



# Big Data

## Big Data is About to Change the Trucking Industry as We Know It

### EXECUTIVE SUMMARY:

Big data. Bigger impact. Yes, everything you've ever known about the trucking industry is about to change. Enormous wells of data, deep data analysis, and predictive modeling will empower motor vehicle carriers—from large national fleets to independent owner-operators—to operate more safely, efficiently, and profitably.

And, for the carriers that ride this paradigm shift successfully—transitioning from experiential-driven trucking operations to those that are data-driven—the gap they carve in competitive advantage will widen to Grand Canyon-sized proportions.

So, what is big data—and how will it change the way you work?

We'll get you up-to-speed—and share how can you prepare to embrace big data as the technology becomes more broadly available to fleets, large and small.

### TABLE OF CONTENTS:

- Deluged with data
- Enter, big data
- Big data baby steps: Planned vs. actual miles
- Forward thinking with predictive analytics
- How does predictive modeling with big data work?
- Custom predictive models for large carriers
- Industry predictive models for small carriers
- The promise of predictive modeling
- Driver turnover prediction
- Truck crash prediction
- Is intelligent routing next?
- The big benefits of big data
- Preparing for a big data future
- Get started



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# Deluged with data

Since the birth of the digital age in 2002, the rate at which we generate data is absolutely unprecedented. What's behind that exponential data growth? The rapid adoption of smartphones, mobile apps, and social media.

So, how much data are we really talking about here?

**"There were 5 Exabytes of information created between the dawn of civilization through 2003, but that much information is now created every 2 days."**

— Former CEO of Google

That's a jaw-dropping statistic if we ever saw one.

Now, let's dial back and consider that, today, a single truck generates an average 6TB of data in a year. Even on that small scale, it's easy to see—we're being deluged with data.

And, unfortunately, those enormous streams of raw data are worthless without the tools to process it into actionable insights.

And, that's a big problem.

When you work in the trucking industry, every day is a fire drill—and finding the trends that could dramatically improve your operations from a pile of paper reports is next to impossible. What's more, while each of those paper reports may offer something useful, if that data were integrated, the insights would drive a far greater impact.

Of course, the avalanche of data we're talking about isn't entirely contained within any individual carrier's systems and databases, which provides additional challenges—and opportunities.

We are now all part of the Internet of Things—our devices are talking, providing valuable information to a sensor network—without human interaction—that allows us to determine where our assets are, how fast they're moving, and their velocity through the supply chain.

For example:

- Vehicle-to-Vehicle (V2V) technologies, like Peloton truck platooning allow trucks to operate more fuel efficiently
- Vehicle-to-Infrastructure (V2I) technologies, like PrePass and Drivewyze allow drivers to electronically pay tolls and bypass weigh stations, moving freight more quickly
- Mobile technologies and location-based applications allow companies like Omnicracks to push Amber Alerts to mobile devices based on real-time locations

Everything we do leaves a digital trace (or, at least it will in the very near future)—and that's data we can capture, analyze, and leverage to inform our decision-making.

Of course, doing that is a mammoth undertaking.

# Enter, big data

Technology is evolving at lightning fast-speed, and it's giving us an ever-increasing ability to simultaneously capture and analyze large and complex data sets across vast networks, and in real-time.

We're not talking about the desktop computer in your office, here.

No, we mean networks of computers that can simultaneously crunch thousands and thousands of terabytes and petabytes of data in a nanosecond.

As an example, consider the data churned out by the CERN particle accelerator. 150 data centers and 65,000 computer processors around the world are busy processing that data and, in doing so, they're revealing the inner workings of the cosmos.

Likewise, the Google - Autism Speaks partnership seeks to advance our scientific understanding of autism through the sequencing of 10,000 autism-affected genomes.

**"Modern biology has become a data-limited science,"  
adds David Glazer, engineering director for Google Genomics.  
"Modern computing can remove those limits."**

**— David Glazer, engineering director for Google Genomics**

The kind of processing power required to analyze that vast amount of data simply wasn't available even a few years ago. But, today, it is—and it could unlock the answers we need to treat autism.

That's where we're going with big data.

And, as exciting as big data is to the fields of medicine, physics, and astronomy, it holds tremendous potential for the trucking industry, too.

Like we said, a single truck generates, on average, a whopping 6TB of data each year.

Of that, fleet optimization vendors today analyze only a fraction to identify trends and anomalies on the metrics that matter to you most:

- Idle time
- MPG
- Asset utilization
- And, speed, to name a few

They then take those billions of points of data and make that information actionable—by building driver scorecards, for example.

And, that's critical, because tools and reports are meaningless if they're not actionable.

