# APPLIED AI IN DATA ANALYTICS:

A Force Multiplier for Human Capital in Classification, Harmonization and Insight Generation.

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**procurevue**

# Introduction

IN TODAY'S DATA-DRIVEN WORLD, THE APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) IN DATA ANALYTICS HAS EMERGED AS A TRANSFORMATIVE FORCE ACROSS VARIOUS INDUSTRIES.

THIS TECHNOLOGY IS COMPELLING IN CLASSIFICATION, DATA HARMONIZATION, AND INSIGHT GENERATION, OFFERING COMPANIES THE POTENTIAL TO UNLOCK UNPRECEDENTED VALUE FROM THEIR DATA.

AI'S ROLE AS A FORCE MULTIPLIER IS CRITICAL, ALLOWING ORGANIZATIONS TO LEVERAGE THEIR HUMAN CAPITAL MORE EFFECTIVELY BY AUTOMATING REPETITIVE TASKS, ACCELERATING INSIGHT GENERATION, AND DRIVING QUICKER IMPACTS ON FINANCIAL OUTCOMES.

**As companies strive** to navigate an increasingly competitive business environment, the need for accurate, timely, and actionable data insights has never been more essential. Procurement leaders, in particular, are constantly seeking ways to optimize spending, negotiate better supplier deals, and streamline supply chain processes. AI can assist in achieving these goals by providing enhanced data processing capabilities, leading to more informed decision-making and greater efficiency.

This document explores how AI technologies, especially Machine Learning and Deep Learning, are applied in data analytics, highlighting their benefits for procurement leaders. Additionally, it will delve into how AI can enhance human capital, improve job satisfaction, and drive overall business success.

# AI Explained

**There are currently** three major areas of AI: Artificial Intelligence at a general level and two prominent subfields, Machine Learning and Deep Learning, each with distinct characteristics and applications. Machine Learning and Deep Learning are both critical components of modern AI systems, but how the different elements of AI work to process data differs, which in turn can impact the speed and accuracy of data processing. We will explain these three areas in more detail.

## Artificial Intelligence

In the broadest sense, AI is a transformative field of computer science that aims to create intelligent machines capable of performing tasks that typically require human intelligence. AI generally uses rule-based systems, a set of predefined rules used to make decisions or perform tasks. These rules are usually created by human experts in a specific domain and are encoded into the system.

Rules-based AI is used for applications such as chat-bots that can handle a basic set of questions and then hand the client over to a human if AI cannot handle the request alone. You may already be familiar with chatbots, which are machine interfaces with an effective, if limited, level of intelligence. This base level of AI is increasingly referred to as Narrow AI.

