
HAX
Hardware
Trends
SOSV
2019

Foreword

An ever expanding hardware ecosystem

The world of hardware continues to grow beyond the consumer electronics of just a few years ago. The rise of automation, connectivity and sensors has opened the door for startups from all over the world to solve new problems and rethink how our physical world works. This has led to a shift in the market due to many traditional "software" companies making bigger investments into hardware, new entrants rising quickly, and open doors for new startups to emerge with compelling new hardware.

A snapshot of the future

This report highlights some of the trends we see every day as investors in the world of hardware. The ecosystem is evolving quickly and, as early-stage investors, we see the signs of what lies ahead. In short, we're as excited as ever to continue investing into hardware startups, knowing they'll have a massive impact on our everyday lives.

Thank you to our authors and key contributors

Anant Pathak
Cyril Ebersweiler
Duncan Turner
Dylan Crow
Garrett Winther
Jo-An Ho
Ji Ke
Kate Whitcomb

Creative Design By

Vitaly Vyazovsky
Lisa Shcheglova

HAX

Venture Capital Program for Hardware

HAX runs a hands-on program to support our investment's technical and business development. Our offices are strategically located in Shenzhen and San Francisco, the most important ecosystems for hardware entrepreneurs.

To date, HAX has invested in over 200 companies. These include businesses in consumer tech, health care, enterprise IoT, industrial robotics, and advanced manufacturing technology.

SOSV

HAX is part of SOSV, a global early stage fund with USD $650M AUM. SOSV invests through a set of flagship programs, which HAX is proud to have as sibling organizations.

MOX

FOOD-X
FEEDING A FOOD MOVEMENT

INDIE BIO

RebelBio

中国加速
CHINACCELERATOR™

Acknowledgements

The authors thank the hundreds of startup founders we work with, our analyst and creative teams for continuing to take this report to new levels, and the many people who are part of the growing hardware ecosystem.

Disclosures

The data quoted in this report belongs to those who conducted the research.

Many of the examples used are SOSV/HAX investments at various stages of development.

There are many exceptional startups shown that are not part of SOSV / HAX portfolio and included as great examples of hardware enabled businesses.

SOSV

Table of Contents

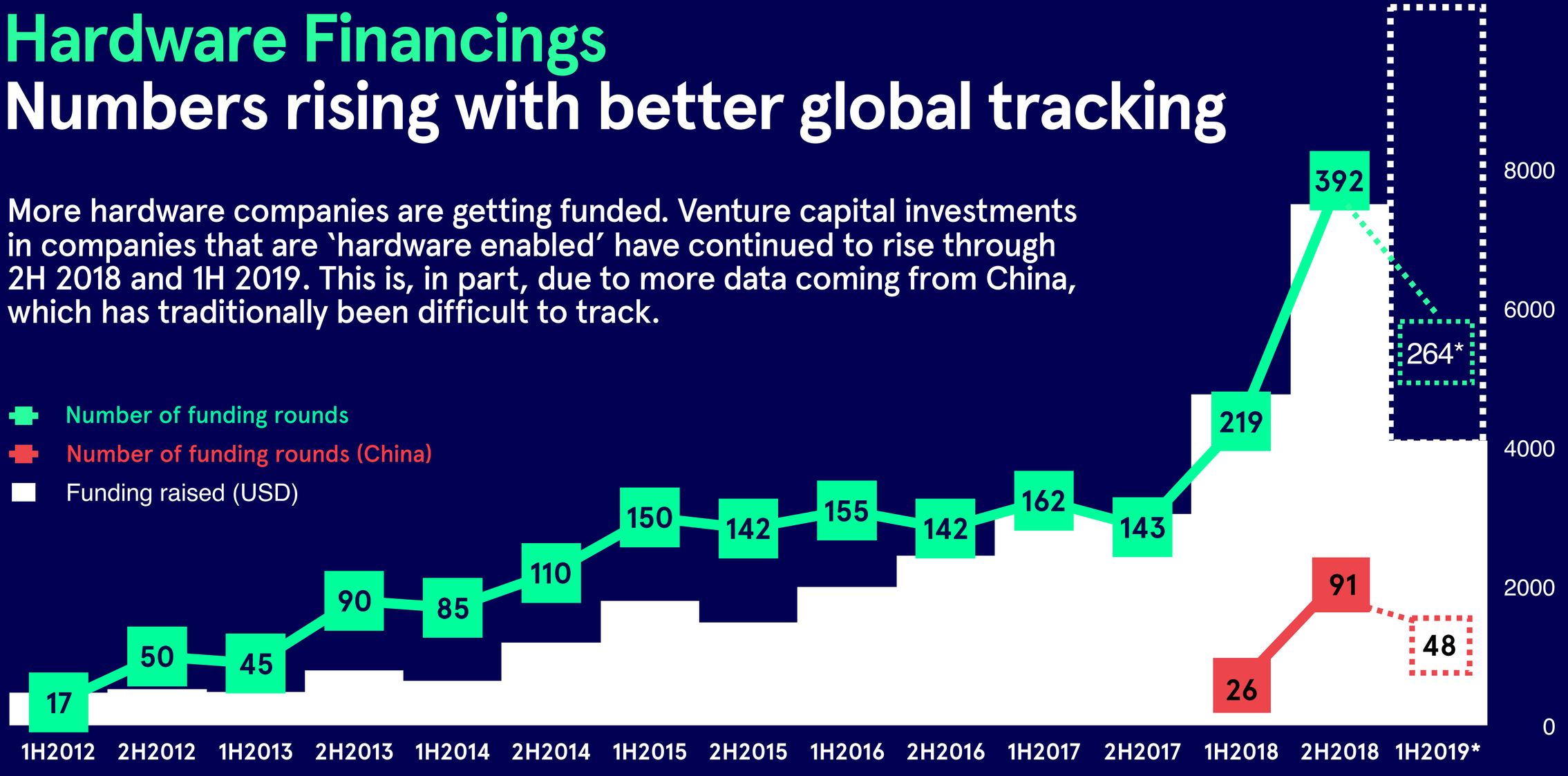
HAX Hardware Trends 2019

/01

Hardware Investment Overview

Hardware Financings
Numbers rising with better global tracking

More hardware companies are getting funded. Venture capital investments in companies that are `hardware enabled' have continued to rise through 2H 2018 and 1H 2019. This is, in part, due to more data coming from China, which has traditionally been difficult to track.



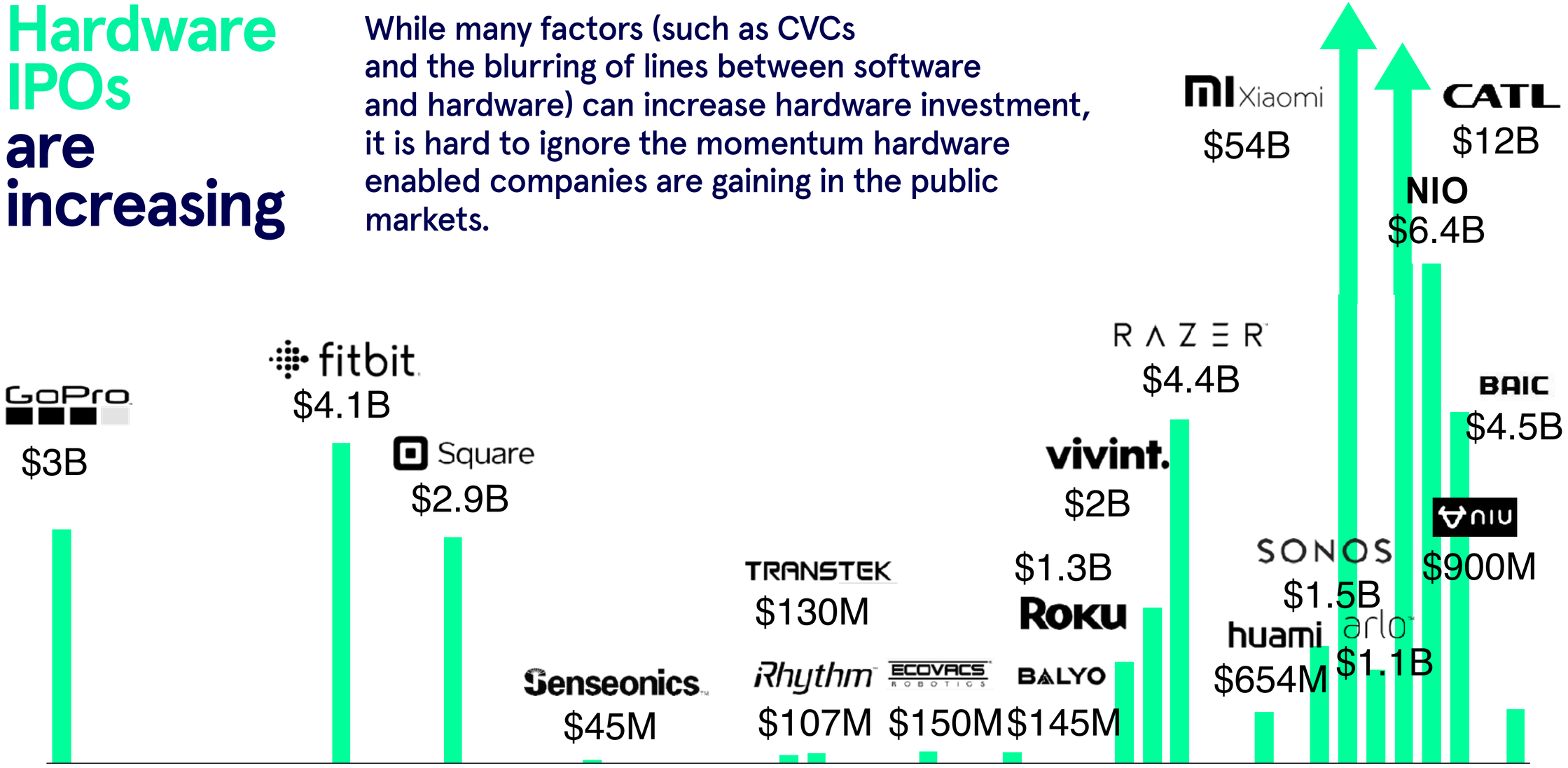
Note: This includes deals between $1M-500M. If pre-seed deals were included, the total number of financings would be much larger.

