



Grid Dynamics Whitepaper

Exploring the transformative impact of generative AI in manufacturing

www.griddynamics.com



Grid Dynamics

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Introduction

Manufacturing business leaders are shifting their focus from milestones to providing value to customers by adopting a product mindset and leveraging data for improved customer-centricity, adaptability, and agility.

But have you considered the transformative impact that generative AI can have on unlocking the full potential of your data resources?

To be clear, we aren't looking to leverage generative AI for the automation of repetitive tasks, such as data entry, inventory management, and quality control. This is already being achieved using rule-based robotic process automation (RPA), but we're looking to Hoover large swaths of available information and create whole texts, images, and videos that can augment human-level critical thinking and decision-making in manufacturing. This technology has high-stake use cases, such as creating digital prototypes and testing them in a virtual environment, which directly impact a company's reputation.

In this era of the 4th Industrial Revolution, characterized by transformative technologies like AI, robotics, IoT, big data, and advanced materials, valuable data from supply chains, social media, customers, and open sources converge to form a vast repository. This data wealth is ready to be utilized and explored. So how can you effectively integrate generative AI to drive data-driven decision-making in areas like product development, design, manufacturing processes, supply chain management, and sales?

While Generative AI plays a crucial role in supporting value creation by providing tools and technologies that enhance data utilization and analysis, our experts at Grid Dynamics, make these technologies more accessible and actionable by developing pragmatic solutions tailored for manufacturers.

Here are some ways we leverage your data wealth to create value streams that solve your core business problems, exceed customer expectations, and foster a product-based culture:

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Tackling manufacturing challenges using pragmatic generative AI solutions

Fueling product development through design ideation

Problem

Product designers face challenges in rapidly bringing ideas to life while manually creating design sketches using CAD tools to convert sketches into more detailed 3D models. Design ideation and modification take considerable time, require advanced skills, and still do not necessarily produce optimal results. Designers seek efficient tools that leverage natural language and visual cues to streamline the design process, foster collaboration, and boost creativity. These tools should augment designers' capabilities rather than replace them.

Value proposition

- **Cost Out:** Cost of design ideation and prototyping
- **Efficiency:** Product designers productivity

Industries

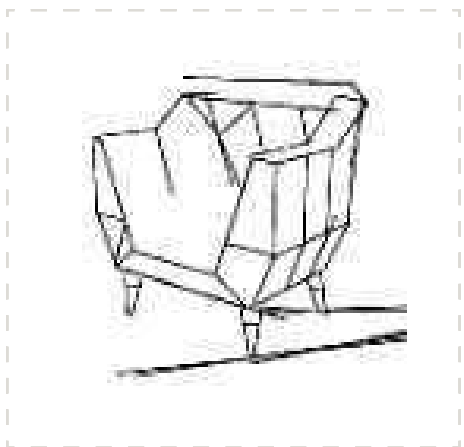


Retail

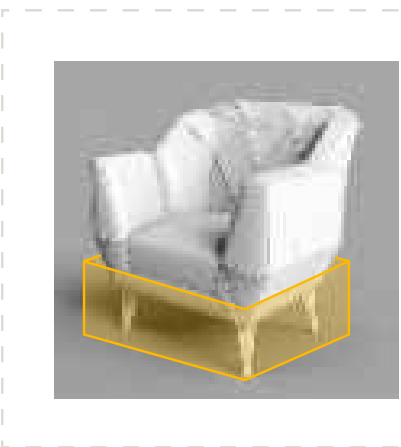


Manufacturing

Product design starter kit



Prompt:
"Modern armchair"



Prompt:
"Swivel lounge chair"



Prompt:
"In the kitchen"



Response

According to CB Insights, generative AI could reduce design timelines by up to 90% for infrastructure projects and slash raw material use by upwards of 95% in industrial design.

