

Top of Mind

Digital supply chain: it's all about that data

The report at a glance

“Exponential data growth is a fundamental problem that is continuing to overwhelm most businesses, and it is accelerating. New digital business models are increasingly more complex, we are talking about entire ecosystems of data and companies that are able to effectively manage that complexity will clearly maintain a competitive advantage. Unmanaged, that complexity becomes a barrier to innovation and inhibits our ability to derive meaningful insights and, in fact, becomes a barrier to achieving the automation and efficiency we desire. To seize the full potential of digital, companies must develop data strategies, and better information and data management discipline, and start asking better questions.”

Dave Padmos

EY Global Technology Sector Leader
Advisory Services

Supply chain data is no exception:

- ▶ The volume of data is skyrocketing as diverse data sources, processes and systems show unprecedented growth. Companies are trying to capture and store everything, without first establishing the data's business utility.
- ▶ The fact is, technology is enabling this proliferating data complexity – continuing to ignore the need for an enterprise data strategy and information management approach, will not only increase “time to insight,” but it may actually lead to incorrect insights.

Cost:

- ▶ Low-cost (including cloud) storage encourages companies to capture all available supply chain data.
- ▶ But it's likely a trap: aggregate storage costs are higher than you think, especially considering how much data ends up being nonessential.
- ▶ Slower time to insight results from increasing data complexity that obscures business insights needed to empower better and faster decision-making.

Value:

- ▶ A growing consensus believes that to drive value from all this data (and avoid incorrect insights), companies must develop a single overarching enterprise data management strategy that aligns with business goals.
- ▶ That enterprise data strategy guides an hypothesis-driven and more focused approach to data acquisition, classification and simplification.
- ▶ Enterprise data strategy likewise is a requisite for guiding advanced artificial intelligence (AI) analytical technologies such as machine learning.
- ▶ Machine learning can also help automate the integration of data from all your external ecosystem partners.
- ▶ On the horizon, Internet of Things (IoT) and blockchain technologies promise supply chain transformation of even greater magnitude than the current mobile-social-cloud-big data transformation.

Risk:

- ▶ Much needed business insights remain hidden in a lake of complex data.
- ▶ Advanced analytics without enterprise data strategy result in false insights (correlations without causal links) that lead companies down mistaken paths.
- ▶ “Dark data” leads to inadvertent compliance risk.
- ▶ The tax liability of giant data troves is uncertain because the true business value of the data is not clear.

Conclusion:

- ▶ Companies must act now to focus, simplify and standardize big data through an enterprise data management strategy.
- ▶ Otherwise, technology will drive increasing data cost, complexity and inefficiency; companies will be unable to benefit from advanced analytics like machine learning; and they will be unprepared for the next wave of data growth triggered by new technologies like IoT and blockchain.
- ▶ Companies that don't act now will find themselves at a disadvantage.

Managing the data-growth dilemma

The growing tsunami of data is both a boon and bane to businesses in the digital age. Limitless oceans of data, often reflecting customer experience as it happens, have the potential to remake supply chains and business models. These models can and should be more efficient, productive, flexible and responsive. But right now, data is a mess. The current period of hyper data growth leaves most companies in a position where their ability to uncover business insights is effectively hidden within an increasingly complex and often unfathomable amount of data. How can we expect data, which today is one of the biggest

transformational roadblocks at many companies, to enable an entire ecosystem? This report explores the promise and perils of the “big data era” in order to encourage all of us to proactively address the issues. Frankly, it’s “all about that data.”

This report explores the emerging consensus of EY teams working in the field, who are increasingly concerned by the impact of unfettered exponential growth of supply chain data. The report focuses on what companies can do to manage growing data complexity and transform that data growth from a challenge to an opportunity.

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Unprecedented data growth:

Can supply chains withstand rapidly rising data complexity?

We know that business winners and losers in the emerging big data era will be defined by their ability to rapidly cull relevant insights out of enormous, complex and fast-growing datasets, and then act on those insights to redefine business processes and customer interactions. But that rising data complexity may well present an existential challenge to companies and their supply chains.