Source: original inspiration from BOLT State of Hardware Financing + amended data via Crunchbase

HAX Hardware Trends 2019

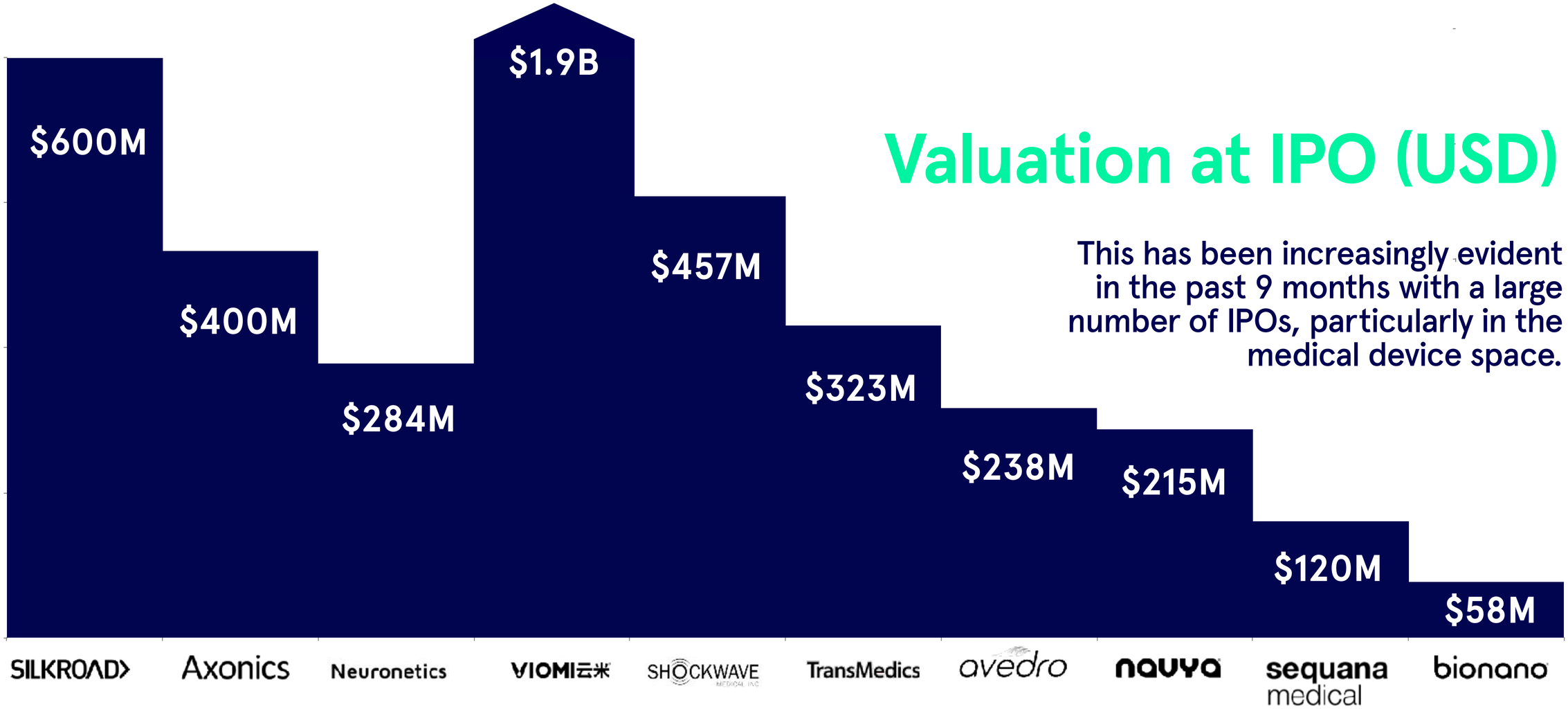
Hardware IPOs are increasing

While many factors (such as CVCs and the blurring of lines between software and hardware) can increase hardware investment, it is hard to ignore the momentum hardware enabled companies are gaining in the public markets.



*Announced/upcoming IPOs

HAX Hardware Trends 2019



Valuation at IPO (USD)

This has been increasingly evident in the past 9 months with a large number of IPOs, particularly in the medical device space.

Hardware IPOs from Q4 2018 + H1 2019

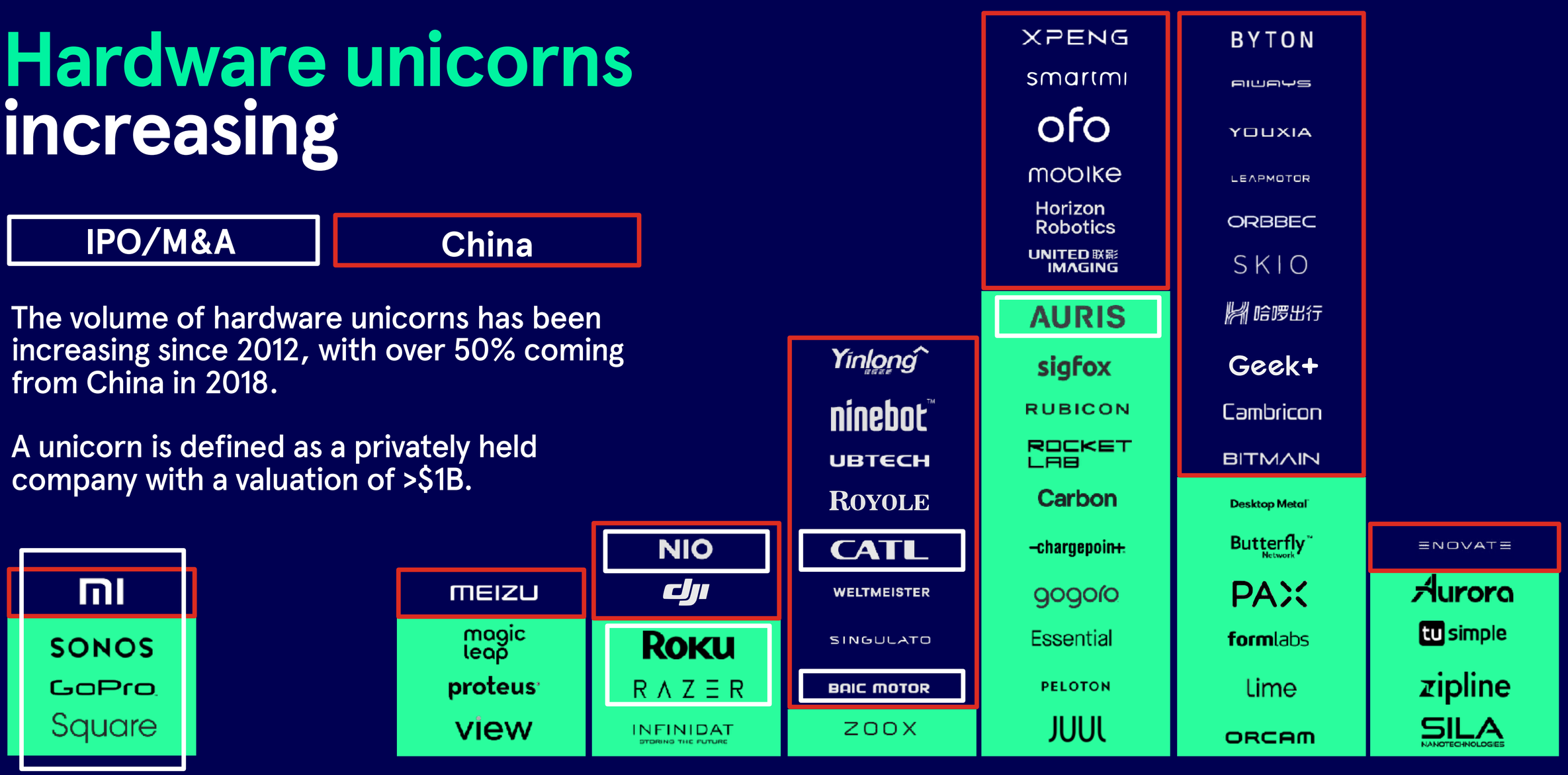
HAX Hardware Trends 2019

Hardware unicorns increasing

IPO/M&A | China

The volume of hardware unicorns has been increasing since 2012, with over 50% coming from China in 2018.

A unicorn is defined as a privately held company with a valuation of >$1B.