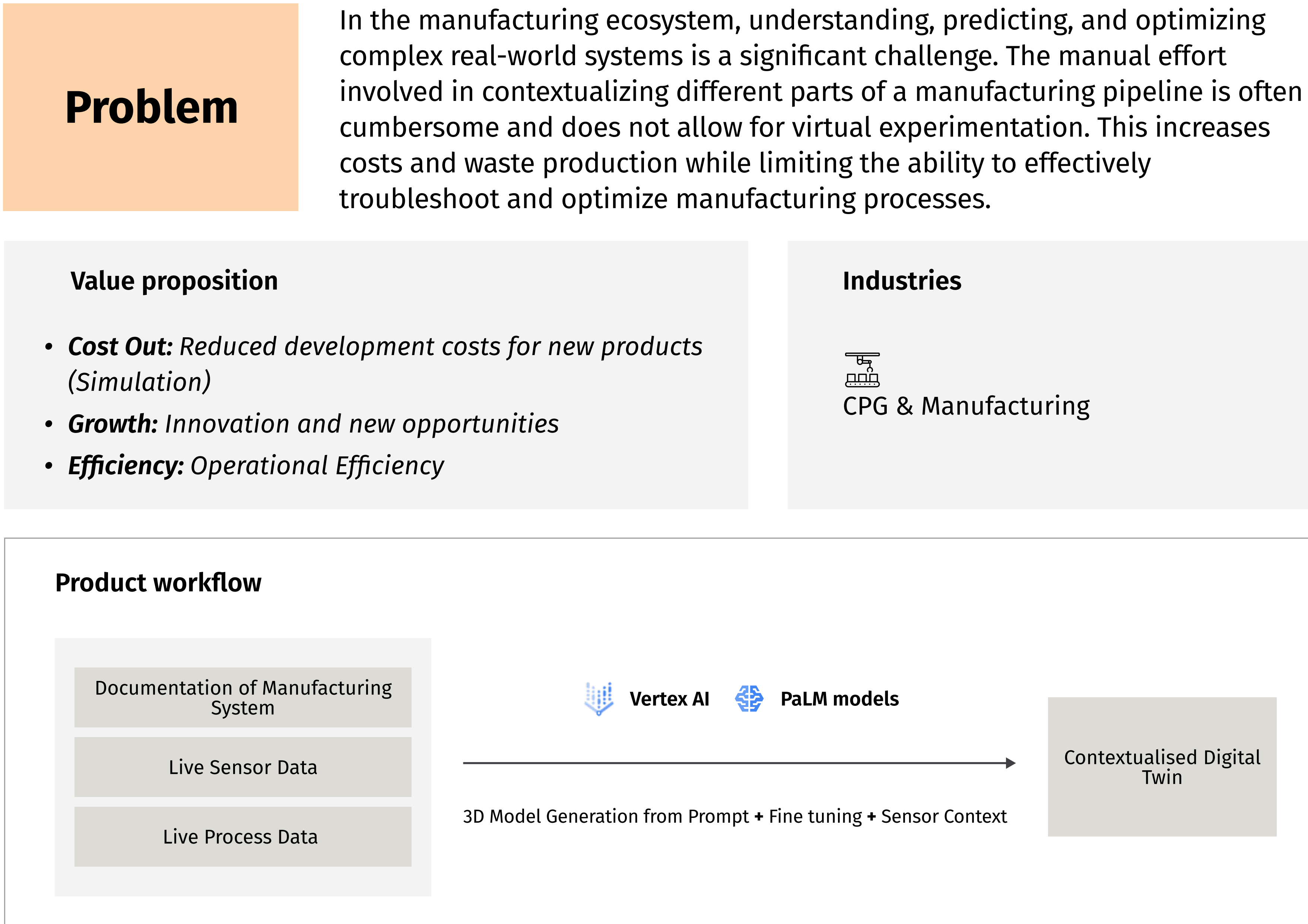
This is possible due to state-of-the-art text-to-image and image-to-image models that help with product design ideation and prototyping processes, requiring minimal effort. Designers can simply provide basic text prompts or image references, and our solution generates corresponding visual representations.