So, what does that look like in real life?

# Big data baby steps: Planned vs. Actual Miles

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As an example, a Roadnet customer's costs went up 20% and he didn't know why, but he was able to build a revealing story with a data-mining tool.

He looked at both his planned transportation costs versus actual costs, reviewing the components that fed into each—time and miles.

As it turned out, his fleet's actual and planned miles were right on target, so that wasn't the culprit.

He then looked at drive time versus service time. While his fleet's service time looked solid, actual drive time versus planned was off quite significantly. Further investigation revealed that changes in road infrastructure were creating additional congestion and inflating his costs.

In the end, data mining tools allowed this carrier to drill down, identify the inefficiency, and take steps to reduce the impacts it had on fleet efficiency.

That's the power of big data analytics—it allows you to identify issues like overtime and out-of-route miles, and optimize routes that are both efficient and executable.

## Forward thinking with predictive analytics

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You've probably heard the phrase "predictive analytics," but what is it exactly—and how does it relate to big data?

In short, predictive analytics is the process of extracting insights from big data sets to identify trends and forecast future events with a high degree of reliability.

Predictive analytics is, in essence, a way to facilitate the use of big data in a powerful way—it allows you to harness your historical and real-time data, so that your decision-making can become more forward thinking.

# How does predictive modeling with big data work?

Consider your phone book—the hard copy version of the Yellow Pages you now use as a doorstop. Now, store that data on your desktop—on a single computer system.

In very simple terms, big data is like taking that rich information and breaking it down into narrow data sets—like last names beginning with A, B, and so on—and storing each data set on a separate server across different locations.

So, when you decide you want to do a quick analysis of St. Louis residents that live within six miles of Busch stadium or all Dallas-Fort Worth residents impacted by the 35Express Project, you can run that analysis in a nanosecond by performing multiple transactions on those smaller data sets across multiple servers and locations.

Crunching data like this requires software configurations and hardware platforms, like Hadoop, that allow you to run big data analysis. And, that's technology that's only recently become available.

So, how might predictive modeling work to improve your fleet?

For starters, companies like Omnitrac Analytics extract two to three years worth of customer data, like:

- Payroll
- Trips
- Fuel
- Miles
- Training records
- Prior employment data

Then, they add their own external data sets, including:

- Weather
- Traffic congestion
- Census data
- Employment statistics
- Population density
- And, so on and so forth

In combination (and supported by some pretty tremendous processing power), they look at patterns of past events to predict future events—events like who's going to leave your fleet and who's going to fall asleep at the wheel.

And, after an event, customers enter notes helping refine their predictive models even further. This is what big data machine learning technology does—and how it can shape a smarter, safer trucking industry as we move forward.

It's happening now—and it's tremendously exciting.

# Custom predictive models for large carriers

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By definition, big data requires big data sets. And, the custom predictive models that might offer safety and efficiency insights for motor vehicle carriers really only work for medium to large-sized fleets—we're talking carriers with 500 drivers or more.

(If you're a small carrier or independent owner-operator, hang on—there's good news on the horizon.)

Now, why is that?

For a predictive model to identify risk signatures in historical events, you must have deep enough wells of data, rich with events, from which to draw your predictions. Small carriers simply don't have enough drivers, accidents, terminations, and the like, for a custom predictive model to work.

However, if you've got at least three years worth of data on 500 drivers or more, you most likely have the rich information you need to identify risk signatures. And when you can determine what caused events to occur in the past, you can make predictions for the future—and incredibly accurate predictions, at that.

We're talking clear insights into how you can prevent accidents and reduce driver turnover, for example.

# Industry predictive models for small carriers

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Big data for small carriers? Absolutely.

Industry models are rapidly evolving that will allow one-truck operations to benefit from the same predictive analysis the large carriers are harnessing now.

How will these work?

By aggregating large numbers of trucking companies' data, we can create the vast data sets required for predictive analysis. Thus, building predictive models that will be totally independent of fleet size.

These models could give small fleets and owner-operators the big data insights they need to predict engine component failure, tire wear, and severe accidents based on Hours of Service logbook data.

Today, for example, we can give you insights into where to position your trucks and how much to negotiate your rates upward, but in the future, we'll be able to analyze that data against not only time and availability, but weather, traffic reports, buyer profiles, and other price elasticity indicators, too. In the end, that will help you understand what you should be bidding, so you can win more business and increase your margins.

# The promise of predictive modeling

What if vendors worked together? What if we were able to figure out how to normalize our data and apply it in aggregate to external data sets, extrapolating recommendations that would make trucks and drivers safer?

