Real-time Business
Playing to win in the new global marketplace

A white paper produced in collaboration with SAP
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Preface

This white paper, produced in collaboration with SAP, provides insight into executive perception of real-time business operations. To ensure the rigor of our research, we relied on a blend of quantitative and qualitative analysis, including:

- A global survey of 525 c-suite level executives in the consumer products, high-tech, oil and gas, and retailing industries.
- A series of in-depth personal interviews with senior executives in the aforementioned industries who are involved in their firm’s efforts to move operations into real time.

We thank all the executives who took part in both the survey and the qualitative research.

Oxford Economics carried out the research. The results of the study are the sole responsibility of Oxford Economics and do not necessarily represent the views of the sponsor.

October 2011
With every passing day, the pace of business is accelerating. Tectonic shifts in the global economy combined with rapid technology adoption are forcing business executives to contend with a new global marketplace fraught with uncertainty and constant change. To be successful under these new market dynamics, firms must adjust operational processes, corporate strategies and business models at lightning speed—allowing them to leverage intelligence instantly and take immediate action. At the same time, they must make sure their decisions are informed by proper data and analysis.

What are executive perceptions and opinions about real-time operations? To explore these issues, Oxford Economics undertook a global survey in March 2011 of 525 executives. The survey focused on large and medium-sized business units in four sectors of the economy—consumer products, high-tech, oil and gas, and retailing. The data revealed some interesting findings:

- **Executives realize they need to take their businesses into real time.** In fact, 30% of firms already derive considerable benefit from real-time business, and nearly two-thirds of companies yet to implement real-time business techniques plan to do so over the next five years. With at least one-fifth of companies in every sector or region using real-time business techniques, its value to businesses of all types is growing. For the majority of the businesses that are behind these leaders, the imperative is to make up lost ground.

- **There are some surprising leaders—and laggards.** The majority of oil and gas firms have implemented a real-time business approach, particularly as part of their production processes and financial and business risk management strategies. This indicates the importance of real-time operations particularly for complex, capital-intensive firms. Consumer product and retailing firms, meanwhile, lag in terms of implementation. Retailers in particular are behind in the implementation of real-time operations for customer experience and supply-chain management, two critical areas for retailing success. Retailers also report their efforts around real-time business to be less effective than firms in other industries.
Early adopters have seen substantial results. The main strategic goals of executives choosing to implement real-time business techniques are to increase market share and enhance service and quality advantages. Operationally, real-time business is proving especially effective in delivering improvements in customer experience, production processes and supply-chain management. But perhaps most striking is the tangible return on investment: Those able to estimate put revenues gains at over 20%, and cost reduction at nearly 20%. In fact, future gains are expected to exceed earlier ones, with revenue increases of 28%.

But challenges are significant, in a number of areas. Respondents cite a lack of technology as a main obstacle, as well as suppliers’ unfamiliarity with real-time systems and a lack of internal expertise. Indeed, the move to real-time operations can be extremely complex, and will require careful planning and strategy to ensure success.

Those planning to roll out real-time systems have different strategies than early adopters. They will put particular focus on financial and business risk, production processes and supply-chain management. Meanwhile, almost all early adopters plan to carry on investing, though they will shift their focus from sales and marketing towards product design and innovation, while continuing to focus on customer experience.

Survey demographics
This study is based in part on results from a survey of 525 businesses worldwide, carried out in March 2011. The survey focused on large and medium-sized business units in four sectors of the economy—consumer products, high-tech, oil and gas, and retailing. The study included 13 countries grouped into four regions: Asia-Pacific, Europe, North America and Latin America. Only business units with an annual turnover in excess of US$250 million were included, except in Latin America, where the cut off was US$150 million. Those completing the questionnaire held senior job roles, including c-level executives, managing directors and vice presidents across a range of business functions.

What does it mean to be a “real-time business”? For purposes of this study, “real-time business” refers to processes that allow companies to conduct a range of business activities instantaneously.
We live in a world that increasingly communicates and operates in real time. Over the past decade, the spread of social media and mobile phone use, combined with the explosion of accessible information and increasing interconnectedness of global markets and cultures, has dramatically sped the pace of our daily lives. The evidence is clear in the dissemination of international news: For example, when US Airways Flight 1549 emergency-landed on New York’s Hudson River after striking a flock of geese during takeoff in January 2009, it took only three minutes for the first “tweet” to alert the world.

The pace of business, too, has dramatically accelerated. Customers and clients expect their queries and problems to be addressed immediately. In an uncertain global market where there are many more competitors and constant change, executives know that success depends on the ability to take fast action and make rapid decisions. Indeed, in the business world today, speed is not only expected, but required.

But are companies prepared to take their firms into real time? Our survey of global business executives in oil and gas, retail, consumer goods and high tech reveals some mixed answers. While nearly all respondents agree that doing so is critical, only one-third of businesses have already implemented real-time business applications in some way (though 65% of those who have not yet implemented real-time systems expect to do so within five years). And the experience is far from uniform. For example, companies that focus on business-to-business operations (35%), are more likely to have moved to real-time than those in the business-to-consumer space (16%). And almost half of the very large businesses surveyed—those with annual revenues in excess of US$25 billion—have introduced real-time business, significantly more than those with a turnover of less than US$1 billion (22%) or between US$1 billion and US$10 billion (28%).
Adopting a real-time business approach can provide companies with myriad benefits at both the operational and management levels:

- **At an operational level**: by speeding up data capture and simplifying processes, executives can reduce inventories, minimize business risks, lower operational costs, accelerate speed to market, foster productivity and better meet customer needs.

- **At the management level**, by accelerating decision-making and planning, executives can exploit market opportunities faster, identify competitive threats sooner, cope with market shifts more quickly and transform stagnating businesses.

With the internet transforming business, mobility moving to center stage and on-demand computing becoming the norm, global firms are on the threshold of an era that will radically transform operations. Companies need to consider how to adopt real-time into the fabric of their firms, or risk falling behind their competitors.

