The future of agribusiness: Integrating AI into traditional farming operations

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Uncertainty and variability are at the heart of the agriculture industry. Uncertainties such as differences in soil composition, determining when produce is ready for harvest, and the weather, challenge agricultural industry players in achieving consistent yield and profitability. Industry players, including farmers, have attempted to impose precision through innovation on the inherently inexact activity of farming for centuries. Almanacs and greenhouses, which assist farmers in regulating and tempering growing conditions, are examples of the agricultural industry's attempts to bring certainty to farming through innovation. However, despite tighter operating controls, significant variability exists in even the most regulated farming operations. Much of the difficulty associated with variability in agricultural activities is the significant time, effort and experience required to make the right decisions at the right time in order to maximize crop output and quality.

Until very recently, the idea that something other than a human being could decide what to plant, when to plant it and when to harvest it, seemed impossible. However, with the introduction of artificial intelligence (AI) systems, full-scale autonomous farming is now inevitable. These systems are being used around the world and have the ability to move autonomously through a farming operation to assess crop health or predict yields. For example, the Plantalzyer is an autonomous system capable of moving through greenhouses classifying and assessing tomato plants in order to provide human farmers with an accurate crop estimation.[1] Appharvest's robotic universal harvester, Virgo, is capable of identifying and harvesting multiple crops while also collecting data on crop health and estimated yield.[2] Moreover, as the computing power of AI systems (and the autonomous systems they direct) continues to increase, while the cost of these systems continues to decrease, there is a very real possibility that in the near future critical activities and decisions around farming will be made with the assistance of, or completely by, an AI system supported by autonomous equipment.

That said, the spectre of losing an entire season's harvest as the result of a poor decision or mismanagement might lead farmers and industry players to be wary about relying on a machine to make decisions of any real consequence. This skepticism is sensible and healthy, especially in an industry that attempts to impose predictability on an unpredictable activity. Traditionally, farms have been managed in a highly regimented manner, grounded in years of experience. However, AI systems represent a tremendous opportunity to reduce (or remove) the variability inherent in farming activity

while simultaneously freeing up farmers to work on more complex, pressing and analytical issues. As such, industry players must find ways to mitigate risks associated with incorporating new technology while continuing to improve on the accuracy, reliability, and intelligence of AI and autonomous systems. Ultimately, to capitalize on this opportunity, farmers and industry players must embrace the disruptive impact of AI systems on farming operations by reimaging and overhauling traditional consumer and supplier commercial relationships as well as pivoting toward relationships that more closely resemble a partnership. In doing so, the agricultural industry as a whole can accelerate the pace of AI and autonomous system adoption while improving yields, reducing costs and improving sustainability.

Data partnerships

High quality, practical data is a pre-requisite to improving the accuracy and reliability of AI and autonomous systems. It is important to recognize and acknowledge the value of data in agreements. By focusing on data, suppliers and their customers can create synergy for both parties and assist in growing AI in the agriculture industry. Customers have the ability to share the data recorded by AI systems (*i.e.* information with respect to crops) with the supplier of such AI systems, which, in turn, allows suppliers to improve on the technology provided to customers. On the other hand, the sharing of customer data can reduce the price paid by customers for use and adoption of a new technology. By drafting clauses that discount the cost of AI systems in exchange for consumer data, suppliers and customers can work together toward building the level of trust required for farmers to cede critical decisions to a machine, while also recognizing that the work done by the autonomous system is not infallible. As part of any agreement where parties exchange data, privacy considerations, data safeguarding procedures, as well as an appreciation for the use and purpose of the data are required in order to ensure compliance with applicable laws and minimal friction between the parties in the future.

Effectively integrating autonomous and AI systems into farming operations requires considerable thought as to how the use of shared data and analytics will change and shift the responsibilities between the various parties. Adding to the complexity, is the fact that the agricultural sector will likely require more collaboration across the various disciplines in order to successfully implement autonomous and AI systems. As a result, assigning responsibilities and liabilities will be a difficult task. Agreements must be updated to reflect novel issues that may not be part of a traditional equipment agreement. Managing issues with respect to data storage, weighing cybersecurity risks, respecting intellectual property allocating liability in face of errors, and physical damage and delays, are a few things that parties and their legal advisors must evaluate when weighing the benefits of deploying autonomous and AI systems.

Licensing agreements

In light of the risks highlighted above, industry players may choose to arrange their contractual relationships in a way that more evenly shares the risk between the parties. In addition, suppliers may be keen to update traditional business models by moving to fee for service or subscription models that better reflect the value that autonomous and AI systems can create for farming operations.

The true value of any AI or autonomous system is its software. As a result, and similar to other sectors that have been disrupted by autonomy and AI, agricultural industry consumers and suppliers may no longer “own” pieces of equipment in a traditional sense. In the place of traditional purchase and sale agreements, suppliers and customers may find it more appropriate and beneficial to enter into licensing agreements, which grant the customer the right to use a product or software for a fee.

By entering into licensing agreements, suppliers can negotiate for better protections for their intellectual property while also funding future research and development. Customers benefit from a licensing arrangement through the access to heightened levels of technical support, intellectual property and equipment that they otherwise would not have the funds or resources to purchase or develop on their own.

However, even this type of model comes with risk. From exclusivity arrangements to a power imbalance between licensor and licensee, agricultural industry players and their legal counsel must clearly delineate responsibilities, repercussions for contractual breaches, dispute resolution procedures, and liabilities for both end user mismanagement and autonomous system failures. In addition, key considerations should be given to ensure there is a clear definition of the equipment and intellectual property being licensed, that the parties have detailed the appropriate ownership and use rights and the consideration is appropriate for the circumstances. Each license agreement will have its own unique considerations that are applicable to the interests of the licensor and the licensee and a careful review of such agreements is important to reduce the risk to the parties when adopting these novel AI systems.

Early adopters of AI systems and autonomous equipment have the opportunity to benefit from the positive disruption these new concepts are bringing to the farming industry. Nevertheless, due to the inherent hesitation with accepting change in an industry that has been long entrenched in tradition, the players in the farming industry need to consider how to appropriately address the risks involved in AI systems through contractual protections. By understanding and mitigating risks, the farming industry (and the ultimate consumer) will benefit greatly from the optimization of production and cost savings that can be created with the use of AI systems and autonomous equipment.

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1 HortiKey Controlled Growing, “Plantalyzer”

2 Nasdaq, “AppHarvest Announces Acquisition Of Root AI And Its Signature Robot, Virgo - Quick Facts”, April 2021

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