

FALL 2013

# TRANSPORT & LOGISTICS

THE INNOVATION ISSUE

A high-speed train, primarily yellow and black, is stopped at a station platform. The train is viewed from a low angle, emphasizing its sleek, aerodynamic design. The platform is paved with grey bricks and has several black lampposts. In the background, there are overhead power lines and a hazy sky. A large blue graphic element, consisting of a diagonal bar and a curved shape, overlays the top and left sides of the image.

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## TO OUR READERS

Welcome to the Fall 2013 edition of Oliver Wyman's *Transport & Logistics* journal. This issue of OWTL focuses on innovation. All transportation and logistics industries are facing a need to innovate, whether as a means to find new growth opportunities, to cut costs, or to increase productivity. Recent Oliver Wyman research and work with clients provides forward-looking insights into a number of industry trends and technological changes:

- The shale gas boom in North America has led to widespread interest in the development of natural gas-powered trucks and locomotives. If trucks can lower their fuel cost first, rail intermodal traffic may become vulnerable.
- An expanding e-commerce market is driving a need for logistics innovation, for both online and traditional bricks-and-mortar retailers. Increasingly sophisticated consumers and mobile shopping options are upping the bar for both supply chain and delivery logistics, in terms of speed and flexibility.
- Air cargo companies are facing the need to overhaul their IT systems, in response to customer demands for greater supply chain integration and better real-time information. The crucial problem: The "next-gen" standard for IT is not yet clear.
- Technological change will play a dominant role in the future of rail equipment supply. In Western Europe, incumbent suppliers face eroding market share and will likely need to both consolidate and innovate. In North America, railroads are actively asking for more innovation in maintenance-of-way and inspection equipment.
- We also look at process and market innovations in this issue. In the rail industry, there may be better ways to stop the "leaks" that often occur naturally in the revenue "pipeline." In the aviation MRO industry, innovative partnerships and business models may be called for to deal with disruptive market forces.

We hope you enjoy this issue of the *Transport & Logistics* journal and look forward to hearing your comments.







# NATURAL GAS: FREIGHT TRANSPORTATION'S FUEL OF THE FUTURE?

JEFFERY ELLIOTT  
DAVID LEHLBACH

Expensive diesel fuel and the availability of cheap, plentiful domestic natural gas in North America is driving research into liquefied natural gas (LNG) and compressed natural gas (CNG) as fuel alternatives. Transportation industries could be among the first to see the benefits of this research. Given that fuel is a major component of transportation costs, natural gas has the potential to improve operating ratios and change competitive dynamics – if the challenges of such a dramatic operational shift can be overcome.

## NATURAL GAS AS A TRUCKING FUEL

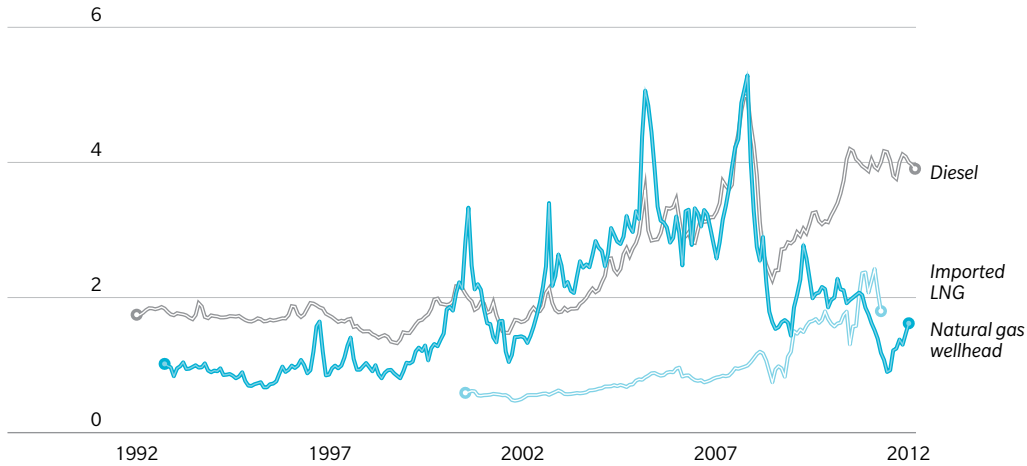
Truck and engine OEMs have seen the opportunity represented by LNG/CNG and are moving to offer natural gas-capable products. Operationally, natural gas

engines are comparable to diesel engines; although natural gas engines have a fuel cost advantage (and are less noisy), the natural gas fuel system is several times heavier and trucks will likely require more frequent refueling.

Perhaps the most pressing issue is simply the cost of converting to natural gas. Given how “young” this technology is, new natural gas engine costs are currently in the range of \$135,000 to \$170,000. The cheaper options lack the efficiency of diesel, while those options with more comparable performance also are more expensive. There is however a lower-cost, short-term solution: conversion kits that can be used to retrofit existing engines, at a cost of \$25,000 to \$45,000, until a broader supply of natural gas engines becomes available.

## EXHIBIT 1: FUEL PRICE COMPARISON, 1992-2012

PRICES IN US\$/DGE



Note: Diesel gallon equivalent (DGE) is the amount of liquid natural gas that is thermally equivalent to one gallon of diesel fuel.

Source: National Energy Policy Institute; Allstate Peterbilt report, "Will Truckers Ditch Diesel for Natural Gas?"

Oliver Wyman estimates that when the incremental capex costs over diesel are taken into account, natural gas engine technologies could have a payback period of about 3-5 years. (There are some other up-front costs for natural gas per truck, it should be noted, including a ventilation system, methane detectors, and explosion-proof lighting.) The upshot could be operational cost savings on the order of 10 to 15 percent annually (Exhibit 2).

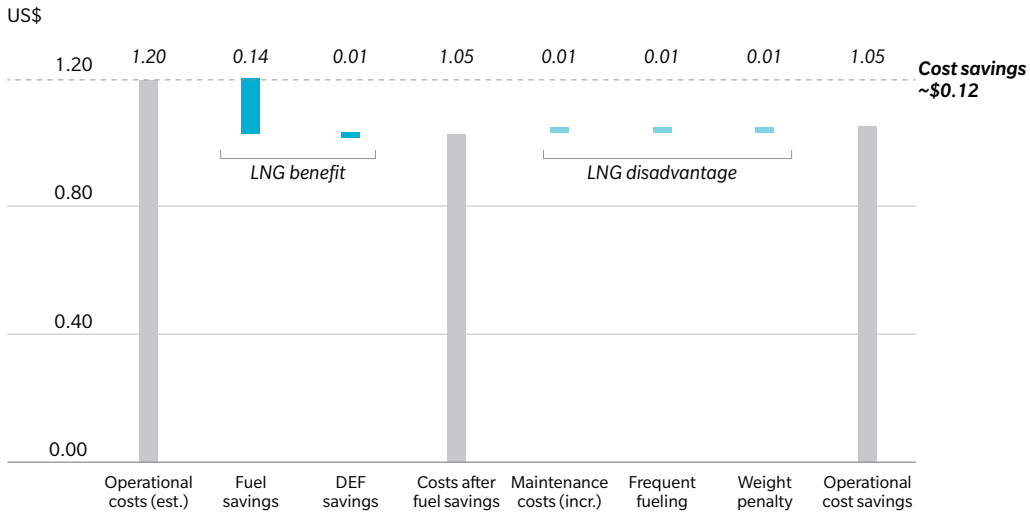
These costs savings are particularly attractive given the range of competitive challenges the industry faces and which are driving up operational costs, including driver retention, driver wages, hours of service restrictions, environmental regulation, and the loss of longer-haul routes to rail intermodal.

Another key driver of how fast LNG/CNG is adopted by the trucking industry will be the pace at which refueling infrastructure develops – and this may be happening relatively quickly. Clean Energy Fuels reports that there are currently 1,100 natural gas fueling stations in the United

States. Clean Energy Fuels is in the midst of building "America's Natural Gas Highway" by strategically locating LNG/CNG fueling stations along major trucking corridors – the first phase should see 150 fueling stations in place by the end of 2013. Similarly, Shell and Travel Centers of America recently finalized an agreement to construct LNG fueling lanes and storage at up to 100 existing truck stops across the United States.

We believe that the current political and economic landscape is likely to accelerate adoption of natural gas as a truck fuel: Not only could it materially improve margins and mitigate ongoing cost issues for the trucking industry, as noted above, but it may provide a simpler option to meet emissions requirements. Technology costs are also likely to fall over time, as adoption becomes more widespread. And the current oversupply of natural gas in North America, plus flat diesel supply, may provide a window for investment. There are of course a number of challenges and open questions around the use of natural gas as a trucking fuel. How long will the price gap between

## EXHIBIT 2: ESTIMATED ANNUAL COST SAVINGS FROM AN LNG SPARK ENGINE OVER DIESEL



Source: Cummins Inc., National Economic Policy Institute, Oliver Wyman analysis.

natural gas and diesel be sustainable? Will early adopters miss out on later price drops and efficiency improvements? How will natural gas adoption impact operational and network complexity? What “critical mass” is needed to justify maintenance infrastructure? The answers are not entirely clear as yet, but could be so in as little as 2-3 years, particularly as major firms move into the space and gain experience. UPS, for example, which has 112 LNG-powered 18-wheelers, has announced plans to buy 700 more and build four refueling stations by the end of 2014. Ryder has deployed some 300 LNG/CNG vehicles, and just opened two natural gas fueling stations in California.

As more and more truck fleets adopt natural gas, the longer-term issue for most companies will be ensuring that these vehicles are integrated in such a manner that they do not simply generate new and different problems (and costs) across areas such as maintenance, IT, and fleet management.

## FUELING THE RAILROADS WITH NATURAL GAS

Despite aggressive improvements in fuel consumption over the past couple of decades, Class I railroads still spend some \$11 billion annually on diesel fuel. The industry has not failed to notice that natural gas locomotive technology might provide a way to lessen the impact of rail’s largest variable expense category. In addition, the railroads are increasingly under scrutiny as generators of carbon emissions, and LNG adoption could make the railroads significant environmental stewards.

GE, EMD/Caterpillar, and Cummins are all developing natural gas-powered locomotive engines, and railroads such as CN, BNSF, UP, and NS are reportedly working with manufacturers on the technology. A favored scenario appears to be hybrid engines that use natural gas together with a smaller amount of diesel (to maintain hauling power). Still, the technology is currently at a much earlier stage of development than is the case for natural gas trucks.

Railroads face several unique issues that could slow or limit the adoption of natural gas technology. For example, railroads typically expect a locomotive asset to remain in service for at least 15 years. A long service life helps justify the \$2 million to \$3 million spent for each new road locomotive. This makes the question of whether natural gas will be a reliable and competitive fuel source over the longer term more pressing.

In addition, railroads would need to deal with the complexities of running LNG locomotives on a jointly owned network that stretches across North America. Some of the issues that would need to be addressed are shown in Exhibit 3. Deploying an LNG fleet clearly would require up-front planning and partnership between the railroads to mitigate risks. (One recent move in this direction, for example, is the Association of American Railroads establishing an industry panel to develop performance standards for natural gas fuel tender cars).

Finally, capex requirements will need to be addressed. Oliver Wyman estimates the incremental capital cost to convert from a diesel fleet to LNG could be \$2 billion to \$5 billion, as:

- 60-70 percent of the locomotive fleet will be renewed in the next 12 years; LNG



may add \$400,000 to \$500,000 to the cost of each locomotive.

- For those locomotives less than 10 years old (35-40 percent of the fleet), conversion costs could be on the order of \$600,000 to \$1 million per locomotive.

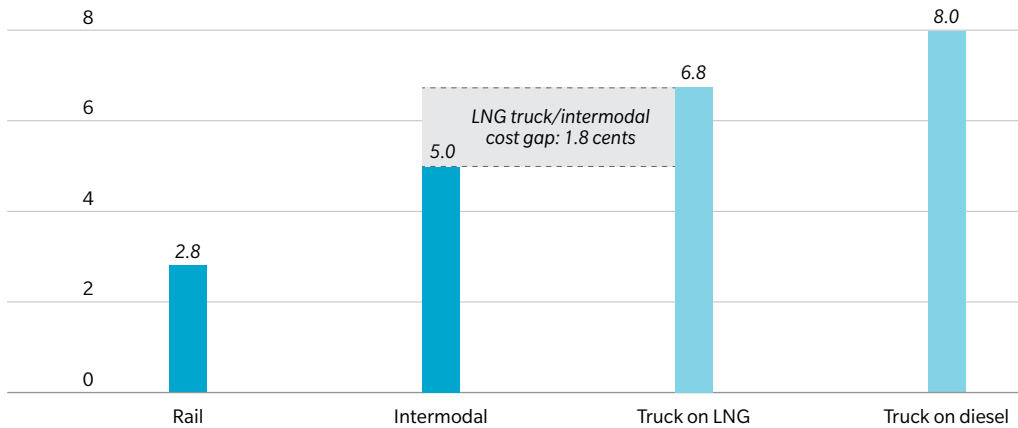
Railroads will also need to allocate capex for fuel tender cars, refueling infrastructure, fuel sourcing mechanisms, and maintenance facilities. Crucial factors could be the timing of investment requirements for natural gas versus federally mandated positive train control (PTC) implementation, as well as for ongoing rail network maintenance and expansion. (For more on the impact of natural gas developments on the railroads, see David Lehlbach’s article, “Will LNG be a Railroad Game-Changer?” in the September issue of *Railway Age*).

