

# *Industry 4.0: Building the Digital Enterprise*

## *Transportation and logistics key findings*



**186**

*transportation  
and logistics  
company  
executives  
interviewed in  
26 countries*

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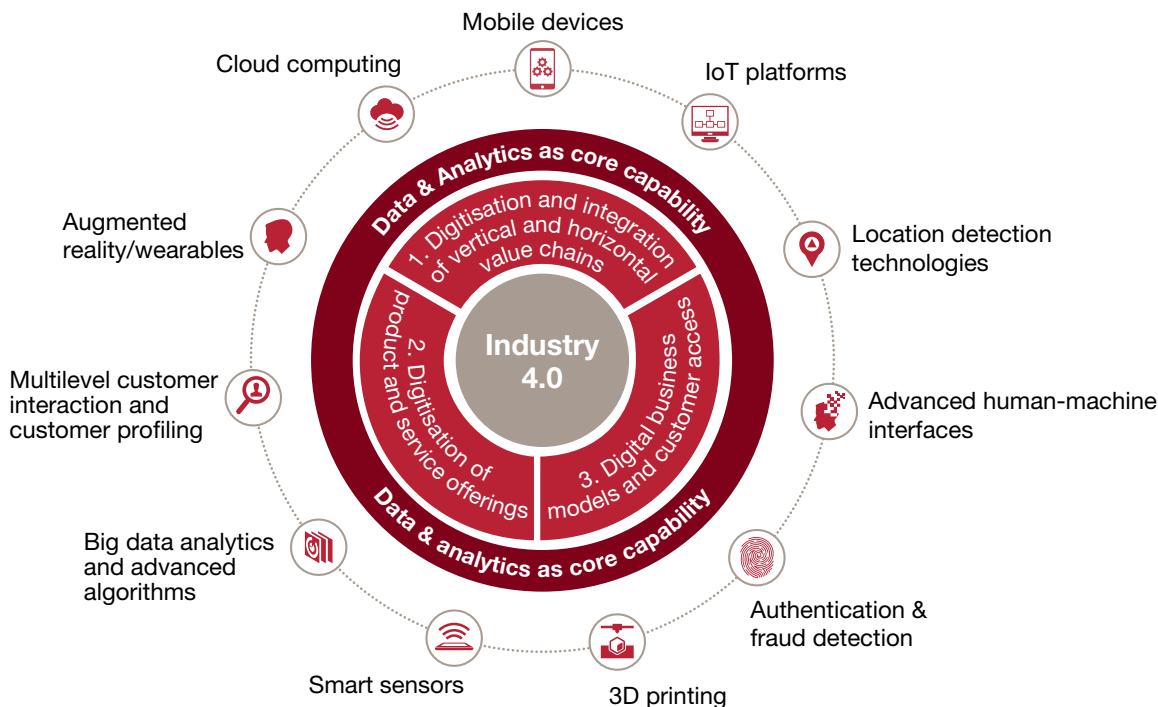
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PwC's 2016 Global Industry 4.0 Survey is the biggest worldwide survey of its kind, with over 2,000 participants from nine major industrial sectors and 26 countries. It goes to the heart of company thinking on the progress of Industry 4.0. The study explores the benefits of digitising your company's horizontal and vertical value chain, as well as building your digital product & service portfolio.

## Industry 4.0 at a glance

We include a detailed description and definition of Industry 4.0 in the main global report on the survey. In summary, Industry 4.0 is being driven by digitisation and integration of vertical and horizontal value chains, digitisation of product and service offerings and the development of new digital business models and customer access platforms.

### Industry 4.0 framework and contributing digital technologies



1 Aerospace, defence and security; automotive; chemicals; electronics; engineering and construction; forest, paper and packaging; metals; industrial manufacturing; transportation and logistics.

## Overview

Behind the scenes of the world's leading companies, a profound digital transformation is now underway. The transportation and logistics sector is no exception. Companies are digitising essential functions within their internal vertical value chain, from procurement through operating activities to customer service, as well as with their horizontal partners along the supply chain. In addition, they are enhancing their product portfolio with digital functionalities and introducing innovative, data based services.