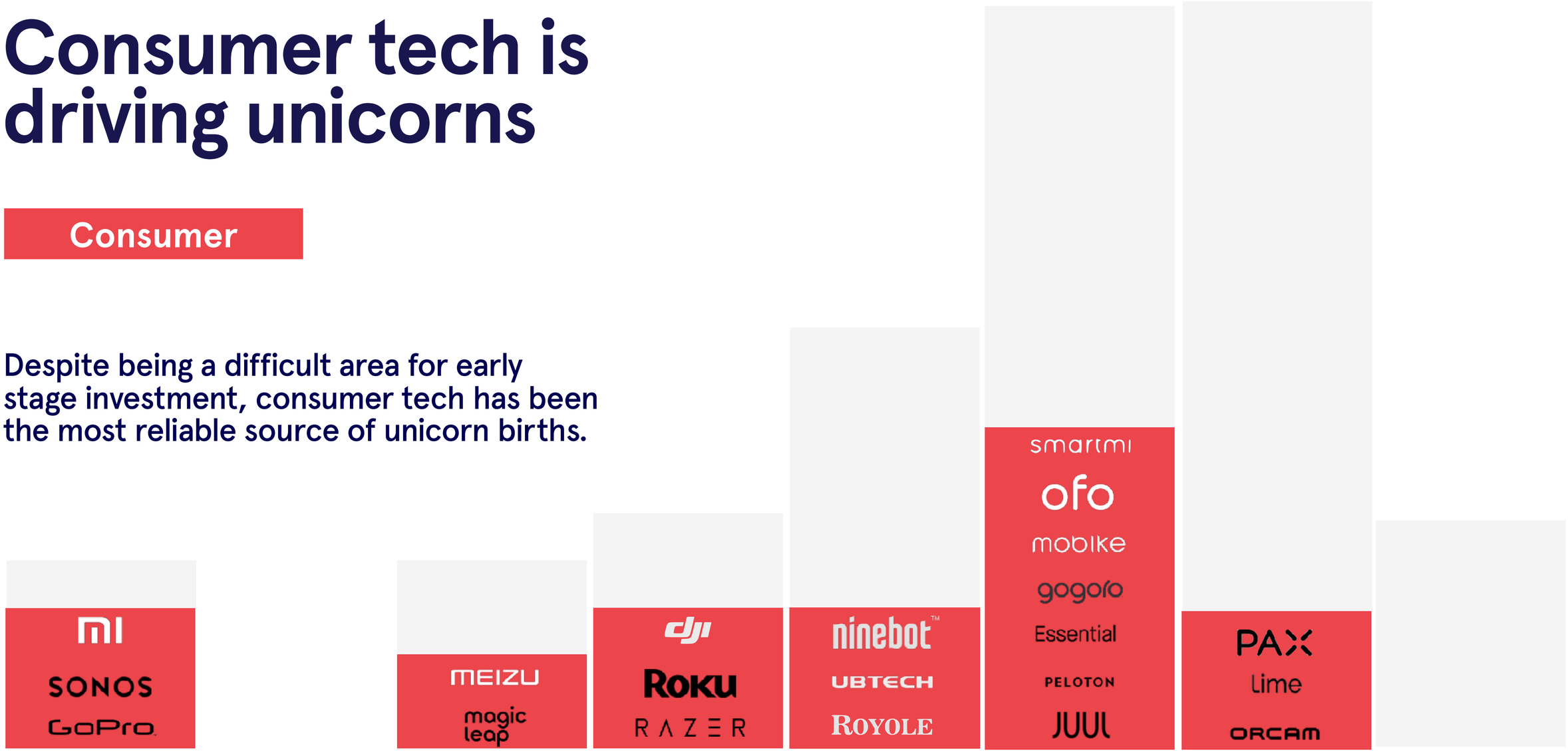


HAX Hardware Trends 2019

Consumer tech is driving unicorns

Consumer

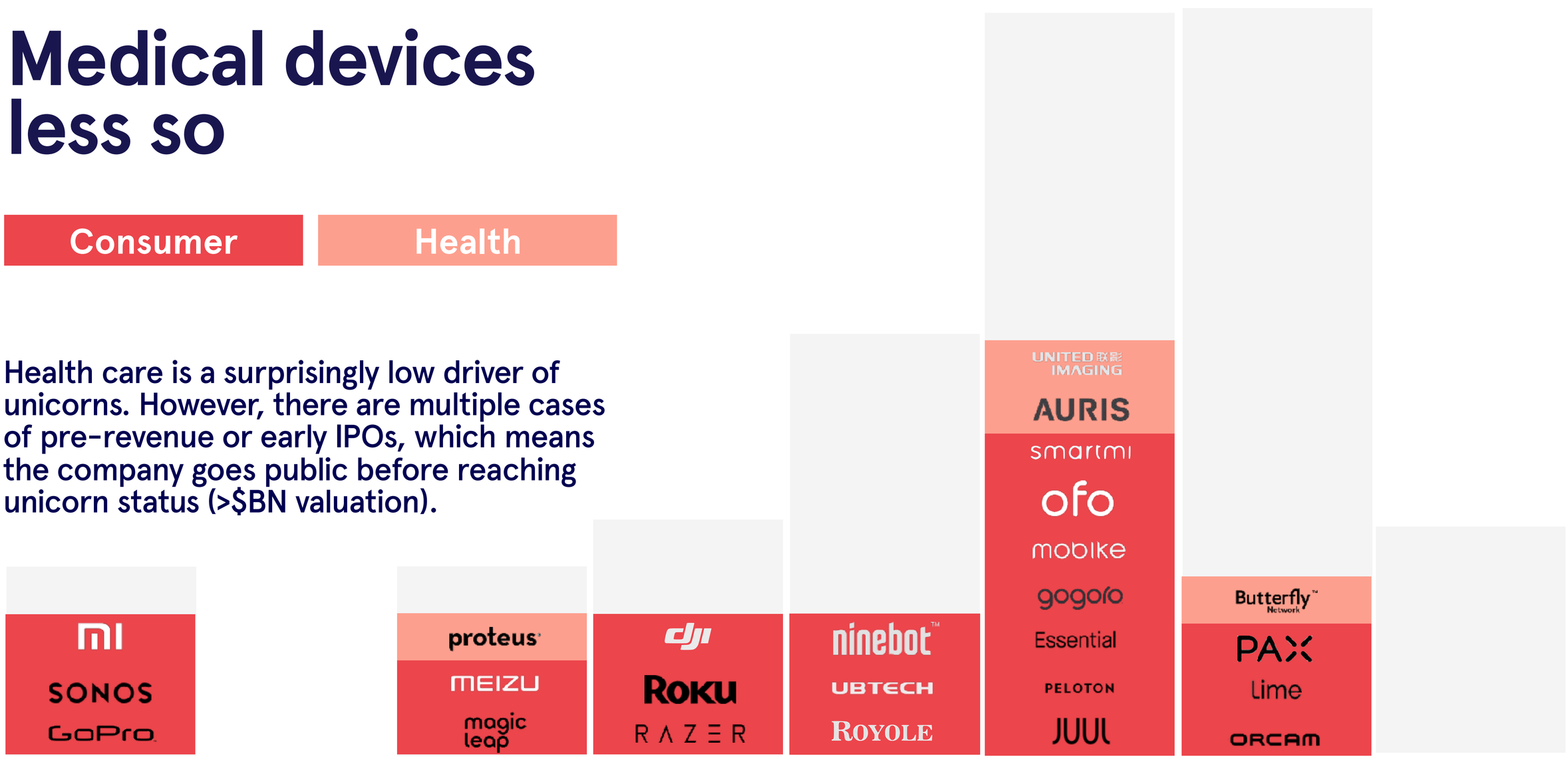
Despite being a difficult area for early stage investment, consumer tech has been the most reliable source of unicorn births.



Medical devices less so

Consumer | Health

Health care is a surprisingly low driver of unicorns. However, there are multiple cases of pre-revenue or early IPOs, which means the company goes public before reaching unicorn status (>$BN valuation).