Data growth drives companies toward chaos

Data proliferation has escalated over the years with each disruptive digital innovation. Today, the sheer volume of data produced by supply chains and their newly formed digital ecosystems is not only overwhelming – it has the potential to harm by adding a counterproductive level of complexity that leads to chaos.

It's an embarrassment of data riches, whose growing complexity actually inhibits executives' ability to access the right business insights at the right time to empower better decision-making. And that's not counting data in the hands of your ever-expanding ecosystem of external partners.

Prepare to aggressively simplify data complexity

Executives must prepare now to manage the ever-growing proliferation of supply chain data and data sources. Growing data complexity must be aggressively simplified, guided by enterprise data strategies that shape the questions that matter most for each individual business's goals and success.

Key takeaways

- ▶ Growing data complexity inhibits companies' ability to access business insights.
- ▶ Data complexity can and must be simplified by a focused enterprise data strategy.

Ask yourself

- ▶ How well are you managing today's data explosion?
- ▶ What is your data strategy and how does it support your business goals?
- ▶ Are you asking the right questions?
- ▶ How would you know?

New information per minute, per person – 1.7 megabytes

To put data growth in context: the world's total digital data volume, which is doubling every two years, stood at 4.4 zettabytes (trillion gigabytes) in 2013 and is projected to reach 44 zettabytes by 2020.¹ In 2014, that worked out to 1.7 megabytes of new information created every minute for every person on Earth.² Most of that data growth occurs on the internet, whose total population grew by more than 750% in the past 15 years to over 3 billion and will soon pass 50% penetration of the human race, according to the World Economic Forum.³ Also every minute, internet users share more than 2.5 million pieces of content on Facebook, tweet more than 300,000 times and send more than 204 million text messages.⁴

Supply chain, disrupted:

Avoiding the out-of-control data-growth trap

The lure of low-cost storage and cloud computing enabling you to capture immense volumes of supply chain data, and the potential of new machine learning technologies to help you find valuable business insights from that data, is undeniable. But it could be a trap – one that is leading some companies into chaos and actually obscuring the insights needed to empower better and faster decision-making. What's missing for those companies is an enterprise data strategy focus that aligns with business goals and drives data simplification.

Emerging data consensus

Big data analytics is a new-enough discipline that there still exist opposing views on certain fundamental issues. But when it comes to the supply chain, we believe that a consensus approach has begun to emerge. That consensus combines elements of traditional, more focused and structured data analysis approaches with newer big data platforms and advanced machine learning technologies.

"The reality is, you have to do both," says Jim Little, Advisory, Technology Sector, IT at Ernst & Young LLP.

"Your human analysts take a strategy-focused approach, understanding the core drivers to achieving the business value your organization is looking for and the major data elements associated with the business outcomes you're seeking. Then you complement that with machine learning technologies to isolate the micro-level patterns that are continuously evolving within the big picture of your business goals," Little explains.

Elusive goal: continuously evolving enterprise data strategy

The words "continuously evolving" are key to any successful data strategy. Supply chains are undergoing their own digital transformations, along with the rest of most modern organizations' business processes. The resulting influx of new digital data will either add to the complexity and chaos or can help organizations optimize supply chain operations. The latter happens only when data is analyzed in the context of key hypotheses – i.e., the questions that matter most to achieving specific business goals.

Digital adaptation too slow

But while many executives believe the current digital transformation will remake their industries in the next five years, they are not prepared to adapt quickly enough to keep up.⁵ And new digital technology disruptions are already beginning to emerge. IoT technologies are enabling new digital business models that, for example, promise to raise service levels to new

heights by enabling supply chains to respond in real time to subtly changing market conditions or customer support needs after products have been deployed. Separately, blockchain technology promises to better integrate business-critical data currently in the hands of external ecosystem partners, enabling improvements in supply chain performance and, perhaps, leading to more open and distributed supply chain networks (see Supply chain, horizon, page 11).

