svb Silicon Valley Bank
A Division of First Citizens Bank

The State of Hardware-as-a-Service

A look at the key metrics driving recurring revenue in hardware

June 2024

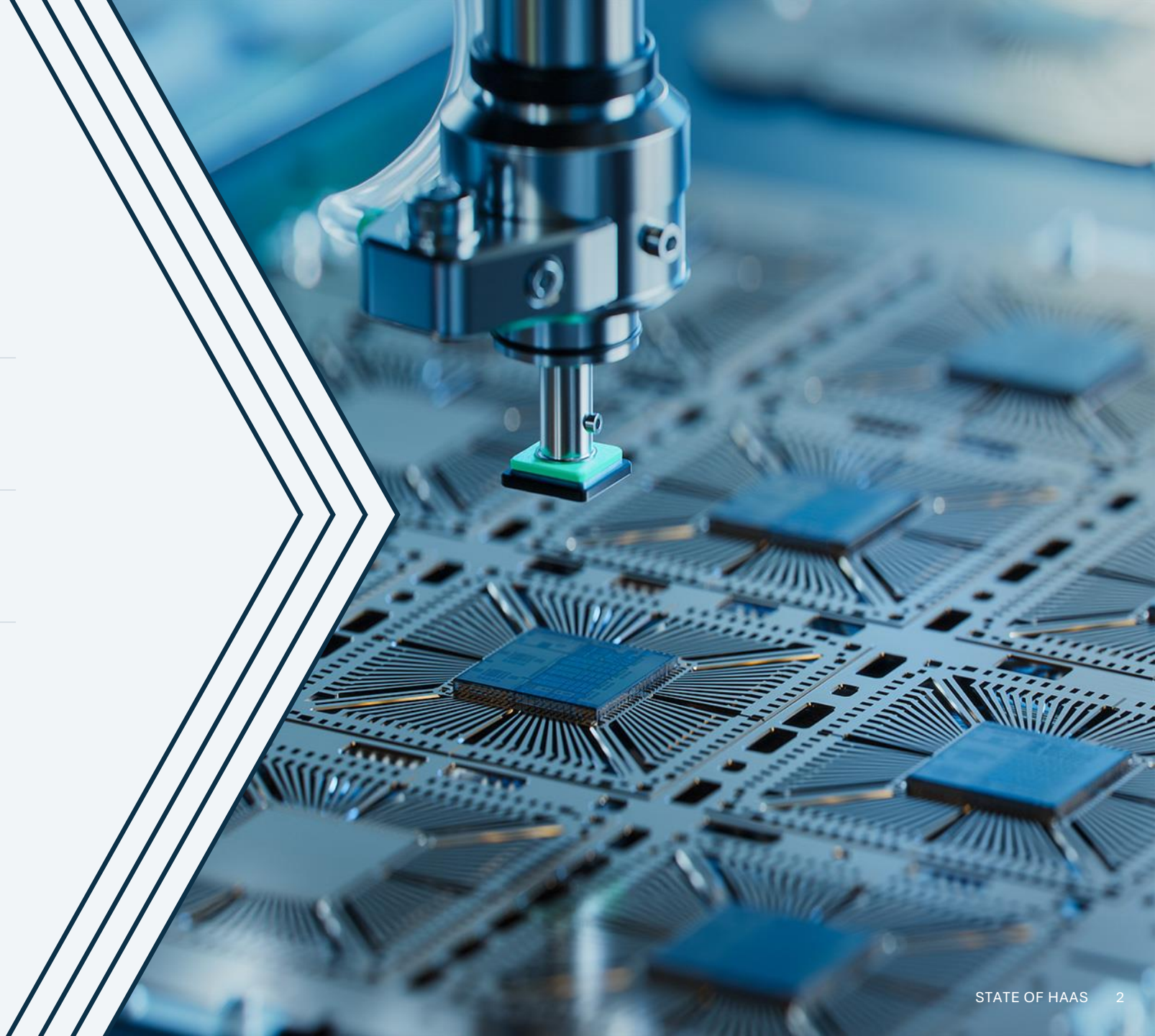
The State of HaaS

4 **Macro**
Incentives and Automation Driving HaaS Growth

9 **Capital**
Investors Recommit to Hardware

13 **HaaS Model Spotlight**
How and Why Businesses Apply HaaS

16 **Metrics That Matter**
Eight Key Benchmarks for HaaS



svb Silicon Valley Bank
A Division of First Citizens Bank

Executive Summary

Refreshed Benchmarks for an Evolving Industry

Through our proprietary survey, we have established benchmarks for the machine metrics to help founders and investors understand what is “typical” in the HaaS model — from payback periods to machine lifetime values.

Jack Garza
Head of Frontier Tech
Silicon Valley Bank
jgarza@svb.com

The innovation landscape has changed in the two years since we published our inaugural State of Hardware-as-a-Service (HaaS) report. The investment slowdown that was just beginning in 2022 has morphed into a plodding recovery, with many hardware founders facing their share of challenges, from rising input costs to slower growth rates. As we’ve helped companies navigate these choppier waters, one trend has become clear: The best companies persist, in part, by evolving to meet the moment.

In this update to our debut report, we have refreshed the HaaS metrics that matter for hardware companies through a proprietary survey of a new cohort of HaaS companies. Not only has the macro economy and funding environment changed significantly, but the HaaS model has also continued to evolve. **The SVB HaaS metrics (pages 18-22) provide a toolset to track key elements of the business and communicate progress to stakeholders.** Through our proprietary survey, we have established benchmarks for the machine metrics to help founders and investors understand what is “typical” in the HaaS Model: from payback periods to machine lifetime values.

While the bar for raising venture capital (VC) has been lifted for all sectors, investors are increasingly returning to hardware, with macro trends such as onshoring, clean energy investment and greater defense spending boosting demand. Tech companies enabled by machines account for the highest share of seed stage VC in four years. This demand is underscored by increasing valuations across every stage. Hardware may be hard, but it’s also indispensable.

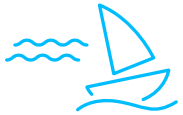
With these tailwinds propelling the sector forward, the benefits of recurring revenue are continuing to gain traction among hardware founders. As we continue to explore this evolving business model, we hope these insights will prove to be both a useful measuring stick and a conversation starter for the hardware tech community. Together, we can help grow this important sector and bring new innovations to life.

svb Silicon Valley Bank
A Division of First Citizens Bank

Macro

Incentives and Automation Driving HaaS Growth

Four Trends Impacting HaaS Companies

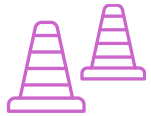


Macro Tailwinds Are Propelling DeepTech

The geopolitical waves that have disrupted the world order since the pandemic are also driving demand for hardware technology. **A rise in conflict is pushing new investment into defense spending, including satellites and drone technology, while the onshoring of supply lines away from China is accelerating the need for automation in US factories and warehouses.** At the same time, the fight against climate change is gaining ground as countries boost investment in clean energy technologies. In the US, spending packages like the Inflation Reduction Act and the CHIPS and Science Act are creating new funding channels and improving the economics for many frontier tech startups.

Seed Stage VC Shifts Toward Hardware

While VC funding overall is down compared to the recent highs of 2021, machines are taking a larger share of the pie at the earliest stage. **Hardware-focused companies account for about 15% of seed-stage VC investment so far this year, up from 11% in 2022.**[1] Government incentives are bolstering aerospace and transportation in particular. In addition to these macro forces, one factor helping hardware is the hardware itself. Large swings in valuation for software companies over the last two years have caused some investors to put a premium on tangible IP and physical assets, which can help attract an acquisition or secure financing if VC sources dry up.



Financing Is a Barrier for HaaS Adoption

VC investors almost universally favor the reliability and growth potential of recurring revenue models over one-time sales. But unlike software subscriptions, you can't copy/paste machines. **The intense capital requirements of financing hardware are the top deterrent for companies that have not implemented a HaaS model.**[2] Investors may favor the model, but they tend to want their capital going toward IP, not machinery. The sweet spot seems to be industrial robotics. Our research shows that 45% of HaaS companies are in the industrial space. Falling prices for robots have reduced the CapEx required, while customers see replacing labor and turning CapEx into OpEx as a net win.

Unit Economics Need Time To Reach Maturity

It may take years to see if the value proposition on paper plays out in reality. In theory, the HaaS model should generate higher cash flows than a direct sales model, all other factors being equal. But the devil is always in the details. Will customers renew? Will ongoing costs eat away the excess benefits? For most HaaS companies, it's still too soon to tell. **Fewer than one-in-four HaaS companies has a deployed machine older than its estimated service life.** For a CapEx-heavy company with high potential value, development may take over a decade. The model takes time to reap rewards, and the clock only starts after development ends.

Notes: 1) According to our analysis of VC-Backed industries and verticals using PitchBook Data Inc. 2) SVB conducted a proprietary survey of 63 frontier tech companies in May and June of 2024. Responses were collected from a pool of mostly VC-backed SVB clients with hardware-enabled products. Survey results appear

Source: PitchBook Data, Inc. and SVB analysis.

Perspectives on HaaS from Conversations with VCs and Founders

"Venture investors like to see their capital spent on talent, distribution, research, new products, and services. **VC money goes a lot further if you're not using it for equipment."**

Brad Bogolea,
CEO and Co-Founder

simbe

"For contract renewals, you may have to take a leap of faith, but hopefully you see some evidence of renewal or expansion by Series B. Some **customers who are replacing OpEx really prefer longer contracts to lock in the ROI** for their automation investments."

Samantha Huang,
Principal

BMW i Ventures

"At the highest level, boards need to understand the short- and long-term implications of the financial models to make HaaS happen. They're still learning... **Payback periods need to be less than one year or less than the length of the contract.** Investors won't believe customers will renew until you prove it. That may take years."

