Chapter 4
Improving Fleet Management Strategy and Operational Intelligence with Predictive Analytics

Bill Powell and Suresh Chandran

Abstract The fleet management industry is comprised of fleet management providers that help ensure an organization's vehicles remain on the road supporting core business functions efficiently, safely, and at the lowest total operating cost. Recent technology advancements in the data analysis space coupled with enriched data domain have made it possible for analytics to be applied strategically for fleet management solutions. One of the latest and game changing services to enter the fleet management market in recent years is in the IoT (Internet of Things) space, specifically, vehicle telematics services. Collating pure telematics information with other information from other areas such as maintenance, fuel, and driver performance can improve fleet management. Using the case study of ARI, this paper explores the application of advanced analytics to various facets of fleet management and ARI's experience in aligning analytics with its business strategy. The paper also outlines the steps needed to implement a telematics and analytics strategy in organizations and the importance of bridging the gap between theory and practice.

Keywords Fleet management industry · Data · Analytics · Telematics · Internet of Things · Operational intelligence · Business strategy

Introduction

Fleet managers face increasing economic challenges in the acquisition, operation, and disposition of their company cars and trucks (PWC, 2015), especially in vocational fleets where complex work trucks and equipment are vital to their organization. The acquisition and configuration of company assets (cars and trucks) have

B. Powell
ARI, Mount Laurel, NJ, USA
e-mail: bpowell@arifleet.com

S. Chandran (✉)
Drexel University, Philadelphia, PA, USA
e-mail: sc44@drexel.edu

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become ever more intricate due to evolving options and expanded supply chain processes. Once the asset is built, delivered, and put into service, the fleet managers' attention turns toward the effective operation of the fleet. Decisions regarding fuel management, vehicle maintenance, and asset uptime can have a profound effect on the fleet's total cost of ownership. Finally, once the asset has reached its economic breakeven point, multiple options need to be considered to maximize its residual value. Thus, smart and strategic business decisions must be made throughout the entire life cycle of the fleet from acquisition to operation to disposal. Furthermore, it is essential that these choices are balanced with the safe and effective use of the asset.

Recent technology advancements in the data analysis space coupled with enriched data domains have made it possible for analytics to be applied strategically for fleet management solutions. One of the latest and game changing services to enter the fleet management market in recent years is in the IoT (Internet of Things) space, specifically, vehicle telematics services. Telematics is a technology used to interface with, obtain, and measure diagnostic and positional data from moving assets (cars, trucks, trains, etc.) that can be analyzed and leveraged to make better decisions about their location, type of use, status, and behavior. GPS data provide the exact location and speed of the asset, while numerous vehicle sensors capture its idle time, battery voltage, fuel/air ratio, carbon output, and other performance metrics including any diagnostic issues should they arise. This information is streamed at high velocity over a cellular network to a centralized facility where it is stored and combined with other empirical data (fuel, maintenance, accident information, etc.) to form a more complete picture of how the asset is operating. Telematics devices are either plugged into the asset's OBD-II port (onboard diagnostic port) or directly wired into the asset depending on the vendor, vehicle manufacturer, and required capabilities.

The use cases for pure telematics information are vast. However, the real potential for this information is when it is collated with other data domains such as maintenance, fuel, and driver performance and aligned to the fleet management strategy. Our paper explores applications of advanced analytics in various facets of fleet management and demonstrates these applications through ARI's experience in aligning analytics with its business strategy.

Background

The Fleet Management Industry: An Overview

The fleet management industry is comprised of fleet management companies that are partnered with organizations to help manage the vehicles they need to conduct day-to-day operations as a strategic business asset that contributes to the bottom line. Fleet management companies help clients by optimizing the entire lifecycle of the vehicle beginning with the acquisition of the car or truck, continuing to

programs and services such as maintenance management and licensing compliance and through to the eventual sale of the vehicle. Fleet management providers help ensure that an organization's vehicles remain on the road to support core business functions efficiently, safely, and at the lowest total operating cost.

The fleet management market is constantly evolving, and the richness of telematics data has provided insights that previously were difficult to obtain or riddled with inaccuracies. Telematics enables more accurate odometer readings, very precise vehicle positional information, and the ability to determine how the vehicle is operated. Drivers who have a propensity to speed are now easily identified in addition to those who tend to start and idle their vehicles for an excessive amount of time (each hour of idling consumes about one gallon of fuel). This information can be used to help customers slow down their fleet, which improves fuel economy. In other cases, customers have provided their insurance companies with details about their fleet's performance to negotiate lower rates. Another area where geospatial information has helped reduce costs is for customers who operate Department of Transportation (DOT)- compliant vehicles. Customers who operate a DOT vehicle on a federal highway are required to pay a tax for the distance traveled. Typically, customers take a conservative approach and overpay. However, if the asset has telematics capabilities, customers can be assured they pay only for the exact distance traveled.

