

Research

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**Measuring Industry
Digitization**
*Leaders and Laggards
in the Digital Economy*

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EXECUTIVE SUMMARY

The pace of digitization is picking up rapidly, as consumers, companies, and entire industries become increasingly connected at home, in the office, and on the go. It is already obvious, however, that the speed at which digitization is taking place varies a great deal from industry to industry. And these differences can already be felt in how quickly certain industries are capturing value as digitization grows in importance.

To gain a better understanding of the relative degree to which digitization is transforming different industries, we have created the Industry Digitization Index, consisting of the four factors involved in the digitization effort: input, processing, output, and underlying infrastructure. At the top of the list is the financial services and insurance sector, which should come as no surprise, given its purely informational products and services, and its long-standing effort to automate both back-office and customer-facing transactions. At the bottom are such industries as hospitality and real estate, both of which have made great strides in digitizing their contacts with customers but still struggle to automate supplier and construction management in a highly fragmented environment.

The race to capture value in the age of digitization is not yet over, however. All industries can benefit by investing in the input, processing, and output capabilities needed to extend their digital footprints throughout their business ecosystems.

THE WORLD IS DIGITIZING

Broadband connectivity, wireless mobility, cloud computing, e-commerce, social media, sensors—they're all coming together to transform the world as we know it: how we work, play, consume, interact, stay in touch. We call this process "digitization": the pervasive adoption of a wide variety of digital, real-time, and networked technologies, products, and services that will enable people, companies, governments, and even machines to stay connected and communicate with one another, gathering, analyzing, and exchanging massive amounts of information on all kinds of activities—and the economic and societal impacts those activities will have.

People at home, in the office, and on the go can now find a vast wealth of information on just about everything, and exchange, rate, and review that information for all to see. In turn, companies are collecting detailed information on consumers and their behavior—not just their Web-browsing preferences but also their location—and even their friends and *their* behavior, and using that information to target marketing efforts more effectively and to design better products and services.

Governments, too, can gather and disseminate information quickly—for purposes both good and bad—making their operations, in the best cases, more transparent and their dealings with their populations more efficient.

The process of digitization is taking place on a global scale, and the benefits for companies on the leading edge of the trend—greater customer insight and reach, higher productivity, and the creation of new business models—are already being realized. However, those benefits are not yet evenly distributed among different nations, markets, or industries. In previous studies we have investigated the causes behind this transformation and the benefits to be reaped (see "Resources," page 13). In this study, we analyze which industries are leading the pack in digitizing themselves, along with the supply, demand, and industry-level aspects of digitization that are driving industry leadership and differentiation. To that end, we have created what we call the Industry Digitization Index, a core component of a body of global research we are conducting to understand the digitization trend and its effect on national economies, industry sectors, and society at large.

The benefits for companies on the leading edge of the digitization trend are already being realized.

DIGITAL CAPABILITIES

The primary goal of the index is straightforward: to understand better which industries in which markets are adopting, and benefiting from, digitization first, and which are lagging. A further goal is to gain insight into the specific technological factors that are enabling certain markets and industries to move forward more quickly. To do this, we wanted to get a complete picture of how these markets and industries use technology. This picture includes four separate but tightly interconnected dimensions: The first is the way in which transactions into an industry are enabled by digitization (through electronic procurement or inbound supply chain logistics, for example). The second involves the digital platforms and tools that companies in a particular

industry use to orchestrate their internal value chain as well as interactions within their industry ecosystems, including strategic partners, financial institutions, or government bodies. The third consists of the industry outputs for which digitization enables more efficient delivery of products and services, including distribution, electronic commerce, and the like. And the fourth concerns the foundational infrastructure that underpins it all, since without the underlying connectivity and computing capabilities, digitization would be impossible.

The most complete and reliable source of such data we have found comes from Eurostat, the E.U.'s central statistics agency. To our knowledge, no other country or region currently has a comparable public source of such data; therefore, we have restricted the scope of the index to the European Union. Ultimately, we plan to extend the index further as sufficiently

differentiated data becomes available for other geographies. Despite this limitation, we believe that the index provides a comprehensive picture of the current state of digitization and why some industries are already gaining traction while others are not.

