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Process Book

Exploring Commercial Pathways for Robotics

A Process Book for Evaluating the Zero-to-One Stage

CSL - Honda, Fellows Project, Fall 2025

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Executive Summary

This Process Book documents a 15-week collaboration between the CSL-Honda Fellows, Honda's CTSO office, Honda's R&D team, and the Corporate Startup Lab, answering a core question: how does a B2B robotics idea move from zero to one? What we learned was very different from how we first approached the problem. The "answer" had less to do with raw technology readiness and more to do with how teams learn, prove value, and earn the right to scale.

Honda engaged CSL to explore commercial pathways for robotics beyond factory automation, and to bring business thinking into technology work earlier in the process. We started where many projects begin, with a top-down scan of the macro robotics market, ranking markets by funding trends and sizing opportunities. That approach gave us the landscape, but did not provide tangible insights. When the Honda team visited CMU during Startup Week on September 25, we realized that "One" in "Zero-to-One", could mean many things, but for Honda we landed on something specific: a repeatable production line in real operations, starting from scratch. That visit shifted the focus to stop asking "which sector?" and start asking "how does commercialization actually happen, step by step?"

Our project moved through three distinct phases.

Phase 1 was the consulting mindset. We mapped markets, built sector rankings, and created CB Insights-style analyses. This work built a foundational understanding, but it answered "what exists" rather than "what works." The October CSL Forum on CMU's campus, when the Honda team returned during the week of October 21, confirmed that we needed to flip our approach and treat Honda's question as a zero-to-one learning problem, not a market selection exercise.

Phase 2 was the bottom-up discovery phase. We stopped relying on reports and started talking directly with people building and funding robotics companies. We interviewed VCs, founders, operators, and connectors, mainly from Pittsburgh but also from Seattle and New York. We dove into real cases and mapped out each company's commercialization pathway tracking each funding round and noting key traits like competitive edge, major pivots, and founders' expertise. We created profile templates for both startups and investors, and began to fill them out for every company and firm we spoke to and studied. We compared them side by side with the whole CSL-Honda team during our weekly meetings and started to see commercialization patterns that never show up in market reports.

Phase 3 was synthesis. We developed the tools that now form the core of this book, including a Robotics Commercialization Stages model and a new focus on ROI levers (speed of value, profit engine, learning loop, hidden costs, plus the team's ability to learn). We also adopted a forensic reading method that investigates how companies move from working prototype to commercialization using funding announcements, publications, and investor portfolios to reconstruct what each round actually proved for startups and the investment thesis of venture capitalists.

The key lessons are practical.

- Robotics commercialization is messy. Questions evolve. The path from prototype to production is rarely linear, and each stage has its own evidence requirements.

- Start with the customer's problem, not the robot's capabilities. The companies that succeed fall in love with the customer or market pain points and treat the robot as one of several tools to solve it.
- VCs and strategic investors provide a window into emerging directions. Their theses, concerns, and evidence expectations show which milestones they watch, but the signals can be distorted because their model tolerates many failures and aims for outsized wins.
- ROI math drives decisions. In most segments, customers expect payback in roughly 12 to 18 months, and Robotics-as-a-Service (RaaS) models change the equation by shifting more risk and responsibility onto the provider, while allowing the customer to access the robotics solution faster. This approach has its pros and cons.
- Integration cost is a hidden killer. It often adds hidden costs on top of the robot price, and it is where many promising pilots stall or fail to scale. Data, build-versus-buy choices, and the simulation-to-reality gap also emerged as recurring make-or-break factors.
- Software is key to any robotics solution. Leveraging a RaaS model, robotics startups are increasingly pitching themselves as a software-first robotics platform, which makes their timelines and ROI more palatable to investors. This evolved from the long understood view that robotics are slow and capital intensive. Also, the integration of software in warehouse management systems, for example, is a real problem for any robotics solution and solving this unlocks the ability for customers to integrate multiple robotics solutions.

This book is not a checklist, or a prescriptive method to follow. It is a record of how the CSL-Honda team learned to think about zero-to-one robotics, and a set of tools designed to be reused. The goal is to provide Honda one journey of how to investigate an ever-evolving robotics landscape and provide key insights to help Honda in making decisions for future business-to-business (B2B) robotics products as new evidence and technologies emerge.

Brief of the Challenge from Honda

Honda engaged Carnegie Mellon's Corporate Startup Lab as part of the Honda R&D's broader effort to shape Honda's next pillars of growth, especially in B2B robotics and new business creation. The shared goal was to bring business and customer thinking into technology work earlier, and to test zero-to-one paths for robotics ideas in a structured, repeatable way. The following factors informed the project scope.

First, labor and demographic trends are squeezing capacity in factories, logistics, and services. In many regions, the question is no longer whether to automate, but how to keep output steady when headcount cannot grow fast enough. Robotics is shifting from an option to a necessity to stay competitive.

Second, robotics and autonomy are advancing in sharp, uneven bursts. Intralogistics and medical robotics already have real fleets in the field, public companies, and credible payback stories. Other areas, like humanoids and space robotics, still absorb large amounts of capital while sitting in long, experimental test phases, which makes it hard to see where the near-term opportunity truly lies.

Third, Honda has deep experience with automation in its own plants and a strong mass-production expertise, and is now exploring additional shared, lean ways to judge new robotics ideas in B2B settings.Those ideas may come from internal R&D, potential partners, or startups seeking investment. Without a common way to read evidence and timing, decisions can drift toward excitement or fear of missing out, instead of a consistent view of value, risk, and product–market fit.

About the Corporate Startup Lab

The Corporate Startup Lab (CSL) is a Carnegie Mellon initiative based at the Tepper School of Business and the Swartz Center for Entrepreneurship, focused on helping companies explore early-stage innovation questions that fall between traditional R&D and classic consulting work. CSL pairs corporate partners with graduate student fellows who spend a semester running hands-on research, interviews, and rapid prototyping to build reusable frameworks and evidence. For this engagement, Honda's R&D team partnered with CSL to apply VC and startup-style thinking to robotics commercialization, asking the fellows to act as an external exploration unit that could test hypotheses, profile companies, and translate the patterns they found into tools Honda can keep using after the project ends.

Our Team

This project was a collaboration between the Carnegie Mellon Corporate Startup Lab, our mentors at CSL, and our partners at Honda R&D. Each contributor offered a unique perspective. Together we shaped the journey documented in this book.

CSL Fellows

- **Shreya Gupta**, CSL Fellow, MISM '25
- **Jon Ernster**, CSL Fellow, MBA '26

CSL Mentors

- **Jim Jen** – CSL Mentor, CMU Faculty, CSL Director
- **Hallie Johnson** – CSL Mentor, CSL Academic Program Manager

Honda Team

- **Toshiro Kiura** – Project Sponsor, Chief Technology Strategy Officer, Honda R&D Co., Ltd.
- **Rajeev Chhajer** – Project Advisor, Chief Engineer / Research Domain Leader - Software-defined Intelligence, Honda R&D Americas, 99PLabs
- **Ryan Lingo** – Project Advisor, Applied AI Research Engineer and Developer Advocate at Honda R&D Americas, 99PLabs

Timeline of the Work

The CSL-Honda team ran this project across fifteen weeks, from our kickoff on September 3 through early December 2025. Shreya and Jon held ten formal CSL-Honda meetings with the full team—Rajeev, Ryan, and Kiura-san from Honda, and Jim and Hallie from CSL. Those sessions gave us the checkpoints and feedback loops we needed to course-correct every week. Between the big meetings, Shreya and Jon worked closely with Jim in working sessions, refining our approach, troubleshooting dead ends, and building out the tools that eventually became this book.

The rhythm of the project was anchored by three major Pittsburgh events and two in-person visits from Kiura-san. On September 24–25, the entire CSL-Honda team attended the Robotics Venture Day during Pittsburgh Startup Week, when Kiura-san made his first visit to CMU. We shifted from formal slide presentations to a roundtable discussion that fundamentally altered our perspective. The week of October 21, Kiura-san returned for CSL Forum week and the “AGE of NexT” expo, when the entire CSL-Honda team used that time to dig into VC and startup interview insights. Then on November 5, Jon spent the day at the Pittsburgh Robotics Network AI & Robotics Discovery Day, walking through 230+ exhibitor booths, collecting insights that continued our startup profiles, and listening to three prominent Venture Capital firms in the space. Each of these touchpoints led us to rethink our assumptions, and each one left us with clearer questions than when we started.

Part 1 — The Journey: A Narrative in Three Phases

This is the story of our 15-week project, told as a journey in three phases. This narrative reflects the inflection points where our thinking shifted and moves through three distinct phases: from an initial top-down, consulting-style analysis to a bottom-up discovery driven by conversations with founders and VCs, and finally to a period of synthesis where we integrated the core tools and frameworks we had created throughout the project and shared our overall insights. Within each phase, we will show our approach, our key learnings, the specific turning point that changed our direction, and the key lessons that set us on our next path.

1.1 Phase 1 — Top-Down Approach

"The Consulting Phase and First Pivot"

1.1.1 Approach

We began the project on September 3, 2025, with what seemed like the natural professional starting point: a broad, top-down scan of the robotics market. We, the CSL-Honda Fellows, used CB Insights and other sources to map out 12 robotics sectors, rank them by funding activity and growth rates, and identify where capital was most active. We built sector maps, highlighted emerging trends, and tried to

identify where Honda might find the strongest opportunities in areas such as healthcare, agriculture, logistics, and construction.

As any good consultant would, we structured the ideas in mutually exclusive and collectively exhaustive ways presenting cycles and frameworks commonly discussed with new technologies. We pulled market sizing reports, summarized competitive landscapes, and asked questions such as “Which sectors are maturing fastest?” and “Where is capital flowing?” We then chose two verticals as test beds, healthcare delivery robots and agriculture crop-spraying drones, and went deeper into customer pain points, startup traction, and key players. This exercise ended up being great practice for our later work in profiling specific startups. Along the way, we drafted an early evaluation scorecard with dimensions like regulatory approvals, tech readiness, unit economics, and buyer urgency. Our hope was that Honda could use this as a filter for any robotics opportunity. The work was structured and complete, but it became apparent that a market survey was not going to drive real insights on how commercialization is achieved.

1.1.2 Key Learnings

Phase 1 showed us that a top-down view can set context, but it cannot explain how a robotics idea actually reaches production. Market sizing showed how big a segment could be, but nothing about how robots progressed from prototype to real deployments. Funding trends showed where investors were writing checks, but not why some companies earned follow-on rounds while others stalled. Sector rankings answered “what exists,” but not “what works.”

We also learned quickly that robotics behaves differently from software. Hardware is capital intensive. Integration is a substantial and sometimes dominant cost, often adding new layers of time, risk, and investment beyond the robot itself. Deployment cycles run on months, not weeks. Adoption depends on local factors that do not appear in high-level data, such as a facility’s layout, IT systems, safety policies, and workforce readiness to change how work is done.

During these early meetings, our CSL Mentors and the Honda R&D team challenged us directly. They asked how Honda would actually use the framework we were building. Were we assembling another “trend deck,” or building a way to judge real commercialization progress? Their questions made it clear that Honda did not need a list of attractive sectors. They needed a way to understand how robotics ideas succeed or stall in practice, especially in B2B settings.

For more, the two reports produced at this phase were the “Market Landscape Summary” and the “Startup Landscape Summary”, included in the files submitted at the end of this project.

1.1.3 Inflection Point: The CSL Forum

The turning point in Phase 1 came during Pittsburgh Startup Week, when the Honda team visited CMU on September 25. We went into that week planning to walk through our market maps and early framework, but once we were in the room with Kiura-san and the rest of the Honda R&D team, the format shifted. The meeting turned into a roundtable discussion, with questions, clarifications, and shared problem framing rather than a one-way briefing.

In that conversation, we worked together to clarify what “One” in “Zero-to-One” meant for Honda. Several possibilities surfaced, from funding milestones to market penetration, but the definition that

resonated was more concrete: a repeatable production line in real operations. In other words, a robotics solution that can be deployed reliably across multiple sites, not just a single pilot or demonstration. That shared definition shifted the center of the project.

After that visit, we no longer saw our primary task as choosing a promising sector. We began to ask, “How do robotics companies actually demonstrate they are ready for that level of repeatable deployment?” We adjusted our plans, stayed at Startup Week events, and treated the remaining sessions, panels, and founder conversations as our first round of primary research. By the time we reconvened as the full CSL-Honda team during the CSL Forum in late October, there was clear alignment that the real focus needed to be commercialization pathways and evidence, not just market size.

1.1.4 Forming Next Steps

Coming out of Phase 1, we decided to treat the sector maps and macro analysis as necessary background, but not as the core of the project. As a CSL-Honda team, we agreed that our next steps needed to move closer to how robotics companies and investors actually operate.

For the next phase, we committed to three specific shifts:

- Move from desk research to structured conversations with founders, VCs, operators, and connectors, using interview guides as our main tool.
- Build standardized profiles for startups and investors in a consistent “baseball card” format, capturing funding, traction, and milestones so we could compare companies side by side.
- Reframe the core question we brought into each weekly meeting from “Which market looks attractive?” to “What does evidence-based zero-to-one progress look like in robotics, and how can Honda read that progress in a consistent way?”

These decisions set up Phase 2. We moved from a consulting-style, top-down approach toward bottom-up discovery and pattern-finding, which ultimately shaped the tools and methods that form the rest of this Process Book.

1.2 Phase 2 — Bottom-Up Approach

"Zero-to-One Redefined Through People"

1.2.1 Approach

In our Phase 2 pivot bottom-up discovery, our goal was to run structured, forensic interviews with founders, venture capitalists, operators, and ecosystem connectors to uncover the actual steps companies take to move from an idea to a scalable product.