Similar to the DOT use case, drivers who operate a company vehicle and are allowed to use it for personal use must declare their personal mileage as a fringe benefit to the IRS. The process of recording business and personal mileage is tedious and error prone. To streamline the process, automatic recording for vehicles equipped with telematics was recently introduced. By geocoding the driver's home and office, the system can distinguish business trips from personal use. Drivers can now simply skim and verify the information before it is posted to their tax department instead of manually keeping detailed driving logs.

Aligning Fleet Management Strategy with Analytics: The ARI Case Study

ARI is the largest privately held family-owned fleet management company in the world. It provides an array of products and services specifically designed to control and reduce its customers' fleet expense, increase the fleet's availability, and allow the fleet to be operated in a safe and effective manner. Over 1.4 million vehicles are managed by ARI across the globe with large concentrations in North America and Europe. Focusing on complex vocational fleets is a key component of ARI's strategy. ARI provides a full range of services including acquisition, supply chain management, maintenance, telematics, licensing and compliance, fuel management, accident claims and subrogation, driver safety, and vehicle remarketing. Each of these services generates volumes of information; this is collected, collated, and analyzed to understand their underlying factors and provide recommendations for continual cost reductions and improvements in efficiency.

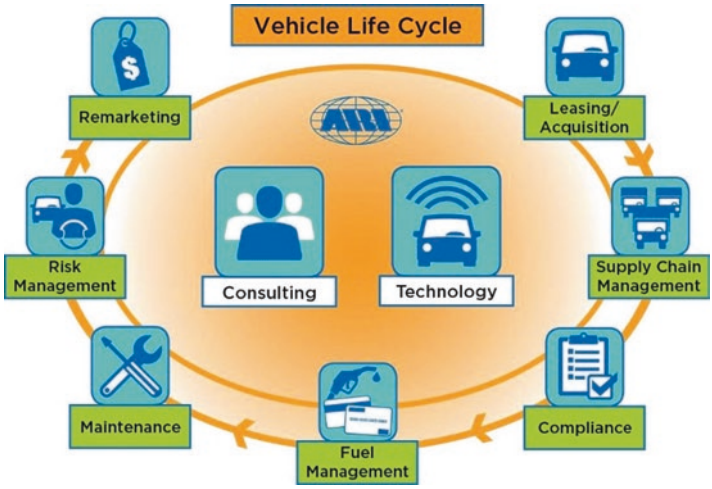

Fig. 4.1 Vehicle life cycle management

The fleet management lifecycle illustrated in Fig. 4.1 consists of numerous processes and decisions to control the asset's cost and ensure its reliability categorized into several major subject areas: acquisition, supply chain management, compliance, fuel management, maintenance management, risk management, and remarketing. The acquisition and supply chain phases entail aligning the customer's current and future needs with the best options based on the manufacturer's availability. ARI uses status feeds from its vendor network to continuously monitor the assets as they are built to ensure timely delivery and to take proactive measures if disruptions in the supply chain are detected.

Once the asset is built, delivered, and put into service, ARI provides various operational services including fuel, maintenance, and risk management. ARI receives electronic feeds from its fuel vendors for each transaction that occurs. The data are very granular and include the type of fuel purchased (diesel, premium unleaded, regular unleaded, etc.), the gallons/liters purchased, the cost per unit, and the total cost for the transaction. Analytics are used for both audits and cost control to identify anomalies (pilferage) and areas of opportunities (the best station to use based on proximity and price). Maintenance management is aimed at maximizing the asset's uptime/availability through preventive maintenance and negotiations about repair costs. By using historical repair information combined with vehicle sensor data (IoT) to predict future failures, the appropriate proactive correction can be determined to minimize major component failures.