Alignment with business goals is key

Business goals, however, are above the constantly shifting landscape of data technologies and digital business models they enable. Those business goals and related hypotheses drive successful enterprise data strategy, which then instructs classification taxonomies and more focused data acquisition and analysis. Enterprise data management strategy should be a core foundational element of everything you're trying to do in digital.

“I know of one company with five different master parts data schemas in different silos. That multiplies complexity at a time when companies urgently need to simplify their data to derive truly business-critical insights.”

Chris Cookson

Advisory, Technology Sector, Supply Chain
Ernst & Young LLP

Stop and ask why

If you're attempting a digital transformation without an enterprise-wide data management strategy, you need to stop and ask why? Why would companies want to implement something that will make their business more complex, higher risk and likely to dilute if not completely eliminate the benefits they are seeking?" says Dave Padmos, EY Global Technology Sector Leader, Advisory Services.

Grim reality: data-growth challenges multiply into chaos

Few companies have achieved the goals-driven enterprise data strategy of that consensus vision. Instead, encouraged by inexpensive storage solutions (including cloud storage services), many are choosing to capture all the data they can, often without first establishing the data's business utility. Worse, business units of large enterprises are doing so independently, resulting in a proliferation of multiple different data approaches, data schemas, classification taxonomies and incompatible analytical systems. "I know of one company with five different master parts data schemas in different silos. That multiplies complexity at a time when companies urgently need to simplify their data to derive truly business-critical insights," notes Chris Cookson, Advisory, Technology Sector, Supply Chain, Ernst & Young LLP.

The chaos of data growth without coherent enterprise data strategy and the ways in which big data analytics tools are entering large companies today is leading to challenges such as:

- **Rising cost:** Though storage solutions seem inexpensive at first, costs mount up fast when a company starts capturing all the available data produced by digital supply chains. A recent survey of nearly 1,500 Europe, Middle East and Africa (EMEA) companies reported that a midsize company with 500 terabytes of data is likely spending roughly US\$1.5 million per year in storage and management costs to support nonessential data.⁶
- **Compliance risk:** The approach of capturing all data for later analysis puts organizations at risk of accumulating sensitive data not in compliance with relevant regulations. Of note, the previously mentioned research revealed that, on average, 54% of the data collected by respondent companies was "dark data," the contents of which was unknown.⁷
- **Poor insights:** Too much data can hide potential insights in "noise" or, worse, lead to incorrect conclusions.⁸ "When you have too much data you can find random correlations that have no real causal link, which could lead a company down the wrong path," explains Paul Brody, EY Americas Strategy Leader, Technology Sector.

“If you don’t develop enterprise data strategy now, disruptors or competitors will do so to get the competitive advantage.”

Matt Alexander

Technology Sector, People Advisory Services
Ernst & Young LLP

How to move from chaos to insight

The first step in shifting from chaos to control of supply chain data varies depending on a given company’s situation. If multiple incompatible systems have been brought into different business units, the first step should be to stop those incompatible purchases. “There are companies where, if a data tool doesn’t flow directly from the corporate data strategy’s core purpose, it doesn’t get funded,” says James Chadam, Principal, Corporate & Growth Strategy, Ernst & Young LLP.

Unifying enterprise data

Companies with multiple incompatible data analysis tools must find a way to obtain a unified enterprise view of the disparate data in their systems. One approach is to choose one data analytics platform in which to aggregate data from the others. A more recent approach is to use advanced machine learning tools emerging now that automate data processing, alignment and visualization, enabling you to automate the process of aggregating and classifying data from all your disparate systems. “But to do that, you need a data strategy and a data architecture to inform those advanced tools,” notes Matt Alexander, Technology Sector, People Advisory Services, Ernst & Young LLP.

Developing enterprise data strategy that aligns with business goals

Next – or first, if a company is lucky enough not to have the multisystem problem – is to actually develop your enterprise data strategy. “To build the right data strategy and data architecture to support it, you need to go back and start with the use case and the goal of the data,” says Alexander. This is where hypotheses about business success need to be established, and the data elements that tie to those hypotheses identified.