We used Pittsburgh as a primary field lab, leveraging the density of robotics activity in the region. Key interactions included the CSL Forum in late October, where we engaged with corporate innovators and early-stage teams, and the Pittsburgh Robotics Network AI & Robotics Discovery Day on November 5. At Discovery Day, we walked the floor to meet with over 200 exhibitors—including established players

like Seegrid and Thoro.ai, as well as emerging teams like Atlas Robotics—to observe how they pitched their maturity and commercial progress.

To organize this qualitative data, we built “Startup Profiles” and “VC Profiles” to standardize our comparisons. For startups, we tracked funding history, traction milestones, and the specific evidence used to raise each round. For investors, we captured their thesis, red flags, and the metrics they use to gate-keep capital. We also interviewed legal advisors, incubator directors, and program mentors to map the support structures that help early-stage robotics ventures survive.

1.2.2 Key Learnings

As we synthesized these interviews and profiles, a clear commercialization pattern emerged. Successful robotics companies do not simply launch a product; they move through a sequence of learning loops we categorized as the sequence of Discovery to Validation to Integration.

- Discovery involves finding an urgent or painful problem where customers will tolerate an imperfect early solution.
- Validation requires proving the robot can perform the job reliably in a paid pilot without constant engineering support.
- Integration means embedding the robot into the customer’s workflow, IT systems, and financial model.

We found that funding rounds often align with these transitions: Seed funding typically supports Discovery and early prototypes; Series A funds Validation in controlled pilots; and Series B and beyond fund Integration and scaling. Companies that fail to align their technical progress with these commercial milestones often struggle to raise follow-on capital. We also observed that business models like Robotics-as-a-Service (RaaS) act as risk-transfer mechanisms, shifting operational risk from the customer to the vendor, which has profound implications for cash flow and unit economics.

1.2.3 Inflection Point: The Stages Model

The turning point in Phase 2 was not a single interview, but a cumulative realization to look for the underlying structure of commercialization. Throughout late October and early November, as we reviewed more profiles and interview notes, we saw that every company could be placed on a consistent maturity ladder.

This ladder—which we refined into the Robotics Commercialization Stages Model—moves from Lab Prototype to Sponsored Environment, Controlled Pilot, First Deployment, and finally Scaling. This framework became our focus allowing the CSL-Honda team to look at any startup, regardless of sector, and instantly place it on a map of commercial maturity. It moved us beyond vague terms like “early stage” and gave us a precise, shared language to discuss progress and risk.

1.2.4 Forming Next Steps

By the end of Phase 2, we had moved from collecting individual stories to identifying repeatable structures. We agreed as a CSL-Honda team that the next phase should focus on synthesis—turning these patterns into practical tools Honda could use.

We committed to three next steps for Phase 3:

1. Refine the Stages Model: Formalize the definitions and evidence requirements for each stage of the maturity ladder.
2. Finalize the Profiles: Complete the standardized Startup and VC profiles for a core set of examples to include in the Process Book.
3. Develop the ROI Framework: Translate our learnings on RaaS and capital sales into a structured ROI and payback model (the “4+1 Levers”) to help Honda evaluate the financial viability of future robotics concepts.

These decisions set the stage for Phase 3, shifting our work from discovery to the creation of the final tools and frameworks presented in this book.

1.3 Phase 3 — Tool-Building & Synthesis

“Pulling It Together: ROI, Patterns, and Honda Fit”

1.3.1 Approach

Phase 3 was not about gathering more data; it was about making sense of what we had. By early November, we had dozens of interview insights, pages of field notes from Discovery Day, various startup profiles, and a whole host of artifacts from the project. Our challenge was to convert these individual stories into a coherent system that Honda could use.

We started by treating our profiles as a dataset. We laid them out side-by-side and looked for patterns in how companies moved from one funding stage to the next. This “forensic” work—tracing a company’s history backward from its current state to its earliest press releases—allowed us to see the commercialization journey not as a smooth curve, but as a series of specific, discrete steps.

In parallel, we tackled the hardest question Kiura-san had asked: “How do we know if the business model actually works?” The team eventually arrived at a set of operational levers that revealed the key elements for how a robotics business successfully navigates customer traction..

1.3.2 Key Learnings

As we started to model ROI, a clear pattern appeared. Successful robotics deployments answered four hard questions for the customer:

1. How fast do I see value?
2. How does this make or save money, at the unit level?
3. How does this system learn and improve over time?
4. What hidden costs, risks, or frictions sit around the robot?

From those questions, the four main ROI levers formed: Speed of Value, Profit Engine, Learning Loop, and Hidden Costs. We tested these levers against various companies like Carbon Robotics (agricultural

weeding), Seegrid (warehouse AMRs), and Gecko (infrastructure inspection). In each case, the levers revealed the core commercial risk and the evidence that mattered.

We also saw how pricing models changed the math. For capital sales, customers worried about large upfront checks and long payback periods. For RaaS, they cared more about monthly cash out and operational risk. The same robot could feel like a safe bet or a big gamble depending on how the contract was structured. That learning pushed us to treat pricing as part of the commercialization design, not an afterthought.

Finally, we realized that no model was complete without the team. Many investors told us they backed founders who could absorb feedback, pivot, and stay close to reality. That led us to add a fifth, central lever: the team's ability to learn. This fifth lever sits in the middle of the ROI framework, since every other lever depends on whether the team actually adjusts to what the market shows them.

1.3.3 Inflection Point: ROI Levers Clarify Real Value

The inflection point in Phase 3 came when we presented the first batch of startup and VC profiles, annotated with insights, to the full CSL-Honda team. For the first time, we were not only telling stories about companies, we were showing, on one page, what each company had proven, how they made money, and where their risks were.

In that session, when we walked through a company like Seegrid, we could say, in plain language: here is when they proved reliability, here is when they proved multi-site repeatability, here is when the profit engine started to work. Honda's reaction told us we had landed on the right level of abstraction. The tools were simple enough to apply to a new case, but specific enough to extract insights.

That moment shifted the Process Book from a narrative log into a practical manual, built around a short set of questions, lenses, and examples that future Honda teams can reuse in new contexts.

1.3.4 Forming Next Steps

Phase 3 taught us that tools only matter if they are both clear and readily usable. The Robotics Commercialization Stages model and the 4+1 ROI levers worked because we had tested them against real companies and adjusted them when they did not fit. They were not theories we wrote in isolation. They were reflections of what we kept seeing in real conversations.

We also learned that patterns cut across sectors. Whether we looked at agricultural robots, hospital delivery bots, or industrial AMRs, the same questions kept coming up: What job are you doing, how fast does it pay back, and what does it take to run this at scale? That gave us confidence that Honda could apply these tools beyond the exact cases in this book.

Finally, we saw more clearly what "Honda fit" could mean. It was not only about market size. It was about where Honda's strengths in manufacturing, quality, and long-term engineering matched the stages and ROI profiles of certain types of robotics companies. Phase 3 did not produce a single "answer," but it gave us a structured way to judge whether a given robotics idea, internal or external, lines up with how Honda creates value.

Part 2 — The Tools & Methods

This section introduces the core frameworks and templates we built during the project. These are the artifacts we tested, refined, and presented to Honda. Each tool appears here with enough detail to understand its purpose and structure. The full "recipes"—step-by-step instructions for building these from scratch—are available in the appendices. The goal is not to hand over a black box, but to give Honda the blueprint to recreate and adapt these tools for future robotics opportunities.

2.1 Market Mapping Method

Our market mapping started as a top-down scan of 12 robotics sectors, but we needed to go beyond simple lists. We combined quantitative data with qualitative signals to identify where real commercial traction was happening, not just where the hype was loudest.

The method involved:

- Aggregating Data from Multiple Sources: We pulled funding data, deal velocity, and growth metrics from CB Insights, Pitchbook, and Crunchbase. To ensure we weren't just looking at lagging indicators, we cross-referenced this with emerging technology reports from Gartner and focused industry deep dives from McKinsey and Deloitte.
- Applying a Strategic Filter: We didn't just rank by total dollars raised. We looked for sectors with "Capital Momentum"—where deal volume and check sizes were accelerating year-over-year—and "Deal Velocity," which indicated active investor interest rather than stale capital.
- Overlaying Qualitative Signals: The numbers only told half the story. We actively searched for press releases, pilot announcements, and customer testimonials to verify if the funding was translating into deployments. We looked for evidence of "repeatability"—startups winning multiple contracts with similar customers—rather than just one-off pilots.
- Selecting Finalists for Deep Analysis: From the initial 12 sectors, we narrowed our focus to three priority areas: Agriculture (labor scarcity driver), Healthcare (demographic shift driver), and Intralogistics (supply chain resilience driver). We chose these not just for their size, but because they showed the clearest evidence of moving from pilot to production.

The map itself is less important than the logic behind it. It shows how to move from a wide aperture (“what’s happening in robotics?”) to a focused set of verticals worth investigating, validating that opportunities are real before committing deeper resources. A summary of the results are included in **Appendix A**.

2.2 Startup Profile Template

We developed the Startup Profile Template to act as a standardized lens for robotics companies, enabling side-by-side comparison across different sectors. Unlike typical market research that focuses on funding totals or valuation hype, this template isolates the operational proof points that matter for genuine commercialization judgment.

Core Fields:

- **Company & Sector:** Defines the specific robot type and primary market application. This field moves beyond broad industry tags to pinpoint the exact problem the robot solves and the physical environment it operates in, grounding the analysis in reality.
- **Funding History & Traction:** Links each funding round to a specific verified milestone. Instead of just listing capital raised, this tracks what that capital actually bought in terms of de-risking—distinguishing between a company that funded a prototype and one that funded a repeatable sales process.
- **Commercialization Stage:** Plots the company's maturity on our 15-stage ladder, from Lab Prototype to Platformization. This provides a standardized yardstick to measure true readiness, stripping away marketing hype to reveal where the technology sits on the path to scale.
- **ROI Story:** Evaluates the business through the 4+1 Levers: Speed of Value, Profit Engine, Learning Loop, Hidden Costs, and Team. This framework forces you to look past technical specs and assess the economic engine, identifying exactly how the robot generates returns for the customer.
- **Key Risks & Evidence:** Identifies the specific commercial hurdles ahead and the evidence required to clear them. This turns vague concerns into testable hypotheses, outlining exactly what proof points (like a signed renewal or a technical benchmark) are needed to validate the next phase of growth.

This tool is designed to move analysis beyond the pitch deck. By explicitly linking funding dollars to operational milestones, the template exposes "valuation traps"—companies that have raised massive capital without proving basic unit economics—and forces researchers to articulate the hidden costs (like installation and training) that often kill robotics deals. Testing this template with companies like Seegrid, Carbon Robotics, and Gecko Robotics revealed immediate patterns, clarifying which companies had proven repeatability versus those still stuck in "pilot purgatory," and exposing the difference between theoretical ROI and actual unit economics. The set of completed profiles is available in **Appendix B**.

2.3 VC Profile Template

We designed the VC Profile Template to capture the decision-making logic of investors, revealing not just what they invest in, but why. This tool helps Honda decode the signals behind capital allocation, moving beyond a simple list of funds to understand the strategic intent driving the market.

Core Fields:

- **Firm & Fund Size:** Identifies the investor's scale, location, and typical check size. This contextualizes their financial capacity and investment horizon, distinguishing between early-stage partners who tolerate risk and growth-stage firms that demand scale.
- **Thesis & Stage Focus:** Articulates the firm's specific investment philosophy. This clarifies the market gaps they are betting on, separating generalist investors from those with deep, sector-specific conviction in robotics or automation.
- **Key Robotics Bets:** Highlights the portfolio companies they champion as success stories. This reveals their actual risk appetite and success criteria, providing concrete examples of the business models they believe will win.
- **Red Flags:** Lists the specific factors that cause them to walk away. This uncovers the often unspoken deal-breakers, such as weak unit economics or cap table issues, that immediately disqualify a startup regardless of its technology.
- **Evidence Expectations:** Defines the exact proof required at each funding stage. This establishes the concrete benchmarks, such as pilot retention rates or revenue thresholds, that act as the gatekeepers for releasing capital.

We validated this template through interviews with firms like Magarac Venture Partners, Techable, and Interwoven Ventures. These profiles exposed the rigorous filters investors use to separate viable businesses from cool science projects, providing Honda with a powerful lens for evaluating future partners or acquisition targets. The completed profiles are available in **Appendix C**.

2.4 Robotics Commercialization Stages Model

The Robotics Commercialization Stages Model is a maturity ladder from lab to platform. It maps how robotics companies typically progress on safety, reliability, repeatability, economics, and finally software leverage. We found this same sequence echoed in real companies as we built startup profiles and applied the forensic method.

For the Process Book, we group the progression into linked stages:

- **Lab Prototype:** A functional system that works in controlled conditions, often with engineers nearby. The goal is to prove the core technical approach is real. This is usually funded by pre-seed or early seed capital.
- **Customer Validation and Sponsored Environments:** The robot moves into a real customer setting, such as a warehouse aisle or plant floor, typically under supervision. One or more sponsor customers validate the problem is real and the robot can operate outside the lab.
- **Controlled Pilots:** The system runs repeated jobs in a live workflow, with measured uptime and performance. This is where projects shift from stunts to operations. Seed and Series A rounds often fund this step.
- **First Commercial Deployments:** The company ships production units into the field, with paying customers and clear service expectations. Revenue is modest, but the robot is doing real work on a recurring basis. Investors start to assess it as a business, not just a research effort.
- **Manufacturing and Scaling:** Once deployments work, the bottleneck becomes building and supporting more units. Capital goes into manufacturing, QA, supply chain, and regional support. Team composition tilts toward operations and delivery.
- **Sales, Support, and Multi-Site Fleets:** The company adds sales and customer success teams, service depots, and fleet management tools. Robots are deployed across multiple customers and geographies, and the focus turns to reliability, uptime, and unit economics at scale.
- **Second Product and Vertical/Platform Expansion:** After enough field hours, the team designs second-generation hardware and expands into new SKUs, software layers, or adjacent verticals. Some companies begin to look like platforms, with APIs, add-on modules, and integrations. Later rounds typically fund this expansion.

