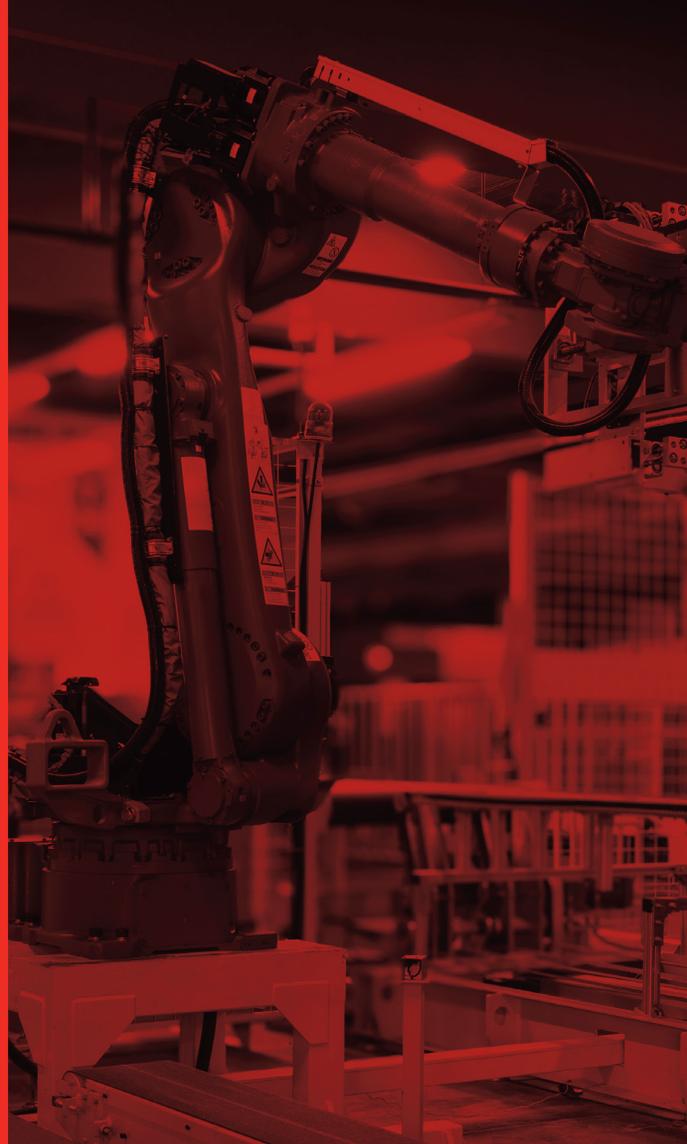# Driving Business Outcomes with Master Data Management in the Supply Chain

Over the better part of the 21st Century, supply chain researchers and practitioners have generally agreed on four areas of focus to propel supply chains into the future: moving from customer satisfaction to customer enablement, raising the stakes on sustainability in operations, transforming real-time analytics into real-time execution, and implementing human-centric work designs & automation to address labor challenges. There's obviously a lot to unpack within each of those topics and what they could practically look like. Thankfully, there are some key elements that cut across all areas and without them, success would be near impossible. One such element is master data management. Master data management ("MDM") is the proverbial foundation from which all organizational systems and processes stand upon. Clean and accurate master data, paired with a strong MDM capability, can make execution feel effortless and seemingly unsurmountable challenges attainable. Fractured and incomplete master data suffering from an undisciplined MDM approach cripples operations with loads of wasteful and non-value added tasks and processes. In this white paper, we'll break down exactly what MDM is, how it should fit into your organization and what different industry scenarios could look like.

Master Data & Master Data Management

While this may seem obvious to most organizations, MDM can be a ubiquitous term that's thrown around to either mean just one piece of key data or anything data related, and neither is true. The fact is, MDM is concise in what it calls master data and what the management of that data looks like. Master data represents the essential information that defines the key components of the organization's supply chain. Unlike transactional data (e.g., an invoice, a shipment) or analytical data (e.g., performance metrics), master data describes the core objects around which business processes revolve. The "big three" master data objects that get the most attention are **Products** (stock-keeping units (SKUs), dimensions, weight, descriptions, bills of materials), **Entities** (Customers, Suppliers/Vendors, and their associated information), and **Locations** (Types, addresses, , contract details, etc.). Equally as important, and argued by some as not even classifiable as master data due to its dynamic nature, is Reference data (Pricing, inventory levels, and transportation rates).

