

How to Become a Data-Powered Organization

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1 / Introduction

The right name for the sea of change the business world is navigating is less important than charting a course through it. Some call the current era the fourth industrial revolution. We think a better name is the Extreme Data Economy. Whatever term you choose, one thing is clear: Data is the driving force behind it.

In the Extreme Data Economy, data plays a new role. Data is behind every decision, so the business must be able to field unpredictable data and perform complex analysis immediately. But conducting this type of analytics on today's complicated data is easier said than done.

In the Extreme Data Economy, to keep up, you need to fundamentally rethink the design choices you make to handle the increasing complexity of analysis and unpredictability of data. To be data-powered, new technology is needed.

This white paper outlines how companies can thrive in the Extreme Data Economy. It provides a framework to think through the design paradigms to make the right technology choices. It examines how companies can effectively mine their most valuable resource, their data, to make the right business decisions.

2 / What is the Extreme Data Economy?

The Extreme Data Economy evolved out of the data-validated and data-informed eras. The following section explains how.

In the **data-validated** era, businesses used data to do rear-view mirror reporting and validation of assumptions. Available data was limited in scope and volume and generally provided only a high-level view of the business. The data might be able to answer questions like “What’s selling and what’s not?” or “What region had the largest average growth in customers?”

Data-validated: Traditionally, data provided a confirmatory role — it served to validate decisions that were made by the leaders of the business once those decisions had already been made.

In the **data-informed** era, a lot more data arrived and could be put to better use. More powerful BI tools made it possible to extract more signals from data, expand the number of people who could use data, and create hand-crafted predictive models.

Along with big data arrived cheap storage, like Hadoop, and this gave rise to the data lake. Suddenly, companies had more data at their disposal than ever before, and they could actually store it. The grand vision of the data lake was that all data, not just structured data, could be stored. This massive trove of data held potential for analysis with all sorts of specialized algorithms and techniques for machine learning and AI that had lain dormant, waiting for sufficient computing power to arrive.

Meanwhile, BI tools for data discovery expanded the usability of traditional structured data sources, and some victories were achieved by creating batch data pipelines to do specialized processing on the data lake. Batch data pipelines that blended big data with traditional data made some types of recurring analysis possible; not everything was a one-off effort by specialized analysts.

But it wasn’t all smooth sailing on the data lake. Businesses soon realized that storing data was not enough. Additionally, the promise of building high-resolution models of the business and extracting signals with advanced algorithms and analytics was not fulfilled.

In the big data era, businesses inadvertently created data swamps with more data stored than they could reasonably wade through for insights ever, let alone in real-time, given the analytic and BI tools available. The entire industry is now evolving and adopting new technology to address some of these problems.

Data-informed: As we shifted into harnessing big data, businesses tried to become more proactive with their data, using data collected to inform their business decision-making in advance. But too often the amount of data and the tools available to analyze it didn’t allow companies to make use of all the data they had stored while it was still fresh.

The **data-powered** era now fueling the Extreme Data Economy incorporates the successes of the past with solutions to its failures.

The data-powered era uses all of the data in the data lake, offering a broad capability for analysts to use advanced tools in a hands-on way. Techniques that were specialized art forms are now productized and used by a much wider group of people.

Data-powered: Data directs the activity of the business in real-time. The business must curate new types of streaming data, analyze it, and react to it with unprecedented speed.

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The Extreme Data Economy is real-time. Businesses have to put data to use immediately to drive business decisions. It is now possible not only to create hand-crafted models, but also to automatically evolve models based on feedback loops that make them more accurate. Once these models perform well, they can drive decisions and automation. This is not just a nice-to-have but a necessity. We will never have enough data scientists to craft all the predictive models we need. Data must be able to trigger action autonomously to address changing circumstances in real-time. This must be driven by AI and machine learning, as no human can keep up with the onslaught of new data without the assistance of automation. This is a key paradigm shift, where data itself makes the business go.

The data-powered nature of the Extreme Data Economy means we've moved beyond big data. In the data-powered era, companies, once they've adopted the right tools, can finally analyze and leverage all their data in all its unpredictability, regardless of its form or source, including the IoT, IIoT, and streaming data, in real-time. They can and must be able to work with a new mix of data incorporating dimensions of location and time to drive operational applications and fuel increasingly complex analysis.



3 / Designing for the future: The technology and paradigms required to succeed in the Extreme Data Economy

How are industries achieving success and becoming data-driven organizations?