For example, imagine a manufacturing company that wants to design a new ergonomic chair. Using our language-to-image tool, a designer can input a description like "Sleek, modern chair with adjustable lumbar support and breathable mesh backrest." The tool will then generate visual concepts and variations of the chair based on the provided description, aiding the designer in exploring different design possibilities quickly.

Similarly, with our image-to-image tool, a designer can input an existing chair image and specify modifications like "Make the armrests wider and change the color to black." The tool will generate an updated visual representation of the chair with the requested modifications, enabling the designer to visualize and iterate on design changes efficiently.

Check out our Generative AI Product Design Starter Kit to learn how we enable a range of product design capabilities for rapid prototyping, customization, restyling, and product visualization. From facilitating ideation sessions to enabling personalized customer experiences, our solution empowers manufacturing companies to unlock new levels of versatility and efficiency in their design workflows. Streamline your product design process by building customized design tools, previewing products in different contexts, and enhancing collaboration among team members, all while maintaining the integral role of designers and fostering greater creativity.

Optimizing manufacturing pipelines with digital twin contextualization



Increasing operational efficiency with legacy code modernization

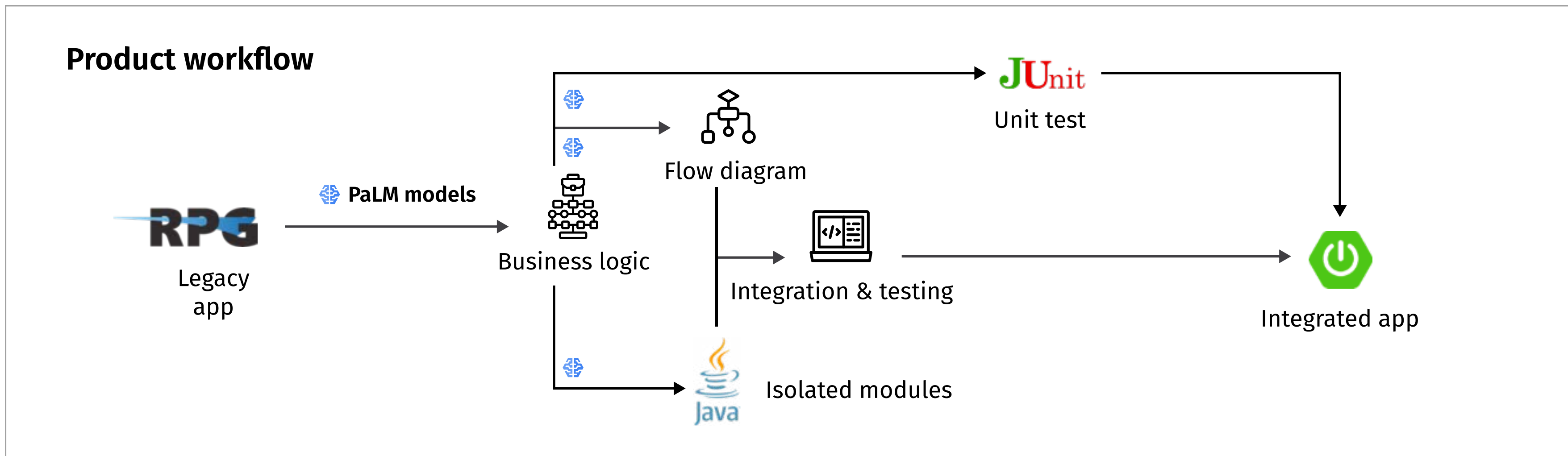
Problem

Despite digitalization on the rise, many manufacturing companies continue to use legacy software systems. Not only does this lead to a critical problem in manufacturing as the pace of innovation varies between information technology (IT) and operational technology (OT) systems but also hinders maintainability, scalability, and alignment with current technology standards. Modernization and modularization of these systems require significant resources that make it necessary for organizations to invest in strategic initiatives that can address such technical debt and meet current industry demands.