### EXHIBIT 3: RAIL LNG CHALLENGES AND POTENTIAL APPROACHES

CHALLENGE	POTENTIAL APPROACH
Lack of LNG rail infrastructure	<ul style="list-style-type: none"> <li>• Temporarily use refueling trucks</li> <li>• Introduce CNG to “captive” lanes, such as intermodal routes</li> </ul>
Complexity of refueling operations	<ul style="list-style-type: none"> <li>• Develop yard refueling infrastructure with a longer-term view on operations</li> </ul>
Design/availability of fuel tender cars	<ul style="list-style-type: none"> <li>• Optimize cost/weight of car vs. LNG hold time</li> <li>• Develop performance and safety standards</li> </ul>
Comprehensive network	<ul style="list-style-type: none"> <li>• Establish an industry-wide partnership to design and develop infrastructure along high-potential corridors</li> <li>• Develop a diesel-to-LNG conversion strategy</li> </ul>
Increased fuel and fleet management complexity	<ul style="list-style-type: none"> <li>• Identify challenges and needs cross-industry</li> <li>• Ensure realization of network and carrier efficiencies</li> </ul>

## EXHIBIT 4: COST OF OPERATIONS (INDICATIVE) FOR TRUCK, INTERMODAL, AND RAIL

US CENTS PER TON-MILE, EXCLUDES FINANCING COSTS



Note: Truck on LNG estimate assumes a 15 percent operating cost reduction for LNG trucks and average truckload of 15 tons.  
Source: Association of American Railroads, Morgan Stanley, Oliver Wyman analysis.

## NATURAL GAS AND COMPETITIVE DYNAMICS

With both motor carriers and railroads moving toward natural gas adoption, what could be the impact on the competitiveness of these two modes? For trucking, natural gas fleets could quickly narrow the gap with truck-competitive rail options (e.g., intermodal). Intermodal is the fastest-growing segment of the surface transportation market: The Intermodal Association of North America reported that intermodal container volumes saw a record high in 2012 of 13.1 million moves. With sufficient natural gas refueling infrastructure in place, major rail intermodal routes would be more cost-efficient for trucks to serve. As shown in Exhibit 4, adoption of natural gas could significantly reduce the current cost gap between trucking and intermodal on a per ton-mile basis.

This situation could cause railroads to run the risk of lower margins or losing existing intermodal market share, if they are unable to match a potential 10-30 percent reduction in trucking costs. Although railroads face significant up-front challenges to adopting natural gas, they have transitioned successfully between technologies before: from steam to diesel in the 1940s-1950s. This transition provided the railroad industry with the competitive edge it would need just a few years later, when the first interstate highways were completed and trucks began to siphon away business. Today, similar competitive dynamics are in the air, and they will color the investment decisions railroads make over the next decade.

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# THE OTHER ENERGY BOOM: CRUDE-ON-RAIL

BOB ORR  
JEFFERY ELLIOTT

Oil and gas companies have developed hydraulic fracturing (fracking) and drilling techniques that have transformed the world's energy landscape. Now, the resulting hydrocarbon boom is rapidly reshaping other industries.

One of the most important challenges for businesses will be to determine how best to seize opportunities created by new energy paradigms while avoiding pitfalls. Current initiatives under way to achieve this balance in the North American railroad industry – a leading indicator of the state of the economy – offer a glimpse of what steps companies may need to take to get ahead of the issue.

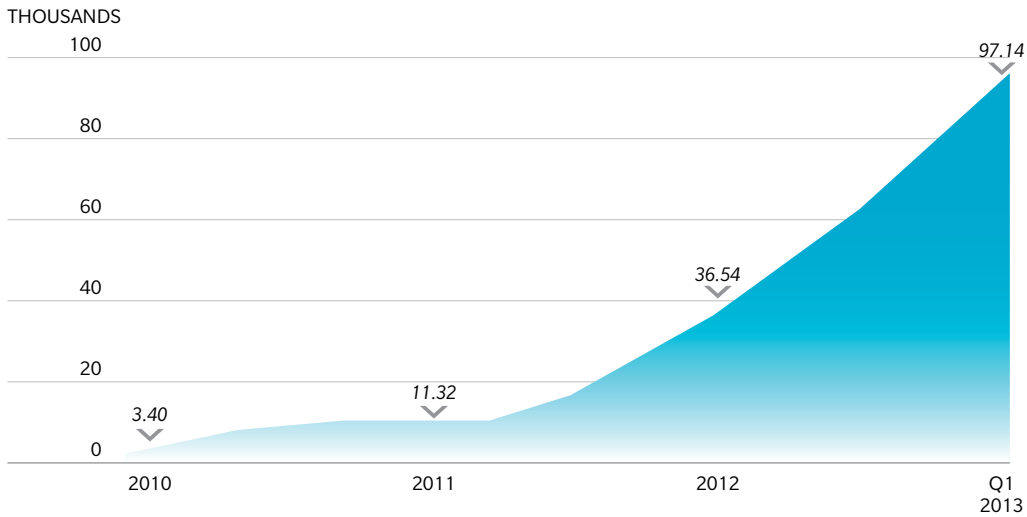
Railroad executives are now testing using natural gas to power their locomotives (see previous article) – a shift that could

become the 21<sup>st</sup> century equivalent of the industry's move from steam engines in the past century. At the same time, railroads are deciding where, how, and how much to invest to chase the oil boom, while taking steps to remain competitive in their traditional businesses affected by a surge in natural gas discoveries.

At present, there are not enough pipelines in the right places to transport oil production from growing fields in North America to refineries. In particular, coastal refineries are struggling to gain access to North American crude oil due to a lack of pipeline capacity and geographic coverage. This shortage has forced refineries to look outside of the traditional pipeline transportation infrastructure for options, and they have found railroads willing to haul.

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## EXHIBIT 1: RAIL-HAULED CRUDE OIL: CLASS I CARLOADS ORIGINATED



Source: Association of American Railroads.

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The good news for railroads is that they are able to make these vital connections. Indeed, some doubled, and even tripled, their crude carloads in 2012 (Exhibit 1). But railroads face the risk that oil-related hauling won't offset declining loads for coal – a traditional core customer. The same energy boom that has created the opportunity for railroads to haul crude has also caused a surplus of cheap natural gas. This surplus has made it difficult in some places for coal-fired power plants to compete with gas turbines. That means fewer coal shipments for railroads now and in the future.

Another challenge is that this summer's Lac Megantic rail crash in Canada will increase regulatory pressures on rail crude oil traffic risk management and might eventually constrain routing of such traffic away from

high-density population areas. Indeed, the US Department of Transportation had already begun a safety review of crude-by-rail shipments originating in the Bakken Shale formation.

In this environment, any railroad expansion requires careful analysis. Without investment, the demand for many rail lines will exceed capacity by 2040. But some of the crude hauling work for railroads could be temporary. Eventually, pipelines will get built. But where, exactly? And which regions might rely on railroads over the long term? Reconfiguring business models to take advantage of the current global energy revolution may take years to get right. But rail companies must start down the path: Too much is at stake to wait.

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# DELIVERY LOGISTICS FOR EUROPEAN E-COMMERCE

## MICHAEL LIEROW

The e-commerce industry in Western Europe is growing rapidly (e.g., revenue growth of 10-15 percent per year) with overall online sales penetration poised to increase by double-digits over the near term. And as Internet-driven business-to-consumer (B2C) package flows expand at nearly the same rate, so too does the opportunity for providers of delivery logistics to grow their businesses – although they will find the e-commerce market radically different from other markets they serve.

The European e-commerce market is at a turbulent stage, with various players competing for market and mind share:

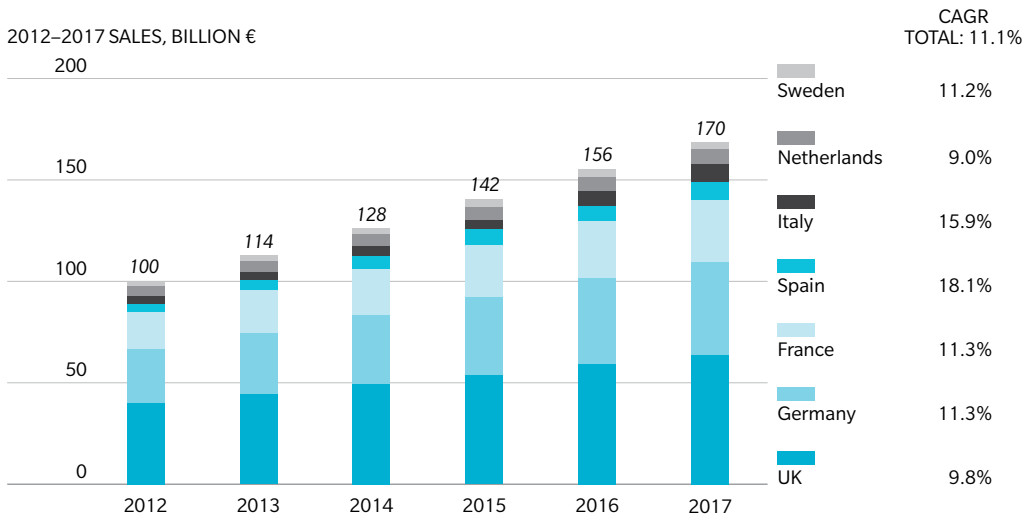
- The giant generalist e-commerce companies and category killers that own their inventory (e.g., Amazon, Asos, Zalando) are driving consumer shopping innovations and further developing

fulfillment capabilities. They are even capturing initial product-related search traffic at their sites.

- Brick-and-mortar retailers (e.g., PPR, H&M, Marks & Spencers) are aggressively adding e-commerce channels and searching for optimal solutions to leverage their existing offline distribution networks.
- Online marketplaces (e.g., Ebay, Overstock) are ever innovating the front end, but are struggling to keep consumer attention, as they lack influence over back-end logistics.

For all companies operating in the e-commerce space, however, offering the most convenient possible shopping experience is a critical component of the value proposition – putting pressure in turn on 3PLs that provide delivery and return services.

## EXHIBIT 1: FORECAST FOR EUROPEAN ONLINE RETAIL



## THE CHANGING PARADIGM OF CONSUMER BEHAVIOR

Consumer expectations regarding delivery services have risen as remote-shopping habits have evolved from a careful buying process that accepted some degree of inconvenience and long delivery times to transactions that are increasingly driven by spur-of-the-moment shopping decisions and total customer convenience. The consumer shopping paradigm has shifted:

- From primarily offline and telesales channels (store/phone/catalog) to increasingly frequent multi-device and online channels: 11 percent of shoppers in Europe are multi-device buyers; 57 percent buy using two or more channels (hence the rise of mobile online sales) (Exhibit 2).
- From acceptance of long delivery wait times to expectations that delivery will be as fast as possible, preferably same-day and preferably at no additional cost (hence the rise of same-day offers).
- From inflexible delivery points and uncertain delivery times to consumers

wanting the flexibility to get deliveries at the time and location of their choice (hence the rise of time-definite windows for delivery services, flexible additional delivery attempts, and multiple options for delivery points).

- From policies designed to discourage returns through difficult logistics to the need to minimize returns (e.g., through better product descriptions and online customer reviews); and on the logistics side, making returns as painless as possible (preferably free, with in-store or pickup return options). An easy return process influences online buying decisions heavily for non-commodity sectors (e.g., fashion).

Meeting these sharpened expectations is one way that e-commerce players can differentiate themselves from their competitors and trigger repeat purchases, increase the value of goods and the average basket size, and reduce return rates. “Beacon” companies, such as Amazon and Asos, drive consumer expectations around delivery service, by constantly improving their offer: Amazon and Asos set service-

level benchmarks, consumer expectations quickly adapt, and other e-commerce players must keep up or lose the race.

## COMMODITIZATION OF STANDARD DELIVERY SERVICES

Standard delivery services, such as next-day home delivery, are increasingly becoming commoditized. Customers are starting to take convenient delivery for granted: from their point of view, delivery is a fixed component of the purchase, not an extra service. To compensate, e-commerce giants are developing sophisticated purchasing organizations and aggregating increasing volumes of parcels through third-party fulfillment businesses they own, thus increasing their bargaining power with delivery logistics providers.

Pricing of delivery into the product (rather than as a separate line item) and the growth of flat-rate subscription models (such as Amazon Prime) – both powerful retention

tools – are exacerbating the need to lower delivery costs. As a result, third-party delivery logistics providers are seeing more volume fluctuation when e-commerce players shift volumes between 3PLs. Prices for next-day delivery in Germany are hovering around two euros per parcel, and are only slightly higher in the UK and France.

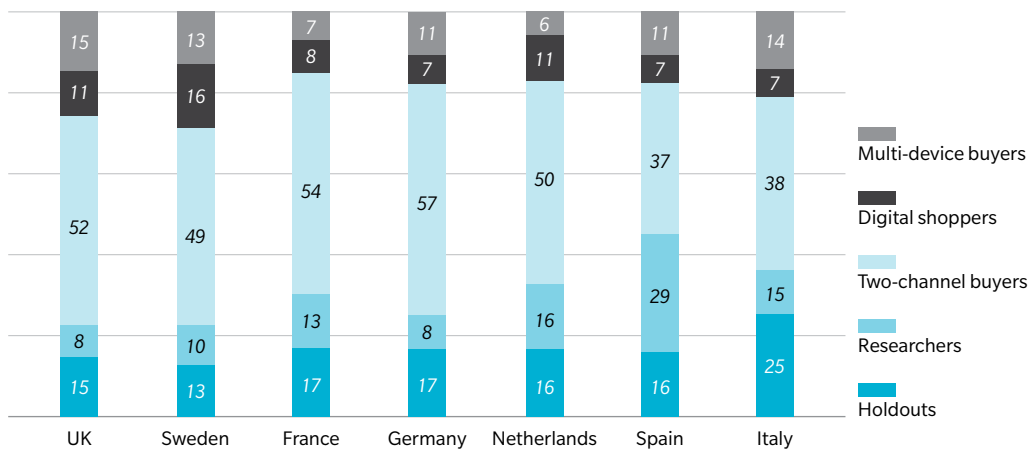
## FOCUS ON THE DELIVERY EXPERIENCE

In their quest for differentiation, e-commerce players are considering selectively moving into logistics to offer improved delivery and return experiences that “plain vanilla” 3PLs cannot offer (since these 3PLs serve the whole market). Amazon, for example, is no longer happy with later outbound cut-off times, compared to other e-commerce players. It may consider moving into same-day logistics (e.g., in Germany) if no logistics partner steps up to offer the service.

At the same time, multi-channel businesses (i.e., bricks-and-mortar retailers with online

### EXHIBIT 2: TOUCH POINT SOPHISTICATION IN EUROPE

PERCENT OF CUSTOMERS, 2012



Source: European Technographics Online Benchmark Survey 2012, Oliver Wyman analysis.



channels) are experimenting with in-store pick-up and return solutions (partially counter, partially locker-based, with 24/7 access in urban downtowns). Well placed and priced – as multi-channel players can save significantly on logistics costs – these solutions have the potential to capture some of the market share vanishing from standard delivery networks.