### What does it mean to be a “real-time business”?

For purposes of this study, “real-time business” refers to processes that allow companies to conduct a range of business activities instantaneously. The activities that make up real-time business can, therefore, incorporate all aspects of business, including gathering and acting on business intelligence, developing promotional and marketing tactics, controlling and adjusting production processes, managing inventory, identifying and managing business risks, closing and fulfilling sales, and meeting customer needs.

Real-time operations depend on in-memory analytics, which takes a different approach than traditional business intelligence systems. Rather than storing information on various external disks and caching bits of data in a computer’s random access memory (RAM), real-time intelligence puts the data directly into RAM. Advancements in computing power and storage have made it possible to store vastly more amounts of data in RAM than ever before, and allows for extremely fast query responses.
Which companies are ahead of the curve in adopting real-time operations? The answers are surprising. According to respondents in the four industries surveyed, oil and gas firms (54%) take the lead, particularly in production processes and assessing financial and business risk. In sharp contrast, only 20% of consumer products and 29% of retailers have moved toward real-time operations.

**Figure 1: Oil and gas leads in real-time**

In the oil and gas industry, real-time data is critical to monitor drilling sites. Shell, for example, maintains six real-time operation sites around the world, in Houston; New Orleans, La.; Miri, Malaysia; Muscat, Oman; Port Harcourt, Nigeria; and Aberdeen, UK. These centers provide around-the-clock monitoring of the firm’s assets and operations.

Considering some of the strides of the world’s most formidable retailers and consumer products companies in championing real-time operations (Walmart and P&G, to name but a few)—and the clear opportunities to improve critical areas of the business such as supply chain management and inventory control, it seems particularly surprising that these sectors would rate so low on our survey.
But Sunil Verma, Chief Information Officer and Senior Vice President of US-based clothing retailer The Children’s Place, is not surprised. “In terms of technology, the retail industry is a follower,” he says. “It’s an old industry which is changing quickly because of the internet. We are quickly understanding that there is a competitive advantage in doing real-time analytics and the idea that we need to infuse every customer touch point with some element of personalization. The minute you start to internalize that, the need for real-time computing becomes more urgent.”

According to Ranjay Gulati, the Jaime and Josefina Chua Tiampo professor of business administration at Harvard Business School, the reasons may center on a lack of understanding of its benefits. “The retail sector is pretty fast-moving—look at how quickly fads and fashions change. Yet retailers don’t have that kind of cycle speed on being able to look at the data and run analytics on it. Even worse, the people who have the data and the people who need the data are not sitting in the same place—in fact, the people who need the information might not even know it exists. So there is a huge disconnect.”

Still, the fact that so many respondents say their firms are planning to move in this direction points to an understanding that this disconnect exists—an encouraging step. “I don’t think we’re at the tipping point yet,” says Professor Gulati. “It’s still early stages. But we are approaching a point where business competition is becoming so strong that it will eventually force companies to find a way to get it done.”

**Drivers of adoption**

For “early implementers”—firms that have already adopted real-time business methods—use is pervasive across the enterprise: Upwards of 95% of these respondents have some form of real-time business applications in place across all departments. And the commitment to real-time business is substantial. For each of the functions identified (consumer experience; supply-chain management; production; sales and marketing; financial and business risk; and product design and innovation), over 50% of early implementers report a high or very high degree of adoption. Customer experience and supply chain management top the ranking (each at 64%), followed closely by production processes (63%), and sales and marketing (62%).

**Figure 2: Functions where real-time operations are most pervasive**

<table>
<thead>
<tr>
<th>Function</th>
<th>% responding high or very high degree of implementation</th>
</tr>
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<tbody>
<tr>
<td>Consumer experience</td>
<td></td>
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<tr>
<td>Supply chain management</td>
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<td>Production process</td>
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<tr>
<td>Sales and marketing</td>
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<tr>
<td>Financial and business risk</td>
<td></td>
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<tr>
<td>Product design and innovation</td>
<td></td>
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</tbody>
</table>

0% 10% 20% 30% 40% 50% 60% 70% 80%
Naturally, obtaining a strategic benefit is a key driver for implementing real-time operations. Among early adopters, growth in market share (77%) is the most frequently cited driver for adoption. This is followed by building service and/or quality advantages (71%), expanding addressable markets (68%) and building cost advantages (67%).

**Figure 3: Key drivers among early adopters**

<table>
<thead>
<tr>
<th>% of responses from implementers in quite or very important category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grow market share</td>
</tr>
<tr>
<td>Build service/quality advantage</td>
</tr>
<tr>
<td>Expanding addressable market</td>
</tr>
<tr>
<td>Build cost advantages</td>
</tr>
<tr>
<td>Match industry leaders</td>
</tr>
<tr>
<td>Market/brand leadership</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

Meanwhile, “planners”—firms that are in the process of moving to real-time operations or intend to do so over the next five years—comprise some 46% of survey respondents. For these respondents, building service and/or quality advantage is most frequently identified (87%) as an important or very important driver. This is followed by ambitions to grow market share (83%) and building cost advantages (82%).

**Figure 4: Key drivers for planners**

<table>
<thead>
<tr>
<th>% responding</th>
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<tr>
<td>Build service/quality advantage</td>
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<tr>
<td>Market share</td>
</tr>
<tr>
<td>Build cost advantage</td>
</tr>
<tr>
<td>Match industry leaders</td>
</tr>
<tr>
<td>Market leadership</td>
</tr>
<tr>
<td>Addressable market</td>
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</tbody>
</table>

Adoption strategies of planners are different from those of early implementers. By function, production process and financial and business risk lead initial investment among planners, with roughly 77% of those surveyed reporting fairly or very significant plans in these aspects of their operations. The next areas for investment are supply chain management, where 75% of planners have fairly or very significant plans, and product design and innovation (74%).
Among oil and gas businesses that plan to make their first efforts to move to real time, most consider building service/quality advantage and cost advantages as key drivers with 95% indicating this is quite or very important. Among new adopters in the retail sector, the greatest perceived benefit is building cost advantages (85%). In contrast, a higher proportion of new adopters in the consumer products sector (87%) cite increasing market share as the greatest anticipated benefit.

