

BEYOND THE HYPE: HOW AGRICULTURAL TECHNOLOGY WINS CUSTOMERS AND CREATES VALUE

BY ARNE DUSS AND JONAH KOLB

INTRODUCTION

Agricultural Technology (agtech) has gained widespread attention and considerable investment totaling an estimated \$7B in 2014 and 2015 alone. We define agtech as individual technologies or a combination of technologies related to farm equipment, weather, seed optimization, fertilizer and crop inputs, irrigation, remote sensing (including drones), farm management, and agricultural big data. We focus particularly on row crops in this paper.

WHY THE RISE IN AGTECH?

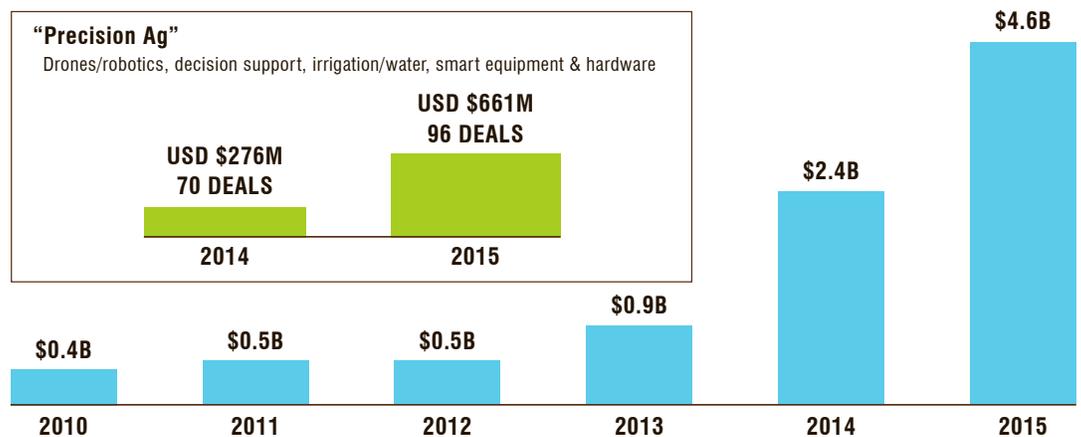
A confluence of factors has helped facilitate the spike in agtech investment, including among other deals, the \$930M acquisition of the Climate Corporation by Monsanto:

- INCREASED DEMAND:** Global food demand continues to grow as the world's population grows and the global middle class expands: the UN's Food & Agriculture Organization estimates food production will need to increase by 70% to feed the world in 2050.
- TIGHT MARGINS AND LARGE VOLUMES:** Small productivity improvements can have a significant financial impact given the tight margins and scale of commodity production.
- TECHNOLOGY ADVANCEMENTS:** Cloud-computing and rural broadband have now reached the coverage and cost thresholds to bring big data and the Internet of Things to the farm, ushering in the first large-scale application of IT in the farming sector.
- INVESTMENT DIVERSIFICATION:** Agriculture is maturing as an "investible" theme for institutional and professional investors, led by farmland. US farmland has significantly outperformed the Dow Jones on both an absolute and risk adjusted basis: from 1970 - 2015 the TIAA-CREF Center for Farmland Research reports an annualized return of 11.6% with 6.9% standard deviation for US farmland vs. 6.7% return and 15.5% standard deviation for the Dow Jones index.

AGTECH INVESTMENT, 2010-2015 \$Billions

SOURCE: AgFunder, AgTech Investing Report, Year in Review 2015

NOTE: 2010-2013 data from Cleantech Group and 2014-2015 data from AgFunder use different methodologies





INPUT OPTIMIZATION



DATA DRIVEN INSIGHT



HOW DOES AGTECH BENEFIT FARMLAND OWNERS?

Although capital can be scarce, arable land is finite.

Farmland owners and investors hold arguably the scarcest resource in the production equation and reap the financial rewards of technology improvements in two important ways:

- Increased productivity raises long-term earning potential and land values
- Increased farmer profitability raises competition for farmland leasing, driving up landowner rental incomes

Alongside profits, however, many farmers and landowners take a long-term stewardship approach to maintaining and improving farms for future generations. The best agtech will facilitate that stewardship process – long term management over the “quick buck.”

WHAT IS THE IMPACT OF AGTECH?