With the understanding of master data in hand, Master Data Management is the set of processes, policies, governance frameworks, and technologies used to create, maintain, and distribute / make available trusted master data by all stakeholders (internal and external). Common goals that can be found within the Management practice are data accuracy, consistency, completeness, governance and accessibility. MDM as a complete approach ensures, as an example, that a supplier record created in a procurement system matches the corresponding record in an ERP, TMS, WMS, and/or CRM, avoiding duplication and confusion. It allows every system in the supply chain to reference the same, reliable data.

What do MDM Systems Look Like?

While specifics can vary between organizations, MDM systems – the people, processes and technology, all follow the same general approach. The individuals or teams that support MDM are typically attached to a larger department or functional area such as IT or Inventory Management but if organizational demands are high enough, they can function autonomously. In terms of what departments most MDM Teams cohabitate with, that can also depend on the industries your business operates within. Retail organizations often see MDM within the purchasing / merchandising group or part of IT given the heavy data integration between systems. Wholesale or manufacturing organizations will typically attach MDM to inventory or quality assurance groups to ensure compliance or product component attributes are accurately maintained. 3PLs, the most execution focused, will attach MDM to Operations or other execution focused teams for direct support in meeting customer needs. One key point to avoid with MDM resources is excessive desegregation between groups. Spreading MDM out too far often drives confusion on ownership and governance and slows the overall data process considerably. Even with advances in applications and workflow, defining clear individual/team owners to ensure policies and processes are adhered to.

Processes within MDM fall into two categories: data creation and data management (or governance). Creation can be enabled by either user interface or software via data integration, which is straight forward and creates standardization / compliance. Certain users interact with forms or an upload screen to populate the required amount of data attributes to create a data record. Software driving the creation process is a similar flow with the additional requirement that the data must already exist somewhere accessible (example: product data in your ERP creating product data in your WMS). Where the rubber meets the road is in management. What are the minimum required data attributes to create records? Are there multiple levels of approval before a record can be used with transactions? Who can update what and when? It's most likely through the management processes that you can expect your MDM Teams to exude most of their value ensuring that data accuracy and completeness exist across all business nodes.

Finally, there's technology that hosts the data, supports management processes and integrates with all necessary applications. The most common piece of technology that enables master data is part of an existing primary tool such as an ERP software or other core supply chain execution application, like TMS or WMS. The main value derived from the embedded MDM tools is it elevates some (not all) integration requirements, often allowing direct access to purchasing and ordering transactions also housed in the ERP tool while offering enough core MDM capabilities to support the Business. There are some industries where data requirements and accessibility are so complicated

that looking to a stand-alone application is best practice. MDM applications like these can scale with data requirements faster and allow for the implementation of data-centric capabilities without significant customization and potential impact to live transactions. Consider the complexity in a large diverse organization with very different lines or business or channels, with or without regulatory requirements, trying to update UOMs for existing products 'live' with orders-in-hand distributed in different systems. Regardless of the technical aspect, data integration between the MDM host software and other systems is critical; even the sharpest MDM Teams with the tightest processes will struggle to add value if that data is stuck siloed in one software system unable to transmit or receive data that doesn't meet the necessary goals of accuracy and completeness.
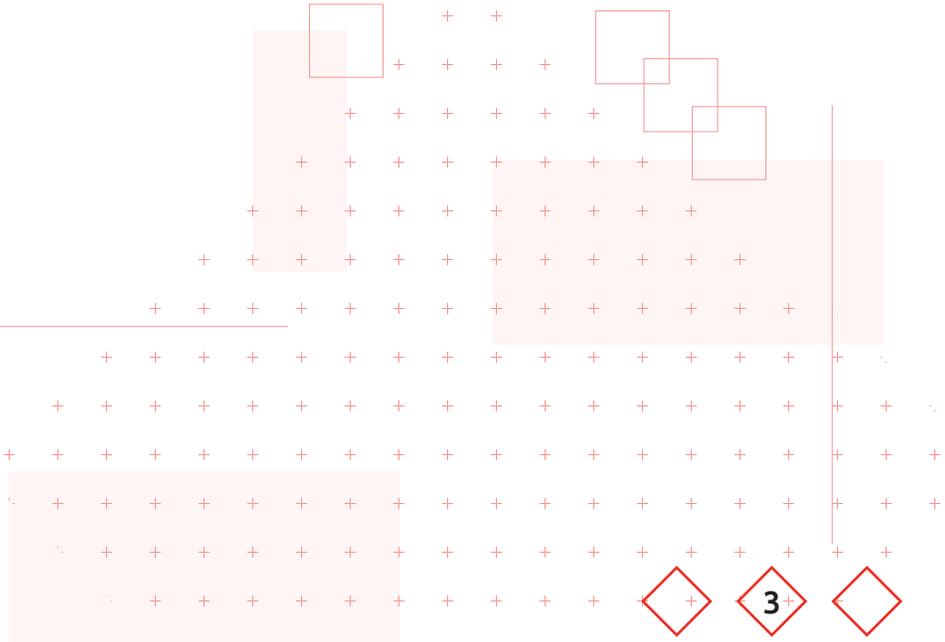
What Role Does MDM Have in Your Data Architecture