Most critically for supply chain data is that the strategy encompasses an integrated view of how data flows through the supply chain, and an understanding of the opportunities the data presents to drive supply chain productivity. “Understanding how data drives productivity should be the starting point because it tells you what’s important – and that defines your data strategy,” says Brian Meadows, Principal and Leader, Digital Operations, Advisory Services, Ernst & Young LLP.

“There are companies where, if a data tool doesn’t flow directly from the corporate data strategy’s core purpose, it doesn’t get funded.”

James Chadam

Principal, Corporate & Growth Strategy
Ernst & Young LLP

“If a company’s data quality is not good, then they are likely out of compliance with the rules and regulations that govern their operation, especially if it involves sensitive information. But how would they know?”

Chris Cookson

Advisory, Technology Sector, Supply Chain
Ernst & Young LLP

Focus, simplify and standardize

Once an enterprise data strategy is established, it is used to focus and simplify the rest of the data management and analytical process, including standardizing data taxonomies across the organization. EY teams working with clients report that the highest-value business insights have been achieved by organizations that thoughtfully classified and analyzed their data in the context of key questions that matter most about their business.

Less is more

“When it comes to data, less is more. Time after time in the projects I’ve worked on it was a relatively small number of data points that really mattered. Focusing on those few data elements that really matter is what drives improvements in planning and forecasting accuracy,” says Brody.

Focus and simplification drive faster time to insight

That focus and simplification helps organizations avoid going astray by following non-causal correlations that can emerge from large datasets. And it makes big data analysis more manageable and, thus, better able to consistently provide the business insights companies need to fuel their digital business models and the supply chains that support them.

Key takeaways

- ▶ Companies risk obscuring needed insights in mountains of increasingly complex data.
- ▶ Other risks include rising cost, noncompliance, incorrect insights and tax uncertainty.
- ▶ Companies need business-goal-driven enterprise data strategy to focus, simplify and standardize their data.

Ask yourself

- ▶ How much data am I willing to own and protect?
- ▶ What insights are a must and which are nice to have?

Tax uncertainty: what’s my data worth – and where does it belong?

If companies do begin using enterprise data strategy and start gaining valuable business insights from their oceans of data, that data’s taxable value will rise. That’s a big change to the status quo. “Most companies tell me, ‘Yes, we have data but we’re so sophomoric in our ability to interpret it that there’s no value to it,’” notes Channing Flynn, EY Global Technology Industry Leader, Tax Services. If there’s no value, there’s no tax consequence.

But as the data begins generating real business insights, how to value it becomes an important question. And once your data is established to have material value there arise even more important tax questions, such as the tax consequences of housing data assets in one country vs. another and the ways in which you monetize that asset. Responding to the fast-evolving digital economy, recent actions of the Organisation for Economic Co-operation and Development (OECD) and various global tax authorities are causing companies to completely revamp their digital supply chains. As data’s value rises, it must be considered in that reinvention process.

“The company that understands how to use its data as an increasingly valuable item of intellectual property will need to figure out what jurisdiction is best to hold it; how to hold it as a legal matter; and how to provide others access to it, which is a contracting matter and a data privacy matter. All of those constructs have potential consequences in today’s digital tax world,” explains Flynn. “This is important to understand because of the scope and scale of data that companies are collecting today. If companies can extract real enterprise value from those mountains of data, and do so with efficiency and accuracy, then suddenly the data becomes very valuable – and tax consequences rise fast.”

Supply chain, advanced:

Machine learning accelerates “time to insight” – but there’s no magic in it

When it comes to enterprise supply chain data, machine learning offers enormous potential to accelerate business insight discovery. It can help integrate data from external partners, automate internal data classification and surface subtle patterns that might otherwise be missed. But there is no magic in it.