Bilal Zuberi,
General Partner

Lux

"HaaS serves as a forcing function for companies to relentlessly enhance their products, particularly the software, to drive customer satisfaction and retention. **Unlike the one-time sale model, HaaS is likely to drive more continuous, rapid product development."**

Neel Mehta,
Partner

G2 Venture Partners

"Flexibility is key. You want a scalable repeatable business model that is investible, but you need to meet customers where they are. **You don't win in deep tech if you superimpose your business model on your customers."**

Nate Williams,
Founder and Managing Partner

Union Labs

"Customers want to amortize their hardware costs over the lifetime of the product. Part of that is trust. **They don't want to plunk out a lot of money for unfamiliar technology."**

Don Burnette,
CEO and Founder

kodiak

"Haas companies need to deliver solutions with obvious high ongoing value, otherwise you're just selling widgets on a deferred payment plan."

Mel Tang,
Operating Partner
and CFO

MATTER VENTURE PARTNERS

"The real value of a subscription product is that it aligns your team's incentives with the needs of the end customer. **Instead of focusing on a one-time sale, you're incentivized to deliver a platform that delivers real value, is habit-forming, and can evolve over time** so that you maintain each customer indefinitely."

Jon Denby
Founder and CEO,
Roadio, Inc.

"Building your company around a HaaS sales model allows you to provide a solution to your customer that avoids an initial CapEx outlay in favor of a recurring subscription model. That subscription model both helps the customer de-risk their upfront engagement (decreased payback periods, time to value, etc.) and **helps your business drive more predictable revenue, collect more data directly, and provide proven retention enhancement for the lifetime of the customer."**

Ty Findley
Co-Founder and
General Partner

IRONSPRING VENTURES

Notes: Quotes have been lightly edited for clarity and style.
Source: SVB interviews conducted in June 2024.

Chips Ahoy! The Great Reshoring

The supply chain bottlenecks that brought global shipping to a standstill during the pandemic are long gone. **Our proprietary survey data of hardware companies shows the longest component lead time is down 40% from five months to two months.** But the policy response to the COVID-era gridlock is shaping the future of American manufacturing.

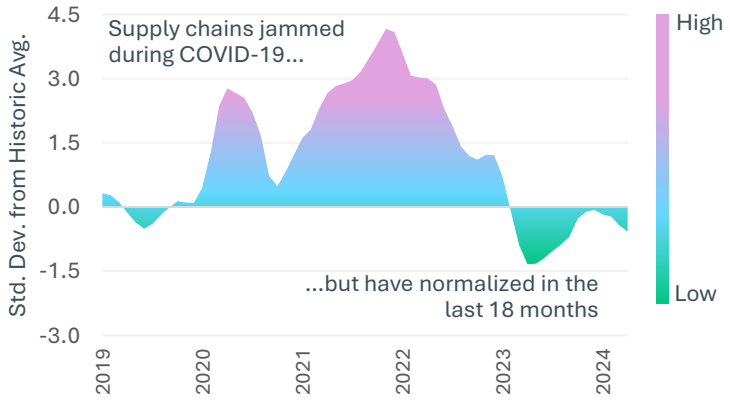
Concerns over the US's reliance on overseas computer chips and other critical inputs have spurred a movement to reshore US manufacturing in the last three years. Private spending on US construction of manufacturing plants more than doubled from 2021 to 2023, with the increase almost entirely attributed to electronic components. Government incentives are providing a big lift. **The CHIPS and Science Act appropriated $53B to support the US semiconductor industry, including $31B in direct funding for domestic chip manufacturing and a 25% tax incentive for chip-making equipment.** Over $447B in new or expanded fabrication plants has been announced since 2022, including a combined $16B in federal funding into Intel, Micron and GlobalFoundry.[1]

This activity is creating momentum for hardware companies, which not only benefit from a more plentiful supply of chips for their own products, but also from the demand generated to automate the incoming wave of factories and warehouses.

svb Silicon Valley Bank
A Division of First Citizens Bank

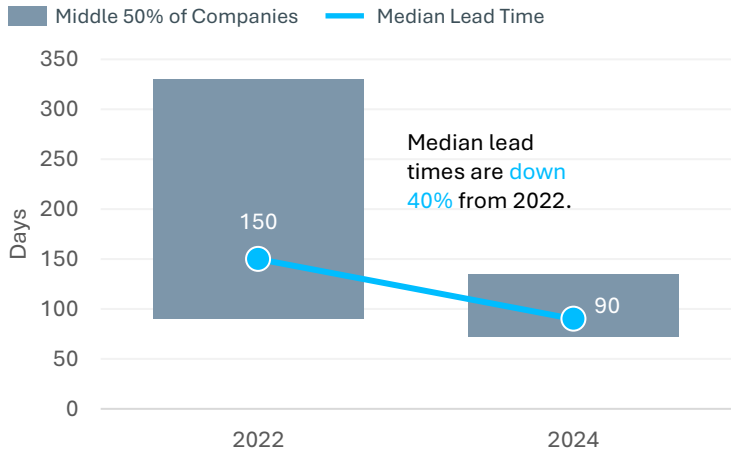
Supply Chains Bounce Back

Global Supply Chain Pressure Index[2]



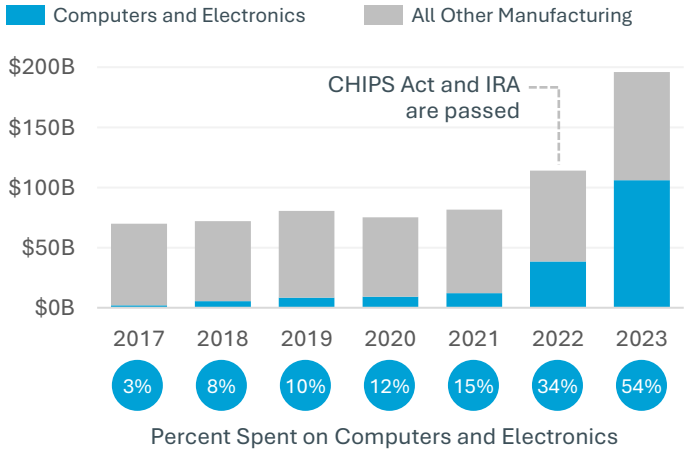
Longest Lead Times Cut in Half

Longest Lead Time for a Machine[3] Component: 2022 to 2024



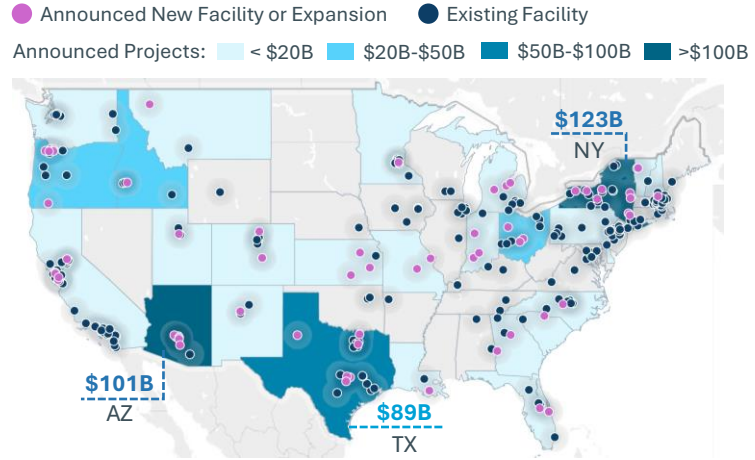
Boom Times for Semiconductor Investment

Private US Construction Spending on Manufacturing Plants



Fab'd in the USA: New Chip Plants Sprout

US Semiconductor Fabrication Facilities



Notes: 1) According to project announcements compiled by the semiconductor industry association. 2) Index displayed as a three-month centered moving average. 3) According to our survey of VC-backed hardware companies.

Source: New York Federal Reserve, US Census Bureau, Semiconductor Industry Association, SVB State of HaaS Survey and SVB analysis.

Robots: Cheaper by the Hour

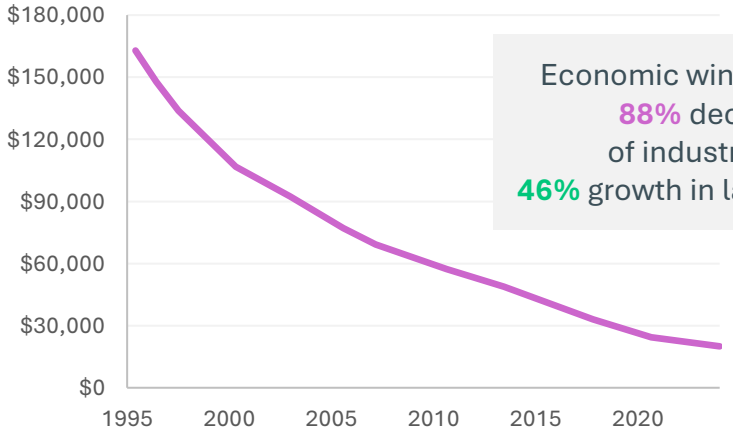
The stage is set for corporate automation to grow. The price of industrial robots has steadily fallen over the last 30 years, dropping 88% since 1995. During much of that time, unit labor costs were stagnant for US manufacturing, but in the last 10 years that has changed. **Manufacturing unit costs have grown nearly 50% since 2015, accelerating the need to automate labor.** These dovetailing trends have resulted in a 3x increase in the number of robots per worker between 2013 and 2022.[1]

Not only is the stage set for general automation, but there are also other winds filling HaaS company "sales." Analysis from public company earnings calls shows companies are increasingly focused on automation and the increasing costs of CapEx. **The HaaS model ameliorates the high CapEx that often accompanies automation by allowing customers to use hardware and pay on a monthly basis.** This allows companies to substitute payroll for HaaS contracts, resulting in improved efficiency without capital intensive hardware investments. Additionally, HaaS companies are responsible for much of the maintenance and ongoing data storage, analysis, and integration. The sales process is also more straightforward for OpEx, with decision-making authority residing lower in the org chart than for CapEx purchases. Taken together, these factors often mean shorter sales cycles for HaaS companies that only need to convince the customer to purchase the product for a contract period vs. an entire product life cycle.

