

# Big Data and Analytics Focus in the Travel and Transportation Industry

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WHITE PAPER

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## IDC MANUFACTURING INSIGHTS OPINION

The travel and transportation industry faces enormous challenges and opportunities as the global economy moves into a new information age that is connected and intelligent. The amount of data, increasingly real time and near real time, that is bombarding businesses in this industry requires faster and more comprehensive data collection and analytics capabilities to support both current ways of doing business and future innovation. Indeed, new technical, organizational, process, and decision management frameworks will be required to handle the four Vs of Big Data and analytics: value, volume, velocity, and variety.

IDC Manufacturing Insights defines travel and transportation as any industry segment that moves people or products; we do not include companies that manufacture transportation assets in this segment. These companies are undergoing a fundamental shift from "product-related services" to "information-related services":

- The role of intermediary in travel and transportation fuels the need to adopt and adapt Big Data and analytics as a way to unlock the insights and capabilities inherent in new data sources and applications — whether unstructured data, social media, remote/mobile device use, or consumer connectivity.
- The "empowered," or "always connected," consumer has particularly profound implications for the segments of the travel and transportation industry that manage passengers. As we've noted, this is both an opportunity and a challenge — companies must adapt their services to handle connectivity and communication requirements and the expectation of consumers for 100% service levels, as well as recognize that the availability of new data sources and new technologies can open up opportunities to both broaden their business appeal and generate new sources of revenue.

## **SITUATION OVERVIEW**

Like so many business segments, the travel and transportation industry is facing a time of deep change and strategic challenge. For the purposes of the discussion in this white paper, IDC Manufacturing Insights defines the scope of travel and transportation to include the following industry segments: airlines, railroads, car rental companies, trucking companies, and third-party logistics (3PL) providers.

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### **Business Challenges and Opportunities**

Travel and transportation companies are facing many of the same challenges and opportunities as other business segments in terms of managing risk, enhancing the customer experience, and ensuring operational excellence. The need to balance cost, product/service quality/safety, and customer service is endemic to all businesses, but for travel and transportation companies, it is particularly important because these businesses are undergoing a fundamental shift. For these "service" businesses, the importance of quality and customer satisfaction has never been in question, but they are seeing a change from "product-related services" to "information-related services." This change is not necessarily instinctive for many of these businesses, so they have tended to struggle in terms of deployment and support. Three examples of this transition are:

- Car rental companies offering GPS and entertainment options
- Airlines offering Internet connectivity and customized entertainment options
- Third-party logistics providers offering business-to-business platform integration and GPS service

For many of these businesses, the instinctive first reaction has been to do it themselves. We see that in the third-party logistics industry, for example, many companies formed their own IT infrastructure initially, only to realize pretty quickly that it was not a core competency, and they were unable to either keep up with technological progress or provide acceptable performance. At the same time, the evolution to an information-related service business is bidirectional. These businesses not only must provide outgoing connectivity to their customers but also must be able to manage large amounts of incoming data from new and varied sources. In some cases, the travel and transportation company may even be asked to act as an information intermediary.

One of the key trends that IDC Manufacturing Insights has identified as driving significant change in the travel and transportation industry is the notion of the "empowered" consumer who uses ubiquitous access to information to make more informed decisions and purchases:

- Mobility and social business connectivity are transforming the way that people interact with each other and with the companies they use to move both products and passengers.
- Traditional forms of outreach are quickly being augmented and, in some cases, replaced by these new ways of communicating, reporting, and evaluating alternatives.
- Consumers are increasingly intolerant of downtime and latency; they expect information access everywhere and at any time, and once they decide to make a purchase, they "want it now."

The "empowered," or "always connected," consumer has particularly profound implications for the segments of the travel and transportation industry that manage passengers. As we've noted, this is both an opportunity and a challenge — companies must adapt their services to handle connectivity and communication requirements and the expectation of consumers for 100% service levels, as well as recognize that the availability of new data sources and new technologies can open up opportunities to both broaden their business appeal and generate new sources of revenue.

The notion of the "empowered" consumer is not limited to companies that move passengers; it also applies to the movement of freight, where shippers and customers require both enhanced visibility status and the ability to dynamically redeploy as business conditions dictate.

