How OEMs can seize the high-tech future in agriculture and construction

Our research showed that OEMs in North America should focus on five core areas to take advantage of the changing landscape.

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We all see it in our daily lives—the pace of change is accelerating, driven by massive advances in computing power, data analytics, and connectedness. Companies across industries are finding new advantages in digitization as they develop innovative products or streamline operations.

But despite these technological advances, the construction and agriculture sectors lag behind sectors such as oil and gas, and even government, with respect to the productivity gains associated with digitization (Exhibit 1).

Both industries face unique challenges. In agriculture, the long cycles for experimentation, connectivity issues in rural areas, and complex systems affected by weather—genetics, nutrition, water availability, soil composition, and the like—have made digitizing more difficult.

In construction, the primary reasons for low levels of digitization are the fragmentation of the value chain (with small companies focused on discrete tasks) and the treatment of every project as unique. These factors have been a drag on productivity, pushing innovation and the adoption of new technologies to the back burner. According to McKinsey Global Institute analysis, 30 percent of the productivity gap in the construction industry can be traced to a lack of technology gains.

Exhibit 1 **Agriculture and construction are behind the curve in digitization.**

Digitization index,[1] %

Productivity growth 2005–14, CAGR,[3] %
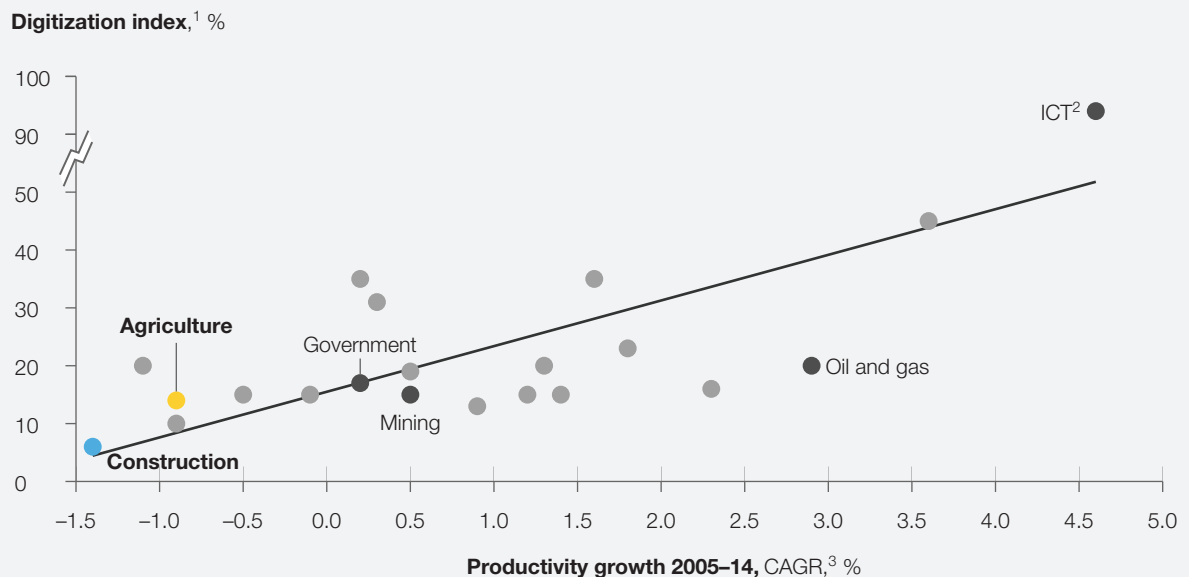
[1] Based on a set of metrics to assess digitization of assets (8 metrics); usage, or integration of digital tools into business processes (11 metrics); and labor (8 metrics).
[2] Information and communication technology.
[3] Compound annual growth rate.

