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Convergence

Mobility in trucking is now anywhere, anything, anytime, anyone

Welcome

Welcome to a new era of technology in the trucking industry. The following components of this industry briefing will help you plan for the future:

- Just to get you warmed up, an introduction to the technology changes which are changing our industry forever;
- A more detailed brief from XRS Corporation about making the technology trends pay off for you and your company;
- From Gartner, the hard facts and research behind these trends; and
- A real-life example of how the technology comes alive in a trucking firm's operations, creating value and ROI.

We're glad to have you join us on this journey.



Jay Couglin
Chairman and CEO
XRS Corporation

Featuring research from

Gartner[®]

An Introduction To A New Reality



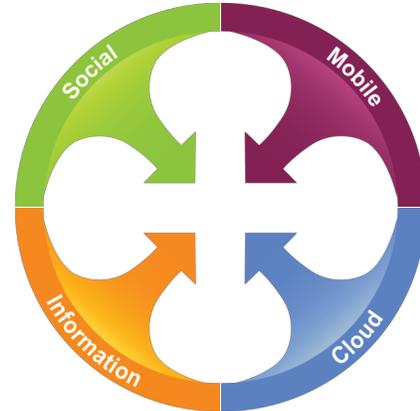
Jay Coughlan
CEO and Chairman
XRS Corporation

An evolution of technology trends is converging on the critically important American trucking industry. We believe this convergence, or what Gartner describes as the “Nexus of Forces,” will allow the entire industry to operate more safely, efficiently and competitively.

As Gartner’s research report says, “In the Nexus of Forces, information is the context for delivering enhanced social and mobile experiences. Mobile devices are a platform for effective social networking and new ways of work. Social links people to their work and each other in new and unexpected ways. Cloud enables delivery of information and functionality to users and systems. The forces of the Nexus are intertwined to create a user-driven ecosystem of modern computing.”

At XRS Corporation, we recognized the convergence of these forces as so powerful that we refocused our business model, products, and strategy in order to serve our changing customer needs:

- Businesses are using mobile technology like never before. These tools are transforming how they run their fleet. Companies who go mobile gain access to a deep and growing set of business applications that deliver significant competitive advantages. Mobile devices in the hands of drivers are at the core of the XRS solution.
- There’s a new “Social Life” delivered through technology, enabling the formation of virtual communities and the ability to move seamlessly between work and personal life. XRS has built a community, X Nation, allowing drivers to share life on the road.
- The Cloud is the secure and expandable platform for the XRS technology solution providing the scale to meet regulatory demands while connecting stakeholders throughout the supply chain.
- Information is the treasure trove in the XRS solution. Engine data allows fleets to know which trucks are performing well; location data is tied to how many hours are available for drivers; and drivers know how they are performing on a route. All this data is used to drive unprecedented business value and competitive differentiation.



We have made massive transitions in our company. We started as a hardware business, collecting data on keys placed into a dashboard computer. We transitioned to a software company, providing real-time intelligence that allowed companies to maximize the investment in their fleet. However, the next evolution into mobile with the XRS product, combined with the power of social, cloud and information, gives fleets access to technology that can dramatically change their business.

For the first time, the trucking industry has all four of these tools within reach. The results for the industry will be impressive:

- Truckers can combine critical business functions and personal online activities on one mobile device that’s already in their hands. Using technology can make life easier on the road for all parties frequently communicating together.
- The industry will be able to meet and prove compliance with federal safety regulations on real-time, economical mobile platforms.
- Using data, collected from mobile devices connected to the truck, fleets become more competitive by reducing fuel use, detecting and correcting vehicle-operating problems, reducing operating costs and improving efficiency through the use of technology.
- The nation’s roads will be safer through both compliance and better-maintained vehicles.

We believe that harnessing the potential of the Nexus of Forces will create groundbreaking, profit-creating business opportunities for those willing to engage. We invite you to read on for more details.

Convergence Seen In Fleets

America urgently needs a healthy, safe trucking industry to help power the economic recovery. Every American relies on trucks. The industry transports an excess of 11 billion tons of freight annually. Now, the trucking industry finds itself at a critical juncture. The industry must improve its efficiency in order to remain competitive and profitable, plus attract a new generation of drivers while meeting increasingly rigorous federal safety requirements.

An important case in point is regulation. Transportation legislation, Moving Ahead for Progress in the 21st Century (MAP-21), was passed by the US Congress and signed by the President in 2012. In a drive for greater safety on the nation's highways, one aspect of the legislation focuses on the Hours of Service rules for a driver, providing electronically verified proof of proper breaks and rest. U.S. truck drivers who are required to keep a Record of Duty Status will soon be required to have the trucks they drive equipped with an Electronic Logging Device. In order for a rule of this magnitude to become workable for all corners of the trucking industry, from the largest fleets to individual Owner/Operators, a convergence of technology must be employed to deliver effective solutions at affordable prices.

In addition to regulation, trucking firms are facing other enormous challenges, such as margin pressure from record high fuel prices and chronic driver shortages which will be exacerbated if drivers fail to comply with driving rules such as Hours of Service.

Combined, these market forces are daunting and threatening.

But there's good news to help trucking operations deal with these challenges. In the following research, Gartner defines the Nexus of Forces as the convergence and mutual reinforcement of social, mobility, cloud and information patterns that drive new business scenarios. We see it as a convergence of technology that will allow you to experience a radical business transformation.

The Need for Convergence

The trucking world is going through a mobile revolution, whether they planned it or not. Trucking companies were pioneers of adapting new technology that helped their business grow. Over 25 years ago, satellite-based communications systems were bolted on top of trucks, transmitting location data to fleet managers, allowing them to see where their trucks were located and communicate with drivers – long before the prevalence of mobile phones. But systems were expensive, and only the largest, most profitable trucking fleets could afford them. We were technology innovators, but at a cost.

With today's mobile and cloud based technology, fleets no longer need to bolt expensive hardware to their new trucks. Consumer mobile devices are putting powerful computers directly into a driver's hands. These mobile devices are powered through an invisible cloud structure, constantly transmitting large amounts of data in real time. Drivers, dispatchers, safety managers, and trucking fleet owners are connected while being spread across the country. And it's affordable for everyone, not just the lonely few that could afford yesterday's technology.

In light of this major revolution, XRS has made changes as well. For 27 years, we were known as Xata Corporation, a trucking data management company, and the originators of the electronic driver log to replace old-fashioned paper versions. We transitioned the company from a hardware provider, to a software provider, to now a mobile application company focused on the needs of fleets, building upon the foundations of technology convergence:



- **Mobile technology** – our solutions are literally in the hands of drivers, building off the ubiquity of communication tools available today. The power of open devices empowers everything we do as a company. XRS was built on mobile, for mobile.



- **Social Interaction** – XRS opens the door to a connected social ecosystem, adding job satisfaction to drivers and fleet employees. Because drivers are connected through social media platforms, they learn from one another.