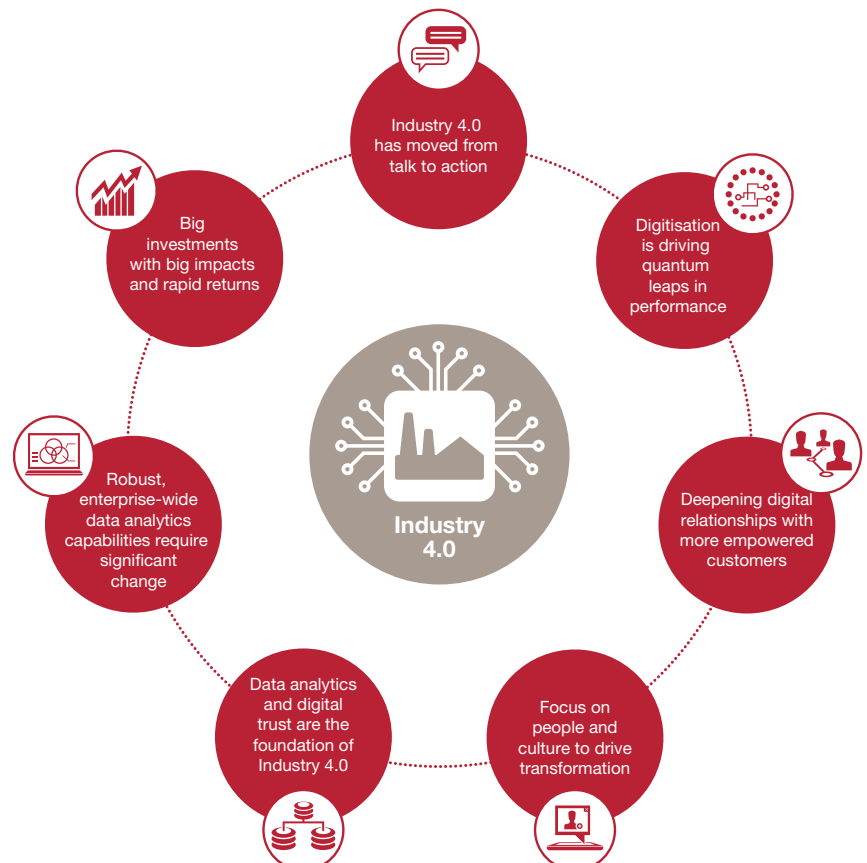
- The proportion of transportation and logistics companies in our survey expecting to have reached an advanced level of digitisation and integration is set to increase significantly over the next five years – from 28% today to 71% by 2020.
- Companies are stepping up investment in digital operations solutions and expect to unlock significant cost reduction and revenue gains. Digitisation is already transforming the customer interface in the passenger transport part of the sector. It is also transforming the logistics and freight side of the industry but here the sector is more fragmented and progress is more uneven. Across all parts of the sector, digitisation has immense potential to deliver internal operations improvements in a wide variety of areas, including fleet repair and maintenance, capital programme management for infrastructure operators and streamlining complex roster and scheduling planning.
- Mobile, big data analytics, cloud and sensor technologies are all fast-evolving and coming of age. The use of machine learning algorithms is having a big impact on predictive maintenance and fleet

management. At the same time, new innovations offer future integration and productivity opportunities. Autonomous picking and autonomous vehicles offer the potential of automated movement and transportation on-site and between sites. Drone technology is also evolving and under active exploration by a number of leading companies.

Some of these developments are happening now. Others remain for the future. But the digitisation journey in the transportation and logistics sector is already well underway and set to accelerate in the immediate period ahead. Approaches will be different in the B2C versus B2B parts of the sector, such as passenger transport compared to warehousing and haulage. But in both, the digitisation, integration and automation opportunities offered enable companies to collaborate both internally and across their value chains in ways that can provide a step change in productivity as well as design and build quality. And they are opportunities that are increasingly important as companies seek to stay relevant as the era of digitally-connected smart infrastructure develops.

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### Key findings from our survey research



## 01 Industry 4.0 has moved from talk to action

The buzz around Industry 4.0 has moved from what some had earlier seen as hype to investment and real results today. Transportation and logistics companies are making investments in digital operations solutions in line with the 5% of annual revenue reported across all sectors over the next five years. It is a significant amount in the context of a sector where margins can be tight.

This investment is translating into increasingly advanced levels of digitisation and integration. Between a quarter and a third of transportation and logistics companies report they have already reached an advanced level of digitisation and integration and nearly three quarters expect to be at such a level in five years' time (figure 2). In common with other sectors, there are significant differences in how quickly digitisation is advancing in different parts of the sector and different aspects of company activities. The sector is very diverse and some smaller transport and logistics operations remain relatively unaffected by digitisation even with the increasing disruption coming from penetration of mobility service apps. Our survey focuses on the more major players in the sector who are more likely to be embracing digital technologies.

