TIMEXTENDER

THE RISE OF THE MACHINE ECONOMY

Preparing Supply Chains for a Data-Empowered Revolution

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THE RISE OF THE MACHINE ECONOMY

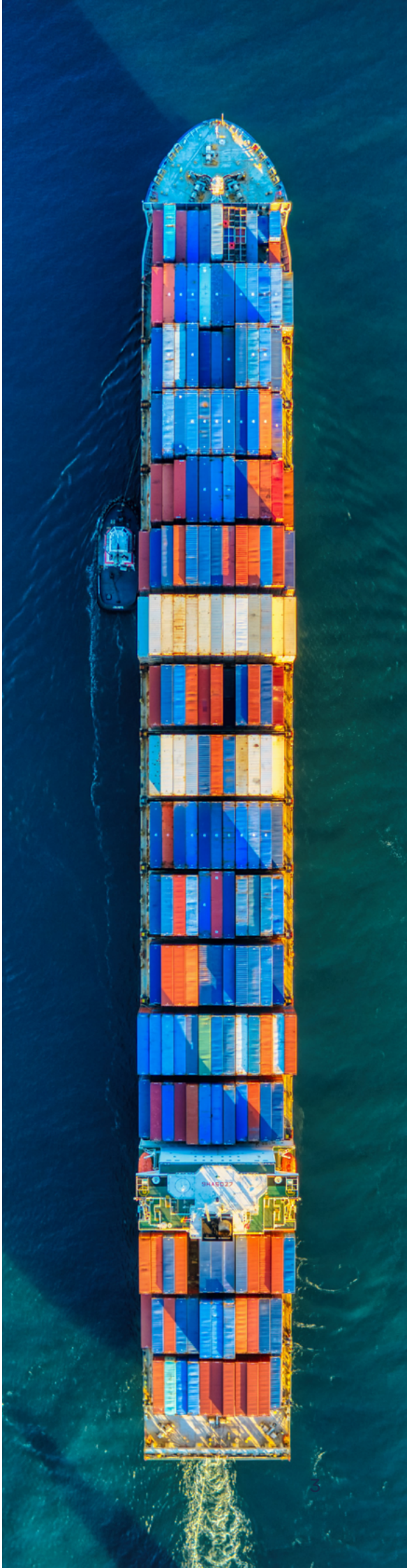
Supply chains around the world are experiencing major disruptions as traditional methods of production, transportation, and logistics are increasingly being taken over by artificial intelligence, autonomous machines, and smart automation.

This shift is sure to have far-reaching implications for the global economy. As businesses begin to rely more heavily on data and artificial intelligence to automate tasks, generate forecasts, make better decisions, and streamline operations, managers will need to adapt their strategies to account for this new landscape.

In particular, they will need to focus on developing data and analytics capabilities that allow them to monitor performance and quickly respond to rapidly-changing world events, market demands, and economic conditions.

The transportation and logistics industry is at a crossroads, and the choices you make today will determine whether you will thrive in this new “Machine Economy”, or be left behind.

However, this industry is particularly well-suited to take advantage of these new technologies. Those who are able to adapt their strategies will be well-positioned to reap the benefits of this new era.



THE MACHINE ECONOMY IS NOW UPON US

	GOING DIGITAL	GETTING SMART	
2000s	2010s	2020s	2030s
	Digital-centric organizations were the winners of the last decade	AI, Machine Learning, and smart automation will drive 70% of GDP growth over the next decade.	