The information provided by Eurostat includes data on the relative sophistication of the digital infrastructures to be found in companies across the 27 national markets of the E.U., as well as data on digital inputs, internal processes, and outputs. Compiling and weighing these four dimensions allowed us to create the overall index of digitization, by market and industry, and to understand better where certain markets and industries are leading or lagging. Thus, the financial services and insurance sector has an index of 53, which means that, on a scale of 1 to 100, the sector scored an average of 53 for the four factors contributing to digitization (*see "Methodology," page 13*).

LEADERS AND LAGGARDS

At the highest level, the top three sectors in terms of industry digitization are financial services and insurance, computers and electronics, and media and telecommunications (see Exhibit 1).

- *Financial services and insurance:* This sector has long been the

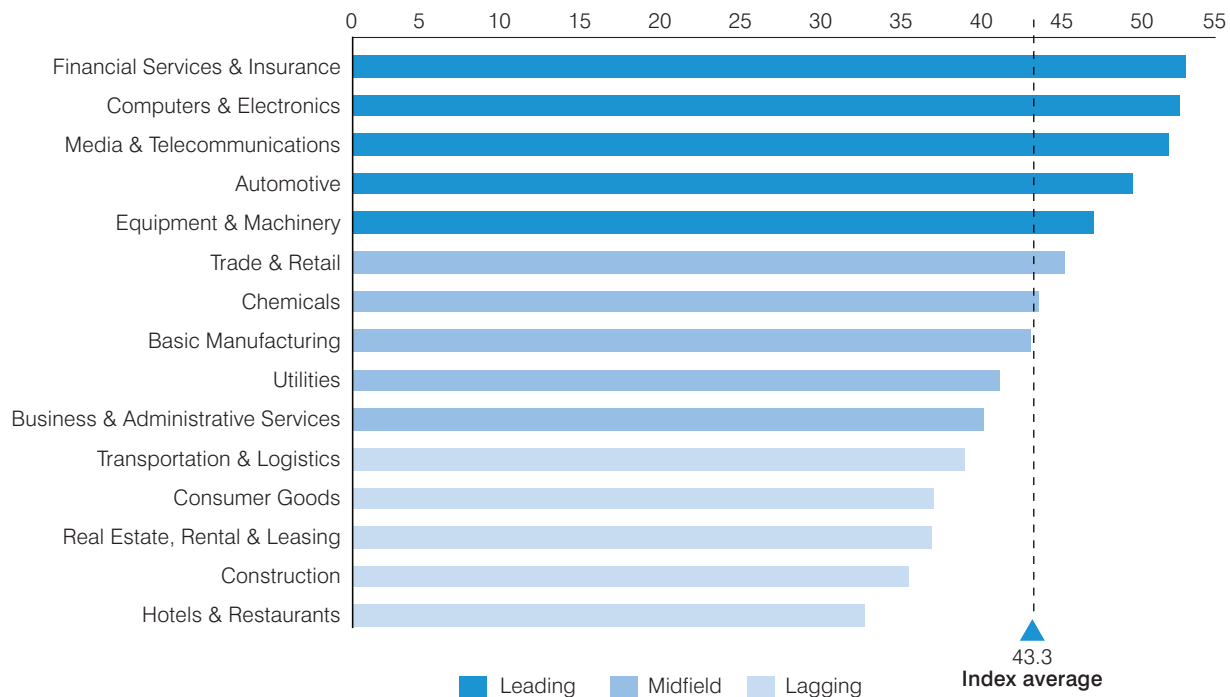
highest-spending industry in terms of information and communications technology (ICT) investments, first digitizing key transaction processes like electronic transfer of funds, securities trading and clearing, and interbank settlement. More recently, it has worked to further digitize the front office, moving from traditional retail and call center activities to fully online processes by which virtually every aspect of retail and home banking is digitized, and developing smart ATMs and online banking solutions to boost convenience and service delivery efficiency. The financial

sector's lead in digitization comes as no surprise: Our previous analysis of the digitization trend found that information-intensive industries will naturally spend more to maintain their competitive advantage, and thus will be affected first.