Avoid misinterpretation

“Don’t misinterpret. You can’t just push a magic machine learning button and have all your work done for you,” says Little. To be most effective, big data analytics and machine learning both require that you gather all enterprise data, establish an enterprise data management strategy and direct the systems based on hypotheses that drive business goals. Their advanced analytical capabilities depend on a detailed, end-to-end view of data across the entire business, including the key drivers that influence sales and profitability.

In practice, then, machine learning is not a substitute for the hard work of enterprise data management strategy development and subsequent data simplification. Instead, it increases the need for both because machine learning systems work most effectively with those elements as context and direction – and can lead you astray if not properly directed.

Other people’s data: ending the “endless reconciliation”

When properly directed, machine learning technologies excel at classification of unstructured data and matching similar data from disparate environments. These capabilities can provide instrumental support for one of the largest challenges facing supply chain data analysts today: up to 80% of a large enterprise’s supply chain data is likely in the hands of other companies in its external ecosystem of partners.⁹

Machine learning can automate and accelerate the integration of external data with an enterprise’s own data, enabling an end-to-end data view. “Really good supply chain planning is now a multi-enterprise collaborative activity. Our partners have some of our data, and we have some of theirs. But today, that can cause endless reconciliation between internal and external data – because we just don’t trust other people’s data,” says Brody.

“Without a level of control and standardization, some companies eventually will have to go back and start mining zettabytes of data. They’re relying on future technology to come along and save them – to help them figure it all out.”

Dave Padmos
EY Global Technology Sector Leader
Advisory Services

Machine learning, defined

Machine learning – the science of getting computers to act without being explicitly programmed – is the AI technology that uses statistical data mining to make speech recognition practical and enable self-driving cars.¹⁰ In business use, it can mine historical and up-to-the-minute data to predict, for example, future customer activity, including trends, behaviors and patterns.¹¹

“Understanding how data drives productivity should be the starting point because it tells you what’s important – and that defines your data strategy.”

Brian Meadows

Principal and Leader, Digital Operations
Advisory Services
Ernst & Young LLP

This capability is especially important given that enterprise resource planning (ERP) and supply chain management (SCM) systems generally do not provide visibility into external partner data.

Automating internal data classification

Classification of unstructured text, among the earliest applications of machine learning, is one of its most advanced capabilities. Machine learning can rapidly automate the hard work of classifying data into useful taxonomies, as well as sorting and cleansing it. Little describes the experience of a client that embarked on a very successful data analysis project roughly 10 years ago, at which time it took 5 years to work out the data strategy and organize and classify all relevant data. “Today’s machine learning technologies would compress a similar effort into 12 months or less,” says Little.

Supply chain optimization from “micro patterns”

Machine learning technology is well-suited to finding micro-level patterns in large datasets that human analysts are likely to miss. In the supply chain, productivity improvements resulting from changes suggested by such micro-patterns can lead to material gains. Machine learning platforms, that have become available in the last two years or so, take such capabilities mainstream.

“Machine learning technologies are entering companies now, giving them the ability to identify subtle incoming demand signals, address the actual supply chain and fulfillment associated with those demand signals, and do so much more cost-effectively than before,” notes Little.

Productivity can’t wait – explore machine learning now

Executives who want to get the most out of their companies’ supply chain data should understand what machine learning can do. The technology is still emerging, but companies cannot afford to wait. Competitors able to leverage machine learning to bolster their predictive analytics capabilities will do more, faster, with their data, driving increased supply chain productivity – and competitive advantage.

Key takeaways

- ▶ Machine learning can accelerate business insight discovery, integrate data from external partners, automate data classification and surface subtle “micro patterns.”
- ▶ It is most effective when directed by key hypotheses – the questions that matter most to achieving specific business goals.
- ▶ Without proper direction, machine learning can deliver questionable – even dangerous – results.

Ask yourself

- ▶ What steps do I need to take as we move toward a more digitally connected supply chain?
- ▶ How can I prepare my data?

“Don’t misinterpret – machine learning is not magic. You can’t just push a magic machine learning button and have all your work done for you.”