Source: AppBrain; BEA; BLS; Bluewolf; Computer Economics; eMarketer; Gartner; IDC; industry-expert interviews; LiveChat; McKinsey Social Technology Survey; US Census Bureau; *US Contact Center Decision-Makers' Guide*; McKinsey Global Institute analysis

The conditions are ripe for original-equipment manufacturers (OEMs) to accelerate their customers' ability to capture productivity gains from new use cases. We recently completed a survey of construction and farming companies to get their views on how technology is disrupting their industries and what role OEMs can play.

The survey showed that contractor and farming end customers are enthusiastic about the ability to use technology to improve equipment maintenance, project-management tasks, and aftermarket purchases. They told us they are already altering their behavior and welcome the coming changes that digitization will bring. They have high levels of trust in OEMs to help them navigate this new era.

Insights from our survey

In the autumn of 2017, we surveyed nearly 1,400 North American businesses, split between contractors (646) and farmers (753).[1] They had varying numbers of employees (from fewer than 10 to more than 1,000), revenue, acreage, and activities. Roughly half of the contractors said their business is related to earthmoving, site excavation, and grading. About half the farmers said corn is their primary crop. Respondents had a direct role in equipment-procurement decisions for their businesses, and they all had purchased or rented equipment within the past five years. Exhibit 2 provides details on the types of technologies we asked the respondents about.

Respondents view most new technologies as attractive

Among the range of use cases we asked them about, contractors most favorably viewed predictive maintenance (using sensors and other tools to determine when to fix equipment) and remote monitoring, connectivity to project-management software, digital aftermarket sales, and operator-guidance systems. Around 80 percent found predictive maintenance attractive or very attractive (Exhibit 3).

For farmers, GPS auto steering topped the list of compelling uses for new technologies, with 88 percent finding it attractive or very attractive (Exhibit 4). They also liked variable application of inputs, such as determining the right mix of seeds, water, fertilizer, and other soil enhancements (76 percent), and predictive maintenance (66 percent).

These tools and technologies that could be integrated into existing operations with relatively minor modifications were perceived by end customers as more attractive than those that would require an entire redesign, such as a move to fully electric or fully automated equipment.

Contractors and farmers prioritize outcomes differently

We found that farmers primarily care about heightened job effectiveness (for example, correct seed depth and higher harvesting yield), while contractors care more about lowering maintenance (parts and labor) expenses and finishing jobs faster. This is mostly driven by the fact that they have different incentives. Farmers' financial incentive is to have a higher yield, while contractors are commercially incentivized to finish a project on time and on budget—a perpetual challenge in the capital-projects industry.

OEMs are strongly positioned to capture digital opportunities, but there is competition

OEMs are at the top of the list of vendors that contractors and farmers trust to provide them with new technologies. However, more farmers ranked high-tech companies above OEMs as trusted providers when it came to use cases such as GPS auto steering, variable application of inputs, and connectivity to farm-management software. By contrast, contractors uniformly view OEMs as the most trusted providers for all applications of technology, although high-tech companies and component suppliers are ranked a close second in many instances.

Exhibit 2   Our survey covered several technologies.