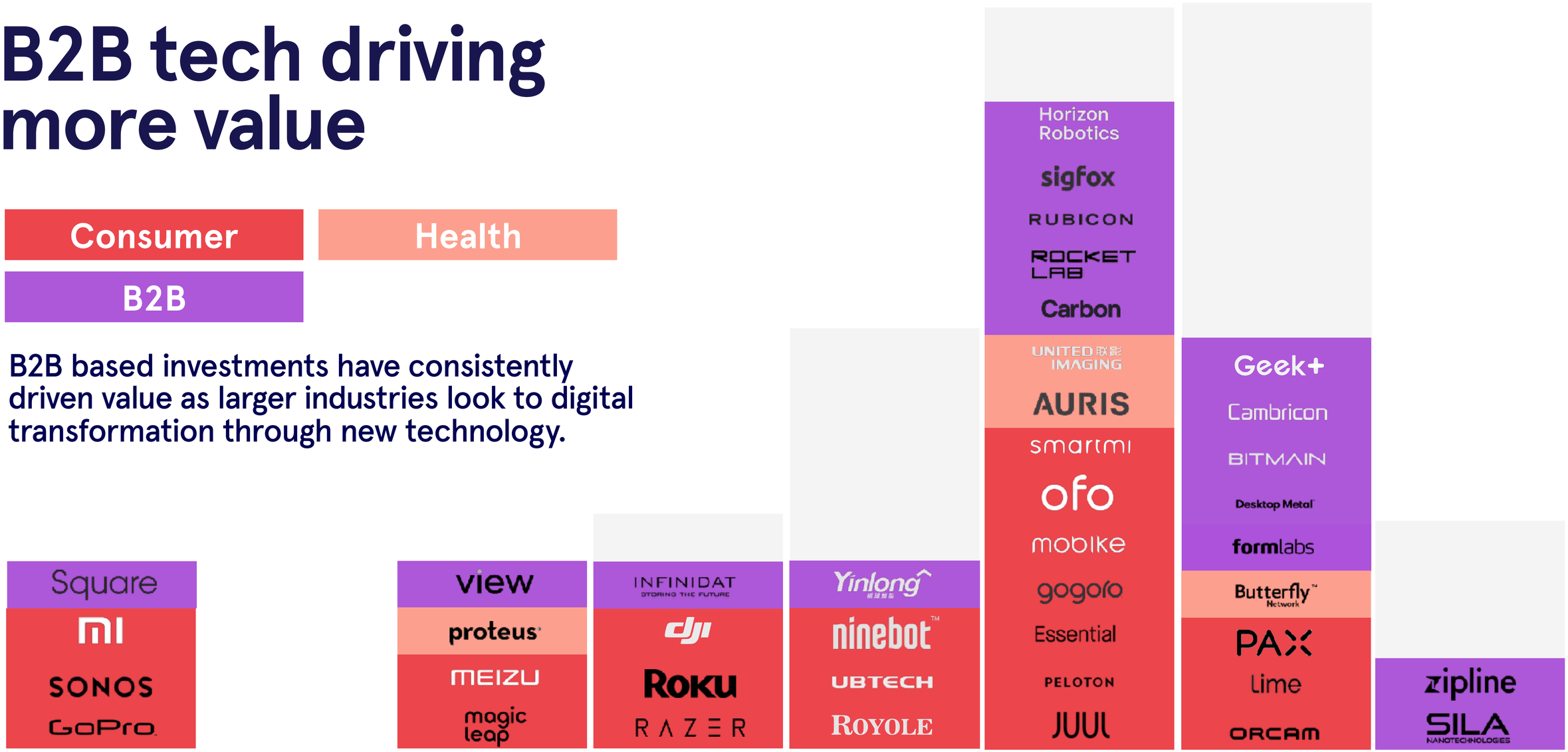


B2B tech driving more value

Consumer | Health

B2B

B2B based investments have consistently driven value as larger industries look to digital transformation through new technology.

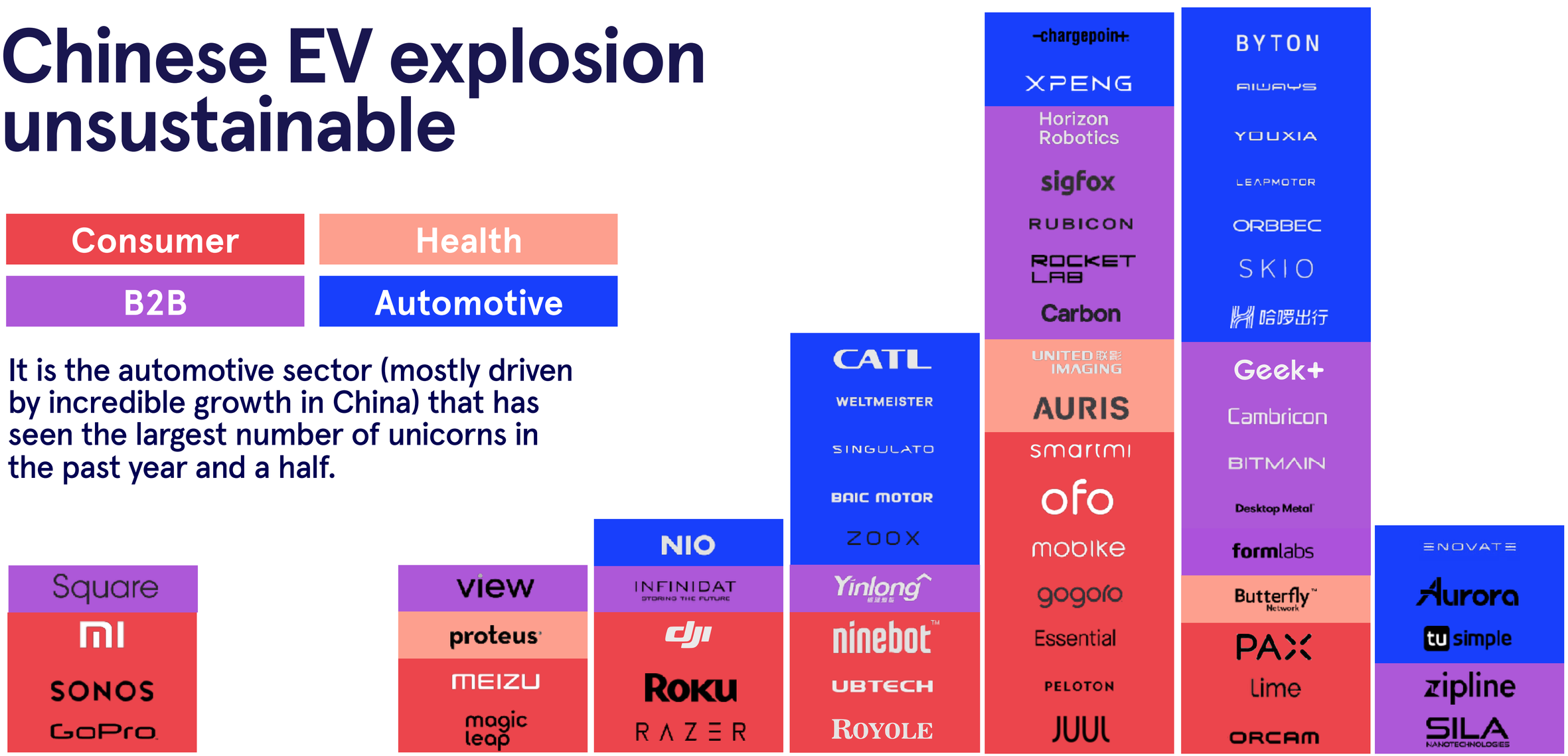


HAX Hardware Trends 2019

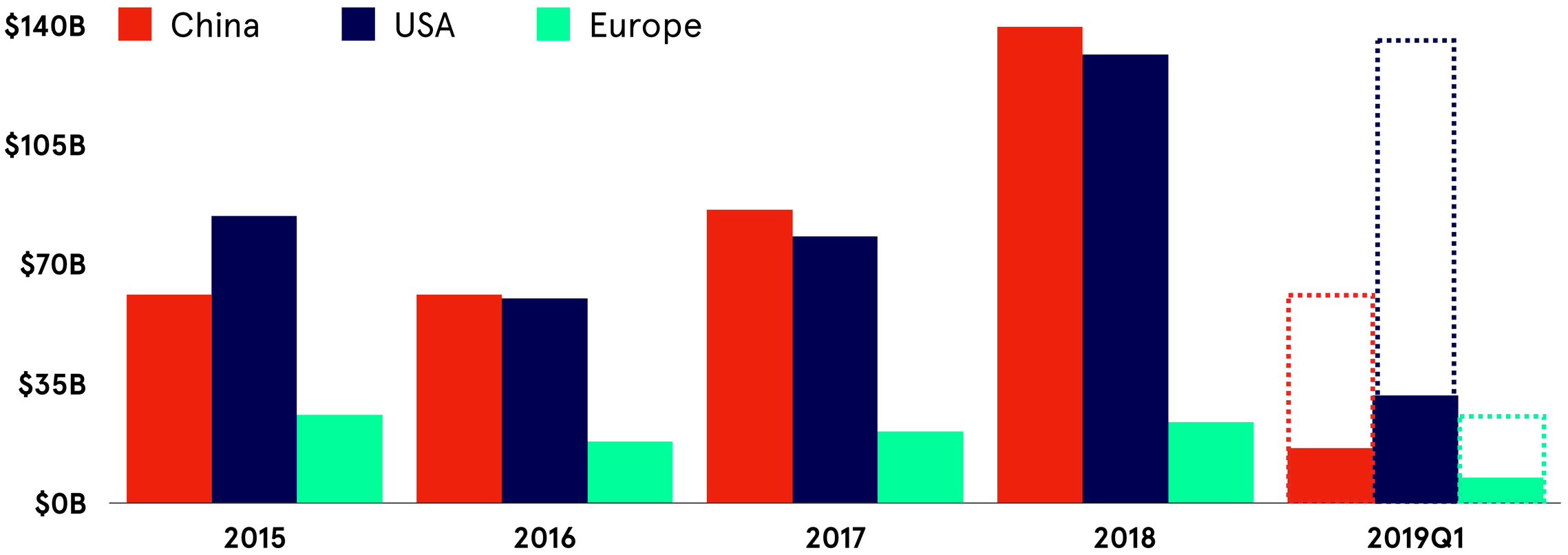
Chinese EV explosion unsustainable

Consumer	Health
B2B	Automotive

It is the automotive sector (mostly driven by incredible growth in China) that has seen the largest number of unicorns in the past year and a half.