Value proposition

- **Cost Out:** Reduced costs on maintenance of legacy systems
- **Growth:** Higher productivity to extend current software development
- **Efficiency:** Higher efficiencies unlocked due to increased developer base
- **Regulatory:** Easier regulatory compliance due to increased documentation & developer base

Industries



Response

By harnessing the capabilities of large language models (LLMs), we effortlessly transform outdated software systems into modern, scalable solutions. These solutions offer efficient and accurate code migration, enabling manufacturing businesses to leverage the latest technologies and enhance their software infrastructure.

For example, consider a manufacturing company that has been using a legacy software system to manage its production processes. This system may be outdated, lacking scalability, and incompatible with newer technologies. With our AI-powered conversion solution, they can seamlessly migrate their legacy codebase to a modern software architecture, preserving functionality while incorporating modern features, scalability, and improved maintainability. This eliminates the need for extensive manual code rewriting and reduces the time, effort, and potential risks associated with traditional software modernization processes.

In addition to modernizing the legacy software system, we develop comprehensive capabilities to enhance the development process. Our documentation generator automatically generates detailed documentation, improving system understanding and facilitating future maintenance. Simultaneously, our test code generator generates test code, reducing manual testing efforts by covering critical functionalities. Overall, our solution allows manufacturing companies to streamline their development workflow, ensure code quality, and accelerate the delivery of reliable and robust software solutions.

Improving supplier management with streamlined procurement contract analysis and generation


Problem


Manufacturers often work with multiple suppliers who provide them with various types of software and hardware. For example, electronic control units (ECUs) come from many suppliers in automotive manufacturing. Procurement teams face challenges when analyzing suppliers' profiles and manually creating, reviewing, and updating contracts with multiple suppliers across different countries. The process is time-consuming, labor-intensive, and prone to errors.

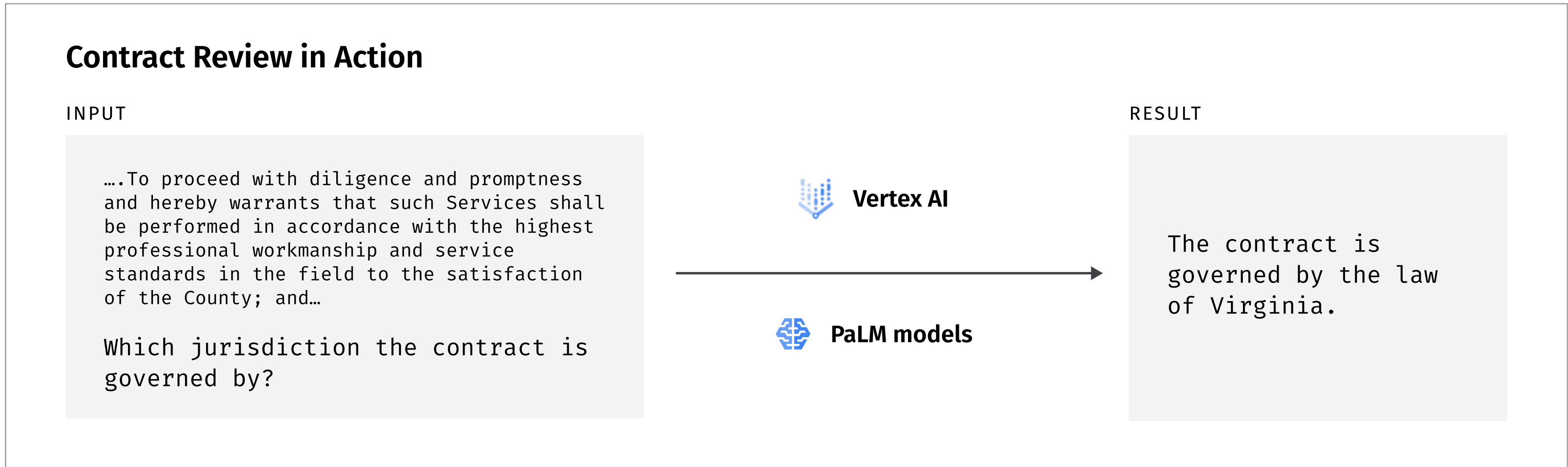
Value proposition

- **Cost Out:** Reduced cost of supplier management and operations
- **Regulatory:** Lower compliance and human error risks