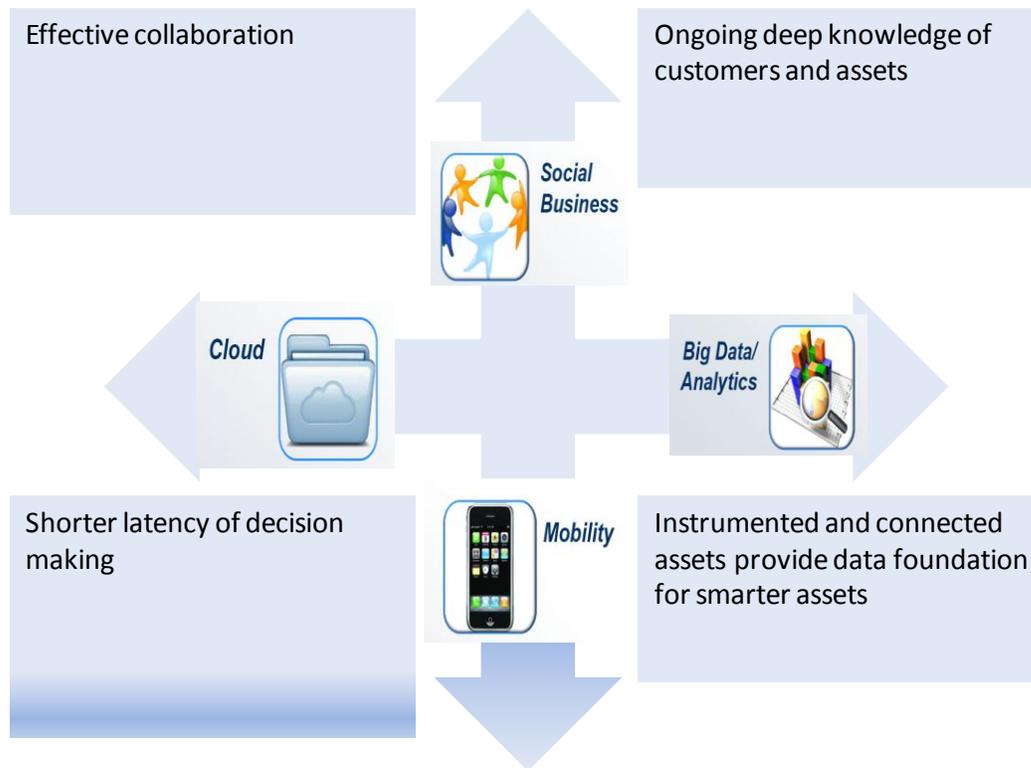
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### **The Four Pillars**

In IDC Manufacturing Insights' overall predictions for 2012, there is reference to a shift to the IT industry's third major platform of growth — built on mobile, cloud, social, and Big Data technologies. These four technology areas make up the "four pillars" of IT, as illustrated in Figure 1.

**FIGURE 1**

The Four Pillars



Source: IDC Manufacturing Insights, 2012

Looking at these four technology areas from the perspective of the travel and transportation industry, we see that Big Data and analytics play a pivotal role in both managing and influencing the "always connected" consumer.

Indeed, the rapid adoption of these transformative technologies within travel and transportation organizations will create new requirements for IT:

- Effective collaboration, where the need to be faster and more nimble in terms of consumer/product user interactions and IT capabilities is poised to dramatically change how services are delivered. Companies are also beginning the fundamental transformation from individual nodes to truly collaborative entities within a globally networked supply chain.
- Deeper knowledge of consumers and consumer needs, driven by both the ubiquity and the volume of data, requires new capabilities to leverage social business tools and Big Data.

- Cloud computing and mobility combine to drive down the latency of decision making, with the ability to react more quickly to consumer needs and wants.
- Automated and instrumented supply chain processes reemerge as a key enabler of smarter assets, both for internal business process evolution and for service-related customer satisfaction. These capabilities are also important for companies to better tailor business offerings to meet varied customer preferences.

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### **Big Data and Analytics Defined**

One of the inherent challenges in discussing the topic of Big Data and analytics is the lack of a clear definition. Further, there is a tendency to look at current data challenges and call everything "Big Data." For the purposes of this discussion of the travel and transportation industry, IDC Manufacturing Insights defines Big Data and analytics using four attributes:

- **Volume.** Travel and transportation data will more than double in the next five years as a result of digitized freight and passenger information found in electronic tickets, bills of lading, en route/delivery records, access to unstructured data, data from mobile devices, both business-to-business and business-to-consumer, as well as social media.
- **Variety.** As travel and transportation companies broaden their definition of "services" from product centric to information centric, the variety of data will expand significantly, including the need to "host" interactions between supply chain ecosystem partners or provide passengers with both access to and insight into destinations. Other new data sources will emerge as initiatives such as in-transit and inventory monitoring grow and the use of social media matures.
- **Velocity.** It is not enough for travel and transportation companies to access or disseminate data — they must do so in real time or near real time. The availability of real-time or near-real-time data will improve the "action-ability" of information — not just in terms of existing use cases but as a facilitator for new use cases.
- **Value.** In the context of travel and transportation, the notion of value is twofold. It is the value from improving internal operational capabilities, but it is also about improving the customer/consumer experience and generating incremental revenue.