Narrow AI is designed to handle specific tasks, such as playing chess, recommending products, or classifying images. While it is highly efficient at its designated tasks, it does not possess the general problem-solving abilities of a human. This limitation, however, does not hinder its utility in specialized areas like data analytics, where specific, repetitive tasks are involved. By automating these tasks, narrow AI can save significant time and resources.
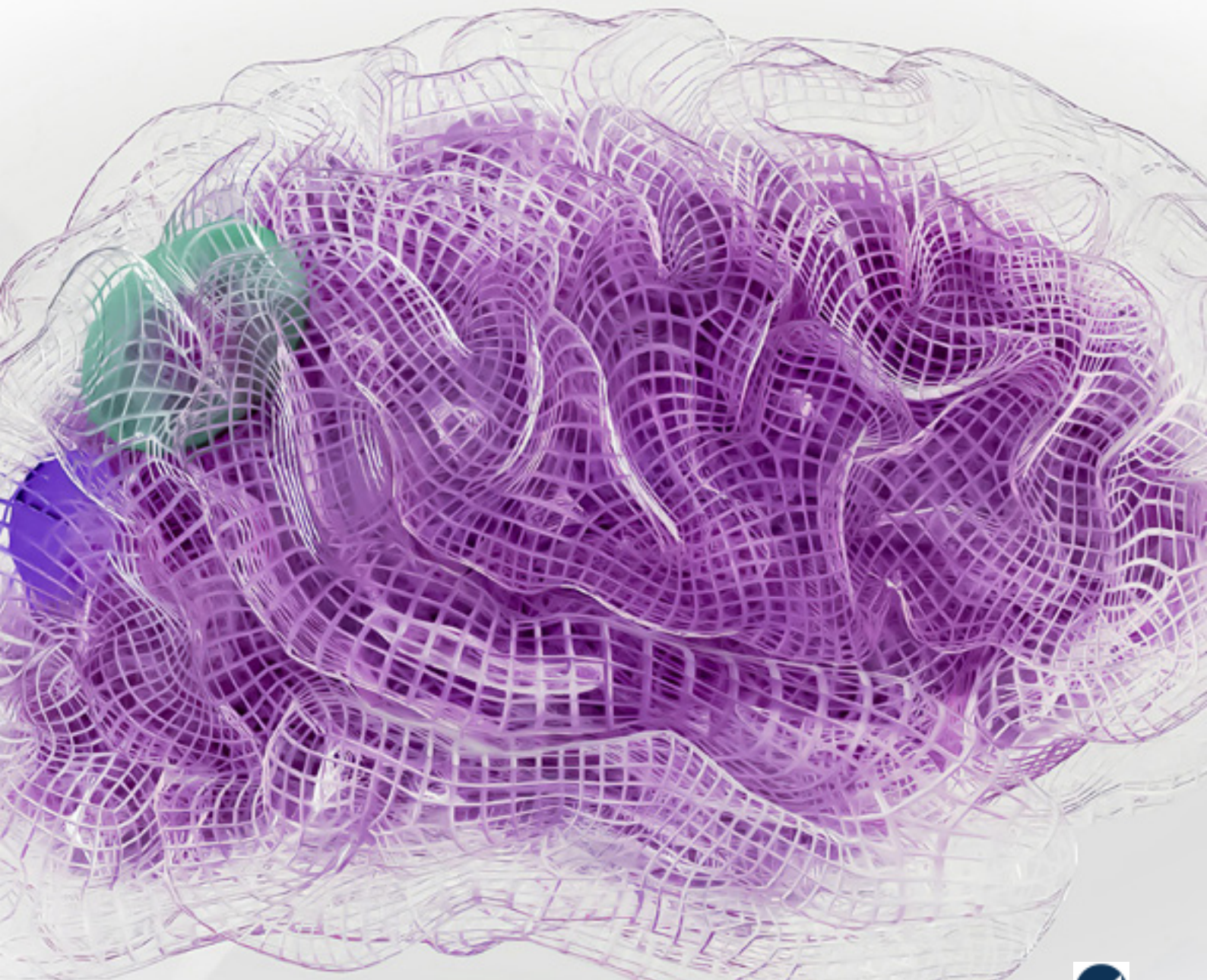
## Machine Learning

Machine Learning is a subset of AI focused on developing algorithms that enable computers to learn patterns and make predictions or decisions from data without being explicitly programmed. Machine Learning can work with a wide range of content sources, giving it access to a broad data set. In traditional programming, developers write explicit instructions for computers to follow. In contrast, machine learning algorithms learn from large datasets to recognize patterns and make decisions or predictions. Machine learning can be used across a broad set of applications, including forecasting weather and traffic patterns, catching spam before it hits your email inbox, and stock portfolio management.

In the realm of procurement, machine learning algorithms can analyze historical purchasing data to identify patterns, such as seasonal trends, supplier performance, and cost fluctuations. This helps procurement leaders anticipate changes in supply and demand, optimize inventory levels, and negotiate better contracts. Some companies are starting to harness machine learning as the basis of their spend analytics offerings, providing procurement teams with deeper insights into where and how their funds are being utilized.

## Deep Learning

Deep Learning is a specialized subset of machine learning that involves artificial neural networks inspired by the structure and function of the human brain. Deep Learning algorithms, also known as artificial neural networks, consist of many layers of interconnected nodes that hierarchically process data. This design is based on how the human brain's neurons work. These networks can automatically learn representations of data through the process of

training on large datasets. The self-learning aspect of Deep Learning is compelling as it is cumulative, so once it can recognize a cat, it will recognize a cat every time it sees an image of one.