Industries

Retail & Brands

CPG & Manufacturing



Response

Introducing our comprehensive solution designed to streamline contract management for manufacturing procurement teams. Our solution enables quick contract reviews and provides valuable insights, answering critical questions such as "Which jurisdiction governs the contract?" and "What are the key risks associated with the warranty statements?" Additionally, our solution offers the capability to generate fully-blown contracts based on concise descriptions and essential guidelines.

For example, consider a manufacturing company that procures raw materials and components from various suppliers located around the world. Currently, their procurement team spends significant time manually reviewing and updating contracts, ensuring compliance, and managing contractual risks. By implementing our solution, the procurement team can expedite contract reviews, leveraging advanced AI capabilities to identify key contract attributes, jurisdictional requirements, and potential risks. This allows them to make informed decisions more efficiently and allocate their resources to more value-added tasks.

In the automotive manufacturing environment, our solution can benefit procurement teams by providing a better understanding of licensing requirements from ECU suppliers. This, in turn, reduces the effort required by manufacturers to seamlessly integrate different ECUs.

Accelerating product innovation with AI-driven virtual focus groups

Problem

Manufacturers often struggle with traditional focus group methodologies for market research due to inefficient participant recruitment, limited geographical reach, and the inability to provide real-time insights. These limitations hinder the ability to gather valuable feedback and insights from a diverse range of participants.

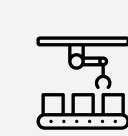
Value proposition

- **Cost Out:** AI personas eliminate the need for participant recruitment and incentives as well as data collection costs.
- **Growth:** AI Personas can be adjusted to reflect market changes without need to wait for data generation.
- **Efficiency:** AI Focus groups can be scaled up or down based on the company's needs.