- *Computers and electronics:* The various elements of this sector have evolved complex ecosystems whose supply chains have been divided among multiple specialized players. The electronics sector, for example, consists of a tiered production system that includes product design and integration players like Apple,

Exhibit 1
The Industry Digitization Index

INDUSTRY DIGITIZATION INDEX (2011)



Source: Eurostat; Booz & Company analysis

chip and component makers like Samsung and Intel, and assembly firms such as Flextronics. In the search for ever greater efficiency and specialization, digital processing is essential to orchestrate and control these complex value chains, from electronic procurement to paperless supply chains and transport logistics to digital factories.

- *Media and telecommunications:* This sector, which includes IT services firms, telecom operators, and Internet companies, both supplies and uses the means of digitization. As such, its leadership position is not surprising—companies in the sector are the closest to the source of digitization in terms of the creation and use of infrastructure and enabling technologies, digital service integration capabilities, and the like. Here, examples include Cisco Systems, a leader in the digitization of its internal operations, and Google, which not only has succeeded in playing a visible role in the everyday digital life of billions of consumers, but also is pushing Web-based apps and cloud technologies to digitize the way in

which employees at Google and elsewhere work and collaborate.

These were the industries that piloted and perfected technologies like electronic data interchange, and where, more recently, machine-to-machine (M2M) communications, smart tags, and mobility are providing the next level of efficiency, transparency, and flexibility. Global companies such as Dell have long focused on digitizing their end-to-end supply chains, tying customer demand in real time with custom business streams through digital tools. Now, Apple, the world's largest consumer electronics company, is leading the pack at combining bricks and mortar with real-time, cloud-based sales and service.

Down at the bottom of the list, on the other hand, are the labor-intensive, old-economy sectors like hotels and restaurants (hospitality), construction, and real estate, rental, and leasing. The position of each of these can be explained by the relative simplicity of their value chains; the high degree of hands-on, on-site, “personal touch” interaction required

by the way they do business; the often lower affinity for digital technology among their labor pools; and their fragmented nature. Taken together, these characteristics ultimately reduce these industries' appeal to digital suppliers—but by the same token suggest that digitization offers the potential for these sectors to make great strides in pushing efficiency and customer convenience.

Hospitality, for example, is a huge industry that has already seen great strides in digitization, though primarily on the reservations front. Social media has the potential to further this process significantly; indeed, a variety of digital service offerings will increasingly become a differentiator along with service, location, and price. Construction, too, will likely see strides in how workforces are managed, through the automation of hitherto manual processes. And though real estate is already largely online on the sales front, the identification, development, and management of the construction of specific projects remains a highly fragmented, analog process.

Digitization offers the potential for old-economy sectors to make great strides in pushing efficiency and customer convenience.

