SOPHIZO

INDUSTRY PLAYBOOK · AGRICULTURE & AGTECH

Soil does not read forecasts. It responds to instruments.

Agentic AI for precision agronomy, autonomous equipment coordination, and yield optimization at field scale.

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Fractional AI & RevOps Leadership
sophizo.net

Climate variability turned every season into an experiment. Most farms are running it without a control.

Yields swing on weather, water, and a labor pool that shrinks every year. The data is there. Sensors, satellites, equipment telemetry. But it sits in dashboards no one looks at during planting. Agentic AI acts on the field, not on the report.

Why this matters now

Irrigation responds to soil moisture in real time. Equipment routes itself around saturated rows. A scout report from one corner of a county updates the spray plan for the next farm over. Precision becomes operational, not just analytic.

> *Your sprayer made twelve application decisions per acre last season. How many were the agronomist's call?*

Precision agronomy and autonomous equipment AI is regulated where it intersects with safety, environment, and farm data.

Beyond the six global regimes, agriculture & agtech carries the overlays below. Each one has its own enforcement model and its own evidence expectation.

EPA AI — EPA Pesticide Application AI Guidance

UNITED STATES, EPA — HIGH

Applies to. AI-driven variable-rate pesticide and fertilizer application.

Key obligation. Label compliance enforced for AI applicators. Drift modeling and buffer-zone accuracy.

Evidence. Application logs, calibration records, label compliance attestations.

USDA Data — USDA Farm Data Privacy + Ag Data Transparent

UNITED STATES, USDA — ELEVATED

Applies to. AgTech platforms processing farm operational and yield data.

Key obligation. Voluntary Ag Data Transparent certification. Data ownership clarity, consent for secondary use.

Evidence. Data rights agreements, certification documentation, consent records.

ISO 18497 — ISO 18497 Agricultural Machinery Autonomy Safety

GLOBAL — HIGH

Applies to. Autonomous and highly automated agricultural equipment.

Key obligation. Safety architecture for autonomous ag machinery. Risk assessment for AI-enabled motion control.

Evidence. Safety case, hazard analysis, operator manuals.

EU CAP AI — EU CAP + Sustainable Use Directive AI Reporting

EUROPEAN UNION — MODERATE

Applies to. Farm management AI used to substantiate CAP subsidy claims or pesticide reduction targets.

Key obligation. Auditable AI methodology for subsidy substantiation. SUD pesticide reduction reporting.

Evidence. Methodology documentation, audit-ready calculation traces, subsidy claim support.

Global emphasis for this sector. EU AI Act · ISO/IEC 42001 · UK AI Framework.

Four capability domains. One operating layer.

01 Real-Time Crop and Irrigation Optimization

- Soil-moisture-aware irrigation agents
- Disease and pest detection from imagery
- Variable-rate input recommendations
- Yield-protection alerts at sub-field resolution

02 Autonomous Equipment Coordination

- Multi-machine field coordination
- Maintenance prediction for fleet uptime
- Operator-assist agents for variable conditions
- Logistics agents for inputs and harvest

> *If a soil-moisture sensor failed at planting, who caught it, and when?*

Capability domains, continued.

03 Sustainability and Yield Reporting

- Carbon and water accounting at field level
- Regulatory and certification reporting
- Cover-crop and rotation planning
- ESG-grade data for buyer programs

04 Edge AI and Connectivity

- Edge inference for low-connectivity fields
- Hybrid HITL/autonomous operation
- Sensor fusion across third-party hardware
- Cybersecurity for OT-grade equipment

What production deployments look like at scale.

15 to 35%
YIELD AND SUSTAINABILITY GAINS

150 to 220%
PRODUCTION ROI

12 to 18 mo
PAYBACK PERIOD

Production-stage benchmarks compiled from USDA Economic Research Service, USDA NASS Agricultural Productivity reporting, and Deloitte AgTech reporting (2024 to 2025). Your spread depends on sensor coverage, equipment-fleet age, and the connectivity profile of your fields.

The AI Officer Mandate.

Three responsibilities a Fractional AI Officer owns from day one in agriculture & agtech.

01
Sustainability and ESG reporting that holds up for buyers, certifiers, and regulators.

02
Edge-first deployment so agents work where the field is, not just where the wifi is.

03
Operator trust. Agents augment the agronomist's judgment, they do not replace it.

06 · A 90-DAY PATH

How a Sophizo engagement starts in Agriculture & AgTech.

DAYS 1 TO 30

Diagnose

MAP THE OPERATING REALITY

- AI system inventory across the operation
- Risk and value-tier mapping by use case
- Vendor and integration audit
- Board-ready findings memo

DAYS 31 TO 60

Architect

DESIGN THE AUTONOMY BOUNDARY

- Agent permissions and escalation policy
- Evidence file and audit trail design
- First production pilot scoped with rollback plan
- Cross-functional governance committee charter

DAYS 61 TO 90

Operate

SHIP AND INSTRUMENT

- First agent in production with HITL controls
- Operator coaching and policy refinement
- P&L instrumentation by use case
- Quarterly review cadence established

What we will not do.

We do not operate your equipment, agronomy team, or sustainability program. We do not recommend autonomous spray decisions in regulated jurisdictions without a documented operator override and a per-application audit trail. We pass on operations where the agronomist has not been brought into the AI conversation, because the agent's policies are their judgment encoded. And we will not encode something they do not trust.

07 · WHAT THE BOARD NEEDS TO HEAR

Five things farm operators need to hear about AI.

Five cited insights for the next risk-committee meeting. Each one is sourced. Each one is what an experienced AI Officer would put in front of the board if they walked in tomorrow.