Across our cases, we saw funding rounds cluster around jumps in this ladder: early money pushed companies from lab to pilots, A and B rounds funded first deployments and manufacturing, and later rounds supported fleet scale, new regions, and second products. The value for Honda is a shared language: instead of calling a company “early” or “mature,” the CSL-Honda team can ask, “Which stage are they in, what evidence do they have for that stage, and what would the next round of capital need to prove?” You can see how these stages are noted under the “Traction” section of the Startup Profiles in **Appendix B**.

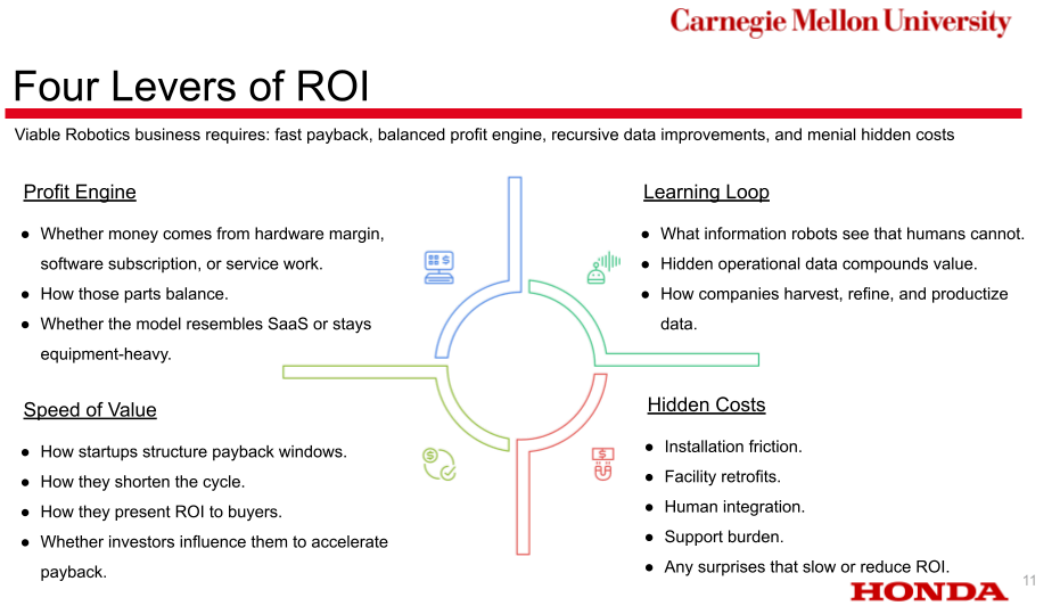
2.5 The 4+1 ROI Levers

The 4+1 ROI Levers form the core lens for evaluating any robotics opportunity. This framework moves beyond simple cost-benefit analysis, turning commercialization stories into structured assessments that reveal whether a robot can actually scale in a real business environment.

The Levers:

- **Speed of Value:** This measures the time gap between "unboxing" and "ROI." A short time-to-value reduces the customer's risk perception and speeds up the sales cycle. The critical metric is whether the customer sees a benefit in hours, days, or weeks.
- **Profit Engine:** This analyzes the unit economics, identifying exactly how the robot makes or saves money per task. Whether it replaces labor or increases throughput, the margins must be sufficient to cover the cost of the robot and its support.
- **Learning Loop:** This assesses how the system improves over time. A static robot is a depreciating asset; a learning robot is an appreciating asset. Success requires evidence of data collection, software updates, and autonomy gains that make the product better the longer it is deployed.
- **Hidden Costs:** This exposes the friction that kills deals. "Drag coefficients" like site retrofitting, heavy IT integration, complex operator training, and downtime often remain invisible in the sales pitch but destroy the actual ROI.
- **Team (The "+1"):** This evaluates the human element—the team's ability to navigate the "Valley of Death." A great technology with a rigid team will fail; a good technology with an adaptable team will find a way to win. The focus is on their ability to learn, pivot, and respond to harsh reality.

We derived this framework from our interviews with investors and founders who repeatedly cited these factors as the difference between science projects and viable businesses. These five levers serve as a grading rubric for every startup. If a company scores high on technology but low on "Speed of Value" or "Hidden Costs," it is likely a research project, not a commercial partner.



2.6 RaaS: Pros and Cons for ROI and Payback

Robotics-as-a-Service (RaaS) replaces a large upfront robot purchase with a recurring fee that covers hardware, software, uptime, and service. You can think of it as paying for access and performance over time instead of owning the asset on day one. This structure changes how both customers and vendors think about ROI, payback periods, and operational risk.

RaaS can improve adoption and ROI thinking for customers:

1. RaaS lowers the customer's hurdle. Customers avoid a six-figure capital purchase and instead face a monthly operating expense that must beat monthly labor savings. This shortens the psychological payback window and often speeds internal approval.

2. RaaS shifts risk to the vendor. Customers expect uptime, maintenance, and updates to be included. If the robot underperforms, they can cancel the contract, which pushes vendors to deliver steady gains in reliability and performance.

3. RaaS makes pilots easier. Customers can start with one robot for a limited period, then expand if it works. If it fails, they walk away. This reduces friction in early adoption.

4. RaaS creates clearer ROI math. Monthly cost versus monthly savings simplifies the value case. Customers can compare the subscription to hourly labor costs, overtime, error rates, and downtime.

5. RaaS spreads cost across the contract. Instead of one large payment, customers pay for usage over time, which helps operations teams in environments with tight cash flow or uncertain volumes.

The same features create real risks for vendors:

1. A lower hurdle can mean weak commitment. Easy entry makes some customers casual about design, integration, and process change, so robots remain "nice to have" and get cancelled at the first sign of trouble.

2. Risk on the vendor can crush margins. Vendors carry hardware, uptime, and service cost, so if pricing chases adoption, every new unit can add cash burn instead of profit.

3. Easy pilots can trap vendors in pilot mode. Customers may run many small trials, request tweaks, and never standardize, leaving the vendor supporting scattered one-off deployments.

4. Simple ROI math can hide real costs. A clean monthly-fee-versus-labor-savings story can ignore retrofits, IT work, layout changes, training, and internal politics, so the spreadsheet looks good while the factory experience does not.

5. Spreading cost out can load risk onto one balance sheet. Vendors often pay upfront for fleets of robots concentrated in a few large accounts; if a major customer walks away, they can be left with stranded hardware and no secondary market.

2.7 ROI & Pricing Thinking

This section focuses on the financial structure of robotics deals. We learned that how you price a robot changes the entire risk profile for the customer.

Capital Sale vs. RaaS:

- **Capital Sale:** Customer buys the robot upfront. The payback period is long, but the robot is an asset. The risk is on the buyer.
- **RaaS (Robotics-as-a-Service):** Customer pays monthly. The payback is immediate (or non-existent), but the startup bears the risk of uptime and performance.

We built a simple ROI model that calculates payback based on labor replaced, uptime, throughput, and error reduction. For example, a warehouse AMR that replaces one $40k/year worker and runs 22 hours/day at 95% uptime has a 14-month payback at a $60k price point. The same robot on a RaaS model at $2k/month shifts the risk to the vendor but requires the vendor to have strong service operations and working capital. The model is simple, but it forces you to be honest about assumptions.

2.8 Dimensions of Startup Profiles

While the Startup Profile Template standardizes data collection, true insight comes from analyzing how companies differ across structural dimensions. Through our profiling work, we identified eight key variables that define a startup's commercial character. We recommend evaluating every potential robotics partner or investment against these dimensions:

- **Industry:** Is the company operating in a regulated, high-stakes environment (healthcare, aviation) or a cost-driven, labor-scarce sector (agriculture, construction)? This dictates the pace of adoption and the tolerance for failure.
- **Revenue Model:** Does the company sell hardware (CapEx), reliable labor (RaaS/Subscription), or outcomes (Service Fees)? This determines who the buyer is and which budget line item pays for the robot.
- **Tech Stack:** Is the core value in the physical hardware (precision systems), the autonomy kit (retrofits), or the cloud logistics layer? This reveals where the "moat" truly sits.
- **Customer Adoption Barrier:** What stands between the pilot and the fleet? Is it regulatory approval, physical infrastructure changes, or a fundamental redesign of human workflows?
- **Repeatability and Scale:** How does the company grow? By cloning physical hubs, deploying identical units across similar sites, or expanding into new software-enabled capabilities?
- **Investor Signal and Maturity:** Is the company funded to survive a long R&D cycle (Deep Tech), or is it expected to hit commercial metrics immediately (Applied Robotics)?
- **Data Loop:** What proprietary data does the fleet generate? Does this data improve the robot's performance (autonomy loop) or provide new insights to the customer (analytics loop)?
- **Unit of Repeatability:** What is the fundamental atom of scaling? Is it a single robot, a full work cell, a facility, or a regional network? Understanding this unit is critical for modeling accurate unit economics.

By comparing opportunities along these dimensions, Honda can move beyond generic assessments of "quality" and instead diagnose the specific structural fit of a startup within its broader strategy.

2.9 Interview Guides

We designed the Interview Guides as field tools to standardize qualitative research. Rather than relying on unstructured conversation, these guides force a disciplined extraction of data, ensuring that every interview yields comparable insights mapping directly to Honda's commercialization questions.

Founder Guide Core Questions:
These questions bypass the sales pitch to expose operational reality:

- **Origin Story:** "How did you get started—tech first or customer problem first?" This reveals whether the company is searching for a problem or scaling a verified solution.
- **The Pivot:** "What was the inflection point that changed your company's trajectory?" This identifies the specific moment the company moved from R&D to commercial traction.
- **Time-to-Value:** "How quickly can you prove ROI?" This connects directly to the "Speed of Value" lever, determining if the sales cycle is scalable (weeks) or consultative (years).
- **Business Model:** "How do you make money across hardware and software?" This validates the "Profit Engine," separating hardware sellers from recurring revenue businesses.
- **Ops Strategy:** "How do you use data to continuously increase that ROI?" This probes the "Learning Loop," checking if the robot creates an accumulating data advantage.
- **Friction Points:** "What hidden factors erode ROI in practice?" This uncovers the "Hidden Costs"—like site retrofitting or training—that often kill deals post-contract.

VC Guide Core Questions:
These questions decode the signal behind the capital:

- **Investment Thesis:** "What is your thesis for robotics?" This separates generalist investors from sector specialists who understand hardware capital cycles.
- **Deal Breakers:** "What red flags make you walk away?" This provides a checklist of warning signs, such as cap table issues or weak unit economics.
- **Traction Definitions:** "What does a 'good' pilot look like?" This standardizes success, distinguishing between free "science project" pilots and paid, repeatable deployments.
- **Founder Assessment:** "How do you judge team quality?" This addresses the "+1" lever, offering criteria for evaluating resilience during the "Valley of Death."

The Evidence Framework:
To ensure rigor, we applied a **Hypothesis → Test → Evidence → Decision** schema to every interview. This mirrors the scientific method, keeping focus on forensic history rather than future promises. This framework turned loose conversations into structured data, allowing for direct comparison of companies across different sectors using the same commercial yardstick.

Part 3 — Reflections & Guidance for Future Teams

This section is what we, the CSL Fellows, would tell the next Honda team starting a similar exploration. It is not a checklist. It is a set of practical heuristics, traps to avoid, and hard-won insights that emerged from our 15-week journey.

3.1 What the Journey Reveals About Zero-to-One at Honda

Zero-to-one in robotics is messy. It is not a straight line from idea to product; it is a series of loops, dead ends, and pivots. The companies we studied did not succeed because they planned perfectly. They succeeded because they learned faster than their capital ran out.

The questions you start with will not be the questions you end with. We began by asking which sector Honda should enter. We ended by asking how to tell whether a robotics idea is ready to scale. That evolution is not a failure of planning; it is a feature of real discovery.

Tools like the Robotics Commercialization Stages model and the 4+1 ROI Levers do not constrain your thinking—they orient it. They give you a shared language to discuss maturity, risk, and evidence. But they are not a substitute for judgment. Use them to ask better questions, not to avoid questions altogether.

Value emerges through iteration, not planning. The survivors treat their first pilot as a learning experiment, not a proof point. They build feedback loops directly into their product and business model. Honda can do the same by treating early robotics projects as hypothesis tests rather than product launches.

3.2 What Surprised Us

Three insights fundamentally shifted our perspective during this project.

- Integration determines success, not the robot. The robot is often the smallest line item. The real risk is making it work inside a live facility. We saw companies with brilliant technology fail because they underestimated the time and money required to connect their robot to a customer's Warehouse Management System (WMS), train operators, and handle edge cases. Honda's internal strength in manufacturing and systems integration is a major competitive advantage here.

- VCs admit what they don't know. Investors repeatedly told us they walk away from deals where the founder cannot articulate the path from pilot to production. They don't demand a perfect plan, but they demand a credible story about how the next round of capital will de-risk the next commercial milestone. This discipline—funding milestones, not just technology—is something Honda can adopt internally.

- Failure is planted early. Struggling companies often share the same origin story: they fell in love with their solution before understanding the customer's problem. Successful ones did the opposite. They spent months on the floor, watching how work actually gets done, before writing a line of code or machining a part. That customer-first orientation is the primary predictor of survival.

3.3 Practical Heuristics for Future Teams

If we were starting this project again, here is what we would do differently.

- Start with the customer, not the robot. Before evaluating a technology, spend time on the floor where it will be used. Watch the work. Talk to operators. Understand the P&L of the process you are changing. Understand how your customer’s customers pay them—that is the funding source for your solution. The best robotics ideas come from pain points paired with capital savings, not just new technology.