## **FUTURE OUTLOOK**

The role of key service providers for travel and transportation companies fuels the need to adopt and adapt Big Data and analytics as a way to unlock the insights and capabilities inherent in new data sources and applications — whether unstructured data, social media, remote/mobile device use, or consumer connectivity.

In the context of managing risk, enhancing the customer experience, and ensuring operational efficiency, the primary challenges for the travel and transportation supply chain are twofold: how to better leverage the data that exists and how to scale for the expected increase in data in the near future.

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### **The Future Role of Big Data**

As is true across the breadth of manufacturing and distribution, the travel and transportation industry is wrestling with volumes of data and shares a general lack of clarity about how to best deal with the massive growth of unstructured consumer "sentiment" data. For the large parts of the industry that involve the movement of passengers, "empowered" consumers, with their inherent tendency to be "privately happy, publicly unhappy," present both an opportunity and a challenge. For these industry subsegments, the ability to use data and analytics is bidirectional, presenting the need to both comprehensively understand incoming data and provide the infrastructure for customers to remain connected during their travel experience.

The ability for travel and transportation companies to unlock insights available from new data sources needs to be a top priority. Whether unstructured data from social media sources, data from remote devices, or just higher volumes of more traditional data from established sources such as frequent flier programs, the ability for companies to differentiate themselves will come largely from data-driven services. It is incumbent on these companies, therefore, to:

- Leverage and optimize data already in use — while it is understandable to focus on future data growth and new sources of data, many companies do a poor job of leveraging the data they receive today.
- Optimize existing technology investments that may be underdeployed or underemployed, particularly with an eye to future compatibility with Big Data growth.
- Recognize the requirement for speed and that the connected and "empowered" consumer has no tolerance for latency.

- Understand the general requirements, from both a line-of-business perspective and an IT perspective, of future data growth and the linkage to services.
- Ensure that the IT infrastructure requirements to support Big Data and analytics are met — both today and for the future.

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## **Examples in Travel and Transportation**

There are a number of interesting examples of Big Data and analytics in the travel and transportation industry. Given the inherent diversity of the subsegments, we highlight one example from the freight side of the industry and one example from the passenger side.

### ***Third-Party Logistics Provider***

As more and more shippers of product move away from owned logistics resources, the 3PL industry has experienced significant growth. Initially, 3PLs principally focused on the physical movement of freight, but the intermediary nature of the 3PL has resulted in the requirement for shipment, delivery, and inventory information management and the growing expectation for an integrated business-to-business capability.

In one example, a consumer products company was looking to use sensors and inventory management analytics to extend the definition of "inventory on hand" to incoming 3PL shipments. This put significant requirements on the intermediary 3PL to provide shipment and in-transit information in real time:

- Integrating departure and arrival times
- Initially based on anticipated "trip time"; subsequently real-time location and arrival time using sensor technology
- In-transit stock added to "available" inventory levels based on order fulfillment and shipment arrival time
- Reduction in order cuts and improved order fill performance
- Linkage to mobile tools in destination distribution center

In another example, the 3PL was being asked by its customers to provide an integrated business-to-business platform in place, evolving from 1:1 connections with customers to an intermediary integration role between the primary customer and its other supply chain partners. Examples of the requirements were:

- The ability to support varied communication protocols, both domestically and internationally

- The ability to handle large volumes of data exchanges as well as large numbers of connections
- Improved information flow and real-time visibility of data and data exchanges with partners and customers

### ***Airline***

Although the airline industry understands the importance of the customer experience, business pressures have prompted it to look for new sources of revenue beyond traditional passenger fares and freight rates. Many of these efforts result in less than fully flier-friendly approaches, with no perceived value to the flier from being "nickel-and-dimed" to death. At the same time, airlines are also moving toward a more highly segmented product that depends heavily on flier data.

Every airline seems to have a frequent flier program, and during a typical boarding process, it is not unusual to move through five or more different levels of "entitlement." Yet, the traditional benefits (early boarding, preferential upgrades, etc.) are giving way to more sophisticated online promotions and flier segmentation (i.e., moving to "upper coach" and "lower coach" differentiated by legroom) designed to drive even higher levels of consumer loyalty. These efforts require a much more precise and measured ability to manage consumer loyalty data as well as the ability to solicit and monitor sentiment through social media.