## 3PLs must become better and faster at innovation to keep up with e-commerce delivery logistics demands



## STEPPING UP TO E-COMMERCE LOGISTICS CHALLENGES

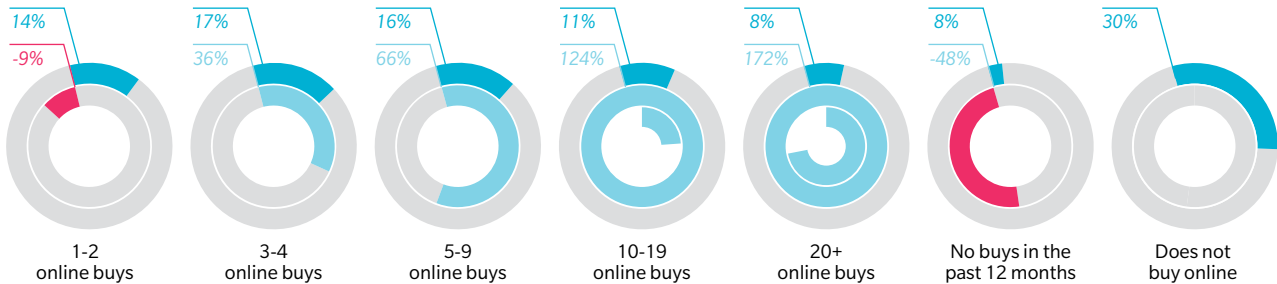
E-commerce business models are still developing at a fast pace. The difference versus five years ago, however, is that e-commerce players today are much larger, their bargaining power is greater, and Internet-savvy consumers are both buying more frequently (Exhibit 3) and more willing to try out new offers. This has allowed players like Zalando to quickly gain significant market share as a category killer, by swamping the market through marketing spend). Deliveries and returns for urban and suburban areas for the fashion segment in Germany alone will account for more than 80 million parcels in 2013.

In this dynamic environment, delivery logistics has become a tool for standing out from the crowd. Logistics providers thus not only need to react quickly, but to implement new business design elements:

- Cost focus will remain relevant: To capture volume from large e-commerce players (so as to fill the network with base volume), 3PL providers need to offer low-priced service – which only works where network assets are well planned and utilized.
- Innovation will be important: 3PLs will need to become better and faster at innovating, whether this involves developing mobile apps to track and trace parcels or tools to enhance customer convenience.
- Multiple location touch points will be necessary to stay competitive:
  - To the door options (standard)
  - Locker options
  - 24/7 retail shop access, serving both urban core (e.g., travel agencies, coffee shops) and suburbs (e.g., gas stations, convenience stores)

EXHIBIT 3: CHANGE IN ONLINE BUYING FREQUENCY IN GERMANY, 2006-2012

OUTER CIRCLE: FREQUENCY OF ONLINE BUYS  
INNER CIRCLE: PERCENT CHANGE 2006-2012



Source: Allensbacher Computer- und Technik-Analyse 2012, Oliver Wyman analysis.

- Workplace access (mailrooms at large firms, where parcels can be delivered to employees)

Another option for 3PLs, as intermediaries between e-commerce players and consumers, is to get more value out of customer touch points, a hitherto largely ignored but potentially valuable asset. Gathering data on how customers use touch points could provide insights into behavior patterns and preferences that delivery logistics providers could use both to improve their own services and to increase their value as partners to leading-edge e-commerce players.

These solutions hold true not just for 3PLs but also for European postal services, which are facing declining letter volumes. The challenge for postal services will be to move away from their traditional, bureaucratic "letter culture," to focus on innovation and seamless integration of customer touch points.

Delivery logistics providers who succeed in serving the e-commerce market will be locking in to a long-term growth engine: While B2B parcel growth is projected to remain weak (and declining in some

markets), B2C flows are expected to continue expanding over the foreseeable future.

### INNOVATION FOCUS CASE EXAMPLE: SAME-DAY DELIVERY

Ever faster delivery is a key e-commerce market trend: D+1 is already quasi-standard for most of Germany and the UK and D+2 for France. The next step for Europe will be same-day delivery service. Same-day is expected to become a widely available option in urban areas of Western Europe within the next five years; indeed, implementation has already begun:

- Shutl and Tiramizoo are back-end services that match an e-commerce order with a courier service for delivery within 90 minutes. They are currently available in the UK and Germany and expanding into the US and other countries. While these services are great examples of bundling single-courier service to become a meaningful market player for same-day delivery in urban areas, they are not all that scalable for lower-cost delivery options.
- DHL is experimenting with same-day delivery from the warehouse, e.g., in the

Cologne area, Germany, together with Gourmondo, an online food retailer.

- After setting up regional fulfillment centers, Amazon is expected to further expand its same-day services, by building on already existing evening delivery services. In Germany, for example, Amazon is expected to expand into a differentiating same-day service within the next 12 months.

The same-day trend favors e-commerce players with a net of distribution centers located close to urban areas. Multi-channel bricks-and-mortar businesses may be particularly well positioned, as they sometimes have decentralized warehouses. E-commerce category killers like Zalando are more vulnerable and will have to move from central to regional warehousing to realize the operational foundations of same-day delivery. We expect possible leapfrogging by multi-channel players into same-day service within the next 12 months.

## GROWING WITH A GROWTH MARKET

The dynamics described above must be considered only a starting point. No delivery logistics provider who wants to serve the e-commerce market can afford to stand still; nor can e-commerce players themselves. Flexibility, keen attention to market trends, and a business culture that embraces change are now critical components of success. B2C flows are becoming more seasonal and more volatile. Consumer shopping habits and expectations will continue to evolve. And, e-commerce players will continue to innovate in their search for an “edge,” putting pressure on their third-party suppliers to keep up. Only through nimble, operationally excellent, and innovative business designs can delivery services providers break the commoditization cycle, increase their bargaining power, and share in the benefits of an expanding e-commerce culture.

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# CONFIGURING THE MULTI-CHANNEL RETAIL SUPPLY CHAIN

MICHAEL LIEROW

Online sales channels have been outpacing traditional offline retail channels for some time. While initially online buying focused on books, CDs, DVDs, and electronics, customers have quickly ramped up to buying fashion, interior design, and DIY goods online. Even scalable models for grocery (including fresh/chilled) are garnering consumer interest. In Western Europe, for example, online retail sales are projected to grow by 11 percent per year on average, with e-commerce market volume reaching US\$1.5 trillion by 2015. Growth in e-commerce spending for the slightly more mature US market is projected to be similar – 10 percent per year on average through 2017.

This rapid growth, combined with fierce competition, is driving many traditional bricks-and-mortar (B&M) retailers to engage

with the online marketplace and become multi-channel retailers – leading in some instances to their successfully gaining ground from “pure” e-commerce retail ventures.

Conventional wisdom tells us that pure players of either stripe have compelling value offers: Pure online channels often have extensive inventories, faster response times, and a lower cost of goods sold (COGS). Pure offline channels, on the other hand, can offer a hands-on product experience, personalized sales support, and immediate ownership. In addition, brand names backed by a tangible business are often associated with higher quality by consumers.

Oliver Wyman believes, however, that a well-tuned multi-channel strategy can offer customers the best of both worlds. It’s not enough, however, to simply sell through

multiple channels: To be successful, the company’s logistics/supply chain must be able to fully and equally support all sales channels profitably, while ensuring a seamless customer experience.

## BUILDING A MULTI-CHANNEL STRATEGY IN EUROPE

Consumers’ changing shopping habits will require B&M retailers to develop new strategies to attract and retain customers. A few examples of such strategies include:

**Linking quality brands in-store with the online availability of goods:** Traditional B&M stores are suffering erosion in the frequency of shopper visits and conversion, with many sales lost to online channels. Some 57 percent of shoppers in Europe

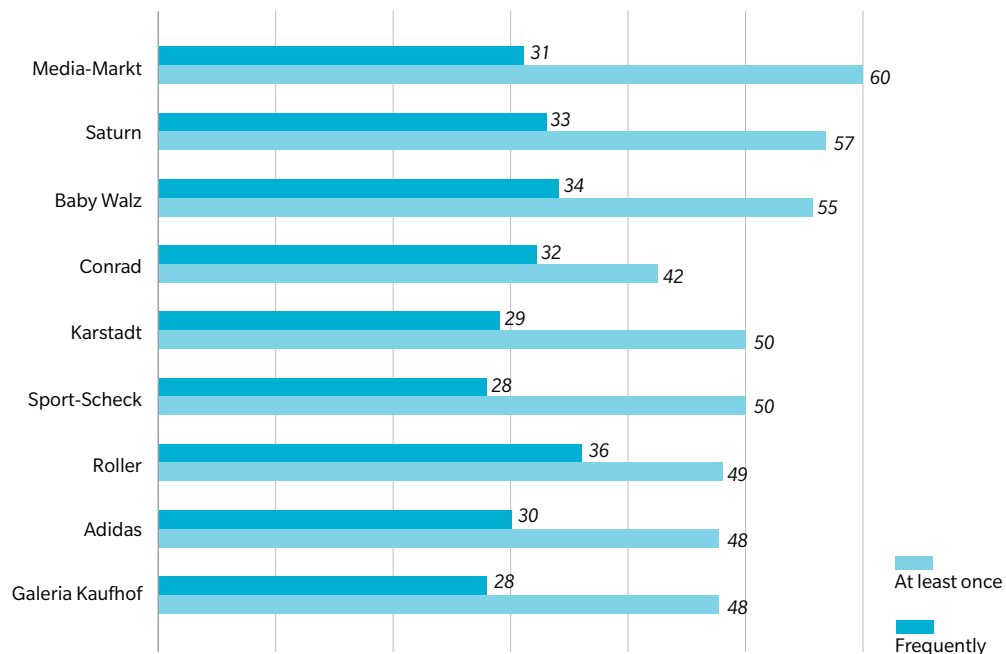
currently use two or more channels to buy products, and we expect this number to grow to 65-75 percent over the next 2 years, with shoppers continuing to use at least one offline channel and one e-channel (with a shift from online to mobile shopping).

One result of multi-channel shopping has been the growth of “showrooming” – using an offline store to check out a product and then buying it online (Exhibit 1). B&M stores can turn this to their advantage, however, by encouraging customers to come in to stores to “try out” branded products – and make (CRM-based) online shopping (including customization and quick delivery options) immediately available in the store.

**Expanding touch points to attract high-value customers:** Recent studies have shown that if multi-channel is done right, multi-channel shoppers (i.e., those with

### EXHIBIT 1: THE SHOWROOM EFFECT: GERMANY EXAMPLE

PERCENT OF CUSTOMERS WHO VISITED A STORE AND BOUGHT THE DESIRED PRODUCT ONLINE INSTEAD



Source: SMP Cross Channel Performance Index, Oliver Wyman analysis.



higher touch point sophistication) spend significantly more at their favorite multi-channel retailers, versus both pure offline and online favorites (Exhibit 2). Thus, B&M retailers can look to tailor their multi-channel strategy to appeal to these customers, maximizing the customer experience by increasing the number of available touch points.

**Using offline to enable fast online delivery:**

For cost reasons, pure online players below Amazon’s scale must use centralized fulfillment. A B&M retailer that adopts a multi-channel approach can often profit from combined offline and online fulfillment and regional warehousing solutions that enable a higher level of customer service (e.g., same-day delivery), as goods are already stored closer to where end customers live.

**Taking advantage of purchasing portfolio effects:**

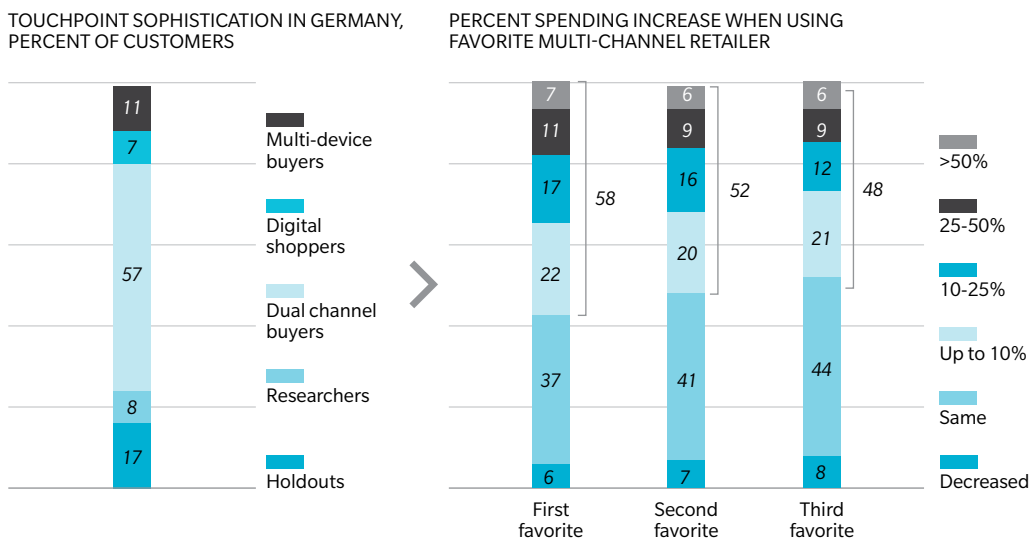
Both online and offline retailers must purchase goods worth a multiple of planned revenue. This multiple depends on brand, industry, number of SKUs, etc. Typically, this

factor can only be reduced with significant scale (or a reduced number of SKUs, which can limit a store’s attractiveness). Offering several channels often allows a retailer to serve slightly different target groups, resulting in different demand patterns (e.g., high versus low demand for the same products in different channels), which when aggregated (total demand) results in reduced purchasing requirements for goods.