svb Silicon Valley Bank
A Division of First Citizens Bank

Automation Costs Far Less Today …

Industrial Robot Cost (2024 Dollars)



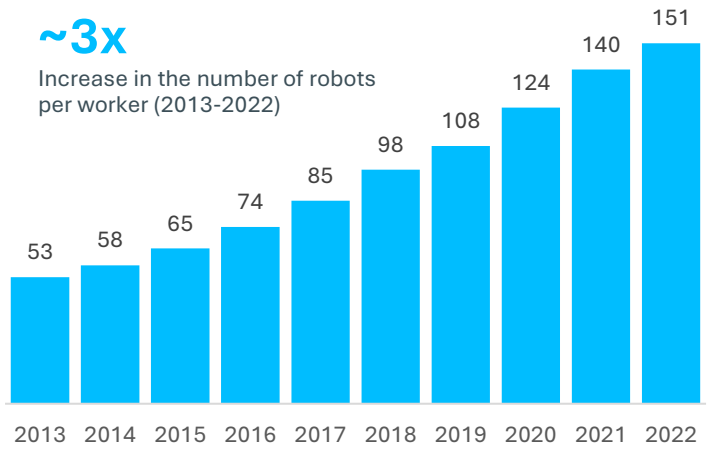
… As Labor Prices Jump

Unit Labor Costs for Manufacturing Indexed to 100 in 1995

Economic winds favor automation:
88% decline in the cost
of industrial robotics and
46% growth in labor costs since 1995.

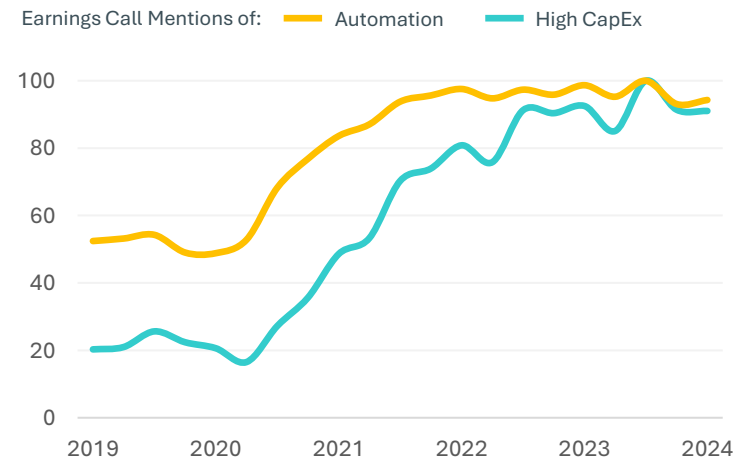
Robots Make Up More of the "Labor Force"

Robots Per 10,000 Workers: Global Average



High CapEx and Automation Converge

Index of Earnings Call Mentions (100 = Five-Year Peak)



Notes: 1) According to the International Federation of Robotics (IFR).
Source: IFR, Organization for Economic Co-operation and Development, CB Insights and SVB analysis.

Capital

Investors Recommit to Hardware

Prodigal Funds: VCs Return to Hardware

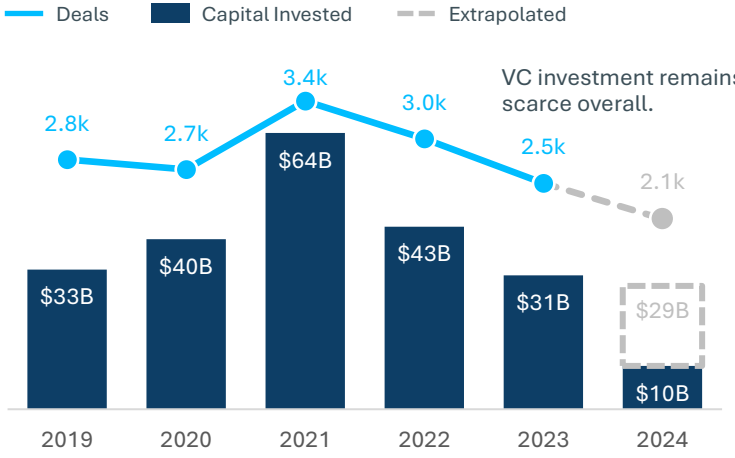
Mirroring the broader innovation economy, VC investment in frontier tech has fallen roughly 50% from peak 2021 levels. But relative to other sectors, investor interest in the space hasn't waned. Since 2021, frontier tech companies have held their share of the VC pie for about 15% of deals. **At the seed stage, VCs are recommitting to the space, with hardware claiming the highest share of capital since 2020.** Within the frontier tech space, some verticals are outperforming. Aerospace, of which defense makes up a large portion, has seen deal activity remain in line with 2021 highs — perhaps fueled by increased military activity and geopolitical unrest. Transportation is also seeing gains, fueled by an increase in autonomous driving technology.

HaaS companies are far more concentrated in industrials where high CapEx proves detrimental to company performance in the short-term. Factories and warehouses are well suited to the HaaS model if they are using machines to offset labor costs, which are already recognized as OpEx expenses. This segment is more primed for HaaS adoption than sectors such as healthcare or consumer electronics where contracts are harder to organize or buyers are used to one-time purchases. While more pioneering companies will begin to find innovative ways to apply the HaaS model to these sectors, industrial automation is the trial ground for this business model.

svb Silicon Valley Bank
A Division of First Citizens Bank

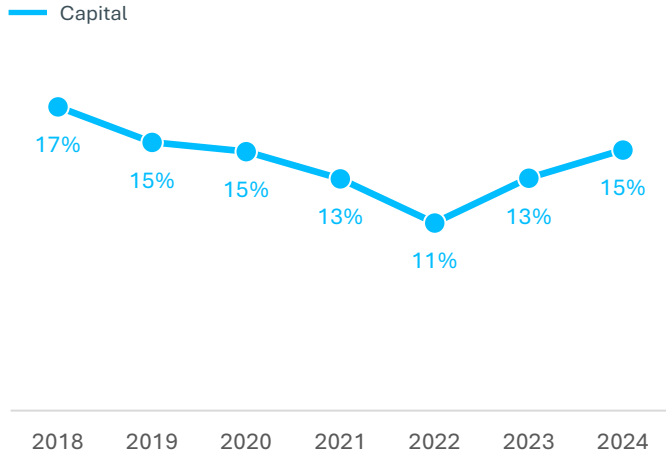
Riding a Falling Tide: Hardware Deals Slip

US VC Investment in Hardware-Focused Companies[1]



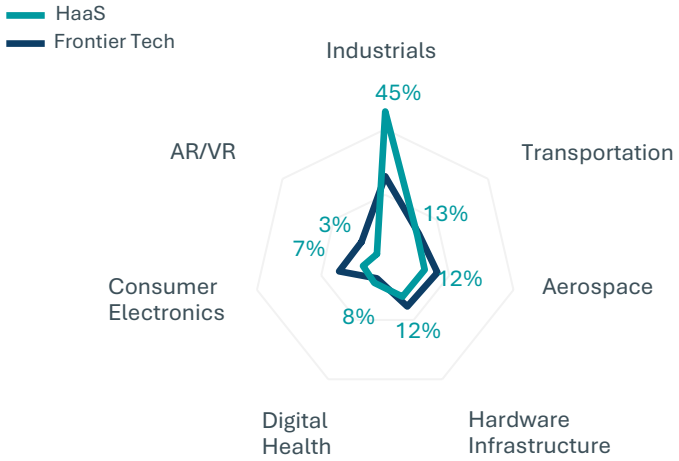
At Seed Stage, Hardware Claims More VC

Percent of US Seed-Stage VC Investment in Hardware



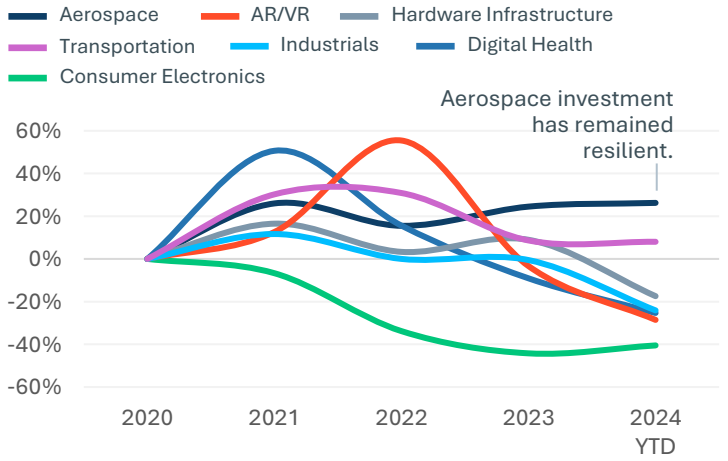
Industrial Robots Rule the HaaS[2] Model

Percentage of US Frontier Tech VC Deals by Segment



Aerospace Stays Aloft; Others Return to Earth

Index: US Frontier Tech VC Deals by Segment



Notes: 1) US VC Investment in companies and sectors requiring machines to deliver products or services. 2) HaaS status determined by survey responses and SVB analysis of company descriptions cross-referenced by our definition of HaaS (see top left of page 18).
Source: PitchBook Data, Inc., SVB State of HaaS Survey and SVB analysis.