- Use the tools as a forcing function. When reviewing a startup, fill out the Startup Profile Template. When talking to a founder, use the Interview Guide. When sizing an opportunity, apply the 4+1 ROI Levers. These tools are only useful if they force you to be specific and evidence-based.

- Trap to avoid: The Demo Trap. A robot that works in a showroom is not a robot that works in a warehouse. Demand to see the robot in a real environment, running a real job, for a real shift. If the company won't show you that, they either don't have it or they don't trust it. Both are red flags.

- Trap to avoid: The Partnership Trap. Many startups promise a "strategic partnership" with Honda. This is often code for "we want your brand and distribution because we haven't proven the robot works yet." Treat partnerships like pilots: define success metrics, set a timeline, and be ready to walk away if the evidence doesn't show up.

Key questions to ask when evaluating a new robot/sector:

- What is the repeatable job this robot does, and how often does it need to do it?
- What is the customer's target payback period, and what evidence exists that the solution works?
- What is the integration cost and timeline, and who pays for it?
- What is the learning loop—how does the robot get better over time?
- What is the team's track record of adapting to feedback?

The tools in this book are ready to be applied. Honda can use them to evaluate internal R&D projects, screen potential partners, or assess acquisition targets. The next logical step is to run a pilot project using these frameworks. Pick one robotics idea, fill out the templates, conduct the interviews, and see what the evidence tells you. The goal is not to find a perfect answer, but to build the muscle for making better decisions, faster.

3.4 A Note on Alternate Futures

The path from zero to one depends on the story we tell about work and automation. We looked beyond technical roadmaps and considered how shifting mental models will dictate commercial success.

- The AI-First Future: A world where AI capability outpaces physical engineering. Value shifts entirely to software, simulation, and teleoperation layers that direct the hardware. The physical robot becomes a commodity, and the business model resembles a service provider managing intelligent fleets rather than a manufacturer selling machines.
- The Return to Craft: A world that rejects the "replace the human" dogma. After decades of digital abstraction, culture shifts toward valuing physical presence and skill. Success here belongs to "cobots" that empower workers rather than displace them—tools that extend a welder's career rather than ending it.
- The "Boring" Future: A capital-constrained world where the speculative projects die. Interest rates stay high, and investors demand immediate cash flow. The only robots that survive are the strictly utilitarian, invisible ones—the floor scrubbers and pallet movers—that pay for themselves in 12 months.

Since no single future is guaranteed, the strategy must be agility. Whether the future is defined by infinite AI or scarce capital, the fundamental question remains constant: Does this machine create more value than it consumes?

Treating robotics purely as a technology problem leads to being blindsided by culture and economics. Treating it as a human problem—one of trust, value, and work—reveals the path to scale.

Appendix A: Market Research Scan – The 12 Sectors

This page summarizes the 12 robotics sectors we initially scanned to identify high-potential commercial opportunities for Honda. This broad aperture allowed us to filter industries based on capital momentum, technological maturity, and alignment with Honda's strategic strengths before narrowing down to our final focus areas.

Priority Sectors (Deep Dive Finalists): These three sectors were selected for deeper analysis due to strong commercial traction and clear "zero-to-one" pathways.

- Intralogistics: Autonomous mobile robots (AMRs) and automated storage systems optimizing warehouse operations. Driven by e-commerce growth and labor shortages.
- Agriculture: Robotics for planting, weeding, and harvesting. Driven by severe labor scarcity and the need for precision chemical reduction.
- Healthcare: Delivery robots and surgical assistants. Driven by an aging population and hospital staffing crises.

Secondary Sectors (Monitored): These sectors showed promise but faced higher regulatory barriers or longer adoption timelines during our scan.

- Construction: Automated machinery for excavation, bricklaying, and site layout. High potential but slowed by complex, unstructured environments.
- Last-Mile Delivery: Sidewalk and aerial drone delivery for food and packages. High regulatory friction and public acceptance challenges.
- Manufacturing (Cobots): Collaborative robots working alongside humans. A maturing market with heavy competition.
- Inspection & Maintenance: Robots for monitoring critical infrastructure (energy, oil & gas). Strong ROI but niche applications.

Emerging & Long-Horizon Sectors: These areas represent high-risk, high-reward opportunities that are largely in the R&D or early pilot phase.

- Humanoids: General-purpose bipedal robots. Currently at the "Peak of Inflated Expectations" with massive capital but unproven commercial utility.
- Consumer/Home: Domestic robots for cleaning and companionship. High cost sensitivity and privacy concerns limit rapid scaling.
- Defense & Security: Autonomous systems for surveillance and logistics. High government spending but distinct ethical and contracting hurdles.
- Food Service: Automated cooking and serving kiosks. Gaining traction in fast food but struggling with reliability and menu complexity.
- Underwater/Marine: Autonomous underwater vehicles (AUVs) for exploration and infrastructure repair. A specialized, capital-intensive niche.

For the full detailed analysis, including market sizing, key players, and specific trend data, please refer to the Market Landscape Summary deliverable included in the project documents.

Appendix B: Full Startup Profiles

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1. Gecko Robotics
2. Carbon Robotics
3. Gather AI
4. Skild AI
5. Aquatonomy
6. Seegrid
7. Thoro
8. Atlas Robotics
9. Zipline
10. CMY Surgical
11. Moon Surgical
12. Built Robotics
13. Naio Technologies
14. Chef
15. Bossa Nova

gecko robotics

Founded 2013 (Pittsburgh, PA)

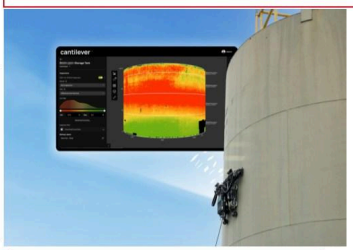
Total Raised: $345M
Revenue FY 2024: $43.8M (14.45x)
Valuation 2025: $1.25B
Investors: Cox Enterprises; US Innovative Technology Fund (USIT), XN, Founders Fund, Y Combinator

Sector: Industrials / Manufacturing Tech / Inspection & monitoring robots

Target Market: Heavy industry (power generation, oil & gas, manufacturing), maritime & defense, infrastructure

Founders' Background: Two co-founders with B.S. degrees.

Description: Wall-climbing robots inspect industrial infrastructure (storage tanks, power plants, ships) to collect data and identify corrosion, weld defects and structural anomalies, preventing costly shutdowns and safety risks.



Round	Seed	Series A	Series B	Series C	Series C-II	Series D
Date	3/24/2016	8/20/2018	12/16/2019	3/3/2022	12/5/2023	6/12/2025
Money Raised	$0.12 M	$7 M	$40 M	$73 M	$100 M	$125 M
Traction	Prototype, early demos	controlled pilots, first production to customers	Revenue, deployments,	Production scaling	Software differentiation	Customers across verticals, geographic expansion

Growth Arc: (Classic robotics commercialisation) initial prototype/pilot work (2016) [1], first commercial deployment (2018) [2], scaling hardware + operations (2019–2022) [3] [4], then strong translation into high-value enterprise/defense (2023–2025) [5] [6].

Key Changes: The shift from hardware-only inspection robotics to a combined hardware + AI platform (Cantilever) appears to be the inflection point that enabled large military/industrial contracts and majority commercial traction [5]. "Robot-enabled-software-company."

Key variables: functional hardware in unstructured industrial environments, credibility of inspection data (especially in defence settings), ability to service high-barrier customers (utilities, military) and scale globally.

Takeaways: Gecko highlights that success often comes after the pilot and early deployment phase — the value unlock happens when the system transitions into enterprise-scale service and data platform [4]. Monitoring the "data platform + service" layer is important. Gecko focused not just on selling robots, but on building layered services and data assets; partnered with infrastructure/defence customers early; engineered for certification and reliability early.

CARBON ROBOTICS

Founded 2018 (Seattle, WA)

Total Raised: $214M
Revenue FY 2024: -
Valuation 2025: $352M
Investors: Bond, NVentures, Anthos Capital, Sozo Ventures, Ignition Partners, Voyage Capital, Revolution, Fuse VC

Sector: Industrials / Machinery & Equipment / AgTech

Target Market: Large specialty crop farms in the United States and Europe

Founders' Background: Two founders - one is Ex-Uber an Ex-Meta. Current CEO is Ex-Uber

Description: Autonomous laser-weeding machines for large vegetable and specialty crop farms. The platform targets labor shortages, herbicide resistance, and soil health damage from chemical use. The robots identify and destroy weeds with computer vision and high-powered lasers while avoiding crops.

Round	Seed	Series A	Series B	Series C	Series C-II	Series D	Series D-II
Date	1/4/2019	9/13/2019	9/1/2021	4/11/2023	12/1/2023	10/21/2024	10/2/2025
Money Raised	$0.9 M	$9 M	$27 M	$30 M	$50 M	$70 M	$21 M
Traction	Prototype, trials	Pilot, early product for US farmers	Revenue, fleet reliability benchmarks	Scaling, regional expansion	Sales & Hiring, partnerships	Geographic Expansion	Expanding Product line

Growth Arc: initial prototype and early field trials (**2019**) [1], pilot deployments with US specialty crop farmers (**2019**) [2], first production LaserWeeder units and commercial traction (**2021**) [3], regional growth and increased demand (**2023**) [4], and platform expansion with multiple robotic products (**2025**) [5].

Key Changes: The shift from a single hardware product to a robotics platform using AI for targeted weed destruction and farm automation appears to be the inflection that enabled significant backlog growth and a path to multiple product lines [3].

Key variables: durability in harsh agricultural environments, accuracy of plant recognition at commercial speeds, the ability to replace chemical herbicides, and factory throughput for hardware delivery.

Takeaways: Value unlock occurs when autonomous hardware is paired with repeatable service and software updates that reduce labor and chemical costs at scale [4]. Monitoring how AI improves performance over time is important. Focus on chemical-free value propositions, work with large specialty growers early, build service models that reduce downtime, and treat the robot as an AI platform with continuous upgrade cycles [5].

GATHER AI

Founded 2017 (Pittsburgh, PA)

Total Raised: $34.5M
Revenue FY 2024: $18.7M (2.1x)
Valuation 2025: $75M
Investors: Bain Capital Ventures, Tribeca Venture Partners, Bling Capital, Xplorer Capital

Sector: Industrials / Warehousing & Logistics Tech / Inventory drone providers

Target Market:

Founders' Background: CMU PhD in Robotics

Description: Gather AI focuses on warehouse inventory management using drones and computer vision technology in the logistics industry. It provides data collection and insights for inventory intelligence, allowing visibility and control.

Round	Seed VC	Seed VC - II	Series A	Series A - II
Date	1/1/2019	1/1/2021	10/6/2022	3/27/2024
Money Raised	$2.5 M	$5 M	$10 M	$17 M
Traction	Prototype feasibility	Pilot, controlled environments, early revenue	Multi-site commercial. subscription revenue	Operational scaling. Upgraded software

Growth Arc: prototype development in warehouse test environments (**2019**) [1], accelerator support to improve enterprise pilots (**2020**) [2], commercial deployments with multi-site warehouse operators (**2022**) [3], expanded use of AI-driven analytics and enterprise rollouts (**2024**) [4].

Key Changes: the shift from drone-only inventory scanning to a computer vision analytics platform improved accuracy reporting and helped standardize data across multiple warehouses, which increased enterprise adoption [3].

Key variables: consistent computer vision performance in low visibility conditions, integration with warehouse management systems, fleet reliability, downstream analytics accuracy, and compliance with indoor autonomy rules.

Takeaways: build the data platform early, link output directly to operational decisions, integrate into existing enterprise systems to reduce switching costs, and validate performance at commercial scale across multiple customer sites [4].

SKILD AI

Founded 2023 (Pittsburgh, PA)

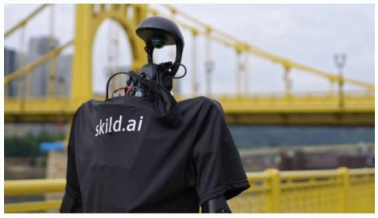
Total Raised: $814M
Revenue FY 2024: -
Valuation 2025: $4.5B
Investors: Softbank, Amazon, Bezos Expeditions, Carnegie Mellon, Sequoia Capital

Sector: Industrials / Machinery & Equipment / Robotics

Target Market: Sectors that require automation and robotics solutions, including construction, manufacturing, and security.

Founders' Background: Two co-founders, both ex-Facebook researcher and both currently faculty at CMU

Description: Skild AI develops embodied systems in the robotics industry. The company offers a robotics foundation model, known as Skild Brain, which is designed to adapt across various hardware and tasks.



Round	Seed	Series A	Series B
Date	1/1/2023	7/9/2024	6/12/2025
Money Raised	$14.5 M	$300 M	$500 M
Traction	Prototype, early demos	First production, revenue, manufacturing	Scaling, partnerships, geographic expansion

Growth Arc: founded in 2023, then out of stealth with a 300 million dollar Series A at a 1.5 billion dollar valuation in July 2024 [1][2][3][4][5][6]; in 2025, Nvidia and Samsung take minority stakes, reported as roughly 35 million dollars combined, to support expansion of a general-purpose robot "brain" [7][8][9][10].

Key Changes: positioning shifts from "stealth robotics" to a foundation-model platform for physical tasks across many environments, with Lightspeed, SoftBank, Coatue, Bezos Expeditions, and others backing that thesis in 2024 [2][3][5]; by mid-2025 the company adds strategic investors Nvidia and Samsung, signaling a push on compute access and potential device partnerships [7][8].

Key variables: scale and quality of training data for general-purpose manipulation and navigation [5], availability of compute to train and serve the model at enterprise latencies [2][7], and the firm's ability to convert platform claims into field performance across many robot types [3][5].