**MULTI-CHANNEL LOGISTICS/SUPPLY CHAIN IMPERATIVES**

Traditional strategy analysis often focuses on the front-end of multi-channel players: offer, pricing, customer relationship management, etc. but often neglects the back end of logistics and supply chain management – which is the basis for many front-end capabilities. Having the right product available, at the right time, and in the right quantity, is the key enabler of a successful multi-channel strategy. Without

**EXHIBIT 2: TOUCH POINT SOPHISTICATION AND ONLINE SPENDING**



Source: SMP Cross Channel Performance Index, Oliver Wyman analysis.



a sufficiently stress-tested supply chain that can handle the added strain of new sales channels, a multi-channel strategy can backfire, leading to customer frustration and damage to the brand.

Over the past few years, Oliver Wyman has been working with clients in various industries to develop approaches to unlock advantages that are unique to multi-channel players. If we look again at the strategies outlined above, we see that each involves a significant logistics/supply chain element based on Oliver Wyman's experience. Indeed, five distinct logistics/supply chain imperatives must be addressed to unlock the true potential of multi-channel players:

### 1. MULTIPLE SUPPLY CHAIN SPEEDS AND FLEXIBLE REPLENISHMENT

The supply chain must be able to deliver goods at different speeds, from slow moves for standardized replenishment to quick turnarounds to meet instant demand. As

an example, Oliver Wyman worked with a client to expand a supply chain from one speed and one planning cycle to four distinct speeds and six different planning cycles, targeted to serve a variety of online and offline retail patterns. As a corollary to this, replenishing for offline/online needs to be flexible, with rules and speeds that enable the company to profit from portfolio effects and thus reduce stock quantities significantly.

### 2. FROM CENTRAL OR LOCAL TO SMART REGIONAL STORAGE

A smart regional storage concept is one that combines the efficiency of semi-centralized (online) warehouses with local availability of goods, allows for scaling (e.g., modular picking technology 2.0), guarantees fast replenishment of offline stores through low-cost trucking, and enables fast online fulfillment. The concept should also enable same-day delivery to a substantial percentage of the regional population. This is an advantage that pure online players (e.g., Zalando, which has an entirely centralized warehousing structure) would have a hard time copying.

### 3. COMBINE FULFILLMENT AND REPLENISHMENT

Innovative picking systems in warehouses should combine pool picking for stores with replenishment for e-commerce and fulfillment. In addition, storage should be optimized for both offline and online channels, e.g., how will e-commerce fulfillment be integrated into the warehousing system? Where will products be stored for which channels? Probable investment needs could include supply chain visibility, labor management, supply chain network design, warehouse management, and transportation to take advantage of existing innovative concepts.

#### 4. READ AND REACT 2.0

Read and react 2.0 involves moving from a traditional read and react model to one that combines online and offline to determine successful products and replenish them quickly. The online channel can be used to pilot and learn about demand patterns, by observing online sales for a specific timeframe. These “reads” can then be applied to offline product selection, replenishment, and reordering.

#### 5. INTEGRATE OFFLINE TOUCH POINTS INTO ONLINE DELIVERY

- Enable same-day delivery: Shipping time is an important value for customers and similarly one of the most challenging issues for online retailers. As noted previously, the next level of customer service in online retail is same-day-delivery, using a broad network of offline stores and regional warehouses, so that ordered products which are available can be shipped to the customer on the same day that an order is placed. Realizing same-day delivery capabilities will bring a huge competitive advantage to the companies that get there first.
- Foster “bricks and clicks,” where a customer orders a product either online or physically in a store, then picks up the order directly at a local retail branch. This model combines the strengths of online and offline channels: product information, description, and advice online, but also a conventional shopping experience with product testing, customer service, and the convenience of quick access to the product.
- Unlock new touch points and services: Retailers need to pay attention to rapidly evolving customer expectations and begin testing services as soon as new trends are identified, e.g.:
  - Shop online and return offline: Customers want better online product descriptions and in-store testing, which can significantly reduce returns. Customers also increasingly expect that a multi-channel retailer will allow local returns.
  - Offline service for products bought online: It will be important to maintain the relevancy of the offline channel as customers’ online shopping channels increase. Some options for doing so might include offering walk-up repair services or set-up support, or a product help desk, such that customers can get help with products at a retail location regardless of the channel used for purchase.
  - 24/7 locker pickup: Lockers enable customers to collect their purchased products 24 hours a day. This service can attract people who are unable to get to a store or post office during normal business hours and are not at home to receive deliveries. Amazon, for example, has begun to experiment with lockers in the US and in London.

In summary, traditional B&M retailers have an opportunity to turn booming online sales to their advantage. Combining the strengths of online and offline sales channels, with seamless integration of logistics/supply chain functions to serve both, can build on the brand strength, product quality, and market awareness that many B&M retailers already enjoy, while keeping increasingly mobile and tech-savvy customers’ attention and spend by offering them the wider range of options and immediacy of purchase and delivery they now expect.

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# PLUGGING THE LEAKS: STRATEGIC REVENUE GROWTH FOR RAILROADS

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JEFFERY ELLIOTT  
SCOT HORNICK

One way to evaluate railroad financial performance is by looking at operating ratio (operating costs divided by operating revenue). Over the past decade, revenue has become an increasingly important driver of operating ratio improvement, as railroads have already spent several decades wringing costs out of their operations. All but one of the North American Class I railroads reported earnings increases in the second quarter of 2013, with operating ratios ranging from 60.9 to 71.9 percent, due to both improving economic conditions and improved revenue (yield) management.

A focus on revenue will become increasingly important as railroads hit capacity limits on significant portions of their main line (principal route) networks. Railroads are, for the first time in decades, facing

new network investment requirements: adding mainline trackage, removing network bottlenecks, and in the United States, implementing federally mandated positive train control (PTC). To meet these capital requirements – expected to run into hundreds of billions of dollars – railroads must realize more revenue from their asset base.

Improving revenue traffic mix and revenue yields will continue to be an industry focus. But railroads could also see more money flow to the bottom line by looking for ways to minimize leakage in what Oliver Wyman calls the “revenue pipeline” – the complete set of the railroad’s interrelated functions that serve to bring revenue into the company, as shown in Exhibit 1. Inefficiencies in individual functions or weak coordination across

functions can lead to lost revenue capture opportunities. In Oliver Wyman's experience, addressing the most obvious revenue leaks can increase realized revenues by a minimum of three to five percentage points within a year – regardless of a railroad's size or business model.

Herein we highlight some of the more common leaks within and across the revenue pipeline, and discuss a diagnostic that can be used to plug such leaks and prevent new ones.

## LEAKAGE WITHIN FUNCTIONS

Every section of the revenue pipeline can leak (or even hemorrhage) revenue if the activities within that section are inefficient. Exhibit 2, on the next page, highlights some common culprits.

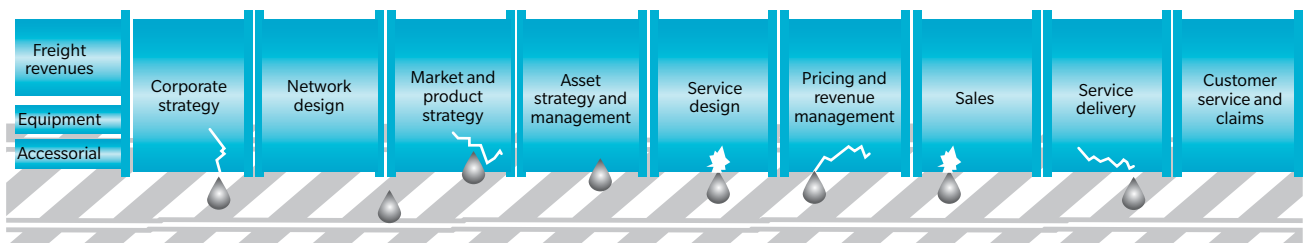
To illustrate how pervasive problems can be, consider revenue management: Railroads have experimented with "dynamic" pricing in terms of day-of-week and spot pricing for intermodal movements, but have never successfully implemented a production system. Many of the concepts that have been tried harken back to travel industry models and may not be appropriate for a supply chain environment. But finding ways to improve train and box utilization through

differential pricing actions and reservations systems remains a reasonable target for the industry. Incentivizing flexible shippers to ship via underutilized routes or at off-peak times can generate valuable incremental revenue while keeping incremental costs low.

One often-missed opportunity to generate incremental revenue is in backhaul pricing. Most railroad pricing systems do not clearly understand headhaul and backhaul competitive dynamics and economics. Unraveling the interdependencies of such moves can enhance yield and efficiency and enable the development of competitive responses that add value to the rail network. Key to this is providing marketing staff with the tools to analyze the profitability of equipment cycles – from pricing to market for headhaul to understanding the true incremental benefits of backhaul.

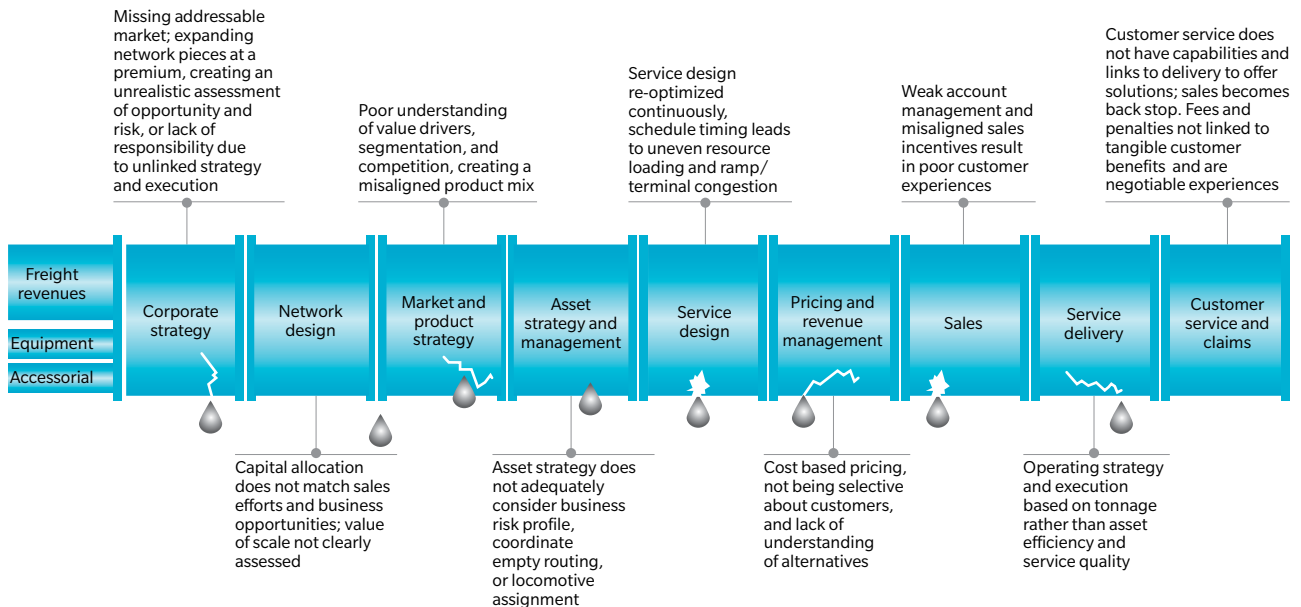
Sales can be another source of leakage: Giving the sales organization poorly defined instructions for price setting or KPIs that don't incent desired behaviors, for example, can erode revenues. A relentless drive to hit revenue and volume targets can turn a disciplined sales force into a discounting machine. KPI's need to be carefully developed and aligned with business objectives across the enterprise or unintended consequences can create leaks in the revenue pipeline.

EXHIBIT 1: THE RAILROAD REVENUE PIPELINE





## EXHIBIT 2: THE RAILROAD REVENUE PIPELINE: EXAMPLE LEAKAGES WITHIN FUNCTIONS



Sales can also be a gateway to revenue leakage via another route: offering multiple customized solutions as a way to meet customer demand for high service levels. Railroads are network-based businesses like passenger airlines and express parcel delivery firms, which offer a range of service products, but obviously could not offer arrival times specifically customized to each client's needs without costs spiraling out of control. Sales should focus on closely matching available service options to customers' needs, then pricing and selling that service relative to competitive alternatives. Even promising "easy" or "simple" customizations, such as a shorter connection time at a main yard, can cause missed connections for other shipments, leading to contract penalties, slower car cycle times, and higher costs for impacted shipments.

Yet a third common leak is a disconnect between demand and supply: Forecasting accuracy can be tricky to get right, especially at a highly detailed level, and is often not

systematically tracked on many railroads. Resource supply (cars, locomotives, crews, and even track capacity), however, is often set based on forecasted demand. Excess resources are a drag on profitability, while resource shortages can lead to lost revenues.

## LEAKAGE ACROSS FUNCTIONS

Revenue leakage across the pipeline occurs when activities in two or more functional areas are misaligned (see Exhibit 3). This cross-functional leakage is particularly destructive because it can be difficult to identify during day-to-day operations.

One example of such misalignment is the allocation of cars to loadings. Oliver Wyman worked with a North American railroad that had a mixed fleet of covered hoppers for grain. It had lower cubic capacity cars best suited to move wheat and higher cubic capacity cars best suited to move corn. But

the railroad would fill cars based on the direction they were moving, rather than the most efficient use of the car. In particular, once low-cube wheat cars had moved east, they would be reloaded with corn on their way back, and then hauled to the opposite coast for export. Because steep grades and siding lengths limited the train size for westbound exports, the railroad was losing revenue by using these low-cube cars to haul corn. In addition, the export terminal charged the railroad for the additional expense of using smaller cube cars at its facility.