● Construction survey   ● Agriculture survey   ● Both surveys

|		**Overview**	**Benefits**
●	Equipment with operator-guided systems	• Operators receive guidance on how to complete their jobs in the most effective and economical way • Some simple tasks are fully autonomous	• Enhanced operator performance • Fewer errors • Enhanced safety • Less required training
●	Connectivity to project-management software	• Onboard system collaborates with project-management software to provide directions to operator on tasks • Tracks progress, inventory, and equipment • Changes to project design instantly communicated to workers	• Improved efficiency of workers and equipment • Increased transparency on fleet usage
●	Predictive maintenance and remote monitoring	• System to predict and identify maintenance and repair needs based on actual equipment condition • Uses data to diagnose issues proactively, service the equipment remotely, or notify a service technician	• Less equipment downtime • Reduction in repair cost • Improved operator safety • Increased resale value of equipment
●	Usage-based contracts	• Equipment costs are linked to how many hours you operate (pay as you operate) and/or to operating style (pay how you operate)	• Potential savings in equipment cost • Keeps costs of balance sheet
●	Digital aftermarket sales	• Purchase manufacturer-branded and nonmanufacturer-branded parts online and have them shipped directly to you	• In-depth product research without having to contact dealer or sales rep • Potentially lower lead times • Increased price transparency • Access to wide array of parts
●	Fully electric equipment	• Fully electric equipment powered by electricity or battery • Wireless charging setup on site or batteries that can be swapped between shifts are used	• Reduced fuel costs, easy plug-in charging, never have to order fuel • Higher precision • Quieter and cleaner • Less maintenance cost • Receive carbon credits
●	GPS auto steer	• Sensors that allow tractors to move more effectively and ensure accuracy/ avoid overlapping in fields	• Higher harvest yields • Zero waste • Accuracy
●	Precision farming: variable application of inputs	• Sensors that enable enhanced precision when applying inputs to a field • Vary ploughing, seeding, fertilizing, and spraying to any part of field based on data	• Higher harvest yields • Accuracy
●	Full automation of equipment	• Equipment is fully autonomous • Tasks set in conjunction with farm/ project-management software	• Longer working hours • Fewer workers • Improved safety • Potentially smaller equipment • Seamless integration to software

Source: McKinsey analysis

Exhibit 3   Contractors are most excited about predictive maintenance.

Conversion, average % of fleet expected to be converted to this technology[1]

Attractiveness, % that finds this technology attractive or very attractive[1]
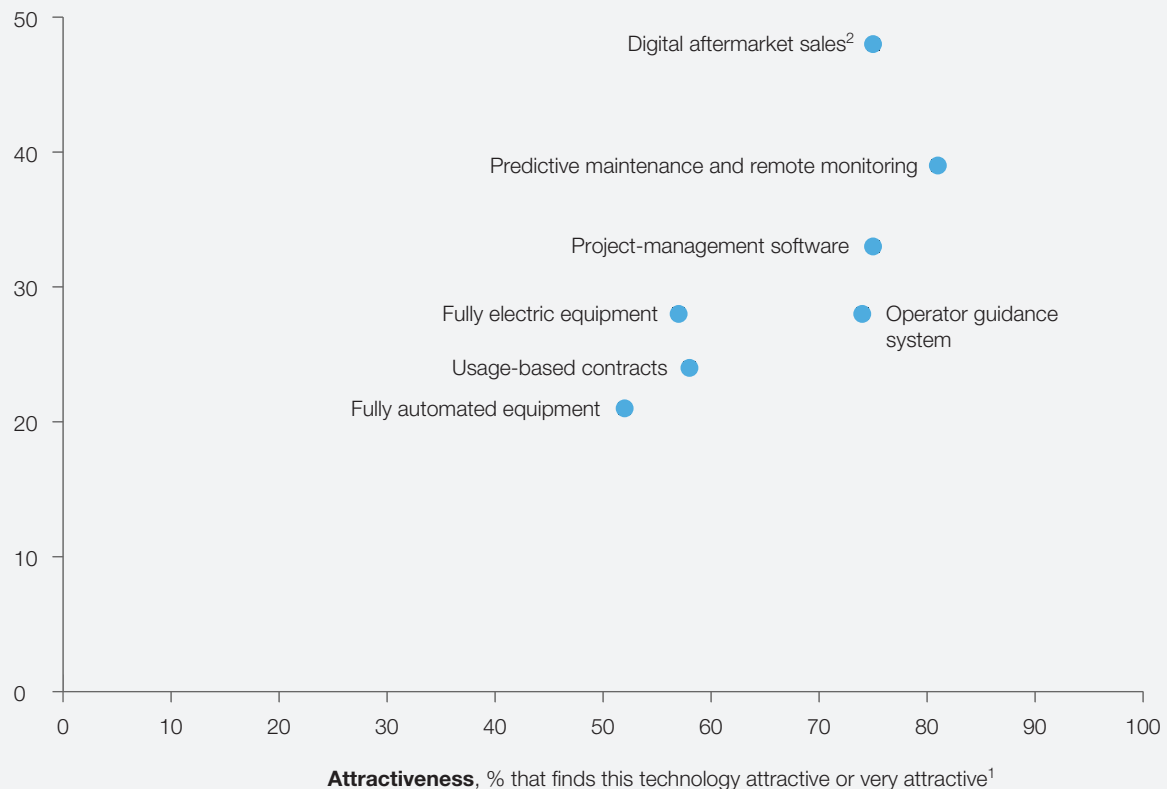
[1] Based on a survey of 614 contractors.
[2] % of aftermarket parts not purchased through dealers in next 5 years.