An organization's data strategy and architecture exist to align the business need and create a framework for how an entire organization's data is created, consumed, and managed across all systems and how the support and utilization of that data is for the organization's current and future needs. All functions exist in this framework: HR systems, procurement, inventory, OMS, WM / Labor tools, transportation, data integration, accounting and finance, etc. Because master data and its management practices are ubiquitous, it is not a stretch to model MDM as its own node, regardless of its ultimate home (embedded or independent). Visualizing master data with its key elements, inputs and outputs will add much needed clarity on where and how critical data enables all supply chain processes. Imagine the basic features of a standard western house; it has a foundation, walls, rooms, floors, cabinets and fixtures. Major process areas around purchasing, orders and finance will likely comprise some of the larger rooms and features while supporting functions like logistics, inventory and IT have some of the smaller (but no less important) spaces. MDM is the foundation. Whether a basement, crawlspace or slab, MDM is the basis point which all other capabilities need to stand on top of and if your foundation is lacking or mismanaged, nothing else will work properly. Strategically thinking about MDM as the foundation in your data architecture will allow an organization to build their supply chain processes in a coherent manner to enable more efficient execution coupled with better decision making through better data.

MDM In Action

Here are some industry scenarios of MDM in practice to show what success could look like in these different spaces.

A Grocery Retailer Struggling with Product Data

A popular, regional grocery chain offering CPG, fresh, and frozen products has traditionally managed MDM through its IT group with corporate buyers owning the creation of all master data (vendors, stores and products). The buyers use several different Excel templates to bulk import and create product records in their ERP and submit requests to the IT group for reports and updates to that product data once created. Products are directly integrated with their WMS and in-store POS systems; not through an integration layer, but through a point-to-point data exchange with no auditing or controls if there's any issues when moving the data. The primary issue facing this retailer is a swarm of inefficient processes around not just product creation but overall product management while trying to support their day-jobs as category buyers. In addition to the 100+ data attributes required by the organization to support POS, warehouse, and transportation process, the buyers can collect up to an additional 800+ data attributes manually from their vendors to support marking, food safety, traceability and certifications required by the retailer to maintain per government regulation. The overall data burden was crushing.

To address the issues, leadership made two key moves to improve the timeliness and data accuracy across the organization. First, the MDM effort moved out of IT and joined the buying team to facilitate faster and more timely communication and engagement creating and managing data across the ERP, warehouse and POS platforms. This way, new process controls necessary to implement into MDM would have direct input and engagement with the primary sources of that data. Second, the retailer engaged with a third-party data partner called 1WorldSync to gather, collate and transmit all the additional product data from vendors directly into the retailers ERP system removing the time spent managing the additional data sets with Excel. Overall, the buyer team netted back about 40% of its working time previously spent on mundane data tasks.

An Equipment Manufacturer in the Oil and Gas Industry with a Complex Vendor Program

A commercial equipment manufacturer making a variety of complex devices for oil and gas refineries currently has a very disaggregated and siloed master data process. Little to more formal management exists and creation across multiple systems is relegated to individual teams responsible for their own software tools and processes. An email distribution list acts as the communication medium for whoever is driving the creation of product, customer or vendor data. Accounting owned data creation for the aging ERP just to facilitate payables, invoicing and GL posting, operations owned generating data for materials planning and the WMS and business development owned customer data and final assembly/finished goods product data

into the CRM and custom OMS tools developed on top of the ERP. It took countless hours across several resources to create weekly business KPIs and P&L content due to the poor data, not to mention the countless untracked rework tasks that plagued supply chain teams trying to execute production runs and get product out the door.