In terms of the in-flight experience, travelers are demanding greater connectivity and flight information — and, in many cases, they are willing to pay for these options. For example, "always connected" travelers will pay for a service that provides value, such as in-flight Internet service, but they view charges for luggage and seat comfort upgrades as pure revenue plays. Yet, airlines still struggle to provide passengers with adequate or timely flight visibility, or the traveler has more accurate information than the airline staff.

Given the industry challenges to drive incremental revenue and improve consumer satisfaction, airlines can use information in a number of ways:

- They can offer broader, incremental **customer-focused services** based on more comprehensive customer insights (e.g., luggage services, passenger escorts, or home pickup).
- Big Data analytics can be used to **deliver personalized services** based on individual insights. With facial recognition software, for example, airlines can analyze real-time images of customers, match the images against the customer databases, and provide

travel profile information to the gate agents before the passengers check in.

- Perhaps the most significant way that Big Data analytics can be used is to **monitor and impact customer sentiment**, particularly in a world of "empowered" consumers who are not shy about communicating their displeasure across multiple forms of social media.

As the airline industry looks for new sources of revenue and moves to information-centric services, its ability to leverage data effectively and in a timely fashion becomes critical. Regardless of efforts to more effectively drive loyalty, companies that provide the better service will be the industry winners.

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## **Industry Challenges**

In many ways, the challenges and opportunities for the use of Big Data in travel and transportation exceed those of other industries. For example, companies that move freight find themselves transitioning into an information role that is far removed from their historical core competency of the physical movement of product and/or the management of fleet assets. For companies that move people, "always connected" travelers are voracious consumers of information with expectations for an experience that is both timely and customized to their preferences.

- Complexity and breadth of data, particularly where consumer experience or data intermediary requirements exist; in the case of connected travelers, the range and ubiquity of available information means that they often have better or more timely information than airline or railroad staff.
- Limited investment budget, with a general lack of alignment between line-of-business requirements and IT, means that the ability to leverage Big Data is often "stuck" in the IT prioritization process, without a direct link to business benefits and revenue growth.
- Although the use cases within travel and transportation are a bit more apparent than those in other industry segments, there is still a general lack of understanding of opportunities for Big Data and analytics, particularly where the application of mobility or social network data is concerned.

## OVERVIEW OF HP BIG DATA AND ANALYTICS OFFERINGS

HP offers a number of capabilities that can address the growing opportunities and challenges of Big Data and analytics in the travel and transportation industry.

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### Services

- **Information Strategy and Organization Services** provide an approach to connecting information across an enterprise. They also establish enterprisewide organizations, tools, and processes; align priorities; and foster collaboration between the business and IT.
  - **Information Management and Architecture Services** provide the technical knowledge, process improvements, and organizational architecture required to capture, manage, retain, archive, and deliver information throughout the enterprise.
  - **Business Analytics and Information Delivery Services** deliver information to enterprise employees.
  - **Business Solutions-Social Intelligence Services** combine insights from unstructured social media data with existing structured customer and enterprise data.
  - **Hosted Delivery-Managed Services, Cloud, and Hybrid Services** leverage software and solution delivery models.
  - **Advanced Information Services** upgrade specific platforms, enabling them to connect and support analysis of large amounts of structured and unstructured data (available for HP, SAP, and Microsoft platforms).
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### Software

- **Autonomy.** Autonomy combines structured and unstructured data for its clients and provides contextual and conceptual understanding capabilities. Autonomy's IDOL 10 product allows clients access to 100% of their data.
- **Vertica.** Vertica offers a suite of services that define specific data analysis requirements and determine the best options for integrating the Vertica Analytics Platform into an existing infrastructure. The Vertica offering is a relational software platform to store, manage, and analyze information and provides SQL and NoSQL analytics capabilities.

## Strengths and Challenges

HP has a comprehensive product and services portfolio that is consistent with what IDC Manufacturing Insights expects from one of the market-leading enterprise vendors. Further, the company has a rich history of application development and use:

- **Information management and analytics.** HP provides services and technology to support the information management and analytic requirements of its clients. Offerings includes information strategy and organization services, information management and architecture services, business analytics and information delivery services, business solutions, and social intelligence services. HP recently acquired two technology companies to strengthen its technology offerings. HP purchased Autonomy on October 11, 2011, and Vertica on February 14, 2011. Autonomy combines structured and unstructured data for its clients and provides contextual and conceptual understanding. Autonomy's IDOL 10 product allows clients access to 100% of their data. Vertica's offering is a relational software platform to store, manage, and analyze information and provides SQL and NoSQL analytics capabilities.
- **Cloud computing.** HP Enterprise Cloud Services—Compute, runs on the HP Converged Infrastructure. The HP Hybrid Delivery solutions provide a secure, enterprise-grade cloud computing platform that delivers services from the most appropriate source — public cloud, private cloud, or traditional network. Additionally, HP enjoys a strong presence in private cloud options offered by channel partner ISVs and VARs. HP can also directly support customers that want to deliver cloud service within the confines of their own organization to their end users.
- **Security.** HP offers clients a security strategy through the HP Security Framework, designed to offer end-to-end information security plans and execution road maps, including the following components:
  - **HP Security Information and Event Management (SIEM)** services leverage ArcSight Express 3.0 and enable clients to identify and protect systems against threats.
  - **HP Comprehensive Applications Threat Analysis (CATA)** service architects and designs security into applications.
  - **HP Application Security Testing-as-a-Service** leverages HP Fortify and HP WebInspect technologies to identify and fix security vulnerabilities in the application layer.

- **HP Enterprise Cloud Service (ECS)** is an endpoint threat management offering that delivers antivirus and antimalware capabilities to secure desktops, laptops, and servers.
- **HP Secure Boardroom** is an "at a glance" portal that lets an enterprise security executive combine existing sources of security data into a central dashboard.
- **HP Discovery Workshop** assesses an organization's environment; identifies challenges; and determines how the challenges are being addressed, an organization's risk tolerance, and where an organization is in the security maturity model.
- **Mobility.** HP's approach to enabling enterprise mobility is suited for organizations that wish to reach their constituents across multiple networks and devices by delivering applications, content, and services in a scalable, secure, and reliable way. This approach leverages HP's global applications services capabilities to provide the architecture, systems engineering, development, and support services. Combined, they help an organization simplify its applications and extend them where necessary as well as build mobile business-to-business, business-to-consumer, and business-to-employee applications. This approach also leverages HP's service-oriented architecture-based integration architecture and is enabled by development and security frameworks that help create componentized building blocks from monolithic legacy applications to develop and deploy mobile applications.

HP faces many of the same market challenges as other enterprise vendors:

- **Competitive portfolios.** HP's competitors are also focused on expanding their solution portfolios in terms of breadth and depth of product capabilities, professional services, and public cloud computing options.
- **Channel network management.** HP's channel strength is also a weakness. Successful execution of HP's strategy to broaden its portfolio will require that HP reinforce its position in the enterprise space without alienating the channel that has been so beneficial to the organization.
- **Focus on security.** As more product and passenger information is made available via a range of devices, including mobile devices, the risk of a privacy breach rises.

## ESSENTIAL GUIDANCE

- **Adopt an enterprisewide approach to Big Data analytics.** The design, development, and deployment of Big Data analytical capabilities should be seen from the outset as an enterprisewide undertaking even as nascent initiatives incubate across different functions within the business. The design objectives of an enterprisewide approach to Big Data analytics should include:
  - Cross-functional program governance
  - Alignment of insights from all sources of Big Data — consumers, customers, partners, and suppliers
  - Integrate data to the point of decision making — leverage data from wherever it resides
  - Delivering insights within the decision management context of the roles they inform — that is, task aligned and just in time — and the style in which and the speed at which the decisions are made
- **Look for monetization opportunities across the board.** Big Data analytics can inform decisions across the breadth of the business. Look for actionable insights including marketing campaigns; product design and quality; new product development and introduction; consumer pricing, promotions, and personalization.
- **Maintain a readiness for rapid evolution of Big Data analytics.** Big Data analytics is a new area; new capabilities for and opportunities to apply Big Data analytics are emerging quickly. Managing rapid change requires agility in a host of technical competencies (e.g., data management and governance, commodity hardware configurations); organizational dimensions of skills, roles, and decision rights; and consumption models and use cases. Travel and transportation companies will increasingly need to find sources of innovation and should look to Big Data information partners. They should screen for partners that provide best-in-class solutions consisting of open source technologies/capabilities and proprietary technologies/capabilities, as needed, that are best suited for their unique requirements.

Travel and transportation organizations looking to improve their capabilities in Big Data and analytics should also consider the following:

- **Recognize the value of untapped data assets** in supporting fact-based decisions by shippers, customers, and consumers.
- **Recognize the implications of operating without critical information** and build use cases to address the challenges. This is particularly relevant to the airline industry where passengers often have better information than airline personnel.

- **Conduct a gap analysis** to determine what new technology and business investments are required.
- **Formulate a Big Data strategy** that includes evaluation of decision makers' requirements, decision processes, existing and new technology, and availability and quality of data.

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