Source: McKinsey analysis

### Digital channels are likely to put pressure on traditional channels

Online channels for aftermarket parts are becoming more prominent. Already, 84 percent of contractors surveyed said they visit three or more websites to compare prices. As a result, contractors expect the share of their purchases from dealers in five years to drop to 54 percent on average, from 72 percent; farmers expect the share to fall to 62 percent, from 80 percent.

OEMs could offset that headwind with a greater share of revenue from services as customers turn to them to support new equipment that they may not be able to maintain in house (such as electric or autonomous equipment).

Exhibit 4 **Farmers are most excited about GPS auto steering.**

Conversion, average % of fleet expected to be converted to this technology[1]

Attractiveness, % that finds this technology attractive or very attractive[1]
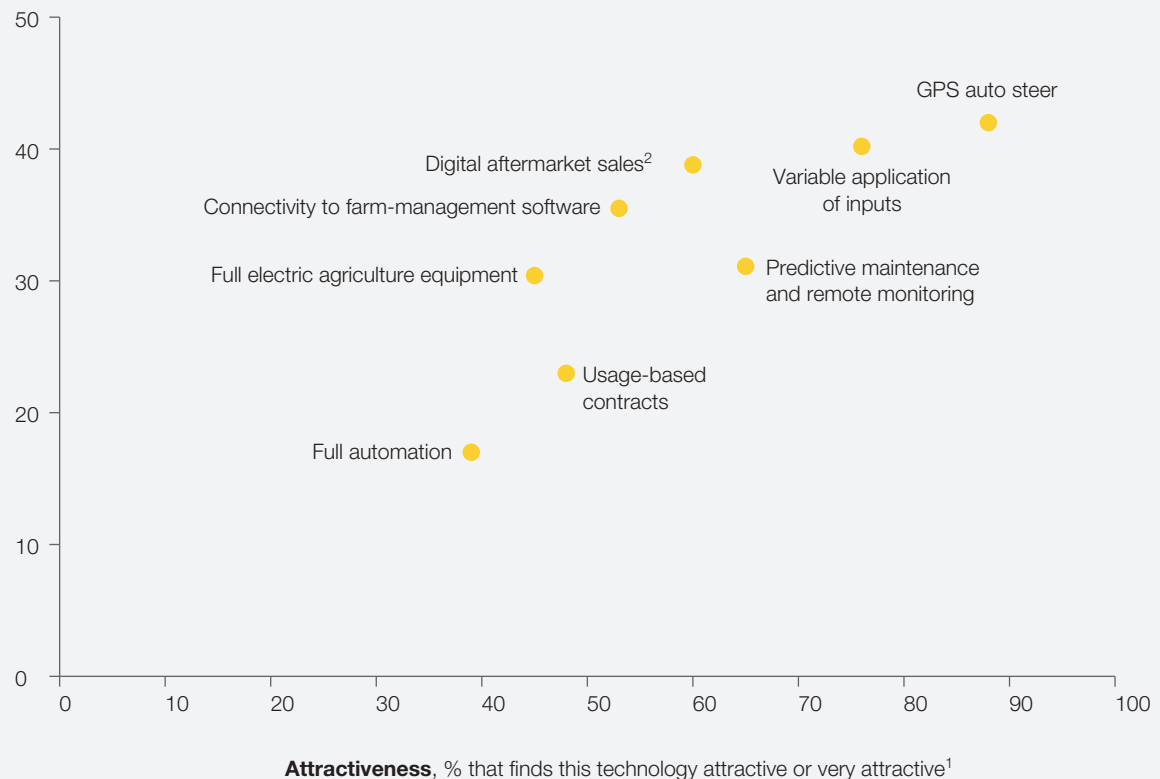
[1] Based on a survey of 750 farmers.
[2] % of aftermarket parts not purchased through dealers in next 5 years.
Source: McKinsey analysis

