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The End of the Beginning: The Agriculture Technology Revolution Enters “Phase Two”

By: Brook Cunningham

Introduction

The supply and demand equation underlying our global food system is increasingly out of balance.

On the demand side, consumer preference continues to evolve toward natural, organic, sustainably grown, and locally sourced foods—a trend which is becoming as much a philosophy of life as a means of agricultural production. Today, people want to know if their food contains genetically modified ingredients, where and how it was grown, what is in it, how it was processed, and how it reached their table.

On the supply side, the world faces daunting demographic and resource challenges—including the need to feed 2 billion-plus more people by 2050, declining arable land, pressure on global water systems, and ongoing climate change. Meeting these challenges will require strong commercial-scale agricultural production, global distribution networks and infrastructure, and further increases in crop yields, all while using fewer resources.

Achieving balance between these seemingly opposite trends is critical. Best practices from mass commercial agriculture need to be applied to organic and local farms in order to improve efficiency and provide economies of scale, as well as to increase food safety. Global transportation and logistics networks need to expand and adapt to accommodate the demand for food traceability and wider distribution of organic and non-GMO products. New sustainable farming methods need to develop and proliferate, not only because they are good for the planet, but because the economics of feeding the world will require them.

These issues are highly complex and solutions will take time. However, the industry is moving in the right direction led by the digitization of the farm, with three key trends driving us into a new phase of the agriculture technology revolution:

- Further enhancements in on-farm technology to support data-driven decision-making;
- A shift toward “outcome-based” solutions for farmers;
- An increase in strategic collaboration across the agribusiness value chain.

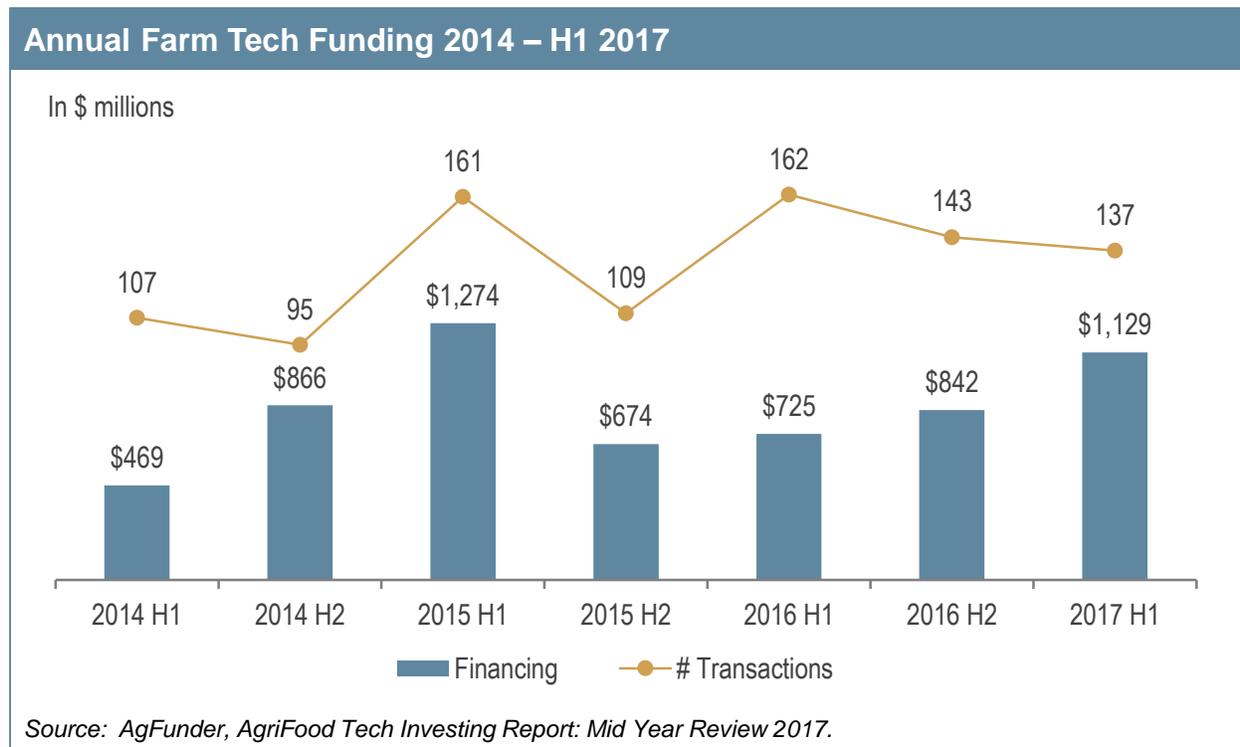
On-farm Technology Leads the Way

“Agriculture technology”—broadly defined— has advanced rapidly in the last decade, driven by dramatically increased investment from a diverse network of parties. These include corporations seeking new growth avenues, governments seeking to ensure food security, and financial investors and entrepreneurs seeking returns. Their common goal is to promote innovation that increases the efficiency, safety, and sustainability of food production and delivery to consumers.