Operations' motivation to take this on came from the poor product data that severely impacted material resource and production planning and caused bills of material to be wrong, raw material yields to be off and overruns in labor costs to fix the data and output shortfalls. First, they expanded the existing operations support team into an independent MDM Team that would report up through operations dedicated resources responsible for both creation and governance. Second, they standardized the minimum required and optional data fields for products, vendors and customers to ensure accuracy, clarity and completeness of all data created. Organizational teams could still submit requests for data to be entered but access across all applications would now be limited and centralized to the MDM Team. Finally, MDM and operations worked with IT to expand the technical capabilities of the existing data tables in the ERP and integrated master data to all required systems, eliminating the need for duplicate entries of data. This made the ERP the official system of record and one source of the truth for master data. After the initial cleanup and 30 days under the new processes, operations saw a 3% cost reduction and a 6% increase in production throughput from fixing master data.

The organization is excited to now explore business intelligence (BI) tools to automate all their manual reporting and Excel sheets and enhancing the ERP master data tools further so they can extend limited creation access, driven by step-by-step workflow, and reduce manual request step to the MDM Team.

An Online and In-store Retailer
Leveraging Omni Capabilities in its Warehouses

A national retailer of apparel, footwear, jewelry, and cosmetics (with over 100 brick and mortar locations plus a growing e-commerce presence) recently opened a new distribution and fulfillment center with omnichannel capabilities. The Retailer designed the facility to simultaneously support store replenishment, new product delivery, online order fulfillment, deep storage and returns disposition. While the facility's go-live and hand-off to operations leadership went off without a hitch, the broader organization uncovered a much bigger problem: they couldn't flow product through the building in an omni fashion. From inbound receiving to shipping, systems and processes in the facility could only support in-store deliveries or online fulfillment one at a time. After several weeks of research, proliferation of vendor and product data was identified as the culprit. Thankfully, supply chain leaders had some recent, hard earned perspective on master data when they attempted to roll out a third party dimensioning process to its older buildings to improve slotting and storage utilization and ran into a similar set of issues. The MDM team resided with Merchandising and, while they're a capable team with a good set of internal controls, populating supply chain data typically took a backseat to marketing, sales