Risk management consists of an array of services aimed at improving driver safety. Data collected from motor vehicle reports and IoT sensor information are combined with empirical data captured from fuel and maintenance transactions to form a comprehensive picture of how the driver operates the asset (speeding, aggressive behavior, consistently late for preventative maintenance service, etc.). Analytics promote this service through personalized recommendations based on enriched data and enhanced

statistical analyses. Fleet management companies can intercede and assign specific driver safety modules and courses that are relevant to the driver's propensities (to speed, drive aggressively, etc.) with the objective of changing driver behavior before an issue or accident occurs. Such proactive actions lead to safer driver behavior and longer-term cost savings. The Red Hawk Fire & Security LLC use case described later in this article is an example of this aspect of fleet management.

Once the asset has reached its economic breakeven point, the inflection point where it costs more to maintain the vehicle than it is worth, ARI's remarketing service begins the process of selling the unit via upstream and downstream options in the timeliest manner for the best margin. Upstream opportunities include selling the asset to the driver or making it available for purchase by other employees of the customer. This method typically yields the quickest results and is seen as a perk for the customer's employees. Downstream methods include consignment sales, BuyDirect – a program where ARI purchases the vehicles and assumes the resale risk – and selling the asset through physical and virtual auctions. Information from multiple auction sources is analyzed in real time to determine the optimal time, price, and location to sell each asset. ARI sells over 80,000 assets annually. It can quickly provide its subject matter experts with insights into market demand in an easily consumable manner to maximize value for its customers.

ARI's telematics strategy depicted in Fig. 4.3 is squarely focused on obtaining and leveraging information from devices. As such, its approach is to remain device and vendor agnostic. Data integration is a critical component of this strategy. Over the last few years, ARI has preintegrated itself with over 20 telematics vendors and has made significant capital investments in its analytic capabilities. Understanding that many of ARI's customers operate in diverse geographical areas, customers may need more than one telematics vendor to cover their territory. ARI's vendor agnostic approach has allowed the company to integrate, collate, and analyze data from disparate telematics vendors. Previously, customers using multiple providers would log in to each vendor's site, download the applicable data, and stitch the analyses together themselves. Certain fleet customers may use multiple telematics vendors due to the composition of their fleet (cars, light duty trucks, heavy duty trucks, equipment, etc.), geographical challenges, or simply because they are required to use multiple vendors instead of single sourcing. The agnostic strategy removes the customers' multi-vendor integration concerns and processes, provides a single system for all of their telematics data, and emphasizes deriving value from information instead of the complexities of obtaining and managing it.

Recent estimates project that the global telematics market will grow exponentially and anticipate that approximately 105 million new cars will have some form of connectivity by 2025. Companies looking to improve efficiencies and introduce a comprehensive driver safety program are investing in telematics. The granular and near real-time data can create opportunities for pay-as-you-play types of insurance programs, rewarding safe drivers and companies with lower premiums. Positional information garnered from the vehicle's telematics device can help the logistics process tremendously by providing live updates of the asset's location with

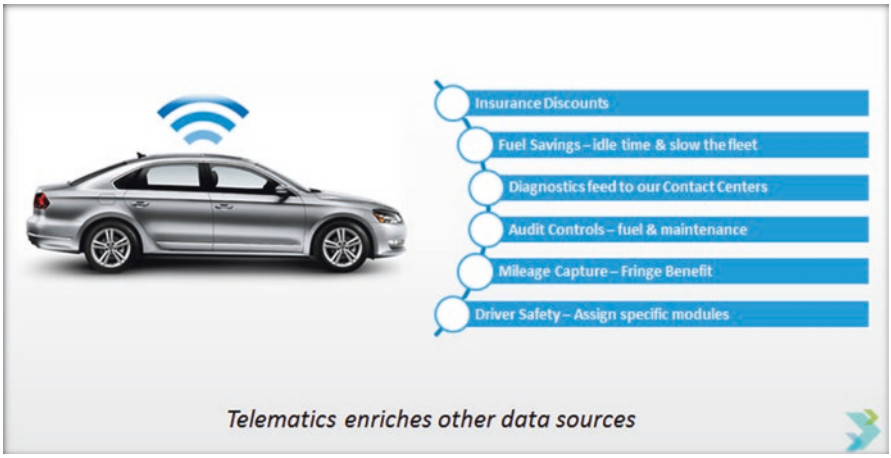

Fig. 4.2 Telematics framework: IoT in fleet management at ARI

intelligent routing to avoid congestion and areas prone to accidents. As the technology continues to mature and become further integrated, two-way capabilities will begin to emerge. However, this level of sophistication will likely be reserved for the manufacturer. A recent example is Tesla's over-the-air reprogramming of select vehicles in the path of Hurricane Irma. Tesla's software update extended the battery's capacity, allowing its customers greater driving range to avoid and escape Irma's path, all without the need to visit a service facility (Fig. 4.2).