- **Cloud Computing** – It is powering the mobile revolution because of its flexible infrastructure, which is needed to handle massive adoption of mobile technology.



- **Information** – Big Data is at the center of what we do. Data collected via the XRS solution is used daily by fleets to make decisions on how to improve dozens of aspects of their operations, such as improving fuel efficiency, maintaining vehicles and assuring driver regulatory compliance.

From our vantage point as a service provider to hundreds of large and small trucking companies, we can see the future tool-of-choice for trucking compliance and fleet optimization. It's the mobile phone, tablet, or rugged handheld, that goes where the driver goes. This revolution is accelerating; we find 86 percent of drivers have personal mobile devices, and about half of those are smartphones. That's why the Gartner's Nexus of Social, Mobile, Cloud and Information resonates so strongly with us.

After we acquired a first-generation mobile data-gathering company in 2009 and were inspired by its potential, we accelerated our R&D investment to bring advanced mobile technology to the trucking industry. We invested nearly \$26 million in R&D in the past two years – a hefty investment for our company. In August of 2012 we introduced our breakthrough product – the XRS mobile technology platform. We've partnered with AT&T, Sprint and Verizon in the U.S., and Rogers in Canada, for XRS to operate on their wireless networks. The solution runs on more than 50 mobile devices from multiple manufacturers. Its job is to collect and analyze mission-critical data for compliance and performance.

As you can see, the mobile revolution has arrived in the truck cab. It's a conspicuous contrast to the past, where fixed, hard-wired data systems were bolted onto trucks, with data transfer through now-obsolete systems. And for the first time, truckers will be able to operate within the new realities of technology convergence.

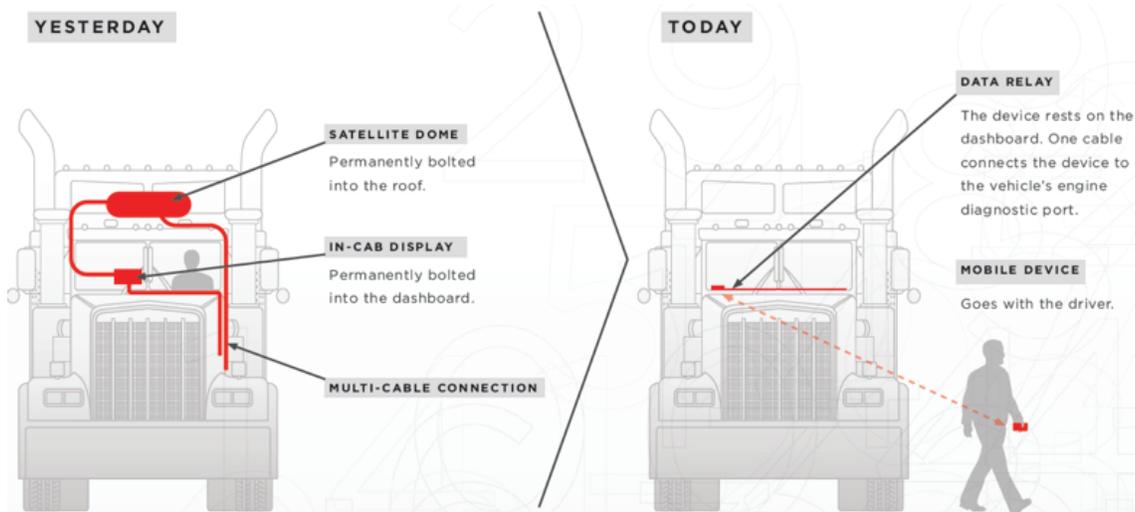


Here's a quick description of how simply the XRS system works: The small, in-cab XRS Relay device is unobtrusively attached with adhesive strips underneath the dash, where it taps into the truck's computer, or data bus; data is transferred from that device via Bluetooth to the driver's smartphone, tablet computer or rugged device with a simple plug and play cable; and it's transmitted via cellular network to the web-based system for data collection and analysis. The result is an easy-to-use dashboard of compliance and fleet optimization data and scorecards.



Obviously, what sounds simple isn't. It took many years and many dedicated partners to make it happen. But the companies and drivers who have been rolling it out are discovering the power of mobile at a fraction of the price of hard-wired solutions.

Gartner notices this change as well. Analyst C. Dwight Klappich notes in the Hype Cycle for Transportation, 2012: "While replacing paper driver logs with data captured electronically by EOBRs has merit, EOBR solution providers are expanding their offerings to include a broader portfolio of capabilities that will enhance value. Over time, there will be a shift from proprietary hardware-centric solutions to more open solutions, with more emphasis placed on the applications that exploit mobility than on the hardware. The market is cluttered with too many vendors offering point solutions and a handful of large, dominant vendors offering expanded solution portfolios. Over time, this market will consolidate to a smaller number of vendors that can support multiple capabilities. Furthermore, as costs continue to decrease as traditional EOBR capabilities are added to less expensive mobile devices, and as broader mobility solutions emerge, the stand-alone EOBR market will evaporate."



Why it Matters to You

We find that fleets are feeling three major burdens impacting everyday operations: regulatory compliance, the need for safe and efficient operations, and finding and keeping the best drivers. All are critical for survival in a thin margin business that requires constant attention to detail and innovation to separate your fleet from the pack. The good news? Technology convergence can be used by your fleet to combat these pressures, and it can be used today.

The regulatory environment:

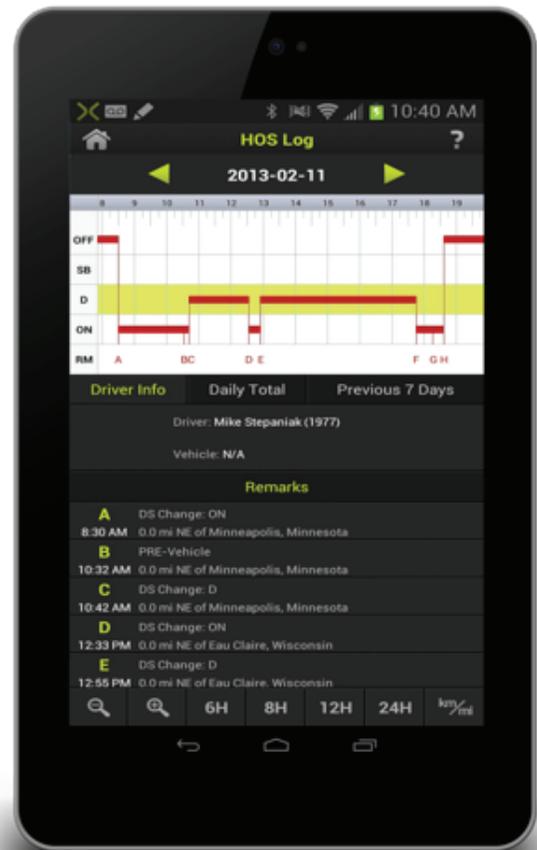
Fleets are facing tremendous pressure from regulatory entities including the Department of Transportation, Federal Motor Carrier Safety Administration (FMCSA), the International Fuel Tax Agreement (IFTA), and even state and local law enforcement personnel. These important governing bodies help create safe roads, but also enact regulatory standards within which fleets must operate.