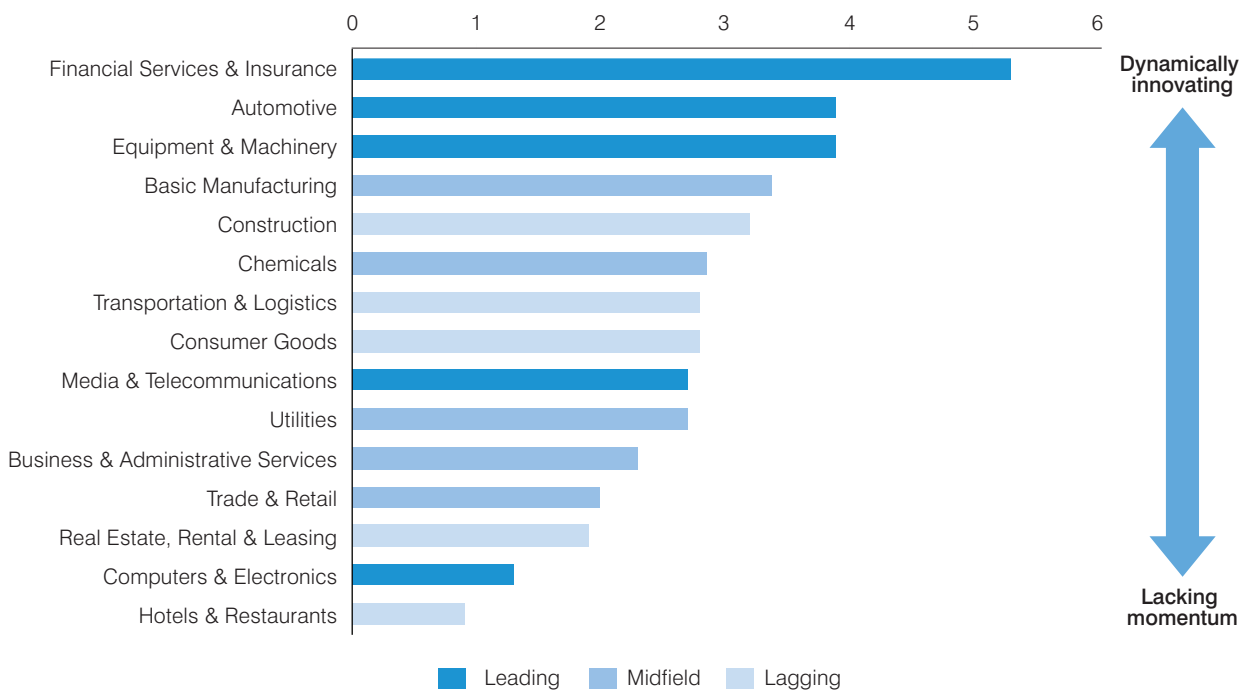
BUILDING MOMENTUM

Not only is there a distinctly wide gap between the digital haves and have-nots, but that gap appears to be growing. The leaders in digiti-

zation are moving ahead quickly, while progress among many of the laggards remains relatively slow (see Exhibit 2).

Exhibit 2
Industry Digitization Index Change, 2010–11

INDUSTRY DIGITIZATION INDEX CHANGE (2010–11)



Note: Chemicals and basic manufacturing figures for 2010 are based on expert estimates.
Source: Eurostat; Booz & Company analysis

- Financial services and insurance, the leader in digitization, is also the most dynamic sector; its digitization index grew by more than five index points between 2009 and 2011. Industry players continue to invest heavily in new digital capabilities—most recently, big data analytics, mobile payments, social media, and lean “bank-in-a-box” concepts. American Express, for example, has developed a company-wide digital strategy designed to leverage its digital assets and capabilities to drive future growth. To that end, the company plans to capture and analyze large amounts of data from both customers and merchants to improve segmentation, aid merchants in their marketing efforts, and ultimately generate more precisely targeted offers to cardholders and participating merchants. As part of this effort, the company is also expanding its partnerships with other companies such as Facebook to take

advantage of consumer interest in social media and other digital technologies.

- Industries in the middle of the pack, such as utilities, consumer goods, and transportation and logistics, are also gaining momentum, a clear sign that technologies such as smart tags, M2M communications, and remote metering have reached sufficient levels of technical maturity and cost-efficiency. Moreover, new regulatory regimes have pushed some of these sectors into adopting new technologies more quickly; the utilities sector, for example, has seen the further liberalization of energy markets and a push for smart meters, while transportation continues to make investments in digitally enabled new infrastructure and has achieved overall efficiency gains as a result of open-skies agreements and other regulations.

- Meanwhile, real estate, business and administrative services, and hospitality are making little headway in their efforts to digitize—despite their direct connection to the consumer. Fragmented demand and an inherent lack of digital skills have kept suppliers from aggressively pursuing these sectors. Unless conditions change, these industries will continue to lag.

These results suggest that as digitization progresses, a profound shift of importance, and ultimately value, will occur among these industries. Consumers themselves will likely continue to find more value in fully digitized industries—consider the shift in status from cars to smartphones, especially among young consumers. And increasingly, those industries that are digitizing fastest will start seeing the highest growth rates.

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INVESTMENT PRIORITIES

Our analysis of different industries also allowed us to “look under the hood” to examine in greater detail where companies in particular industries are pushing the digitization envelope in each of the four elements of digitization—input, processing, output, and infrastructure—and where they still have work to do.

And though the results vary by industry, it is fair to say that for the most part, virtually every industry has made strides in building the digital infrastructure it needs, but even the most forward-looking companies have not yet reached the stage of true digitally enabled, real-time, connected design, supply, build, sell, and service capabilities—the real long-term aspiration of many corporate players (see Exhibit 3).