Deep Learning has gained significant attention and popularity in recent years due to its remarkably high-speed performance in various tasks, such as image recognition, natural language processing, and speech recognition. In procurement, Deep Learning can analyze unstructured data, such as emails, contracts, and invoices, by interpreting natural language to extract valuable insights. For instance, a deep learning model can identify discrepancies between purchase orders and invoices, enabling procurement teams to address issues quickly and avoid overpayments.

ProcureVue uses deep Learning to power the swift processing of cleaning, harmonizing, and categorizing spend data. This allows companies to save time and resources while ensuring that data is accurate and actionable.

# What Are the Differences Between General AI, Machine Learning, and Deep Learning?

**General AI,** often called Artificial General Intelligence (AGI), is the ultimate goal of AI research. AGI aims to create machines that possess human-like intelligence and can perform any intellectual task that a human can. However, AGI remains theoretical and has yet to be achieved. Rodney Brooks, a roboticist at the Massachusetts Institute of Technology and co-founder of iRobot, stated in multiple articles that he believes true AGI won't arrive until 2300.

The key differences between the currently available AI levels are speed, capability, and cost. Machine Learning is a broader concept that encompasses various techniques and algorithms for enabling computers to learn from data and improve their performance over time. It includes traditional statistical methods as well as modern approaches like Deep Learning.

Deep Learning, as mentioned earlier, is a specific subset of machine learning that utilizes neural networks with many layers (hence the term "deep"). Deep Learning has shown remarkable success in rapidly performing tasks involving large amounts of data, complex patterns, and unstructured data types like images, text, and audio. Deep learning models can "self-learn" without explicit feature engineering, making them particularly effective in applications where patterns are not immediately apparent, such as in data classification or speech recognition.

# What Are the Benefits of Using Deep Learning for Spend Data Analytics?

**Now that we** have covered the introduction to the different types of AI that are currently available, let's focus on how AI can assist the spend data analytics processes. Deep Learning offers several advantages for spend data analytics, particularly in handling large volumes of heterogeneous data and extracting meaningful insights. Here's why it's the optimal tool for analyzing spend data:

- **Feature Learning:** Deep Learning models can automatically learn relevant features from raw spend data, eliminating the need for manual feature engineering. This capability is crucial for dealing with complex spending patterns and diverse data sources.
- **Complex Patterns:** Spend data often contains intricate patterns and relationships that may need to be more readily discernible through traditional analytics

approaches. Deep Learning algorithms excel at uncovering these complex patterns, leading to more accurate predictions and insights. Using Deep Learning means the AI swiftly harmonizes and categorizes data very accurately. Research indicates that deep learning models often outperform human analysts in data classification tasks, especially when dealing with large datasets. In image classification, for instance, deep learning models can achieve accuracy levels far exceeding traditional approaches, sometimes reaching or surpassing 95% accuracy. In contrast, human performance can be more variable and context-dependent, often falling to around 50% in complex or high-volume classification tasks. (1)

- **Scalability:** Deep Learning models can scale effectively to handle large datasets with millions of transactions, making them well-suited for analyzing extensive spending data from diverse sources such as procurement systems, invoices, and financial records.

- **Adaptability:** Deep Learning models can adapt to changing spending patterns and business dynamics without extensive manual intervention. This adaptability ensures that spend analytics solutions remain practical and relevant, even as the business environment evolves.

In summary, Deep Learning offers a powerful toolkit for analyzing spend data. It enables organizations to derive actionable insights, optimize procurement processes, and make strategic decisions. Its ability to automatically learn from data and extract complex patterns makes it an essential asset in spend analytics. For procurement leaders, this means they can leverage AI to understand better where funds are going, identify cost-saving opportunities, and ultimately improve the bottom line.