The current Hours of Service laws that govern the length of time that a driver can be on-duty or behind a wheel are a powerful example of these regulations. It's critical for fatigued drivers to keep off the road, yet a balance must be made with fleet operators to live within the economic constraints of shorter delivery windows, rising labor costs, and high operating costs.

With mobile devices such as smartphones, tablets, or rugged handhelds, powered with Electronic Hours of Service applications in the XRS product, drivers and fleets can embrace mobile technology to aid with compliance. Drivers leverage technology they are used to, pinching and zooming on screen to see the details of an automatically created log. A fleet manager can see how much time that driver has left in the day, ensuring they are dispatched with enough hours to legally finish a run. An enforcement officer leverages the knowledge of a device he uses every day to simply navigate the phone handed to him from the truck cab.

The data collected from Electronic Hours of Service allows fleets to dig into what's really happening to their trucking assets and start asking questions like: What shippers are causing hang-ups for my drivers and can I start charging them detention time? How can I optimize the on-duty window and take advantage of exemptions that are legally allowed? Through analysis of the data gathered by mobile technology, transmitted through the cloud, and shared socially, a fleet can start answering these questions.

With the introduction of MAP-21, fleets will be mandated to adopt technology for Electronic Logs. The issue of affordability is a critical one for all trucking operations, but especially for independent Owner-Operators. They've been vocal with their concerns that Electronic Logging Device (ELD) regulations would be unreasonably costly for them. However, they're discovering that complying with new ELD requirements will not be an economic hardship when they can use their own smartphone or tablet.



For those with their own mobile device, there are no up-front hardware costs or capital requirements. An XRS software subscription of \$39 per month, per truck, produces results virtually immediately. Drivers can prove their hours of service and duty time availability on the spot. And having the system generate a single, real-time alert of a safety or truck maintenance problem can save thousands of dollars. Or can save lives. Technology convergence gives fleets the tools they need to live up to this mandate, and become better businesses because of their adoption.

Getting the Most Out Of Your Fleet

Getting the most out of your fleet is imperative for generating profit in your business, whether private fleet or trucking firm. We believe that the technology nexus of Mobile, Social, Cloud and Information technology leads to an understanding of how you can flex your MUSCLE – Maintenance, Utilization, Safety, Compliance, Labor and Equipment. MUSCLE is within reach for fleets of every size.

Maintenance

The need for a well maintained fleet is self-evident. The cost of assets is high, and with environmental regulations, each engine must perform to new standards of fuel efficiency. Increased visibility into your fleet through the FMCSA's Compliance, Safety, Accountability (CSA) program shows a need for you to know about all maintenance issues – from slack lines being out of adjustment to the most simple tires, mud flaps and lights that must be constantly inspected. Outfitting your driver with a mobile device can help solve these issues. By performing an inspection of a truck, enabled with a handheld device and utilizing XRS' Electronic Driver Vehicle Inspection Report (DVIR) drivers can immediately notify maintenance personnel of issues that can impact the uptime of a truck. They can share if a repair was self-certified. Data off the engine bus can be used for preventative maintenance or quickly understanding what fault codes are firing, finding problems before they turn into serious repairs. This-near-real-time connection to the driver and the truck allows for the vehicles to keep rolling – ultimately leading to revenue for everyone.

Utilization

The utilization of assets and operational costs, especially fuel, need to be optimized. Fleets owners and managers must closely work with drivers to ensure everyone is on the same page. By utilizing data collected from a mobile device on MPG trends and idle times of a truck, fleet managers have information sets (delivered through the cloud) that can be analyzed and optimized on driver behavior. By posting a driver scorecard in a social place, which can be as simple as a cork board in a break room, or shared on the driver's mobile device through the XRS platform, a social interaction happens that is extremely powerful – the best drivers know they have risen to the occasion; the drivers who were at the bottom of the list take the challenge to improve. By measuring and monitoring behavior, you can reward great driving that quickly leads to return on many investments.

Safety

Safety is a top concern for fleets, and technology can be used to help companies embrace a culture of safety. Convergence allows for constant communication. Drivers share best practices, and fleet and safety managers have a near-real-time view into safety benefits and programs. Data from critical events, like a hard brake or sudden acceleration, gives second-by-second insights into what happens with trucks at the most critical times.

Compliance

Compliance for trucking fleets is a complex endeavor. Fleets must live within rules on hours of service, fuel tax agreements, driver qualification, driving laws, weigh stations and much more. Drivers must have technology at their fingertips that allow them to understand if they are in compliance. Fleet managers need to rid the office of physical paper, ridden with the often dreadful penmanship of a seasoned truck driver. The mobile device allows for the collection of data, gathering data from the driver and truck that automates compliance – taking an audit from days and weeks to minutes and hours.

Labor

The utilization of a driver's time is a constant struggle for fleets – and how we deal with labor issues can be a make-or-break moment for a fleet. The mobile collection of data allows fleet managers to understand what can motivate and improve worker behavior. This can be as simple as collecting an automated timesheet. It can be as complex as an activity based compensation program built around understanding if a driver is actually ahead or behind on a planned route. By marrying data from complex systems through the cloud, business can start to make advanced decisions on business transformation.

Equipment

Employing a fleet's equipment is at the heart of what you do. Data on usage patterns lets you understand if you need that extra truck for a quick delivery, or if you can use your current trucks a tiny bit more to reduce a days' worth of routes.

The Impact of Social

Truck drivers can live an extremely lonely life on the road. Hours or even days can go by with minimal social interaction. At the same time, drivers can be extremely social. After all, truckers were the original electronic social media pioneers with their CB radios.

Mobile and social technology has radically changed that lonely life. Truckers are engaging in social networks and communities. In the XRS social network of X Nation we see drivers connecting with drivers daily – sharing the best views of the day, the love of chrome on a custom built Peterbilt, and safety tips from the road. They share how to drive, where to park and what to eat. Connecting likeminded strangers helps deal with long trips away from home and loved ones.

As younger drivers enter the world of trucking, we see them embracing mobile technology. They use smartphones in their daily life communicating with friends through texting and emailing. Social networks are engrained in how they live and work.

Making Trucking Easier for a Driver

Most fleets today would suggest that one of the biggest challenges they face is finding and keeping the best drivers. The American Trucking Association suggests there is a current driver shortage of 25,000 drivers, growing to over 250,000 drivers in a few short years based on the aging driver population. Turnover rates are often above 100% annually.

Driver health is a major concern. The FMCSA notes that "in addition to the safety concerns, recent research has linked long work hours and the resulting curtailment of sleep to a range of serious health effects, particularly when combined with a job that is basically sedentary, like truck driving. These health conditions— including obesity, high blood pressure, other cardiovascular diseases, diabetes, and sleep apnea—not only shorten driver's lives, but also can result in substantial ongoing medical costs and put driver's medical certifications at risk."