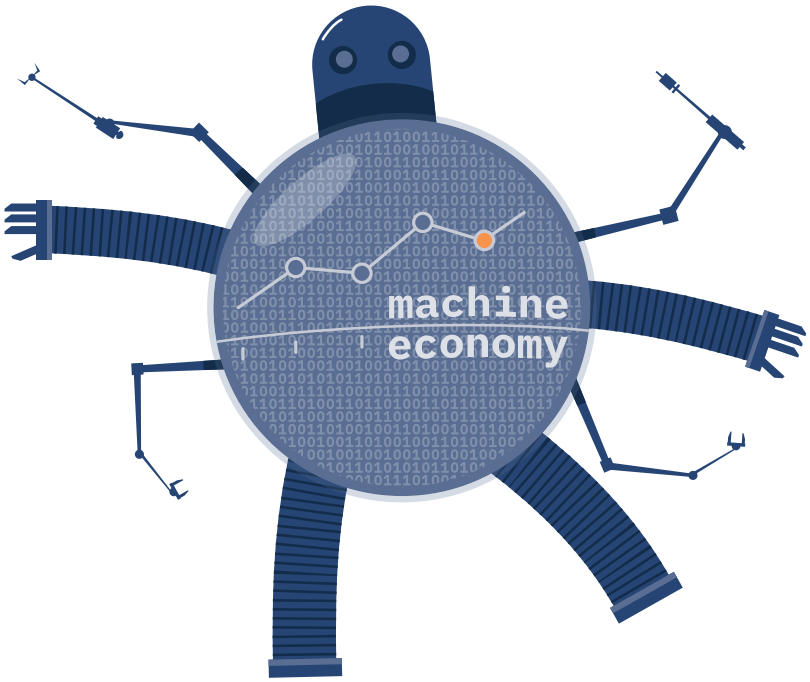
It seems like every day, there's a new story about how machines are taking over the world.

The cultural zeitgeist of the past several decades has been marked by a sense of impending takeover by our "robot overlords". We see examples of this constantly in media and entertainment, which often paint the picture of a grim, dystopic future in which humans are rendered obsolete by our own creations (Terminator and The Matrix being prime examples).

However, artificial intelligence is more than just a buzzword or a science fiction trope, and it's not nearly as frightening as these depictions might have you believe.

...well, not yet, at least.

In any case, smart technologies are already having a major impact on businesses and industries around the world, and it is crucial that transportation and logistics companies take note of these changes.



THE FOURTH INDUSTRIAL REVOLUTION

Industrial revolutions are driven by the introduction of new technologies that allow for increased production and efficiency. The first industrial revolution was powered by steam and water, the second by electricity, and the third by digital technology.

Now we're in the midst of a fourth industrial revolution, driven by data, artificial intelligence, autonomous machines, interconnectivity, and smart automation.

In this new "Machine Economy", organizations will increasingly use these smart technologies to automate tasks, streamline operations, deliver superior customer experiences, and quickly gain market share over traditional players.

To understand the enormity of this shift, here are 3 statistics you need to be aware of:

Artificial intelligence, machine learning, and smart automation will drive ***70% of GDP growth***[1] over the next decade.

By 2030, AI will contribute an estimated ***$15.7 trillion***[1] to the global economy, more than the current output of China and India combined.

62% of business leaders[2] are putting plans in place to succeed in a world filled with smart automation and connected machines – 16% are already investing and performing strongly.

It's now clear that decision-making AI and machines will be the primary driver of economic growth over the next decade. However, organizations are already creating and utilizing all kinds of intelligent machines today.

Here are a few real-world examples

> ***AI-powered applications*** automate repetitive tasks.
> ***Machine learning algorithms*** analyze data, uncover insights, and make predictions.
> ***Chatbots*** provide customer support and resolve issues.
> ***Factory robots*** assemble products faster and with greater precision.
> ***Autonomous vehicles*** efficiently deliver goods and materials.
> ***Connected IoT devices and smart sensors*** collect data, track inventory, and more.

This is just the beginning. Over the next decade, we will see an exponential increase in the advancement and adoption of these technologies. The smarter these technologies get, the more they can do for us, especially when they start engaging with each other autonomously[3] to carry out production and distribution, without the need for human intervention. It's clear that we've entered the age of the Machine Economy. Transportation and logistics companies must prepare now to adapt to these changes or risk being left behind.

What These Changes Mean for the Transportation and Logistics Industry

In many ways, the story of the "Machine Economy" is really the story of the transportation and logistics industry. After all, transportation and logistics companies have always been at the forefront of using new technologies to improve efficiency, optimize operations, and quickly respond to change. However, the changes taking place now are happening at a much faster pace than ever before. In order to stay ahead of the curve, you must start preparing for this data-empowered future now.