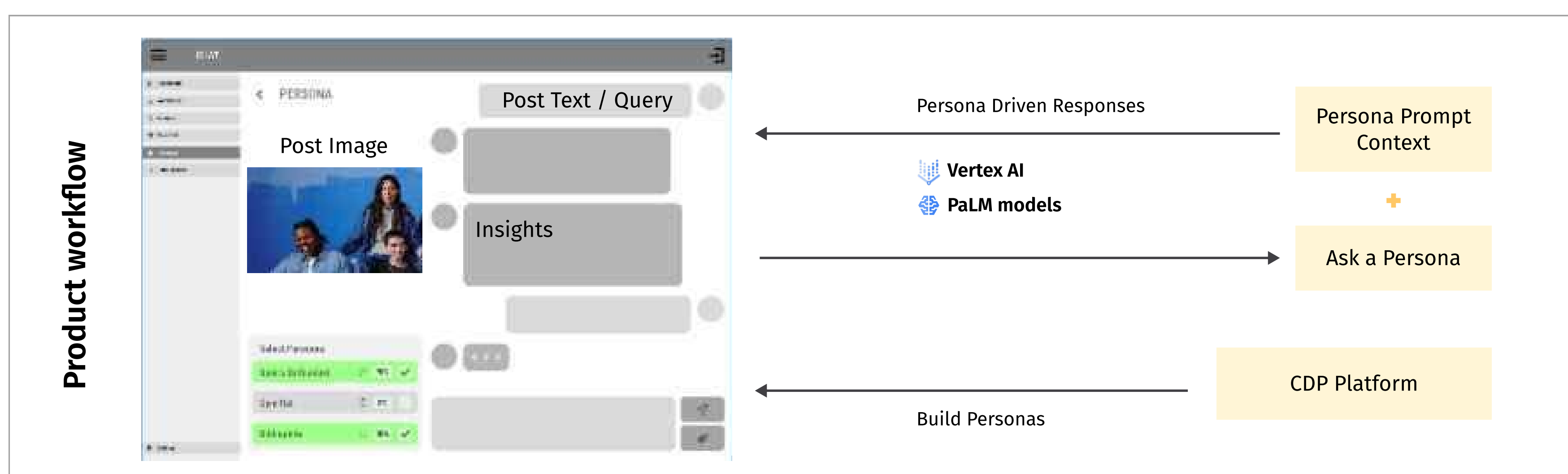
Industries



Retail & Brands



CPG & Manufacturing



Response

We present our groundbreaking AI-powered virtual focus groups tailored to revolutionize market research practices in manufacturing. Our solution harnesses LLMs to create realistic customer personas, enabling businesses to simulate interactive discussions and gather valuable insights in a virtual setting. With this innovative approach, manufacturing companies can overcome logistical constraints and conduct scalable, cost-effective virtual focus groups that provide a deep understanding of their target audience.

For example, let's consider a manufacturing company that is developing a new product line targeted toward industrial automation. Traditionally, conducting focus groups to gather feedback from potential customers would involve significant logistical challenges, such as coordinating schedules, managing travel arrangements, and ensuring diverse participant representation. However, by adopting AI-powered virtual focus groups, the manufacturing company can overcome these hurdles.

Using our solution, the company can create AI personas that accurately represent its target audience, including engineers, technicians, and other industry professionals. These personas can engage in simulated interactive discussions, providing valuable insights into preferences, pain points, and expectations regarding the new product line. The virtual format eliminates geographical barriers and enables participation from a wider pool of participants, ensuring a more comprehensive and diverse range of feedback. This enables manufacturing companies to conduct market research in a cost-effective and scalable manner, facilitating informed decision-making and enhancing the success of their product offerings in the market.

Enabling real-time decision-making using data querying and summarization


Problem


Split-second, data-driven decisions in manufacturing impact the positioning of businesses in a crowded market. But leaders often struggle to do so due to the manual and time-consuming process of analyzing extensive and diverse data. This process requires expertise in data modeling, analytics, and a deep understanding of statistical concepts. The delay between human analysis and executive decision-making often results in missed opportunities and hinders operational efficiency.


Value proposition


- **Cost Out:** Eliminate manual data analysis and dashboard maintenance
- **Growth:** Unlock previously missed opportunities, and engage leadership
- **Efficiency:** Reduce time lag between data acquisition and decision making

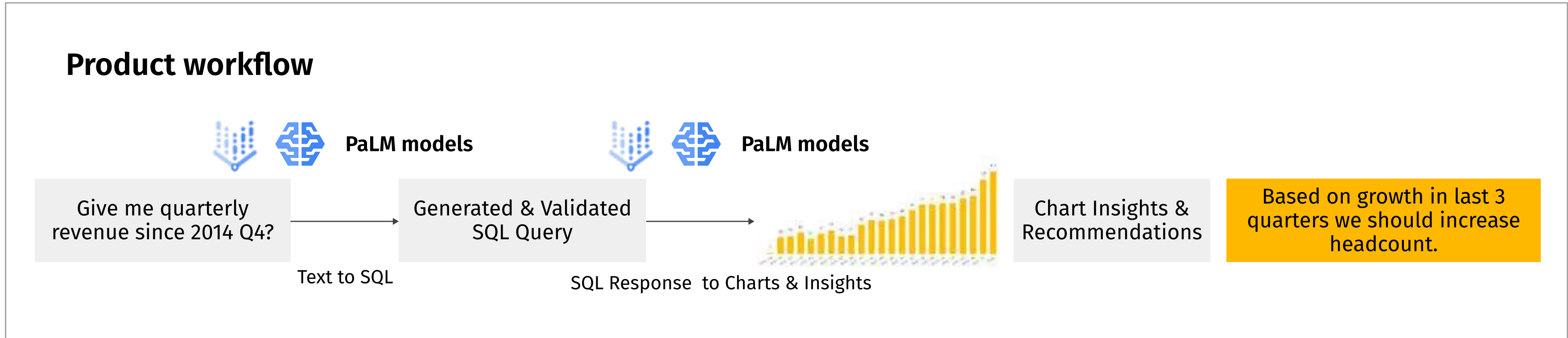
Industries

Retail

Healthcare and Life Sciences

Financial Services

Manufacturing



Response

Our generative AI solution tailored for the manufacturing industry unlocks the full potential of your business data. By combining the power of LLMs with advanced data processing techniques, we revolutionize the way complex structured data is transformed into actionable insights in real time. This transformative approach enhances data-driven decision-making processes and provides your business with a significant competitive edge.