The convergence of technology can enable drivers to lead better lives.

The mobile world brings an ecosystem of tools that enable a driver's work life to become easier. A mobile device with current cloud services allows better communication between home and the driver. A driver can use common, off-the-shelf applications to talk to family daily. Structured communication, as found in the XRS FLX application, allow for better communication between the driver and the office through workflow that insures the right load is delivered and proof of delivery gained. By reducing or eliminating tasks that are not focused on driving we can all help smooth a trucker's tough day job.

Trucking is becoming a “bring-your-own-device” industry. Drivers prefer to use their own smart devices, and trucking companies often want to avoid the high capital costs of providing devices. Using the driver’s device addresses both preferences. The company gets its required compliance solution, but the driver gets to use a preferred device, perhaps with the company picking up part of the tab. As part of this trend, the driver won’t be tethered to the truck to get online work done; everything’s mobile.

This technology revolution will impact driver hiring, too. Hiring qualified drivers will be easier because the drivers will have data records to show their skills and compliance records. With so many drivers approaching retirement age, the hiring crunch will be with us for long time, and technology needs to help manage the issue. Truckers with an electronic track record can prove their value to an employer, and fleets will be able to make better, smarter and more efficient hires.

Why it Matters: The Results

The impacts of this convergence of forces in the trucking industry are emerging. The benefits of data analysis and social interaction in the cloud, available via mobile technology, are becoming clear:

- We’re in a whole new world of regulation, and regulatory non-compliance can grind fleets and trucks to a halt before they know it. Detailed, real-time and mobile monitoring to avoid violations has become an absolute necessity.
- When driver behaviors and truck statuses are measurable and safer, the highways are safer. Safety managers are given tools to see what happens on the road. Unsafe practices can quickly be identified and the proper coaching assigned. Drivers can monitor their own safety measures.
- Savvy fleet operators have figured out that data analysis can slash costs. Fleet optimization is being accomplished with automated reporting of fleet performance indicators: Fuel consumption, hard braking, shift patterns, idle engine wear, PTO usage, trip reporting, MPG, speeding and much more. XRS users, for example, are saving the expense of thousands of gallons of fuel by increasing their MPG by only a half-mile per gallon.
- With mobile applications, the expense, complexity of installation and training for hardware-based onboard systems is replaced by a five-minute training video, 10 minutes to plug a proprietary Relay device into the truck’s computer, and a quick mobile app download onto the smart device. Saving time and money (without holes drilled into the truck) are welcome reprieves.
- Drivers gain more legal driving time per day by automating what were formerly paperwork tasks. Using an electronic log procedure on average saves 15 minutes per driver per day -- more than an extra hour per week.
- Drivers have the satisfaction of merging their personal and business activities onto a single, accessible, easy-to-use mobile device.
- Lastly, we see the growing environmental benefits of less fuel burned.

The Challenge to You:

How can you bring success to your business utilizing mobile, social, information and the cloud? XRS will answer that question and more. See more at www.xrscorp.com.

For more background, read Gartner’s Nexus of Forces.

From the Gartner Files:

The Nexus of Forces: Social, Mobile, Cloud and Information

The Nexus of Forces is the convergence and mutual reinforcement of social, mobility, cloud and information patterns that drive new business scenarios.

Analysis

A Nexus of converging forces — social, mobile, cloud and information — is building upon and transforming user behavior while creating new business opportunities.

What We Saw

Research over the past several years has identified the independent evolution of four powerful forces: social, mobile, cloud and information. As a result of consumerization and the ubiquity of connected smart devices, people's behavior has caused a convergence of these forces. This user-centric convergence was highlighted at Symposium/ITxpo 2011, where the keynote touched on the story emerging around the Nexus and raised a warning to senior IT leaders: Their existing architectures are becoming obsolete.

In the Nexus of Forces, information is the context for delivering enhanced social and mobile experiences. Mobile devices are a platform for effective social networking and new ways of work. Social links people to their work and each other in new and unexpected ways. Cloud enables delivery of information and functionality to users and systems. The forces of the Nexus are intertwined to create a user-driven ecosystem of modern computing.

What We See

The Nexus is the technology-immersed environment, and that environment drives business at an increasingly accelerated pace. Using multiple devices and applications of their choosing, people connect with one another and interact with a wealth of information. Whether they realize it or not, the seamlessness of their experiences and access to data relies more and more on an underlying cloud infrastructure. When these people are also employees, they carry expectations of this prolific interactivity and information access with them into the workplace.

Leading companies are taking advantage of Nexus dynamics to create innovative products and services, reaching new customers in new contexts. These companies understand the subtle relationships between behavior, sentiment, history, location and intention and are able to adjust to the prevailing winds without uprooting business models and system architectures. Traditional companies struggle with this adaptivity, both from a business and IT perspective (indeed, IT is often part of the problem because it may keep an organization from capitalizing on new opportunities). Whether it be vendors, end users, private companies, governments, hospitals or universities, all organizations that produce or consume IT are affected by the Nexus of Forces, and they need to choose how they will respond.

What We Predict

Tools will continue to improve, and access to information will grow wider and deeper. Technocentrism gives way to human-centered design. People will become even more sophisticated consumers and co-creators of technology and content. They will share their experiences and preferences, leading to broad adoption at an accelerating pace. To support the fluid dynamics of the Nexus of Forces, providers of technology will have to get comfortable with a new complexion of control, one where autonomy is provided against a nonintrusive foundation of revitalized infrastructure and operational systems and processes.

These advances don't come without increased complexity: That's just the nature of technology evolution. For users, however, things get simpler and more aligned with their intentions. Donald Norman captured this paradox in "The Invisible Computer: Why Good Products Can Fail, the Personal Computer Is So Complex, and Information Appliances Are the Solution":

Most technology goes through cycles of development and change in both internal and external complexity. Often, the very first device is simple, but crude. As the device undergoes the early stages of development, its power and

efficiency improve, but so does its complexity. As the technology matures, however, simpler, more effective ways of doing things are developed, and the device becomes easier to use, although usually by becoming more complex inside.

The management of this complexity falls on the ecosystem of technology providers — from enterprise IT shops to cloud service providers to device manufacturers — and the ease with which pieces fit together and flex around unforeseen scenarios. The task of enterprise leaders is to hide complexity under a layer of simplicity.

At the Core: Social, Mobile, Cloud and Information Converge and Reinforce

Not that long ago, people's most sophisticated computing experience was at work, and computing was limited at home. Now, in most cases, the opposite is true. The consumerization of IT is a result of the availability of excellent devices, interfaces and applications with minimal learning curves. These devices — especially smartphones and tablets — and their application ecosystems are what the philosopher Martin Heidegger might have called "ready-to-hand," meaning that they fit the tasks and intentions of the user without getting in the way.

