's many capabilities to discover the ways it might improve their processes. For many, this represents a continuation of their ongoing digital transformation journeys, and they know that getting it right could make or break their businesses as the AI revolution progresses.

AI integrations designed to analyze data and model production can be incredibly valuable to businesses contending with today's volatile and dynamic market. Manufacturing-oriented AIs — which can often interface with mission-critical solutions like [Manufacturing Execution Systems \(MES\)](#) — use information gathered by highly sensitive monitoring devices, radio-frequency identification (RFID) programs, and video systems to provide a clearer picture of a facility's (or enterprise's) past, present, and future.

## Part 2: What AI Means for the Market

With manufacturers of all sizes banking on AI to give them a competitive edge, manufacturing's overall dynamics will certainly be in flux as it adjusts to a new status quo. As AI becomes more accessible, powerful, and engrained in the industry's fabric, smaller operations may see the playing field between themselves and the big players become more level — so long as they approach the situation strategically, according to Paul Saffo, tech forecaster and Stanford University adjunct professor. He posits:

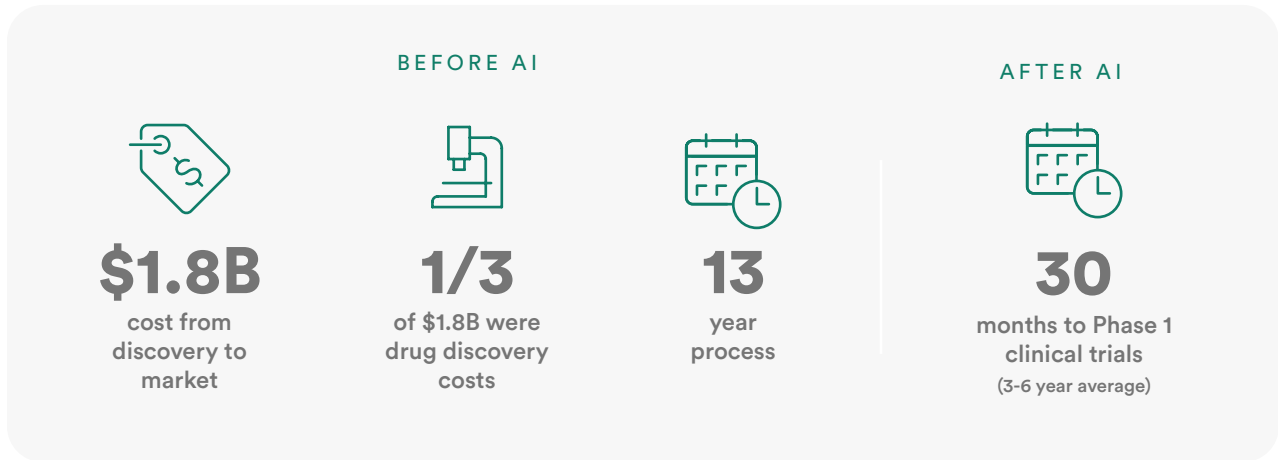


*Smaller companies that find an overperform within a niche will be able to capitalize on the technology to spark growth. However, bigger corporations who are able to use AI to make themselves feel smaller while still having the backing of a large enterprise are most likely to emerge as the winners in the long run.*

Not only will changes in production processes shift competition among manufacturers, but they will also change the dynamics between manufacturers and their vendors, clients, employees, and parent organizations. Development timelines will get faster, material demands will change, and expectations of vendor-buyer relationships will no doubt adjust.

A 2022 Gartner brief uses pharma as an example of [how these dynamics might change](#) as research and development labs implement AI into their processes: “In a 2010 study, the cost from discovery to market for a drug was about \$1.8 billion, of which drug discovery costs represented about a third, and the process

took 13 years. Insilico used generative AI to design a drug to treat idiopathic pulmonary fibrosis (IPF). It is now in Phase 1 clinical trials in under 30 months, a vast improvement over the three-to-six-year average.”