**ARTC: Adopting real-time business techniques**

Although their influence has diminished since the heyday of the industrial revolution, railroads remain the bedrock of the transport and distribution network in many countries. An economy’s transport infrastructure remains a key determinant of competitive advantage, and a crucial driver of growth and prosperity in post-industrial globalized economies.

The Australian Rail Track Corporation (ARTC) is responsible for the management of more than 10,000 route kilometers (6,000 miles) of rail track across the continent. In doing so, it faces the twin challenges of maintaining such a vast network and managing heavily congested “nodal points” (bottlenecks). Unlike many in the Western world, Australia’s economy is booming, driven by strong demand for raw materials from Asia. For the rail sector, the scheduling of train movements and managing capacity in areas such as coalfields and ports is critical if this demand is to be efficiently met. “The freight task is growing exponentially in Australia,” says Lino Di Lernia, program director of ATMS, “and the rail industry is key to meeting that challenge.”

To that end, ARTC is developing an Advanced Train Management System (ATMS), a real-time business system that will enable ARTC to cross-check and verify the precise positions of rail cars on its network, allowing for greater overall capacity and replacing many of the functions of the traditional signaling system.

The benefits of ATMS are numerous. For one, it will enable a significant reduction in costs for signal maintenance by providing a centralized, real-time interface between controllers and train operators. “A real-time business system will allow for much more efficient use of existing rail track infrastructure, avoiding hundreds of millions of dollars in potential capital expenditure over time,” says Mr. Di Lernia. In addition, the new system will create a safer, more cost-effective means of creating saleable “train paths” (slots allocated to train movements), and improve the frequency and reliability of rail cars. In fact, Mr. Di Lernia estimates the new system will allow ARTC to double capacity across its rail network.
Clearly, the purpose of real-time operations is to help companies make better decisions and speed time to market. As such, it is of little surprise that early adopters cite increased revenue (31%) and cost reduction (35%) as the most important benefits. In this area, real-time operations seem to offer a tangible benefit: On average, companies that have implemented such systems are seeing revenue gains of 21% and cost reductions of 19%. In fact, among early adopters, 77% report revenue gains.

For some companies, the benefits are even more substantial. Oil and gas firms report revenue gains of 36%, which are significantly greater than those in the consumer products sector (revenue gains of 14%). Business-to-business operations (27%), meanwhile, also report significantly higher revenue gains than business-to-customer units (13%). The higher figures may be attributed to the fact that firms in these categories are further along the implementation curve, suggesting a connection between real-time operations and revenue.

At GE Energy, work is under way to embed real-time sensing software and controls into equipment to run its plants. “There is a huge wave of activity that is taking place now around data collection,” says Dr Peter Evans, head of strategy for GE Energy. “We are putting in place the frameworks for better decision-making about how to run these plants at higher performance.” For example, GE is now sharing with its clients the real-time data it collects from its fleet of over 1,000 gas turbines so customers can benchmark performance. “We collect and analyze the data, and turn it into better solutions,” he says.
For UK-based movie streaming service LOVEFiLM, which has more than 1.6 million members and manages four million rentals monthly across Europe, the conversion rate of trial to paid subscriptions is critical. “A 1% or 2% change in conversion has a huge effect on the bottom line,” says Mike Blakemore, the firm’s Chief Technical Officer. “So we manage that constantly.” Real-time systems are key to that effort: In addition to crucial housekeeping, such as tracking credit cards and payments in real time, LOVEFiLM can tailor its offerings to members based on their past preferences.

Furthermore, because LOVEFiLM can track instantly which films are most popular among its customer segments, its content team knows which films it should promote to drive sales. “The sooner we have the customer data,” says Mr. Blakemore, “the quicker we can adapt.” It’s a strategy that has paid off. In February 2008, Amazon became the firm’s largest shareholder; this January, the online retail giant announced that it would take full control of the LOVEFiLM.

The benefits of real-time operations are not limited to companies whose business models are mainly digital. Among airline executives, for example, the expression “wheels up” is a key phrase: Once a plane takes off, the value of an empty seat is zero—it can never again generate revenue. To keep financial performance aloft at Continental Airlines (now a unit of United Continental Holdings), real-time analytics track empty seats prior to takeoff to put as many travelers on board as possible. At any time, Continental executives can see an accurate account of revenue-generating passengers on its flights.

But real-time data helps with more than in-flight operations. It is now critical in helping the airline manage seat availability for its 2,000 daily flights, each of which can have as many as 30 different seating classifications. In the past, says Anne Marie Reynolds, director of the airline’s data warehouse, it was difficult to manage the complexity of the various pricing options—updates were done nightly in a batch process. “The science behind it hasn’t changed all that dramatically but now we are able to respond within a few minutes rather than waiting until the next morning.” That alone, she says, has meant millions in increased revenues.

Survey respondents also expect to see substantial benefits from real-time operations in the future. For the sample as a whole, the expected gains in revenue average 28%; the expected cost reductions average 20%; and the gains in productivity 24%.

At The Children’s Place, says Mr. Verma, the company is undergoing a significant transformation. “We have a new mandate to elevate what we do both in terms of product and in terms of how we service the customer,” he says. Real-time operations are critical to that mandate, particularly in terms of personalization. “Having access to immediate customer data is a huge opportunity,” he says. For example, in the past it took 30 days to know if a customer had made a purchase online or in a store. “Because a customer’s status couldn’t be updated immediately,” he explains, “they may have received suboptimal offers or incentives.”

Despite being most pessimistic about future revenue gains and cost reductions, respondents in the consumer products sector anticipate the biggest increase in these measures (when comparing between what has been realized in the past and what is expected for the future). This is likely because these firms have yet to adopt these systems in a fundamental way. In contrast, respondents in the oil and gas sector expect just the opposite—future revenue gains and cost reductions are expected to be smaller than what was previously realized, though they will remain higher than in other sectors. This further underscores the maturity of adoption in this industry.
Assessing effectiveness

While early implementers agree that real-time business is effective, there is some variation in the degree of effectiveness among functions. For example, early adopters rank its effectiveness more highly in consumer experience (69%) and production processes (65%) than in financial and business risk (58%) and sales and marketing (55%).