# AI in Data Classification & Harmonization

**Data classification** and harmonization are foundational processes in data analytics that ensure data is clean, accurate, and ready for analysis. AI technologies, particularly machine learning algorithms, are highly effective in automating these processes.
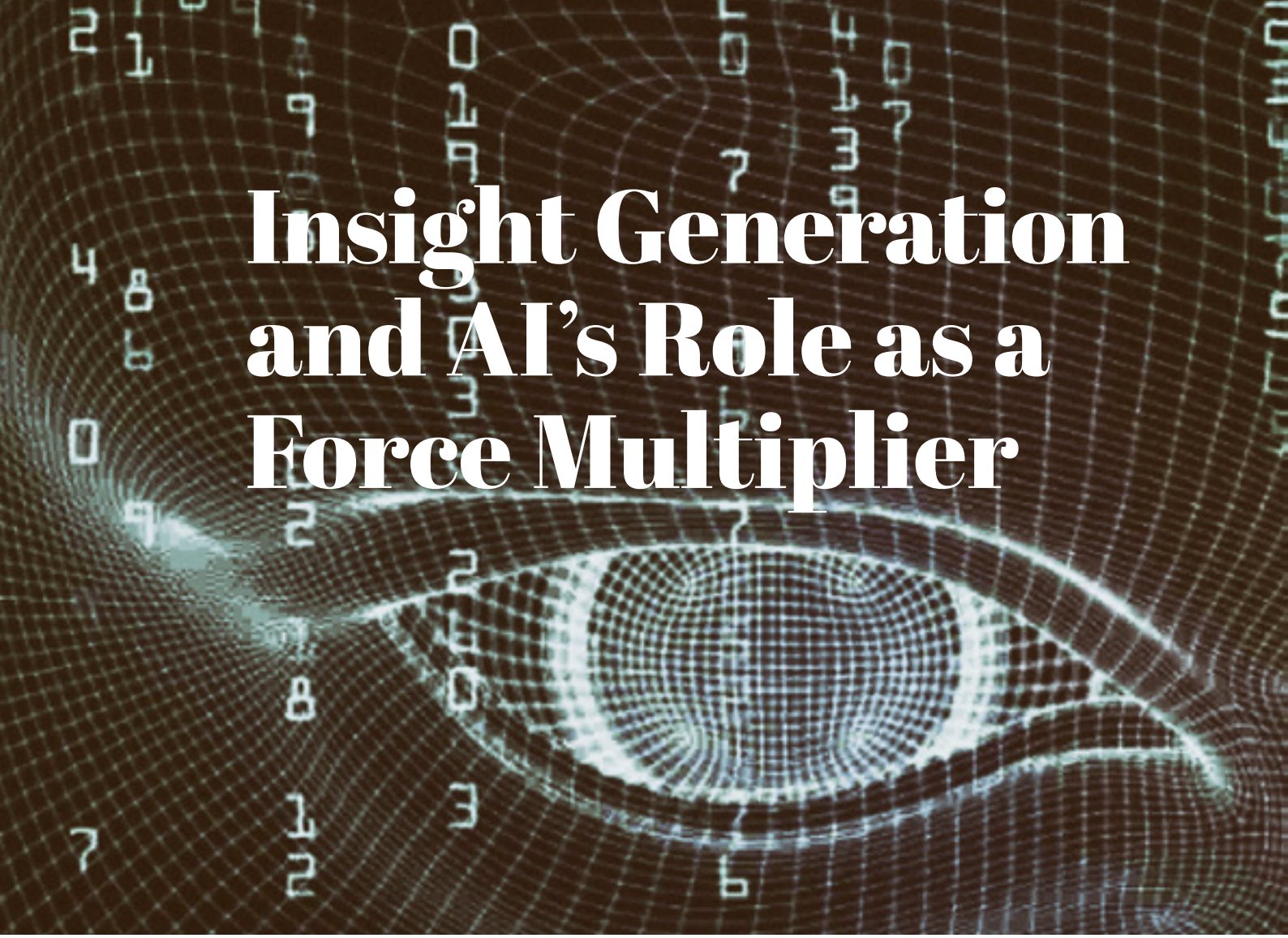
Classification involves organizing data into predefined categories. Traditionally, this has been a manual and time-consuming process prone to errors. AI, however, can automate classification with a high degree of accuracy by learning from large datasets and identifying patterns that humans might overlook. This not only speeds up the process but also improves the consistency and reliability of the classified data. For instance, procurement teams often

have to sort through vast amounts of purchase data to categorize expenses by product type, supplier, or business unit. AI can significantly streamline this classification process, allowing the team to focus on more strategic tasks, such as negotiating contracts or finding new suppliers.