According to the Eurostat data, more than 70 percent of companies in

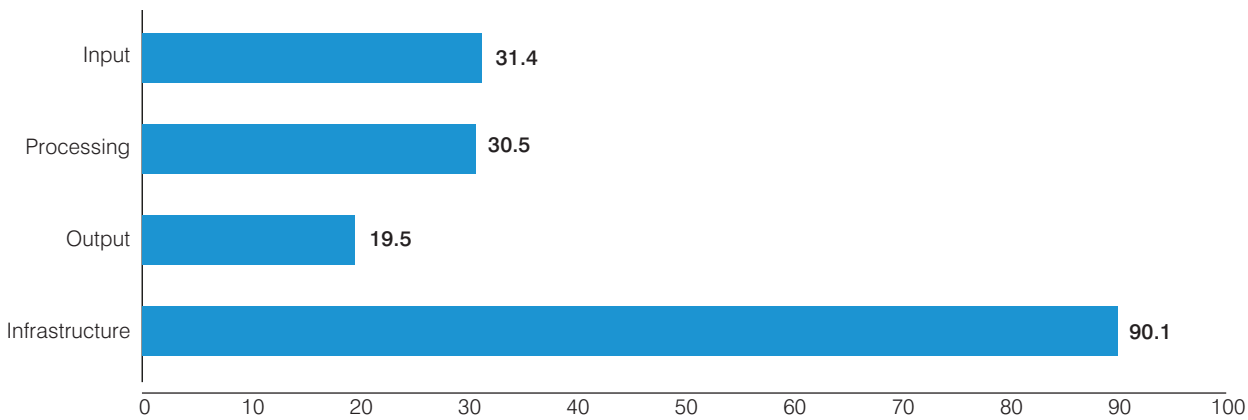
Europe have put in place the key building blocks of broadband, wireless, and computing infrastructure; according to the index, industries vary by no more than 10 points in their degree of infrastructure digitization. This is clearly a reflection of the maturity of a great deal of the underlying technology, the immediate benefits to be reaped in promoting the enabling role of infrastructure, and, thanks in part to Moore’s Law, the relatively low costs involved.

At the input level, companies in many industries are beginning to put together paperless supply chains to speed up the acquisition of raw materials, although insular digital environments in different industries still slow down this process. Companies in customer-facing industries like financial services, trade and retail, and consumer goods are having greater success in digitizing their supply-side relationships for a simple, structural reason: Being downstream players, they are further removed from the non-digital world of raw materials as the ultimate input factor, but rather interact with other service or manufacturing players that are active in the supply side further upstream.

The results are less encouraging at the processing dimension, indicating the existence of a substantial gap between the base infrastructure needed for standard office communication and daily office work and actually putting that infrastructure to work in the form of differentiated digital processing capabilities for driving business process efficiency and effectiveness. The process dimension is a good predictor of the degree of digitization in a particular industry, since this dimension captures the essence of the respective industry’s core value chain, while the other three dimensions primarily enable these processes, or provide the interfaces needed to interact with suppliers and customers. As such, the processing dimension shows very strong variances among industries.

Perhaps the most surprising finding involves the difficulty companies in every industry still have in the output dimension, despite most consumers’ familiarity with processes such as e-commerce. The data suggests that in most cases, bricks and mortar may still be far more important than clicks; moreover, there is a great deal

Exhibit 3
Overall Degree of Digitization Across Business Process Dimensions



Source: Eurostat; Booz & Company analysis

of variance between the leaders and the laggards in this area. This may be due in part to the phenomenon that by now, large corporations have all engaged in e-commerce activities in some shape or form, while small and medium-sized enterprises often tend to be more traditional in the sales channels they use. We are still far from a true multichannel customer-facing capability that would allow customers to move seamlessly from online channels to physical shops to call centers.

By and large, however, companies in most industries tend to be more fully digitized the closer to the customer they are. Many industries, especially those that deal in physical goods, still operate in an essentially analog mode in working with suppliers, whereas those dealing primarily in information and services have moved forward quickly in digitizing their output contact with their customers.