**Figure 7: Consumer experience and production processes seen as most effective**

<table>
<thead>
<tr>
<th>% responding</th>
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<tbody>
<tr>
<td>Customer experience</td>
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<tr>
<td>Production process</td>
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<tr>
<td>Supply chain management</td>
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<tr>
<td>Product Design</td>
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<tr>
<td>Financial &amp; business risk</td>
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<tr>
<td>Sales &amp; marketing</td>
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LOVEFiLM: Adopting real-time business techniques

In the old days—about, say, five years ago—renting a movie meant going to a store, hoping the DVD was in stock, and then making sure the film was returned on time to avoid late fees. Today, more and more of us have internet-enabled TVs, tablet PCs and other devices that allow us to stream movies instantly, whether we are at home, on an airplane or in a moving car.

In Europe, LOVEFiLM has evolved as a major subscription-based service, offering DVDs by post and streaming accessible over virtually any device connected to the internet. Behind the scenes, real-time business tools underpin much of the LOVEFiLM operation. Customer accounts are monitored in real-time, for example, to make sure billing information is up to date and reduce the likelihood of fraud. Marketing campaigns are based on real-time analytics to determine the most popular films on a given day. And of course, keeping customers happy is paramount, says Mike Blakemore, the firm’s Chief Technical Officer. “We find that when customers are engaged they are more likely to stay with the service, so we are always looking for ways in which we can do more event-based communications”—another important aspect of real-time operations, he says.

Real-time techniques are also crucial to logistics. An essential part of the business is to ensure that returned DVDs are recycled as quickly as possible to other members. With upward of 250,000 returns on busy days, this is a considerable task—yet by 10 a.m. each morning, transactional systems contain the information on returns and on DVDs headed for dispatch. LOVEFiLM then uses social media, email and the web to inform members of the movies they will receive by mail the next day.

Of course, the firm has some challenges to address. LOVEFiLM has a record of every click stream of every member since it launched in 2003. Handling the sheer volume of this data is a burden that is forcing some aspects of reporting away from real time to weekly or monthly cycles. Therefore, as much as real time offers enormous benefits and business opportunities, it still requires astute decision-making on where it will bring the most benefit and where it remains more effective for businesses to rely on less timely systems.
Real-time operations are seen as more effective by firms in the oil and gas sector than in the other industries surveyed, perhaps as a consequence of the high level of adoption within the sector. Apart from sales and marketing, a higher proportion of oil and gas respondents see real-time business to be fairly or highly effective than the sample as a whole. This gap is particularly marked for product design and innovation, and financial and business risks, underscoring the power of real-time information in complex, capital-intensive organizations. The weak ranking of sales and marketing likely reflects the commodity nature of much of the industry’s output.

Meanwhile, early implementers from the retail sector are more likely to see the initiative as ineffective or of limited effectiveness than their colleagues in other industries.

Pemex: Real-time business drives efficiencies

Facing the competitive challenges of market liberalization driven by the creation of NAFTA, Pemex, the Mexican state-owned petroleum company, was an early adopter of real-time operations. The systems were initially introduced in the early 2000s to meet new regulatory requirements and monitor evolving competitive pressures. Over time, the systems were expanded to other parts of the business, and now pervades many areas of Pemex’s operations. According to Emilio Aguado-Calvet, the firm’s deputy director of business process and technological infrastructure, “Our real-time systems now give us the ability to control our distribution chain and to interact with the retailers that depend on our deliveries.” Pemex makes 12,000 daily shipments to about 8,000 gas stations.

In the key area of refining, real-time tools are improving the use of available refining capacity. Though Pemex has developed tools using advanced linear programming to optimize production schedules across its refineries, these tools cannot determine production profiles down to hour-by-hour operations. Combining real-time data with simulation techniques allows Pemex to adjust the production profiles of individual refineries and to assess whether the improvements made are sustainable or only achievable following equipment upgrades and investments. “The combination of real-time data and our simulation techniques allows us to identify where we need to sanction spending on equipment upgrades, for example on a new compressor or on a new plate for a cooling tower,” says Mr. Aguado-Calvert.

Real-time operations increasingly are critical to the finance function. Pemex has tapped international capital markets with substantial bond issues. Real-time systems simplify the task of supplying the market with a stream of timely and accurate data that in the long term is likely to influence the company’s ability to attract international investors. In addition, Pemex is unique among Mexican companies in that it pays taxes and duties to the government on a daily basis; real-time systems allow executives to automate and monitor that process, reducing costly man-hours.

Future investments

The vast majority of early adopters plan further investment across their business functions. For them, consumer experience, supply-chain management, and product design and innovation rank top as the business functions where further investment in real-time business will be directed, with over 55% reporting fairly or very significant plans in these aspects of their operations.
Fewer early implementers in oil and gas plan for further investment in sales and marketing functions; instead, they plan to extend real-time approaches in production processes, supply-chain management, and product design and innovation. Early adopters in retail, meanwhile, have more modest plans for investment than other sectors. Nevertheless, for all business functions except production processes, more than 40% of these firms plan for intensive expansion of their capabilities.

As noted earlier, those planning to roll out real-time systems have different strategies than early adopters. Rather than focusing on customer experience, they will focus on sales, marketing and supply-chain management. These firms may be missing an important aspect of real-time business, as early adopters rate consumer experience as the most effective area for real-time operations. Meanwhile, almost all early adopters plan to continue investing and expanding their real-time efforts, though they will move their spending from sales and marketing to product design and innovation, while continuing to focus on customers.

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**Real-time tools give customers the ability to…see our machine capacity. This helps them manage their own inventory position.**

*Red Heitkamp, Vice President, Remmelle Engineering*

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**Remmelle Engineering: Adopting real-time supply chain techniques**

Producing the essentials of modern life depends on various types of machine tools that tirelessly change lumps of raw material—metals, plastics and polymers—into key components. Manufacturing firms that can capture real-time data on a machine’s performance gain an efficiency edge, allowing for adjustments to keep the quality of the product within the required standard and improving the overall efficiency of operations.