As HaaS Grows Up, So Do Valuations

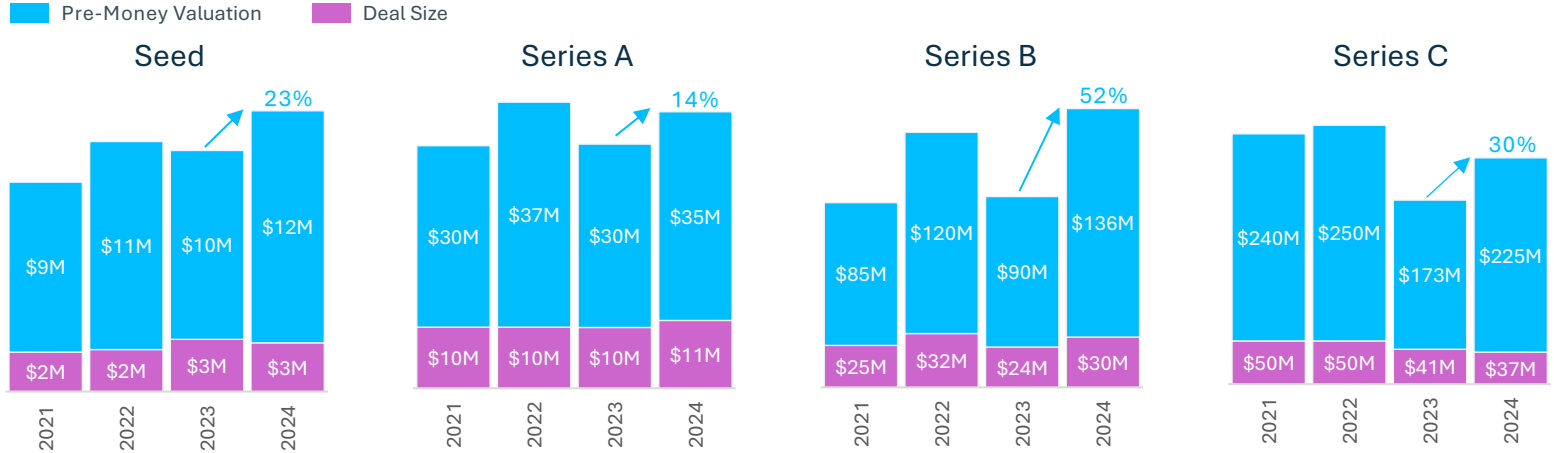
The valuation correction that impacted the overall US VC ecosystem seems to have mostly missed frontier tech companies. While valuations fell in 2023 (slightly), they have quickly rebounded. Twin tailwinds in the form of government policy (CHIPS and IRA) and economics that favor automation and the applications of deep tech have helped support valuations. As expectations for large returns have been tempered across other sectors, VCs may be looking to frontier tech as an opportunity to achieve bigger multiples considering the upside potential.

HaaS companies raise more capital and at better valuations than non-HaaS companies. From the standpoint of financing higher CapEx, the fact that HaaS companies raise more is of little surprise. The higher revenue multiples they receive can also be attributed to the fact that investors prefer the consistent recurring revenue and higher margins (in the long term). Despite the higher multiples, if HaaS companies finance their CapEx with purely equity, it can be a highly dilutive model. **While median valuation multiples are 35% higher for early-stage HaaS companies, across some verticals HaaS models have raised double the equity compared to non-HaaS models.**[1] The biggest differences between HaaS and non-HaaS companies can be seen in sectors that are often the most capital-intensive such as aerospace, industrials and transportation.

svb Silicon Valley Bank
A Division of First Citizens Bank

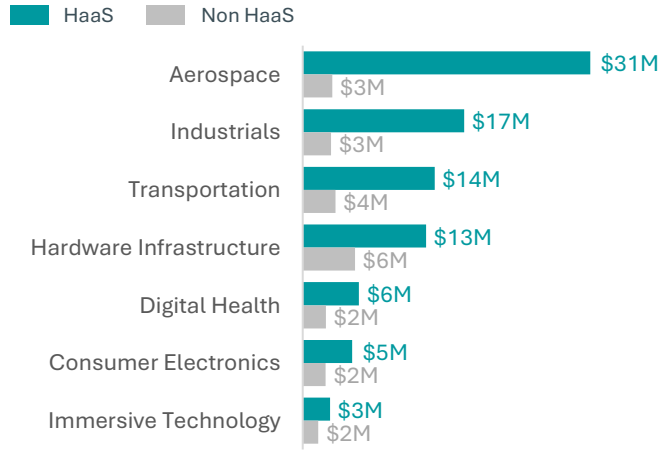
Rebound! Valuations Recover as Investors Embrace Hardware's Potential

Frontier Tech Median VC Deal Size and Pre-Money Valuations[2]



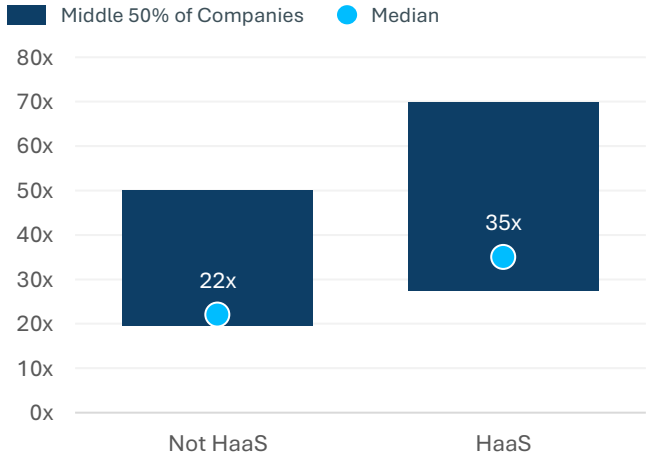
Equity Requirements Are Steeper for HaaS

Median Total Equity Raised for VC-Backed US Frontier Tech[3]



Recurring Revenue Is Worth More to VCs

Hardware Company Revenue Multiples[4]



Notes: 1) According to our analysis of more than 400 VC-backed HaaS companies. 2) Percent change is for pre-money valuations. 3) Sectors based on SVB proprietary taxonomy. 4) Pre-money valuation to annual revenue.
Source: Pitchbook Data, Inc., SVB State of HaaS Survey and SVB analysis.

Equity Won't Build Your Robot Fleet

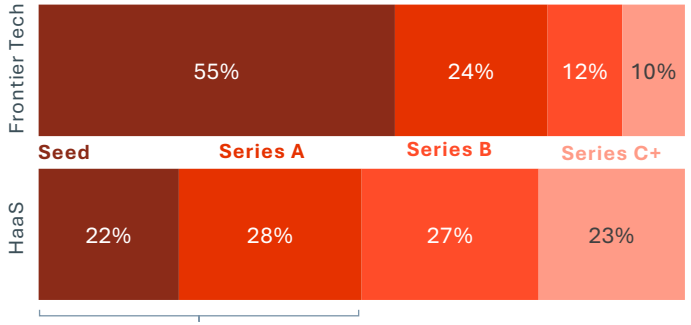
Companies aren't always founded with a HaaS model. Instead, many adopt the model as they find product market fit and begin to better understand their customers' needs. This is seen in the distribution of HaaS companies compared to all frontier tech companies. Seed-stage companies comprise only 22% of our HaaS sample but 55% of all frontier tech companies, indicating that many HaaS companies don't adopt the model until Series A or even C. Several seed and pre-seed founders told us they are working to develop a HaaS model around their product.

A major challenge to adopting the HaaS model is the higher capital requirements for these companies as they scale. At the earliest stages, eventual HaaS companies typically will operate nearly identically to one-time sales companies with proof of concepts financed through equity with no real revenue or margin. At this stage, companies must prioritize flexibility in meeting buyers' needs to gain traction. As these companies scale, they require additional capital to finance the HaaS model. Initially when CapEx is still relatively small investors are willing to foot the bill for initial deployments. But as Bilal Zuberi, GP at Lux notes: "VC is very expensive to deploy assets on the ground." **So as companies reach large-scale deployments, they look for non-dilutive financing solutions**. As seen by the poor performance of recent exits, many frontier tech companies make mediocre candidates to tap public markets for financing if they don't have substantial revenue.

svb Silicon Valley Bank
A Division of First Citizens Bank

First Comes Product, Then Comes HaaS

Breakdown of HaaS and Frontier Tech by Series[1]



Fewer early-stage companies are HaaS. Most companies work on their product development and product market fit before adopting a HaaS business model.