HAX Hardware Trends 2019



Source: Dow Jones Venture Source

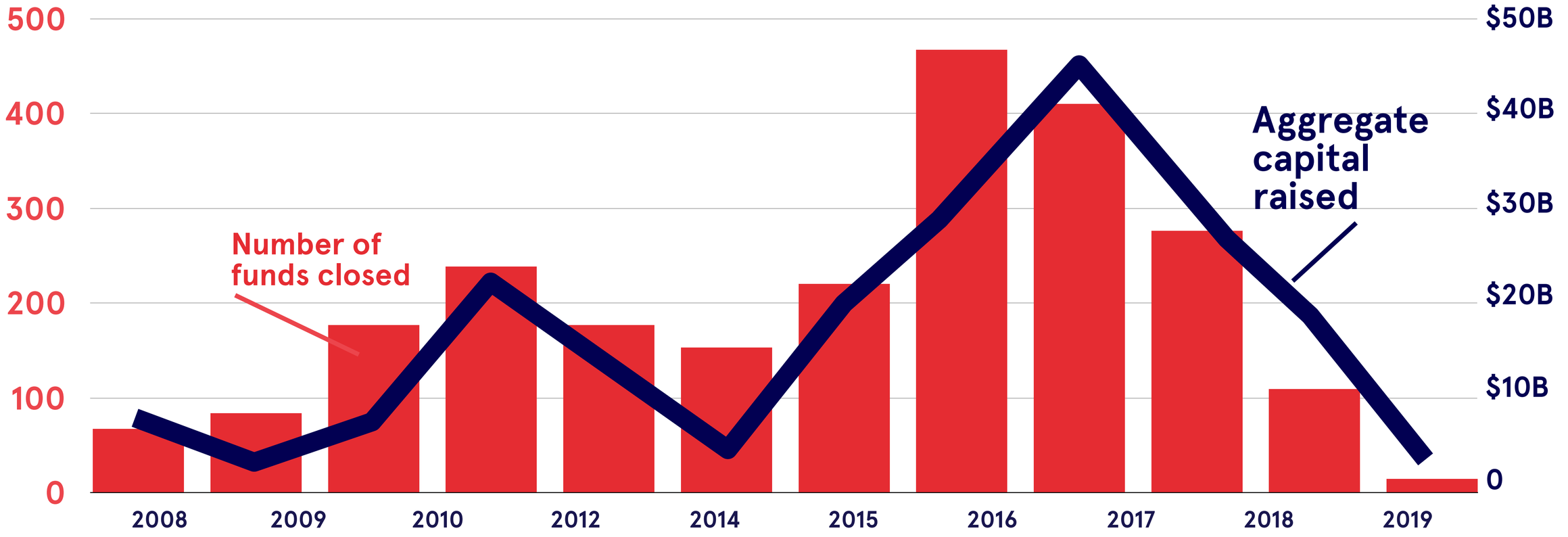
Chinese VC set to hit a record low in 2019

Investment in Chinese GPs has scaled back dramatically in the past year (pre-dating the trade war). Local Chinese governments have traditionally been supportive of early stage VC along with large Chinese corporates (both in the US and China). We predict this will bounce back in 2020 as China looks to invest in homegrown tech talent.

Chinese GPs struggling to raise funds

New fund managers and early stage VC have suffered the most as later stage funds continue to raise capital.

High LP drop out rate (mostly government)



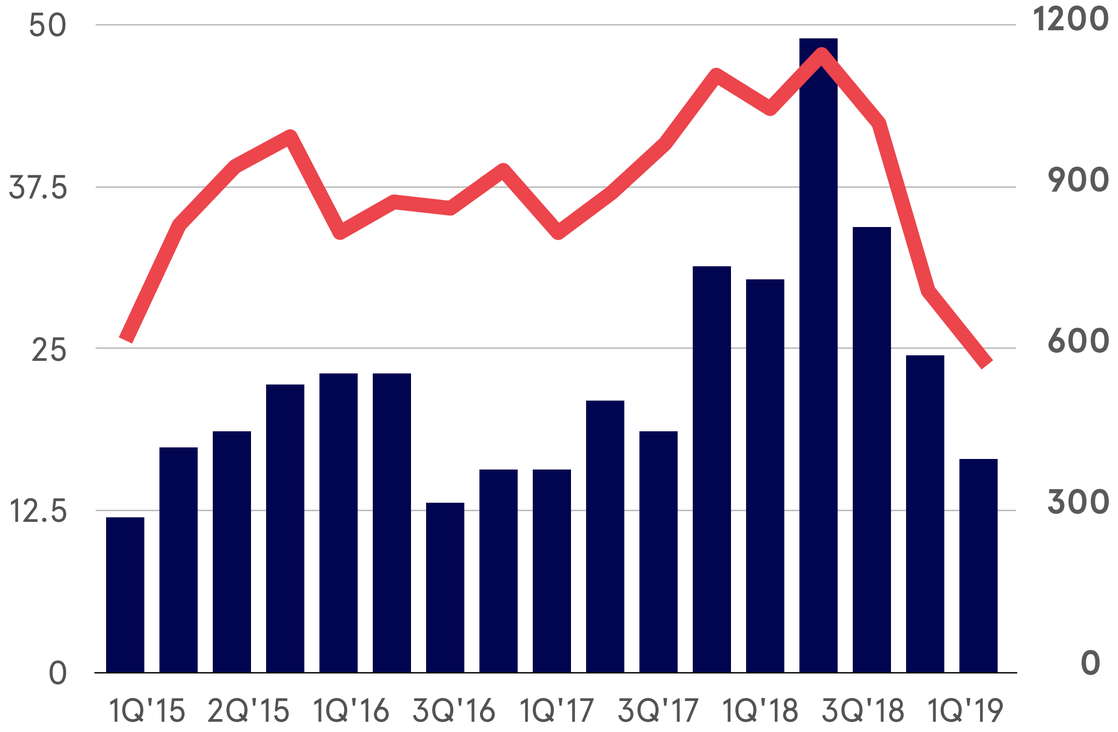
Source: Preqin, Chart by: TechNode/Nicole Jao

HAX Hardware Trends 2019

The shortage of LP commitments to GPs in China is directly affecting financings

This drop in funding has started to impact the total number of equity financings for Chinese companies.

Equity financings for China-based, VC-backed companies (2015-2019)