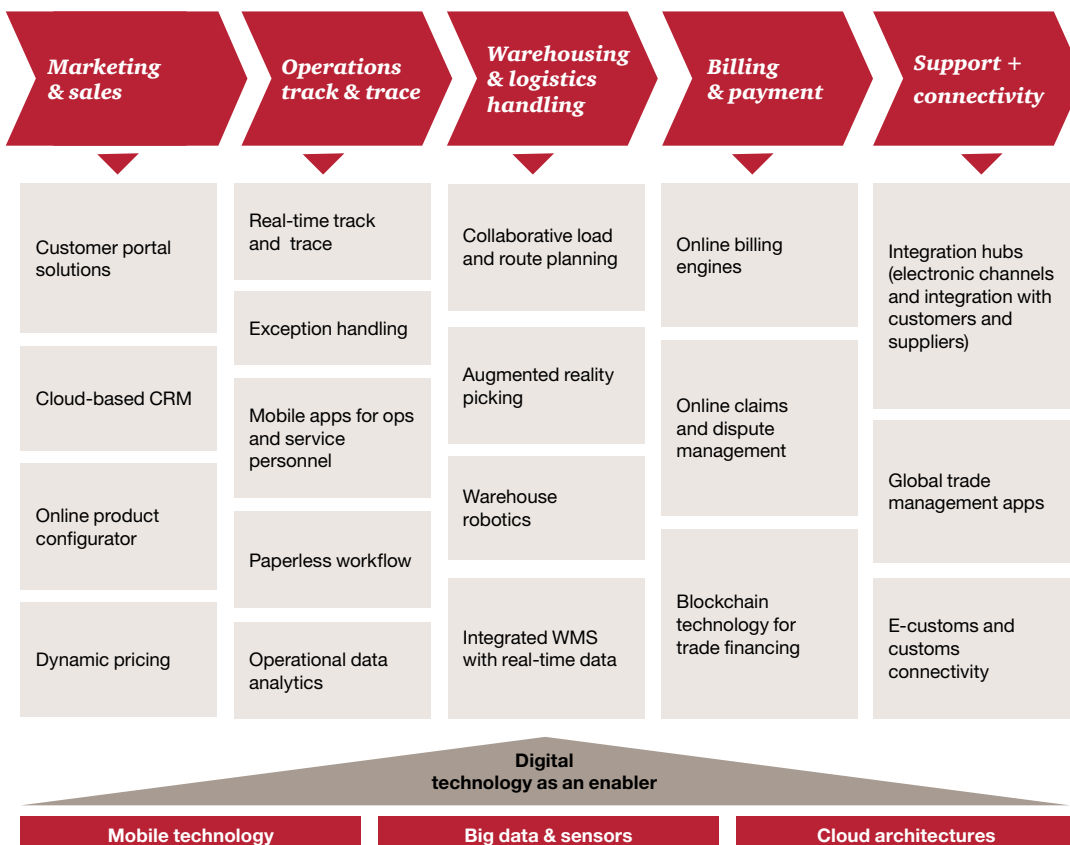
Digitisation of the customer interface is one of the areas where transportation and logistics companies believe they are most advanced today, with 37% reporting advanced levels of digitisation, and the area where most (73%) anticipate an advanced level in five years' time. The shift to mobile is a key factor accelerating this movement with, for example, companies stepping up their initiatives to personalise the passenger travel experience and make use of the full potential of tracking and tracing in logistics.

Digitisation and integration of companies' vertical value chain and the horizontal value chain, with suppliers, customers and other value chain partners, is also a key focus, with digitisation being used to improve transparency and to integrate planning and processes. For example, the volume and richness of data now flowing from an aircraft enables much better advance prediction of repair or maintenance, with data analysis automatically linked into operating and maintenance timetables to prevent schedule disruption and deliver considerable operational savings. In the logistics field, trendsetter companies are using big data analytics for demand forecasting and, in turn, improving inventory planning, warehousing fulfilment and distribution. Figure 1 provides an overview of logistics operations that may be enabled and enhanced by Industry 4.0 technologies.

# 37%

of transportation and logistics respondents say they have already reached advanced levels of digitisation in customer access, sales channels and marketing