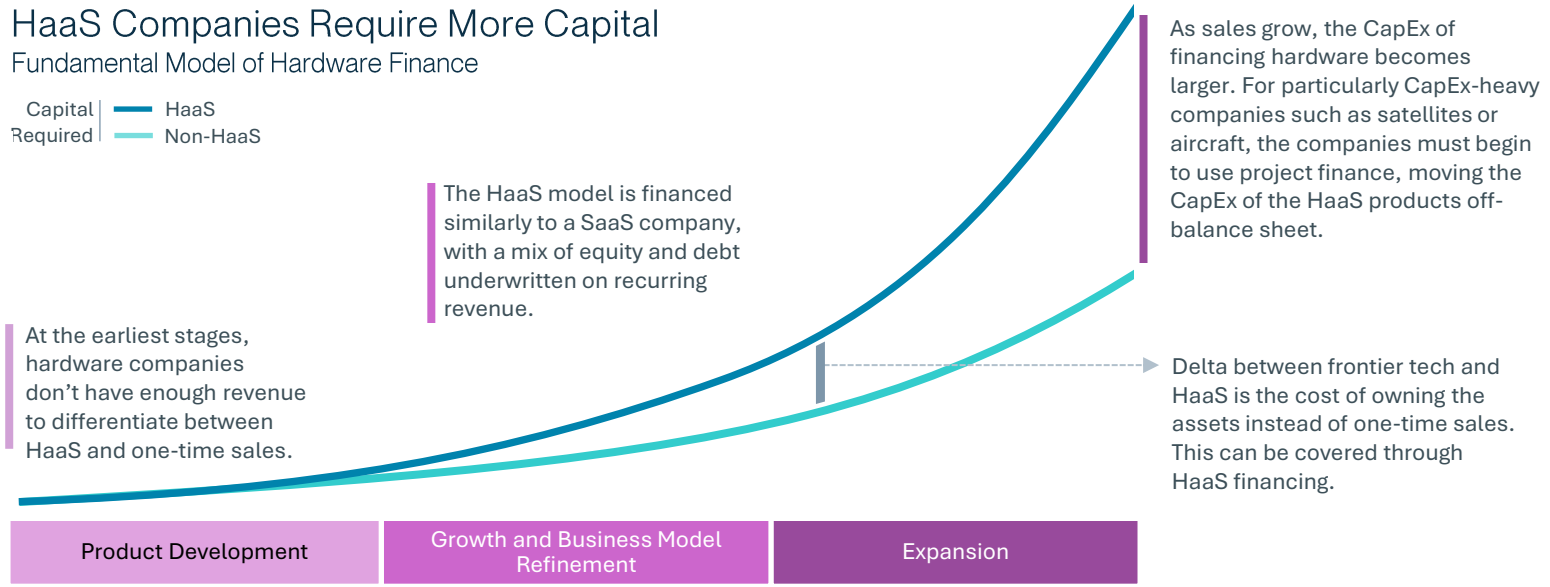
Proofpoint: The VC Perspective

Bilal Zuberi (Lux) on the Evolution of Hardware Financing

> "Hardware used to mean putting investment upfront for development, then selling directly to customers at a decent margin. If it didn't fit into that model, you didn't do it. As it turns out, there are more interesting ways to finance hardware for enterprise use."
>
> -Bilal Zuberi, Lux Capital

HaaS Companies Require More Capital

Fundamental Model of Hardware Finance



Notes: 1) For companies that have raised in the last 24 months.
Source: PitchBook Data, Inc., SVB Interview of Bilal Zuberi on 06/06/2024, and SVB analysis.

HaaS Model Spotlight

How and Why Businesses Apply HaaS

Payback Is Best Served Quickly

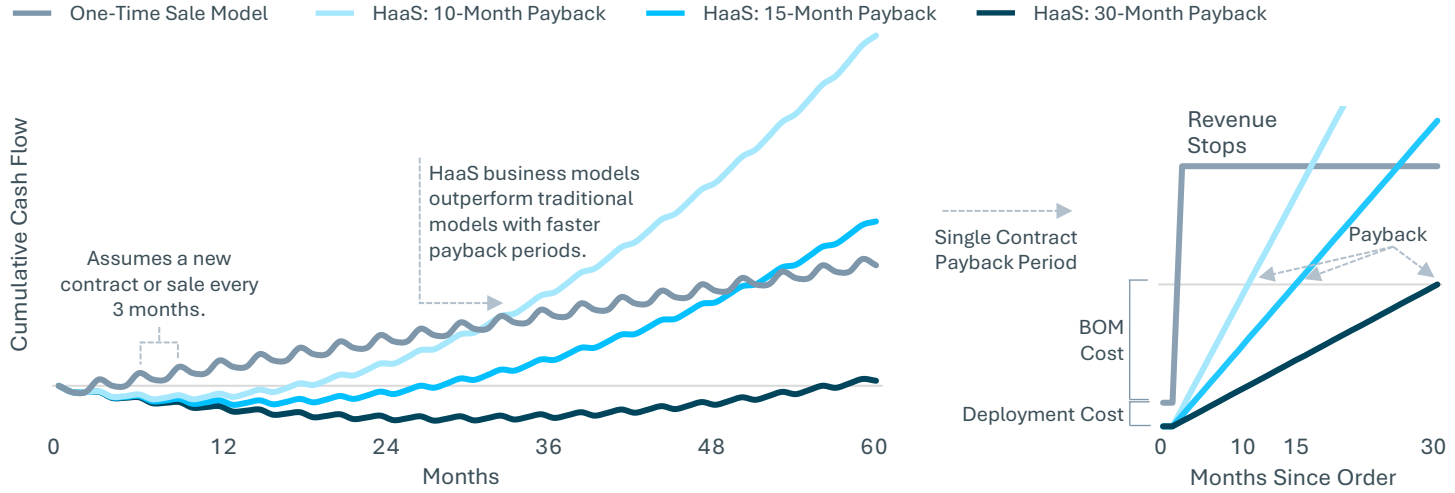
HaaS models have the potential to outperform a traditional one-time sale model because revenue continues over the life of the contract. But not all HaaS models are equal. **One of the most important metrics for a HaaS company is how quickly it is able to payback the bill of materials (BOM) and installation costs of a deployment.** This period coupled with how quickly the company is deploying systems and the cost of those systems are the main variables in determining the amount of capital they will need to finance a HaaS model.

Longer payback periods take more time to surpass a traditional model in terms of cash flow. In a highly simplified cash-flow models that assumes a new deployment of a constant size every three months it takes a company with a 10-month payback period about 2.5 years to outperform a traditional model (in terms of cumulative cash flow). However a company with a 15-month payback period would require about 4.5 years to have higher cumulative cash flow than a traditional one time sale model. With these dynamics, longer payback periods generally equate to higher capital requirements, which are cited as the top reason companies choose not to opt for a HaaS model.

svb Silicon Valley Bank
A Division of First Citizens Bank

Faster Payback, Higher Cumulative Cash Flow

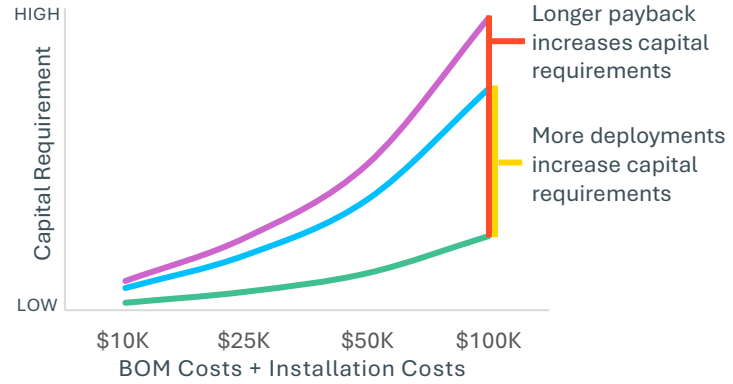
Cumulative Cashflow by Payback Period and Business Model



HaaS Models Have Different Capital Needs

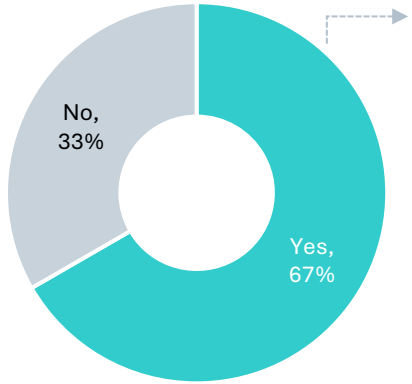
Amount of Capital Required for Different HaaS Models

Payback Period	Deployments per 90 Days
15 months	1
15 months	3
30 months	1



Capital Requirements Are a Barrier to HaaS

Non-HaaS: Have You Considered a HaaS Business Model?



Top Reasons for Not Adopting HaaS:

1. Intense capital required for HaaS.
2. Structure doesn't work with product.
3. Structure doesn't appeal to customer.

Source: SVB State of HaaS Survey and SVB analysis.

HaaS Isn't One-Size-Fits-All

The spectrum of technologies that apply a HaaS business model can range from low CapEx solutions such as wearable sensors to high CapEx products like satellites. **While companies can find success at every point on this range, considerations for how to structure contracts and scale the business can vary greatly depending on where you sit.**

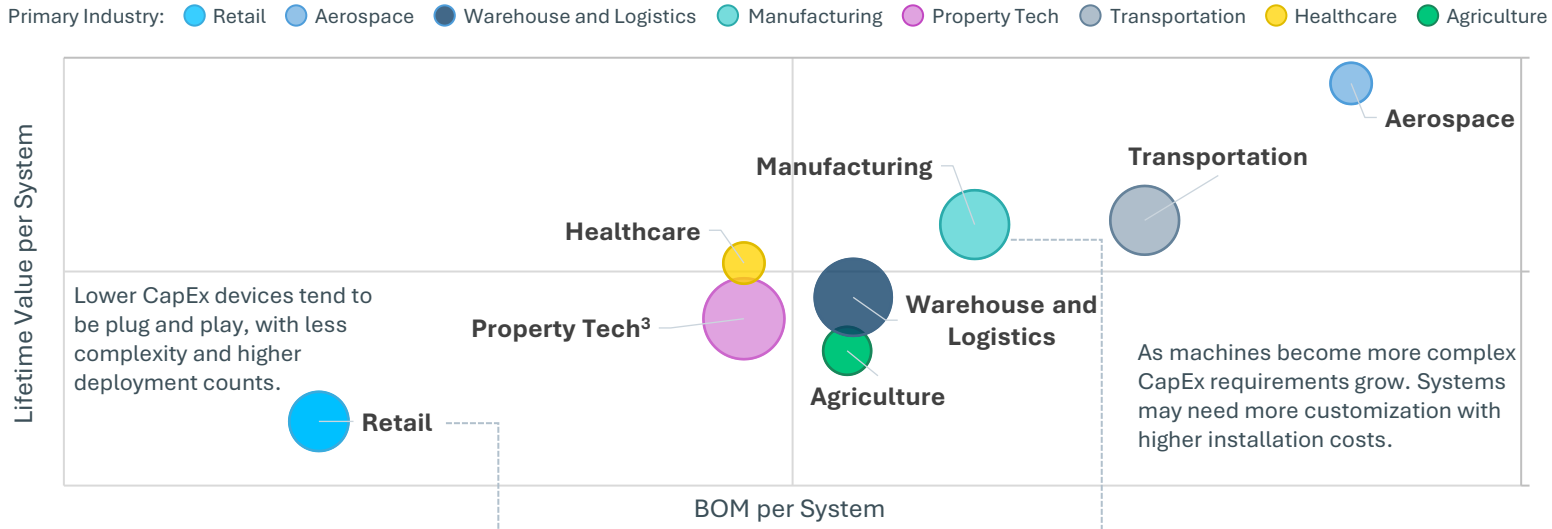
Products with relatively low CapEx — say, an office security camera — tend to have a shorter development cycle with less R&D required. They can accommodate a much quicker payback period, allowing CapEx to be recouped typically well within a year. The risk is generally with the business model and product market fit more than the technology itself. These companies tend to scale easily and require little to no customization with low installation costs that are often passed to customers though a one-time fee. With lower lifetime value per machine, these companies must achieve high sales volumes before challengers emerge.