With high-tech manufacturing increasingly based on lean processes, global supply chains and just-in-time delivery, both the purchaser of the machined component and the supplier of the raw material have a greater need for real-time information. The purchaser wants to know about the availability of components, delivery times, quality and potential issues. The supplier, meanwhile, has its own production process and short-term demand requirements. The development of the MTConnect standard, led by the Association of Manufacturing Technologies (AMT) in the US, provides the platform that enables sharing of this critical data.

Remmelle Engineering, a Minnesota-based precision engineering company serving the aerospace, defense and medical devices sectors, has benefited significantly from the new real-time standard. According to Mark Conley, the manager of Remmelle’s CAM/EDI (Computer Assisted Manufacturing/Electronic Data Interchange) Center, some of the capabilities real-time monitoring brings are quite basic. “Standardized communication among machines means that we can access information that was not available in the past—including whether or not your machines are running and why,” he says. Additional gains come from the window on machine efficiency opened by real-time information, allowing operators to ensure high-quality output of materials. “For example,” says Mr. Conley, “if we’re running a machine tool, we would want to know if a spindle on that machine is starting to wear out. We can put sensors on our tools that will monitor their health.” That, he says, is critical because “it allows us to be ahead of the maintenance on the machines and get things fixed before they fail, which has a big economic impact.”

There is another important benefit: the power to transform relationships within the supply chain. No longer must buyers of components rely on faith that a supplier is working on parts as scheduled, or following the correct processes for their manufacture. Red Heitkamp, vice president of advanced engineering at Remmelle, notes that with the arrival of real-time data the days of opacity in precision engineering are gone. “In some of our business segments we work to ‘certified processes.’ Real-time tools give customers the ability to confirm that we are, in fact, following all the instructions of the certified process and to see our machine capacity. This helps them manage their own inventory position.”
Despite the understood value of real-time systems, significant challenges remain with regard to adoption. At the top of this list, respondents note the lack of availability or adoption of technology (59%), suppliers’ unfamiliarity with real-time systems (58%) and a general lack of internal knowledge or awareness of (58%) real-time operations.

Figure 8: Barriers to adopting real-time operations

% responding

- Availability of technology
- Knowledge / awareness
- Suppliers unfamiliarity
- Communication of benefits
- Lack of internal expertise
- Benefit cost ratio
- Relevance

Professor Gulati is not surprised by these findings, and points to data silos as one culprit. Similar to the aforementioned barriers in retail, when information is not transparent or easily accessible, “you have a situation where the person who owns the data, even if they are able to analyze it and figure it out, is not in a position to impact change.” The resulting opacity around what types of data exist and how they might best improve the business continues to hold companies back. “You need to either move the decisions to the people who have the information, or move the information to the people who are making the decisions,” he says.
At The Children’s Place, the challenges have been both cultural and technical. When Mr. Verma arrived at the company a year ago, there were at least six separate merchandising systems, each with its own set of data. Moving to a single system requires full-on collaboration and communication—setting standards for data, and creating processes for generating reports and sharing information. At the same time, asks Mr. Verma, “how do you get people to believe that the new way is better?” Like any organization undergoing transformation, “there’s caution among associates who have been here a while who have seen things work a certain way. You have to demonstrate there are alternatives that have better outcomes. It’s all about educating.”

To that end, Mr. Verma has established a cross-functional IT innovation group at the company. “If you give your team the opportunity to work in different environments and understand how systems within individual business areas work together to connect business processes, they become more open to change.”

By sector, consumer products firms see a lack of available technology as a particular barrier, and generally judge the obstacles in the way of implementing real-time business to be greater than other sectors. Surprising given their lead in using real-time business, oil and gas companies see substantial barriers around communicating the benefits of real-time operations. From a cultural perspective, “it takes time to roll these things out so that it becomes embedded in day-to-day operations,” says Dr. Evans. “Given the high stakes that are involved in sustaining large energy systems, both trust and capability need to be built for wide-spread deployment into pipelines, networks and electrical distribution systems to be achieved.”

At Continental Airlines, Ms. Reynolds says the greatest challenge for her group will be integrating the airline’s real-time revenue management systems with its new parent company, United Airlines. Thankfully, “United reservations will be done on the Continental system once they’re fully integrated, so all we have to do is figure out how to back populate the United history and incorporate the new United forecasting system into the revenue management calculations. It’s a lot of work—there are cases where United’s data doesn’t have all the attributes that Continental has, but we expect to be fully integrated by the middle of next year.”

For the small group of respondents who do not plan to implement real-time operations, more than half cite a lack of available technology, a lack of internal expertise and an inability to communicate the benefits as quite or very important. It’s possible that for these firms, real-time data is not necessary for operations. However, it is more likely that these respondents have not yet fully considered how such systems could improve their business.
For firms that are at the beginning of their efforts to move to real time, Professor Gulati says there are three steps executives must consider. The first is to make sure the information that is gathered across the firm is accurate. Professor Gulati refers to this as the information architecture. This may seem obvious, but executives constantly underestimate the complexity of creating a single version of the truth.

The second step is to understand the processes by which information is shared across the firm, and how departments need to use information to perform critical tasks. “This is the organizational architecture,” Professor Gulati says. “Without clarity around who needs access to what information, you’re working in a vacuum. No technology ever solved a business problem by itself.”

The third step is to take a hard look at how decisions are actually made inside companies—which can be different from understanding the organizational processes. Professor Gulati calls this the decision architecture. “Think in terms of the reporting, and who has what mandates.” This will require the IT team to work closely with executives across functions to ensure that the systems are designed to be truly useful. “What happens in a lot of the initiatives that are CIO-driven is that they work on the information, build a data warehouse and then add analytics. And then what do you find? Nobody uses it.”
The Children’s Place: Real-time business growth

According to Sunil Verma, CIO of North American-based apparel retailer The Children’s Place, the retail industry is undergoing a profound transformation. “There’s almost universal recognition that our customer’s expectations are quickly evolving, and retailers need to be ready to respond to this change,” he says.