DATA IS THE LIFEBLOOD OF THE MACHINE ECONOMY.

AI & Machine Learning
Smart Automation
Self-service assistants
IoT Sensors
Autonomous vehicles

These technologies all rely on data, but they're also generating massive amounts of data.

While the opportunities that these new technologies bring are incredibly exciting, none of it possible without data. Not only does the Machine Economy depend on data to operate, but all these smart applications, machines, and connected devices will also continue to generate exponentially increasing amounts of data. The last decade was a fierce data arms race, and that will be even more true in the Machine Economy as data continues to rapidly increase in both volume and value.

DATA STRAGGLERS WILL FALL EVEN FURTHER BEHIND

Data volumes are exploding, but expectations for how fast data should be curated, prepared, and delivered for analytics and AI/machine learning haven't changed. Many data teams are struggling to keep up, which has led to some sobering statistics.

The newcomers that are taking their place all have one thing in common: they have fast access to reliable data which they use to drive innovation, efficiency, and growth.

DATA-EMPOWERED ORGANIZATIONS WILL WIN

Over the last decade, the most successful organizations were the ones with the best data.

According to McKinsey Global Institute[7], data-empowered organizations were not only 23x more likely to acquire customers, they were also 6x more likely to retain customers, and 19x more likely to be profitable.

Data-empowered organizations gain huge advantages over their competitors, because they are able to quickly:

- ***Spot industry trends and new business opportunities***
- ***Anticipate customer needs and create better products***
- ***Optimize productivity, performance, and resource allocation***

Data scientists report spending around ***45% of their time***[4] just on data preparation tasks.

63% of employees[5] report they cannot gather insights in their required time-frame.

25% of business experts[5] have had to guess when making an important business decision because they couldn't get the data they needed.

The most sobering statistic of them all:

50% of today's S&P 500 firms[6] **will be replaced in the next 10 years as the Machine Economy picks up steam.**

Data analytics capabilities are now table stakes – the basic cost of doing business – regardless of your industry or company size.

EVERY COMPANY IS NOW A DATA COMPANY.

Now, we must all start preparing to use data in entirely new ways to power intelligent machines, automate manual tasks, and multiply our capacity to produce value for our customers.

HOW TO BECOME DATA-EMPOWERED & THRIVE IN THE MACHINE ECONOMY

As we've seen, data is the key to unlocking the potential of the Machine Economy. Today, both humans and machines need fast access to reliable data in order to make informed decisions. Unfortunately, data teams continue to face daunting challenges in the process of consolidating, preparing, and delivering reliable data to stakeholders.

The first step in this process is to extract data from a wide variety of sources (databases, CRM and ERP software, social media platforms, APIs, IoT devices, etc.). Once these data silos have been broken down, all that data must be consolidated into a central location, cleaned up, and prepared for analytics and AI/machine learning.

This process of data consolidation, cleansing, transformation, and rationalization is typically accomplished using 3 primary components:

Data Lake

Where you ingest and store all your raw data. The data lake can be used by Data Scientists for advanced analytics purposes using AI and machine learning.

Data Warehouse

Used to store curated, cleansed, and transformed data for business analysis and intelligence purposes.

Data Marts/Products

Provides business experts with a subset of data based on their specific domain or use case (sales analysis, finance, etc.), without overwhelming them with a huge data warehouse that contains all reportable data.

*WE REFER TO THIS MODERN INFRASTRUCTURE AS THE **"DATA ESTATE"***

OBSTACLES TO BUILDING A MODERN DATA ESTATE

Unfortunately, there are significant obstacles that can grind the process of building a modern data estate to a halt:

Exploding data volumes: As we've already seen, organizations are experiencing an explosion in both the amount and the types of data that need to be collected, stored, and processed from a growing number of sources.