Source: DowJones

Investment areas within HAX

HAX Hardware Trends 2019

HAX Consumer

HAX Enterprise

B2B

We invest in

4

key areas

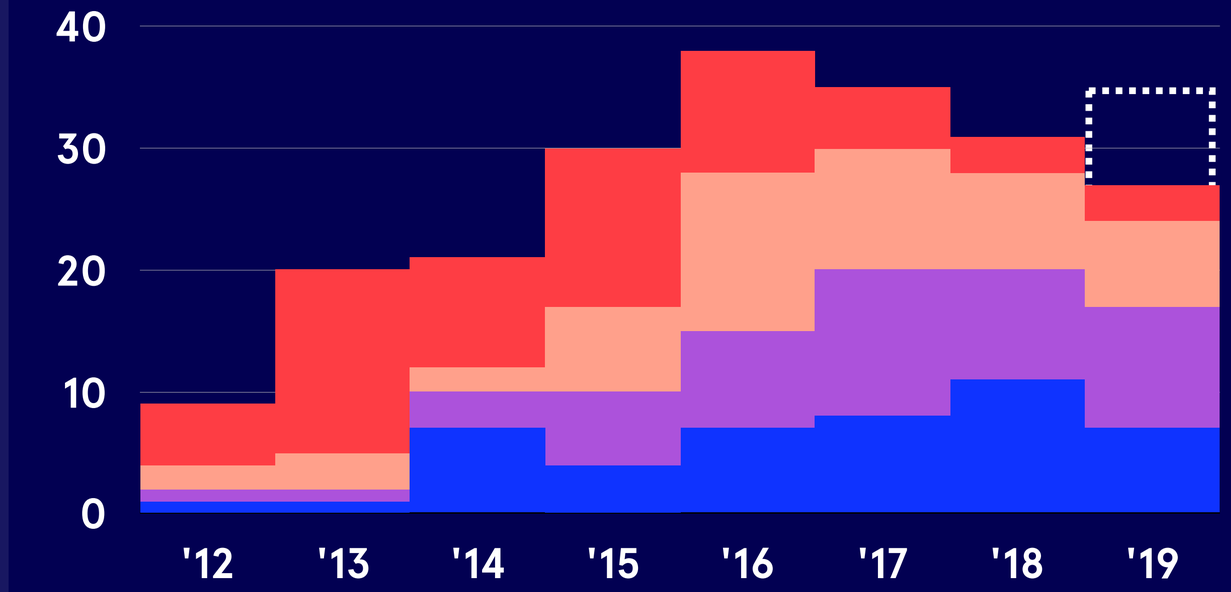
HAX Health

HAX Industrial

HAX Hardware Trends 2019

HAX has invested in over 200 startups

We split them into 4 tracks



HAXConsumer

HAXHealth

HAXEnterprise

HAXIndustrial

/02

HAX Consumer

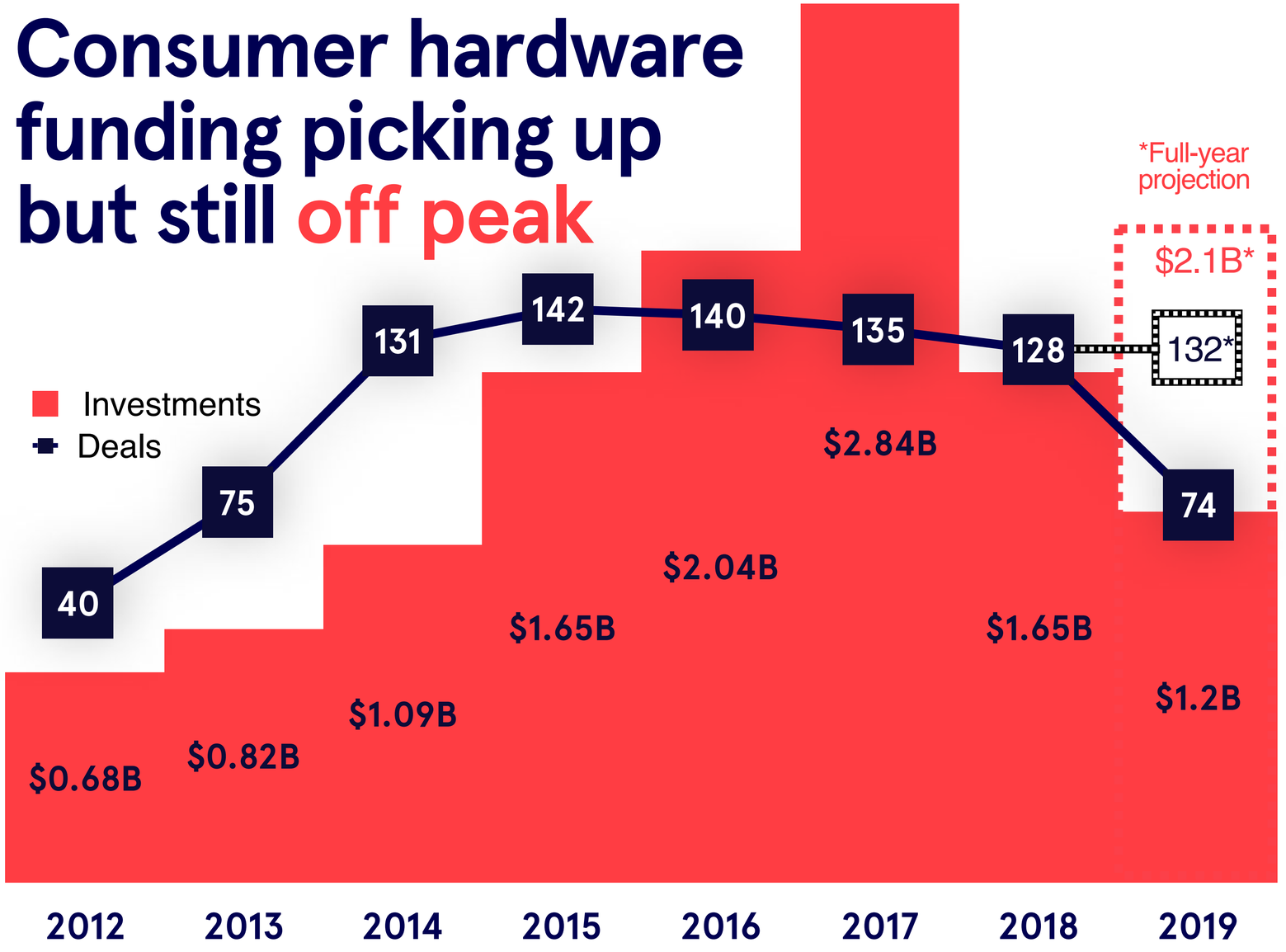
Early and growth stage hardware funding has seen a resurgence. Since 2014 the number of consumer hardware fundings has remained fairly stable, but the average amount of money has trended up.

Consumer companies tend to die quickly or scale rapidly. As new business models emerge we expect more investor focus on the consumer space, which has previously (and rightly) been viewed with caution.

HAX Hardware Trends 2019

Rounds above $500M are not included in this data. The largest 2019 funding round included is a $420M financing for Pax Labs

Consumer hardware funding picking up but still off peak



Source: data via Crunchbase

Technology is adapting to, and driving changes in consumer purchasing behaviour

Convenience, experience and affordability have always been desirable to consumers.

Automation, sensors and connectivity have enabled entirely new products and business models. These areas will continue to grow and affect our day-to-day lives.

HAX Hardware Trends 2019

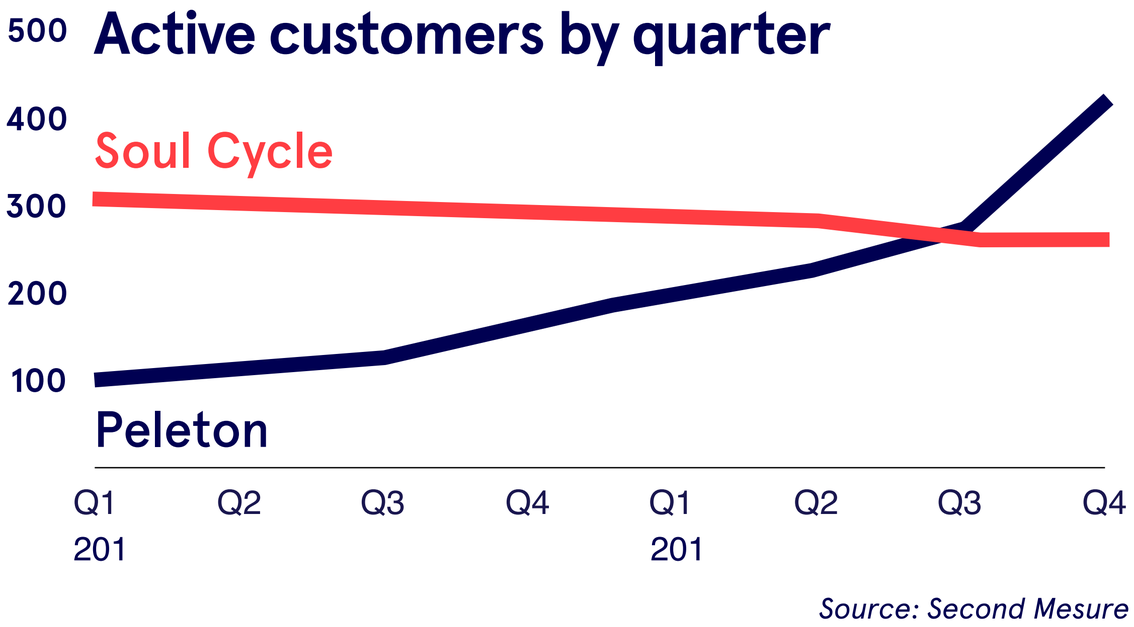
Zume Pizza
Automated pizza delivery restaurant

JUMP
Dockless scooter and bike sharing acquired by Uber

Tonal
Digital weight machine with in-built personal trainer

Tech is enabling new home experiences

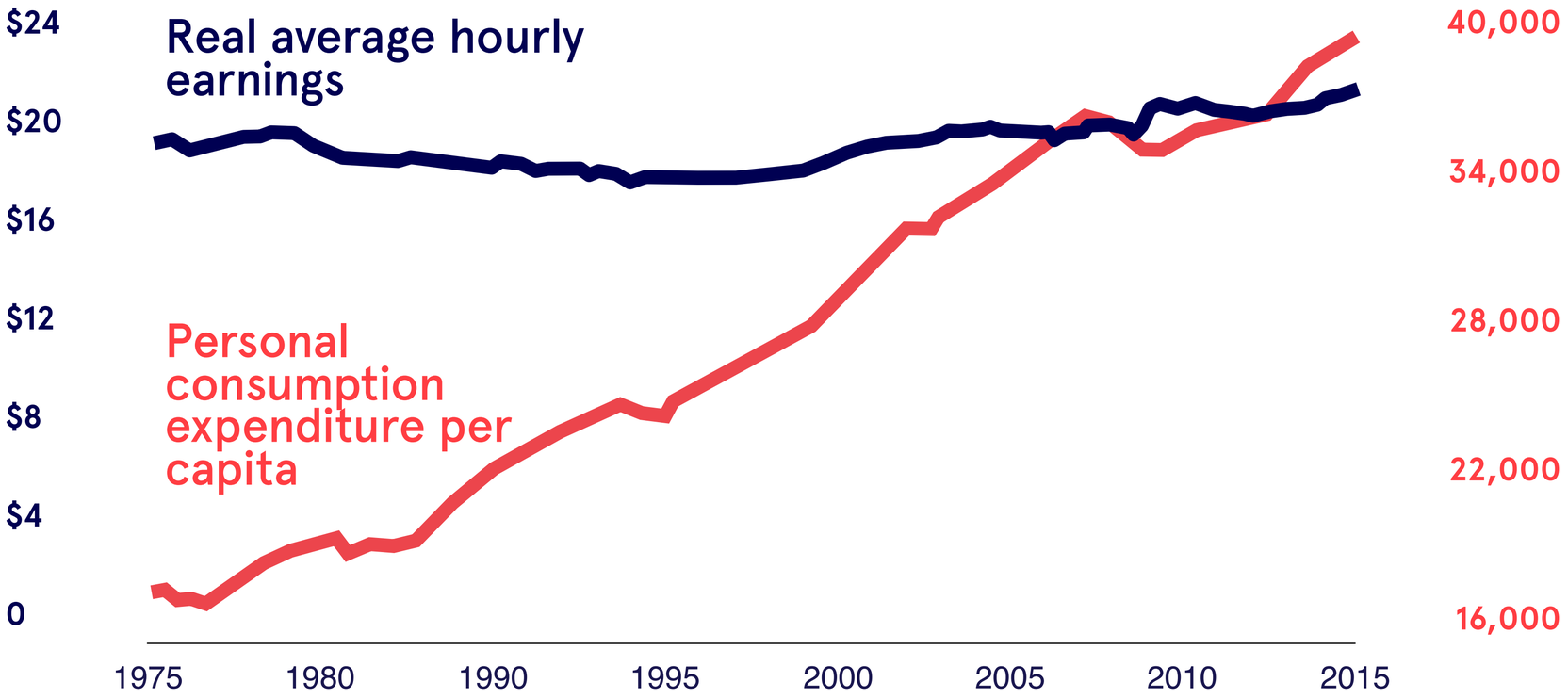
Just as the video game console disrupted video arcades and the VHS disrupted the cinema, when it comes to the home, hardware enabled convenience wins over centralized locations.



Source: Second Mesure

Spending is up, yet we are **rejecting** high priced items

If we normalize personal consumption expenditure and wages we see consumer expenditure has risen dramatically



Source: FRED, U.S. Bureau of Economic Analysis

Increasing LTV (lifetime value) is the most important factor for consumer facing companies. Many, like Netflix and Spotify, give access to undervalued content in order to draw users to their platform then monetize them throughout their lifetime.

We consume a vast amount of content on these platforms for nearly no money.

hulu classpass

Consume more online, buy less offline

Hardware enabled companies often balance large **upfront costs** with credit based monthly payments

While 0% APR and great return policies work well to drive business, we know that debt is scary, especially to millennials who came of age during the 2008 financial crisis.