Real-time operations play a key role in this effort, adds Mr. Verma. “Our customers expect a seamless cross-channel shopping experience. So the ability to access data in real time across shopping channels and form factors is an important component of our technology strategy.”

At The Children’s Place, one big driver for real-time computing is the opportunity to personalize customer touch points. “Customers want to be recognized and rewarded for their loyalty, and expect some element of personalization when they interact with us,” Mr. Verma says. As such, “we want to be able to make our offers relevant to each individual customer.” For example, if the firm’s systems recognize that a customer is purchasing clothes exclusively for a newborn girl, “we should probably not send you offers for apparel for a school-age boy,” says Mr. Verma.

Expanding e-commerce is another key strategic initiative for the firm. Says Mr. Verma: “A large proportion of our customers will soon be multi-channel and we have to make the shopping experience across channels consistent, easy and fun.” This, he adds, goes beyond merely enabling a digital storefront on a mobile device. “Our customers’ retail choices will be influenced strongly by social media and the ability of retailers to be present in different formats when needed.” The ability to use real-time data to eliminate the friction between channels will become a key differentiator for retailers, he says.

Of course, transformation is never easy. “We obviously need to upgrade our technology and our ability to use real-time analytics to improve our customer’s shopping experience, but more importantly we need to change our culture to be more customer-centric,” says Mr. Verma. This involves hiring the right people, extensive training and fostering collaboration across functional areas. But in the end, the payoff will be substantial. “There’s so much opportunity,” he says. “We’re focused on improving the customer experience, and real-time computing will help us.”

“The ability to access data in real time across shopping channels and form factors is an important component of our technology strategy.”

Sunil Verma,
Chief Information Officer,
The Children’s Place Inc.
Looking at the survey results by region, our study reveals some interesting differences in adoption rates, and important insights for how firms will approach real-time systems over the next five years.

**Asia-Pacific**

Businesses in the Asia-Pacific region are increasing their use of real-time systems across a range of business functions. Survey results suggest that in terms of the level of real-time business implementation, these firms are approximately in line with the rest of the world: 28% of those surveyed say they have already implemented real-time techniques into some aspect of their business operations, and 44% say they plan to do so within the next five years. This compares with global averages of 30% and 46%, respectively.

As expected, the degree of implementation varies across industries. Leading the way is the high-tech industry, where fewer than 38% of firms have already implemented some type of real-time technology. Retail follows, with 30%. This figure drops to 13% for businesses in the consumer goods sector, although these firms are the most aggressive in terms of future planned implementation—45% of executives surveyed from this sector plan to invest in real-time operations over the next five years.

**Figure 10**: High-tech leads real-time operations in Asia-Pacific

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1 Due to the very small sample size (just one firm was interviewed) we have excluded the results of the oil and gas sector from this chart as they are unlikely to be representative.
Our research suggests that an aggregate shift up the implementation curve by Asia-Pacific firms over the next five years can generate a significant boost to real GDP growth. We modeled three alternative scenarios (marginal increase, major upgrade and market leader) based on different levels of average implementation by firms, which we then compared with our baseline scenario (which assumes a median level of implementation). The results imply that increasing implementation of real-time business operations could generate between 0.2% and 1.9% in additional real GDP in the Asia-Pacific region over the next five years. The size of these gains is significant and suggests that accelerated adoption of real-time business techniques has the potential to generate a tangible improvement to people’s living standards. Although the region has impressively withstood the impact of the global financial crisis, the so-far muted recovery in the US and Western Europe suggests that sustaining strong growth will depend increasingly on domestic rather than external sources. The implementation of real-time technologies can contribute toward this end, as increased labor productivity should eventually lead to increased profits and higher wages.

**Figure 11: Scenario impact on real GDP 2011-15**

For early implementers, the most popular business functions for real-time investment have been sales and marketing, supply chain management and production process, with 65% of surveyed firms confirming they have implemented to either a quite or very high degree in these functions. Overall, implementers in Asia-Pacific appear to be more willing to invest further in real-time business technologies than companies in other regions.

For firms that are planning investments, building service and/or quality advantages is most frequently cited as an important driver (93%), followed by matching the industry leader (84%), and gaining market share (83%). In the coming years, planners intend to invest substantially in real-time business across a range of functions, placing particular emphasis on financial and business risk (82%), production process (79%) and supply chain management (73%). The intensity of planned investment by Asia-Pacific newcomers lags that of firms in Latin America across every business function. However, compared with North American firms, newcomers in Asia-Pacific are more willing to invest across every real-time business function. With the exception of sales and marketing, the same is true in comparison with Europe.

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2 The three scenarios were developed by assuming different levels of future median implementation across the four sectors covered in the survey. The impact was then calculated by applying the results (in terms of revenue gain and cost savings) from those different levels of implementation. For further details see the methodology document.
Compared with the global average, Asia-Pacific firms have generated slightly better revenue gains (26% versus 22%) and cost savings (23% versus 19%) as a result of their use of real-time systems. Nearly 90% of firms in this region report revenue gains, and 76% have benefited from cost savings, figures that also are on par with global averages. Looking at the results by region, our results show that investments have yielded better returns for Asia-Pacific firms compared with their European and North American counterparts, though less spectacular than their Latin American peers. Given this, it is somewhat surprising that implementation and planned investment rates are lower than the global average.

There are several potential reasons for this. Not all firms, for example, are fully conversant with the benefits that real-time operations bring. Among all Asia-Pacific respondents, the most common obstacle to implementation is a lack of internal expertise to enable real-time business. Other commonly cited barriers include the lack of available technology, lack of internal expertise and uncertainty relating to suppliers. All these factors have been identified by more than 55% of respondents as either quite or very important barriers to investment.