01 · ADOPTION SIGNAL

Precision ag crossed 50 percent of US row-crop acres in 2023.

USDA Economic Research Service reports 55 percent of corn and soybean acreage now uses precision-ag technology, up from 38 percent a decade earlier. The data layer exists on most operations. The decision-loop closure does not. Agentic execution is the next leverage step, not another sensor.

Source. USDA Economic Research Service, Precision Agriculture in the U.S., 2023.

02 · LABOR MATH

H-2A wages reset the cost-of-labor equation.

DOL adverse-effect wage rates for H-2A rose from a 13.68 dollar national average in 2019 to 17.97 dollars in 2024. Labor is no longer the variable that absorbs operational risk. Agronomic decisions, equipment routing, and crop-rotation planning are the leverage points where agents earn back the cost.

Source. USDOL Office of Foreign Labor Certification, H-2A Adverse Effect Wage Rates, 2024.

03 · FEDERAL DIRECTION

USDA NIFA's AI Institute funding sets the academic-extension agenda.

NIFA has committed roughly 220 million dollars to AI Institutes through 2027, with explicit priority on agriculture, food systems, and rural sustainability. State extension programs follow the federal funding. Operations that align with the same research agenda find easier paths to grant-supported pilots.

Source. USDA National Institute of Food and Agriculture, AI Institutes funding announcements, 2024.

Two more, then the framework.

04 · INSURANCE ECONOMICS

Crop insurance loss ratios are repricing risk on the operation.

USDA Risk Management Agency 2023 reporting shows 19.1 billion in indemnity payments against 17.1 billion in premiums. Climate volatility is structurally repricing federal crop insurance. Operators with field-level telemetry data have a measurable advantage at the underwriting table.

Source. USDA Risk Management Agency Summary of Business by Year, 2023; AFBF 2024 Crop Insurance Report.

05 · EQUIPMENT PROOF

See and Spray Ultimate set the new equipment-purchase benchmark.

John Deere's 2024 field-trial results report up to 59 percent reduction in non-residual herbicide use with See and Spray Ultimate. That economic case is now strong enough to drive equipment purchase cycles, not just spray decisions. The agent is inside the sprayer.

Source. John Deere See and Spray Ultimate Field Trial Results, 2024; Successful Farming 2024 Precision Ag Adoption Survey.

The Yield-to-Margin Loop.

Agronomy used to live in one loop. Equipment in another. Crop marketing in a third. Agentic AI closes them into one continuous decision system. Decide on the closing artifact before you wire the agents.

INPUT 1

Field telemetry

Soil moisture, NDVI, scout reports at sub-field resolution.

INPUT 2

Fleet status

Equipment availability, maintenance state, operator hours.

INPUT 3

Market signal

Weather forecasts and forward price curves for the operating window.

DECISION

Per-acre plan

Variable-rate inputs and harvest sequencing tied to economic return.

OUTPUT

P&L per acre

Fed back to next season with ESG-grade audit trail for buyer programs.

From John Utley.

> *The agronomist is the agent. The technology is the leverage. Any project that flips the order dies before harvest, and rightly. Bring the agronomist into the design conversation, encode their heuristics, and the agent stops being a vendor sale and becomes an extension of their judgment.*

John Utley

FOUNDER, SOPHIZO · SEATTLE, WA

John Utley founded Sophizo to give growth-stage companies the AI and revenue architecture work historically reserved for the Fortune 500. He writes and advises on agentic AI governance, predictive forecasting, and operating-model design for boards and operators across agriculture & agtech and adjacent sectors.

Test your operating picture against these.

1

Your sprayer made twelve application decisions per acre last season. How many were the agronomist's call?

2

If a soil-moisture sensor failed at planting, who caught it, and when?

3

Your sustainability report passed for one buyer. Will it pass for the next four?

Frequently asked questions.

What happens when there is no connectivity in the field?

We run high-frequency decisions at the edge. On the equipment itself or a local gateway. And synchronize with the cloud when connectivity returns. The agent does not stop because the cell signal does.

Can this integrate with our existing equipment fleet?

Yes. We integrate with John Deere, AGCO, CNH, Trimble, and the major aftermarket telematics providers. Mixed fleets are the norm, not the exception.

How do we get our agronomy team on board?

We bring them in as the design authority. The agronomist's heuristics become the agent's policies. Most teams move quickly once they see the agent treating their experience as a first-class input.

If this maps to your operating reality, we should talk.

The Diagnostic Sprint is two weeks. Board-ready output. Tailored to agriculture & agtech.

ENGAGE
sophizo.net/checkout/diagnostic-sprint

INDUSTRY PAGE
sophizo.net/industries/agriculture

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12 · SOURCES

Primary research behind this brief.

Every claim, statistic, and citation in this playbook traces back to one of the primary sources below. Pressure-test any of them with your team. We have done the same.

01. USDA Economic Research Service.

Precision Agriculture in the U.S., 2023.

02. US Department of Labor Office of Foreign Labor Certification.

H-2A Adverse Effect Wage Rates, 2024.

03. USDA National Institute of Food and Agriculture.

AI Institutes funding, 2024.

04. USDA Risk Management Agency.

Summary of Business by Year, 2023.

05. American Farm Bureau Federation.

2024 Crop Insurance Report.

06. John Deere.

See and Spray Ultimate Field Trial Results, 2024.

07. Successful Farming.

2024 Precision Ag Adoption Survey.

08. Deloitte.

2024 AgTech and Food Supply Chain Outlook.

Editorial note. This brief is a field reference compiled by Sophizo Research. It is not legal, accounting, or clinical advice. Cite the primary regulator guidance for binding interpretation. Where statistics are quoted, the most recent published figure as of early 2026 is used.