Imagine a manufacturing company that produces electronic components. They generate a vast amount of data from production lines, quality control systems, and supply chain operations. Analyzing this data manually and deriving valuable insights promptly can be a daunting task. However, our solution allows the company to rapidly process and analyze its data by leveraging LLMs. The AI system can identify patterns, anomalies, and correlations, providing real-time insights to decision-makers.

Our generative AI solution goes beyond data analysis. It can suggest the next best action based on the analysis using natural language to empower manufacturing businesses to optimize their processes, improve quality control, and identify opportunities for cost reduction or performance enhancement.

- Operators will have a better understanding of display machine statuses, part counts, or other KPIs to ensure they’re meeting production goals.
- Plant managers wouldn’t need to decipher visible production dashboards to see where operators need support or when machines are down.
- Engineers will understand bottlenecks without needing to comprehend aggregated shop floor data to tweak processes accordingly.

While we have discussed the core application of generative AI in manufacturing, discover additional use cases of generative AI in various functional roles, such as marketing and customer service, within the manufacturing industry and beyond. [Read this article to explore these applications.](#)



Conclusion

As manufacturing leaders embrace a product mindset and harness the power of data, the transformative impact of generative AI becomes a compelling opportunity. By leveraging this technology, manufacturers can unlock the full potential of their data resources and drive value creation across various aspects of their operations. However, it is crucial for manufacturers to develop a data-first culture and establish an infrastructure that supports automated real-time collection of shop floor data. By making decisions rooted in accurate, real-time production data, manufacturers can drive efficiency and innovation throughout the value chain. While reaching this level of data sophistication may take time, manufacturers must remain vigilant in error elimination and continue exploring generative AI use cases with specific datasets, logic, and guardrails.

Partner with Grid Dynamics to amplify the impact of generative AI. Our proven track record of delivering successful enterprise AI solutions highlights our expertise in defining pragmatic use cases, change management guidance, and strong engineering capabilities. We collaborate closely with the best cloud providers to unlock the full potential of your data, driving innovation and delivering tangible results.

Contact us now and embark on your AI-driven journey of success. #PrepareToGrow

Don't let your data go untapped. Embrace generative AI with Grid Dynamics to adopt a product mindset that helps you reach greater milestones. Seize the opportunity to lead the industry with AI-driven excellence.