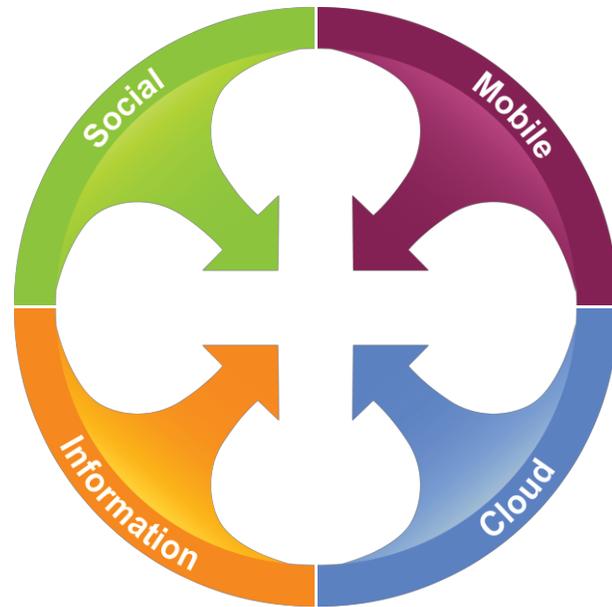
The key to design lies in understanding the readiness-to-hand of the tools being built [...]. [W]e can create tools that are designed to make the maximal use of human perception and understanding without projecting human capacities onto the computer.¹

As a result of using these well-designed devices, people have become more sophisticated users of technology: The individual is empowered. People expect access to similar functionality across all their roles and make fewer distinctions between work and nonwork activities. People have come to expect and make use of presence and location services, contextual search results, and spontaneous interaction with their social networks to enhance everyday experiences. And they spread those experiences across multiple devices, often at the same time.

To preserve this highly interactive experience, several dependencies act together:

- Access to relevant, stateful information requires access to ubiquitous cloud services where that information is made available.

FIGURE 1 The Nexus of Forces



Source: Gartner (June 2012)

- People are mobile, and they require devices and applications in their hands as opposed to (only) machines tethered to a desk.
- Location data (for example, from a device) shapes the enormous amount of potential data into information that is most relevant.
- Access to social networks implies a personally relevant transactional experience that is integrated into, and initiated from, a social platform (for example, Facebook).

Business Scenarios and Opportunities

Consider the evolution of Amazon. In the mid-1990s, Jeff Bezos spotted an opportunity to create a mail order store on the emerging Internet that would make use of a searchable database. Books were a natural product for such a database because of the vast number of available titles and the reliance on the combination of information and physical form. Over time, Amazon enlarged its portfolio of merchandise and extended its reach through partner relationships. The Kindle ushered in a new paradigm for readers and closed the gap between idea ("I should read that!") and delivery

(quick transaction using my “1-Click” settings and immediate download to my handheld device). New self-publishing models at Amazon now make it much easier for authors to deliver their work into the hands of new readers without the overhead of provisioning physical merchandise or the logistics of traditional delivery. In this mobile, contextualized, cloud-driven, information-centric scenario, all parties benefit more immediately: reader, author, provider (publisher) and proxy (retailer). The dark side of this accelerated delivery model is the shuttering of traditional bookstores that, while providing an important tactile and personal experience, cannot keep up with the pace of demand.

How are you enabling consumers to get their results more quickly? How are you empowering your knowledge workers to share their ideas? How long until your business closes its doors because it can't keep up with new delivery models?

In many of our homes, we have theatre-quality entertainment experiences. Increasingly, those experiences involve streaming high-quality video and audio across fast Internet connections for delivery on devices throughout the home. Again, the time gap has closed from idea (“We should watch that!”) to delivery (log onto Netflix, BBC iPlayer, iTunes or other providers and press “Play”). Who has patience to wait for the mail or drive to the corner video store? Oh, and by the way, the corner video store isn't there anymore. Providers of these services use the cloud to achieve scale and reach, while your collection of devices use the cloud to enable seamless playback experience from room to room and from wall to hand.

What could your business deliver to paying users if your systems and business models allowed? What delivery methods are you clinging to that are holding you back? Are your customers going somewhere else?

At my local outdoor farmers market set up in a grassy field, the seller of heirloom tomatoes is cashless — well, she keeps cash on hand (just in case), but keeps it quiet. When I buy a bag of perfect purple beefsteaks, she swipes my debit card on her Square mobile card reader and I sign with my finger. My receipt is in my inbox, and her cash is in the bank the next day. Once more, the gap has closed from idea (“Those tomatoes would be great for dinner!”) to delivery (on the scale, in the bag, on my way), especially in a day when the

“idea” is more likely: “Those tomatoes would be great for dinner, but I don't have any cash on me, and the closest ATM is five miles away.”

What is keeping your customers from acting on your services? How can you enable instant transactions — not only transactions of money, but also ideas?

The choices available for information, entertainment and purchasing are overwhelming. Consumers cannot browse every blog, headline or newspaper available to them to decide what to read. They cannot sample every movie or song that comes out every week to decide what is worthwhile. Increasingly, they rely on their friends or trusted others to recommend where they should spend their attention. RSS readers sit unused because people rely on retweets or Facebook “Likes” to decide what to read. Professional movie and music reviewers become less relevant as consumers depend on the friends they trust for recommendations. Professional analysts (potentially even those at Gartner) could lose some of their influence because social techniques make it easier for people to reach their peers for advice.

Are you relying on increasingly obsolete promotional channels to let people hear about your product? Do you know who the real influencers are?

These are examples of well-known scenarios that harness the Nexus of Forces, but every day, entrepreneurs test new ideas that push the boundaries of traditional business models and the IT that supports those models. Ideas that make the technology transparent while enhancing human behavior will gain a foothold in this fast-paced ecosystem. End-user organizations and technology providers that are slow to move will be left far behind.

The Four Forces

Each of the four forces of the Nexus provides a starting point for research. Depending where your particular interest or experience lies, you can begin from any force and work your way toward the middle, building an understanding of the dependencies that hold the Nexus of Forces together.

Social

[T]he creative tension generated by the mingling of people from different fields, different backgrounds, and different expectations makes a critical contribution [to collective experience]. Among other things, such experience helps provide not only knowledge and information that people don't know they need, but also the skill to judge the worthwhile from the worthless — an increasingly important skill in an age of ubiquitous and often unreliable information.²

Social is one of the most compelling examples of how consumerization drives enterprise IT practices. It's hard to think of an activity that is more personal than sharing comments, links and recommendations with friends. Nonetheless, enterprises were quick to see the potential benefits. Comments and recommendations don't have to be among friends about last night's game or which shoes to buy; they can also be among colleagues about progress of a project or which supplier provides good value. Consumer vendors were even quicker to see the influence — for good or ill — of friends sharing recommendations on what to buy.