A backlog of requests: Line of business teams outnumber data teams, which leads to a never-ending backlog of analytics requests. A quarter of business experts[5] admit they have given up on getting an answer they needed because the data preparation and analysis took too long.

Talent shortages: This assumes you already have a large data team of highly-specialized professionals who can do all this work. Demand for data and analytics skills is outstripping supply[8], leaving many companies struggling to find talent.

Constant re-skilling: Data and analytics professionals are under constant pressure to spend what little free time they have on learning the latest technologies, tools, and methodologies so they can update their skills and preserve their market value.

Burnout: The data team is often forced to spend significant amounts of time on manual, repetitive data preparation tasks, which can lead to burnout and high turnover. 79% of data professionals[9] have considered leaving the industry entirely.

Data quality, security, and compliance: 95% of data professionals[5] report fears or concerns around controlling access to sensitive data, accidental data deletion, errors when analyzing data that lead to poor decision-making, security breaches, and regulatory compliance issues.

Communication barriers: Even with a strong data team in place, communication barriers between business experts and the data team often create additional bottlenecks and slowdowns. 34% of business experts[5] admit they are not confident in their ability to articulate their data questions or needs to the data team.

These issues can cause bottlenecks and frustration, inhibit growth, and do considerable damage to your entire organization.

YOUR OPTIONS: STACKS, PLATFORMS, OR BUILDERS

APPROACH 1: THE STACK

The process of ingesting, preparing, and delivering data for analysis has traditionally relied on a highly-complex stack of tools, a growing list of data sources and systems, and months spent hand-coding each piece together to form data "pipelines".

The problems with this approach:

Manual coding & pipeline creation: New pipelines must be manually built for each data source, data store, and use case (analytics reports, for example) in the organization, which often results in the creation of a massive network of fragile pipelines. Most data professionals report that they spend up to 50% of their time[5] solely on these types of manual, repetitive tasks.

Stacks on stacks of tools: To make things even more complicated, there is often a separate stack of tools for managing each stage of the pipeline, which multiplies the number of tools in use and creates additional silos of knowledge and specialization.

Vulnerable, rigid infrastructure: Building and maintaining these complex data infrastructures and pipelines is not only costly and time-consuming, it also introduces ongoing security vulnerabilities and governance issues, and makes it extremely difficult to adopt new technologies in the future.

Fragile pipelines: These data pipelines are hard to build, but very easy to break. More complexity means a higher chance that unexpected bugs and errors will disrupt processes, corrupt data, and fracture the entire pipeline.

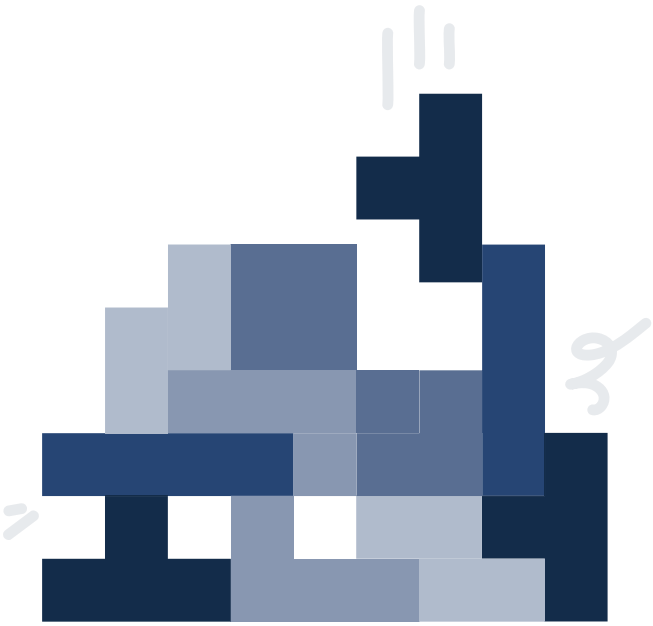
Manual documentation and debugging: Each time an error occurs, data engineers must take the time to go through the data lineage and track down the error. This is extremely difficult if the metadata documentation is incomplete or missing (which it often is).