High-CapEx products, on the other hand — say, a package delivery drone — may take many years to become operational. Payback periods are long, scaling can be difficult and technology risk is high. But the opportunities are immense. When these companies succeed, they create entirely new categories unto themselves.

svb Silicon Valley Bank
A Division of First Citizens Bank

Balancing Cost and Reward Is a Spectrum for HaaS Companies

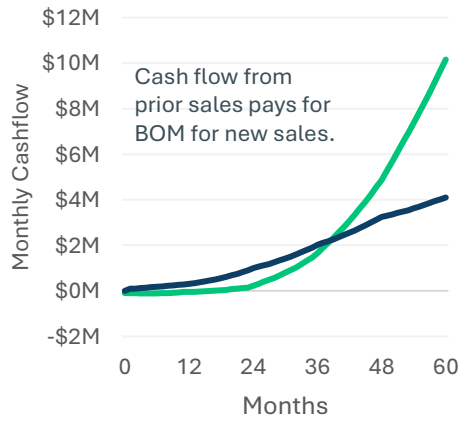
HaaS Business Models Across Industries: Plotted by Machine Lifetime Value and BOM Costs[1]



To HaaS or Not to HaaS?

HaaS vs. One-Time Sales Scenarios Based on CapEx Intensity[2]

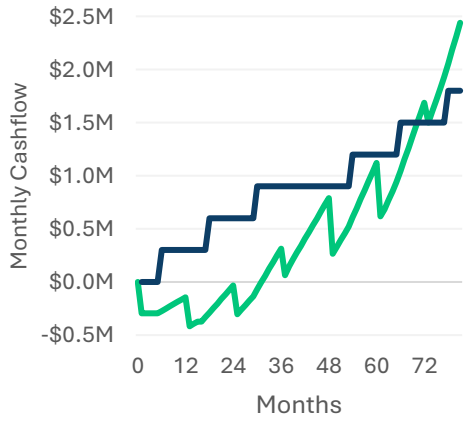
Low CapEx Scenario: **Retail Robot**



HaaS:
BOM Cost: $20k
Initial Fee: $2k
Subscription: $12k/yr
Service Life: 4 years
Replacements: 5%
Customer Churn: 3%
Payback: ~17mo

One-time Sales:
BOM Cost: $20k
Sale Price: $40k

High CapEx Scenario: **Industrial Robot**



HaaS:
BOM Cost: $300k
Contract: $25k/mo
Service Life: 4 years
Replacements: 5%
Customer Churn: 3%
Payback: ~31mo

One-time Sales:
BOM Cost: $300k
Sale Price: $600K

Notes:1) Sectors plotted based on average rankings of the companies in our survey data set. 2) The models are based on theoretic scenarios meant to mimic real world companies. 3) Includes real estate services and construction.
Source: SVB State of HaaS Survey and SVB analysis.

Metrics That Matter

Eight Key Benchmarks for HaaS

SVB's HaaS Machine Metrics That Matter

Where the unit economics go, the business will likely follow

Machine Churn	Is your machine staying in service?	$= \frac{\text{Machines Replaced in Period}}{\text{Machines in Service at Start of Period}}$
Contract Value (CV) to Upfront Cost Ratio	Are you getting enough value per contract to recoup upfront costs?	$= \frac{\text{Contract Revenue}}{\text{BOM + Installation Costs}}$
System Lifetime Value BOM Ratio (SLV to BOM)	What is the earning potential of your machines?	$= \frac{\text{Annual Revenue per Machine x Service Life}}{\text{BOM}}$
Gross Payback Period	How long does it take to start earning profit per contract?	$= \frac{\text{BOM + Installation Costs}}{\text{Monthly Revenue}}$
System Operating Margin	How profitable is your system once upfront costs are returned?	$= \frac{\text{Monthly Revenue per System – Ongoing COGS}^{1}}{\text{Monthly Revenue Per System}}$

svb Silicon Valley Bank
A Division of First Citizens Bank

Notes: 1) Ongoing cost of goods sold are COGS minus BOM, depreciation and installation costs.
Source: SVB analysis.

What Does HaaS Look Like?

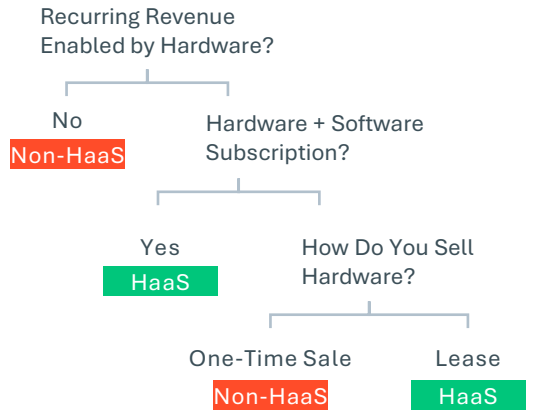
Building on our 2022 HaaS survey, we refined our definition of HaaS to exclude companies that have a subscription model for their software, but a one-time sales model for their hardware. For HaaS, ownership is a big piece of the puzzle, and the primary challenge of hardware financing is solved if customers purchase the equipment outright. For those companies that make recurring revenue from their hardware, there are many different ways of generating that revenue — from a recurring usage model to a subscription model. One theme that came up in our conversations with investors is the need for flexibility in sales strategies. **While recurring revenue is preferred, you can't force-fit the model for every customer.** A customer that may be considering an automated solution to replace CapEx may prefer a one-time sale. Just over half of the average HaaS company's revenue is recurring, and nearly half comes from other revenue streams such as one-time sales or fees. Thus HaaS, in practice, is built alongside a traditional model for many companies to meet customer demands.

We sent the 2024 HaaS survey to our network of frontier tech companies and investor portfolio companies. Among HaaS respondents, nearly half were robotics companies and another quarter were companies selling sensors and cameras. These two HaaS applications are easily adapted to the HaaS model — relatively low-cost products that can easily plug into an existing problem (i.e., they aren't creating a new market).

svb Silicon Valley Bank
A Division of First Citizens Bank

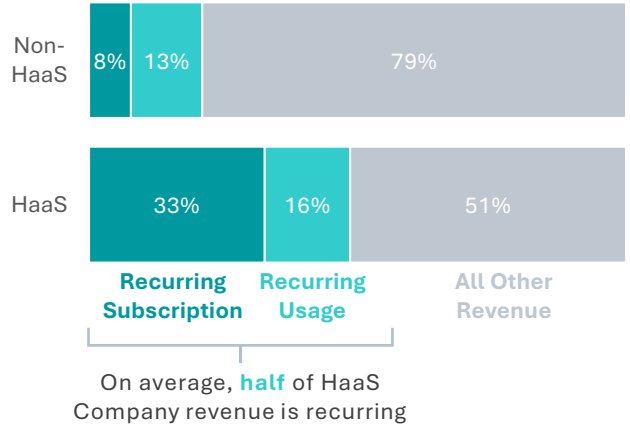
How We Define HaaS

A Decision Tree for Identifying HaaS Companies[1]



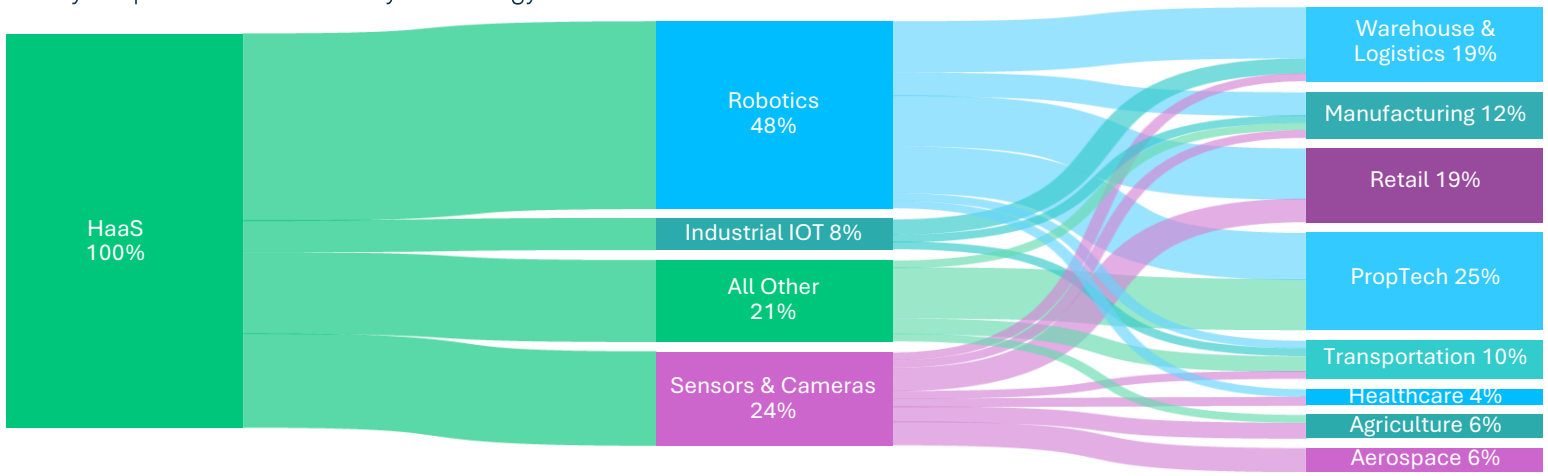
HaaS Isn't All Recuring Revenue

Hardware Company Revenue Mix by Business Model



Robotics Companies Make Up Nearly Half of HaaS

Survey Respondent Breakdown by Technology and Sector[2]



Notes: 1) We prioritized hardware financing in our definition of HaaS, thereby excluding companies that sell hardware through a one-time sale and an accompanying subscription for software. 2) "All other" technology includes machines not easily categorized elsewhere such as satellites, consumer electronics, 3D printers, etc. Sectors grouped by SVB taxonomy. Percentages don't sum to 100% due to rounding.