HAX Hardware Trends 2019

PELOTON

Basics Package

$2,245

Includes delivery and setup

As low as $58/month at 0% APR.

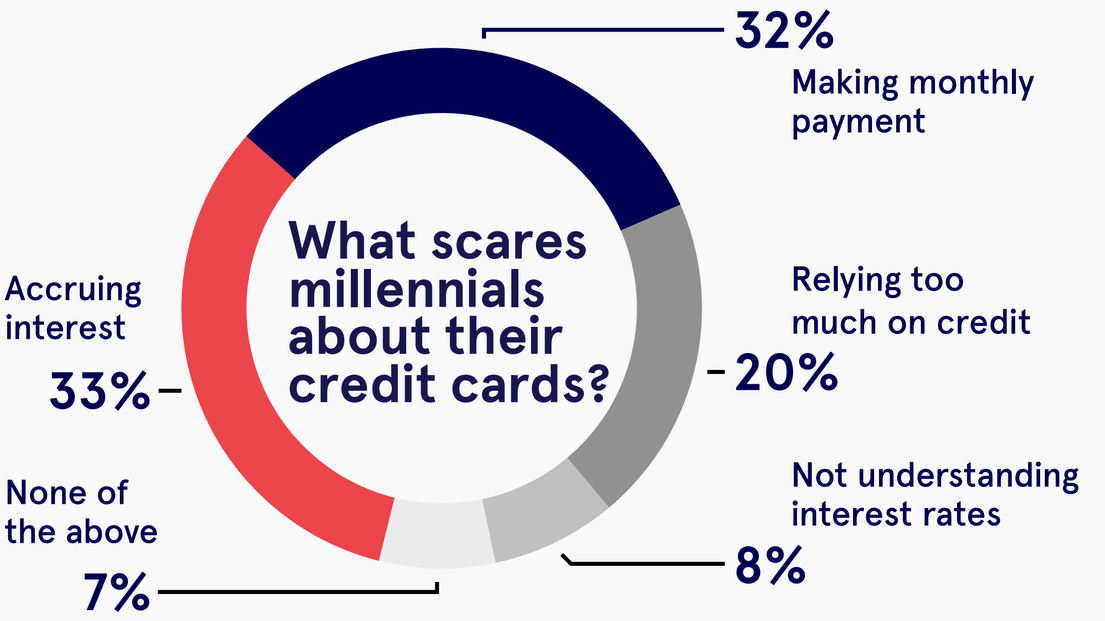
Prequalify Now.

ADD TO CART

With no money down and 0% APR financing, buying the Peloton Bike is now easier than ever.*

$0	$58/mo	0%
NO MONEY DOWN	FOR 39 MONTHS	APR FINANCING

PELOTON MEMBERSHIP SEPARATE



Source: CNBC: Credit Card Debt Scares Millienials

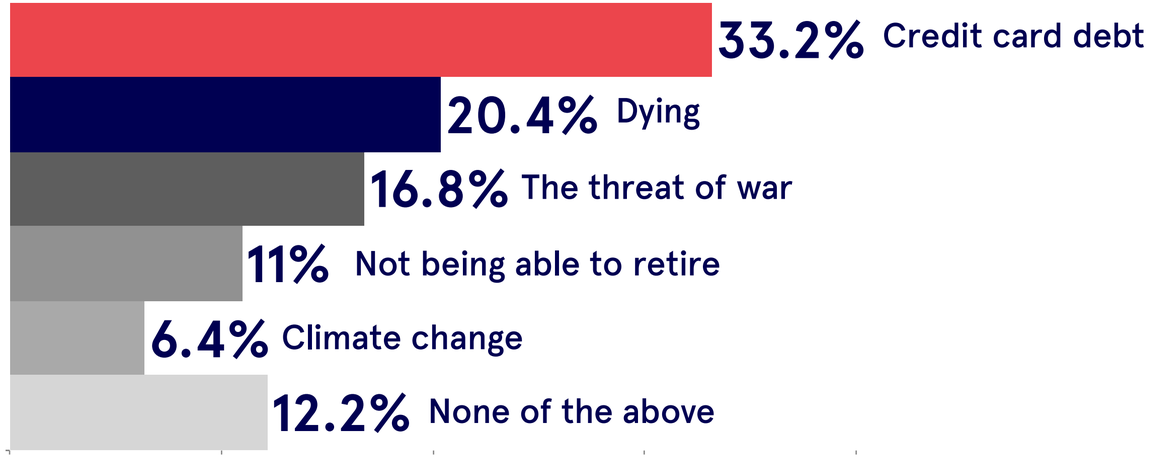
Debt is scarier than death for millennials

This is an increasingly important trend for consumer companies to watch.

They are (or will be) selling to a generation who are saving less to finance big purchases, and are also rejecting debt.

HAX Hardware Trends 2019

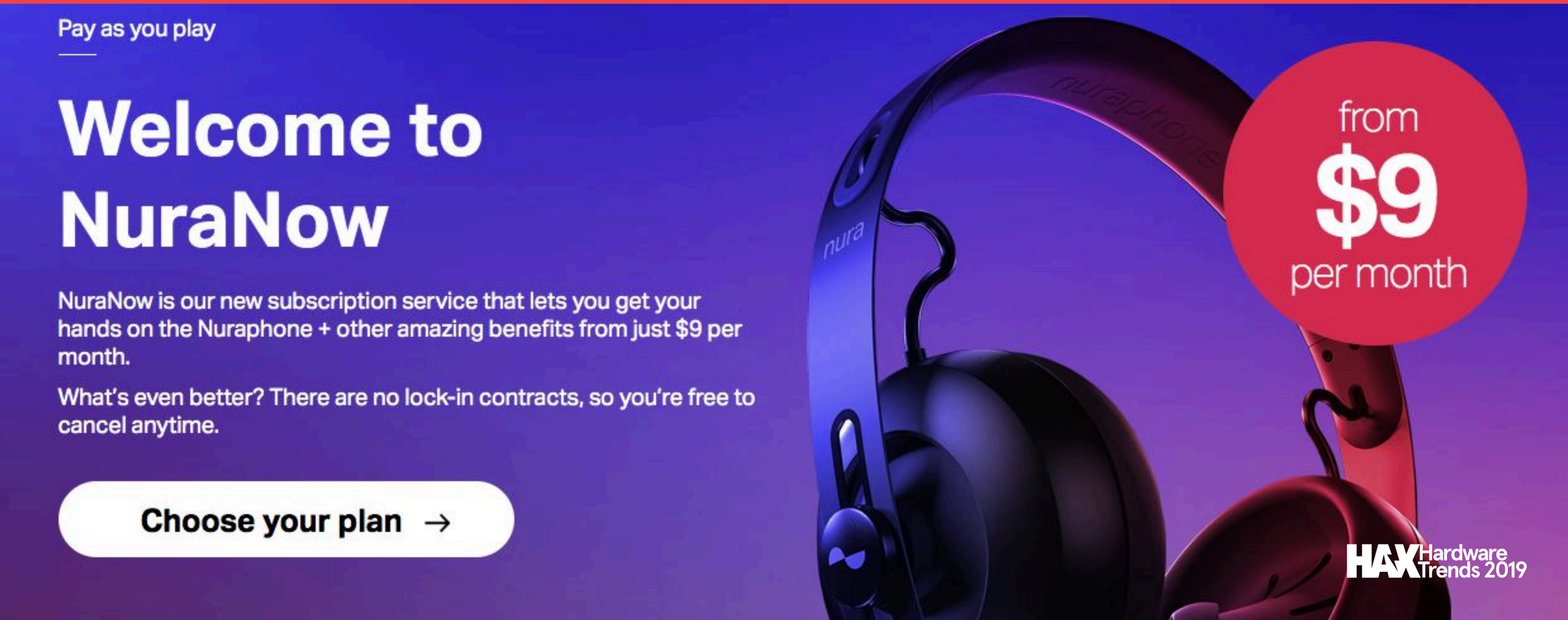
What scares you the most?