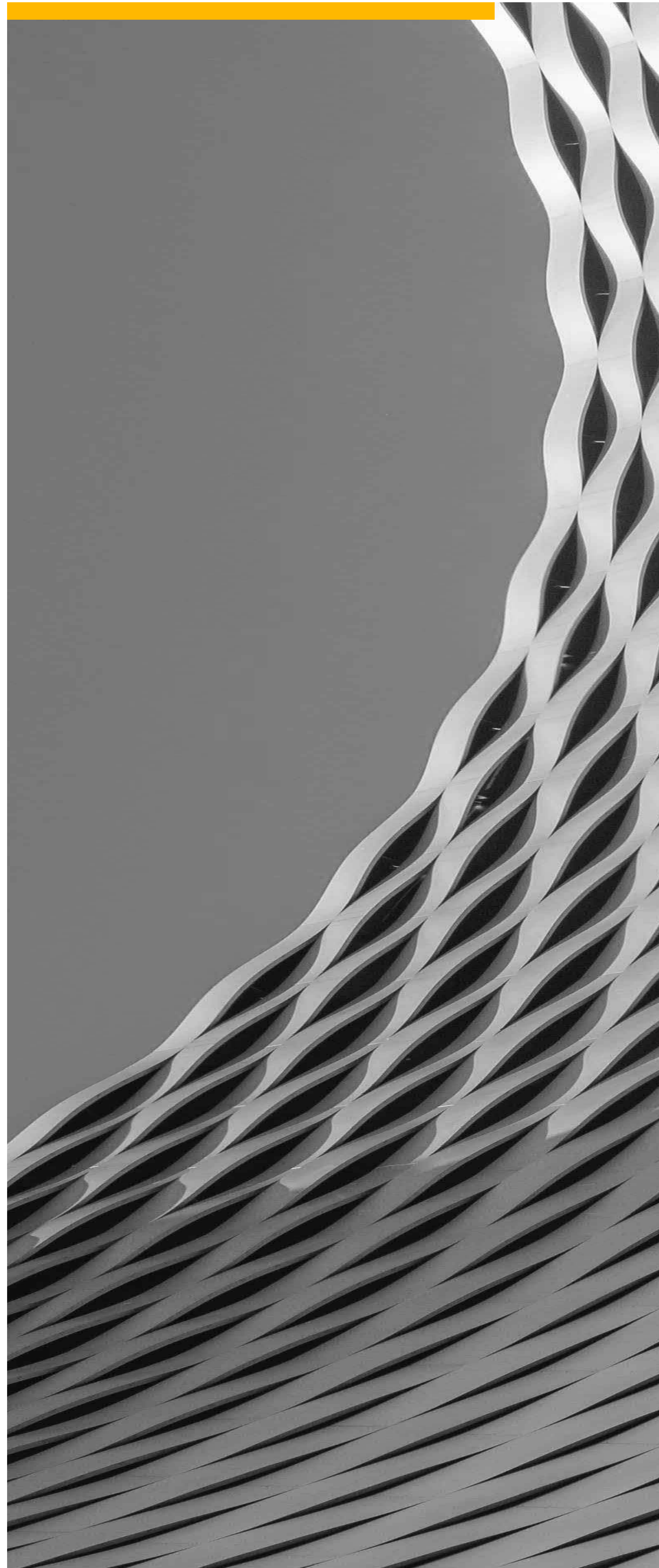
About Grid Dynamics

Grid Dynamics is a global digital engineering company that co-innovates with the most respected brands in the world to solve complex problems, optimize business operations, and better serve customers. Driven by business impact and agility, we create innovative, end-to-end solutions in digital commerce, AI, data, web UI and UX, and cloud to help clients grow.

Headquartered in Silicon Valley, with delivery centers located throughout the globe, Grid Dynamics is known for architecting revolutionary digital technology platforms for 7 of the 25 largest retailers in the US and 3 of the 10 largest consumer goods companies in the world, as well as leading brands in the digital commerce, manufacturing, finance, healthcare, and high tech sectors.

Our secret sauce? We hire the top 10% of global engineering talent and employ our extensive expertise in emerging technology, lean software development practices, a high-performance product and agile delivery culture, and strategic partnerships with leading technology service providers like Google, Amazon, and Microsoft.

In 2020, Grid Dynamics went public and is trading on the NASDAQ under the GDYN ticker.





About Grid Dynamics







Key facts

- Offices across the US, Mexico, UK, Europe, and India
- Thousands of employees across the globe
- Proprietary starter kits developed in collaboration with AWS, Google Cloud, Microsoft Azure, and others

Areas of expertise

- **Experience engineering**
Web UI | Mobile | UX | AR/VR
- **Data Science and AI**
Search | Personalization | Supply chain | IoT
- **Platform engineering**
Microservices | MACH | Composable
- **Data engineering**
Big data | Streaming | MLOps
- **Cloud and DevOps**
CI/CD | AIOps | SRE | QE

Clients

| | | |
|---|---|---|
|  | Google | JABIL |
| align |  |  |
| RAYMOND JAMES | fiserv. | AMERICAN EAGLE |
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