The crop inputs sector continues to play a leading role, with ongoing development of bio-based herbicides and fungicides and mini-chromosome-level seed innovation, all working in unison to grow larger, more resilient crops. Advancements in fertilizer have been slower to materialize, but a number of interesting new companies are focused on reducing leaching, harmful by-products, waste, as well as costs, while improving soil quality and overall plant health.

The farm equipment sector has arguably seen the most rapid innovation in recent years with the development and commercialization of on-field robotics and drones, soil and crop sensors, precision irrigation and navigation systems, and self-driving tractors. Advances in software enable the collection and analysis of data from telematics, weather, field mapping, and farm-wide enterprise resource planning (ERP) systems. Together, today’s combine has become a highly sophisticated mobile office, enabling real-time, data-driven decision-making.

However, even as the digitized 21st century farm is becoming a reality at a rapid pace, the \$12 trillion agribusiness industry remains in “Phase One” of its transformation. “Phase Two” must connect individual technology products and the data they generate into a highly integrated, easy to use network of information, tools, systems and solutions to generate better tangible results— or “outcomes”—for the farmer, as well as for the broader agribusiness ecosystem.

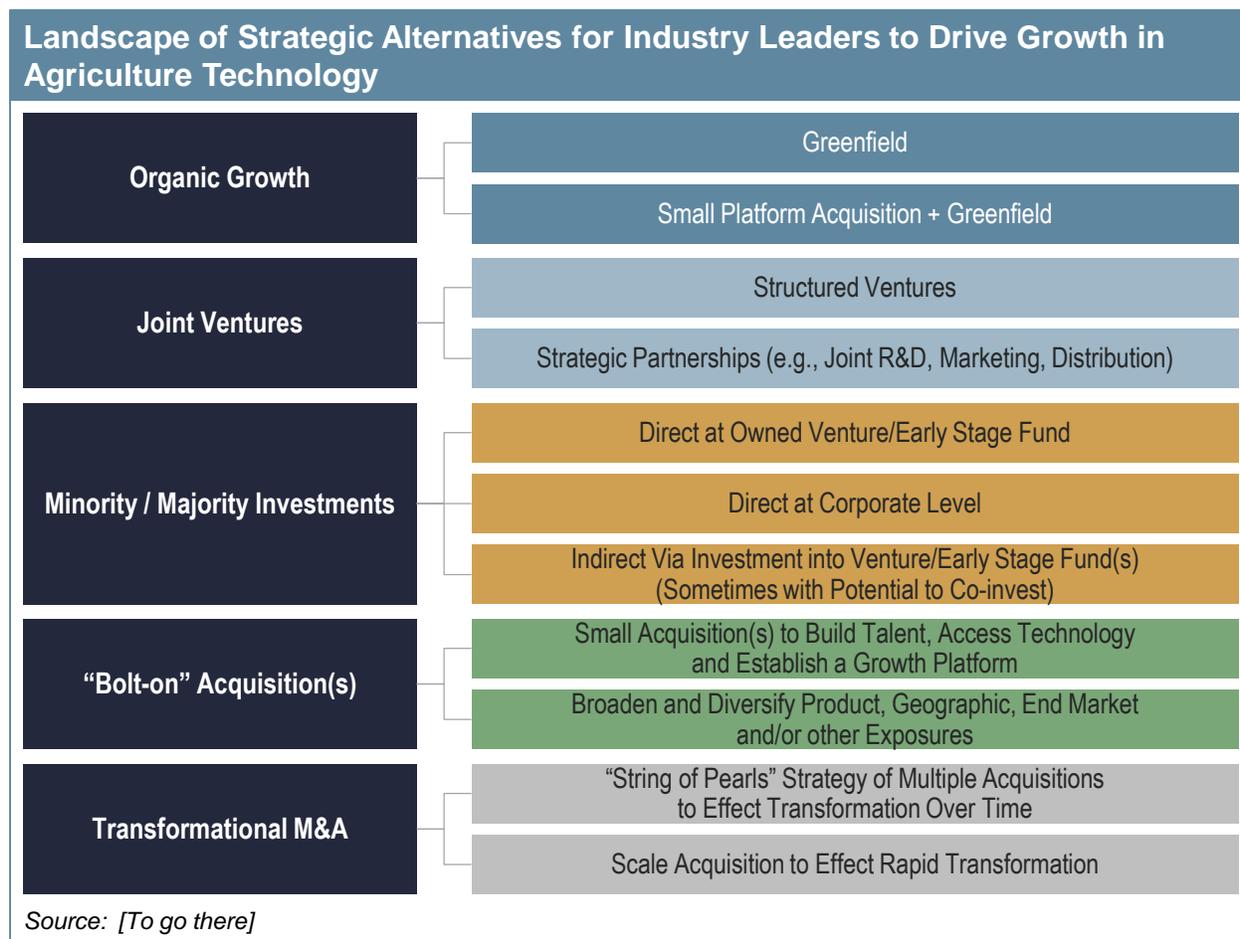


The Need for Outcome-based Solutions

Farming has never been as complex as it is today. Delivering a bushel of corn to market requires the management of agronomists, full-time and seasonal workers, advanced storage, logistics and finance networks, as well as a deep understanding of dozens of input products, millions of dollars in advanced equipment and software, volatile commodity markets, government regulations, and—just to keep things interesting—geopolitical dynamics and the weather.

While technology has begun to help modern farmers manage this complexity, it has not yet “connected the dots.” Technology products and services need to become more integrated and easier to use, producing results that can be measured, tracked, and analyzed in terms of both yield and—critically—profitability per acre.

The effective incorporation of profitability analysis is key. Even as substantial progress has been made to increase in-field yields, all yield is not created equal. In fact, applying additional herbicide or fertilizer can increase production but be an uneconomic decision, depending on the cost of inputs and other factors. Somewhat shockingly, the emergence of on-farm ERP systems that enable farmers to execute upon agronomic recommendations and track resulting profitability per acre is a relatively recent development, with a small number of scale competitors in the sector.



The Transformation Toward Outcome-Based Agriculture Solutions

The Current Model

Multi-provider approach focused on yield per acre



Source: [To go there]

The Future of Agribusiness

Holistic, farmer-centric, outcome-based solutions



As a result, farmers are increasingly calling on their suppliers to shift away from a product-centric mentality and move toward delivery of outcome-based solutions based on both yield and resulting profitability. These solutions should connect: (i) the agronomic recommendations from input providers and retailers; (ii) the data-driven capabilities of advanced equipment; and (iii) ERP and other software systems to support decision-making, with measurement and analysis of the results.