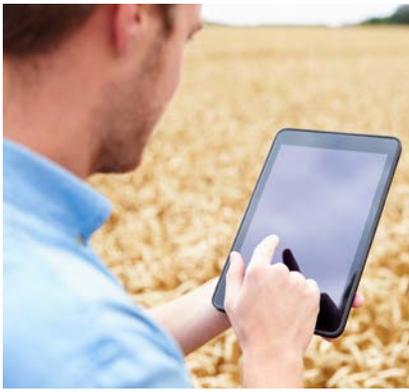
AgTech innovation creates value in three key areas:

- **AGRONOMIC PRODUCTIVITY & EFFICIENCY:** Generate more yield per input by using data-driven insight and the right equipment and systems to hone in on the 4 R's – right product, right rate, right time, right location.
- **FARM OPERATIONS & LOGISTICS:** Optimize equipment, personnel, and work orders to maximize equipment utilization, minimize transportation costs, and limit staff down-time.
- **FINANCIAL PLANNING & ANALYSIS AND BUSINESS MANAGEMENT:** Use integrated IT platforms and enterprise resource planning to leverage management time and improve economic and operational decision-making. Better analytics and forecasting enable improved commodity marketing.



EXAMPLE TECHNOLOGIES

AGRONOMIC EFFICIENCY	FARM OPS. & MANAGEMENT	FIN. PLANNING & ANALYSIS
Smart Irrigation	Weather Forecasts	ERP For Farm Operations
Big Data Driven Seed Optimization	Fleet Optimization/ Equipment Telematics	Yield Forecasting
Nitrogen Modeling	Variable Rate GPS Equipment	
Air, Soil, and Crop Sensors	Satellite Imagery/ Drones	
Field Documentation	Robots, Autonomous Vehicles, Process Automation	



EARLY ADOPTER ACCEPTANCE



SIGNIFICANT GROWTH OPPORTUNITY



EARLY MAJORITY RETICENCE

HOW ARE NEW TECHNOLOGIES BEING ADOPTED IN AGRICULTURE?

The adoption of evolutionary technologies is typically described by *Rogers' bell curve*, which was originally developed by observing the adoption of farm practices. We combine this approach with *Geoffrey Moore's chasm model* that describes the adoption of disruptive technologies. One of the key insights of *Moore's model* is the existence of a "chasm" or gap between the early adopter segment ("Visionaries") and the early majority segment ("Pragmatists").

Crossing the chasm represents the fundamental challenge of marketing disruptive technologies: where early adopters will pursue technology for its own sake, the early majority seeks alignment with business and strategic objectives. The chart below shows the technology adoption bell curve with its different market segments and their relative size.

CURRENT ADOPTION IS LARGELY LIMITED TO ENTHUSIASTS AND INNOVATORS, LEAVING SIGNIFICANT OPPORTUNITY FOR MARKET GROWTH

WHAT ACCOUNTS FOR THE CURRENT CHASM?

- While there is no sales data publicly available for agtech, our discussions with farmers have indicated that most agtech offerings are not widely accepted yet at this point.
- Individual competitors have quickly started to gain market share, however we don't yet see a consistent move into the early majority of (paying) customers.
- "Soft" adoption may influence perception of adoption rates: initial reported adoption rates are sometimes skewed by steeply discounted or free beta versions and trials, and an important distinction exists between exploratory use and true enterprise adoption and integration. Some farmers are also exploring several offerings in parallel during a trial phase.

GEOFFREY MOORE'S CHASM MODEL

SOURCE: Geoffrey Moore



COMPETITIVE RATIONALE



TRUSTED RELATIONSHIPS



ECONOMIC FEASIBILITY

As we consider the promise and potential of agtech, the challenge may lie more in speed of adoption than the underlying technological feasibility. The headwinds to crossing the “chasm” are not insignificant:

- **US net farm income is down significantly from its peak in 2013.** USDA forecasted 2015 farm income down 36% from 2014, making it the lowest farm income since 2006.
- **Closely-held farming operations are not responsible to arms-length shareholders for delivering market-rate returns,** which can slow the speed or competitive rationale for adopting otherwise positive ROI technology.
- **The inverted demographic pyramid of the American farmer** (62% over the age of 55 and 33% over the age of 65) means a significant majority of decision makers have retirement on the horizon. Risk appetite, change-over costs, and delayed financial returns reduce the attractiveness of systems upgrades.
- **A single growing season in much of the US limits the speed of the product innovation cycle** and reduces customer acquisition opportunities. Past new products and technologies that failed to deliver promised results have resulted in understandable farmer concern over being sold “snake-oil” that doesn’t work.

HOW CAN AGTECH CROSS THE GAP?

If the critical question for agtech is how companies cross the gap to adoption by the early majority, we think the following steps can help:

- **Justify the value added by agtech products** to cost-conscious customers in a downturn. Proving economic feasibility and ROI are critical, as is providing the price points that make products accessible to the diversity of farmers in the early majority.