Customer preferences on owning versus renting equipment are likely to stay the same

Farmers and contractors indicate that they do not anticipate much change in the share of owned versus rented equipment in their fleets.

Usage-based contracts (equipment costs linked to how many hours the equipment is operated) generate relatively lower levels of excitement: contractors expect to convert 22 percent of their

fleets, and farmers 23 percent of their fleets, to such an arrangement. Contractors are mostly concerned about the fact that cost is linked to factors outside of their control.

More than 90 percent of respondents cited the extra cost of overusage as a main worry, followed by 79 percent who were concerned about the availability of equipment when they need it, and 35 percent who said suppliers do not have the

necessary understanding of the work performed by their business. Farmers were primarily worried about the availability of equipment when it is needed.

Interest in peer-to-peer rentals is also low, with 72 percent of farmers and 77 percent of contractors either unsure about or uninterested in this offering out of concern about pricing and availability of the right equipment.

Many respondents anticipate having fewer brands in their fleets

With the growing importance of communications among pieces of equipment, 55 percent of contractors expect to have fewer brands in their fleet (Exhibit 5). Farmers, on the other hand, tend to already have higher brand concentration— 65 percent of farmers have three or fewer brands currently. Fifty-seven percent said they expected no change in brand concentration in the future.

Respondents say having access to their equipment data is important

Because farmers and contractors still perform several maintenance and repair tasks on-site with their own employees, they place great importance on having access to data generated by their equipment. Ninety-nine percent of contractors and 95 percent of farmers say that it is somewhat or very important to have access to their equipment data.
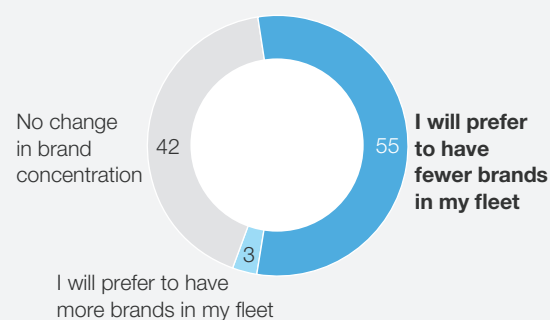
Privacy is a central concern

Privacy is a big issue for the majority of respondents. Connected machines and components supplied by OEMs will inevitably collect lots of proprietary data—about yield, processes, schedules, and so on.

Seventy-three percent of contractors and 77 percent of farmers expect to know why OEMs are collecting their equipment data, and about half of respondents feel that being personally identified would adversely affect their relationships with an OEM.

Exhibit 5

OEMs with narrow product lines may need to consider integrating their products with other OEMs' platforms.

Contractors are considering potentially higher brand concentration in the future
Share of respondents, %

No change in brand concentration 42

I will prefer to have fewer brands in my fleet 55

I will prefer to have more brands in my fleet 3

Source: McKinsey analysis

However, we expect that like end users in the auto industry, OEM customers in construction and agriculture will be willing to share data when they see clear value. For instance, farmers in the United States whom we interviewed said they are willing to share data with the Farmers Business Network because they find the aggregated insights that the organization shares with them very useful.