Takeaways: Skild is an infrastructure-style bet on a common robot brain rather than a single device, backed by large 2024 capital and 2025 strategic stakes [2][7]; for a partner evaluating this space, track model capability across tasks, cost to deploy on third-party hardware, and access to compute and data channels with chip and device makers [3][5].

AQUATONOMY

Founded 2021 (Pittsburgh, PA)

Total Raised: $70K
Revenue FY 2024: -
Valuation 2025: -
Investors: Innovation Works, Robotics Factory, Duquesne New Venture Challenge

Sector: Underwater autonomy / inspection robotics / infrastructure monitoring

Target Market: Owners and operators of critical submerged infrastructure (hydropower plants, dams, locks, maritime vessels, piers)

Founders' Background: Robotics scientists and engineers with deep experience in underwater robotics, vision systems, and infrastructure asset inspection

Description: Aquatonomy builds autonomous underwater robotic systems that perform high-resolution 3D scanning in any visibility condition, generating digital twins of submerged structures so infrastructure owners can reduce downtime, avoid safety risks, and make confident maintenance decisions.

Round	Seed + Incubator	Competition
Date	6/22/2023	5/1/2024
Money Raised	$0.05 M	$0.02 M
Traction	Prototype, early demos, first production and Pilot study	Early customer validation

Growth Arc: Aquatonomy began by building underwater robots for complex inspections in GPS-denied aquatic environments[1]. It then entered pilot projects with infrastructure owners in 2024-25[2], and now it is scaling operations toward service and data-platform offerings for submerged critical infrastructure[3]. Michael Kaess described their goal as "moving from scientist-assembled prototypes to technician-built products," signaling a shift from R&D to repeatable production.The team validated real-world pain points through NSF i-Corps and direct field immersion—Xiaoyu Kaess even became a certified commercial diver to "see what customers see" underwater.

Key Changes: The company shifted from hardware-only underwater vehicles to a full stack that includes autonomy, robotics hardware, and high-fidelity 3D data analytics[4]. This enabled Aquatonomy to secure enterprise contracts rather than just one-off sales. The founders see data, not the robot, as the long-term asset—proof that robotics value is unlocked only when hardware evolves into a scalable service + data platform.

Key Variables: Reliable robotic performance in zero-visibility, underwater conditions[1], quality of scanned data and digital twins for decision-makers[2], and the ability to win and scale contracts with asset-heavy customers such as dam operators[3]. Their early focus on hydropower provided a stable, regulated beachhead for recurring Robotics-as-a-Service contracts.

Takeaways: The real value in robotics is unlocked not just by the machine, but when the system evolves into a service + data business[4]. For Honda's robotics strategy, this means focusing beyond the hardware: build for harsh real-world deployment, partner with infrastructure/defense clients early, and plan for scalable service delivery.

SEEGRID

Founded 2003 (Pittsburgh, PA)

Total Raised: $251M
Revenue FY 2021: $70M (5.52x)
Valuation 2025: -
Investors: G2 Ventures, Spark Ventures, Plug and Play, Innovation Works
Known customers: General Motors, Whirlpool, Boeing, 3M, Procter & Gamble, Amazon, DHL

Sector: Industrial Robotics – Autonomous Mobile Robots (AMRs) for Material Handling

Target Market: Automotive, logistics, and manufacturing companies with indoor material flow needs.

Founders' Background: **Scott Friedman** (original founder, ex-**CMU Robotics**). **Jim Rock** (since 2014; not a founder, **ex-Innovation Works**, tech commercialization background)

Description: Seegrid builds vision-guided autonomous mobile robots (AMRs) that move materials within manufacturing and warehouse environments. The robots use proprietary 3D vision and mapping technology instead of LiDAR to navigate facilities safely without infrastructure changes.

Round	Debt	Pre-Seed	Seed	Series A	Series B	Series C	Series D	Series D-II	Series D-III
Date	2003–2014	2/24/2015	4/24/2016	3/25/2020	9/15/2020	7/11/2022	7/6/2023	9/5/2024	10/2/2025
Money Raised	~24 M	$11.12 M	$14. M	$25 M	$27 M	$30 M	$32 M	$50 M	$25 M
Traction	Early R&D runway	Vision tech validation	Revenue growth. Giant Eagle shareholder	New product development	Workforce increases	Multi-site expansion	Software platform launch	Enterprise integrations grow	Global fleet expansion

Growth Arc	Key Changes	Key Variables	Takeaways
- From CMU spinout into a leading AMR supplier. - **It spent a decade perfecting 3D vision navigation** before scaling deployments with major manufacturers. - By 2020, it had more than 1,000 robots in service and began layering in analytics and fleet software. - From 2022 onward, it shifted from single-site automation to multi-plant platforms. "We've now sold to all of Honda's tier-one suppliers—everywhere they go, they see us," said a company rep, underscoring its deep industrial reach.	- Moved from **hardware maker to automation platform.** - Adopted the **VDA 5050** protocol to unify robot communication and reduce costly warehouse integrations. - The company standardized deployments, introduced digital twins, and focused on enterprise scalability—transitioning from bespoke installs to repeatable automation templates.	- Growth hinges on **reliability, interoperability, and integration cost.** - Each factory has unique layouts, so they balance flexible navigation software with controlled product scope. "We move stuff around inside the building—indoors only." Its ability to automate complex, aging facilities remains its competitive edge.	**Discipline and focus outperform diversification** in industrial robotics. By perfecting **indoor material movement** and leading the shift to **standardized fleet control**, it turned reliability and communication standards into long-term competitive advantage.

thoro.ai

Founded 2020 (Pittsburgh, PA)

Total Raised: $18.8M
Revenue FY 2024: -
Valuation 2025: -
Investors: Carnegie Robotics
Known Customers: Nilfisk, Carnegie Mellon facilities, airport and retail pilot sites

Sector: Industrials / Machinery & Equipment / Robotics

Target Market: Platform is used by leading OEMs across industries such as retail, education, logistics, healthcare, airports, and event centers. Flagship deployment powers the Nilfisk SC50, autonomous floor cleaning machine.

Founders' Background: Leadership includes **Pat Mondi, CEO (**Ex-Lime, -Uber**)** and **Daniel Beaven, CFO (ex-Carnegie Robotics and Argo AI)**. Roots in perception, autonomy, and safety-critical robotics.

Description: Thoro is a **software-first** robotics company that provides OEMs with a complete **autonomy platform** - including safety-certified navigation, cloud infrastructure, and fleet management tools - enabling rapid deployment of autonomous industrial equipment.

Round	Spinoff	Seed	Series A	Later Stage VC
Date	8/31/2020	3/19/2021	5/16/2023	2/23/2025
Money Raised		$6 M	$7 M	$6 M
Traction	Carnegie Robotics spinout	Technology validation	OEM partnerships	Commercial scaling

Growth Arc	Key Changes	Key Variables	Takeaways
- CMU Robotics spin-out into a key autonomy supplier for industrial OEMs. - First partnership with **Nilfisk** brought the Liberty SC50 scrubber to market, followed by **Big Joe Forklifts** for pallet-moving AMRs. - By 2024 the company was delivering full commercial deployments across customer fleets. - Trajectory—**lab prototype → OEM validation → product integration → commercial rollout** (disciplined scaling through channel leverage rather than direct sales)	**- Shifted from direct robot manufacturing into an OEM integration model**, embedding its autonomy stack into existing industrial equipment rather than competing with established equipment makers. - Product focus went from cleaning/disinfection machines to general material-handling autonomy across industrial OEMs	- Ability to achieve and maintain **safety certification** for human-robot interaction remains a critical adoption factor in facilities with live operators. - Stability of **OEM partnerships** and the smoothness of **technology integration** across diverse hardware platforms and facility environments significantly influence deployment cost and scale	**- Partnering with established OEM equipment manufacturers can accelerate adoption in industrial robotics**. - By focusing its autonomy technology on live human-occupied environments and building a credible safety and integration track record, it positions safety-validated autonomy as a differentiator beyond warehouse automation.

ATLAS ROBOTICS

Founded 2021 (in Turkey, now based in Pittsburgh, PA)

Total Raised: $3.5 M
Revenue FY 2024: -
Valuation 2025: -
Investors: Magarac Venture Partners, ScaleX Ventures

Sector: Automated guided vehicles (AGVs) & autonomous mobile robots (AMRs)

Target Market: Warehouses, manufacturing plants, logistics hubs; use-cases include pallet transport, trailer unloading, put-away, cross-docking.

Founders' Background: **Çetin Meriçli**, Co-Founder & CEO (**ex-Locomation**) long technical career in robotics. **Tekin Meriçli**,Co-Founder & CTO, held post-doctoral robotics role at the Carnegie Robotics Institute

Description: Their unique approach uses AI, sensor fusion and flexible navigation to handle unstructured, real-world facility conditions using artificial-intelligence-guided vehicles (AIGVs) that transport pallets in dynamic industrial environments, solving the problem of labor-intensive, inefficient material movement in warehouses.

Round	Seed VC	Seed
Date	2/14/2022	1/31/2025
Money Raised	$0.75 M	$2.77 M
Traction	Prototype	Pilot

Growth Arc	Key Changes	Key Variables	Takeaways
- Began by developing a prototype of a smart pallet-handling vehicle capable of trailer unloading and put-away. - In 2022 the company secured its seed round and **tested early pilots in warehouse environments**. - By 2025 it raised a larger round (~$2.77 M) to support production rollout of its AIGV platform.	- **Shift from purely hardware mechanics toward a full AI-guided vehicle stack** (software + sensors + navigation). From structured facility use-cases (perfect environments) toward operations in dynamic, real-world facilities (uneven floors, misaligned pallets)	- **Navigation reliability** in irregular warehouse environments (uneven floors, dynamic obstacles). - **Integration cost / installation time** (how quickly a customer can deploy the robots). - **Workforce adoption & safety compliance** (how well the robots operate alongside human workers)	**- Emphasises operation in "chaotic" real-world facilities rather than ideal labs**. As their site says: "Built for complex environments … unlike traditional automation that depends on perfectly structured environments, it thrives in the unpredictable conditions of busy docks and aisles."

Zipline

Founded 2011 (San Francisco, CA)

Total Raised: $817M
Revenue 2022: $25M
Valuation 2023: $4.2B
Investors: Sequoia Capital, Andreessen Horowitz, GV (formerly Google Ventures, Katalyst Ventures & Reinvent Capital
Known customers: Cleveland Clinic, Mayo Clinic, Michigan Medicine, Walmart, Panera Bread, Sweetgreen, Chipotle.

Sector: Industrials / Machinery & Equipment / Robotics

Target Market: Health systems, national and regional governments, pharmacies, restaurants, and retailers that need fast last-mile delivery of medical product

Founders: Robotics and software engineers from Romotive, including Keenan Wyrobek who worked on first ROS

Description: Provides drone delivery and logistics services across various sectors with an automated delivery system, offering delivery services to consumers and businesses.

Round	Seed	Series A	Series A - II	Series B	Series C	Series D	Series E	Series F
Date	11/1/2011	10/17/2012	4/4/2016	11/10/2016	6/1/2018	5/20/2019	6/30/2021	4/10/2023
Money Raised	$0.12 M	$5 M	$13 M	$25 M	$70 M	$120 M	$250 M	$330 M
Traction	Early consumer sales	Scaling toy robots	First medical drone delivery	Rwanda delivery network	Multi-country medical logistics	Scaling health systems	National healthcare deliveries	Launching Platform, urban delivery

Growth Arc	Key Changes	Key Variables	Takeaways
•2011–2014: **Romotive era**, consumer robots, core team built. [1] •2014–2016: **Pivot to medical**, first blood-delivery network in Rwanda. [2] •2016–2019: **Ghana expansion**, multi-center medical logistics. [3] •2020: **Subscription hubs**, fixed monthly fee per DC. [4] •2021–2025: **Health + retail**, Walmart and food partners; US and Japan growth. [5]	•**Toy robots → medical infra**, consumer line shut, focus on life-saving logistics. [2] •**Single-country → multi-country** health networks (Rwanda, Ghana, others). [3] •**Medical-only → mixed demand**, add groceries and restaurant delivery. [6] •**Per-flight fees → subscriptions**, predictable spend per hub. [4]	•**Weather, DAA, noise** drive uptime and community acceptance. [7] •**Route density** inside each service radius sets margin. [8] •**Regulatory approvals** (BVLOS, air-carrier) gate expansion speed. [9] •**Anchor partners** (govts, health systems, Walmart, QSRs) lock in volume. [10]	•**Start with critical care**, high-value medical use cases earn trust. [11] •**Full-stack ops moat**, owning aircraft, hubs, and ops speeds iteration. [10] •**Subscription hubs = profit engine**, stable revenue for Zipline and customers. [4]

CMR Surgical

Founded 2014 (Cambridge, UK)

Total Raised: $1.3 B
Revenue 2023: $67M
Valuation 2025: -
Investors: SoftBank Vision Fund 2, Ally Bridge Group, Tencent, GE HealthCare's venture arm, ABB Technology Ventures
Known customers:

Sector: Healthcare & Life Sciences / Care Delivery / Surgical Robots

Target Market: Large public systems, Private hospital chains and academic centers

Founders:: Mix of surgeon, med-tech and engineering founders all with prior medical device and technology experience - Mark Slack, Luke Hares, Martin Frost, Paul Roberts and Keith Marshall.

Description: Specializes in surgical robotics namely, Versius, a surgical robot designed for robotic minimal access surgery. CMR Surgical aims to improve the accessibility and affordability of robotic-assisted surgical procedures.