As mentioned previously, the potential for telematics is better unleashed when combined with key performance indicators related to maintenance, fuel, and driver performance. The appropriate key performance indicators are determined during a discovery phase with customers to understand their business needs and the items most relevant to them. Delivering key performance indicators in the proper context is an important part of the process if the information is to be actionable. As an example, if the customer is a CFO, his/her needs will focus on fiscal analysis and actual-to-budget items as opposed to a fleet manager whose key performance indicators will relate to maximizing operational performance. ARI provides recommended pre-built dashboards based on customer preferences, which can be further tailored to match their specific requirements. ARI's experience aligning its services with analytics is documented below.

Aligning Maintenance and Vendor Management Strategy with Analytics

ARI's maintenance management program consists of multiple call centers with automotive service excellence (ASE)-certified technicians who interact with vendors to manage asset repairs on behalf of its customers. Knowing which components need replacing and obtaining the best price for the part and labor has traditionally been

Fig. 4.3 Key performance indicators in maintenance analytics

learned through experience. Decisions relating to repair vs. replace, which vendor the driver should be referred to, and if the issue is under the manufacturer's warranty all need to be made accurately and efficiently in an environment where time is of the essence. A new system called VMS (vendor management system) has recently been created to reduce the number of inbound calls into the call center and increase the overall customer and vendor service experience. Vendors can request the recommended repairs via a new website that is based on an advanced rule-based engine. Under the cover are advanced analytics that use an array of information to determine if the repair is needed, if the cost is within acceptable tolerances based on previous repairs and location, and if the repair needs to be handled by an ARI technician.

Maximizing asset uptime and ensuring that the fleet is available are critical for ARI's customers. By leveraging predictive algorithms to determine potential component failures, ARI can proactively address these issues while the vehicle is being serviced for routine maintenance, thus minimizing catastrophic repairs and avoiding roadside trouble calls. As Fig. 4.4 illustrates, algorithms compute the likelihood of failure using historical maintenance data combined with vehicle sensor information supplied via telematics devices, odometer predictions, and driving patterns. In Fig. 4.3, the top three component expense categories (tires, engine, transmission, etc.) are categorized by manufacturer, cost, and occurrences to highlight potential patterns. The software allows the user to drill through the aggregate data into the details and to change the dimensions and measures as new questions arise.

To further maximize asset uptime, telematics data are now used to determine when a vehicle is repaired and back in service. Historically, the only method for learning whether a vendor was finished repairing an asset was to call them within a predetermined timeframe. Requiring vendors to notify ARI has proved to be a futile effort. ARI's vendors are geocoded, meaning their longitude and latitude are recorded in their system. When a vehicle initially goes to a vendor, a geofence is

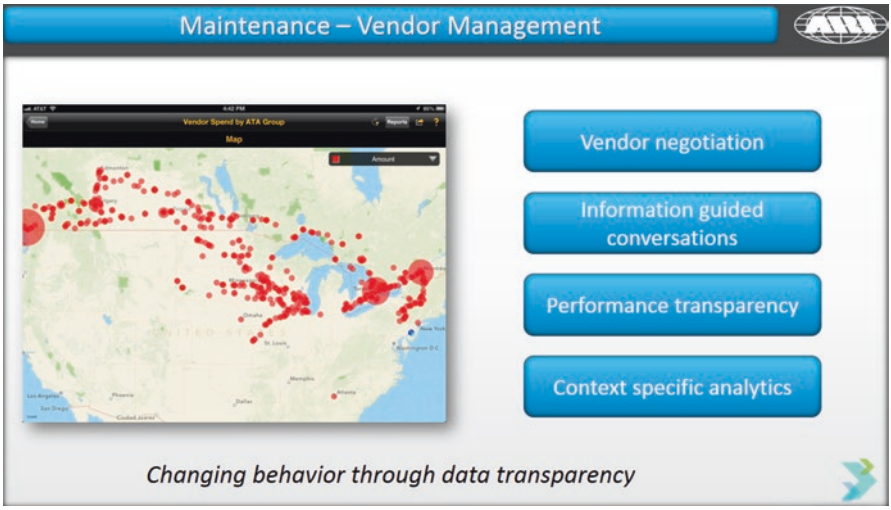

Fig. 4.4 Vendor management analytics

constructed by matching the asset's position to the vendor's location. Once the asset is repaired and the driver is back on the road, the geofence is broken, and ARI's system is automatically notified that the asset is back in service – completely negating the need for any phone calls.