No wonder 85% of these projects fail[10].

We know how slow, painful, and expensive this approach is from years of first-hand experience as IT consultants. We struggled through all these same issues when helping our clients build their data infrastructures.

APPROACH 2: THE PLATFORM

The data management market is now full of "platforms" that promise to reduce complexity by combining all your data storage, ingestion, preparation, and analysis tools into a single, unified, end-to-end solution. **While this might *sound* ideal, these claims start to fall apart upon closer inspection:**



Stacks in disguise: Most "platforms" are actually just a stack of tools that have been bundled together and sold under a complicated pricing model that nobody can figure out. The result is that you still need a large team of highly-skilled data professionals that specialize in using each tool within the stack (sorry, the "platform"), and you're still dealing with high training costs and siloed knowledge within your organization.

Stitched together like Frankenstein's monster: Since it's a "platform", you'd expect a simple, clean user interface, right? Instead, you get chaos. Yes, all the tools have been bundled together and sold by the same vendor, but they're often collected through acquisitions, and it ends up just being a big, ugly mess of incompatible code that has been haphazardly stitched together into a "platform".

Low-code: Many of these platforms brag about being "low-code", but when you dig into the details, there's usually only 1 or 2 features that actually have this functionality.

Welcome to data management prison: Worst of all, you end up being locked into a proprietary ecosystem that won't allow you to truly own, store, or control your own data. All tools and processes are pre-defined by the platform developer, and then hidden in a "black box" that you can't access or modify. Many of these platforms even force you to migrate all your data to the cloud, and do not offer support for on-premises or hybrid approaches.

Trying to escape might cost you everything: Not only do these platforms significantly limit your data management options, but if you decide to migrate to a different data platform later, you must rebuild nearly everything from the ground up.

These solutions are not truly "platforms", and they don't really "unify" anything. They're just stacks with better branding and a lot more restrictions.

APPROACH 3: THE BUILDER

It's clear that these old approaches to data management simply cannot meet the needs of modern data teams. The rapid pace of the Machine Economy does not allow for the bottlenecks, slowdowns, and limitations these approaches bring.

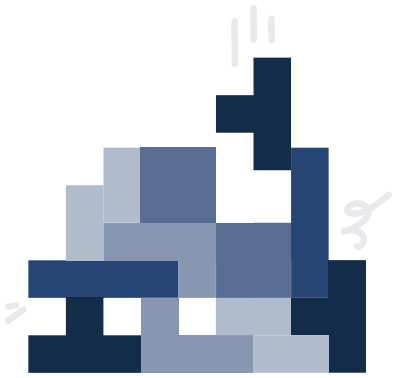
Data professionals around the world are in desperate need of a faster, smarter, more flexible way to build and manage their data estates.

To meet the challenges of the Machine Economy, data professionals need a solution that meets all 3 of these criteria:

Low-Code: It must be smart enough to build your entire data estate for you by automatically generating all the underlying code and documentation, from end to end.

Agile: It must provide both technical and business users with a simple, drag-and-drop user interface for quickly ingesting, preparing, and delivering corporate data for analytics and AI/machine learning.

Integrated: It must seamlessly overlay your data storage infrastructure, with no vendor lock-in, while integrating all the data ingestion, preparation, quality, security, and governance capabilities you need into a simple, unified, metadata-driven solution.

		NEW APPROACH
STACK	**PLATFORM**	**BUILDER**
MANUAL CODING AND A STACK OF COMPLEX TOOLS	*RESTRICTIVE, COMPLEX STACK OF TOOLS IN DISGUISE*	*ONE LOW-CODE, AGILE & INTEGRATED SOLUTION*
		
Army Of Developers	Big Teams Still Required	Small Efficient Team
Many Complex Tools Fragile Pipelines Manual Documentation	Many Complex Tools Poorly Integrated Restriction & Lock-in	One Integrated Solution Drag-and-Drop Interface Flexible & Future-Proof
High Cost of Personnel, Training, and Tools	Complex Pricing Model No Transparency	70-80% Reduced Implementation Cost

MEET TIMEXTENDER,
THE LOW-CODE DATA ESTATE BUILDER

TimeXtender empowers you to **build a modern data estate 10x faster** by eliminating manual coding and complex tool stacks. With our low-code data estate builder, you can quickly integrate your siloed data into a data lake, model your data warehouse, and define data marts for multiple BI tools & endpoints – all within a simple, drag-and-drop user interface.