- **Demonstrate efficacy through independent scientific studies** that confirm agronomic feasibility and marketed impact. Not enough new technologies consider potential risk-sharing models – if a product works, why not verify and profit-share the benefits to hesitant adopters?
- **Align distribution of agtech products** to the way farm inputs are marketed to farmers today: through trusted relationship models. Trying to disintermediate established distribution channels may take a long time.
- **Target a niche market to build initial market share** and establish a beach head. As *Moore* suggests, “concentrate an overwhelmingly superior force on a highly focused target.” Too many initial, unfocused, and unsupported roll-outs can create significant reputational problems.
- **Emphasize ease of use and systems compatibility.** The farm technology purchaser is not only a farmer, but also an equipment mechanic, truck driver, crop marketer, crop scout, drone pilot, and agronomist. Embedded technology and products that are an ecosystem fit will gain traction more quickly with time-strapped farmers.
- **Match business and technology goals to crop seasonality.** Product roll-outs need to match farm operations. “Harvest preparation tips” three weeks into harvest reinforces the stereotype of Silicon Valley tech having no idea what’s happening in the field. The rapid innovation of the lean start-up model doesn’t always match an industry where some choices and information only come once a year: being right can sometimes be much more important than being early.

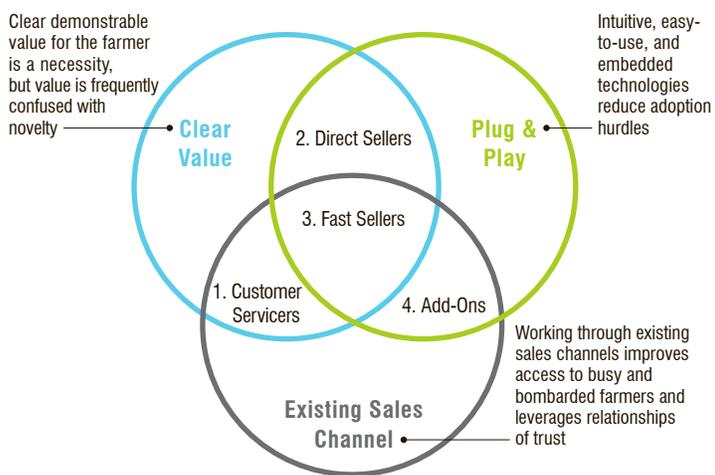


STRATEGY IMPLICATIONS FOR PROVIDERS OF AGTECH PRODUCTS AND SERVICES

Once agtech products have reached technological feasibility, important go-to-market questions remain for any company offering their products and services to growers:

- Is there clear demonstrable value for the grower?
- How easily can products be integrated into the farm operation?
- What sales channel can be leveraged to reach the grower?

FOUR DIFFERENT TYPES OF AGTECH PRODUCT OFFERINGS



- **Customer servicers:** Products with a clear value proposition that are sold through existing sales channels (e.g., ag retailers) that lack the benefit of being an embedded technology. When the technology is not seamless and intuitive, firms must dedicate more time and resources to smoothing the installation and use of their technology.
- **Direct Sellers:** Valuable products with plug-and-play, low-headache or embedded technology that are sold through new channels. Building the salesforce, inroads, and trust in the ag community requires time and investment.
- **Fast Sellers** - Agtech that delivers clear value, is embedded in existing products and practices, and is sold through existing sales channels stands to benefit from the fastest adoption and growth in sales. Farmers can more easily focus on the value these products deliver than on how to buy and how to use them.
- **Add-ons** - Promising products whose value is not yet clear can still make inroads when those products are embedded technologies sold through established channels. It is the classic add-on to existing orders and services, and can benefit from the reputational halo of trusted business partners.

THERE IS UNDOUBTEDLY TREMENDOUS OPPORTUNITY IN AGTECH.

Once un-attainable and un-wieldy data can now be collected and processed, opening new insights applied with specialized equipment. The potential due to the multiplying effect of scale x new insight x new capability is significant, and new management tools are increasingly important in light of the likelihood of increased environmental regulation.

The speed of adoption ultimately determines our arrival at that future “farm of tomorrow,” and we believe the factors governing farm-level decisions and agribusiness competition will drive that process over years, if not the better part of a decade. **Agtech is truly a marathon and not a sprint.**

Modern agriculture is built on an ecosystem of equipment, services, and products where relationships and reliability are key. Incumbents who have already survived agribusiness consolidation and earned a place in the machine shed or field can fold agtech into their existing product lines and relationships. Independent players may deliver value in part due to their independence, but we see a future in which a few independents survive, some are acquired by strategic buyers, and many more are out-competed.

THE FUTURE OF FARMING IS AN EXCITING AND PROFITABLE PLACE TO BE, AND WE DO WELL TO REMEMBER IT IS FORMED NOT JUST BY THE RECENT FLURRY OF CAPITAL AND INNOVATION BUT BY THOUSANDS OF YEARS OF AGRICULTURAL PROGRESS.



Dr. Arne P. Duss
HighPath Consulting,
Founder & CEO



Jonah Kolb
Moore & Warner,
Vice President

CONTACT US TO LEARN MORE

E arne_duss@highpathconsulting.com
P 617.653.7538
W highpathconsulting.com

E jkolb@moore-warner.com
P 217.935.9799
W moore-warner.com