

GAMING THE (MANU- FACTURING) SYSTEM

**GAMIFYING BUSINESS OPTIMIZATION USING
AI AND IOT ALLOWS BUSINESSES TO NAVIGATE
AND STRATEGIZE FOR THE UNPREDICTABLE**

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INTRODUCTION

Have you ever played the classic strategy game with yellow and red game pieces called Connect 4? Many of us have, but did it ever occur to you that there might be more to this seemingly simple kid's game?

Surprisingly, Connect 4 is also a great representation of the all-too-common complexities in the manufacturing industry. It not only shows the need for adapting one's strategy in the face of uncertainty, but it also provides a humbling acknowledgment of our limitations to foresee all that could happen in our value chain.

FINDING YOUR BEST STRATEGY AMIDST CHAOS

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CONNECT 4 AND MANUFACTURING

While these core ideas behind Connect 4 game apply to most industries, it finds its most natural home in manufacturing. Here, the industry's value chain is long and complex, clearly mimicking the game from start to finish. And along the manufacturing chain, there are many opportunities for issues such as quality problems, delays, supply chain interruptions, and more. These are events that you cannot foresee—just like your opponent's next few moves in Connect 4—but they will still impact your future decisions and your final output, and potentially even your place in the market.

With so many components to track and analyze in the seemingly chaotic manufacturing environment, the best way to succeed is to find a winning strategy. And a winning strategy starts with artificial intelligence (AI).

AI PROVIDES THE WINNING STRATEGY

Every year, manufacturing generates [around 2000 petabytes](#) of data, more than double the next closest industry. For context, combining all the data from the 80,000 academic libraries worldwide would only take up around [50 petabytes](#).

The data-intensive nature of the manufacturing industry has led to the development of advanced technologies and innovative methods which extract value and drive efficiency and growth, such as AI.

Since AI is a data-based technology that can optimize nearly any process, it's a strong foundation for a winning business strategy. In Connect 4, you have one player versus another. For manufacturing, one of those players is the manufacturer itself. The other player represents everything that could go wrong, from minor disruptions such as an issue with a supplier to major ones, such as a container ship blocking the Suez Canal and disrupting the global supply chain.

While you valiantly seek to beat these odds, you still don't know what will happen next. Therefore, your strategy needs to continue adjusting to the changing environment, which is precisely what AI components do.

WHY TRADITIONAL AI DOESN'T ALWAYS WORK IN MANUFACTURING

In traditional AI, algorithms learn from experience using labeled data that indicates the right and wrong responses at its most basic level. However, if you're trying to optimize for the massive number of possible and unknown event combinations along the value chain, then this traditional AI approach won't work.

Instead, we must be flexible and creative. When we train an AI system to learn from itself and teach an algorithm to understand strategy instead of the final output, that's called **reinforcement learning (RL)**.

At the heart of RL is the concept of Digital Twins. **Digital Twins** is a mathematical model of a real component or process which can be as specific and tangible as the electric load of a motor inside an extruder or as ambiguous and abstract as the impact of a worldwide pandemic.

With Digital Twins, we can safely simulate situations in the software world before making any fundamental changes to our business or strategy. RL solutions use Digital Twins as the guide for learning to face an uncertain future. The algorithms test different strategies against millions of described simulation scenarios, thus preparing for even the unlikeliest potential situations a manufacturer might encounter.

To reap the benefits of these technologies, it's not necessary to focus on the entirety of the value chain. Manufacturers can still benefit greatly from systems designed for particular situations, such as managing the heating and cooling of their factories, optimizing critical physical magnitudes in the production line, or improving their last-mile delivery.

As comprehensive as these technologies can be, they often benefit from incremental implementations that tackle one aspect of the value chain at a time. Either way, RL and digital twins provide a way to adapt and strategize along the way to increase manufacturing capacity while reducing production costs.