At the sector level, the differences among the four dimensions stand out even more vividly (see Exhibit 4). For instance, financial services and insurance, the overall leader in digitization, is particularly strong with respect to underlying infrastructure, transaction processing both internally and with external partners, and the digitization of output processes such as interfaces among banks, stock exchanges, clearing and settlement parties, and regulatory institutions. Clearly, the essentially digital nature of financial products, services, and information lends itself to digitization.

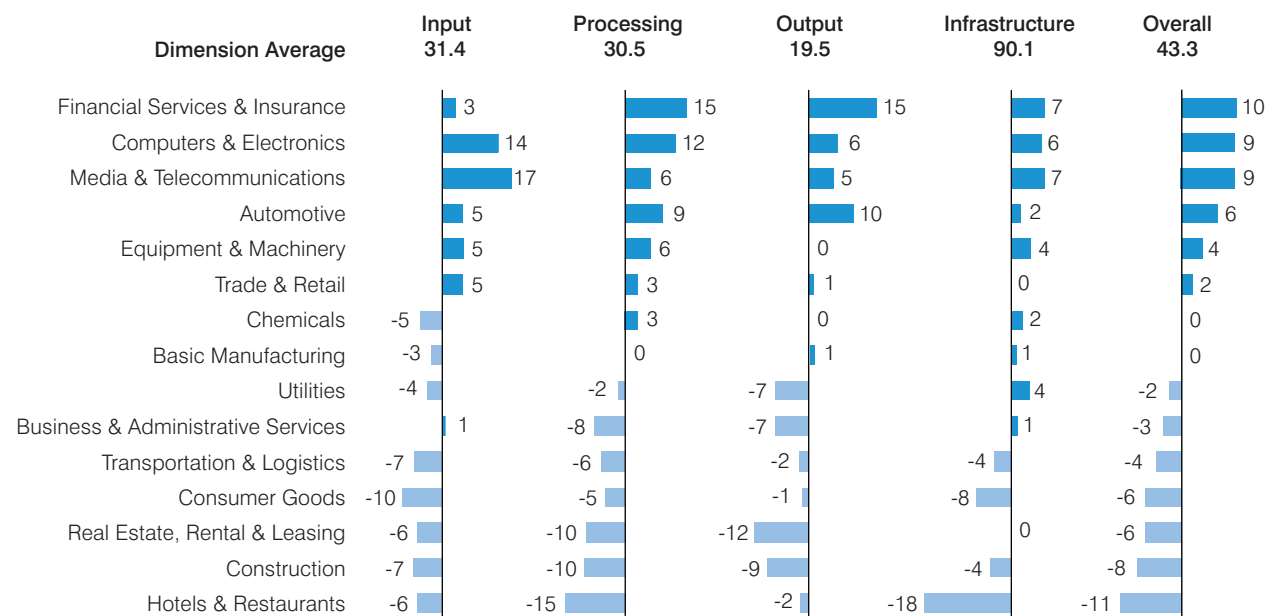
On the other hand, the computers and electronics industry, though it outperforms the industry average index across all dimensions, is stronger on the input side than the output. And many telecom operators have created impressively optimized inbound supply chains involving handset and device

procurement and logistics, network and IT equipment sourcing, and ordering and warehouse management needed to efficiently build and maintain their networks and service production infrastructure. At the same time, many operators face challenges in the output dimension, where their efforts to improve the e-commerce and overall digital customer experience is not yet on par with leaders in this discipline.

As noted, however, most industries continue to face difficulties in the output dimension. Even trade and retail and consumer goods, surprisingly, do not perform better than the average in this area. Despite their well-publicized efforts in the digital realm, these sectors continue to be dominated by bricks-and-mortar players that are moving toward a Web-centric, digital model only gradually.

Exhibit 4
Industry-Level Digitization Index Across Business Process Dimensions

INDUSTRY VARIATION FROM AVERAGE FOR EACH DIMENSION



Source: Eurostat; Booz & Company analysis

THE GEOGRAPHIC DIVIDE

The process of digitization is differentiated not just along sector lines, but along geographic lines as well. Europe demonstrates these distinctions clearly. In general, the farther north and west a country is located, the more advanced it is in terms of digitization, and this is true not just in overall terms but on the industry level as well. Germany, the U.K., and the Benelux and Nordic countries are the most digitized in Europe, and they lead eastern and southern Europe in all but one industry. Southern Europe is close behind, while eastern Europe clearly lags (*see Exhibit 5*).