Source: SVB State of HaaS Survey and SVB analysis.

Squeezing the Most from Your Machines

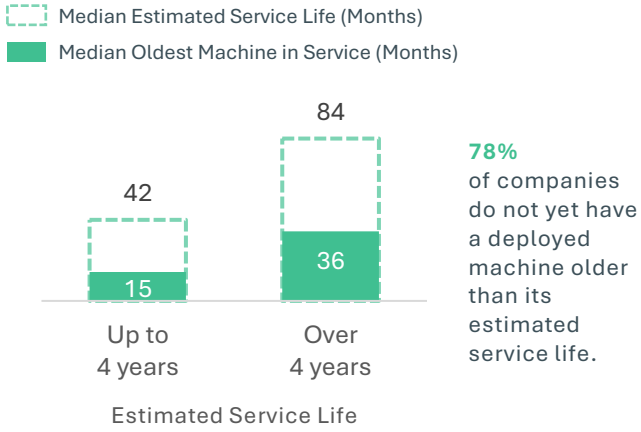
How long will the machine last, and how much does it costs to build, install, operate, and maintain? The answers to these questions impact a company's gross margin. But many companies only have projections for how long their machines will last. Many startups haven't operated long enough to understand their machines' true service life. Because much of the profit in a HaaS contract comes toward the end of a machine's lifetime — after the BOM and installation are paid off — accuracy in service life estimates are important. **Service life also has a significant impact on the SLV to BOM ratio — a key metric that assesses if a company brings in enough cash flow per system.** The median HaaS company in our sample had a system lifetime value of 8x, indicating they bring in eight times more cash flow from the machine than the BOM costs. SLV to BOM doesn't account for the overhead of maintaining the system and contract, but it is a good measure of financial performance on a machine basis.

A complementary metric is the contract value to BOM cost ratio, which assesses if an individual contract earns enough to recoup the BOM and installation costs. The typical company has a 1.8x ratio. A ratio below 1x means a company is taking on additional risk of renewal or redeployment, which, judging by machine churn, is no small risk, given 45% of machine churn comes from end of contract.

svb Silicon Valley Bank
A Division of First Citizens Bank

Still Early Innings for Most HaaS Companies

Distribution of Oldest Deployed System and Service Life

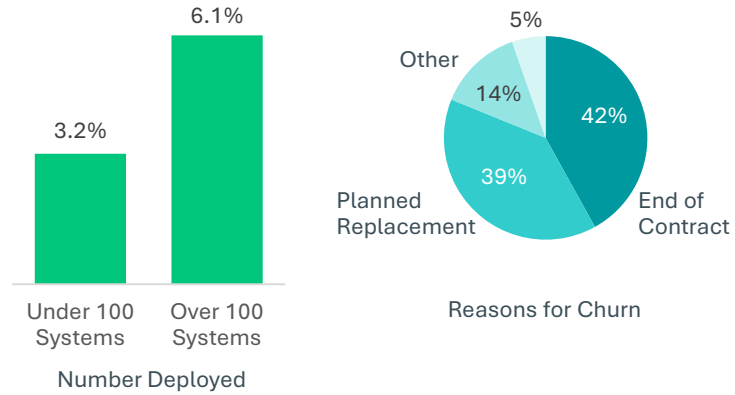


78% of companies do not yet have a deployed machine older than its estimated service life.

Is the Machine Staying in Service?

SVB Metric That Matters: Average Machine Churn Rates

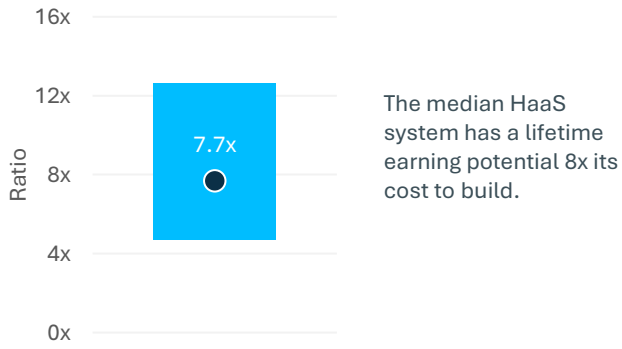
$$= \frac{\text{Machines Replaced in Period}}{\text{Machines in Service at Start of Period}}$$



Do You Earn Enough per System?

SVB Metric That Matters: System Lifetime Value to BOM Ratio

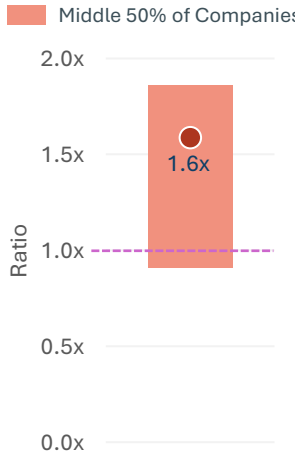
$$= \frac{\text{Annual Revenue per System x Service Life}}{\text{BOM Costs}}$$



The median HaaS system has a lifetime earning potential 8x its cost to build.

Do You Get Enough Value per Contract?

SVB Metric That Matters: Contract Value to Upfront Costs Ratio



$$= \frac{\text{Contract Revenue per System}}{\text{[BOM + Installation Costs]}}$$

A ratio less than one means taking renewal risks to recoup CapEx.

Notes: 1) Ongoing costs are the cost of goods sold other than BOM, installation and depreciation costs.
Source: SVB State of HaaS Survey and SVB analysis.

Payback Period: Until BOM's Away

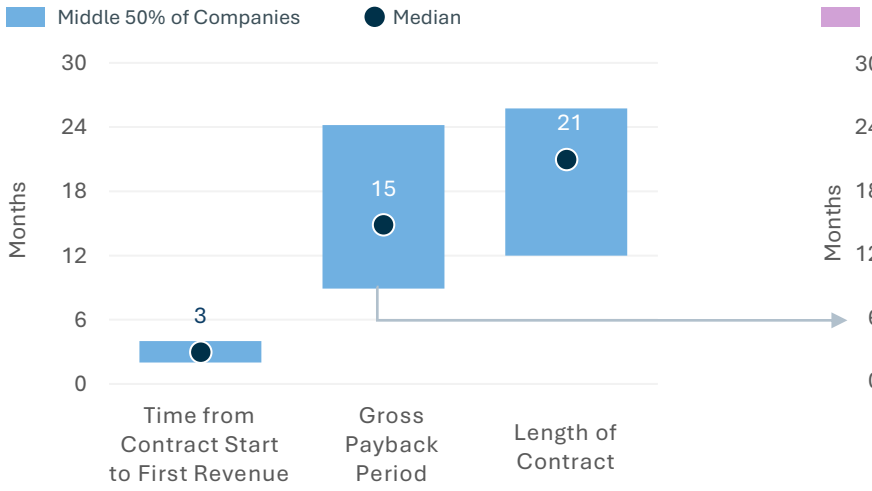
As we saw in theoretical examples (pages 14-15), the payback period is one of the most important metrics to a HaaS company (faster payback is generally better). But there are many variables that companies must consider to find the appropriate payback period. For one, not all companies make revenue from the beginning of the contract. Half of all companies take at least three months to get their first revenue from a contract. BOM costs are another key variable — companies with higher BOM costs typically have a longer machine service life and longer contract periods, meaning they can extend their payback period.

For companies with BOM costs less than $100K, the typical company had a gross payback period of just 11 months — a stark difference from companies with over $100K where the typical company took 24 months to repay BOM and installation costs. But BOM and paying back the BOM are only one side of the story. The machine operating margin (monthly system revenue minus ongoing COGS divided by monthly system revenue[1]) can also eat into profits if the margin is low. The monthly operating costs on average account for about 20% of COGS. **Ongoing costs are important because they represent a continued value-add to customers, which is the keystone of sticky HaaS products. "[O]therwise you're just selling widgets on a deferred payment plan," as Matter Ventures CFO Mel Tang put it.**

svb Silicon Valley Bank
A Division of First Citizens Bank

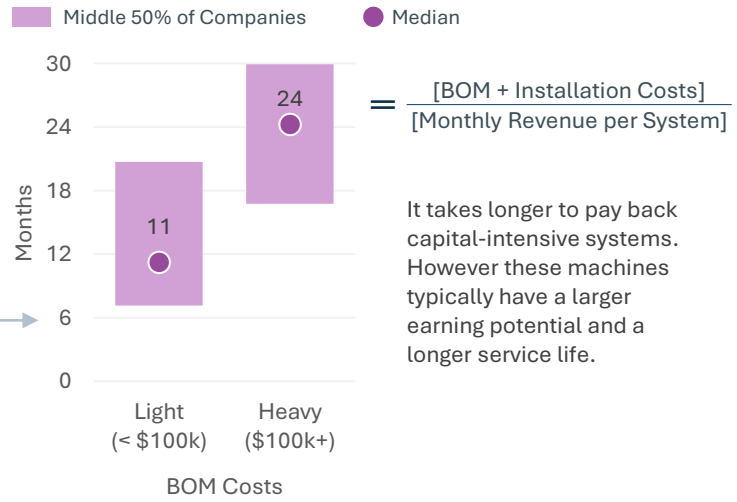
Payback Within the Contract Time

Time to First Revenue, Payback Period and Contract Length



How Long Until Contracts Earn a Profit?[2]

SVB Metric That Matters: Gross Payback Period

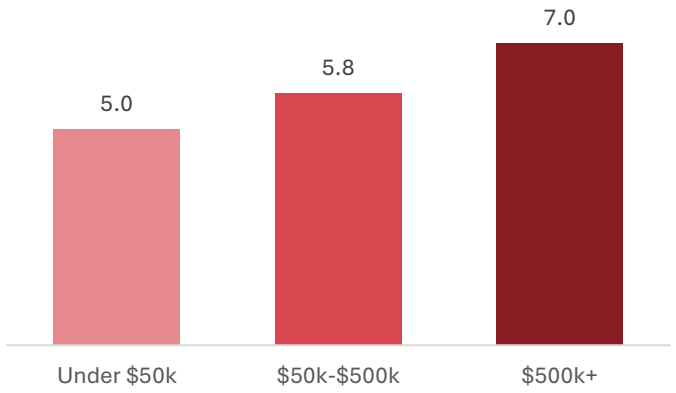


= [BOM + Installation Costs] / [Monthly Revenue per System]

It takes longer to pay back capital-intensive systems. However these machines typically have a larger earning potential and a longer service life.