Up to this point, the technology to succeed in the Extreme Data Economy wasn't available. That's no longer the case. Now there are tools on the market that allow businesses to navigate this new reality of hyper scale, hyper speed, and hyper complexity. These technologies harness the exponential computing power of GPUs that support working with extreme data at a faster rate.

As you think about building your technology stack for next-generation applications fueled by extreme data, there are some key design paradigms to consider:

Static versus streaming data. The Extreme Data Economy requires the ability to analyze high-volume, high-velocity streaming data to drive operational decisions in real-time. Data must be ingested from clickstreams, sensors, banking activity, social media—a wide breadth of sources—and analyzed in real-time. Of course, data is stored to support ongoing analysis, but live data must be analyzed as it's ingested to drive operational use cases.

Bottom line: Look for the ability to operationalize analyses of real-time data.

Disk-based versus memory-based processing.

Disk-based processing used by traditional systems cannot provide rapid responses to handle numerous concurrent users; users compete as they attempt to access the disk. In-memory processing offers instantaneous response for many users at once, empowering you to handle streaming data in real-time.

Bottom line: The best solution optimizes use of all tiers of storage and memory to consistently deliver the optimal mix of value and response time.

CPUs versus GPUs. GPUs increase the power to process data in real-time and in parallel, across many users. The typical CPU has 16 to 64 cores. With a GPU, generally the minimum is 4,000 cores. This type of power means that problems that formerly took days are tackled in minutes. And GPUs thrive supporting the type of multi-component analysis, regression, and neural networks necessary for data-powered AI and machine learning.

Bottom line: The data platform must dynamically use GPUs and CPUs to handle analytical and AI workloads intelligently.

Location-agnostic versus location-powered insights.

The Extreme Data Economy is driven via real-time operational applications that are location-aware. While location data has been siloed in GIS systems or even ignored, now it can be captured and managed as a first-class element, enabling new connections between established data layers based on time and location that reveal new patterns. Delivering the right offer to a mobile user is just the beginning. Supply chain optimization, asset management, emergency response, and many other applications demand real-time location awareness, visualization, and analysis.

Bottom line: A system must be able to unify location, time, and data about people and objects in the real world into a single data landscape for analysis and modeling.

Human-powered decision-making versus autonomous decision-making.

There's too much data for humans to compute on their own at this point. You need a system that automates many of the machine learning and predictive models necessary to become a data-powered organization. Automated decision-making must be based on timely, well-trained models designed to drive operational changes within defined parameters in real-time.

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Bottom line: The best system supports a smooth progression from insights created by analysts, to those delivered as products to the business, to those that become the model for automated decision-making and operations.

These capabilities are synergistic, feeding one another. Solutions leveraging GPUs and in-memory processing enable you to analyze and visualize massive geospatial datasets and query them from all angles concurrently in real-time. Millions or billions of data points ingested daily inform models that adjust themselves responsively to drive operational decisions.

Are You Ready for the Extreme Data Economy?

The Extreme Data Economy is empowered by major technological shifts that advance the realm of the possible. But that value is realized only when your organization is prepared and willing to look at how they analyze, process, and leverage data as an asset differently than they have in the past.

We recommend driving data-powered initiatives from the business side. Challenge line of business executives think about what data they have and how much of it they're using. Help them envision new services, products, or capabilities they could offer. Choose the technology that's needed to solve those problems and actively address the organizational change required to take full advantage of that technology. Using insights on real-time data to make decisions is the first step. Using insights to guide and then automate operational decisions is a higher level.

4 / Why this matters: Case studies exploring the new needs of the Extreme Data Economy

What do companies need to succeed in the Extreme Data Economy? These are real-world examples from businesses across industries that are beginning to understand what is possible with the new technology on the market, and what is achievable once they become data-powered organizations.

Oil and gas. A leading international oil and gas company has a newfound ability to visualize huge data sets. These data visualizations improve the way they extract hydrocarbons, leading to reduced environmental impact and resource consumption. Leaders gain visibility to drive exploration as they integrate real-time data about wells, pipelines, land ownership. Analytics on extreme data empowers them to focus on the most promising new oil and gas fields. This is only possible because they are able to use all their data, including geospatial data, coupled with machine learning and predictive modeling, to assess which assets currently provide value and which do not.