As an example, we could look at hard brakes across the country in aggregate. And, if we found that a significant number of trucks had a hard brake at the same GPS location across fleets and solutions, we could warn drivers of a dangerous curve ahead and recommend that they slow down.

These are the sorts of possibilities that excite us.

A few companies, like Omnitracs Analytics, are doing some of this big data work now. They're applying carriers' data from a variety of vendors, like XRS, to their own external data sets and developing predictive models that provide rich insights into fleet operations—and we fully expect other vendors will move in this direction.

Of course, those are the big, splashy benefits of predictive models powered by big data. There are softer benefits, as well.

For example, when fleet managers understand when drivers are stressed—and why—they can talk to their drivers about the right topic at the right time, resulting in happier, well-rested drivers who are content with their jobs, produce more miles, earn more money, and burn less fuel.

Yes, carriers may be excited about preventing car-truck crashes at the outset, but they'll quickly find that relieving driver stress becomes less art and more science, returning big benefits for drivers and carriers, alike.

Let's take a close-up look at a few of those predictive models...

## Driver turnover prediction

A carrier with 1400 drivers was experiencing high driver turnover. By using a custom, big data-powered predictive model, they were able to prevent 290 truck drivers from quitting—reducing driver turnover by half and saving the company \$1.2M.

How?

Without knowing anything about any particular driver, their predictive model could analyze thousands of data points and determine with high probability when a driver might be ready to quit for any number of reasons, like frustrations with a fleet manager, a skills gap, or family and financial problems.

And, armed with that knowledge and with specific dialogue direction from the solution, fleet managers were able to connect with their drivers at the right time and in the right way, so that their drivers felt heard and supported.

Pretty phenomenal, right?

# Truck crash prediction

Now, consider the Omnitracs Analytics industry model for accident prediction.

They took driver logs and turned each one into about a thousand distinct data points—from the amount of time the truck driver drove each hour of the day, to how many hours of sleep that driver got and when those hours occurred, to how many times that driver drove through sunrise.

Then, they took 27,000 severe accidents from their customers' data sets and reverse engineered a severity model, which allowed them to identify predictive data points in a particular driver logbook that indicated the potential for a bad wreck.

The model is so good they can take any driver's log book and predict the likelihood of a bad accident each hour of his or her day.

*And, it's absolutely staggering how accurate these predictions are.*

This was a huge undertaking to be sure—but that's what a big data exercise is all about.

Yes, we've listened closely to the Hours of Service compliance debate and it's true—HOS logbooks today are a measure of a driver's compliance; they don't tell us anything about how safe a driver is.

The fact is there's no direct correlation between compliance and safety—you can be 100% compliant with Hours of Service and still be half asleep at the wheel.

So, instead, Omnitracs Analytics looked at the relationship between driver logbooks and crash risk, and that's what they quantified with their predictive model.

With big data, we can predict certain accident types—when a driver will fall asleep behind the wheel, for example. And, knowing the high likelihood that this will occur, a business rules engine can provide a recommended course of action to the fleet manager that will prevent it from happening. (In this case, some sleeper berth time at a prescribed hour.)

The possibilities here are truly life changing in scope. Big data will give us the tools to prevent bad wrecks from happening, making the trucking profession a safer one industry-wide.



# Is intelligent routing next?

The trucking industry is generating vast quantities of data. We all get that. And, we need to harness that data to provide clear, actionable information.

The tremendous challenge here is that carriers are using multiple niche solutions from a variety of vendors that work in isolation. And, when solutions don't talk to each other, they create data silos.

So, you might be running:

- Applications on telematics devices in the cab
- Critical event technologies, like collision avoidance cameras
- Fuel management systems
- And, navigation technologies

Yes, each generates a wealth of information, but the insights you gain from those solutions in isolation are limited.

Now, imagine what would be possible if those solutions were integrated.

Consider, for instance, the potential for intelligent routing.

What if route optimization software could do more? What if instead of plotting routes based upon miles, road conditions, and customer hours of operation, you did that and factored in:

- Weather forecasts
- Traffic congestion analysis
- Predictions of how tired a truck driver will be based upon his Hours of Service logbook
- Refueling station access based on real-time price and wait time information
- Safe parking availability when a driver's legal hours are up

Big data will remove inefficiency and risk by harnessing machine learning technology to crunch all of these various data points down into clear, simple, actionable information in real time—and not for one truck, but for a thousand trucks all at once.

# The big benefits of big data

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In the trucking industry, everything comes down to safety and ROI—and, the way we see it, truck and driver safety improvements will be the most immediate benefit of big data technologies.

Of course, anytime you can prevent a wreck, that's a good thing—and big data will make that possible.