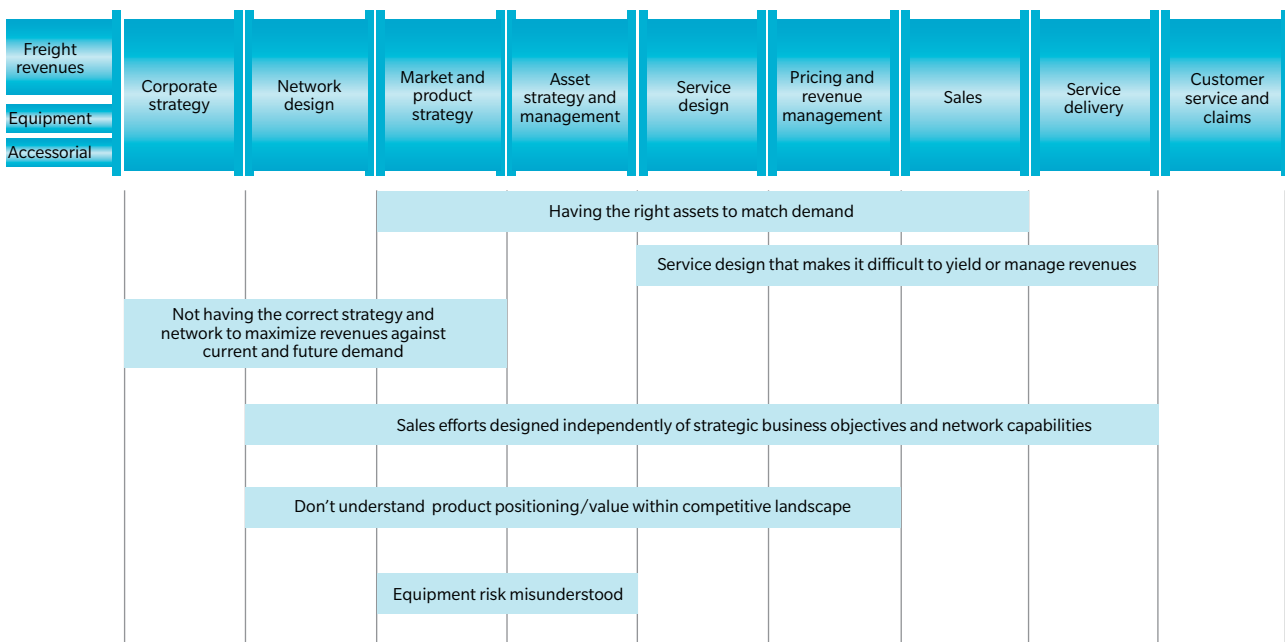
Oliver Wyman worked with the railroad to align customer service, car management, and operations to get each customer the best car based on commodity and destination. In particular, since high cube cars could hold 6 percent more corn for no additional tare weight (and the train was only marginally heavier, requiring no more locomotives), high cube cars were allocated specifically to moving corn (Exhibit 4). This

added 150 empty car-miles at a minimal incremental cost (for fuel), but led to an increase in haulage revenues of 6 percent, as well as reduced terminal expenses.

Another example: An international railroad was resource constrained but desperately trying to find a way to grow revenues; locomotives were its scarcest resource. In particular, the carrier had both diesels and several types of electrics that could only operate in specific territories. Oliver Wyman determined that revenue leakage was occurring across the entire functional pipeline, due to the railroad's inability to maximize locomotive utilization. As shown in Exhibit 5, recovering lost revenue and priming the railroad for future growth required adjustments to many different facets of railroad operations.

Once the plan was aligned across operating functions, it was reviewed with customers to ensure that loading and unloading times of

### EXHIBIT 3: THE RAILROAD REVENUE PIPELINE: EXAMPLE LEAKAGES ACROSS FUNCTIONS



day could be staffed, that increased volumes to be shipped were supportable, and that the elapsed loading and unloading times were achievable. Aligning operations across all of the different resource functions and with the customer base increased effective capacity and enabled a 5-12 percent increase in revenues per corridor.

## DIAGNOSTIC: ARE YOU LEAKING MONEY?

Only a holistic diagnostic that looks at the entire revenue pipeline can ensure that all potential leakages are identified and addressed – including both “quick wins” and longer-term opportunities.

EXHIBIT 4: CASE EXAMPLE: OPTIMIZING HAULAGE TO REDUCE REVENUE LEAKAGE

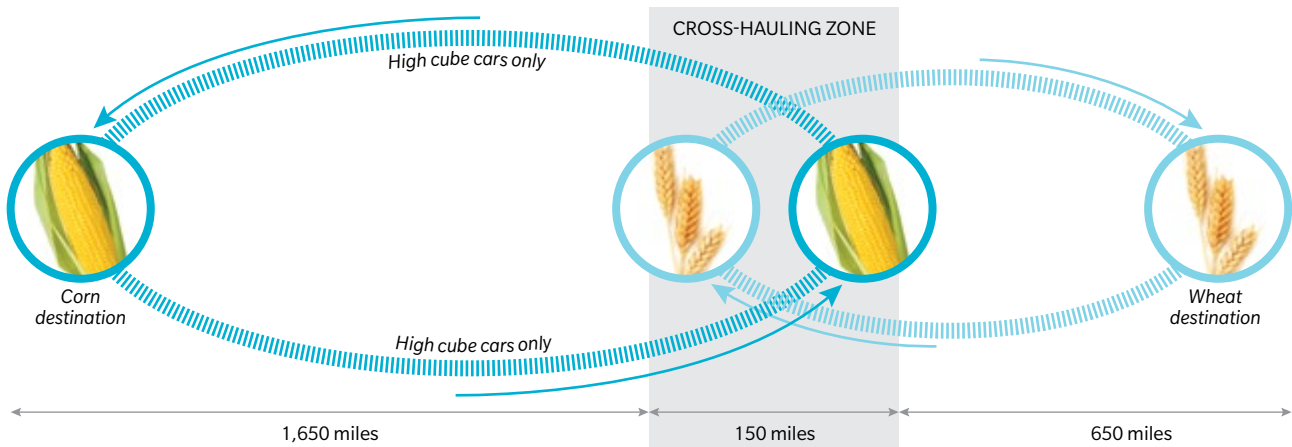







EXHIBIT 5: CASE EXAMPLE: OPTIMIZING LOCOMOTIVE USE TO REDUCE REVENUE LEAKAGE

					
FUNCTION/ COMPONENT	TRAIN SCHEDULES	TRAIN SIZES	CAR FLEET	DRIVER SCHEDULES	LINE CAPACITY
ANALYSIS/ CHANGE	Analyzed and adjusted to minimize lost time changing between locomotive types	Reviewed and adjusted to match the capabilities of the assigned locomotive consist	Analyzed to ensure there were sufficient cars to operate the revised train consists	Reviewed to ensure there were sufficient drivers and that rest requirements were not being violated	Reviewed to ensure that infrastructure capacity was sufficient to handle volumes/ revised schedules
▼	▼	▼	▼	▼	▼
FINDINGS/ IMPLICATIONS	In some cases, diesels could be used for the entire run, completely eliminating locomotive changes	In some cases, train size could be increased by using a different locomotive consist. In others, a few cars could be removed from a train to eliminate one locomotive from the consist	In most cases, the cycle times for the cars could be best reduced by reducing train delays incurred when waiting for locomotives at locomotive and driver change points	The most important factor turned out to be a need for sufficient drivers qualified on the assigned locomotive types to move the trains	It was important to ensure that new volumes/schedules would not adversely impact passenger train schedules

It can be useful to focus first on identifying quick wins as a means of generating funding for and ensuring the sustainability of longer-term assessment, roadmap planning, and execution support. In Oliver Wyman’s experience, certain revenue pipeline sections – e.g., pricing and revenue management, sales and customer service, and claims – are often better targets for identifying quick wins, primarily because these functions can have such a high impact on transactional value and frequency, require little asset impact/investment, and cause little strain on the organizational structure. But as noted in the example above, optimization of a bottleneck resource can also unlock significant increases in revenue.

A first-step diagnostic (see Exhibit 6) should help generate ideas and in brainstorming potential initiatives, which can then be ranked by value and feasibility. Focusing just a few top-tier commercial resources on these initiatives, with some assistance, often can lead to projects that can be implemented fast enough to produce quantifiable results

and provide the stability required to tackle bigger hurdles.

It is critical that the railroad make some needed systemic changes during this effort to ensure new leaks don’t form:

- First, it must assess its market and customer strategy to understand in which markets it can be most effective, what these customers value, and what will they value in the future.
- Second, the railroad should begin to rethink its asset management strategy with an eye to maximizing future revenue potential based on these market decisions, and then institutionalize these lessons.

Addressing the most obvious revenue leaks can increase realized revenues by a minimum of three to five percentage points within a year

#### EXHIBIT 6: REVENUE LEAKAGE SELF-DIAGNOSTIC

CORPORATE STRATEGY	Do we have a clear and unified strategy that highlights the company’s plan to achieve its objectives in each of its markets and products? Is this plan clearly communicated across the organization?
NETWORK DESIGN	What parts of our network are critical to achieving our business goals? What is our strategy to ensure we allocate our scarce capital to those parts of our network that will provide the most upside?
MARKET AND PRODUCT STRATEGY	Do we actively target the segments that we can effectively compete for and are most valuable to our company? What is the most effective product catalog to achieve our business growth objectives?
ASSET STRATEGY AND MANAGEMENT	Do we have the right asset mix to support our strategy? What is our strategy to ensure we allocate our capacity to those customers and markets that are most valuable?
SERVICE DESIGN	Is our service design optimal in maximizing the value of our franchise, and the utilization of our scarcest resources given market requirements, operational capabilities, and network constraints?
PRICING AND REVENUE MANAGEMENT	Do we take full advantage of differential market pricing? How do we maintain pricing integrity across the portfolio of business?
SALES	How do we ensure that our sales force is focused and incented to drive sales in areas (markets, segments, customers) that are aligned with our business strategy, and which will generate the most contribution?
SERVICE DELIVERY	Is the quality of our delivery in line with our market offerings and competitive?
CUSTOMER SERVICE AND CLAIMS	When our customers have an issue, do we handle it like we are trying to retain our revenue or simply finishing the job?





- Third, and most important, railroads need to manage the revenue pipeline holistically as an interrelated flow of revenue-generating activities and not as functional silos.
  - One option is to appoint a “chief revenue officer” who takes sole responsibility for managing the end-to-end process and ensures that all activities are coordinated efficiently.
  - Another option is to develop one or more cross-functional teams reporting to the CEO; these teams can manage day-to-day operations and report upward any issues that require a higher level of leadership to resolve.

It’s an unfortunate reality, but all organizations leak revenue. Nonetheless, it is possible to find critical leaks and stop them permanently. The result will be more value from existing assets as well as better positioning for long-term growth.

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# AVIATION MROS: THRIVING, NOT JUST SURVIVING

CHRIS SPAFFORD  
DARRYL ROSE

The world is shrinking for independent aviation maintenance, repair, and overhaul providers (MROs). For years now, major engine and component manufacturers have been muscling into the aircraft maintenance market, keeping MROs from winning work on the new models that comprise the majority of modern fleets. MROs have been left fighting for a vanishing piece of the pie: end-of-life aircraft destined for retirement or second lives in far-flung markets.

MROs have stayed afloat by signing licensing deals with original equipment manufacturers (OEMs), as well as cutting costs by relying on serviceable materials. Neither strategy, however, guarantees a future. MROs seeking long-term prosperity need to access the growing market for new aircraft models that OEMs dominate.

## SHRINKING OPTIONS FOR MROS

In our latest annual MRO Survey, Oliver Wyman confirmed that the competitive imbalance between MROs and OEMs is deepening. These dynamics have eliminated opportunities for airlines to find cost-competitive maintenance following aircraft delivery, where MROs and OEMs once fiercely competed. In response, airlines now increasingly conduct maintenance procurement in parallel with the equipment selection process, forcing OEMs to compete against each other. While this trend benefits airlines, it has blocked independent MROs from major procurement campaigns altogether.

## EXHIBIT 1: AGE BREAKDOWN OF GLOBAL AIRCRAFT FLEET

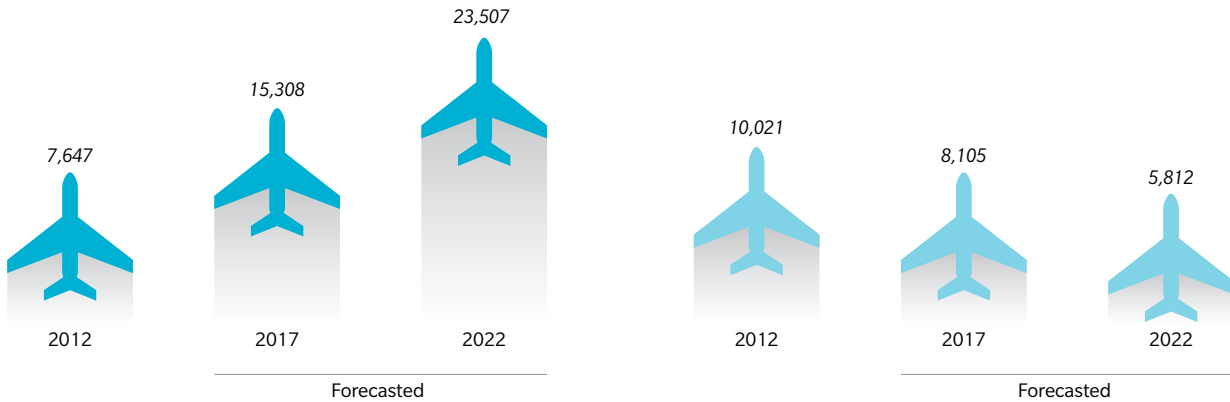
FLEET COUNT BY YEAR, 2010-2022

AIRCRAFT <10 YEARS OLD IN 2012 AND ALL NEW DELIVERIES AFTER 2012, LESS FORECASTED RETIREMENT

MARKET TARGETED AND CONTROLLED BY OEMS

AIRCRAFT >10 YEARS OLD IN 2012, LESS FORECASTED RETIREMENT

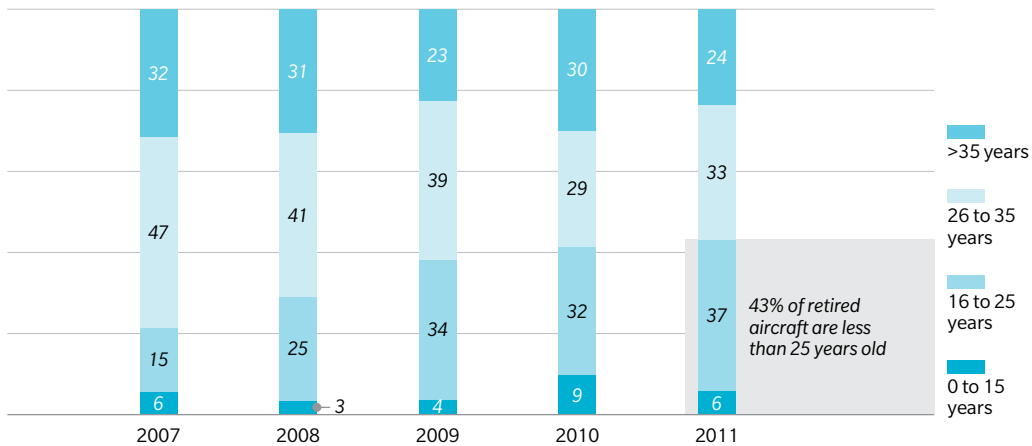
PRIMARY TARGET MARKET FOR MROs



Source: ACAS, Oliver Wyman analysis.