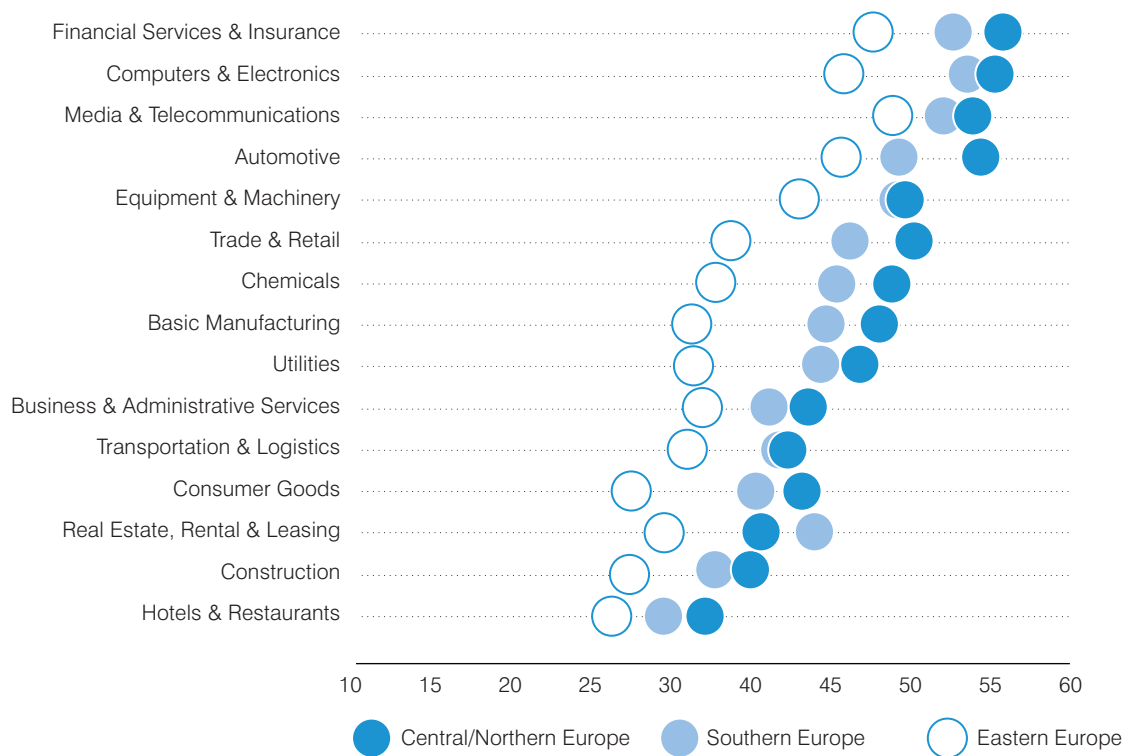
On an industry basis, the gaps among regions tend to be largest in the old-economy non-service sectors, such as basic manufacturing and chemicals. These industries typically require significantly higher levels of investment in order to digitize than do service sectors, and the digitization process itself is more difficult,

given the complexity of their legacy production environments.

These distinctions should come as no surprise, given the well-established link between the extent of digitization in any particular country and its per capita gross domestic product. The fact that this relationship also holds true on the sector level—Germany’s financial services sector is more advanced digitally than Italy’s, for example—only confirms the effect that country-level characteristics such as governmental policy and the availability of investment capital have on promoting digitization. Moreover, the relationship between digitization and wealth creates a virtuous circle: The availability of investment funds enables digitization, and more digitization supports higher levels of GDP growth, making more money available for investment. Every government would be wise to try to encourage this positive spiral in its economy.