TimeXtender seamlessly overlays your data storage infrastructure, connects to any data source, and integrates all the powerful data preparation capabilities you need into a single, unified solution. Because all code and documentation are generated automatically, you can reduce build costs by 70%, free data teams from manual, repetitive tasks, and empower BI and analytics experts to easily create their own data products – no more bottlenecks. We do this for one simple reason: **BECAUSE TIME MATTERS**

Goodbye, Data Management. Hello, Data Empowerment.

Data teams at top-performing organizations such as Komatsu[11], Colliers[12], and the Puerto Rican Government[13] are *already* taking this new approach by using TimeXtender[14], the low-code data estate builder.

By making the complex **simple**, and automating all that can be **automated**, our goal is to free up millions of human hours that can be used to **execute** on what matters most and change the world.

HOW TIMEXTENDER EMPOWERS EVERYONE ON YOUR TEAM:

Business leaders get fast access to reliable data, with 70% lower build costs and 80% lower maintenance costs.

Data teams get freedom from manual, repetitive tasks, and have more time to focus on higher-impact analytics projects.

BI and analytics experts get a code-free experience for creating their own data products – no more bottlenecks.

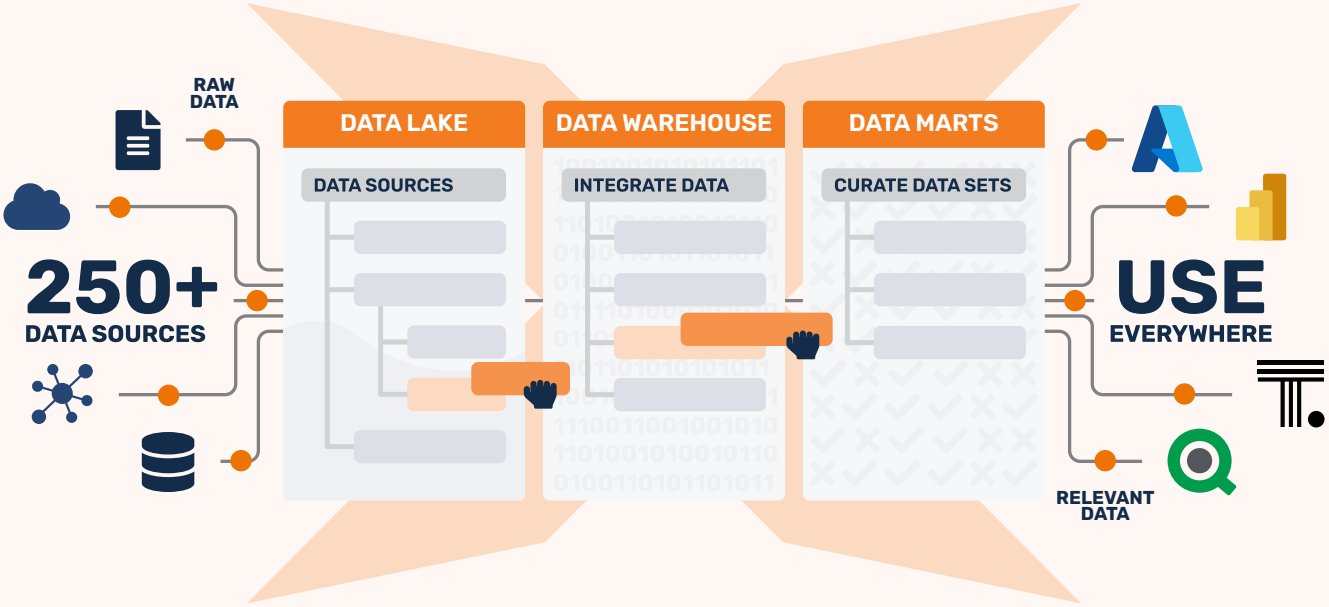
This is what winning looks like in the Machine Economy.