**Figure 1: Digital technology impact on logistics processes**

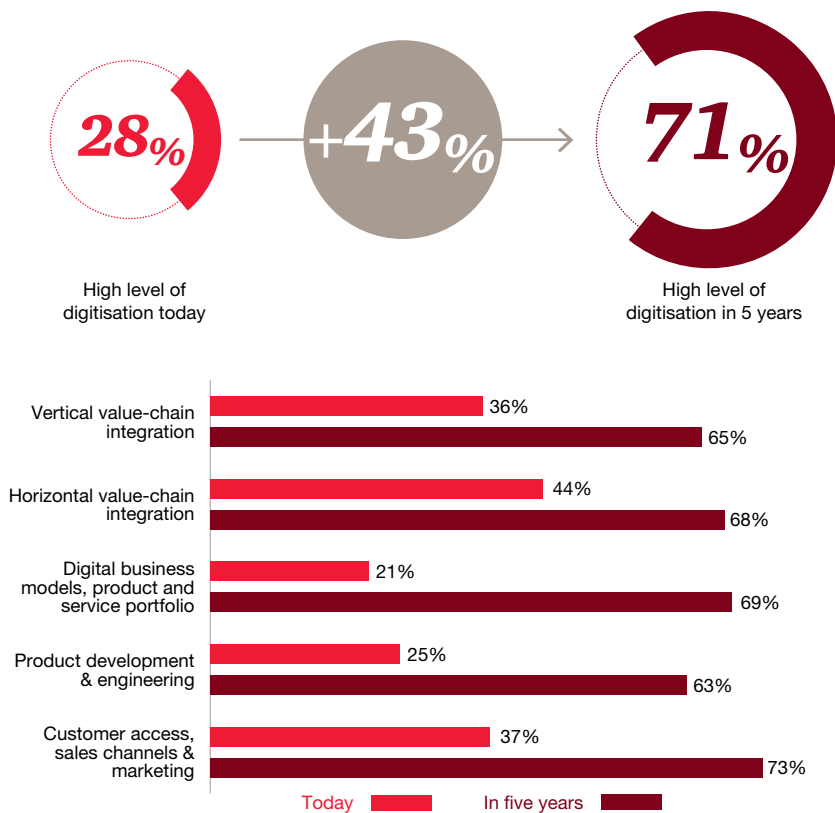


Potentially most significant is the impact of digitisation on business models. Only one in five of our interviewees from the sector feel that their company has reached an advanced level of digitisation and integration when it comes to developing digital business models, products and services. But again this is something that most hope to change in the next five years. Many will have an eye on the potential disruption to business models from digitisation. It's already very real for city taxi drivers taking on the likes of Uber and Grab. Much of the logistics industry is ripe for similar kinds of business model disruption. New entrants such as Los Angeles-based Cargomatics and New York-based Transfix have entered the sector and are using digital business models to instantly connecting truckers with shippers.

**“Digitalisation of our business and industry is not only a necessity, it is becoming inevitable as the customer demands for ‘always on’ and ‘always instant’ mount, competitive pressure on cost and presence increase and our own ambitions for profitability rise. This becomes very clear in the Industry 4.0 survey results from PwC, where we see and recognise the digital trends across industries and their impact on the way businesses and industries collaborate.”**

Rene Overgaard Jensen  
Head of Process Excellence  
Maersk Line

**Figure 2: Industry 4.0 is beyond the hype – it has arrived at the strategic and operational core of many transportation and logistics companies**



Shown: Percentage of companies reporting advanced levels of digitisation and integration

**Q: How would you classify the current level of digitisation and integration in the following areas in your company? What levels of digitisation and integration are you expecting in the next five years?**

## 02 Digitisation is driving quantum leaps in performance

Our survey respondents anticipate significant gains over the next five years from the implementation of Industry 4.0 initiatives. On average, the companies that we surveyed expect to reduce operational costs by 3.6% per annum. Transportation and logistics companies are marginally less bullish than companies in the survey as a whole but, nonetheless, still expect major cost savings (figure 3).

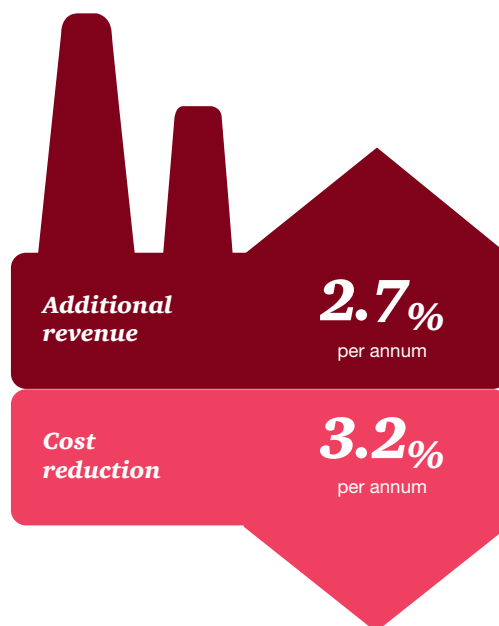
Survey participants also expect additional significant revenue growth to flow from their digitisation and integration initiatives. Again, the expectations of transportation and logistics companies are only slightly less ambitious than those of companies in all the sectors covered in the survey. They anticipate a revenue gain of 2.7% per annum compared to 2.9% in the survey as a whole.

These are noteworthy gains and the actual reality will vary considerably from company to company. But when we validated them with a cross-section of clients in a workshop following the survey, the feedback was that they reflect many companies' experience and ambition. In a sector where margins can be very tight, gains of the magnitude uncovered by our survey have the potential to change the competitive landscape within a very short space of time. This is particularly the case if they are on top of the continuous improvement gains that companies would expect to achieve regardless of Industry 4.0. In parts of the transportation and logistics sector where digitisation carries transformative potential, companies which are slow to react may find it difficult to compete. The next two to three years will be an important time for companies looking to catch up.

**Those who are slow to explore digitisation and data analytics may find it difficult to compete. In an increasingly cost-competitive market, no company in the transportation and logistics sector can afford to lose opportunities to improve their cost and revenue position against their market peers.**

**Figure 3:** High expectations of cost savings, increased revenue and efficiency gains (transportation and logistics)

**Expected benefits from digitisation over the next five years**



Q: What benefits from digitisation do you expect in the next five years?



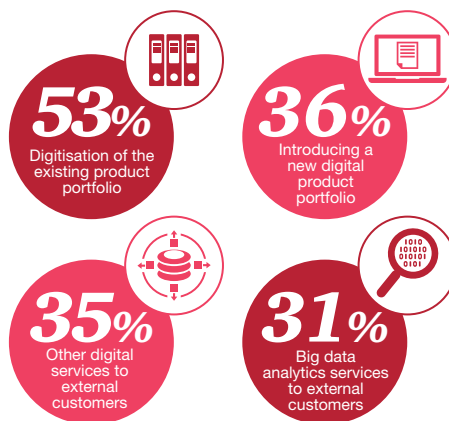
### 03 Deepening digital relationships with more empowered customers

As Industry 4.0 develops, it will greatly enrich the opportunities to retain and grow the client relationship, but it will also make the fight for the customer more intense. Clients and customers will be at the centre of the changes to value chains, products and services. Products and services will be increasingly customised to customer needs, and many of our survey respondents say they plan to use data analytics to understand and meet these needs.