## EXHIBIT 2: AGE BREAKDOWN OF RETIRED AIRCRAFT

PERCENT OF TOTAL AIRCRAFT RETIRED EACH YEAR  
2007-2011



Source: ACAS, Oliver Wyman analysis.

As a result, MROs are vying for a diminishing share of work tied to mature fleets, which are not dominated by OEMs. While shorter removal intervals and heavier work scopes typical of older components are a boon to MROs today, this market may already be endangered: Retirement of aircraft less

than 25 years old has been rising, hitting 43 percent of all retirements in 2011, compared with just 21 percent in 2007 (Exhibits 1 and 2). Recent retirements shrink the mature aircraft market and will adversely impact MROs that rely on those fleets.

## OEM PARTNERSHIPS: A SHORT-TERM SOLUTION

Our survey found that MROs have begun to seek partnerships with manufacturers as an avenue to growth. More than 70 percent of our MRO respondents indicated that they have entered at least one OEM partnership within the past three years. More than 80 percent of such respondents though characterized those partnerships as licensing agreements (Exhibit 3). Licensing agreements can help MROs solidify revenue and reach otherwise inaccessible customers. But such deals generally leave the licensee in a subordinate position, prone to shifts in licensor fulfillment strategies and to encroachments by rivals.

Many respondents noted that MROs have attempted to establish more symbiotic partnerships with OEMs, but with little success. Until MROs can implement more ambitious tie-ups with manufacturers, maintenance organizations will remain susceptible to their more-powerful partners' shifting priorities.

## PURCHASING: A STRONGER COMPETITIVE OPTION

Despite this seemingly dire outlook, MROs are far from doomed. Current strategies and fleet types can sustain many MROs over the medium term, and some MROs maintain strong and sustainable niches. And encouragingly, airlines want a more robust maintenance market that includes MROs in a meaningful way. According to our survey, most airlines would welcome competition from MROs for long-term maintenance services when aircraft are purchased.

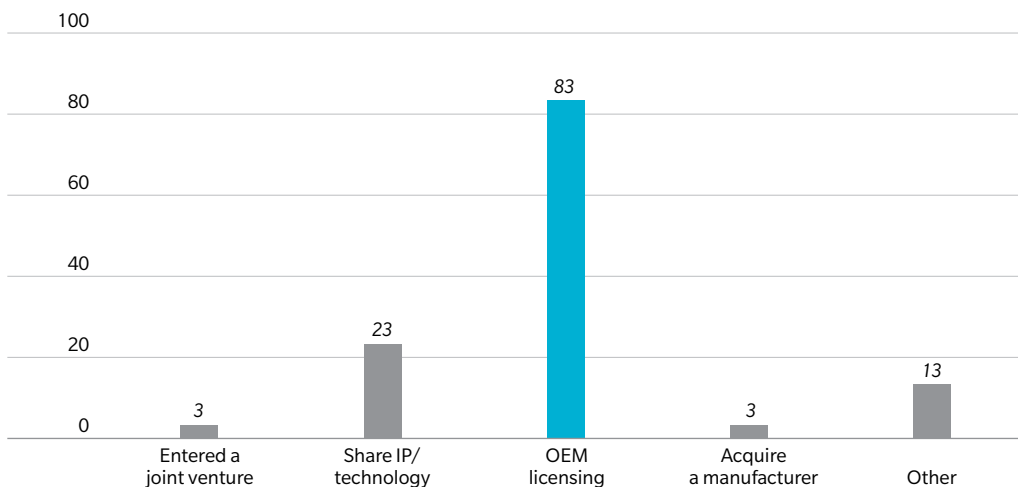
To thrive rather than survive, MROs must find a way around OEMs and into these sourcing campaigns. This means seeking partners who can inject MROs into the selection process: Two candidates are aircraft lessors and airframe manufacturers.

## AIRCRAFT LESSORS

Aircraft lessors work with many operators at the point of aircraft acquisition. MROs could serve carriers in need of bundled

### EXHIBIT 3: NATURE OF CONSUMMATED PARTNERSHIPS

PERCENT OF MRO RESPONDENTS



Source: Oliver Wyman 2013 MRO Survey.



## Airlines want to see more competition for maintenance contracts – can MROs deliver?

services and owners keen to ensure capable stewardship of their asset through its lifecycle. According to our companion survey of the aviation finance market, many lessors would support this strategy. Of lessor respondents, 70 percent indicated they already advise airlines on maintenance contracting matters. And a significant

majority of our respondents also favor pairing MRO services with lease agreements for commercial (63 percent) and asset marketability (100 percent) reasons.

To capitalize on this opportunity, MROs would do best to partner with lessors managing concentrated portfolios to maximize exposure to end users. First-mover advantage may also be critical with this strategy. If an MRO is selected by an airline to service early-entering aircraft, the MRO will be more likely to win subsequent contracts on future deliveries, regardless of the related lessor.

### AIRFRAME OEMS

MROs should also consider partnerships with airframe manufacturers to gain access to the aircraft selection process. These players continue to develop their own aftermarket service offerings, but with less success than their engine and component counterparts. MROs able to provide complementary capabilities to airframe OEMs will increase the attractiveness of their aftermarket package and may gain increased access to the aircraft selection process through such a relationship.

There are clear challenges ahead for engine and component MROs. Seeking powerful allies, defining ways to serve unmet needs, and developing innovative business designs to combat OEM dominance are critical to long-term viability. Read the full survey at: [www.oliverwyman.com/mro-survey-2013.htm](http://www.oliverwyman.com/mro-survey-2013.htm).



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# EMBRACING NEXT-GEN AIR CARGO IT

NIKO HERRMANN  
MAX BORRECK

Most companies have been doing business on the Internet for more than a decade. But some cargo airlines are still celebrating their first electronic airway bill or the full implementation of bar code labeling as major innovations. It's not for lack of want that the air cargo industry remains on the fringes of the information technology revolution. There are substantial drivers of complexity inherent in the business, making efficient supply chain automation a real challenge: regulations, competitive business dynamics, and physical multi-dimensionality, to name a few.

Recently, however, changes within the industry have picked up speed. The cargo industry overall is undergoing major transformations, driven by external factors, such as market volatility, financial

crisis, capacity growth in passenger markets, and security and environmental regulatory restrictions. Advances in enabling technology, such as new aircraft, new airports, new materials, and new technology, are also contributing to change.

As a result, now is the time for carriers stuck in mainframe systems to evaluate new technology. Air cargo companies must decide whether to install current technology, which is already a step forward, or wait for the next generation of air cargo IT (Exhibit 1).

## INDUSTRY CHANGE CONTINUES

Recent years have not been good for cargo industry economics. The glory days of the pre-financial crisis, supply side shortage,

seller's-market-out-of-Asia that fueled so much of global air cargo growth won't likely return anytime soon. On the positive side, the constant economic pressure on airlines and forwarders focused the industry on efficient, integrated supply chain services that benefit all parties along the air freight value chain.

One of the dominant characteristics of the industry is ongoing consolidation and supply chain integration. Integrators like FedEx, UPS, and DHL are leading the way. They have long understood that IT enables cost advantages and customer service propositions with a distinct competitive edge. Large commercial air cargo carriers have also invested substantially during the past decade. Now, smaller carriers that have treated cargo as a low attention contribution business will survive only if they can meet new expectations of an integrated supply chain and efficiently provide information, in real time, at any point along the supply chain.

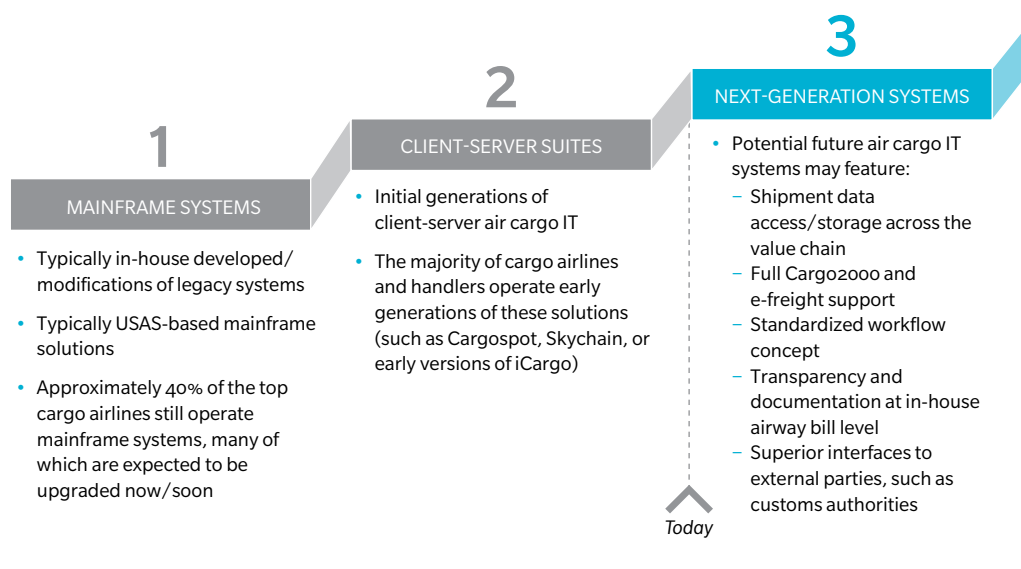
Air cargo in a world of globalized commerce and trade is heavily dependent on strong IT systems. This was abundantly clear five or six decades ago, when most of the mainframe

computer systems were conceived. Air cargo was then at the forefront of business automation.

Now, the old systems are cracking. They can no longer satisfy today's requirements, and the air cargo industry is at the beginning of a major IT overhaul. Key players have started to upgrade their systems in anticipation of the changing demands of an integrated supply chain. These moves pressure competitors, large and small, to follow.

Cargo is often part of an overall airline operation. There are naturally plenty of interfaces within an airline's IT systems, including network planning, flight operations, revenue accounting, and many more. Plus, there are plenty of external interfaces, with forwarders, customs, security, and other third parties. Sometimes the interfaces are dominated by process, sometimes technology. Many carriers build customized systems for each and every one of these interfaces around the core reservations and inventory management system. Managers at most air cargo carriers clearly understand the need for a more

## EXHIBIT 1: PHASES OF AIR CARGO IT



advanced core system, but the task of not only switching the core system but also simultaneously maintaining or re-building this connectivity can be daunting.

The pressure to upgrade is further intensified by external IT developments, including security and transparency regulations, termination of service for mainframe systems, and shippers' constant need to increase the efficiency of air cargo processes and ground handling.

Several carriers have made headlines recently with announcements of large IT investment programs. Lufthansa, together with IBS Software, is one example. Also, Cathay Pacific has begun replacing its cargo booking system, scheduled to be completed in 2015. Many other carriers are watching closely, contemplating their options for their future IT systems.

## ALL CARGO IT SYSTEMS AREN'T ALIKE

Cargo airline IT systems fall into three categories, defined by innovation speed and development stage:

- 1. Mainframe systems:** Roughly 40 percent of the world's top 100 cargo carriers still operate on IBM's Transaction Processing Facility products or other mainframe systems. These systems are powerful but cumbersome to develop further or even to maintain. Many air cargo companies, especially large ones, say they may upgrade soon.
- 2. Client-server suites:** During the 2000s, many leading carriers, forwarders, and handlers adopted next-generation cargo systems that allowed significant improvements and efficiency gains. These carriers made substantial efforts to implement new systems and are still amortizing the investment. These

carriers are less likely to be early adopters of the next wave of systems.

### **3. Next-generation air cargo IT systems:**

Airlines that are just now developing new core systems gain the advantage of both the IT vendors' investment in next generation products, as well as the technological evolution around supply chain integration. This could enable advanced features such as integrated shipment data access and storage across the value chain, full Cargo2000 and e-freight support, standardized workflow concepts, and superior interfaces to external parties such as customs authorities.

There are also a range of IT providers: While full-suite providers offer compelling propositions, niche providers play a vital role in covering all value chain needs (Exhibit 2).

## ADDRESSING PAIN POINTS

On the supply side, innovation leaders among cargo IT providers have also identified industry pain points and have begun to develop solutions.