TIMEXTENDER'S DATA ESTATE BUILDER

LOW-CODE. AGILE. INTEGRATED.

Manual coding	→	**Low-code simplicity**
Lengthy implementations	→	**Agile integration**
Strict lock-in	→	**Future-proof scalability**
Fragile pipelines	→	**Smart pipelines**
Waiting months for analytics	→	**Fast self-service analytics**
Fragmented governance	→	**Holistic governance**
Security vulnerabilities	→	**Enterprise-grade security**

HOW TIMEXTENDER ACCELERATES YOUR JOURNEY TO DATA EMPOWERMENT



Low-Code Simplicity

TimeXtender empowers you to build a modern data estate 10x faster with a simple, drag-and-drop solution for data ingestion and preparation. Our data estate builder automatically generates all code and documentation, which reduces build costs by 70%, frees data teams from manual, repetitive tasks, and empowers BI and analytics experts to easily create their own data products.

Don't worry! Powerful developer tools, SQL scripting, and custom coding capabilities are still available, if needed.

Agile Integration

TimeXtender seamlessly overlays your data infrastructure, connects to 250+ data sources, and integrates all the powerful data preparation capabilities you need into a low-code, agile, unified solution. This eliminates the need for complex stacks of tools, lengthy implementations, and costly disruptions, while still giving you complete control over how your data is stored and deployed.

Future-Proof Scalability

Because TimeXtender is independent from data sources, storage services, and visualization tools, you can eliminate solution lock-in, and ensure your data infrastructure is highly-scalable to meet future analytics demands. With TimeXtender, you can quickly adopt new technologies and deployment models, prep data for AI and machine learning, and migrate to cloud platforms with one click.

Smarter Pipelines

When unexpected changes occur, fragile pipelines can easily break and must be manually debugged. With our metadata-based approach, whenever a change in your data sources or systems is made, you can instantly propagate those changes across the entire pipeline with just a few clicks. In addition, TimeXtender provides built-in data quality rules, alerts, and impact analysis, while leveraging machine learning to power our Intelligent Execution Engine and Performance Recommendations.

Self-Service Analytics

Our low-code technology, drag-and-drop interface, and Semantic Layer allow for fast creation and modification of data products, without requiring extensive data engineering knowledge. These data products can be created by BI and analytics experts once, and then be deployed to multiple visualization tools (such as Power BI, Qlik, or Tableau) to quickly generate graphs, dashboards, and reports.

Holistic Governance

Our metadata-based approach allows neat organization of your data projects, while providing end-to-end documentation, data lineage visualization, and version control across multiple environments. By using metadata to drive the model and deploy the code, TimeXtender never requires any access or control over your actual data, eliminating security vulnerabilities and compliance issues, while giving you a holistic view of what is happening across your entire data estate.

Enterprise-Grade Security

TimeXtender's security features allow you to provide users with access to sensitive data, while maintaining data security and quality. You can easily create database roles, and then restrict access to specific views, schemas, tables, and columns (object-level permissions), or specific data in a table (data-level permissions). Our security design approach allows you to create one security model and reuse it on any number of tables.

Trust and Support

As a Microsoft Gold-Certified Partner, we have 15+ years of experience building modern data estates for over 3,300 organizations with an unprecedented 97% retention rate. When you choose TimeXtender, one of our hand-selected partners will get you set up quickly and help you develop a data strategy that maximizes results, with ongoing support from our Customer Success and Solution Specialist Teams. We also provide an online academy, comprehensive certifications, and weekly blog articles to help your whole team stay ahead of the curve as you grow.

Learn how to become Data Empowered with TimeXtender

Watch a demo[20] to learn how we can help you build a modern data estate 10x faster, become data empowered, and win in the Machine Economy.

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