Jim Little

Advisory, Technology Sector, IT
Ernst & Young LLP

Supply chain, horizon:

IoT and blockchain impact coming fast

The cloud-mobile-social-big data digital transformation that companies are grappling with today is causing seismic shifts in business strategy and processes. But the IoT and blockchain deployments emerging now promise transformation of even greater magnitude. Each has clear immediate implications as well as significant long-term potential.

IoT today: a data surge that brings real-time response to changing customer needs and market conditions

With recent estimates of 28 billion IoT-connected devices worldwide by 2021,¹² the first thing IoT will do is add to the barrage of information driving companies' data-complexity challenge. At the same time, IoT will challenge supply chains to open up to new business model and operational possibilities. These are enabled by IoT data flowing back from customers as direct input from networked sensors attached to deployed products, as well as from a multitude of external vendors.

A cornerstone of this vision is that predictive analytics will alert companies to issues emerging with their devices in customer use, and then relevant supply chain processes can be marshalled to respond to the customer – possibly even before the customer becomes aware of the problem. Supply chains responding to changing customer needs in real time effectively transform products into “products-as-a-service” – a new digital business model.

IoT, tomorrow: intelligent, self-organizing supply chains

It is a small conceptual leap from products-as-a-service to intelligent, self-organizing supply chains. As supply chain processes and their raw materials and components become instrumented with IoT sensors, the signals they send about the state of those processes can be analyzed by increasingly capable machine learning systems. Combining that data with information about the various customers for whom the supply chain's output is destined, such systems could decide for themselves how to operate and respond dynamically to changing conditions.

“In exchange for having much more accurate and useful data in a shared blockchain, we will accept that our competitors know who we buy from and what some of the flows in our supply chain look like.”

Paul Brody
EY Americas Strategy Leader
Technology Sector

Blockchain, today: trust, automation and standard data

Blockchain's impact on the supply chain is already underway. It is expected that blockchain's ability to "automate trust" through a distributed digital ledger database and automate transactions when pre-set conditions are met will significantly raise supply chain efficiency. Importantly, blockchain also could become a "single source of truth" – with a single data format – for all partners in an ecosystem. "I believe blockchains are the way in which the multi-enterprise data problem will ultimately be solved," says Brody.

Blockchain, tomorrow: open, distributed supply chains?

Blockchain's ultimate impact on supply chains may be more profound. Brody envisions a future in which blockchain technology results in most or all supply chains becoming publicly open, distributed networks, similar to the way Android smartphones are produced. In Android's open ecosystem, one company creates the core software and reference designs and then different companies compete to design chips enabling core functionality, manufacture those chips, design the mobile devices, manufacture those devices, create demand and provide mobile connectivity to customers.

Collaboration rising

Similarly, blockchain is encouraging a trend toward more and more business occurring over collaborative, multi-enterprise value chains run on a blockchain or a series of blockchains. "Ultimately, in exchange for having much more accurate and useful data in a shared blockchain, we will accept that our competitors know who we buy from and what some of the flows in our supply chain look like," says Brody.

IoT and blockchain: no waiting

As with machine learning, companies cannot afford to put off exploring the implications of IoT and blockchain technologies in their markets and supply chains. The impact of these technologies will happen faster than you think, because developed economies have deployed the devices, the cloud and the high-speed broadband networks necessary to support far faster propagation of disruptive digital technology than was ever possible before.

Key takeaways

- ▶ IoT is creating a data surge that enables new digital business models and operational processes.
- ▶ It may lead to intelligent, self-organizing supply chains.
- ▶ Blockchains are expected to ease multi-enterprise collaboration.
- ▶ They may also lead to publicly open, distributed-network supply chains.

Ask yourself

- ▶ How prepared are you to address the impact of IoT, blockchain and open, self-organizing supply chains?

"With IoT, your supply chain must learn to manage even more data. But there will be upsides to customer care, because you'll be able to proactively get customers to replace components or parts before they break down."

