

Unlocking Tesla's AI Mojo... Enter the Dojo: Upgrade to OW, PT \$400, Top Pick

Investors have long debated whether Tesla is an auto company or a tech company. We believe it's both, but see the biggest value driver from here being software and services revenue. The same forces that have driven AWS to reach 70% of AMZN total EBIT can work at Tesla, in our view, opening up new addressable markets that extend well beyond selling vehicles at a fixed price. **The catalyst?** Dojo, Tesla's custom supercomputing effort in the works for the past 5 years. *Version 12 of Tesla's full self driving system (OTA by year-end) and Tesla's next AI day (early 2024) are worth watching.*

STOCK RATING

Overweight

INDUSTRY VIEW

In-Line

PRICE TARGET

\$400.00

We believe that Dojo can add up to \$500bn to Tesla's enterprise value, expressed through a faster adoption rate in Mobility (robotaxi) and Network Services (SaaS). The change drives our PT increase to \$400 vs. \$250 previously. We upgrade to Overweight and make Tesla our Top Pick.

What is Dojo? Dojo is a purpose-built supercomputer designed in-house by Tesla to *train* the full-self-driving (FSD) system that sits inside every Tesla vehicle. **Why is Tesla doing it?** Tesla's cars are sensor encrusted robots making life and death decisions in highly unpredictable environments and driving situations. Tesla's ability to improve the efficacy of its full self driving system is limited by the ability to collect and process real world video data from the edge and to train these robots from the experience of its vehicle fleet in service, which is 5mm units today and closer to 50mm by end of decade. **Tesla management has said it needs as much compute power/NVIDIA GPU clusters it can get its hands on and currently it cannot physically secure the amount of chips necessary to train cars. In addition, they believe they can develop a more efficient system for their specific needs while not funding a supplier's 60% gross margin.**

With a highly experienced semiconductor team, Tesla has built a custom AI ASIC chip, that, due to its core function of processing vision-based data for autonomous driving use cases, can operate more efficiently (energy consumption, latency) than the leading cutting-edge general-purpose chips on the market (NVIDIA's A100s and H100s), and at a fraction of the cost. *Dojo is a training computer made up of many thousands of D1 chips housed in an AI data center. It trains the inference engine (FSD chip) that sits within the vehicles at the edge which Tesla has designed in-house for the past 7 years.*

Tesla is not the first tech player to attempt to build a custom silicon system in-house. What's

WHAT'S CHANGED

Tesla Inc	From	To
Price Target	\$250.00	\$400.00
Rating	Equal-weight	Overweight
Top Pick	RACE.N	TSLA.O

Tesla Inc (TSLA.O, TSLA US)

Top Pick

Autos & Shared Mobility | United States of America

Stock Rating	Overweight
Industry View	In-Line
Price target	\$400.00
Shr price, close (Sep 7, 2023)	\$251.49
Mkt cap, curr (mm)	\$875,508
52-Week Range	\$313.80-101.81

Fiscal Year Ending 12/22 12/23e 12/24e 12/25e

EPS (\$)***	4.07	3.26	3.92	5.58
Prior EPS (\$)***	-	-	3.74	4.94
ModelWare EPS (\$)	3.62	2.77	3.43	5.07