Proper vendor management is necessary to ensure that ARI's customers receive the best service at the best price. ARI's vendor management team relies on vendor analytics to determine which vendors are performing well and which ones need some guidance and/or counseling. The team is armed with information to identify vendors with repair prices that frequently fall outside the norm and also details vendors who receive poor ratings from ARI's call center technicians, driver/customer feedback, and scores from the VMS system's vendor performance algorithms. The vendor management team is very transparent with the data and uses the information during conversations to show the vendors how they are performing and compares and contrasts them to other similar maintenance vendors within a specific proximity using geospatial capabilities. Vendors can easily ascertain if their prices are in line with their competition. If they are not and are unwilling to negotiate lower rates, ARI will typically steer future work to another vendor.

Vendor scorecards that measure performance, cost to value, customer service experience, and first-time resolution are key components of ARI's customer facing insight system. Fleet managers can quickly and easily determine which vendors are performing per expectations and which ones are the outliers. ARI frequently reviews vendor performance with each vendor to ensure they understand expectations and are meeting objectives. Figure 4.4 presents an example of a vendor analysis that identifies specific repairs by highest cost. This information is reviewed during vendor relationship meetings to ensure that the repair facilities provide a fair and competitive price relative to their geographical footprint.

Fig. 4.5 Key performance indicators in fuel management analytics

Aligning Fuel Management Strategy with Analytics

After the asset's monthly depreciation, fuel is the largest expense. Given that it is a variable cost, its volatility can lead to budgeting challenges. Fleets that utilize fuel cards benefit from tighter fuel controls via detailed transactional information. As Fig. 4.5 depicts, this information is analyzed for anomalies, fraud, and cost-saving opportunities. The key performance indicators in Fig. 4.6 can be customized based on each customer's objectives. As an example, this particular customer has chosen to be alerted if any vehicle purchases more fuel than it can store (tank violations). This alert can indicate possible pilferage. Another key performance indicator on the customer's dashboard identifies the percentage of assets with a company fuel card. If the asset lacks a fuel card, its transactions cannot be measured. Finally, the customer is also concerned with fuel economy and carbon dioxide outputs, which have an inverse relationship. As the fuel economy increases, the asset's carbon footprint decreases.

As an example, fleet managers typically look for assets that have had multiple fuel transactions in a single day, transactions where the gallons purchased exceed the asset's capacity, drivers purchasing unwarranted premium fuel, and transactions on a consecutive Friday and Monday, indicating the asset was used during the weekend (unauthorized use). Finally, as Fig. 4.6 demonstrates, by combining the data about daily fuel rates from suppliers with the fleet's geospatial footprint, drivers can be steered toward the lowest fuel provider or station based on their needs.

Additional auditing controls on assets with telematics devices can be brought to bear for both maintenance and fuel transactions. As an example, when a fuel transaction is sent to ARI, it is assumed the transaction was for the company vehicle. However, how would the company know if the driver decided to use the company fuel card to fuel his/her spouse's vehicle? If the vehicle is equipped with telematics,

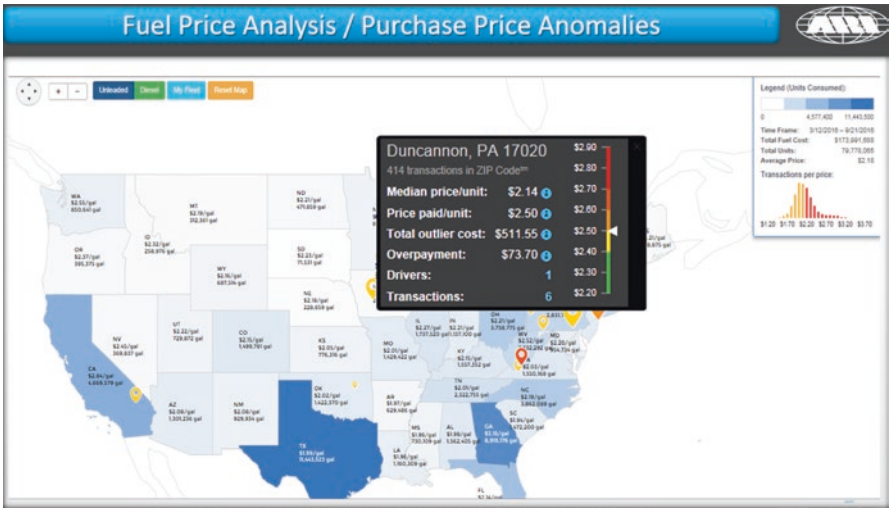

Fig. 4.6 Fuel price analytics management strategy

ARI can easily and accurately determine if the company vehicle was physically at the gas station when the transaction was authorized by comparing the asset's geolocation to that of the vendor. If a disparity is identified, the company can investigate whether a fraudulent transaction transpired to avoid future losses.