Harmonization refers to standardizing data from different sources to ensure uniformity. In many organizations, data is scattered across multiple systems in various formats, languages, and currencies. AI can streamline the harmonization process by automatically converting and unifying this disparate data into a single, standardized format. This enables organizations to create a cohesive "one source of truth," essential for accurate data-driven decision-making.

AI-powered data harmonization tools can transform chaotic, unstructured data into an organized, standardized dataset that procurement teams can quickly analyze. By providing a clear picture of spending patterns, AI helps procurement leaders make more informed decisions, identify cost-saving opportunities, and improve supplier management.

Once the data has been harmonized using AI, the extra step that Procurement teams would require is categorization. AI can place the harmonized data into groups of related commodities or services that share demand and supply factors and suppliers. Categories will differ depending on the size and kind of organization and the supply market. Knowing and understanding the procurement categories can improve procurement processes and increase productivity. Procurement categories allow the procurement team to develop targeted strategies for the best way to procure similar goods/services and drive a better picture of procurement spend across the entire organization.

# Insight Generation and AI's Role as a Force Multiplier

**One of AI's** most significant advantages is its ability to generate insights from large datasets. By leveraging Deep Learning and advanced analytics algorithms, AI can uncover hidden patterns, trends, and correlations within the data that may not be immediately apparent to human analysts.

Another critical advantage is the speed at which AI can process and analyze data. In traditional data analysis, generating actionable insights could take days or even weeks, depending on the complexity of the data and the questions being asked. AI, however, can produce insights in a fraction of the time, enabling businesses to make quicker decisions and respond more rapidly to market changes.

For procurement leaders, this rapid analysis capability is invaluable. By quickly identifying spending inefficiencies, AI can highlight where money is being wasted and suggest areas for improvement. Furthermore, AI can help predict future trends, such as which suppliers may be more reliable or which products are likely to see price increases, enabling procurement teams to make proactive decisions that reduce costs and improve supplier relationships.