Social technologies both drive and depend on the other three Nexus forces:

- Social provides an important need for mobility: Accessing social networks is one of the primary uses of mobile devices. Indeed, it is the main reason that many people acquire more powerful smartphones instead of simple portable phones. Social interactions are transient, fleeting and spontaneous. They have much more value when they are possible wherever the user is located.
- Social depends on cloud for scale and access: Social networks benefit from scale, the kind of scale that is really only practical through cloud deployment.
- Social feeds and depends on deep analysis: Social interactions provide a rich source of information about connections, preferences and intentions. As social networks get larger, participants need better tools to be able to manage the growing numbers of interactions, which drives the need for deeper social analytics.

Mobile

I'm a great believer that any tool that enhances communication has profound effects in terms of how people can learn from each other, and how they can achieve the kind of freedoms that they're interested in.³

Walk down the typical crowded street, and half the people you see will be looking at or talking on their mobile phones. Mobile devices are the constant gateway of attention. And it's personal: Many users would give up other essentials rather than give up their handheld companion. It is their constant point of interaction to their social world, where their most trusted personal and business relationships are maintained. Through the window in their palm, they are never alone, never lost, and never bored.

Mobile computing is forcing the biggest change to the way people live since the automobile. And like the automotive revolution, there are many secondary impacts. It changes where people can work. It changes how they spend their day. Mass adoption forces new infrastructure. It spawns new businesses. And it threatens the status quo.

For business, the opportunities — and the stakes — are high. To a retailer, the same device that navigates a customer into a store can redirect the final sale to the competition. To a bank, the mobile phone is a new wallet that could make the credit card obsolete. To a sales organization, mobile computing keeps salespeople out in the field talking to customers. To a medical caregiver, a patient's vitals and behaviors may be constantly monitored, which increases the effectiveness and efficiency of treatment. Every industry is affected.

But mobile does not stand alone as an isolated phenomenon: Devices will come and go faster all the time. New form factors will emerge. People will interact with multiple screens working in concert. Sensor data will transparently enhance the experience, integrating the virtual and physical worlds contextually. The information gathered in this immersive world will have tremendous value.

Ultimately, the lasting relationship will be between a user and a cloud-based ecosystem.

Cloud

The utility model of computing — computing resources delivered over the network in much the same way that electricity or telephone service reaches our homes and offices today — makes more sense than ever.⁴

This “utility model of computing” that Scott McNealy described in 2001 is at the heart of cloud computing now, more than a decade later. Cloud computing represents the glue for all the forces of the Nexus. It is the model for delivery of whatever computing resources are needed and for activities that grow out of such delivery. Without cloud computing, social interactions would have no place to happen at scale, mobile access would fail to be able to connect to a wide variety of data and functions, and information would be still stuck inside internal systems.

The model of cloud computing is what we call a “global-class” phenomenon because it focuses us on outcomes connected across the globe rather than technologies and outcomes centered on an internal enterprise strategy. There is no need to spend forever vetting technology acquisitions when we can sign up for a service and use it without having to care about the underlying technologies. No need to spend 80% of our IT budget just “keeping the lights on” when we can offload much of that to service providers who can deliver it more efficiently than we can and change the “light bulbs” for us.

In a global-class computing world, everything shifts to the culture of the consumer and the externalized view of computing. This plays nicely into the ideas of the Nexus because that externalization of computing is what allows the forces to converge and thrive. Mobile independent software vendors using cloud services have more options to access information and processes than ever before — without having to own it all. Crowdsourcing can be done through mobile communities because the cloud allows them all to exist in the same “workspace” rather than being isolated in enterprise or single-PC environments. And, the cloud is the carrier ecosystem for a wide variety of data forms, both structured and unstructured. This data can be gathered from cloud-based communities, through cloud services, from mobile endpoints, and all in a consistent and globally available environment.

The cloud force is the glue of the Nexus and will drive the monetization of Nexus relationships as it drives the service enablement of IT across the world.

Information

Information is not stored anywhere in particular. Rather, it is stored everywhere. Information is better thought of as “evoked” rather than “found.”⁵

For years, technologists have discussed the ubiquity of information without realizing how to take full advantage of it. That time is here now. Social, mobile and cloud make information accessible, shareable and consumable by anyone, anywhere, at any time. Knowing how to capture the power of the ubiquity of information and utilize the smaller subsets applicable to your company, your product and your customers, at a specific point in time, will be critical to new opportunities and for avoiding risks.

Developing a discipline of innovation through information enables organizations to respond to environmental, customer, employee or product changes as they occur. It will enable companies to leap ahead of their competition in operational or business performance.

An enterprise can succeed or fail based on how it responds to trends such as:

- **Social media:** People are sharing detailed information about themselves, the products they use, and the companies they like (or don't like) in social media. Prior to social, getting specific data about customers/consumers was costly and aggregate in nature. Harnessing the information in social media allows organizations to understand the customer, or potential customer, in ways never before possible.
- **Cloud computing:** Cloud is both the underpinning of the massive amounts of information generated by social media and the primary model for elasticity in accessing and storing information in a cost-effective manner.
- **Mobile:** People are no longer tied to a specific location. The devices they use enable ubiquitous integration of work and nonwork tasks while providing easy access to application ecosystems, social networks and information.

Technology advances in the information space offer a chance to exploit these trends to meet a business's long-standing demand for better data with which to make fact-based decisions. Content analytics, social analytics, in-memory databases, Hadoop and other technologies can deliver better access/analysis of more varieties and volumes of information at lower costs.

Success requires an IT organization to understand the business requirements for new information and how it can affect measurable business outcomes and help drive innovation. At the same time, information demand can quickly outstrip the IT organization's ability to deliver. The increasing volume, variety and velocity of information will overwhelm familiar disciplines for accessing, storing, managing, analyzing, governing, presenting, collaborating on and sharing information. The IT organization must develop an iterative information strategy to guide its response to business requirements for information. Gartner's research will help CIOs, IT leaders and enterprise architects develop such an information strategy.

Challenges for Traditional IT

Traditional IT relies on engineering and prescription: I build a specific tool and teach you how to use it. Now, because of consumerization and democratization of IT, more control has shifted to the user, and the role of IT is to adapt and absorb, not just prescribe. Inflexibility of systems causes increased brittleness and divergence from their original use cases, thus making it difficult to address the fluid nature of human behavior as described by neurophysiologist William H. Calvin:

Inconsistency is part of flexibility, of nature's strategy of keeping options open. Animals that cannot adapt to new environments will not survive the incessant fluctuations of climate. Judicial systems that cannot grow and change with our society's evolving problems will become rigid anachronisms that promote social earthquakes. Consistency and rationality are human virtues in dealing with certain potentially orderly situations; we make excellent use of them in engineering and legal systems, but we shouldn't expect living systems to have made them centerpiece of their operation in a changing, unpredictable world.⁶

Enter the IT executives and their staff. How prepared are they to deliver what the sophisticated, creative and sometimes circumventive user requires? IT departments are faced with legacy architectures, processes and skills designed for an increasingly obsolescent way of working. Along with those legacy architectures come legacy mindsets and habits, all of which must be changed to deal with the Nexus of Forces.