Aligning Operator Performance with Analytics

Determining how the driver is operating the asset is vital to cost control and its effective and safe use. ARI's driver safety program collates information from a variety of sources to understand the driver and his/her propensities. Motor vehicle records are analyzed in conjunction with maintenance and fuel use, driving patterns (hard stops, turns, speeding, etc.), and accident information to determine and rate the driver's performance. Based on the algorithms, specific driver training modules are assigned to educate and change behavior before an incident occurs.

ARI provides its customers' drivers with a mobile application that can be used to locate the most cost-effective fueling station and repair facility within a specified proximity based on type of fuel (unleaded, diesel, LPG, etc.) and type of repair required (oil change, alignment, major component failure, etc.), and identifies the preferred vendor(s) based on key performance indicators related to quality of work, customer service experience, and cost to value. The application is a pull method, meaning, the drivers need to log in to the mobile application to request information. This action was chosen instead of a push/text method to avoid the possibility of distracted driving. Thus, aligning operator operations with analytics promotes the cost-effectiveness of fleet operations.

Use Case Example: Red Hawk Fire & Security LLC

Red Hawk Fire & Security LLC is an existing ARI customer that operates a fleet in excess of 800 trucks in the USA in support of their fire and security products. In 2013 their expenses from preventable accidents were a staggering $1.5 million. ARI was consulted (SiliconAngle, 2017) and, working together with Red Hawk, devised a multistep process to first understand the contributing factors and then implement technology to monitor, manage, and reduce their accident expense. Telematics devices were installed on their fleet. By leveraging their information and combining it with motor vehicle reports, ARI was able to identify high-risk drivers, who were required to take specific driver training courses to change their behavior. As a result, Red Hawk's accident expenses were reduced from $1.5 million in 2013 to $350 K in 2015 and as of 2016 dropped to $250 K.

Future Trends: Advanced Analytics Technology at ARI

ARI invests heavily in its analytic capabilities, investing about 25 percent of its operating budget in systems and technology. The fleet management market is unique. Off-the-shelf software packages are typically not available, so systems need to be custom designed to provide the capabilities required to tackle difficult business problems while providing a competitive advantage. Five years ago, ARI began investing in a new state-of-the-art analytic foundation in order to capitalize on its strategy. Major capital investments were made across the board with significant acquisitions of SAP, Oracle, and EMC technology. As Fig. 4.7 demonstrates, SAP HANA, an in-memory database platform, was chosen as the analytic foundation. HANA's remarkable speed was one of the main decision points. As data volumes increased and became more verbose, ARI wanted to ensure that the user experience would not be affected. Reports and analyses that used to take minutes or hours, and in some cases never returned a result, now consistently run in milliseconds. Speed is a powerful catalyst for innovation – it removes barriers and enables creativity.

Moving beyond the foundational aspects, ARI wanted to ensure that data analytics was pervasive throughout the organization – its full potential would not be realized if it remained an IT capability. To that end, it utilized SAP Web Intelligence for reporting and analysis and Lumira for visual exploration. To further leverage the investment, ARI's. NET development group has begun creating new applications directly on HANA. Using this multipronged approach, a culture of data-driven decisions is leading to innovative new products and services and improved customer service.

ARI's analytic roadmap is full of challenges and opportunities and is centered on extending its HANA investment. Sentiment analysis, enhanced statistical capabilities with "R" and HANA's PAL (predictive analytic library), and embedded geospa-

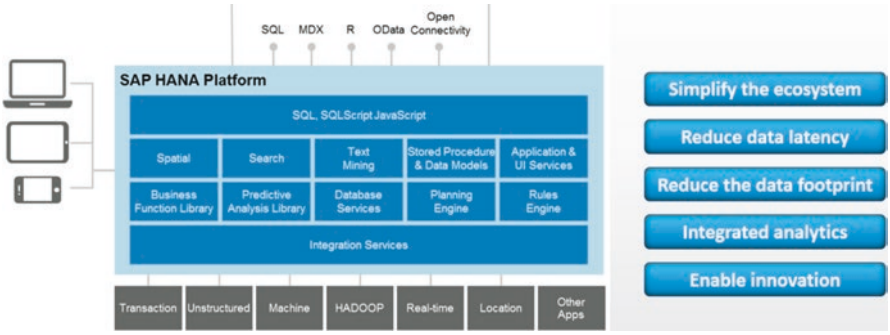

Fig. 4.7 Advanced technology analytics overview at ARI

tial capabilities are but a few of the items that the team will be exploiting over the next 12 months.