Chris Cookson

Advisory, Technology Sector, Supply Chain
Ernst & Young LLP

Conclusion

Harness the power of data – don't let it flatten you

Data volumes are skyrocketing and data sources are multiplying. Meanwhile, technology business models such as cloud-based services and the sharing economy are constantly changing and becoming more volatile – with more volatility visible on the horizon. Meanwhile, a recent survey of nearly 1,500 Europe, Middle East and Africa (EMEA) companies (in all industries) revealed that, on average, respondents could identify only 14% of their data as business-critical and another 32% as redundant, obsolete or trivial; that left 54% as “dark data,” the contents of which was unknown.¹³

Companies must act quickly to take control of data growth, complexity and chaos. That includes focusing, simplifying and standardizing data analysis through an enterprise data management strategy, and exploring the range of possibilities afforded by machine learning, IoT and blockchain.

Those that do will be getting meaningful insights that truly matter to their business. As the more volatile and complex future rushes toward them, they will be first to detect changing market conditions and trends, and most importantly they will be able to innovate and adapt more quickly. They'll continuously evolve their supply chains, business models and operational processes from a position of strength derived from those insights. Those that don't will find themselves at a significant disadvantage.

“The bloom is off the rose when it comes to the ‘store everything’ standpoint. People are starting to realize that keeping too much data is a liability, not just an asset.”

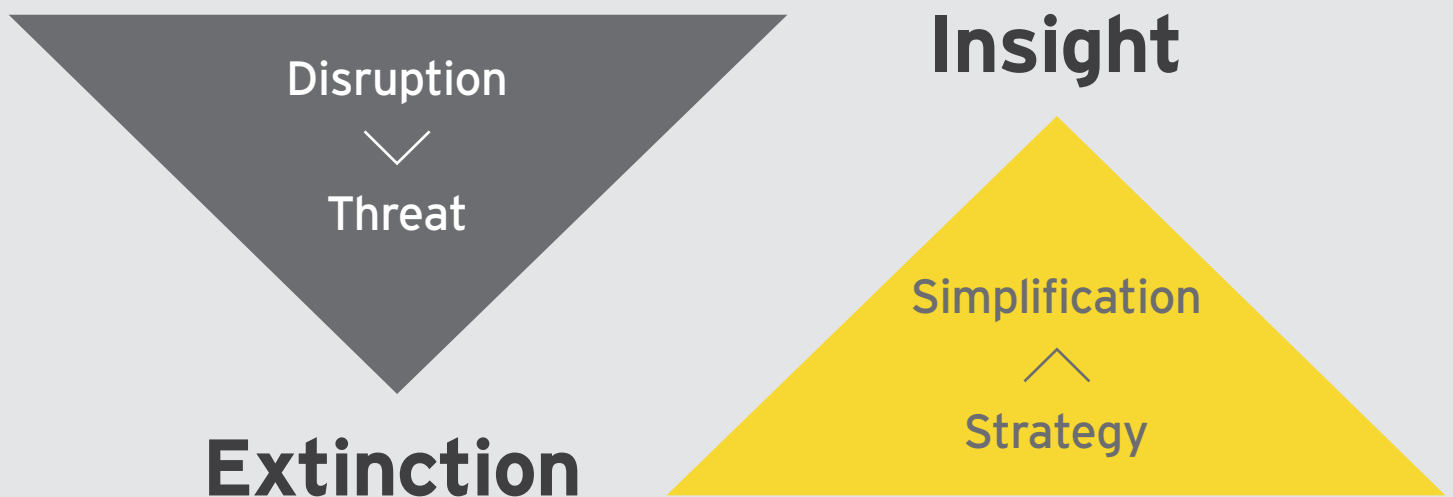
Paul Brody
EY Americas Strategy Leader
Technology Sector

Ask yourself

How have you prepared to evolve your supply chain, business models and operational processes concurrently with customers and markets – in real time?

- ▶ **Are you asking the right questions – questions that provide real value to your business?**
 - ▶ **Are you being good data stewards?**
 - ▶ **Are you working to protect something that is now more than ever becoming one of your most valuable assets?**
-

Are you clear about where your data is leading you?



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