and advertising data to drive sell through. Furthermore, the MDM tools currently within the decades old ERP were deeply tied into the core architecture of the enterprise system resulting in a proliferation in product and vendor records to indicate a change in purchase price, ad buy, UOM, serialization, etc. While supply chain leaders and the broader organization had the right mentality to implement an omni strategy, these MDM constraints sidelined much of that effort.
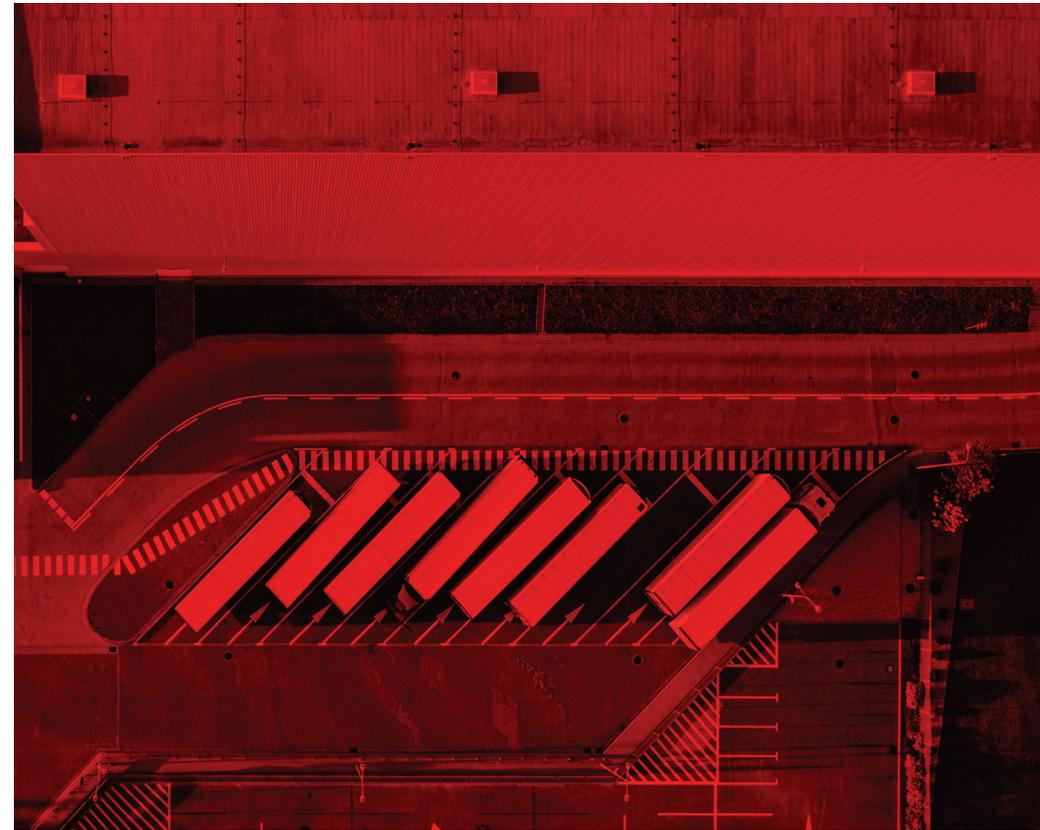
To unblock the move to omni, supply chain leaders effectively persuaded the MDM team to move out of Merchandising to a more neutral vertical: Inventory & Quality. Residing there, it would still own creation, governance and maintenance of master data but it would be much closer to supply chain operations, transportation and downstream logistics teams supplying e-comm and stores. While the change was first met with some skepticism, after focused change management activities, both the Inventory and MDM teams were able to glean quite a bit of value from each other's processes and focus areas throughout the supply chain. With the right people in the right place and processes in play, the newly formed team sought IT's help to solve the technical challenges. As mentioned before, customizing the existing master data fields and forms in the ERP was a nonstarter so IT and MDM looked outside the ERP for an approach. After a brief RFP, they obtained organizational buy-in to purchase licenses and implement a third-party MDM cloud application to house all their master data and governance. The new tool would integrate with the existing ERP and all other supply chain execution applications to provide both real time and near real time master data to execute against. After the changes, the new omni facility was able to hit it's ROI goals months ahead of schedule all the while operating on a third of the budget compared to other legacy facilities in the Retailer's network.

The Tactical and Strategic Value Proposition of MDM

From the example scenarios above, the viewpoint of master data and how best to manage can vary wildly from both peer organizations and top performers. Some companies, like our Grocer on one hand, had a strong tactical justification to elevate labor and reduce overhead hours slugging through tons of data for vendors; it returned time back to focus on customer facing needs rather than the back-office demands. On the other hand, our Retailer surprisingly had a demand planning problem that stalled a $50 million plus greenfield building launch. Solving this challenge had a tactical goal (depending on your viewpoint) of going live with the new building but the reality is a much more strategic in nature for the Retailer. Refocusing MDM with Inventory and improving their technical capabilities unlocked more omni brownfield opportunities for existing sites, improves store operations offerings with consumers (BOPIS, BOSS, SFS, etc.) and creates better execution for free shipping, expedited processing, gifting and other fulfillment VAS, and online returns initiation to credit. Overall, what these example MDM scenarios illustrate is that an organization's approach to master data should evolve with the organization, not despite it. Each of these scenarios had a process for data but ultimately outgrew it resulting in a substantive amount of pain felt throughout.