Oliver Wyman recently surveyed industry leaders and experienced system providers and identified five categories of pain points:

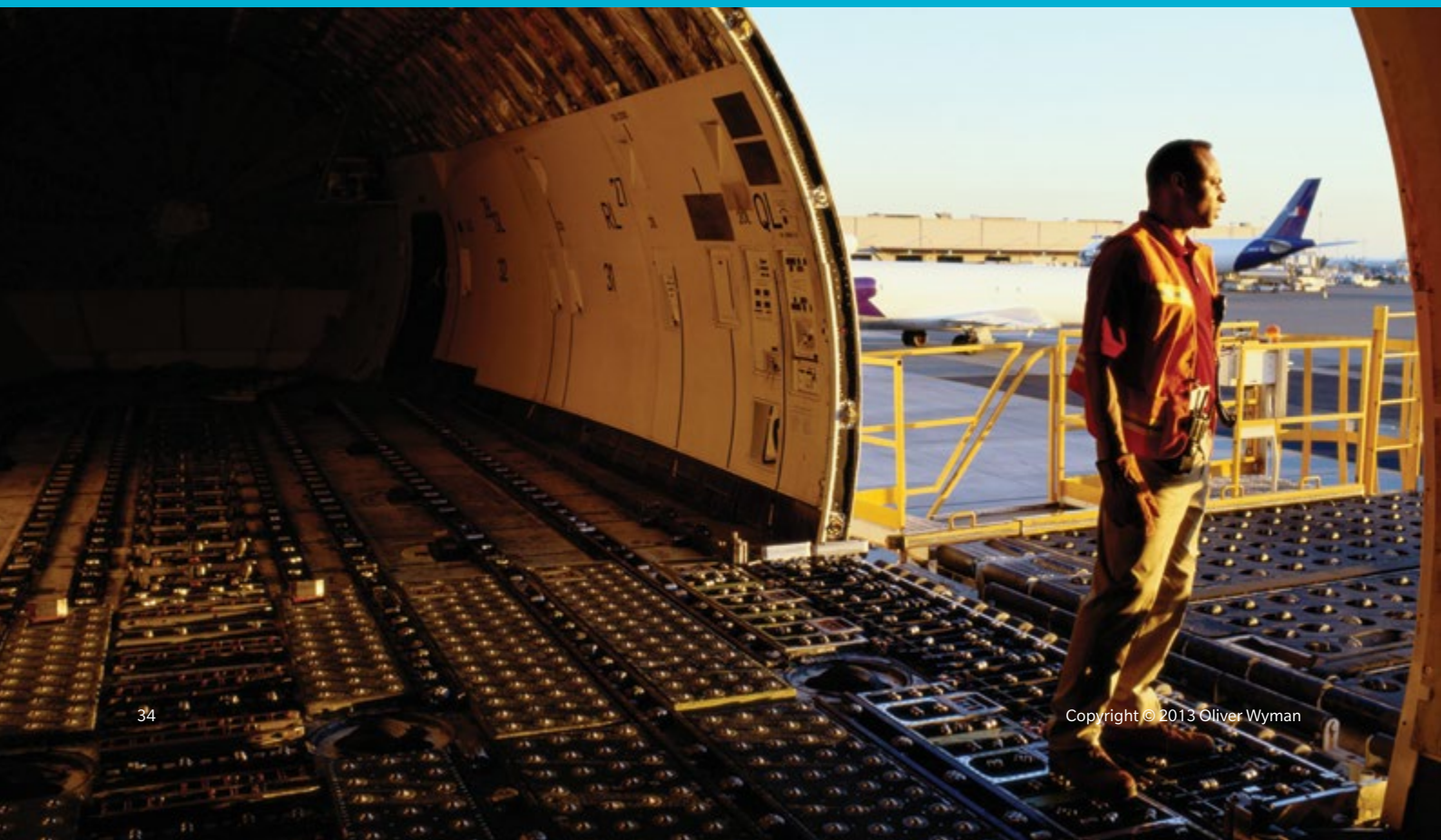
- 1. Overly complex processes:** Cargo airlines expect new systems to simplify and standardize processes in innovative ways, not just replicate inefficient legacy processes with more advanced technology. The new system will only improve process efficiency by cutting out work steps altogether. This means IT must support actual workflow organization, e.g., by means of guided processes or clear visualization of improvements. Integration with other processes, such as crewing or handling optimization, will lead to simpler, more efficient processes.



# AIR CARGO IT HEALTH CHECK

In this highly dynamic environment, airlines still stuck with old technology would do well to run health checks on their air cargo IT systems to see where they are today and where will they be in five years, compared with competitors.

- Does your current air cargo IT system offer comprehensive scheduling, capacity, reservations, and booking management?
- Does your system have intuitive screen layouts and navigation aids for effective task and workflow management on all levels?
- Does your system offer a web-based, browser-driven environment?
- Does your system allow you to flexibly improve work processes to capture efficiency? Or are you hostage to technology limitations and inflexible architecture?
- Do your system interfaces and messaging options comply with industry standards to easily connect with all partners along the supply chain, and enable you to fully participate in an e-freight environment?
- Does your system give you full transparency of your business with sophisticated, real-time, key performance indicator reporting and parameter-driven reporting tools?
- Does your system vendor give you the flexibility of a licensed or a hosted environment?
- Is your system built on a modular, flexible architecture that allows easy integration of additional functions from third-party vendors?
- Does the benefit you receive from your system on a daily basis justify the cost of running and maintaining the system?



## EXHIBIT 2: TYPES OF AIR CARGO IT PROVIDERS

TYPE	DESCRIPTION	EXAMPLES
Full-suite providers	<ul style="list-style-type: none"> <li>Provide a full array of services, covering core functionalities required by a cargo airline</li> <li>Offer various degrees of depth in individual functions</li> <li>Some providers (e.g., Champ) cater to the wider air cargo community, like ground handlers or customs.</li> </ul>	Accenture, Champ, IBS, Mercator, Unisys
Single solution providers/specialists	<ul style="list-style-type: none"> <li>Supply individual components for air cargo airlines, enhancing other suppliers' core products</li> <li>Some suppliers pursue standing cooperation with core suite suppliers (e.g., Kale with Unisys).</li> <li>Many specialists use passenger business expertise.</li> </ul>	Accelya, Accenture, Lufthansa Systems, Sabre
Community facilitators	<ul style="list-style-type: none"> <li>Supply software that facilitates information flow along the IT chain and between members of the value chain</li> <li>Touch on some core functionalities but usually do not provide functional systems</li> </ul>	Calogi, Cargonaut, Descartes, Kewill
Non-airline providers	<ul style="list-style-type: none"> <li>Focus on systems for non-airline partners of the air cargo value chain (e.g., forwarders, ground handlers)</li> <li>Some of the systems can be linked to airline IT systems as add-ons.</li> </ul>	BoxTop, CargoWise, Hermes Group

- 2. Interface management:** The simplification above requires no small degree of seamless information flow between value chain players, up or down the chain. To improve processes and eliminate manual work, the system must create standardized interfaces or data exchange mechanisms and protocols to both internal and external systems.
- 3. Regulations:** Fast-growing carriers that frequently expand their global networks require systems that facilitate compliance with security and transparency standards and electronic customs processes. To process cargo smoothly, the carrier needs intelligent organization and provision of all required data and documents. This will speed up the flow of highly regulated processes and can differentiate a carrier from less sophisticated rivals.
- 4. Data management:** This is critical for paperless cargo and to handle complex documentation, from seemingly simple consolidated shipments to shipments that require a multitude of specialized documents, such as dangerous goods, perishables, or live animals.

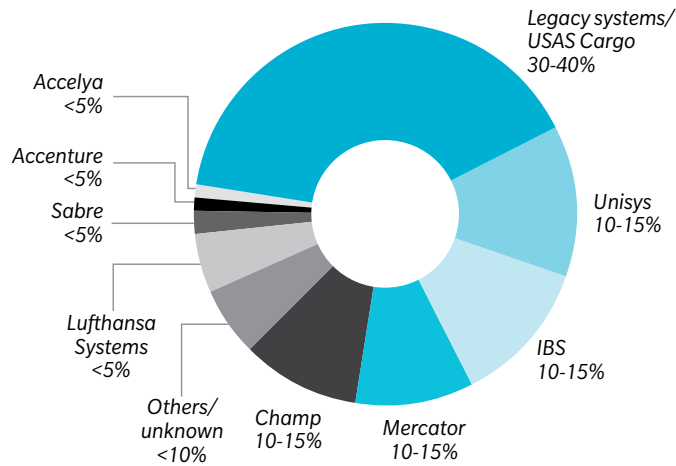
- 5. Customer support and innovation:** It is important to ensure professional support and system maintenance for all users (airlines, ground handlers, etc.). This goes for providing professional management and documentation of upgrades and clear communication of future developments with key clients. The main challenge here is finding the right balance between a community model that seeks consensus on next development priorities and a product-push model where the vendor effectively drives the emergence of a de facto standard.

Some IT innovators in the air cargo industry are actively pushing systems with industry participants. Other IT players, including dominant market incumbents, have reduced their investments and will either exit the market or focus on niche products. New players with focused systems will likely emerge, offering products that make use of advanced technology like smartphones and distributed computing, not only for customer service interaction and commercial processes, but also for operations.

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### EXHIBIT 3: MARKET SHARE OF AIR CARGO IT PROVIDERS

2011 INSTALLED SYSTEMS, BASED ON REVENUE



Note: Cargo airlines only, does not include integrators.

Source: Oliver Wyman analysis.

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The air cargo IT market is bound to experience a significant shake-up. As shown in Exhibit 3, as the share of legacy systems shrinks, consolidation is likely to occur around one to three leading players within the next five to ten years. For air cargo carriers, this means the time is right to evaluate their current set-ups and consider their options. Even if you're happy with your old mainframe system, your vendor may not have the support capabilities forever. That's good reason to start thinking.

A recent Oliver Wyman survey of cargo carriers and IT vendors showed three user concerns: poor service, support, and maintenance; lack of vision or innovation capabilities; and problems maintaining legacy systems.

One survey participant had a sobering message for the vendors. While some cargo companies are satisfied with their systems, "There is room for improvement at all air cargo IT suppliers."

There is a general interest on the operational side of the business in standardization that integrates with different value chain players, helps simplify processes, and supports future transparency, tracing, and tracking requirements. However, customers desire systems that allow differentiation in commercial processes, via parameters and business rules. Also, cargo airlines like cross-value-chain systems that are accessible to handlers and forwarders, possibly even shippers. Clearly, minimum implementation disruption is also high on the wish list, as well as easy integration of existing third-party systems.

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# WHAT'S NEXT FOR EUROPEAN RAIL SUPPLIERS?

GILLES ROUCOLLE  
JORIS D'INCÁ  
JEAN-PIERRE CRESCI

Oliver Wyman recently updated its research on the European rolling stock equipment industry, and confirmed several trends that will both make future growth more challenging and require new strategies to meet the needs of a globalizing and more complex market.

## TREND 1: SUSTAINABLE BUT MORE GEOGRAPHICALLY DIVERSIFIED GROWTH

The rolling stock equipment market remains attractive from a growth standpoint, with emerging countries in particular exhibiting increasing demand. Over the past five years, mega-projects around the world – including in Europe, Asia, and the Middle East – have driven growth in new orders, resulting in healthy backlogs that should continue to

fuel the rail equipment business until at least 2015 (see Exhibit 1 on the next page).

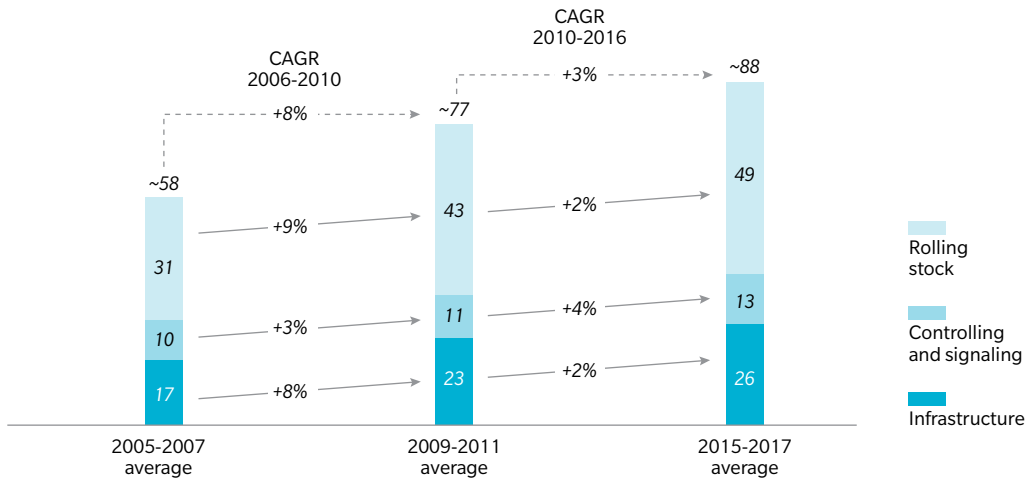
Past that point, large new orders are less certain. Many major projects for metros, commuter rail systems, and high-speed rail are in the pipeline, particularly in regions such as Brazil, India, China, and the Middle East. The timing of some of these projects is not entirely clear, however, and financing issues (especially where government funds are involved) in the context of protracted economic downturn may generate significant delays or changes in scope. As a result, new order global growth is expected to slow to 3 percent per year (versus 8 percent per year through 2011), impacting rail equipment suppliers post-2015.

Nevertheless, over the longer term, Oliver Wyman is confident that global



## EXHIBIT 1: RAIL EQUIPMENT MARKET EVOLUTION (NEW ORDERS)

ALL GEOGRAPHIES, 2005-2017, ACCESSIBLE MARKET  
€ BILLIONS



Note: Infrastructure excludes civil engineering and renewal/maintenance. Source: UNIFE, Oliver Wyman analysis.

mobility and trade internationalization, urbanization in emerging countries, and aging infrastructure/equipment in mature countries will continue to support the development of the rail supply industry.

### TREND 2: INTERNATIONALIZING SUPPLIER BASE

The growth of projects in emerging countries and pressure on equipment and component prices in mature countries (where train operators face greater competitive and financing issues) have triggered the development of suppliers from emerging countries. Large new integrators, such as Pesa (Poland), Skoda (Czech Republic), and CSR/CNR (China) have seen rapid growth, backed by thousands of Tier 2/3 component suppliers worldwide.

As an example, as shown in Exhibit 2, Oliver Wyman estimates that China's CSR and CNR have become almost as large as Bombardier, Alstom, and Siemens – long the undisputed leaders of the rolling stock

market. CSR and CNR have even developed leadership positions on some product lines, such as metros.

Benefiting from both their experience and massive technology transfers from mature countries, these companies are now pushing aggressively to move beyond the domestic sphere and capture projects worldwide, independent of their legacy partners in Western Europe and North America. CSR and CNR, for example, now have a strong presence in Southeast Asia, the Middle East, Africa, and South America.

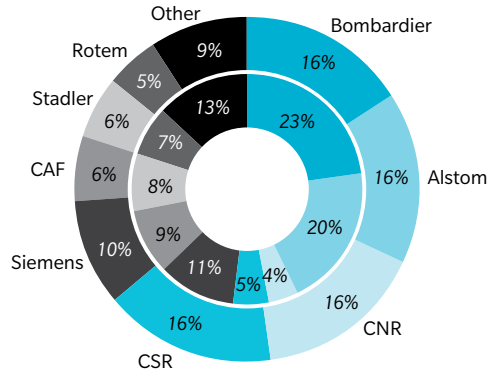
### TREND 3: INCREASING TRAIN COMPLEXITY

Hand in hand with diversification and the globalization of the supply base, customer needs and priorities are evolving. As a result, train technologies are becoming more complex, driven by the growing importance of electronics/mechatronics and software, as well as the criticality of homologation/security requirements.