Round	Series A	Series B	Series C	Series D	Series E	Series F
Date	7/2/2015	6/4/2018	9/17/2019	6/28/2021	9/20/2023	4/2/2025
Money Raised	$20 M	$100 M	$240 M	$600 M	$165 M	$200 M
Traction	Prototype. Prep for 1st trials	Pre-launch. Validation studies	early repeat deployments. Unicorn status	Heavy scaling. Global rollout	15,000 surgeries completed. PMF proven	30,000 surgeries in 30 countries.

Growth Arc	Key Changes	Key Variables	Takeaways
•2014–2019: Series C to take Versius from trials to first commercial launches in Europe and Asia. [1] •2021: Series D at a **$3B valuation** to fund large-scale global rollout and manufacturing. [2] •2023: Passed 15,000 procedures, and reached 140+ installs across 20+ countries. [3] •2024–2025: Gained FDA clearance, surpassed 30,000 procedures in 30+ countries, raised another $200M, and began exploring a ~$4B sale. [4]	•Moved from early pilot sites to a broad hospital network: 140+ hospitals and public systems like the NHS. [5] •Built a high-capacity UK factory to produce up to 500 systems per year. [6] •After US approval, shifted focus to US and Asia launch, backed by new capital and active sale process. [7]	•Procedures per installed system: hospital economics and clinical confidence. [8] •Versius is pitched as smaller and more affordable. [9] •Speed of regulatory expansion in US, Europe, and Asia. [10] •Sustaining funding and eventual exit while still unprofitable [11]	•Surgical robotics can attract $xB funding with clear need and credible technology [12] •Compact robot that fits **existing ORs** and **supports multiple specialties** can win adoption in public and private hospitals. [13] •Late-stage robotics companies still depend on large new rounds even with clinical traction. [14]

MOON SURGICAL

Founded 2019 (Paris, France)

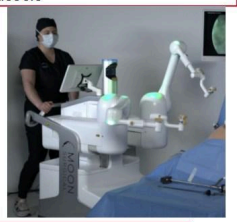
Total Raised: $92M
Revenue: na
Valuation: na
Investors: Sofinnova Partners, NVentures (NVIDIA), GT Healthcare Capital, Cathay Health, JJDC
Known customers: urgeon's Point Surgery Center (Texas), Lee Health (Florida), CHU Saint-Pierre Brussels

Sector: Healthcare / Medical Devices & Equipment / Surgical Devices

Target Market: Hospitals and ambulatory surgery centers performing procedures that rely on manual assistants

Founders' Background: Surgeon-entrepreneur with med-tech experience

Description: Moon Surgical develops the Maestro Platform, a compact robotic digital surgical assistant with two extra laparoscopic arms plus Maestro Insights software that analyzes procedure and OR data. The system targets the large volume of mid-acuity soft tissue cases that lack robotic support, while fitting around existing instruments and workflows rather than replacing them.



Round	Seed VC	Series A	Series B
Date	7/2/2020	6/7/2022	5/17/2023
Money Raised	$3.38 M	$31 M	$55 M
Traction	Incubation, prototype build	Clinical validation, first FDA clearance	Commercial system, EU pilots, scaling

Growth Arc	Key Changes	Key Variables	Takeaways
•2019–2020: **MastOR seed**, Sofinnova MD Start incubation. 1 •2021–2022: **Team + first FDA**, Maestro prototype and initial clearance. 2 •2023–2025: **CE + commercial pilots**, 200+ cases, ASC debut in Texas. 3	•**Prototype → Maestro**, rebrand into compact bedside assistant. 2 •**Trials → ASC use**, from Belgium FIH to outpatient commercial cases. 3 •**Mechanical → AI-guided**, ScoPilot built on NVIDIA Holoscan. 4	•**Assistant labor gaps**, scrub-tech shortages raise demand. •**Workflow fit**, plugs into standard laparoscopy tools. 6 •**Case volume**, mid-acuity laparoscopy in hospitals and ASCs. 2	•**"Extra hands" positioning**, sells staffing relief, appealing to hospital workers. 3 •**Low disruption wins**, small footprint and existing tools speed adoption. 6

BUILT ROBOTICS

Founded 2016 (San Francisco, CA)

Total Raised: $112 M
Revenue: na
Valuation 2025: $391M
Investors: Tiger Global Management, Tiger Global Management, Founders Fund, Fifth Wall, Building Ventures
Known customers: Blattner and renewable energy infrastructure

Sector: Industrials / Machinery & Equipment / Solar construction automation & robotics

Target Market: Utility-scale solar farm developers and EPC contractors that build large ground-mount projects.

Founders: Noah Ready-Campbell and Andrew Liang, both with software and construction tech backgrounds.

Description: Built Robotics is a technology company that focuses on automating construction tasks in the solar industry. Its main offerings include AI-powered robots for utility-scale solar construction and cloud-based software for remote monitoring and control of these robots.

Round	Series A	Seed VC	Series B	Series C
Date	10/6/2017	9/10/2018	9/19/2019	4/7/2022
Money Raised	$15. M	$1 M	$33 M	$64 M
Traction	Prototype excavator autonomy, first pilots	Robots tested on live sites	$100M customer commitments, 10 projects	Scaling Exosystem production for solar

Growth Arc	Key Changes	Key Variables	Takeaways
•**2016–2019**: Built **Exosystem** autonomy kit, early pilots. 1 •**2019–2022**: Tightened focus on **solar piling**, launched RPD 35. 2 •**2022–2025**: Fleet-scale deployments, major **Blattner** deal, Australia expansion. 3	•Broad earth-moving to **solar-only** specialization. 4 •Retrofit kit to **integrated piling system**. 5 •Tech sale to **RaaS** with per-pile pricing. 6 •General partner network to **EPC + union** partnerships 7	•**Solar build rate** sets ceiling. •**Uptime** and pile accuracy. 8 •**Operator supervision ratio**. (implied by fleet-scale deployment articles) •**Integration friction** with existing excavators. 9	•Narrow vertical focus unlocked **fit and repeatability**. •Retrofit approach cut **adoption barriers**. 10 •RaaS model aligned with EPC economics. •Strong EPC partnerships created **credible scaling path**. 11

naio TECHNOLOGIES

Founded 2011 (France)

Total Raised: $61M
Revenue: $2.4M
Valuation: na
Investors: Mirova, Bpifrance and its Ecotechnologies fund, Capagro, Demeter, Pymwymic, Codema
Known customers: GAEC Le Potager Fleuri, La Soléiade, Robert Hall Winery

Sector: Agricultural Robotics – autonomous electric field robots for weeding, cultivation, and vineyard management

Target Market: Vegetable growers, vineyards, orchards, and specialty crop farms in EU, US, and Japan

Founders: Robotics Engineers

Description: Naio Technologies designs, manufactures, and services fully electric autonomous robots that handle soil preparation, seeding, mowing, and mechanical weeding. The robots reduce manual labor and chemical herbicides while improving field consistency for high-value crops

Round	Seed VC	Seed VC - II	Series A	Series B	Series B - II
Date	12/17/2015	12/14/2017	1/9/2020	12/9/2022	11/6/2025
Money Raised	$3.54 M	$2 M	$16 M	$33 M	$7 M
Traction	Pilots in France	New product development	250+ robots deployed	Autonomy achieved. Dealer expansion	

Growth Arc	Key Changes	Key Variables	Takeaways
•**2011–2014**: Oz weeding robot commercialized in market gardens. [1] **2015–2019**: Added Dino and Ted, passed 250+ robots in fields. [2] •**2020–2022**: Raised ~$49M, expanded to US, 300+ robots worldwide. [3] •**2023–2024**: FCC certification, Jo launch, revenue pressure. [4] •**2025**: Judicial recovery and €6.4M relaunch focused on Oz/Ted. [5]	•Single Oz platform to **multi-robot lineup** (Oz, Dino, Ted, Jo, Orio). [6] •Supervised operation to **Augmented Autonomy** and unsupervised work. [7] •Growth-first strategy to **focused Oz/Ted core** after restructuring. [5] •France-centric sales to **global dealer network** in 20+ countries. [8]	•**Safety certification** window, EU and FCC approvals for unsupervised work. [4] •**Per-hectare economics**, labor savings and herbicide reduction levels. [9] •**Dealer coverage**, quality of install and after-sales service. [8] •**Production capacity**, ability to reach ~100 robots per year. [10]	•Early **category pioneer**, yet still financially fragile after 2023–2024 downturn. [11] •**Autonomy lead** and certifications are real moats in field robotics. [12] •Product sprawl hurt margins, **refocus on core** improves survival odds. [5] •Hardware ag robotics needs **patient capital** even with strong farmer pull. [11] •Naio **consolidated product lines** in 2025.

CHEF

Founded 2019 (San Francisco, CA)

Total Raised: $65 M
Revenue: $32M
Valuation: na
Investors: Avataar Venture Partners (lead), Construct Capital, Bloomberg Beta, Alumni Ventures, BOLD Capital Partners
Known customers: Amy's Kitchen, Sunbasket, Chef Bombay, Cafe Spice

Sector: Food manufacturing automation / industrial kitchen robotics

Target Market: High-mix prepared and frozen meal manufacturers, co-manufacturers, and large food brands in North America that run tray and bowl production lines.

Founders: Rajat Bhageria, a Penn robotics alum previously ran early-stage VC firm Prototype Capital

Description: Chef Robotics builds AI-enabled robotic cells for meal assembly in food plants, using AI vision to portion and deposit ingredients on conveyors, and sells them primarily through a **RaaS** model with flat annual fees that bundle hardware, software, monitoring, and field service.

Round	Seed VC - II	Seed VC - III	Series A	Debt - II
Date	5/13/2021	1/26/2024	3/31/2025	3/31/2025
Money Raised	$7.7 M	$11 M	$21 M	$23 M
Traction	Early plant pilots	Live production lines	Multi-site rollouts	Fleet financing scale

Growth Arc	Key Changes	Key Variables	Takeaways
•**2019–2021:** Founded in SF, built ChefOS and early pilots in frozen / ready-meal plants. [1] •**2022–2024:** From pilots to production, surpasses 20M+ servings with North American fleet. [2] •**2025:** Raises $43.1M Series A, 44M+ servings and NSF/ANSI 169-certified module, plans UK expansion. [3]	•**Restaurants → high-mix factories** for frozen and prepared meals. [4] •**Hardware sale → RaaS + SVB equipment financing** to avoid customer CapEx. [5] •**Generic robot → NSF-certified flexible "labor equivalent" cell** that drops into existing lines. [6]	•**Labor shortage** and wage pressure in food manufacturing. [7] •Servings and uptime → **AI data flywheel** trained on tens of millions of real meals. [8] •Food-safety **trust** via unique NSF/ANSI 169 certification for food portioning robot module. [9]	•**Clear ROI story** around labor relief, higher throughput, and lower giveaway. [10] •**RaaS + debt structure** shows how to finance embodied AI so plants pay from Opex, not CapEx. [11] •Data + certifications + OEM partners (ILPRA, others) give a path from single cells to full-line automation [12]

bossanova

Founded 2005 (San Francisco, CA)

Total Raised: $64 M
Revenue: na
Valuation: na
Investors: Innovation Works, Celesta Capital, Paxion Capital, Cota Capital, Intel Capital, LG Electronics, Lucas Venture
Known customers: Walmart, Albertsons, Carnegie Mellon and Digimarc

Sector: Retail automation, mobile robotics

Target Market: Large-format retailers and grocers that need real-time shelf inventory visibility, starting with Walmart and other US chains

Founders:Sarjoun Skaff, Martin Hitch; CMU Robotics Institute spin-out

Description: Bossa Nova Robotics built autonomous shelf-scanning robots and AI software that capture on-shelf inventory and pricing data in big-box stores so merchants can find out-of-stocks, mispriced items, and planogram errors far more often than manual scans.

Round	Seed	Series A	Series B	Series B-II	Series B - III	Loan	Dead
Date	12/19/2012	8/5/2012	8/26/2016	5/8/2018	6/21/2018	4/28/2020	5/25/2024
Money Raised	Innovation Works	$14 M	$18 M	$3 M	$26 M	$4 M	
Traction	Toy robots	Proven in-store pilots	Walmart tests, scaling plan	Leading Walmart shelf robots	Robots in 50 Walmarts	1,000 robots	Contract ended, layoffs

Growth Arc	Key Changes	Key Variables	Takeaways
•2007–2011: Consumer toy robots sold at retail. [1] •2013–2015: R&D shift toward store robotics. [2] •2016: $14M Series A, retail pilots. [3] •2017: $17.5M Series B, Walmart scaling. [4] •2018: $29M Cota round, Flex manufacturing. [5] •2018–2020: Walmart rollout, contract ends, layoffs. [6]	•Toy robots to enterprise inventory systems. [7] •Prototypes to paid shelf-scanning service. [8] •Small-batch robots to Flex manufacturing. [9] •Single Walmart bet, post-2020 layoffs. [10] •Operating company to cautionary case study. [11]	•Depth and durability of Walmart contract. [12] •High capital needs versus lifetime revenue. [13] •Large, complex 230-person technical organization. [14] •Robot economics versus flexible human store labor. [15]	•Hundreds of stores, still customer-concentration risk. [16] •Robots lagged adaptable human workers operationally. [17] •Concentration, hardware, sales cycles overwhelmed performance. [18] •Building APIs and modular product platforms was critical for scaling [20] •Product Market Fit is never static. [19]

Appendix C: Full VC Profiles

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1. Magarac Venture Partners
2. Techable VC
3. Pioneer Square Labs
4. Cybernetix Ventures
5. Interwoven Ventures
6. Lightscape Partners

Magarac Venture Partners

Inception 2022 Pittsburgh, PA

Description: Formerly Draper Triangle Ventures (1999). Early-stage VC focused on being the first institutional investor in the Midwest, with a long history tied to CMU and an above-average tilt to robotics/automation.