A 2023 article from the analyst group [expands on the potential impacts to business at large](#), positing that genAI will soon become: “[... A] general-purpose technology with an impact similar to that of the introduction of the web browser. [... The] impact of genAI will grow as people and enterprises discover more innovative applications for the technology in daily work and life.”

With this in mind, Shipra Sharma, head of AI and analytics at Bristlecone, advises manufacturers to see the bigger picture:



*“I’ve seen studies predict that half of supply chain operations will be digital by 2030. If that’s true, we all need to think deeply about how that happens, what that looks like, and what changes a rapid shift like that will demand of not just manufacturing but businesses in general.”*



## Part 3: Familiar Challenges

Broad change doesn't happen overnight, and leaders integrating AI into their processes will face challenges along the way. Many of them will be familiar to those who operated during the Dot-Com boom or smartphone revolution. According to Saffo, "the only constant in all change is human behavior."

### Public sentiments and workers' fears

Getting the public to embrace new technology can be an uphill battle, as change can spark hesitation, concerns, and even fears about what's to come. Though people seem fascinated with AI's potential, there's also an undeniable and palpable anxiety about the tool and the results of integrating AI into daily life too fast.

Of course, this anxiety [spills over to people's working lives](#), which can impede internal progress. When managers and leaders say *digital transformation* or *AI integration*, team members may hear, *you're being replaced*. Figuring out how to quell these fears internally will be a make-or-break endeavor.

To do it, Sharma suggests that manufacturers "start with a big vision" and let that guide the rest. "Leaders that build their roadmap around a vision and communicate the end goal to workers will have an easier time getting alignment," she explains. "Making facility personnel a part of the process helps them see the value in process adjustments and sends the message that *you* see the value in their contributions."

## Labor and skills gaps

Getting current workers on board with AI processes won't be the only labor-related challenge manufacturing faces. The industry also faces a [difficult labor market and a significant skills gap](#) that's likely to grow alongside AI adoption. Manufacturers will need to develop training programs that help tenured employees get up to speed on how the tech works and how its use may change their roles.

Sharma suggests businesses lean into the hierarchical nature of manufacturing floors and adopt a “top-down” approach to behavioral training. “The key will be getting floor supervisors excited about the changes and turning them into liaisons for the project,” she explains. “Shop floor personnel feel more connected to the people they work alongside every day than executive leadership. If the shift leads are on board, the rest of the team will follow.”

Given the [low engagement with manufacturing roles](#) seen among younger workers, enticing Gen-Zers and Millennials will also be critical — and that's something AI can also help with. Younger workers are often [excited to work with emerging tech](#), and having those tools from day one can help them learn the job more quickly. Sharma says she's seen this phenomenon in action, noting that younger workers who jump into fully digitalized facilities learn the nuances of the job at an impressive clip.

## Integration and storage

The pièce de résistance of AI implementation in factories, for many leaders, is the ability to build a comprehensive “digital twin:” a digital model of the whole operation that can be accessed and viewed in a single window. These models use historical and real-time data to provide an ongoing and holistic view of the status of projects, equipment, and production, as well as run various scenarios to guide decision-making.

But Sharma warns building this powerful tool — or any robust digital ecosystem — requires integration and storage capabilities that are equally robust: “Digital twins are very cool, but our customers often realize too late that data collection and computing are just one piece of the project. Every second of video is 120 frames — approximately 600MB. Now, multiply that by all the cameras in the facility, add in all the sensors, market and landscape feeds, business information, and so on; then compound all that over time, in perpetuity. That's the data lake a system like this needs to be successful.”