**EXHIBIT 2: ROLLING STOCK MARKET EVOLUTION (NEW ORDERS)**

ALL GEOGRAPHIES, PERCENT OF TOTAL MARKET VALUE

INNER RING: 2007-2008 AVERAGE  
 OUTER RING: 2009-2011 AVERAGE



Source: Oliver Wyman analysis.

This trend presents a major challenge to rail integrators, which must upgrade and realign their engineering capabilities in response. In general, these firms are finding that a range of talent, organizational, and process issues must be addressed to keep up-to-date with the latest requirements. This increased technology pressure conflicts directly with the short lead times required by the market, and heightened homologation hurdles.

Component suppliers are being even more impacted by rapidly increasing complexity, as aside from a few large Tier 1 OEMs, most firms that provide components to European rail equipment integrators are relatively small, and thus often lack the capability to invest in related technologies (both in terms of R&D and talent), internationalize their



manufacturing footprint, and deliver on newly defined requirements.

These small and medium-size enterprises may find it difficult to survive on local/regional demand alone, especially as local content requirement barriers are falling, driven by international commerce deregulation, the deployment of international standards (e.g., ERTMS), and integrators' cost-driven equipment standardization efforts.

## TREND 4: CHANGING BUSINESS MODELS

Relevant business models for rail suppliers will also change as their customers (operators, municipalities, etc.) continue to face a cash shortage. In addition, European operators are under fierce pressure to reduce costs in the wake of reduced subsidies, as well as heightened competition due to market liberalization – meaning fewer and more volatile investments for renewed fleets.

Suppliers can thus also expect lower payments up front to become the norm, which will mean a need to find alternative financing solutions. New models already under development include:

- Public-private partnerships (PPPs), where private partners assume part of the financing in return for a share of long-term profits.
- Build-operate-transfer schemes (BOTs), where suppliers develop a

financing model based on projected concession revenues.

- Lifecycle costing (LCC) based models, where suppliers commit on the performance (operational and costs) of equipment over its lifecycle, in general based on incentive/penalty schemes.

## CREATING A MORE RESILIENT INDUSTRY

Oliver Wyman's research makes it clear that ensuring the sustainability of the European rail supply industry in the face of increasingly demanding markets, growing competition, and continued financial constraints will require industry leaders – operators, integrators, and European authorities – to craft a holistic and balanced industrial strategy. The European rail supply industry of tomorrow must be more technologically savvy, more competitively robust, and more creative in its financing solutions.

It is likely the industry will need to consolidate to achieve these goals: a few larger Tier 1 and Tier 2 companies would have the scale and scope to respond faster and more flexibly to emerging market trends. Given the current market environment, we suggest as a starting point that electrical and electronics, on-board hardware and software, and interiors might be sub-systems/components most vulnerable to the trends noted above, and thus first in line for strategic assessment and redesign.

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# THE EVOLVING RAIL MAINTENANCE OF WAY MARKET

BILL RENNICKE  
JEFFERY ELLIOTT  
PATRICK LORTIE

Oliver Wyman recently completed its 2013 survey of North American rail suppliers/contractors and railroads on maintenance-of-way (MOW) and rail inspection trends. This update on our 2008 study found that while these activities are projected to continue to see growth, many challenges remain virtually unchanged from five years ago.

Railroads are clearly facing greater demands on their track infrastructure as traffic density continues to increase – driving a need for ongoing MOW work and rail inspection. But the Class I and regional railroads we interviewed expressed frustration at the pace of supplier innovation. In particular, railroads want updated technologies and methods that will reduce manpower needs and make these tasks simpler, safer, and faster, while ensuring the utmost in reliability.

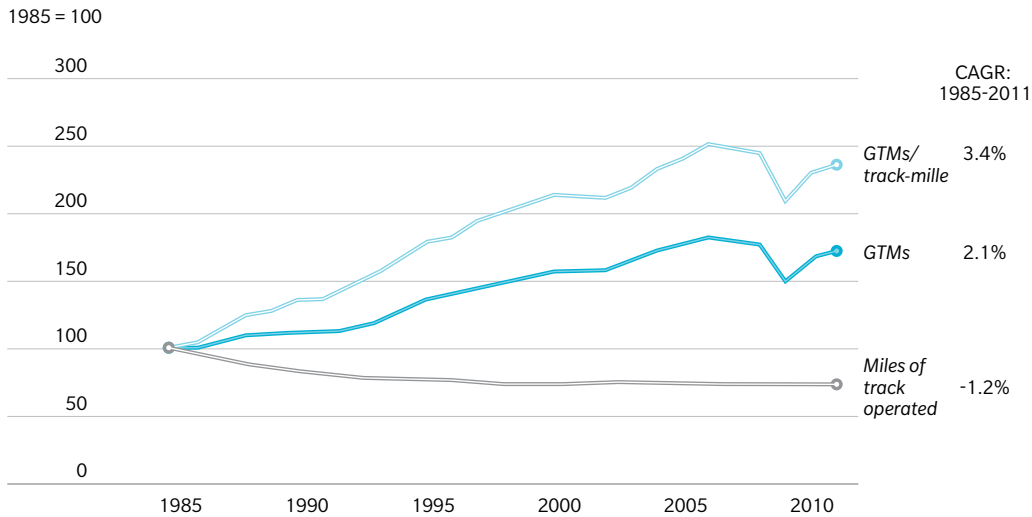
Other major findings of the survey include a clear reduction in cyclicity of MOW spending, the importance of total cost of ownership data and relationship building as supplier selection criteria, and the wide range of unmet needs railroads report with respect to MOW/rail inspection products and solutions.

## MOW/RAIL INSPECTION MARKET OUTLOOK

Railroads of all sizes expect growth in MOW and rail inspection work, a function of increasing gross ton-miles per mile of track (see Exhibit 1 on the next page), as well as the desire in some cases to raise baseline track quality.



## EXHIBIT 1: INDEXED US CLASS I TRACK OPERATED AND GROSS TON-MILES, 1985-2011



Source: Railroad R-1s, Oliver Wyman analysis.

Seventy-five percent of interviewees expect MOW equipment purchases to be stable, although responses from railroads ranged from a desire for better utilization of existing equipment to plans for major buys. All railroads are clearly looking to keep equipment in service for as long as possible, cascading it down from production gangs to regional and local uses as it ages.

The picture for rail inspection equipment and services is brighter for suppliers, as 60 percent of respondents expect spend to increase, and nearly 70 percent anticipate outsourcing of inspection services to expand over the next five years (Exhibit 2).

A key longer-term trend driving the MOW market as a whole is that rail investment appears to be following a less cyclical path: Prior to 2008, investments made by the railroads matched the level of revenues. But during the last economic downturn, as one respondent noted, “Everyone learned a really good lesson: The business will eventually come back, and so a downturn is the time to pour the coals on infrastructure work, since you’ll be 5-10 percent more efficient with your track time.”

Another trend worth noting is a shift toward contracted MOW operations. Contracting is generally limited to heavy maintenance work for Class 1s (e.g., overhauls), but more extensive for smaller railroads with fewer in-house capabilities. Forty-three percent of respondents expect MOW repair and “other” work (such as brush clearing) to increase in the near term.

## SUPPLIER SELECTION CRITERIA

When it comes to selecting suppliers, it’s no surprise that railroads rank reliability, cost, and customer service as priorities. But there are several other criteria that are worth suppliers’ attention as well. In the MOW equipment category, railroads ranked “total cost of ownership” (TCO) as more important than the base price. This suggests that suppliers would do well to develop a thorough understanding of TCO, such as by partnering with customers to review costs for equipment already in service. Breaking out TCO at a fine level of detail can then provide insights on where improvements might be worth making.

For repair/rebuild services, beyond customer service and cost, rail customers cited “one-stop shopping” and building long-term relationships as important. Thus, suppliers who offer a strong suite of services, take the time to familiarize themselves with a railroad’s needs, and show a willingness to commit to supporting the railroad are more likely to see growth.

In the area of rail inspections, TCO is also a criteria for equipment. Otherwise, customers see rail inspection as highly consolidated; some go so far as to distribute spend in an effort to maintain competition in this space. One potential area for differentiation is that railroads would like to see better support and analysis of inspection data.

## CUSTOMER PRIORITIES

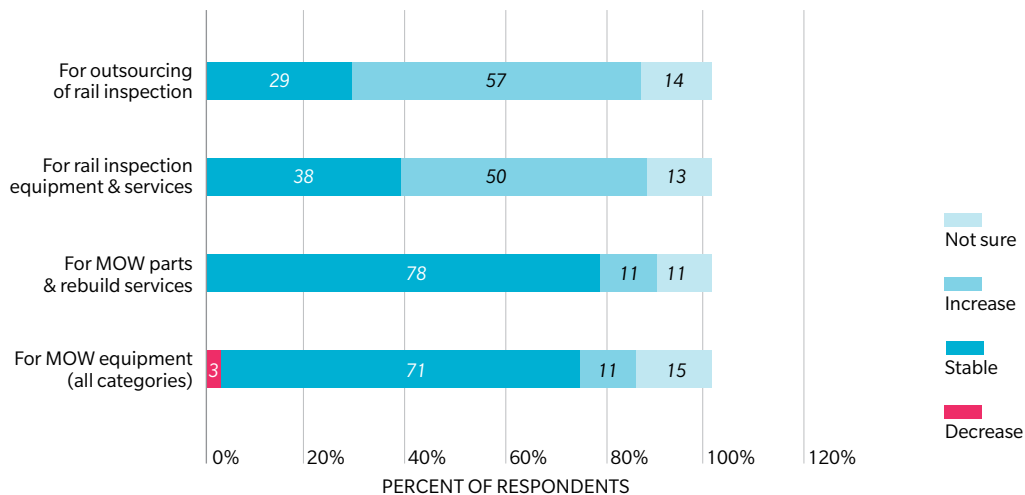
Rail customers identified a wide range of needs related to MOW/rail inspection, including for greater equipment reliability and mobility, more operator training, and

updated equipment and technology that can support critical railroad objectives, such as increased worker safety, less track downtime, and fewer emergency repairs.

- Safety and labor reduction: Railroads consider safety to be their number one priority, and seek MOW equipment advances that will support this (particularly for injury-prone jobs, such as laying rail), as well as a reduction in overall labor requirements. Greater mechanization, more remote control options, and robotics were cited as promising avenues that suppliers should pursue.
- Proactive maintenance: Railroads continue to shift toward preventative and scheduled maintenance as a core business strategy. This could represent a major opportunity space for suppliers who are able to apply their specialized industry expertise to develop new products and integrated solutions that support predictive monitoring and maintenance planning. In addition, smaller customers want creative solutions

### EXHIBIT 2: MOW AND RAIL INSPECTION SPENDING TRENDS

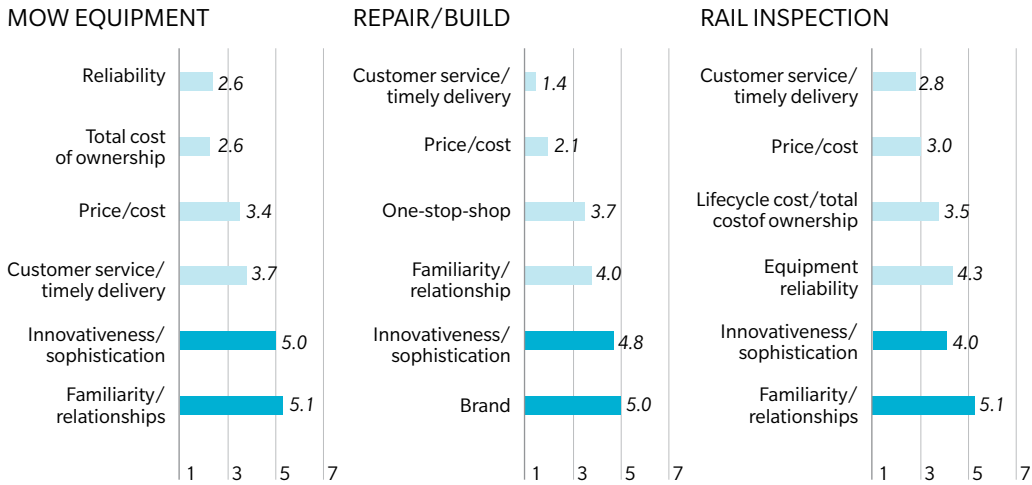
“HOW DO YOU EXPECT SPEND TO CHANGE IN THE NEXT 5 YEARS, COMPARED TO THE PAST 3?”



Source: Oliver Wyman 2013 Survey of Rail Operators and Contractors.

### EXHIBIT 3: SUPPLIER/PROCUREMENT SELECTION CRITERIA

AVERAGE RANKED IMPORTANCE, 1 = TOP PRIORITY



Source: Oliver Wyman 2013 Survey of Rail Operators and Contractors.

that reduce the need for in-house maintenance capabilities, such as leasing.

- **Software development:** Customers are seeing MOW/inspection data processing and analysis as chokepoints, with insufficient solutions in the market to enable this data to be used productively (such as for predictive failure analysis). Railroads also believe that currently available sensors could replace many manual rail inspections, but here again the software needed to intelligently monitor such systems is lacking.
- **Innovative equipment features:** Interviewees expressed a desire for technology features that are becoming commonplace elsewhere (e.g., in automobiles) – such as collision avoidance and cameras, which would give operators greater visibility. Another area where innovation is desired is in the development of new rail testing

methods, such as the capability to put rail under load and check for compression-related flaws.

In summary, suppliers for MOW and rail inspection can expect a stable market over the near term, but are likely missing out on new opportunities by failing to meet the needs being voiced by their customers, particularly for greater R&D and innovation. Railroads see the MOW/inspection supplier base as relatively undifferentiated, and at present have little reason to either switch vendors or grow business with current vendors beyond their baseline requirements. Suppliers who rise to the challenge of identifying and implementing the solutions their customers want, however, could realize a new source of competitive advantage and motivate greater railroad investment.

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