Investment Thesis: Magarac backs early-stage applied AI and robotics founders who can outperform human labor, progress beyond prototype cycles, and sell into real operational environments. The firm moves early to capture return asymmetry before larger funds enter. Robotics succeeds regionally due to strong technical talent, costly labor environments, and industrial customers who value throughput and safety over novelty.

Focus: Early stage technology
Stage: Pre-Seed, Seed, and Series A
Sector: Robotics, AI, Enterprise Software, HealthTech
Geography: Midwest
Typical Investment: $500k to $5M.
Current Fund: $46M (12/31/24)
AUM: $325M
Portfolio includes: RE2 Robotics, Hellbender, Atlas Robotics, Locomation

Key Investments:

RE2 Robotics: New strength-to-weight ratio in mobile arms, validated government use cases, differentiated hardware advantage.
Atlas Robotics: Automatic forklift had real ROI against human operator benchmarks, simple adoption, and easily replaceable parts.
Hellbender: AI vision systems for manufacturing inspection align with factories seeking automation that improves consistency and lowers scrap rates.

Key Criteria: Magarac expects startups to show clear metrics where a machine matches or outperforms a human in cost, throughput, error rate or safety. They require a pricing and adoption model that mimics decisions around human headcount rather than being purely capital equipment. They demand hardware platforms built with commodity replaceable parts so service friction stays low and scaling is possible. They select teams whose mindset is driven by real customer outcomes and revenue rather than perpetual R&D or lab demos.

HONDA

PSL

Pioneer Square Labs

Inception 2015 (Seattle, WA)

Description: Pioneer Square Labs operates as a startup studio and venture capital fund focused on creating and launching technology startups. The company partners with founders to build new companies, offering investment capital and support services. Pioneer Square Labs also invests in early-stage companies across various sectors, including sales tax solutions, ad quality tools, real estate technology, and immigration support services.

Investment Thesis: PSL seeks to invest in technology-driven startups in the Pacific Northwest that combine founding talent, rapid validation of product-market fit, and scalable business models. They believe that by both incubating ideas internally and investing as external seed/series investors they can capture high-growth opportunities early.

Focus: Early stage technology
Stage:
Sector:
Geography:Pacific Northwest
Typical Investment:
Current Fund: $100M (March 2021)
AUM: $200M
Portfolio includes: Boundless, Outgo, Mudstack, and others spun out or invested by PSL

Key Investments:

Boundless: PSL spun out Boundless from its studio model, seeing an opportunity to transform the immigration-law service market. The rationale: a large market of immigrants needing legal assistance, a founder with firsthand experience, and a digital product that could radically reduce cost and effort.
Outgo: PSL's investment in Outgo reflects its long-standing interest in vertical fintech and logistics tech. The company's founders had deep domain experience in trucking/carrier operations, and the product addressed cash-flow pain points in transport. PSL backed this team because they understood the segment and could move fast.
Mudstack: A more recent seed investment, Mudstack fits PSL's model of backing companies that build developer tools or infrastructure in growing markets. The rationale: as creative and multimedia workflows move to the cloud, tooling gaps emerge; PSL judged this as a market where rapid adoption and capital-light scaling were possible.

Key Criteria: PSL looks for companies that can be built rapidly from inception, ideally via its studio model or through very early checks in external startups. It values founders who are execution-oriented rather than purely research-oriented, markets where product-market fit can be tested quickly, and technology that can scale. The fund is prepared to lead or co-lead rounds in the pre-seed and seed stages, typically in the $0.5 M to $3 M check size range.

HONDA

CYBERNETIX VENTURES

Rep: Mark Martin | Inception 2021 Boston, MA

Description: The firm invests in four core markets: advanced **manufacturing**, **logistics** and warehousing, architecture, engineering and **construction**, and **healthcare**. It built a curated support and talent network called "The Cybernetix Collective has a distinct adoption slope" said Mark Martin at PRN 11/5/25

Investment Thesis: Industrial automation is expanding from pilots to production because **costs are falling**, **AI is improving**, and **labor pressure** is persistent. The firm aims to capture this shift by backing technical founders who ship field-ready systems with clear payback in factory, warehouse, construction, and healthcare settings."Robotics is finally ready for mass deployment, but each vertical

Focus: Early stage robotics and physical AI.
Stage: Pre-seed, Seed, Series A.
Sector: manufacturing, logistics and warehousing, AEC, and healthcare
Geography: Global, with strong ties to Boston
Average Deal Size: $15.8M
Portfolio includes: Verve Motion, Raise Robotics, Cambrian Robotics, Realtime Robotics, Corsha, Airworks, Bionomous

Investments	Criteria
Verve Motion: Wearable exosuits for industrial workers. $20M Series B to scale deployment where **injury reduction and productivity** are measurable. **Raise Robotics:** On-site construction robots. Cybernetix invested at pre-seed then supported the 2025 seed signaling belief in field use on **high-risk tasks**. **Cambrian Robotics:** AI for robot arms in vision-based tasks. Cybernetix co-led the $3.5M seed+ to push **precision automation** in manufacturing and QA.	Backs **founders with deep industry experience** who understand real operational pain points and can prove customer pull through **repeatable, paid deployments**. They prioritize **commercial traction over prototypes**, evaluating pilot quality, renewals, and clear ROI before scaling capital. They invest in **resilient, adaptable teams** who can navigate slow industrial adoption cycles and build "use-case-ready" systems that solve measurable problems today, not speculative ones tomorrow.

HONDA

INTERWOVEN VENTURES

Rep: Lisa Chai | Inception 2022 New York, NY

Description: Formerly ROBO Global Ventures. An early-stage venture firm investing in **"physical AI"**—robotics powered by intelligent software. The fund backs companies turning autonomy from **lab demos to integrated workflows**, particularly in food automation, logistics, and industrial operations. It combines capital with technical and operational mentorship to help founders prove traction through **credible pilots and disciplined pricing**.

Investment Thesis: Interwoven believes the next decade of automation will be driven by **software-enabled robotics** transforming the physical economy. Falling **compute costs**, scalable Gen AI models, and new hardware supply chains are creating investable openings where automation can close **labor and efficiency gaps** across food, logistics, and healthcare. The firm targets startups that can demonstrate real-world performance and repeatable deployments rather than speculative prototypes.

Focus: Robotics, AI and advanced sensors in traditional industrial / physical sectors
Stage: Seed through early growth
Sector: Agriculture, healthcare, construction, transportation, logistics, and industrial manufacturing, utilizing technologies
Geography: US
Current Fund: Fund 1 (2022)

Investments	Criteria
Chef Robotics: AI-enabled robotics for meal-assembly and food-processing plants. Raised $43.1 M in Series A financing to expand its **RaaS offering** and extend deployments beyond 40 million servings. **Proscia:** Digital-pathology + AI software platform that serves major pharmaceutical firms and diagnostic labs. Secured $50 M in funding (total ~$130 M) as it scales enterprise adoption of its Concentriq® platform. **Blackshark.ai:** A geospatial intelligence startup building a semantic 3D digital twin of the planet, supporting simulation, autonomy and infrastructure applications. It raised ~$35 M in an oversubscribed Series A extension.	The firm prioritizes **founders who execute**—engineering strength paired with commercial focus. It evaluates **pilot renewal rates**, customer feedback loops, and early unit economics as leading indicators of success. Startups must show readiness to scale through **integrator or corporate partnerships**, clear value per deployment, and disciplined capital use to advance from pilot to production.

HONDA

LIGHTSCAPE PARTNERS

Rep: Sohail Khalid | Inception 2022 New York, NY

Description: The firm invests in companies that combine data, compute, infrastructure, and applications of AI, and frames its approach around what it calls a "Prism Investing" strategy—building foundational relationships and exploring new product opportunities.

Investment Thesis: The era of generative AI and foundation models opens up large market opportunities across unstructured environments, robotics, autonomous labs, sensing, and automation. The firm aims to exploit the gap between technology novelty and real-world deployment by backing ventures that deliver verified, repeatable field outcomes, especially where **perception**, actuators, or **software stacks** enable robots or systems to operate in complex settings. The thesis emphasises that "robots are gaining eyes, ears, and brains" as Sohail said at PRN.

Focus: Software, Data Infrastructure, Insurance and Fintech, and Physical AI
Stage: Early (Seed, Series A/B), and growth (Series B)
Sector: AI, automation, sensor/actuators, medical labs, materials discovery, food/logistics
Geography: US

Investments	Criteria
Standard Bots: Backed for its **collaborative robotic arms** that deploy AI-powered dexterity in manufacturing and logistics; the company closed ~$63 M in a Series B with Lightscape **Bucket Robotics:** Focuses on high-speed, flexible defect-detection systems for manufacturing lines, using AI vision that transforms CAD into inspection models. **Fulcra Dynamics:** Although less directly in robotics hardware, this company provides advanced data-software stacks for real-world physical systems (which could tie into servicing, sensors or monitoring for manufacturing/automotive).	Lightscape seeks startups with a clear **problem-statement** and founders who are **uniquely qualified**, rather than generalist teams. They prioritise ventures that have **repeatable field performance** and verified data rather than just polished demos. They prefer component or enabling-play ventures (such as sensors, actuators, infrastructure) over full systems, and expect early indicators of **scalability and servicing model** in real-world deployment.

HONDA

Appendix C: Company Contact List

Contact / Company	Type	Industry	Interviewed?	Profiled?
Dave Mawhinney	Connector	General Startups	Yes	No
Jason Somma	Connector	General Startups	Yes	No
Melanie Simko	Connector	General Startups	Yes	No
Aquatonomy	Startup	Marine robotics / inspection	Yes	Yes
Beyond Reach	Startup	Infrastructure	Yes	No
EcoMerc	Startup	E-waste recycling / spectroscopy	Yes	No
Kromha	Startup	Agri-tech / modular farming	Yes	No
Stack AV	Startup	Autonomous trucking	Yes	No
Starfish Space	Startup	Space / Satellites	Yes	No
Gecko Robotics	Startup	Infrastructure / Inspection	No	Yes
Carbon Robotics	Startup	Agri-tech / Laser Weeding	No	Yes
Gather AI	Startup	Logistics / Inventory Drones	Yes	Yes
Skild AI	Startup	General Purpose / Brain	No	Yes
Seegrid	Startup	Logistics / AMRs	Yes	Yes
Thoro.ai	Startup	Industrial / Cleaning	Yes	Yes
Atlas Robotics	Startup	Logistics / AGVs	Yes	Yes
Adrich	Startup	IoT / Usage Data	Yes	No
SKA Robotics	Startup	Integrator / Consulting	Yes	No
Journey Robotics	Startup	Aviation / Logistics	Yes	No
Astrobotic	Startup	Space / Lunar Logistics	Yes	No
Zipline	Startup	Logistics / Drone Delivery	No	Yes
CMY Surgical	Startup	Healthcare / Surgical	No	Yes
Moon Surgical	Startup	Healthcare / Surgical	No	Yes
Built Robotics	Startup	Construction / Excavation	No	Yes
Naio Technologies	Startup	Agri-tech	No	Yes
Chef Robotics	Startup	Food / Commercial Kitchen	No	Yes
Bossa Nova	Startup	Retail / Inventory	No	Yes
Magarac Venture Partners	VC	Early-stage VC	Yes	Yes
Techable	VC	Technology VC	Yes	Yes
Cybernetix Ventures	VC	Industrial / Infrastructure VC	Yes	Yes
Lightscape Partners	VC	Data / Lab Automation VC	Yes	Yes
Interwoven Ventures	VC	Robotics / Physical AI VC	Yes	Yes
Pioneer Square Labs	VC / Incubator	General Startups	Yes	Yes