This evolution will be driven by data, and will require meaningfully improved on-farm broadband connectivity and data storage infrastructure. Perhaps more importantly, it will require significantly enhanced collaboration and data sharing between the leaders across the agribusiness and technology value chains, to an extent previously unseen.

Increasing Collaboration Across the Value Chain

The industry is increasingly aware of the need for outcome-based solutions—in large part due to a prolonged period of low commodity prices and the resulting pressure on farm economics. This is generating a substantial acceleration in strategic activity between input producers, retail and co-op channels, equipment companies, grain traders, and the pure-play agriculture technology landscape.

Industry leaders are resolutely seeking ways to participate in the agriculture technology “innovation ecosystem,” including the formation of internal venture capital funds, acting as limited partners in external funds, making direct investments into companies, and, increasingly, acquiring early stage companies that offer innovative, or potentially disruptive, technologies (for example, Monsanto/Climate Corp; DuPont/Granular; Deere/Blue River Technology).

Some companies are taking a “capital-light” partnership approach, in part because of concerns about the challenge of combining the “traditional agriculture” culture with the fast-paced, risk-oriented culture of technology start-ups.

Others believe that mergers and acquisitions are the only viable way to create organizations that can hit the ground running and develop the next generation of solutions to meet evolving farmer demand.

Some companies find the valuations of recent M&A transactions involving early-stage companies to be irrational. However, others see such substantial value that they can easily rationalize the price. The value, to them, is in the opportunities to capture data, acquire talent, and gain speed to market, all of which will ensure their ability to maintain or advance market share in existing products, optimize working capital and R&D costs, as well as realize other benefits.

As a middle ground, many companies are taking a multi-pronged strategic approach to broaden their networks, knowledge base and economic exposure to agriculture technology, seeing what works best for them. With this strategy, they concurrently pursue a combination of small acquisitions, investments in VC funds or portfolio companies, and/or a range of strategic partnerships.

All this activity has resulted in a meaningful uptick in strategic partnerships for data sharing, product development, marketing and distribution and other alliances across the industry. These are the first steps toward developing the outcome-based solutions of the future.

Conclusion

We are at the end of the beginning of the digital agriculture revolution.

The technological innovation that will balance the system supply/consumer demand equation underlying our global food system remains in early stages. But progress continues at a rapid pace, equipping the farm today as a critical first step toward meeting the evolving demands of consumers and the environment tomorrow.

Industry leaders across the agriculture value chain are forming comprehensive digital strategies to win mind share, and wallet share, of the farmer.

Importantly, those strategies will need to involve both independent innovation and unprecedented collaboration across the agribusiness ecosystem in order to deliver the holistic, outcome-based solutions that farmers—and our global food system—need.

In the midst of this transformation, one thing is certain: "Phase Two" promises to be an exciting ride.



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