This ability to generate quicker and more accurate insights has direct financial implications for companies. For instance, businesses can implement changes that lead to significant cost savings, revenue growth, and higher profit levels by identifying inefficiencies, optimizing operations, or predicting market trends. This rapid insight generation, driven by AI, allows companies to achieve faster time-to-value from their data initiatives, which is increasingly essential in a competitive business environment.
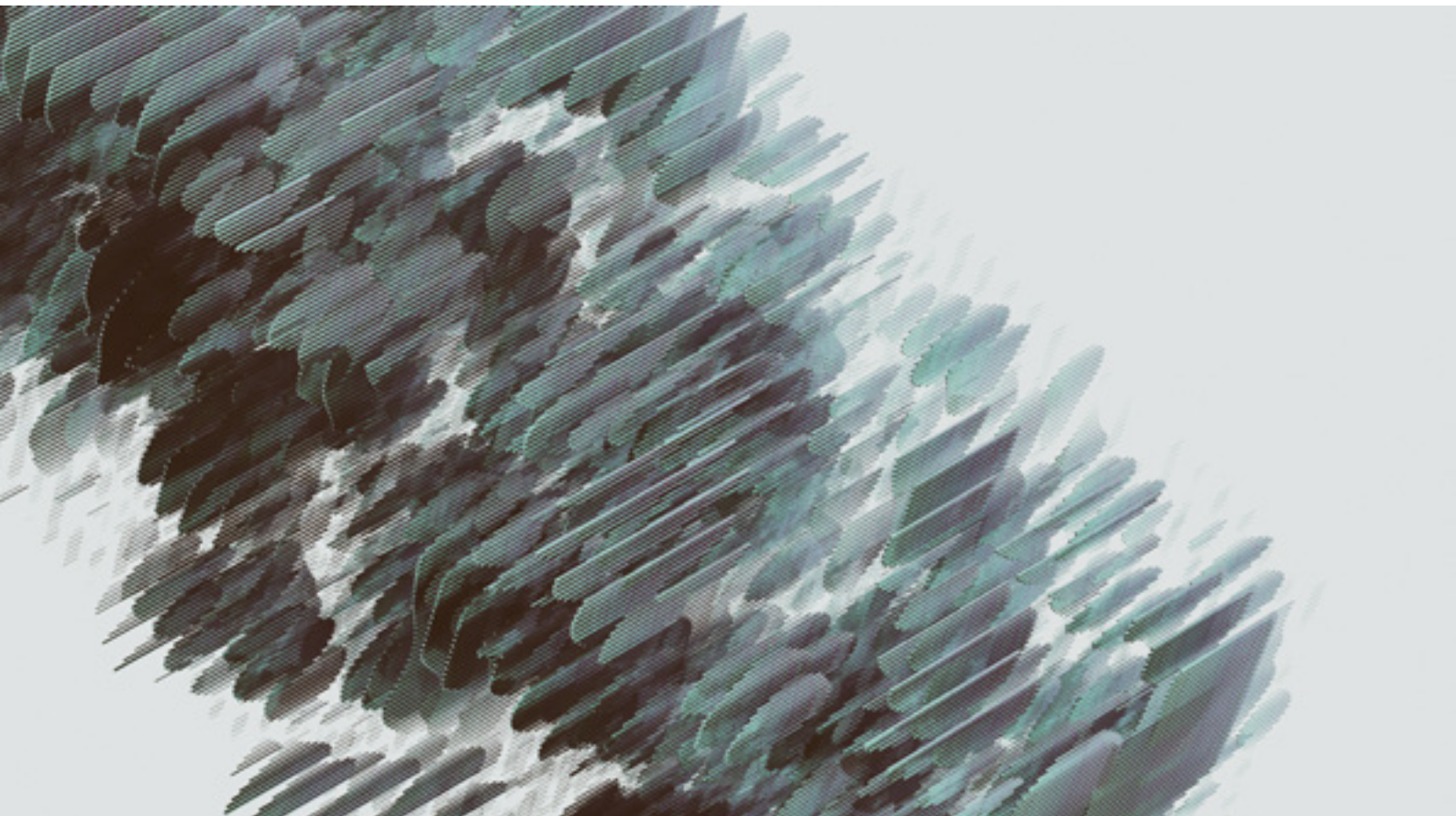
# Enhancing Human Capital Through AI

**AI is not** just about replacing human labor; it's about enhancing it. By automating routine and repetitive tasks, AI frees human capital to focus on higher-value activities requiring creativity, critical thinking, and strategic decision-making.

For example, instead of spending hours on data entry or manual classification, employees can spend their time interpreting AI-generated insights, devising strategies, and driving innovation within the organization. This shift increases productivity and enhances job satisfaction by allowing employees to engage in more meaningful and impactful work.

Moreover, AI acts as a force multiplier by augmenting human capabilities. Even the most experienced data analysts have cognitive limitations and biases that can affect their work. Conversely, AI can analyze vast amounts of data without bias, providing human analysts with a broader and more objective view of the data. This collaboration between AI and human analysts can lead to better decision-making and more robust business strategies.

The use of AI also supports talent retention. Employees are more likely to find their work engaging and fulfilling by reducing the need for repetitive and mundane tasks and working on strategic initiatives that add real business value. In turn, this helps businesses retain skilled professionals critical to their success.  AI should be recognised as a tool to empower procurement teams rather than as a replacement.

Embracing AI is, therefore, not just about technology; it's about leadership. Senior procurement leaders who integrate AI into their human capital strategies are positioning their organizations to thrive in a future where innovation, agility, and talent empowerment define success. By using AI to complement human expertise, they can unlock unprecedented opportunities to create value, inspire teams, and drive their organizations forward.

# Challenges and Considerations in Implementing AI

**While the benefits** of AI in data analytics are evident, there are several challenges and considerations that organizations must address when implementing these technologies:

- **Data Quality:** The effectiveness of AI models is highly dependent on the quality of data they are trained. Data quality can lead to accurate results and informed decisions. Organizations must invest in data cleansing and standardization processes to ensure the data used for AI analysis is reliable.
- **Cost and Infrastructure:** Implementing AI solutions can require significant upfront investment in technology infrastructure, software, and skilled personnel. Businesses must assess whether they have the necessary resources and budget to support such initiatives.
- **Skill Gap:** There is often a skill gap in implementing and managing AI systems. Given the current demand for these skills, companies may need to hire or train employees

with specialized skills in AI, machine learning, and data science, which can be challenging.