Artificial Intelligence's Evolving Role in MDM

Frankly it's hard to not see something pertaining to AI industry periodicals or technical solutions regarding supply chain. Unfortunately, most of the rhetoric is too futurist evoking Skynet-esque scenarios or near-perfect utopias or is too generic lacking any substance for supply chain leaders to act upon. Yes, AI as a fully formed capability is still in its infancy for MDM but it's growing exponentially and there's real value starting to surface for early adopters who are taking the leap. Unsurprisingly, master data is one of those early benefactors of AI advancements with tangible savings attached in three specific areas. First, traditional machine learning (ML) can support better classification of data and alert MDM team members of data anomalies it notices, either based on similar data already in existence or other data sources. ML observes corrections MDM users make to datasets and supports those corrections going forward for other qualifying data based on indicators it's trained on (product descriptions, industry classifications, supplier info, etc.). Next, Natural Language Processing (NLP) and Large Language Models (LLMs) take ML one step further by smoothing and standardizing data to meet organization objectives ("US" to "United States" or parsing out contact info into the correct fields). Finally, reinforcement learning models can augment existing workflow and business rules to ensure compliant use of both creating and maintaining data and highlighting risk areas based on historical issues and anticipate future ones. There is a fourth concept that is more of a bleeding edge for MDM but worth mentioning based on its

growing popularity, generative AI. Think something akin to ChatGPT to provide data recommendations, next steps and allow your systems to "interact" more dynamically with users.

Master Data Management Success Factors

With Master Data and MDM defined, and describing how MDM plays into the organization's strategy and architecture with real-world use cases, here are some key success factors to focus on in the MDM journey:

- Take an honest and objective view of how you're creating and managing your data today. Don't just assume that your current processes and the resources allocated to them are how it must be and that you must somehow engineer your way around that. Go through the exercise of modeling your ideal process and approach and work backwards from there either implementing small changes to get to your goal or knock out the biggest changes first to add the most value the fastest.

- Do not assume technical changes are always the answer or the first thing you need to do. While software and tools will undoubtedly play a role, consider some simpler, low hanging fruit first and measure the value. If it's working and morale is responding to that, keep going, otherwise check and adjust before laying out significant capital.

- Bring MDM into the strategy and planning conversations. Between the discussion points above around system architecture and strategic value, elevating MDM to these higher-level conversations and decision-making keeps how the organization manages its data in step with all other strategic goals and objectives and not an afterthought.

- If you're considering a third-party MDM software, make sure your integration strategy and capabilities are strong and up to the task of supporting data transformations to all your necessary systems. The last thing you want is to invest in a high-powered sports car only to not be able to get it out of the garage.