Most companies we spoke to are expecting to strengthen their digital offering to customers, either by digitising existing products or by developing new digital products. The opportunity is there not only to greatly increase the ability to respond flexibly and more rapidly to customer demands but also to anticipate demands, helping the customer get ahead of themselves in a range of predictive ways.

Many transportation and logistics companies plan to expand their digital portfolio in some shape or form (figure 4). Others are moving slower when it comes to specific initiatives such as new digital products or use of big data to enhance the customer offer. The digitisation of customer relationships has already enabled transportation and logistics companies to give customers much greater control and customisation of the service they receive and to add new services to enhance the customer experience and provide greater personalisation of the customer journey.

**Figure 4: Revenues from digitising the product and service portfolio will grow significantly in the future (transportation and logistics)**



Note: Companies achieving 10% or more additional revenue in the following areas over the next 5 years. Multiple answers possible

**Q: Which of the following new digital products or services do you plan to introduce and expect will generate more than 10% of your future revenue over the next 5 years?**

**Most companies we spoke to are expecting to strengthen their digital offering to customers, either by using big data analytics to offer services to external customers, digitising their existing products or by developing new digital products.**

## 04 Focus on people and culture to drive transformation

Industry 4.0 has significant implications for the way in which a company chooses to organise itself and its delivery model. Companies will need to make sure staff understand how the company is changing and how they can be a part of it. From our interviews with transportation and logistics companies, the biggest challenges centre around internal issues such as culture, organisation, leadership and skills. Although external issues, such as whether the right standards, infrastructure and intellectual property protection are in place, are also important, they are not ranked by the companies in our survey at the top of their list of challenges.

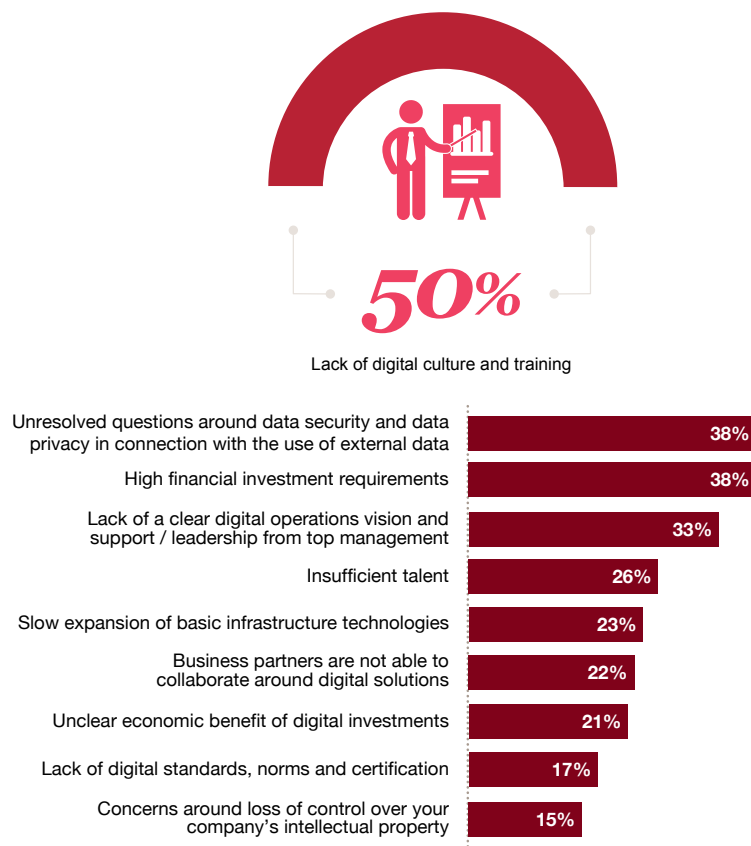
The absence of a digital culture and the right training was identified as the single biggest challenge by the transportation and logistics companies we surveyed. Half put it in their top three challenges (figure 5). In this respect,

they are in good company, as changing the culture was a lead issue across all the sectors we surveyed.

For many companies, culture is linked closely with the need to have clear vision and leadership from top management about the direction of digital operations. This was ranked the second most important challenge across all the sectors we surveyed. But it was beaten into second place among transportation and logistics survey participants by concerns about the high financial investment requirements of digital operations and data security.

Clearly some of these factors go hand in hand and one important way of establishing momentum in changing the culture will be for top management to communicate clearly the investment case and benefits that they see ahead and to ensure they are identified and celebrated as they are achieved.