Five ways OEMs can capture value

In interviews with more than a dozen OEM senior executives,[2] we asked, "How do you feel about your level of readiness" when it comes to disruptive forces? Several concerns came to light. While we caution against extrapolating their answers to the industry as a whole, we did get a hint at what types of change are foremost in executives' minds.

They told us that they feel most ready for disruption related to the physical product, such as electrification and autonomous systems, but less so when it comes to newer offerings arising from shifting customer preferences, digital business models and connectivity, 3-D printing, and the Internet of Things.

Further, these executives acknowledged that it will be critical to transform their organizations to navigate these disruptions successfully. Yet, they felt their readiness with respect to creating an agile organization, including talent management, was not in line with the likely impact of these disruptions.

Given these concerns, OEMs can focus on five areas to take advantage of the rapidly changing landscape.

Address critical control points in the ecosystem

OEMs have traditionally been at the forefront of hardware product development. However, with value shifting from hardware to software, they will have to expand their digital capabilities. Ecosystems—a collection of entities that can partner to serve customers better—allow OEMs to learn from other players in areas like agile development methodologies and creation of a single vision of desirable end products for all stakeholders.

Develop a deep understanding of customer-decision journeys

Our survey revealed that the top factors influencing customer decisions in adopting a new technology were personal testing, observing the application of the technology, advice from friends and colleagues, detailed information, and expert opinion. Farmers and contractors told us they have concerns about data collection and usage, but that would change if OEMs could demonstrate how to create value. For example, we see that in the automotive industry, 70 percent of US customers are willing to pay for technology features and share data to increase safety.

Adopt two-speed R&D

To find the agility required to meet end users' ever-changing needs, OEMs must attract and retain software developers, as well as invigorate their R&D processes. OEMs should also implement a two-speed approach for developing new online features: a hardware-development lane and a software-development lane that are separate but tightly linked. Hardware is linear, and software is iterative. Hardware requires well-defined processes while software requires ad hoc collaboration. Hardware has defined and longer upgrade cycles; software involves fast and continuing development cycles.

Drive productivity improvements to fund new technology

We have seen in multiple industries that customers are not always willing to pay for all the new technology improvements they demand. This is the case in the automotive industry, in which the price of cars has not changed much in recent years despite an increase in content. To avoid margin dilution, automotive OEMs had to find ways to drive cost reduction continuously through productivity improvements, including supply-chain optimization. OEMs that serve contractors and farmers could follow the lead of their automotive peers and leverage advanced analytics, artificial intelligence, and automation to drive internal productivity gains and fund these new technologies.

Rethink the talent model

Millenials will make up 54 percent of the workforce by 2024. They often emphasize meaningful work and an opportunity to learn new skills over better financial benefits. OEMs need to look in different talent pools, restructure work assignments, and market themselves to different cohorts of the work-force. Further, OEMs must recognize that they may not have all the needed capabilities in house. It is therefore important to create partner ecosystems to fill gaps in capability and gain exposure to new technologies.

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As the pace of digital disruption accelerates, several industry shifts are becoming clearer.

New-equipment sales will be affected by a changing product mix, as more fleets become fully electric and automated. Furthermore, contractors are seeking greater connectivity of equipment within their fleet, so much so that they are expecting to have fewer brands to make that a reality. Parts sales will also face significant pricing pressure as more customers buy online. At the same time, a reduced parts business could potentially be supplemented by services: one-third of fleets could be covered by predictive-maintenance contracts or farm-management software.

The machinery industry, like so many others, is at a technology tipping point. If OEMs want to thrive despite the disruptions ahead, the key will be to create a compelling value proposition for customers to share data and pay for these new technologies. The winners will be companies that selectively disrupt their business models by prioritizing high-value technology to drive market share and earn recurring revenue streams.

Enabling customers to adopt these use cases will also allow OEMs to realize greater profitability and viability for themselves. Indeed, our research shows that construction and agriculture OEMs in the United States can generate value from these new technologies that is four to six times the current profits of OEMs. The opportunity is there for those who can seize it. ■

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