In addition to the enhanced analytic capabilities, ARI is also exploring the convergence of its transactional and analytic platforms into HANA. Previously, system architecture's best practices consisted of separating transactional and reporting and analytic databases. However, HANA's unique design now allows these disparate systems to be combined into a single platform. The result is a simplified architecture that removes data latency (the time it takes to transfer data from the transactional to the reporting database) and reduces the overall data footprint, thereby lowering the operating costs.

SAP is a strategic vendor of ARI providing insightful guidance in terms of technology market trends and helping to establish relationships with other customers in the automotive space where best practices are discussed and shared. ARI frequently provides key input at SAP events and conferences (Powell, 2017), detailing the alignment of technology and strategy to solve complex business challenges. These opportunities provide a conduit to a larger market using SAP's connections. They produce positive results for SAP and ARI.

Bridging the Gap Between Theory and Practice

Addressing the challenges and opportunities inherent in fleet management can best be accomplished by creating a forum or round table of industry representatives and academics to create an awareness of the issues at hand. Both traditional and nontraditional solutions provided by academia would be invaluable to the fleet management community. Fleet management is at an inflection point where margins are being challenged, and differentiation between competitors is becoming blurred. Having an outside view and incorporating nontraditional perspectives into the fleet business is a healthy exercise and should be leveraged to provide opportunities where tunnel vision has set in. Leading companies in the fleet management industry

such as ARI could take the lead in organizing and hosting such a forum for educators to give them an inside look into the business to determine where opportunities exist and efforts are best placed. The key is to build advocates within the business community. Once the value is recognized, the requests for better alignment with academia will grow organically.

Another area that needs to be addressed is how best to prepare students to address current business problems in the fleet management industry. We believe that students can be better prepared to handle complex business problems through hands-on, real-life exposure. Internship programs such as Drexel University's co-op program are an excellent method to expose students to the challenges facing local businesses and give them experiences beyond the classroom environment. Another suggestion is embedding elements of the fleet management business into the students' curriculum through programs such as business analytics. On-campus presentations are also another excellent method to provide awareness about fleet management to students. These presentations can be broad based or more specific to the business and the students' area of interest (supply chain, analytics, marketing, etc.). Finally, offering business problem-solving and consulting courses to students in which fleet companies provide real data and seek solutions is another proven way to prepare students for the business.

Steps to Implement a Telematics and Analytics Strategy

Implementing an analytics strategy, whether for telematics or any other type of product or service, starts with a business need. Businesses should begin with actionable questions that need to be investigated to improve efficiencies, increase customer retention rates, reduce costs, identify and create new revenue streams, and enhance products and services. Strategies that begin with technology and then try to find business problems to solve are destined to fail. All successful projects need advocates, and analytic projects are no exception. Advocates will help sell the value and demonstrate the impact to other business leaders in contexts and forums to which IT might not have access. The key is to have the business drive the need and sell the value to build momentum. If information technology is pushing the project and/or if IT is working in a silo, the chances for failure are exponentially raised.

Once the advocate(s) and business problems and questions have been identified and agreed to, a clear and measurable understanding of success should be established and shared with the team. Initial steps should be small. Large challenges should not be confronted until incremental success stories are created. Such stories will be needed to counter resistance.

At this stage, attention should turn inward to determine the underlying data requirements, how the information will be shared (reports, visual analysis, integrated into existing transactional systems, etc.), the data's quality, the necessary human resources with the appropriate skillset to ensure success (architects, statisticians, data modelers, etc.), and the proper controls to implement related to data

privacy and security and its ecosystem (creation, use, storage, and destruction). It is critical to review these items in depth and to look at their costs and dependencies from a holistic perspective. Otherwise, tactical solutions will have a tendency to emerge instead of a strategic approach.