**Figure 5: Lack of digital culture and training is the biggest challenge facing transportation and logistics companies**



Note: Included as one of three possible responses

**Q: Where are the biggest challenges or inhibitors for building digital operations capabilities in your company?**



## 05 Data analytics and digital trust are the foundation of Industry 4.0

Data lies at the heart of the fourth industrial revolution, but the massively growing information flow brings little value without the right analytics techniques. The rapidly growing number of sensors, embedded systems and connected devices as well as the increasing horizontal and vertical networking of value chains result in a huge continuous data flow.

Data is coming from multiple sources, in different formats, and there is a need to combine internal data with data from outside sources. Expert and effective data analytics is essential to using data to create value. And with so many points of entry, companies need to take a rigorous, proactive approach to data security and related issues and work to build digital trust.

Our survey data shows that many transportation and logistics companies already understand the vital importance of data analytics. Indeed, the use of data, such as on passenger and freight journeys, has been at the heart of planning in much of the sector for many years. But the nature of data and the ways it can be put to use are changing rapidly. It is coming from multiple sources, in different formats and in real-time. There is a need to combine internal data with data from outside sources. Expert and effective data analytics is essential to getting the value out of it.

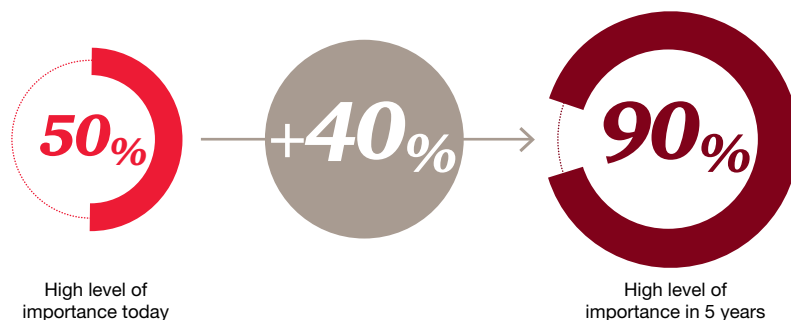
A half of the transportation and logistics executives we interviewed view data analytics as important or very important to their companies today, and this rises to 90% when they are asked to look five years ahead (see figure 6). This is the highest of all the sectors covered in our study. The wealth of data gathered by transportation and logistics companies is massive, including things such as the movement of passengers through airport terminals, parcel movements as a result of online buying and selling, through to wider trade and cargo flows. These have obvious commercial value. Indeed, just under a third of those we interviewed are planning to introduce big data

analytics services for customers (see earlier figure 4).

The data gathered by transportation and logistics companies also has wider strategic value. Companies like Uber have a rich databank of the behaviour of customers ordering taxis that could be used, for example, in the planning on wider public transport services. Data analytics is also highly relevant to the security concerns that all companies face in the sector. The integration of data from multiple sources – such as surveillance cameras, passenger data and biometrics – into systems that enable threat identification and prevention is a key area for many companies.

**Transportation and logistics companies rate the future importance of data analytics higher than any other sector we surveyed.**

**Figure 6: Transportation and logistics: in five years from now even greater importance will be placed on data analytics**



**Q: What significance does the gathering, analysis and utilisation of data for decision making have for your company?**

But there's still a long way to go before companies reach the level of sophistication needed to really drive Industry 4.0 applications. Only 10% of transportation and logistics companies rate the maturity of their data analytics capabilities as advanced – a result that lags behind other sectors, with 19% across the survey as a whole classifying themselves as advanced. And, indeed, not very long ago a PwC study of freight transport companies in Germany and six other European companies found that around a third of those surveyed had not yet developed any strategy around big data and many of them had no clear plan to do so in the future.<sup>2</sup>

A key challenge is skills. Three fifths (61%) of our sample of transportation and logistics companies cite increasing in-house data analytics technology and skill levels as the single biggest improvement route to boost their data analytics capabilities (versus 69% in the survey as a whole). Legacy IT systems are also a key inhibitor and will need upgrading in many organisations. Existing systems do not have capabilities to handle the more sophisticated data trends, analytic methods and algorithms that need to be used to provide the more advanced business intelligence and foresight that will be needed in the Industry 4.0 era.

<sup>2</sup> PwC, Data Analysis in the Logistics Sector, 2015.