Final Thoughts

Master data management is foundational to building resilient, efficient, and strategically aligned supply chains. Without consistent, accurate, and well-governed data, investments in advanced technologies, sustainability initiatives, and customer experience enhancements cannot deliver their intended value. The evidence is clear: organizations that prioritize MDM are better positioned to achieve real-time visibility, regulatory compliance, cost efficiency, and strategic agility. As supply chains continue to expand in complexity and global reach, the importance of MDM will only increase. By embedding robust governance frameworks, leveraging AI-enabled tools for automation and quality assurance, and fostering a culture of stewardship, enterprises can ensure that their master data supports both current operations and long-term growth. Ultimately, MDM is not simply a technical requirement but a strategic operational enabler—turning information into action and insights into competitive advantage.
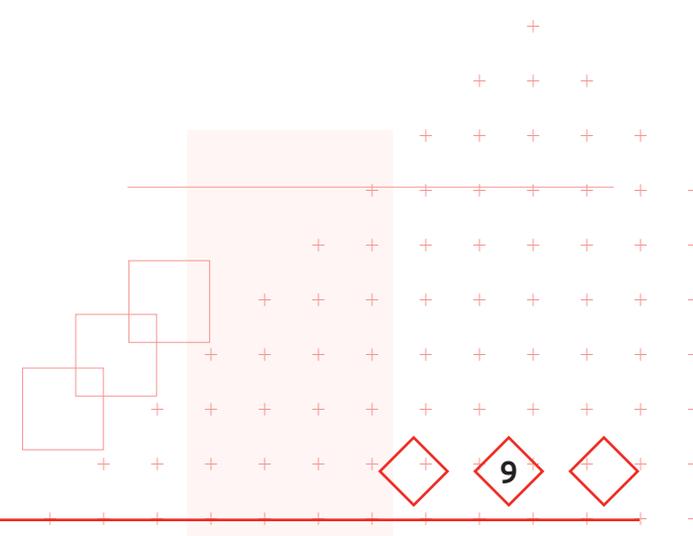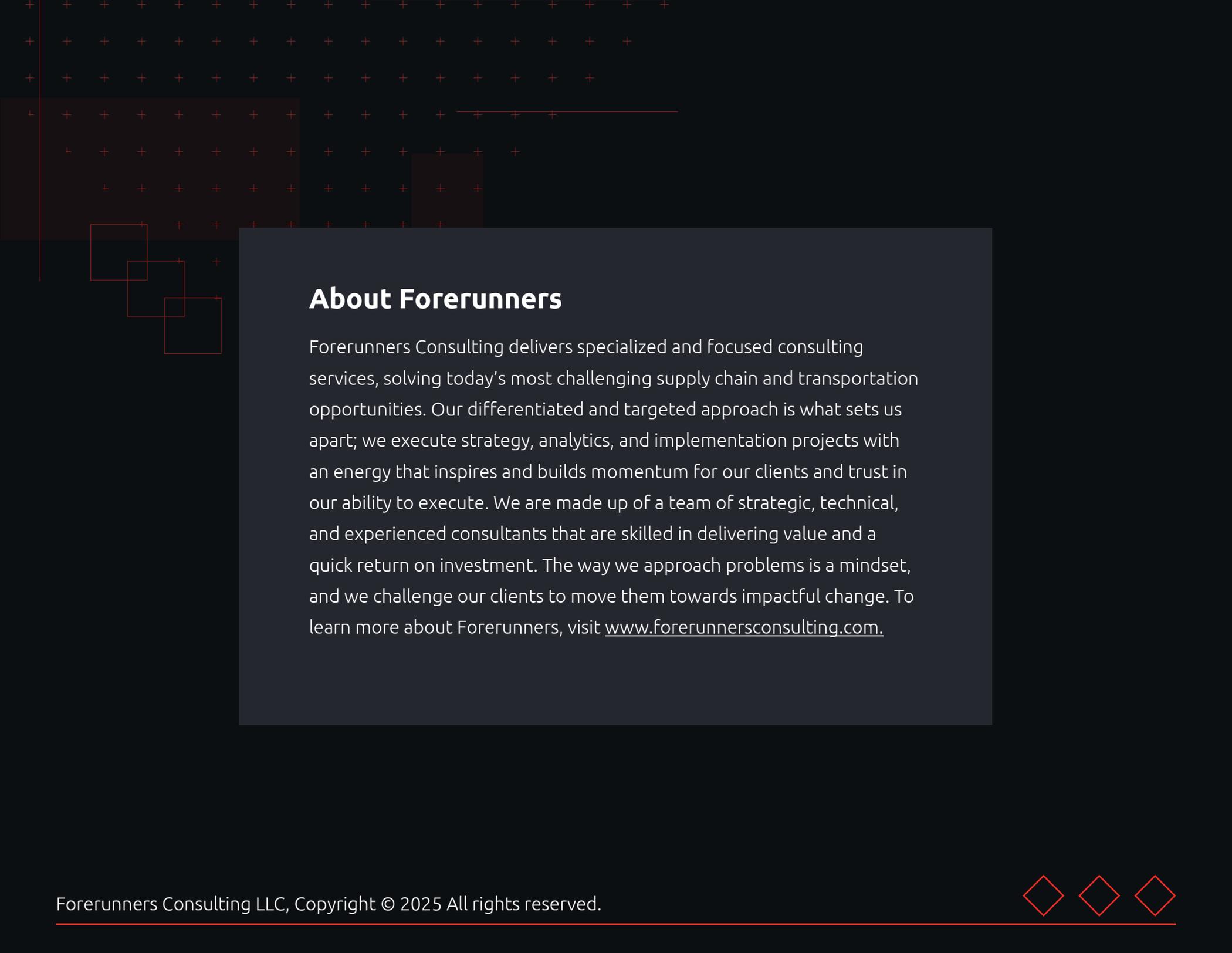
About Forerunners

Forerunners Consulting delivers specialized and focused consulting services, solving today's most challenging supply chain and transportation opportunities. Our differentiated and targeted approach is what sets us apart; we execute strategy, analytics, and implementation projects with an energy that inspires and builds momentum for our clients and trust in our ability to execute. We are made up of a team of strategic, technical, and experienced consultants that are skilled in delivering value and a quick return on investment. The way we approach problems is a mindset, and we challenge our clients to move them towards impactful change. To learn more about Forerunners, visit www.forerunnersconsulting.com.