Exhibit 5
Geographic Distribution of Industry Digitization in Europe

DIGITIZATION IN DIFFERENT REGIONS



Note: Central/Northern Europe: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, Netherlands, Norway, Sweden, and United Kingdom. Southern Europe: Croatia, Cyprus, Greece, Italy, Macedonia, Malta, Portugal, Serbia, Slovenia, Spain, and Turkey. Eastern Europe: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia.
 Source: Eurostat; Booz & Company analysis

BUILD CAPABILITIES NOW

The real value of the digitization index is the insight it provides into the risks and rewards for digital leaders and laggards alike, on both the sector and the country levels, in an increasingly digital future:

- Sectors already leading the race to digitize, such as financial services and insurance and computers and electronics, have a unique opportunity to build sustainably advantaged positions.
- Lagging industries, including real estate and hospitality, are at risk of missing out on the digital revolution, and becoming less relevant in the minds of consumers. If this trend continues, these industries will likely also begin to lag in their ability to capture their fair share of consumer revenues in the future. It is therefore critical that they reassess the value of digitization in their industries and speed up their digitization efforts.
- Too many companies in every industry fail to understand the direction that digitization will

be taking in the future. So they overspend on infrastructure and underspend on intelligent process automation and better digital output mechanisms.

- ICT companies should place their bets on supporting the industries that are digitizing fastest, as those are the ones spending the most money to further the digitization process.
- All national governments need to set their digital agendas to take into account the importance of digitization—solidifying their current strengths, remedying their current shortcomings, and investing further to compensate for “GDP bias.”

As the process of digitization evolves and matures, monitoring how it is affecting different industries and countries will be critical. Our Industry Digitization Index is designed to do just that. Tracking these changes is the only way to understand where progress is being made, and thus where it needs to be supported further.

As the process of digitization evolves, monitoring how it is affecting different industries and countries will be critical.

Resources

"The Next Wave of Digitization: Setting Your Direction, Building Your Capabilities," by Roman Friedrich, Matthew Le Merle, Michael Peterson, and Alex Koster (Booz & Company, 2011). www.booz.com/media/uploads/BoozCo-Next-Wave-of-Digitization.pdf

"The Rise of Generation C: Implications for the World of 2020," by Roman Friedrich, Matthew Le Merle, Michael Peterson, and Alex Koster (Booz & Company, 2010). www.booz.com/media/uploads/Rise_Of_Generation_C.pdf

"Value Shifts in the Telecom, Media, and Technology Industries," by Pierre Péladeau, Roman Friedrich, Timo Benzin, and Frédéric Sarrat (Booz & Company, 2011). www.booz.com/media/uploads/BoozCo-Value-Shifts-Telecom-Media-Technology.pdf

METHODOLOGY

The Industry Digitization Index is derived from a wealth of data gathered by Eurostat, the European Union's statistical agency, under its 2011–15 information society benchmarking framework. Among other dimensions, the program captures data on how many companies (of the total number of companies with 10 or more employees) use or have deployed various elements of digital infrastructure, tools, platforms, and management capabilities and policies.

In creating the index, we began by dividing the data into four separate factors, each of which is defined by several sub-factors and components. The four dimensions summarize the following underlying data points:

- *Digital input:* The extent of digital processes in the procurement stage of the business, including data points regarding the use of computer networks as well as electronic transmissions suitable for automatic order processing.
- *Digital processing:* The degree to which processes are integrated, both internally and with external partners. The internal integration sub-factors include data points regarding the existence and use of digital technologies such as enterprise resource planning and customer relationship management, as well as data points regarding the use and purpose of internal information sharing with different organizational functions like accounting, inventory management, and production and services management. External integration comprises such activities as electronic data interchange, including the electronic transmission of data with business partners, public authorities, and financial institutions, as well as activities like supply chain management, which includes the use of electronic data transmissions to and from business partners both upstream and downstream.
- *Digital output:* The importance of digital processes in the sales function, including the use of computer networks as well as electronic transmission of data suitable for automatic sales processing.
- *Infrastructure:* The sophistication of the underlying IT technology, focusing on the presence and use of computers and computer networks (wired and wireless) as well as the presence and type of connection to the Internet, including the use of fixed and mobile broadband or other fixed connections, such as cable or leased lines.

Then, by logically aggregating the results of the data collected for each factor within each industry, we were able to construct both the overall index and a deeper understanding of the progress each industry has made in each of the four factors.

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Alex Koster is a principal with Booz & Company based in Zurich. He focuses on strategy, revenue growth, and business model transformation opportunities across technology, telecom, and Internet companies, and advises these companies on their route toward a digitized world.

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