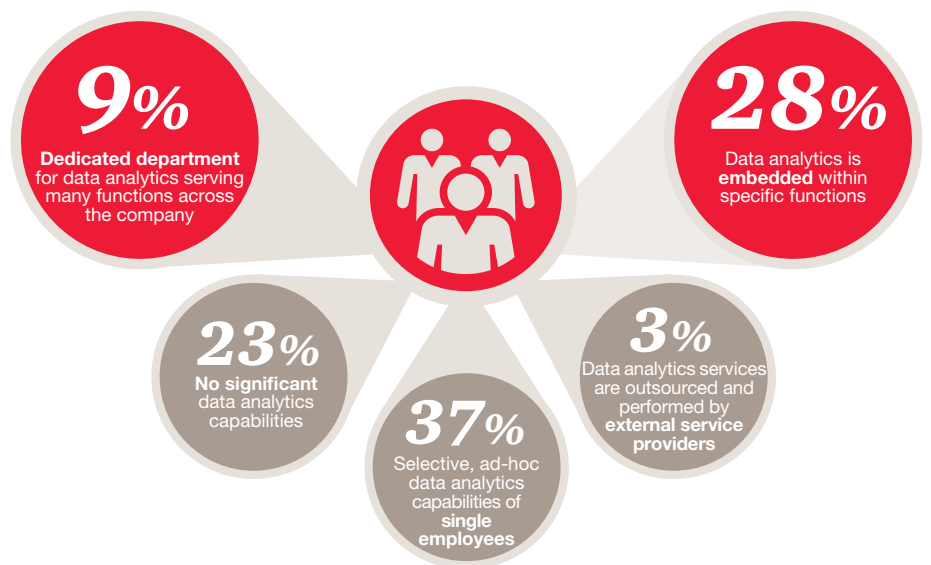
## 06 Robust, enterprise-wide data analytics capabilities require significant change

Another challenge lying in the way of companies establishing strong data analytics capabilities is getting robust organisation and governance frameworks in place. We found that many companies still have ‘ad hoc’ approaches to data analytics. Three fifths lack a structured approach to data analytics organisation and governance. Many (37% of transportation and logistics companies) rely on the selective, ad-hoc data analytics capabilities of individual employees, while another 23% have no significant data analytics capabilities at all. This proportion of companies without any significant data analytics capability is the highest of all the sectors we surveyed.

In contrast, just over a quarter (28%) have embedded data analytics into specific functions, giving themselves the flexibility and proximity to business knowledge to fully utilise the potential of data analytics. Another 9% of companies have a dedicated department for data analysis serving many functions across the company.

Across all sectors, our survey found that companies who consider they have advanced data analytics capabilities are much more likely to have pursued these two options – 43% have embedded their data analytics in specific functions and 24% have a dedicated department.

**Figure 7: Transportation and logistics: organisation of data analytics capabilities**



**Q: How are data analytics capabilities organised in your company?**



## 07 Big investments with big impacts and rapid returns

Big investments are being made in Industry 4.0 initiatives. The prize for companies is a very special one – the prospect of achieving significant revenue gains while simultaneously reducing costs, although extra revenue won't necessarily translate into extra profit. But there are many new entrants into the sector eyeing up the opportunity to eat into the position of incumbents.

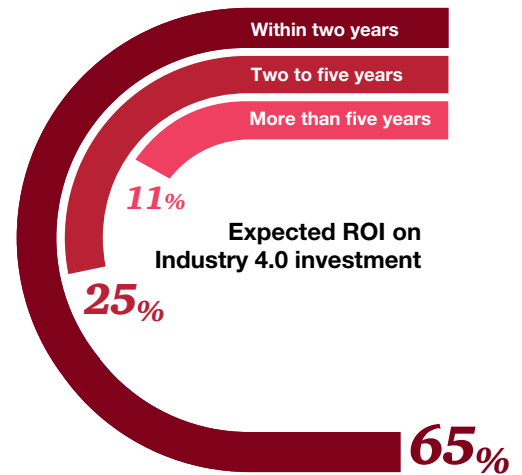
The advanced connectivity and automation of Industry 4.0 allows companies to gather and analyse data from across a wider range of activities and from partners, suppliers, collaborators, end users and end customers in ways that enable faster, more flexible processes to produce higher-quality output, sometimes highly customised, at reduced costs. Heightened connectivity and automation gives companies the opportunity to add value to products and to develop new kinds of offerings to address their markets.

The pace at which transportation and logistics companies expect to accrue benefits from Industry 4.0 investment leads a majority (65%) to estimate a return on investment (ROI) timescale of two years or less (figure 8). A quarter (25%) of companies anticipate a longer timescale of two to five years but relatively few (11%) think that it will take any longer than five years for Industry 4.0 investments to pay for themselves. These are ambitious expectations and will have to be achieved against the reality of many significant hurdles. The challenges of digital culture, data security and legacy IT all present major obstacles.

### Catching up is getting increasingly difficult

Looking ahead, many of those who haven't invested significantly in the past two years plan to step up investment in the coming five years. But just over a third of companies still expect to keep their future investment relatively low. That is an understandable approach for companies in parts of the transportation and logistics sector that are relatively sheltered from the impact of digitisation, for example small hauliers.