Architectural Dependencies and Responses: The Well Is Deep

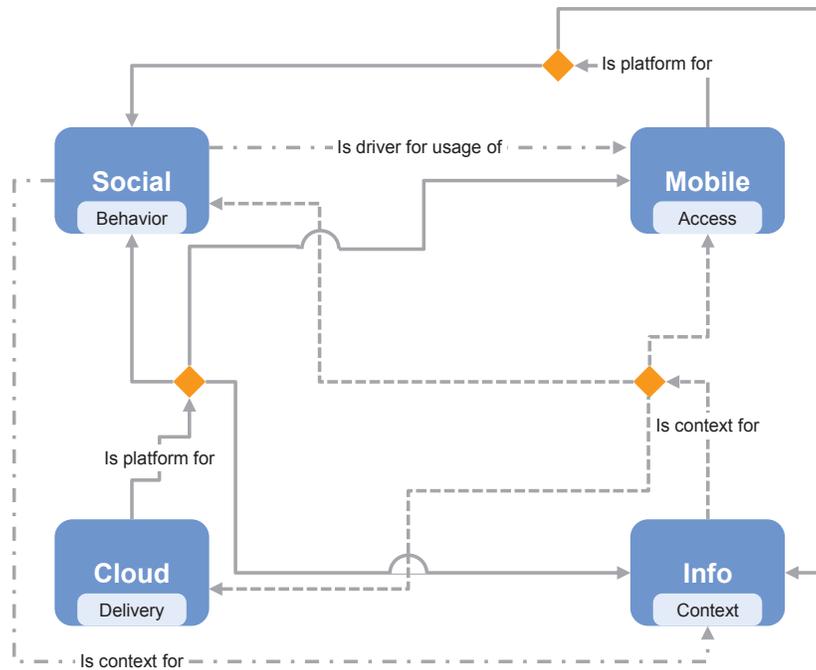
The combination of shifting control, hyperflexibility and extreme collaboration underlying new user scenarios has deep architectural implications: How do you offer users autonomy, flexibility and choice without endangering underlying systems and data? The four forces reinforce one another (see Figure 2).

The reinforcing nature of the four Nexus forces provides a foundation for sophisticated human behavior that relies on high usability and access to information and applications that support that behavior (see Figure 3).

The dynamics shown in Figure 3 in turn have nontrivial application architecture implications that impact how functionality is composed and delivered (see Figure 4). Many of the choices that architects will make in conjunction with Figure 4 will affect access to appropriate data for given roles. In addition, there are multiple design inflection points (for example, providing mobile, offline access to data) that have major ramifications for system complexity, identity and access, risk management, and cost.

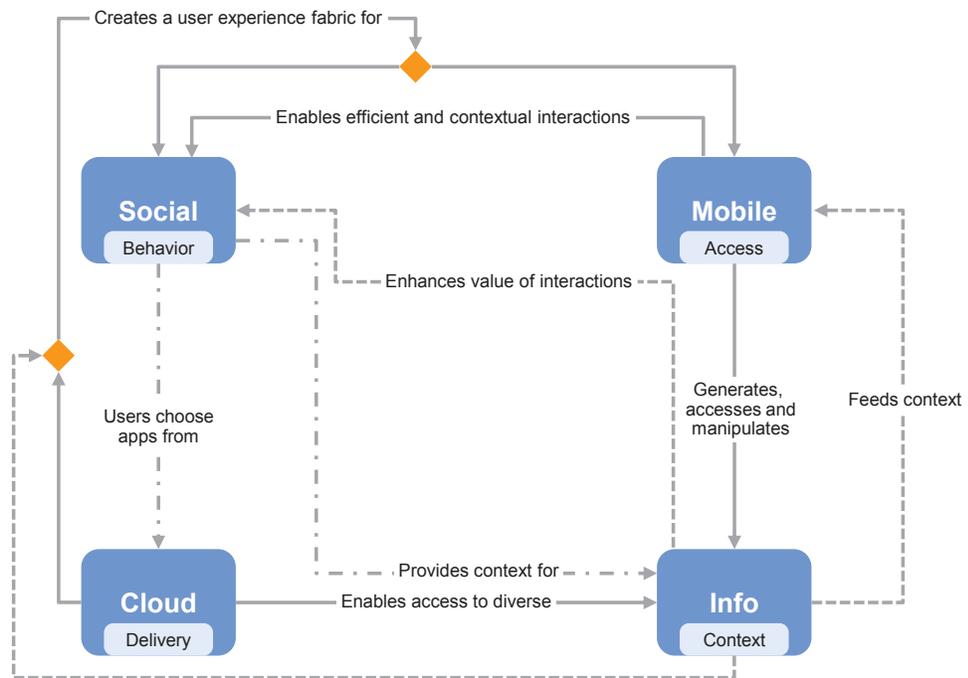
Gartner is producing research to closely examine architectural dependencies in the Nexus of Forces and to advise architects and technology leaders concerning design requirements and trade-offs. This will include research into emerging technologies at all levels of the IT portfolio.

FIGURE 2 Basic Relationships Among the Nexus Forces

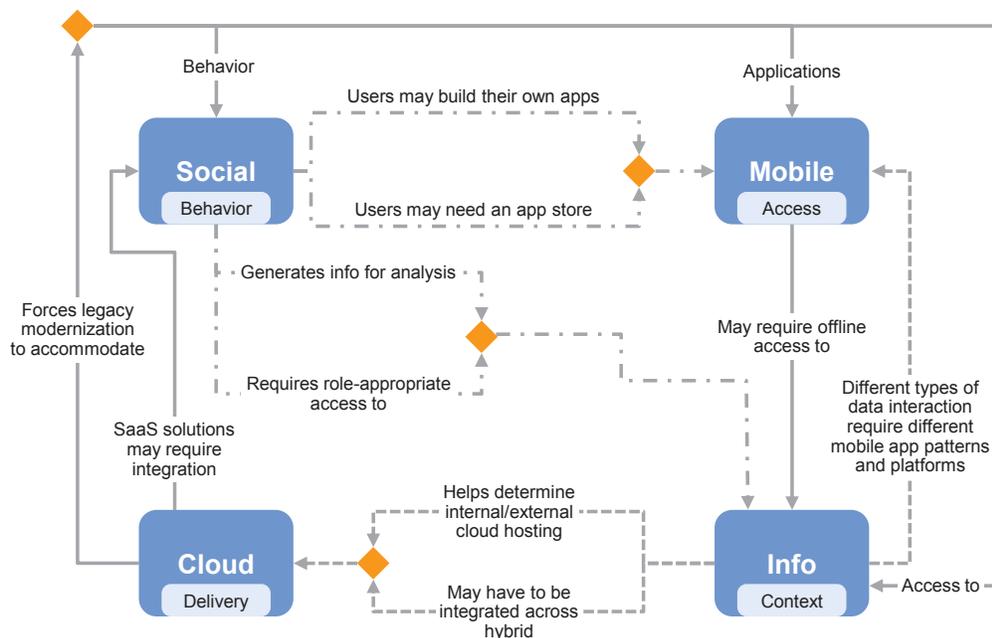


Source: Gartner (June 2012)