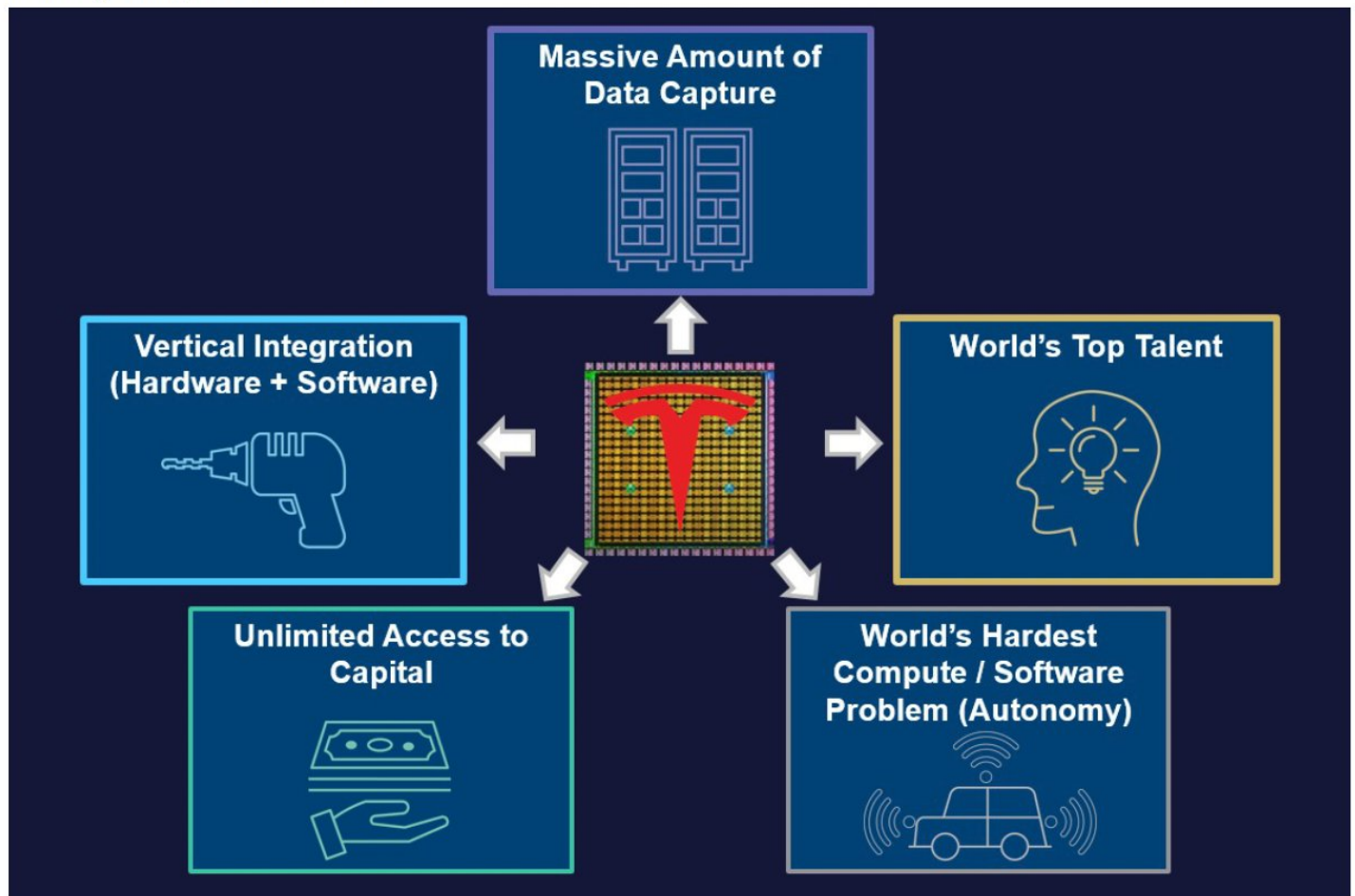
Unless otherwise noted, all metrics are based on Morgan Stanley ModelWare framework

*** = Based on consensus methodology
e = Morgan Stanley Research estimates

unique about Tesla is the company's longtime experience with advanced driver assist systems (ADAS). It has commercialized a vast network of vehicles that is constantly increasing (400k+ FSDs on the road already collecting data from 300+ million miles traveled). In addition, the company has brought together a world class design team, and has allocated expansive resources towards the autonomy problem. Like other tech platforms, Tesla pursues high vertical integration in key technology domains to enable high iteration and continual improvement while helping to diversify away from over-reliance on 3rd party suppliers that may not be able to provide an optimal solution for Tesla's specific needs. *While it is difficult to explicitly validate the many claims Tesla has made about Dojo's cost and performance, we believe Tesla has a chance of bringing forth a competitive customized solution given the company's innovation track record and capabilities.*

In this report we present a comprehensive "primer" on Dojo involving insights and opinions across Morgan Stanley's AI/Semis research teams. We explore what Dojo is, why Tesla is doing it and how it can impact the business and the stock's valuation. We invite investors to dive into the world of custom silicon at exaFLOP scale solving some of the world's most challenging problems (autonomy) offering a gateway into vast untapped commercial potential... essentially *everything with a camera that can process data to make decisions*. The more we looked at Dojo, the more we realized the potential for underappreciated value in the stock. Like many other large cap tech stocks on your screen, we believe Tesla can reasonably test its all-time highs of \$400 over the next 12 months.

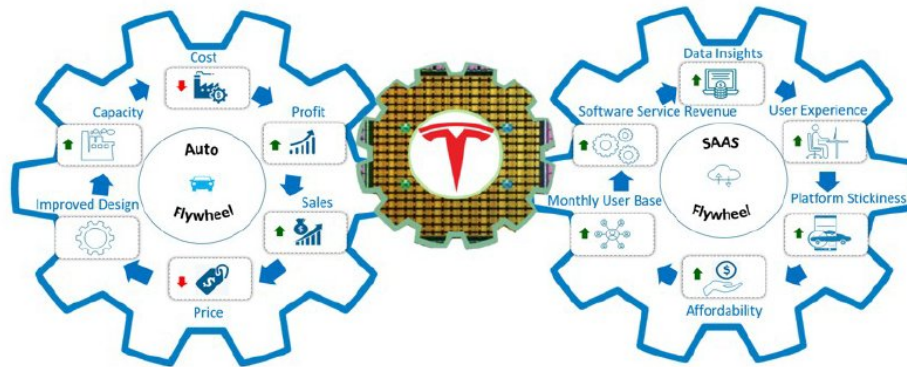
Exhibit 1: Tesla's capabilities and business model can significantly benefit from the development of custom AI tools. It's too big and too specialized an opportunity not to have in-house.