Appendix D: References

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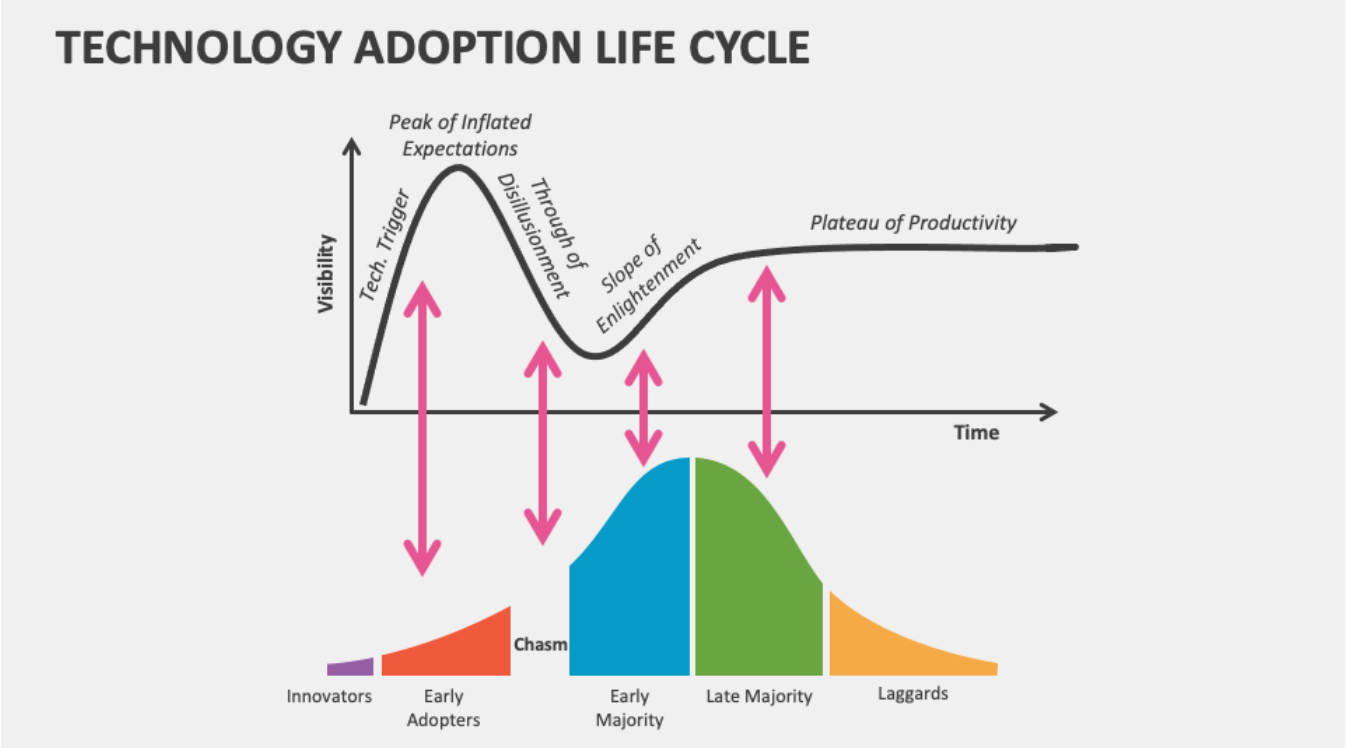
1. Entrepreneurship
    a. Steve Blank slides, lean startup and customer discovery tools:
    b. CMU Swartz Center NSF I-Corps program, evidence-based entrepreneurship
    c. Marc Andreessen, "The Only Thing That Matters" (product–market fit archive)
2. Funding databases
    a. CB Insights, global private-company and VC database, sector funding trend reports
    b. PitchBook, private and public market data on companies, deals, funds, and investors
    c. Preqin, investor data across private equity, venture, infrastructure, and private credit
3. Trend Reports
    a. Silicon Valley Bank - "State of Hardware-as-a-Service Report 2024"
    b. McKinsey Technology Trends Outlook 2024
    c. F-Prime Capital "2025 State of Robotics" report
4. Sector news
    a. The Robot Report, news and company directory focused on the business of robotics
    b. International Federation of Robotics, World Robotics "Industrial Robots" datasets
5. Borrowed Concepts:
    a. Customer Discovery (UXR) - from Tech Product Management (PM)
    b. Strategic Industry Memo (SIM) - from Entrepreneurship through Acquisition (ETA)
    c. Peter's Thiel's "Zero to One" - heavily weighted in "monopoly in wedges" terms
    d. Venture Capital (VC) assessments
    e. Product Market Fit (PMF) - from Marc Andreessen

Appendix E: Frameworks

1. Tech Adoption Curve

1.1. This model illustrates how new technologies diffuse through society, from risk-tolerant **Innovators** to the conservative **Late Majority**. The critical insight is the "Chasm"—the gap between visionary Early Adopters and pragmatic Early Majority customers—where most startups fail.

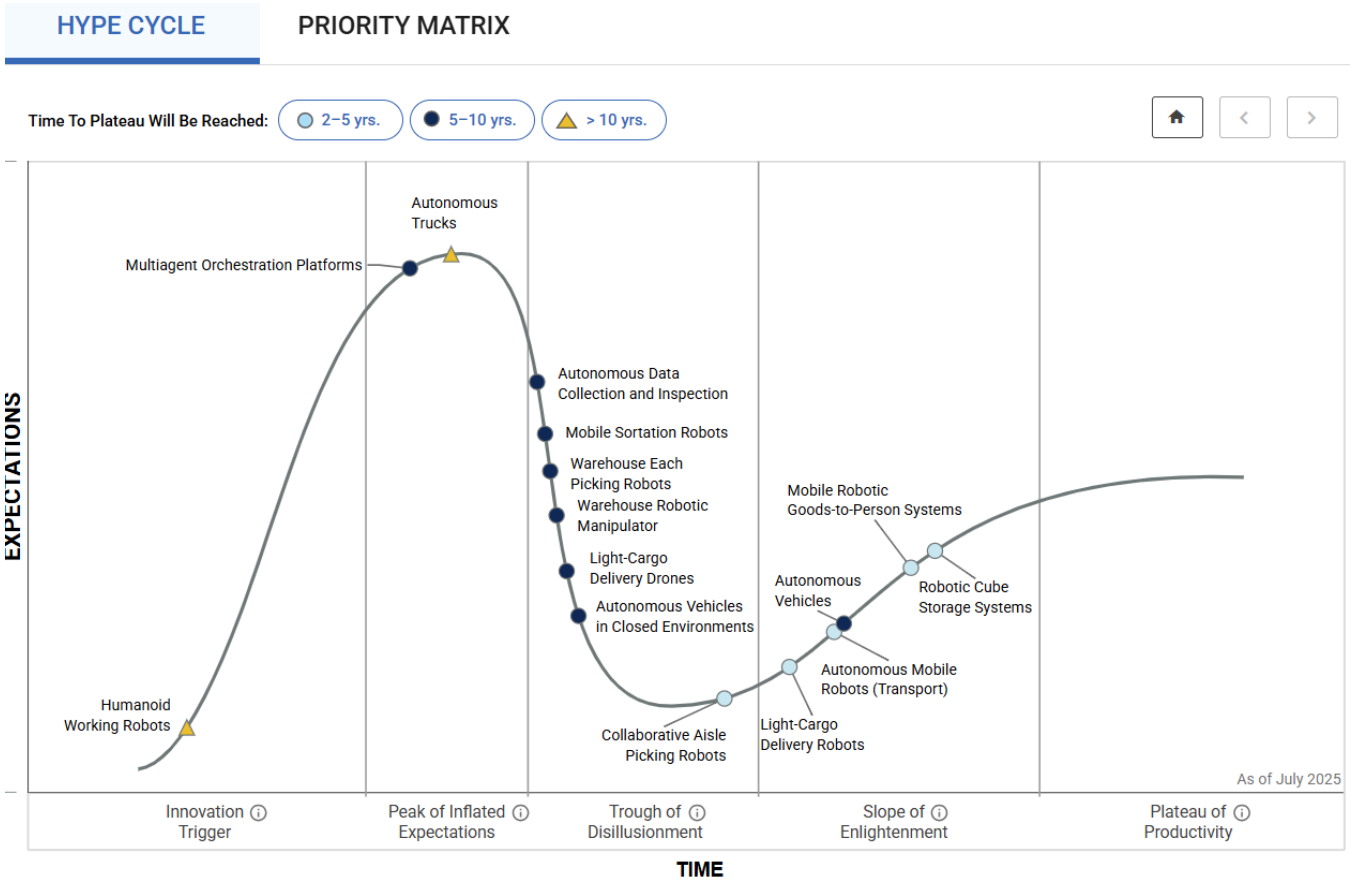
1.2. **Relevance to Honda:**
To capture zero-to-one value, Honda must act as an **Innovator**. This requires ignoring standard market reports (which only track the Majority) and instead using direct customer discovery to identify "hair-on-fire" problems before they become obvious mainstream trends.



2. Hype Cycle

2.1. This model maps the journey of emerging technologies from the "Innovation Trigger" through the "Peak of Inflated Expectations" and the "Trough of Disillusionment," eventually reaching the "Plateau of Productivity."

2.2. **Relevance to Honda:**
We used this framework to calibrate market entry timing. For instance, **Humanoids** currently sit at the Peak of Inflated Expectations, signaling high risk and unproven value, whereas **Intralogistics** (AMRs) are entering the Plateau of Productivity, representing a lower-risk opportunity for immediate operational scaling.



Source: Gartner

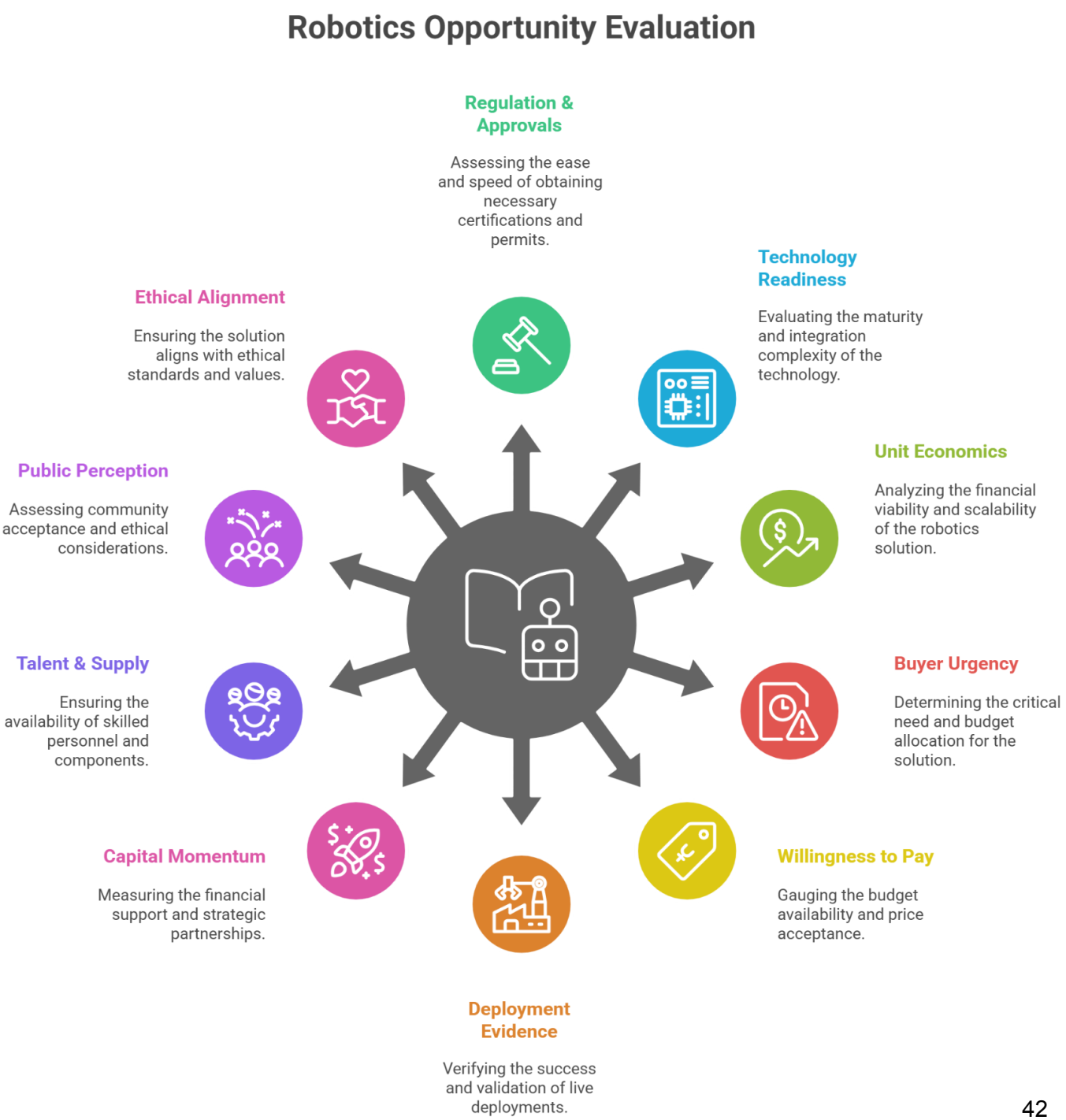
3. Robotics Opportunity Evaluation Framework

3.1. There are 10 Dimensions by which to judge an opportunity, scored 0-10.

3.2. Weights will be designated to each dimension to match Honda's intent.

3.3. Each Robotics Market Entry idea will be tested against the ScoreCard Dimensions, then multiplied by the weights, resulting in a final score.

3.4. The results will be ranked for final decision making.



4. Market Evaluation Framework

4.1. **Regulation & Approvals:** Path to permits, certifications, and union acceptance

4.2. **Tech & Integration Readiness :** Works at scale and plugs into customer systems.

4.3. **Unit Economics:** Payback time from CAPEX, OPEX, uptime, labor offset.

4.4. **Buyer Urgency / Pain:** How acute the problem is right now.

4.5. **Willingness to Pay:** Clear buyer with budget and procurement route.

4.6. **Deployment Evidence:** Number and quality of paid production sites.

4.7. **Capital Momentum:** Investor quality, runway, and strategic partnerships.

4.8. **Talent & Supply:** Availability of skills, parts, and integrators.

4.9. **Public Perception & Adoption:** User sentiment and change-management load.

4.10. **Ethical Alignment (Honda ethos):** Human benefit and safeguards against harm.

4.11. **Safety & Liability / Insurance:** Compliance, fail-safes, and insurability record.

4.12. **Channel / Distribution Access:** Scalable routes to market and service.

4.13. **Service & Maintenance Burden:** MTBF/MTTR, remote support, parts logistics.

4.14. **Security / Cyber & Privacy:** Access control, updates, logs, data handling.

4.15. **Interoperability & Standards:** Clean APIs and common protocols support.

4.16. **Energy & Charging Infrastructure:** Power needs and uptime impact.

4.17. **Environmental Impact:** Lifecycle footprint and end-of-life plan.

4.18. **Strategic Adjacency to Honda:** Fit with Honda’s strengths and roadmap.

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5. **Hypothesis to Commercialization** - How do you successfully match supply and demand?

5.1. Problem-Founder Fit

5.1.1. Validate the problem before building.

5.1.2. Run 50–100 interviews with buyers and operators.

5.1.3. Map workflows, pain, current workarounds.

5.1.4. Success metric: quality of insight, not prototypes.

5.2. Problem-Solution Fit

5.2.1. Build the smallest prototype to test the core value.

5.2.2. Trial with early adopters, collect hard feedback.

5.2.3. Iterate quickly, kill weak assumptions.

5.2.4. Investor signal: early technical validation.

5.3. Product-Market Fit

5.3.1. Market pull begins, not just push.

5.3.2. Renewals and expansions increase. Track net revenue retention.

5.3.3. Unit economics improve with repeatable sales.

5.3.4. Target proof: $1–3M ARR or equivalent usage revenue.