Telecom. Telecom companies face a number of issues in the Extreme Data Economy, including exponential and even suffocating growth in data from mobile devices and the IoT. They need a platform so that they can ingest and analyze all of this data. Consider network efficiency and performance. Telecoms need to assess where signal strength is optimal and poor and layer it in with information about dropped calls to ensure high-quality service. This type of wide scale granular spatial-temporal analytics can lead directly to network improvements and to marketing to undersaturated areas, mixing in customer experience data to target, attract, and retain high value clients. Telecoms empowered for the Extreme Data Economy embrace increasing real-time data volumes to envision new revenue streams and opportunities.

Finance. Financial institutions manage more pricing risk today than ever before and must comply with new, stringent regulations. With data-powered tools, Basel III-compliant institutions have seen compliance tasks drop from days to minutes. They can run analytics in parallel on cheaper, denser systems, and let their analysts and data scientists experiment more than ever before. Additionally, to mitigate

risk, companies take real-time data about specific sectors, and either increase or decrease trading so that portfolios are optimally exposed. They're able to do this because data-powered systems ingest every trade that comes in and immediately use AI and machine learning to assess it in the context of historical data. The scale is staggering: think of a financial services risk portfolio with 500 million positions. Each of those positions must be modeled out to 100 years to comply with regulation. The faster those answers come back, the better they drive real-time trading.

Media and broadcasting. Up until now, though set-top boxes generate tremendous amounts of data about customer usage, communications service providers have not been able to leverage it. But with data-powered tools that ingest 300 million to a billion events a day, companies now answer questions about the specific reach of an advertiser on a program, down to the time and location of viewers, as well as how users are viewing media, whether on TV or on mobile devices. This empowers communications companies to improve advertising and target programs more specifically to certain high-value demographics, and, in some cases, develop the kind of programming that appeals most to particular audiences.

Logistics and inventory. A data-powered system enables machine learning to drive real-time inventory decisioning. If demand for a certain product spikes, operational algorithms send out more of that product to stores. Route optimization is performed at scale with a more efficient infrastructure on a dramatically reduced technology footprint. New business models and services powered by real-time data, such as 15-minute delivery windows, support additional revenue streams.

5 / Making the right design choices to become a data-powered business

Technologies like Kinetica that are GPU-powered, memory-based, location- and time-aware, and built for streaming data provide a solid foundation to develop a data-powered business.

Kinetica is more than just a database; it's an insight engine. In addition to core in-memory, distributed database capabilities, it provides visual data discovery, instant streaming data analysis (including location data), and streamlined machine learning and AI.

As you design your data infrastructure to become a data-powered business equipped for the Extreme Data Economy, you have to embrace technology that fits within the design parameters outlined above.

Kinetica lets BI analysts, data scientists, and ML algorithms assess complex data in real-time and react immediately, influencing the customer experience as it happens.

As the case studies in this white paper illustrate, regardless of your industry, becoming a data-powered business is both possible and a necessity. Competitors are adapting to the new reality and gaining first mover advantage.

Adopting a platform to become data-powered offers a path forward. It dramatically accelerates existing, data-informed applications, while at the same time positioning you to quickly develop differentiating, leading-edge, data-powered applications that drive new opportunity. This is the foundation required to survive and thrive in the Extreme Data Economy.

The journey towards thriving in the Extreme Data Economy starts with building a data-powered business and making the right technology decisions along the way. Browse Kinetica's solutions across various industries to explore the transformative impact a next-generation insight engine could have on your business. Learn more about the product or get a demo to see Kinetica in action.

Explore the Product

Get Demo

About Kinetica

When extreme data requires companies to act with unprecedented agility, Kinetica powers business in motion. Kinetica is the instant insight engine for the Extreme Data Economy. Across healthcare, energy, telecommunications, retail, and financial services, enterprises utilizing new technologies like connected devices, wearables, mobility, robotics, and more can leverage Kinetica for machine learning, deep learning, and advanced location-based analytics that are powering new services. Kinetica's accelerated parallel computing brings thousands of GPU cores to address the unpredictability and complexity that result from extreme data. Kinetica has a rich partner ecosystem, including NVIDIA, Dell, HP, and IBM, and is privately held, backed by leading global venture capital firms Canvas Ventures, Citi Ventures, GreatPoint Ventures, and Meritech Capital Partners. For more information and trial downloads, visit kinetica.com or follow us on [LinkedIn](#) and [Twitter](#).

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