Source: Morgan Stanley Research

For years, we've tried to focus investor attention on the potential of Tesla's leadership in EV hardware (semi-autonomous electric 'robots') to convert vehicle owners into 'subscribers' generating highly recurring (and high margin) revenue. While Tesla has had some modicum of success on this front to date, we believe Tesla's in-house computing efforts have the potential to materially accelerate the network effect and speed of data capture/analysis/learning from the 1 billion miles traveled *per day* we forecast is executed by its global fleet (Tesla + 3rd party) by 2027. *The scale and complexity of the data (the collective global light vehicle fleet travels a distance of nearly 2 light years annually) combined with the high standard of safety requirement make the global mobility market highly relevant territory for the expression of the AI investment theme.*

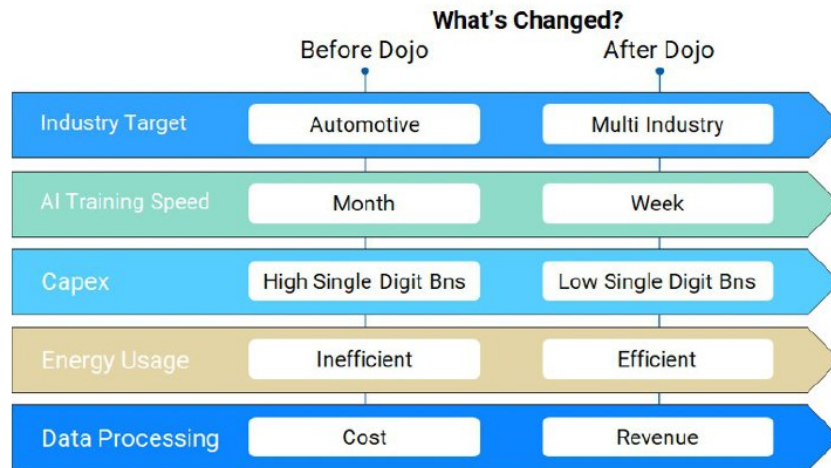
Exhibit 2: We believe Dojo can accelerate Tesla's Auto & SAAS 'Double Flywheel'



Source: Morgan Stanley Research

We collaborated with a range of AI experts at MS to weigh in on Tesla's AI ambitions and to compare and contrast them to those of NVDA and other hyper-scalers. Extending beyond the implications for Tesla, we hope this work sheds light on the potential of the broader custom silicon market.

Exhibit 3: Dojo - Before & After



Source: Morgan Stanley Research

In conjunction with this report, we feel it is prudent to include a degree of optionality for Tesla's AI potential into our revised price target which has increased to \$400 vs. \$250 previously. Our bull case valuation is raised to \$550 (vs. \$450). And our bear case valuation is raised to \$120 (vs. \$90). Within our forecasts and valuation we express the potential of Dojo through our raised assumptions, primarily for Tesla Mobility (autonomous robo-taxis) and Tesla Network Services (SaaS business derived from Tesla vehicles and 3rd party customers) in the form of faster adoption and higher ARPU. We share a comprehensive review of Tesla valuation on our new earnings forecasts which have increased approximately 20% by FY25/26 which we believe fairly underpins our \$400 price target vs. the growth and valuation multiples of the relevant tech peer group.

Executive Summary - Our Thesis in 3 Charts

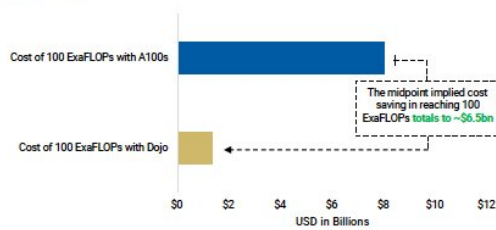
We believe Dojo can represent the next step-change in market perception of Tesla. Dojo emphasizes 3 of Tesla's core capabilities: 1) speed, 2) performance, and 3) cost. In the near term, we believe Dojo can accelerate the development and monetization of Tesla's software and services business. Longer term, we see scope for Dojo to provide avenues for Tesla's software and hardware capabilities to extend well beyond the auto industry. If Dojo can help make cars 'see' and 'react,' what other markets could open up? Think of any device at the edge with a camera that makes real-time decisions based on its visual field.