Larger BOM Costs; Longer Service Life

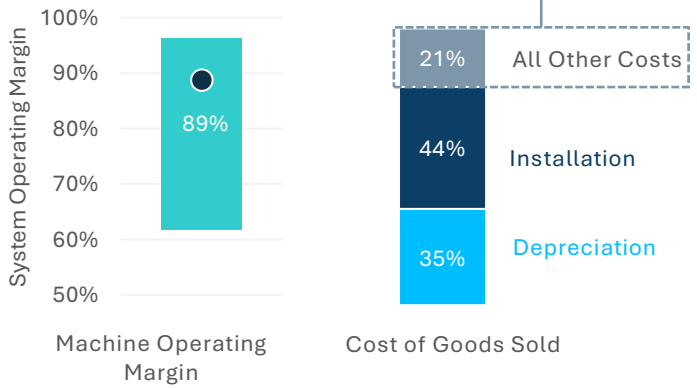
Median Estimated Service Life in Years by BOM Costs



COGS in the Machines

SVB Metric That Matters: Machine Operating Margin[2]

= (Monthly Revenue per System - Ongoing COGS) / Monthly Revenue per System



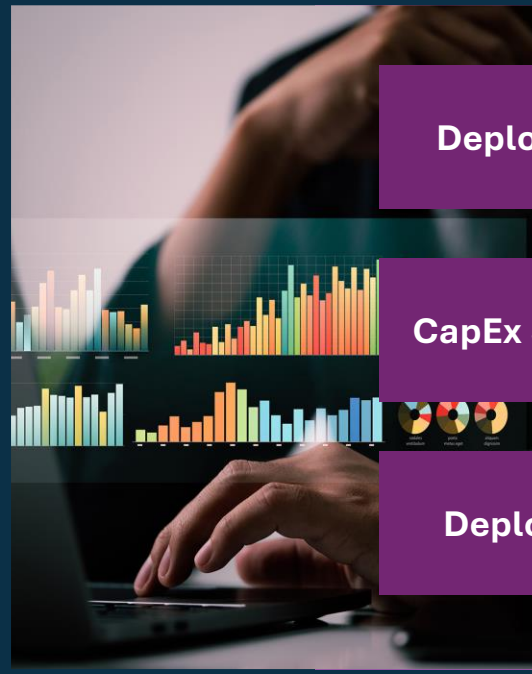
Notes: 1) Ongoing costs are the cost of goods sold other than BOM, installation and depreciation costs. 2) Not including ongoing costs.
Source: SVB State of HaaS Survey and SVB analysis.

HaaS Company Metrics That Matter

When the pieces come together, does the big picture make sense?

Machine metrics are no substitute for the bottom line. Aggregated company financials are where the rubber meets the road, and for HaaS companies, these figures can reveal both the hidden costs and the true value of the business. Beyond the standard generally accepted accounting principles (GAAP) reporting metrics, HaaS companies should consider at least three additional metrics to monitor their financial performance. The first metric is **deployed annual recurring revenue (DARR),** a calculation of the annualized monthly recurring revenue from deployed machines. While many companies have a significant bookings backlog, revenue doesn't start flowing until the machine is deployed into the field. Deployment can be complex, requiring the company to manage supply chains and coordinate with the customers on installation.

The second metric is **CapEx share of net burn**. For companies yet to reach profitability, this helps measures how much of their cash burn is going to CaPex vs. investment into R&D, Sales, etc. The third metric is **deployment multiple**, a ratio of deployed recurring revenue to committed recurring revenue. This multiple should be as close to 1 as possible, a measure of efficiency in deploying revenue generating machines. We hope these metrics offer guidelines to build on. While we aren't providing benchmarks to these aggregate metrics — norms can vary widely across sectors, technology types and company stages — we encourage companies to set their own standards and monitor them over time. Not only can these metrics help keep the business on track, they can also serve as a shorthand for communicating progress to investors.



Deployed ARR (DARR)	What's the scale/size of the business?	= (Monthly Recurring Revenue from Deployed Machines) x 12
CapEx Share of Net Burn	How much of your burn is driven by CapEx?	= $\frac{\text{CapEx in period}}{\text{EBITDA in period + CapEx in period}}$
Deployment Multiple	How quickly can you turn bookings into revenue?	= $\frac{\text{Change in Deployed ARR in period}}{\text{Change in Committed ARR in period}}$

svb Silicon Valley Bank
A Division of First Citizens Bank

Source: SVB analysis.

Authors

Lead Authors

Jack Garza
Head of Frontier Technology
Silicon Valley Bank
jgarza@svb.com

Jack Garza is a seasoned finance professional responsible for guiding the Silicon Valley Bank's frontier tech sector strategy and leading the frontier tech relationship management team for northern California. As Senior Market Manager, Jack leads a team of dedicated experts focused on companies in the deep technology space centered at the convergence of hardware and software. He is based in the San Francisco Bay Area.

Chelsea Hakso
Director Hardware-as-a-Service
Silicon Valle Bank
chakso@svb.com

Chelsea Hakso is the director of Silicon Valley Bank's hardware-as-a-service (HaaS) team where she has been instrumental in building SVB's HaaS lending capabilities over the past six years. Her expertise centers on creating financing solutions that fit the business models of her clients and accelerate their go-to-market strategies. Prior to her current role, Chelsea supported enterprise software clients, with a focus on AI-powered technologies.

Market Insights Team Authors

Josh Pherigo
SVB Senior Researcher
SVB Market Insights
jpherigo@svb.com

Eli Oftedal
SVB Senior Researcher
SVB Market Insights
eoftedal@svb.com

Contributing Authors

Janice Ahn
Managing Director
Silicon Valley Bank

Lane Bruno
Managing Director, ICBD
Silicon Valley Bank
lbruno@svb.com

Julian Nash
Managing Director
Silicon Valley Bank
jnash@svb.com

svb Silicon Valley Bank
A Division of First Citizens Bank

About Silicon Valley Bank

Silicon Valley Bank (SVB), a division of First-Citizens Bank, is the bank of some of the world's most innovative companies and investors. SVB provides commercial and private banking to individuals and companies in the technology, life science and healthcare, private equity, venture capital and premium wine industries. SVB operates in centers of innovation throughout the United States, serving the unique needs of its dynamic clients with deep sector expertise, insights and connections. SVB's parent company, First Citizens BancShares, Inc. (NASDAQ: FCNCA), is a top 20 U.S. financial institution with more than $200 billion in assets. Learn more at svb.com.

Silicon Valley Bank www.svb.com

About the HaaS Survey

SVB's HaaS survey includes responses from a pool of VC-backed hardware companies drawn from SVB's network of companies. We first conducted the survey in the spring of 2022 and again in in May and June of 2024. Data presented in the 2024 report includes the most comprehensive data available for the metrics presented. For questions or feedback, email SVBMarketInsights@svb.com.

Learn more

SVB Hardware and Frontier Tech

We help deep tech and hard tech innovators break new ground in creating the future, now.

See complete disclaimers on the following page.

©2024 First-Citizens Bank & Trust Company. Silicon Valley Bank, a division of First-Citizens Bank & Trust Company. 3003 Tasman Drive, Santa Clara, CA 95054

Disclaimers

The views expressed in this report are solely those of the authors and do not necessarily reflect the views of SVB.

This material, including without limitation to the statistical information herein, is provided for informational purposes only. The material is based in part on information from third-party sources that we believe to be reliable but which has not been independently verified by us, and, as such, we do not represent the information is accurate or complete. The information should not be viewed as tax, accounting, investment, legal or other advice, nor is it to be relied on in making an investment or other decision. You should obtain relevant and specific professional advice before making any investment decision. Nothing relating to the material should be construed as a solicitation, offer or recommendation to acquire or dispose of any investment, or to engage in any other transaction.

All non-SVB named companies listed throughout this document, as represented with the various statistical, thoughts, analysis and insights shared in this document, are independent third parties and are not affiliated with Silicon Valley Bank, a division of First-Citizens Bank & Trust Company. Any predictions are based on subjective assessments and assumptions. Accordingly, any predictions, projections or analysis should not be viewed as factual and should not be relied upon as an accurate prediction of future results.

Investment Products:

Are not insured by the FDIC or any other federal government agency	Are not deposits of or guaranteed by a bank	May lose value

©2024 First-Citizens Bank & Trust Company. Silicon Valley Bank, a division of First-Citizens Bank & Trust Company. 3003 Tasman Drive, Santa Clara, CA 95054