Even today, with our immature big data technologies, we can squeeze out inefficiency from experiential-driven decision-making, finding an extra hour of drive time per day for the OTR driver.

That's what happens when you have lots of visibility into what's happening down the road—you get a lot more productivity out of your trucks.

Big data solutions will also provide some powerful insights into driver retention. Predictive models will be able to tell you when a driver is likely to quit and why, so you can improve the situation and prevent the loss of your behind-the-wheel talent.

Don't discount the importance of driver satisfaction.

Raising the happiness meter within your organization not only mitigates the cost to hire and train a new driver (estimated at \$8000 - \$23,000), it will ripple out into the interactions your drivers have with your customers when delivering shipments—and that's the sort of brand representation you're after.

As for the soft benefits of big data, you'll be empowered by the reporting you receive—you'll feel more comfortable and confident in your decisions and your speed-to-decision will be faster, too.

And, as we all know, time is money.

## Preparing for a big data future

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We know that carriers who implement technology see year-over-year improvements in safety and efficiency of 6-13%. And, as we move away from fragmented data and toward fully integrated systems, those improvements will only increase.

If you're excited about the potential big data holds to shape your organization (and why wouldn't you be?), we encourage you to inventory all of your data now. And, if you're not collecting every bit of your available electronic data already, then start immediately.

The richer and deeper your data stores, the more insight you'll gain when you do move forward. Of course, many of the big fleets are already doing this. For them, the big question is: Are you really and truly ready for big data?

It's not uncommon for trucking executives who've leveraged their experience to advance their careers and lead successful companies to find predictive models really confronting. These models can counter what their past experience tells them to be true in the absence of big data.

So, you must be open to thinking differently and being data-driven.

If you're ready for that, then you're ready for big data technology—and you'll find yourself making decisions with far more certainty than you ever have in the past.

# Ready to move forward?

Two factors will be critical to your big data project success.

First, you need to identify a project champion. This is absolutely critical; someone needs to push this project through when time and resources are tight.

Second, you must build a cross-functional team, including driver, sales, and customer service teams. Any constituency can kill this project. So, creating an environment that fosters excellent communication and generates buy-in from the beginning will ease barriers and accelerate your success.

Is it time to implement big data technology?

Take the time to work with your provider to truly understand the solution.

We can't express enough the importance of investing in a dedicated, in-house expert. When time is tight and every call is a fire call (which is always, right?), you need someone who "gets it" and will ensure this important can doesn't get kicked down the road.

Remember: The more time you invest early, the quicker you'll realize an ROI.

This is going to be an exciting ride. Who's ready?

## Get started

Omnitracs Analytics (formerly FleetRisk Advisors) is a pioneer in applying predictive analytics and remediation solutions to the transportation industry. In fact, we began building predictive models for the trucking industry as far back as 2005.

In our work, we discovered that a surprisingly consistent set of behaviors leads to events, such as preventable accidents and employee turnover. With predictive analytics, we can:

- Identify these patterns
- Accurately predict near-future events
- Recommend remediation actions to prevent them

We'd love to empower your fleet with big data. Just give us a call and let us show you how we can help.

(800) 348-7227  
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## Getting More from Your Technology Investment

The Omnitrac Alliance Program facilitates integration of Omnitrac solutions with other leading companies that provide complementary technologies and services. This program taps into the power of integration in order to best meet the needs of our shared customers.

We offer Omnitrac Professional Services to all sizes of fleets to help you utilize our applications and our partners' applications in the most efficient way. Our assessment, integration, custom development and programming, training, business intelligence, and predictive modeling services deliver practical solutions. This critical information increases your productivity and efficiency, so you can both grow and differentiate your business.

The Omnitrac Services Portal provides access to a suite of web-based fleet management applications, including satellite mapping. Data from the Services Portal can be integrated into your existing enterprise systems.

## About Omnitrac, LLC

Omnitrac, LLC is a global pioneer of fleet management, routing and predictive analytics solutions for private and for-hire fleets. Omnitrac's nearly 1,000 employees deliver software-as-a-service-based solutions to help more than 50,000 private and for-hire fleet customers manage nearly 1,500,000 mobile assets in more than 70 countries. The company pioneered the use of commercial vehicle telematics over 25 years ago and serves today as a powerhouse of innovative, intuitive technologies. Omnitrac transforms the transportation industry through technology and insight, featuring best-in-class solutions for compliance, safety and security, productivity, telematics and tracking, transportation management (TMS), planning and delivery, data and analytics, and professional services.

Learn how you can use our applications, platforms, and services to reduce costs, increase profitability, and stay competitive. Visit [www.omnitrac.com](http://www.omnitrac.com) and let us show you how you can save time and money.



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