Tesla estimates that Dojo can provide 6x cost saving vs current, state of the art, GPU alternatives. On our calculations, when comparing what Tesla would have to spend on equivalent compute from NVIDIA, Dojo has the potential to drive ~\$6.5bn in cost savings for Tesla over the next couple of years to reach the company's stated goal of materially increasing internal computing power by October 2024 (to 100 exaFLOPs). This is achieved by having a purpose built, in-house semiconductor and AI tech stack. Dojo became operational in July of this year and we believe the continued roll-out and subsequent company announcements will provide the catalyst for investors to appreciate Dojo's potential. We note that 6x cost savings is Tesla's claim and we are unable to verify it with specificity given the early stage of Dojo roll-out. We also note that there are other pieces of data provided by Tesla that suggest other implied cost savings outcomes that could differ from the 6x claim. Finally, just because Tesla is making a major effort to commercialize Dojo for its in-house purposes does not mean that the system will ultimately represent the

best cost/performance alternative on the market longer term give continuous improvement of rival compute technology.

For our Tesla modeling purposes, we focused on the potential for Dojo to deliver autonomy and network services revenues at a faster attach rate with higher average monthly revenue per user (ARPU), driving a material increase to our estimates. We have NOT given Tesla credit for specific cost savings from Dojo vs. its current supercomputing budget. Nor have we given Tesla credit for any non-auto-related revenue streams. With significantly increased computing power and faster processing speeds (latency), Tesla's path to monetizing vehicle software can materialize sooner, and at higher recurring revenue rates. We also for the first time incorporate non-Tesla fleet licensing revenue into our Network Services model as we expect recent charging station cooperation will extend into FSD licensing (discussions ongoing) and operating system licensing. We now forecast Tesla Network Services to reach \$335bn in revenue in 2040 vs \$157bn previously, and expect the segment to represent over a third of total company EBITDA in 2030, doubling to over 60% of group EBITDA by 2040 (vs. 38% previously). This increase is largely driven by the emerging opportunity we see in 3rd party fleet licensing, increased ARPU, with operating leverage driving higher long-term EBITDA margin vs. prior forecast (65% from FY26 onwards, vs. 50% previously). In addition to Network Services, we indirectly ascribe the value of Dojo to our Tesla Mobility robotaxi assumptions (increased long term fleet size and margin), and 3rd Party Battery Business, as we believe the charging and FSD deals will also result in higher hardware attach.

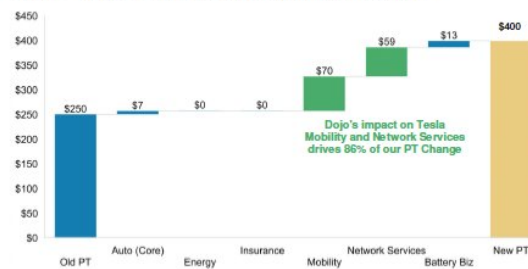
Exhibit 4: Tesla's claims of 6x performance improvements imply multi-billion-\$ cost savings from Dojo



Source: Tesla, Morgan Stanley Research

We made no changes to our assumptions for Tesla Energy or Tesla Insurance. The modest (\$7/share) increase in the value of the core Auto business was mostly related to an increase in our exit EBITDA multiple assumption to 13x from 12x previously. Our near term (FY23/FY24) core Auto assumptions for volume and gross/operating margin were unchanged.

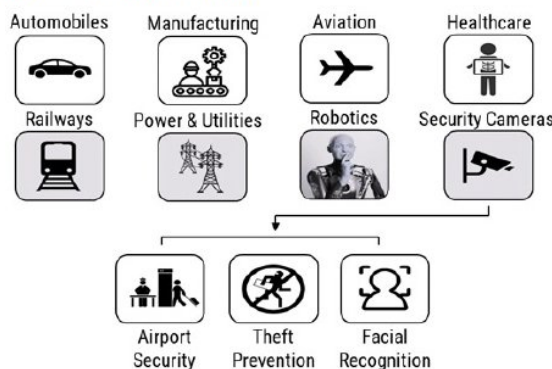
Exhibit 5: Tesla Price Target Bridge: Raised to \$400 from \$250 previously



Source: Morgan Stanley Research

Stretching your thinking. Could success in vehicle autonomy enable Tesla to become Go-To provider for visual data processing across other adjacent markets? Although Dojo is still early in its development, we believe that its applications long-term can extend beyond the auto industry. Dojo is designed to process visual data which can lay the foundation for vision-based AI models such as robotics, healthcare and security. In our view, once Tesla makes headway on autonomy and software, third party Dojo services can offer investors the next leg of Tesla's growth story.

Exhibit 6: Industries that can utilize visual AI



Source: Morgan Stanley Research