**Figure 8: Transportation and logistics: most companies expect Industry 4.0 investments to pay back within two years**



Note: Answers shown are rounded

**Q: Which return on investment period (ROI) do you expect from your digital investments?**

**Companies which try to jump in too late will find that their internal cultures have lagged behind.**

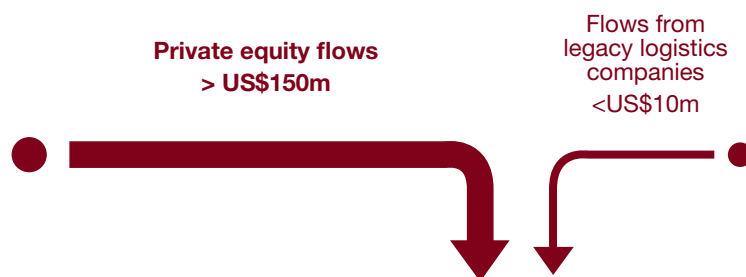
**“The steam engine and electricity powered the first two industrial revolutions. A rare and exciting confluence of technologies is poised to exponentially impact industry yet again. Winners will go beyond the Industrial Internet. They will take the opportunity to examine and change business models, processes and culture. Revolutions don’t wait for laggards to catch up. Neither will this one.”**

Neetan Chopra  
SVP IT Strategic Services  
Emirates Group

Other companies may be waiting for technology to evolve and to invest in less costly and possibly more reliable solutions later. But, as we’ve already shown, the biggest challenge companies face isn’t buying the right technology, it’s transforming their people and culture. These require long-term change programmes. And there are signs that logistics companies are missing opportunities in early stage digital investments. As figure 9 shows, investments by private equity companies in digital logistics startups are outstripping those from logistics companies by more than fifteen-fold.

Companies need to keep a careful eye on the possible gap that could be opened up by those which are making earlier investments to achieve advanced digitisation. Faster-moving companies will have a significant advantage when it comes to positioning their offerings as a “platform of choice” within digital ecosystems. Perhaps most importantly, companies which try to jump in too late will find that their internal cultures have lagged behind and it will be difficult for advanced technology acquired later on to bring them up to speed.

**Figure 9: Venture capital flows into digital logistics startups since 2011\***



\* Totals are not exhaustive. Our estimates of capital flows are based on analysis of most prominent and publicised startups.

Source: Strategy& analysis based on Bloomberg and Crunchbase reports.



## Blueprint for success

To move forward with Industry 4.0, digital capabilities are all-important. These take time and concentration; a step-by-step approach is important. But move with deliberate speed, so that you don't lose the first-mover advantage to competitors.

### 1) Map out your Industry 4.0 strategy

Evaluate your own digital maturity now and set clear targets for the next five years. Prioritise the measures that will bring the most value to your business and make sure these are aligned with your overall strategy. Make sure company leadership is ready and willing to champion your approach.

### 2) Create initial pilot projects

Use them to establish proof of concept and demonstrate business value. Target a confined scope, but highlight the end-to-end concept of Industry 4.0. Not every project will succeed, but they will all help you to work in a cross-functional and agile approach with customers and technology partner – the new norm of the future. With evidence from early successes, you can also gain buy-in from the organisation, and secure funding for a larger rollout.

Design pragmatically to compensate for standards or infrastructure that don't yet exist. Collaborate with digital leaders outside your organisation, by working with start-ups, universities, or industry organisations to accelerate your digital innovation.

### 3) Define the capabilities you need

Building on the lessons learned in your pilots, map out in detail what capabilities you need to achieve your vision. Include how enablers for Industry 4.0, such as an agile IT infrastructure, can fundamentally improve all of your business processes.

Remember to develop strategies for attracting people and improving processes as well as for implementing new technologies. Your success with Industry 4.0 will depend on skills and knowledge. Your biggest constraints may well be your ability to recruit the people needed to put digitisation into place.

### 4) Become a virtuoso in data analytics

Consider how you can best organise data analytics; cross-functional expert teams are a good first step. Later these capabilities can be fully embedded in your functional organisation.

Learn to get value out of data by building direct links to decision-making and to intelligent systems design. Use the data to improve products and their use in the field to offer and build new service offerings. Think big, but start small, with 'proof of concept' projects.

### 5) Transform into a digital enterprise

Capturing the full potential of Industry 4.0 often requires company-wide transformation. Look to set "tone from the top", with clear leadership, commitment and vision from the C-suite and financial stakeholders. Foster a digital culture: many of your employees will need to think and act like digital natives, willing to experiment with new technologies and learn new ways of operating.

Remember that change doesn't stop once you've implemented Industry 4.0. Your company will need to re-invent its capabilities at faster rates than in the past to stay ahead of the game.

### 6) Actively plan an ecosystem approach

Develop complete product and services solutions for your customers. Use partnerships or align with platforms if you cannot develop a complete offering internally. You may find it difficult to share knowledge with other companies, and you may prefer acquisition. But look for ways to bridge this gap – perhaps with technical standards – so that you can profit from being part of platforms that you don't fully control.

Real breakthroughs in performance happen when you actively understand consumer behaviour and can orchestrate your company's role within the future ecosystem of partners, suppliers and customers.

*Don't buy the hype. Buy the reality. Industry 4.0 will be a huge boon to companies that fully understand what it means for how they do business. Change of this nature will transcend your company's boundaries – and probably the national boundaries of the countries where you do business.*

## Blueprint for digital success



Map out your Industry 4.0 strategy

1



Create initial pilot projects

2



Define the capabilities you need

3



Become a virtuoso in data analytics

4



Transform into a digital enterprise

5



Actively plan an ecosystem approach

6

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