Conclusion: Enabling Effective Fleet Management Strategies with Analytics

As described in this paper, advanced analytics (TDWI, 2014) plays an important role in fleet management solutions and makes numerous insights possible (Network Fleet, 2015):

1. Predictive analytics – Usage of historic and current information to calculate the likelihood and probability of events such as speeding tickets.
2. Prescriptive analytics – Details specific output based on inputs. An example would be a driver receiving a warning that he or she was about to go beyond a set number of speeding violations.
3. Geospatial analytics – Usage of spatial data to analyze events such as fleet location tracking.
4. Operational intelligence – Enhancing fleet operations by continuously analyzing real-time data leading to operational efficiency.

Like other types of risk assessment programs, the usage of analytics to derive insights requires commitment from all parts of the organization. As Fig. 4.8 illustrates, the most successful users are organizations that involve all departments including operations, finance, marketing, safety, HR, and IT in the process at an early stage. One reason previous predictive analytics projects have failed in the past is due to lack of alignment and enterprise-wide adoption (Automotive Fleet, 2015a).

In order for analytics to reach its full potential and become pervasive within an organization, it needs to have the appropriate presence so that no one line-of-business steers its direction. Our experience reflects an analytics discipline that typically begins in IT but quickly grows beyond its borders once advocates from other lines-of-business surface and early achievements demonstrate its value. Experience has shown that a federated organizational approach involving building relationships with key stakeholders is more effective than a centralized service where requests for analyses are performed by one group, typically in IT. A federated approach (hub and spoke) has the added advantage of empowering all departments, highlighting best practices and techniques, and removing the typical funnel effect associated with centralized services that can greatly impede the business's ability to scale.

Identifying and hiring the right analytics talent is by far the most challenging aspect of instilling an analytic discipline within an organization. ARI has taken a two-pronged approach to hiring and developing talent in this space. First, current employees who have the right mix of desire, aptitude, business acumen, and IT

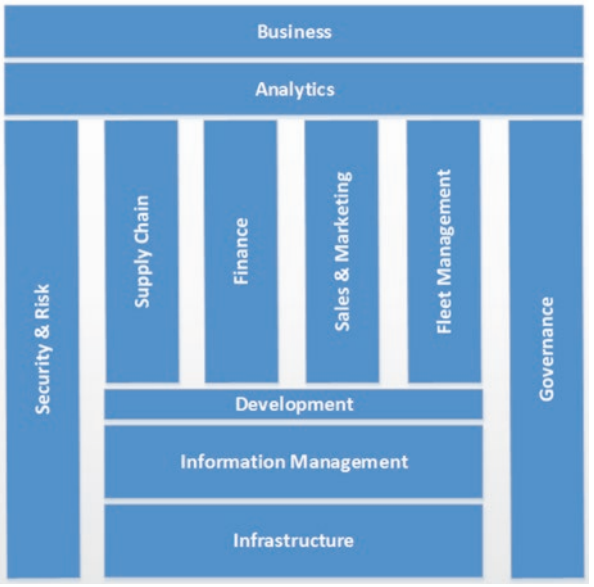

Fig. 4.8 Organizational alignment framework and role of analytics

capability are actively recruited. Using a combination of in-house educational services and third-party training, these employees' skills are enhanced to maximize their performance. The second path ARI has taken is to align itself with universities in the Philadelphia tristate area. Drexel University was chosen as the primary school due to their well-respected analytics program, their proximity to ARI, Drexel's co-op program, and overall support from multiple Drexel alumni at ARI.

Top Mistakes to Avoid When Gathering Data

Here are some mistakes to avoid in data gathering (Automotive Fleet, 2015b) for fleet analytics:

- Not differentiating between fleet vehicles – Fleet vehicles are not uniform. They have their own requirements that need to be considered.
- Focusing on the wrong issues – The business proposition has to be proven before using data and analytics.
- Using an incorrect sample size – Ensuring that the sample size is large enough helps avoid problems.
- Using questionable data – The importance of checks on the data quality is critical to model development.

Top Mistakes to Avoid When Analyzing Data

- Becoming overwhelmed by voluminous data
- Using incomplete data in analysis
- Focusing too much on numbers without understanding their origin
- Not paying attention to outliers and anomalies
- Ignoring industry benchmarks in performance
- Not understanding all of the variables and drawing incorrect insights and conclusions
- Not considering enterprise-wide solutions and opportunities

Understanding the business challenge and value proposition and then collecting data to input into models that solve a real-world problem is critical to success.

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