FIGURE 3 Behavior, Usability and Context in the Nexus of Forces



Source: Gartner (June 2012)

FIGURE 4 Application Architecture Implications in the Nexus of Forces


Source: Gartner (June 2012)

Conclusion

Four independent forces — social, mobile, cloud and information — have converged as a result of human behavior, which creates a technology-immersed environment. The forces interact and reinforce one another and are associated through complex dependencies. New business opportunities emerge from this Nexus of Forces, especially scenarios that extend reach and relationship to customers, citizens, patients, employees or any other participant in an ecosystem of humans and machines. The combination of pervasive mobility, near-ubiquitous connectivity, industrial compute services, and information access decreases the gap between idea and action. To take advantage of the Nexus of Forces and respond effectively, organizations must face the challenges of modernizing their systems, skills and mind-sets. Organizations that ignore the Nexus of Forces will be displaced by those that can move into the opportunity space more quickly — and the pace is accelerating.

Notes

- ¹ T. Winograd and F. Flores, "Understanding Computers and Cognition: A New Foundation for Design," Addison-Wesley, 1987, p. 137.
- ² J. Brown and P. Duguid, "The Social Life of Information," Harvard Business School Press, 2000, p. 219.
- ³ Bill Gates, Digital Dividends Conference, Seattle, 18 October 2000.
- ⁴ S. McNealy, CBS MarketWatch, 20 December 2001.
- ⁵ D. Rumelhart and D. Norman, "A Comparison of Models," in G. Hinton and J. Anderson, eds., "Parallel Models of Associative Memory," Lawrence Erlbaum Associates, 1981.
- ⁶ W. Calvin, "The Cerebral Symphony: Seashore Reflections on the Structure of Consciousness," Bantam Books, 1989, p. 313.

Port Logistics Group Case Study

The HOS Solution I Had Been Looking For

*A Conversation with Mike Johnson
Port Logistics Group*

THE RISK OF PAPER LOGS

Eleven-hour driving limits. 34-hour resets. 70-hour on-duty limits. Staying hours-of-service (HOS) compliant. All these issues are critical to the successful operation of any trucking business, yet reliance on paper logs can put these very same companies at risk.

Just ask Mike Johnson, Trucking Operations Manager for Port Logistics Group. A 33-year veteran with the drayage and intermodal carrier, he had been plagued by problems associated with paper logs.

Johnson knew that inaccurate paper logs from company drivers and owner-operators were a problem for nearly all port-based transportation providers. "In the past, my problem was that some drivers were doing everything by memory at the end of the day, and because of that their logs could be inaccurate. Auditors would request a source document to audit, and if logs weren't exactly correct, we'd get dinged."

Port Logistics Group was one of the first drayage companies to proactively employ a vehicle tracking system in the late '80s. Yet while it was a great tool for the company, it didn't give them the ability to electronically capture driver logs. In the meantime, HOS compliance remained a focus area for Port Logistics Group, and one that required an effective long-term solution.

"Hours of service compliance was our major challenge. After all, trucking companies can't afford to be out of compliance, and poor BASICS can mean FMCSA intervention, an inability to compete for contracts and increased exposure to accident liability. In short, failure to take corrective action can put a fleet out of operation."



Searching for an e-log solution

There was no doubt that Port Logistics Group needed an onboard electronic logs solution, but Johnson's search for that solution was not an easy one. "Years ago, I began looking for log auditing software and ended up working with a Canadian company. We drew up plans for special logs, equipment and inspection reports that would work for multiple intermodal units during the day." The custom solution, however, proved to be too expensive.

Johnson then tried another log-auditing provider, but they couldn't audit Port Logistics Group's format. "We spent three months on a private program. Every day, we scanned all of our logs to them, but they weren't able to get it working correctly," said Johnson.

It was another disappointment, and Johnson still needed to find and implement a cost-effective solution that would capture the data they needed. Johnson didn't know it yet, but he was looking for XRS, powered by Road Science.

XRS's Road Science makes capturing and analyzing truck and driver data simple. The XRS EOBR solution makes sense of the overwhelming amount of fleet data, and distills it into quick and easy reports that help with HOS-compliance, helps reduce operations costs and helps improve customer satisfaction.

"One day I answered a sales call from XRS," said Johnson. "After that I thought: you know what? I'm going to take a chance with these guys. As soon as I saw what it could do, I knew the price was right for our budget and that XRS was the HOS solution I had been looking for."

A practical approach to implementation

Johnson understood that getting driver buy-in was a critical part of any fleet wide implementation. So, he studied up and became an in-house expert. He then used his new working knowledge of XRS to educate his driver team: he issued how-to memos well in advance of launch, while highlighting the importance of using the new technology to Port Logistics Group's profitability—something that had a direct impact on each and every driver.

Johnson says it was easy when he installed the XRS technology in ten company vehicles as part of a phased implementation: "It didn't take a full-blown training class and it didn't require hours and hours to get our drivers up to speed." Johnson simply brought five drivers into his office at a time and demoed XRS himself.

With his company drivers on XRS, Johnson says the owner-operators driving for Port Logistics Group immediately heard about the benefits of using the technology, including how easy it was to track HOS. They were hooked. "When I first announced we'd be implementing electronic driver logs, there was some hesitation from drivers," Johnson says. "To get them over this hurdle, I just told them to think about all the benefits of electronic logs, like the reduction in admin time needed to track and record HOS. Once they realized how easy it was, the guys really bought into it."



Saving Money and Keeping HOS Compliant

That has freed up a lot of time at Port Logistics Group. Johnson adds, “Our audit process is fast and a lot more accurate than before. We’ve cut down on time spent in the audit process by 80%. The drivers are now electronically logging all of the information that we need to see: they’re entering the container number, chassis number, plate number and our freight bill number or the trip number. XRS has eliminated all of our paper logs.”

Johnson is responsible for making sure his drivers follow HOS regulations, a responsibility he takes very seriously. “XRS makes it a lot easier to monitor what my drivers are doing. We’re taking corrective action, when needed, and our BASICS are improving.”

“Before XRS, our audit process was painful. It took a long time to gather the data.

Now, we have all that data at our fingertips—in real-time. We don’t spend any time gathering, sorting and filing driver-log information anymore.”

Not only is Johnson happy with the results he’s seeing at Port Logistics Group, he’s sharing his success story. “I know a lot of people in the business, and they often ask me for recommendations. I strongly promote XRS because I believe in the solution and the results I get from it. I’m saving money and I have a better audit process.”

With XRS’ Road Science, HOS compliance has never been so easy.