- **User Adoption:** Ensure that the procurement team and the key stakeholders understand the value that can be driven using a spend analytics solution and are trained to use the solution effectively where required. Employing change management processes is crucial for successful, long-term implementation. Refining the data to standard internal terminology and descriptions for goods, services, and categories that are individual to each company will help to make the processed spend data more intuitive and easier to work with

- **Ethical and Privacy Concerns:** As AI systems handle vast amounts of data, there are concerns about privacy and ethical use. Organizations must establish clear guidelines and policies to address these issues and ensure compliance with data protection regulations.

Despite these challenges, AI's potential benefits far outweigh the obstacles. With the right approach and strategic planning, procurement leaders can overcome these hurdles and leverage AI to drive significant value for their organizations.

# Future Trends in AI for Procurement

**AI is continually** evolving, and new advancements are being made rapidly. For procurement leaders, keeping an eye on future trends can help them stay ahead of the curve. Some key trends to watch include:

- **Predictive Analytics:** AI will become more adept at predicting future events, such as supplier delays, price changes, and shifts in demand. This will allow procurement teams to anticipate issues and take preemptive action before they arise.
- **Natural Language Processing (NLP):** NLP technologies will improve AI's ability to understand and process human language, enabling more sophisticated analysis of unstructured data such as contracts, emails, and supplier communications.
- **Blockchain Integration:** AI combined with blockchain technology can enhance supply chain transparency and traceability, ensuring that procurement data is accurate and verifiable.
- **Automated Negotiation Bots:** Future AI systems may be capable of handling negotiations with suppliers, using data-driven insights to achieve the best deals without human intervention. While this technology is still in its infancy, it could revolutionize how procurement teams interact with vendors.

# Conclusion

**After looking at** the different levels of AI, we have described how AI's application in data analytics transforms how businesses approach classification, harmonization, and insight generation. By acting as a force multiplier, AI enhances human capital, enabling employees to focus on strategic tasks while AI handles the repetitive and time-consuming processes. The result is better and quicker insights and faster and more significant, positive financial impacts for companies. The strategic use of AI for data analytics helps with the recruitment and retention of key team members, supports the core work of the procurement team, and means that procurement can make significant contributions to the operational and financial performance of the business.

**ProcureVue**™, developed specifically for strategic sourcing, exemplifies this integration of AI and machine learning. By incorporating just the right amount of these technologies, ProcureVue™ solves complex problems in data classification and harmonization and accelerates insight generation, all while ensuring that human expertise remains at the forefront of decision-making. As AI continues to evolve, its role in amplifying human potential and driving business success will only become more pronounced.

## References
1. A Study and Comparison of Human and Deep Learning Recognition Performance Under Visual Distortions (2017) by Samuel Dodge and Lina Karam of Arizona State University

# About ProcureVue

ProcureVue™ was created by accomplished procurement leaders and data scientists with diverse industry expertise and is focused exclusively on strategic sourcing, spend analytics, and procurement process transformation.

Our platform is an AI-driven spend data analytics tool that generates rapid, accurate, and detailed VUEs delivering total visibility into spend data and provides quickly deliverable, meaningful and impactful outcomes.

Our full-service SaaS spend VUE solution, combined with our data optimization services and direct consultative approach, gives clear insight into your spending so you can confidently deliver on identified opportunities in real-time and on an ongoing basis.

We use deep learning AI to empower our clients to realize impactful outcomes utilizing innovative and dynamic software technology.

Our first step is to cleanse the data; the data is then harmonized, enriched and categorized. Spend categorization, spend analysis, and benefits identification are generated using our AI to provide unprecedented VUEs and insights into your data through our cloud-based solution.

The consultative approach that ProcureVue™ offers, means we can work with senior leadership and stakeholders to develop the best strategy that supports your current business needs from concept to negotiations to completion.

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