TECHNICAL COMBINATIONS THAT SUPPORT SUCCESS

Manufacturers that have been the most successful at leveraging AI to solve their urgent problems have used one if not more of the following technologies:

1. INTERNET OF THINGS (IOT) AND EDGE COMPUTING

Observes the physical world, tracks events as they happen, and ensures analytics are produced timely and locally where their operations are happening.

2. DIGITAL TWINS AND ADVANCED SIMULATIONS

Conducting experiments responsibly and safely avoids risking harm to actual business operations. Using digital twins and mathematical simulations accomplish this for parts of the manufacturing chain and their interactions.

3. AI

Develops the algorithms that learn to identify the best strategy given all possible scenarios that might affect your production chain.

4. MLOPS

Ultimately, manufacturers need solutions that are robust, scalable, and economical. A mature MLOps framework ensures that the AI developed becomes a production-ready tool that can be maintained, upgraded, and deployed across all your operations, where and when you need it most.

SOFTSERVE DELIVERS STRATEGIC GUIDANCE

We regularly play our version Connect 4 here at SoftServe. Our experts love solving complex industry problems. SoftServe's teams have collaborated with clients to optimize their critical operations using AI—including using RL, big data, IoT, and more. In fact, we loved it so much that we built our own AI-supported Connect 4 game to test different AI approaches and exchange ideas with our clients.

In this version of Connect 4, a sensor constantly observes the game played by two players, while a Neural Network-based Computer Vision system detects the pieces being played. An IoT architecture connects the sensor with an edge computing device and the cloud while an AI algorithm identifies and suggests the next best move in the game.

No matter how you approach solving complex problems, it requires integrating multiple technologies and approaches. SoftServe knows how to deliver collaborative guidance and partner with your team to ensure success.

CONCLUSION

The manufacturing industry has frequently led the way in embracing flexibility and innovation. From introducing robots in the 1960s to today, the world of manufacturing calls for organized plants and flawless processes to guarantee that design teams, supply chains, quality control, and more are perfectly coordinated.

Even when situations are complex and too chaotic to foresee, a winning strategy is needed to accomplish these seamless processes and organization levels. That's why using technology to draft and adjust strategies in real-time helps navigate a changing market. Our Connect 4 or Business Optimization with AI and IoT demo offers a gamified experience showcasing how IoT and AI can interact, monitor the physical world, and produce data-driven insights for previously unsolvable problems.

Let's talk if you want to see Connect 4 in action and learn more about how SoftServe delivers cutting-edge technologies where they are needed most and unlocks insights to keep pace with dynamic growth.

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Volodymyr Semenyshyn leads SoftServe's organization in EMEA. He joined SoftServe in 2005 and has extensive experience across Marketing, HR, Delivery, and Business Development. Volodymyr holds a dual Master of Science degree in International Economics and Management, an MS degree in International Business and Law, and a PhD in Economics. He has also attended executive leadership programs at the London Business School and Harvard University.

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Sebastian Santibanez helps lead the teams involved in Advanced Technologies at SoftServe. His work enables clients across industries and markets to develop solutions at the intersection of AI, Big Data, IoT, and other emerging technologies. Over the past 15 years, Sebastian has held positions in startups, academia, research, consulting, manufacturing, and more.

ABOUT US

SoftServe is a digital authority that advises and provides at the cutting-edge of technology. We reveal, transform, accelerate, and optimize the way enterprises and software companies do business. With expertise across healthcare, retail, energy, financial services, and more, we implement end-to-end solutions to deliver the innovation, quality, and speed that our clients' users expect.

SoftServe delivers open innovation, from generating compelling new ideas, to developing and implementing transformational products and services.

Our work and client experience is built on a foundation of empathetic, human-focused experience design that ensures continuity from concept to release.

We empower enterprises and software companies to (re)identify differentiation, accelerate solution development, and vigorously compete in today's digital economy-no matter where you are in your journey.

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