**Europe**

Businesses in Europe see the need to increase their use of real-time systems across a range of business functions. Yet our survey presents a mixed picture. In one respect, these firms are ahead of the curve: More than 38% of European business units have already implemented real-time business in some aspect of their operations, higher than the global average of 30%. However, the proportion of businesses that have not and have no plans to implement real-time business applications in any part of their operations is higher than any other region—35%, compared with 31% in North America, 28% in Asia Pacific and just 5% in Latin America.

Considering the general enthusiasm for real-time business among executives around the world, why do so many executives across Europe express disinterest? Among respondents who say their firms do not plan to implement real-time operations, more than half cite a lack of internal expertise, difficulties with suppliers that are unfamiliar with real-time business techniques, and the lack of availability of technology required to enable real-time operations.

An aggregate shift up the implementation curve by European firms over the next five years can generate a significant boost to real GDP growth. Our model suggests that increasing implementation of real-time operations could generate a cumulative increase of between 0.2% and 1.6% in real GDP in Europe over the next five years, depending on the extent of increased implementation. In monetary terms, this would translate into an increase of between $148 billion and $1.36 trillion in 2005 prices and exchange rates. These gains are significant, particularly given the current economic climate and our expectation that Europe will endure a period of slowed growth due to continued deleveraging by consumers and government.

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3 The decision to estimate values in 2005 prices was made for computational convenience since the forecasts of real GDP on the OE model are currently presented in that format.
For early implementers, efforts to date have focused mainly on customer experience, and sales and marketing, where 70% report a high or very high degree of adoption. Supply chain management also ranks high, with 68% of respondents reporting a high or very high degree of adoption. For many companies, customer service is an important first step, and a good place to test real-time operations.

Over the next five years, the vast majority of early adopters plan further investment across their business functions. Customer experience ranks highest as the business function where further investment in real-time business will be directed, with more than 58% of existing users reporting fairly or very significant plans to embed such tools into this aspect of their operations. Still, plans for future investment among European respondents lag those in the rest of the world, except in sales and marketing and customer experience.

**Figure 13: European early adopters lag rest of the world**

% responding fairly or very significant plans

<table>
<thead>
<tr>
<th></th>
<th>Europe</th>
<th>Rest of the World</th>
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<tbody>
<tr>
<td>Sales and marketing</td>
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<tr>
<td>Customer experience</td>
<td></td>
<td></td>
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<tr>
<td>Financial and business risk</td>
<td></td>
<td></td>
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<tr>
<td>Production process</td>
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<tr>
<td>Supply chain management</td>
<td></td>
<td></td>
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<tr>
<td>Product design</td>
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</tbody>
</table>
For planners, building service and/or quality advantages is most frequently cited as an important or very important driver (88%), followed by gaining market share (79%), and building cost advantages (79%). In the coming years, planners intend to invest substantially in real-time business across a range of functions, placing particular emphasis on financial and business risk (73%), product design (72%), sales and marketing (71%) and customer experience (70%).

One reason for the slower adoption of real-time operations in Europe may be that companies in this region have not seen returns on investment that compare as favorably with other parts of the world. For example, the global average gain in revenue among early adopters is 22%, while the global average cost reduction is 19%. Though roughly 80% of respondents in Europe are seeing increased revenues, their estimated gains—about 12% on average—are well below the global figure. And while nearly 72% report reduced costs, that reduction averages at only 11%. It is not entirely surprising that marginal gains reported from real-time business in Europe might be lower than those in emerging economies—firms in the developing world are starting from a lower base and have more to gain. Still, these figures, combined with the number of respondents in Europe who say their firms are not moving toward real-time systems, suggest that executives in Europe are not realizing the full potential of such approaches.

Latin America

Companies in Latin America display the most enthusiasm toward real-time business: 95% have either already implemented or have plans to implement such strategies, significantly higher than the global average of 76%. It is important to note, however, that this figure is largely driven by the number of firms that plan to implement rather than those with systems already in place. At present, the proportion of firms using real-time business (26%) remains lower than in either Europe or Asia-Pacific.

The degree of implementation varies significantly across industries. Very high rates of take-up are seen in the oil and gas sector (81%), contrasting sharply with the retail (14%), consumer goods (11%) and high-tech (5%) industries. Conversely, firms in the retail, consumer goods and hi-tech industries have very aggressive implementation plans going forward, reflecting relatively low prior investment: 67% of firms in retail, 84% of firms in consumer goods and 95% of hi-tech businesses surveyed plan to implement real-time business technologies within five years, compared with much lower proportions in the oil and gas (19%) sector.
Data analysis suggests that increased implementation of real-time operations by Latin American firms over the next five years can generate a significant boost to real GDP growth. Increasing implementation of real-time business could generate a cumulative increase of between 0.2% and 2.1% in real GDP in Latin America over the next five years. In monetary terms, this would translate into an increase of between $36 billion and $348 billion in 2005 prices.4

4 The decision to estimate values in 2005 prices was made for computational convenience since the forecasts of real GDP on the OE model are currently presented in that format.
Over the next five years, the vast majority of early implementers plan further investment across their business functions. Product design ranks highest as the business function where further investment in real-time business will be directed, with 85% of existing users reporting fairly or very significant plans to embed such tools into this aspect of their operations, closely followed by production processes (79%). Overall, Latin American early adopters are more keen than their foreign peers to invest further in real-time operations. In every business function except sales and marketing, a higher proportion of Latin American early adopters have either “fairly” or “very significant” future implementation plans as compared with the rest of the world.

The intensity of expected investment by Latin American planners, meanwhile, is higher than any of the other regions. Indeed, a higher proportion of Latin American firms report they have either fairly or very significant plans for investment in real-time technologies across every business function compared with the rest of the world. One reason that may explain the high number of planners in Latin America is that early adopters have seen significant returns on their efforts. On average, Latin American firms report that real-time business has raised revenue by 41% and reduced costs by 47%, significantly higher than the global averages of 22% and 19%, respectively. Part of this trend can be explained by the fact that Latin America is comprised of emerging markets, where growth potential is higher in comparison with Europe and North America.