*“When speaking with clients, I sometimes have to tell them to forget the analytics for a second and focus on their systems: ‘Do you have a plan to integrate your systems? Can you even store the data?’”*

## Uncertainty

Ultimately, no one knows what will happen with AI — and that uncertainty is a challenge in and of itself. The path forward won't always be clear, and leaders are going to make decisions that shake out differently than they expect. Keeping an open mind and being willing to pivot can be difficult, but it will be crucial for manufacturers in the coming years.

Critically, though, this uncertainty should not discourage manufacturers from engaging with emerging tech. Saffo hopes to remind leaders that we often “learn most from the near misses,” emphasizing the importance of trial, error, and flexibility to progress:



*“During WWII, engineers would look at planes returning to carriers and reinforce their bodies where they saw the most damage. One day, they realized that the important information was where the bullets weren’t; the planes hit in those areas were the ones that didn’t make it back. Manufacturers need to adopt a similarly flexible approach to their plans and accept that, sometimes, the right answer is counterintuitive.”*

Sharma also urges manufacturers (and developers, for that matter) who are uncertain about what’s to come that viability, not feasibility, is likely to guide AI’s trajectory. “You don’t just have to justify implementation, you have to justify the time and resources that go into maintaining the system,” she says. “There are tons of things we will be able to do with AI in manufacturing environments, but the bulk of them will hit a ceiling because the return won’t justify the ongoing costs.”

Saffo believes that a measured approach will yield the best results. An expert in the cycles of technology and business, his message to manufacturing leaders is to be a “fast follower” and ride the curve implied by Lowey’s MAYA principle: aim to implement what’s most advanced, yet acceptable. Then, once you’ve succeeded there, move on to the next thing.

Sharma shares a similar point of view on the path forward, suggesting that leaders focus on small steps that support the big vision: “Manufacturing is about the process. The product is only as good as the process’ weakest link. The same is true for change management and digital transformation planning. It’s important that leaders know what the end goal is and make incremental progress toward it before getting too deep into something they can’t roll back.”

Sharma also notes that the approach, as in similar moments of change, must be tailored to each business' market position and overall business objectives: "Smaller companies looking to scale will be in an advantageous position because they will be able to plan expansions with AI and technological needs in mind. Bigger, more established companies will need to view the process as a reimagining. They'll need to go back to the drawing board to figure out where starting over is more effective than just adjusting. After all, a suboptimal process supported by AI is still a suboptimal process."

## Part 4: Making Automation Accessible with TrakSYS

As AI continues to work its way into manufacturing, business leaders need tools that are built to accommodate the unique challenges they face. MES platforms — like Parsec's flagship solution, [TrakSYS™](#) — serve as the foundation of modern manufacturing facilities' digital infrastructure, and they are increasingly built with AI integration in mind.

TrakSYS stands out among competitors, delivering reliable and significant returns for manufacturers. According to an IDC study on the business value of TrakSYS, companies utilizing the platform are poised to achieve a remarkable [454% three-year return on investment](#) by:



Improving efficiency



Boosting productivity



Reducing errors



Improving order fulfillment

When it comes to maximizing the utility of their existing — or future — AI and ML software, TrakSYS has manufacturers covered. Utilizing TrakSYS' native interoperability, businesses can tie their AI toolsets into the platform, resulting in even greater enterprise-wide visibility and optimization. With this system synergy, businesses are able to [streamline everything from inventory management to production performance and quality assurance](#).

By consistently evolving and expanding upon its TrakSYS platform, Parsec continues to further its commitment to empowering manufacturers and setting them up for success in marketplaces that necessitate advanced software and streamlined operations.

# About Parsec

Parsec is the developer of TrakSYS, a proven manufacturing execution system designed to significantly improve manufacturing processes. Parsec is committed to providing best-in-class products and solutions to our worldwide community of clients to assist them in optimizing their manufacturing operations. There are thousands of TrakSYS licenses in use around the globe in a wide variety of industries. TrakSYS helps manufacturers maximize asset utilization and efficiency, increase capacity with no new capital equipment, reduce production costs, decrease lead times, and improve profitability.

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