Despite the enthusiasm, executives surveyed do note a number of obstacles that impede the implementation of real-time operations, and more so than in other regions. The most common problems are the lack of availability of suitable technology (76%), difficulties in communicating the benefits of real-time to management (71%) and a lack of familiarity among suppliers (69%).

**North America**

When it comes to implementing real-time business operations, companies located in North America are surprisingly behind the curve. According to survey data, only one-quarter of North American business units have already implemented real-time business in some aspect of their operations, while another 44% plan to implement real-time business over the next five years. This compares with 30% of businesses globally that have already implemented real-time operations, and 46% that plan to do so within five years. Even more surprising is that nearly one-third of those surveyed in this region have no plans to move toward real-time operations, compared with only one-quarter of the total pool of respondents.

These firms may be missing an important opportunity, as our economic model suggests that an aggregate shift up the implementation curve by North American firms over the next five years could generate a cumulative increase of between 0.2% and 1.4% in real GDP in North America over the next five years, depending on the extent of increased implementation. In monetary terms, this would translate into an increase of between $131 billion and $1.14 trillion in 2005 prices and exchange rates.

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5 The decision to estimate values in 2005 prices was made for computational convenience since the forecasts of real GDP on the OE model are currently presented in that format. Note that the cited figures are cumulative over 5 years.
Over the next five years, the vast majority of early adopters plan further investment across their business functions. Supply chain management and production process rank highest as the business functions where further investment in real-time business will be directed, with more than 42% of existing users reporting fairly or very significant plans to embed such tools into these aspects of their operations. Nevertheless, plans for future investment among North American respondents lag those in other regions, particularly in sales and marketing, and product design.

Figure 17: North American early adopters lag rest of the world
% responding fairly or very significant plans

<table>
<thead>
<tr>
<th>Function</th>
<th>North America</th>
<th>Rest of the World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales and marketing</td>
<td>376</td>
<td>1,140</td>
</tr>
<tr>
<td>Customer experience</td>
<td>1,400</td>
<td>1,140</td>
</tr>
<tr>
<td>Financial &amp; business risk</td>
<td>131</td>
<td>0.2</td>
</tr>
<tr>
<td>Production process</td>
<td>550</td>
<td>600</td>
</tr>
<tr>
<td>Supply chain management</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Product design</td>
<td>400</td>
<td>400</td>
</tr>
</tbody>
</table>

Figure 16: Scenario Impact on real GDP 2011-15

2005 US$ bn

Monetary Value (LHS)
Share of GDP (RHS)
0 200 400 600 800 1,000 1,200 1,400 1,600
Marginal Increase Major Upgrade Market Leader
0.4 0.6 0.8 1.0 1.2 1.4 1.6

<table>
<thead>
<tr>
<th>2005 US$ bn</th>
<th>% GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>131</td>
<td>0.2</td>
</tr>
<tr>
<td>376</td>
<td>0.5</td>
</tr>
<tr>
<td>1,140</td>
<td>1.4</td>
</tr>
</tbody>
</table>
For planners, gaining market share is most frequently cited as an important or very important driver (80%), followed by building service and/or quality advantages (78%), and building cost advantages (75%). In the coming years, planners intend to invest substantially in real-time business across a range of functions, placing particular emphasis on supply chain (63%), production process (63%), product design (61%) and financial and business risk (61%).

Again, the intensity of investment effort by planners in North America lags that of their peers elsewhere in the world, particularly in financial and business risk and customer experience. One reason for the slower adoption rate may be that companies in this region have not seen as significant returns on investment relative to other parts of the world. For example, the global average gain in revenue among early adopters is 22%, while the global average cost reduction is 19%. While roughly 77% of respondents in North America are seeing increased revenues, they estimate gains at about 13% on average—well below the global figure. And although nearly 68% say they have reduced costs, that reduction averages at only 10%.
As our respondents confirm, use of real-time systems will only grow more pervasive in the coming years. According to research firm Gartner, 30% of business analytics tools will use in-memory functions to add scale and computational speed by 2014. And 30% of business intelligence applications will use predictive forecasting.

As noted earlier in this report, executives expect to reap substantial revenues as a result of real-time adoption. Mr. Verma of The Children’s Place says that real-time systems will be instrumental in helping the company move to enable mobile commerce—a move that he believes will transform the retail industry. “In the near future customers aren’t going to come into a store to find their size. It will be more a scenario where on a whim, a customer decides he or she needs something. They will use their mobile device to figure out what they are going to buy and where they are going to buy it. Then purchase it wirelessly, and simply pick it up in the store.”

At LOVEFiLM, plans are under way to use real-time data to improve the streaming quality of films. “We have capacity to scale based on demand, and the only constraints are around the physical infrastructure associated with people’s network connections in the home,” says Mr. Blakemore. “What we can do with real-time data is to look at the network down to customers’ internet service providers, and see which are the best local points of delivery.” In other words, “If customers are having buffering issues or difficulty with playbacks because the network is overloaded, we can switch to a different route to deliver content.” That, says Mr. Blakemore, will dramatically improve service—and help it gain market share.

At GE Energy, one of the longer-term objectives for real-time data is “to allow consumers to have more information and control of their energy use,” says Dr. Evans. While some of that work is already happening with GE’s business-to-business customers, Dr. Evans envisions a day when a smart electricity grid provides transparent information to consumers so they can better control the electricity consumed by the various appliances in their home.
Chris Denison, who recently left his post as managing partner of the innovation hub at Axa Financial to launch his own insurance consulting firm, Ingenin, takes Mr. Evans’ thought one step further. Mr. Denison says the next five years will be a time of monumental transformation for the insurance industry—and business intelligence and mobility will be the key drivers. As an example, he points to the increasing number of GPS-based real-time telematic services that track drivers’ routes as well as the performance of their vehicle. “You present that data to an auto insurer, and it can give you a tailored quote based on your level of risk.”

While it will take several more years for real-time operations to become ubiquitous, executives should start putting their thinking together sooner than later. As Carl Icahn once said: “In life and business, there are two cardinal sins. The first is to act precipitously without thought. The second is to not act at all.”
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