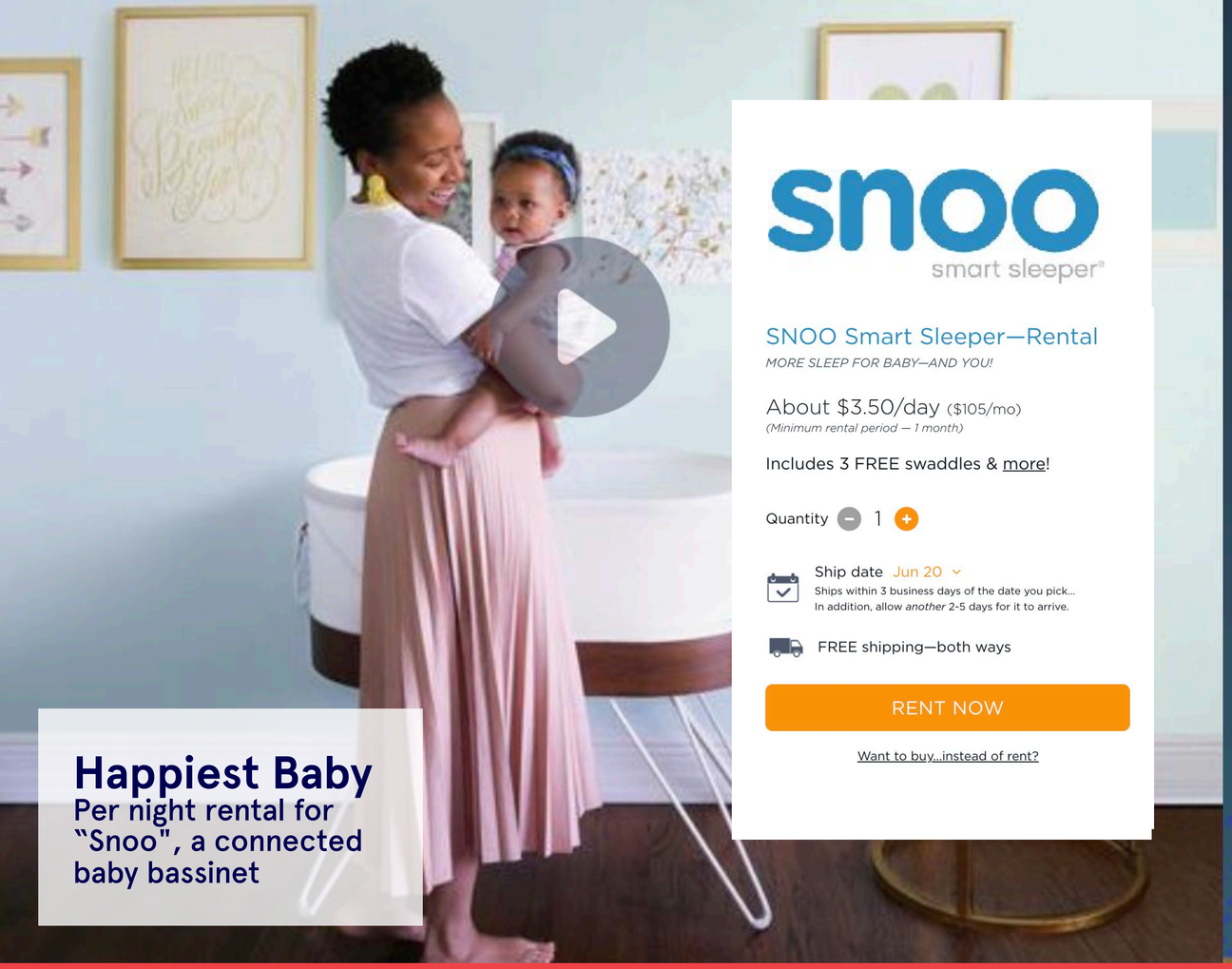


Source: CNBC: Credit Card Debt Scares Millienials

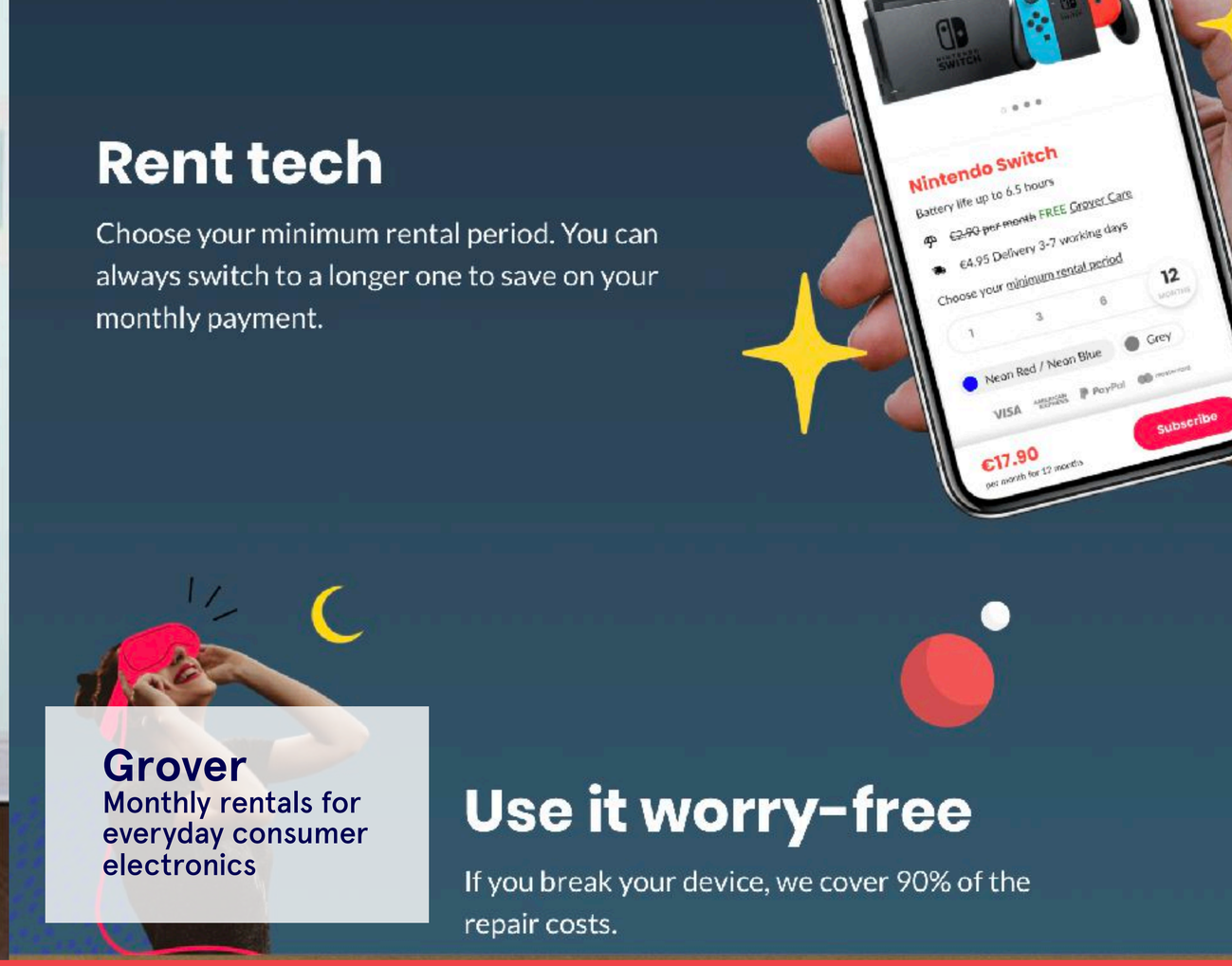
Flexible, non-commitment pricing plans are the future

One of HAX's consumer companies, Nura, has launched a revolutionary pricing model which has seen their number of customers increase dramatically.





Happiest Baby
Per night rental for "Snoo", a connected baby bassinet



Grover
Monthly rentals for everyday consumer electronics

Use it worry-free
If you break your device, we cover 90% of the repair costs.

New subscription models are enabling new consumer companies to emerge

HAX Hardware Trends 2019

Automation is also changing D2C

There are more and more examples of robotic automation enhancing customer experiences: a vending machine that interacts like a human, or a restaurant where automation creates a truly customized product.

Cafe X
Automated artisanal coffee vending machine

Zume Pizza
Delivered pizza prepared by robots

Spyce
Fast-casual restaurants with robotic cooks

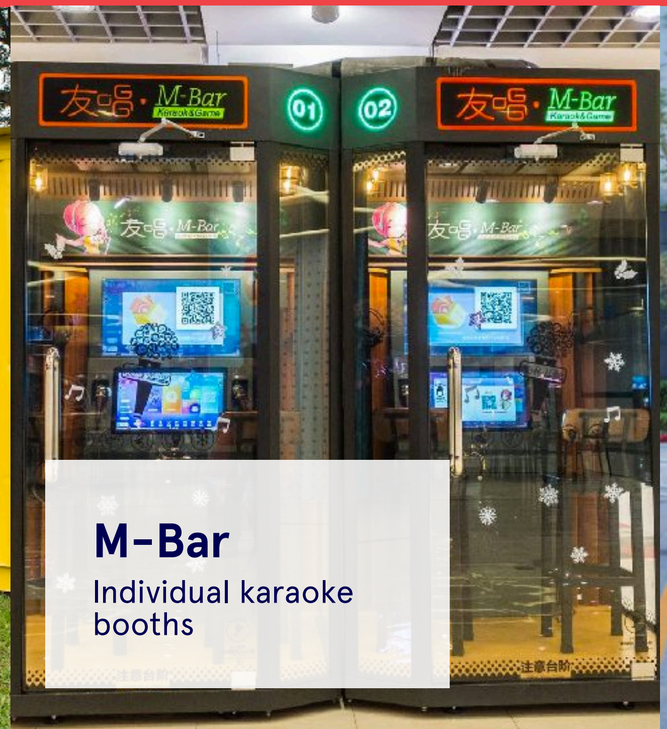
Large retail overheads don’t always make sense China is leading the way with miniaturized retail

Automation allows new micro-retail possibilities that just weren’t possible before.

D2C companies can now offer services as well as bespoke products. This is especially prevalent in China where tiny gyms, karaoke rooms and automated nail salons are on the increase.

Nail printers
Vending machines for toe and fingernail art

The Gym Pod
Single occupancy exercise gyms



M-Bar
Individual karaoke booths

BingoBox
Unmanned, small footprint stores

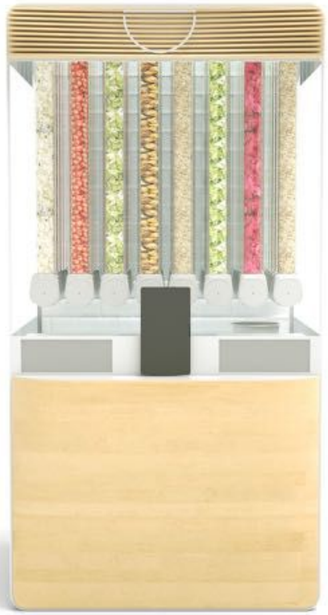
HAX investments in the past 6 months

Oasis

Decentralized recycling stations to cope with the paper shortages in China.

Presso

Dry cleaning at a fraction of the footprint, time and cost of traditional methods.

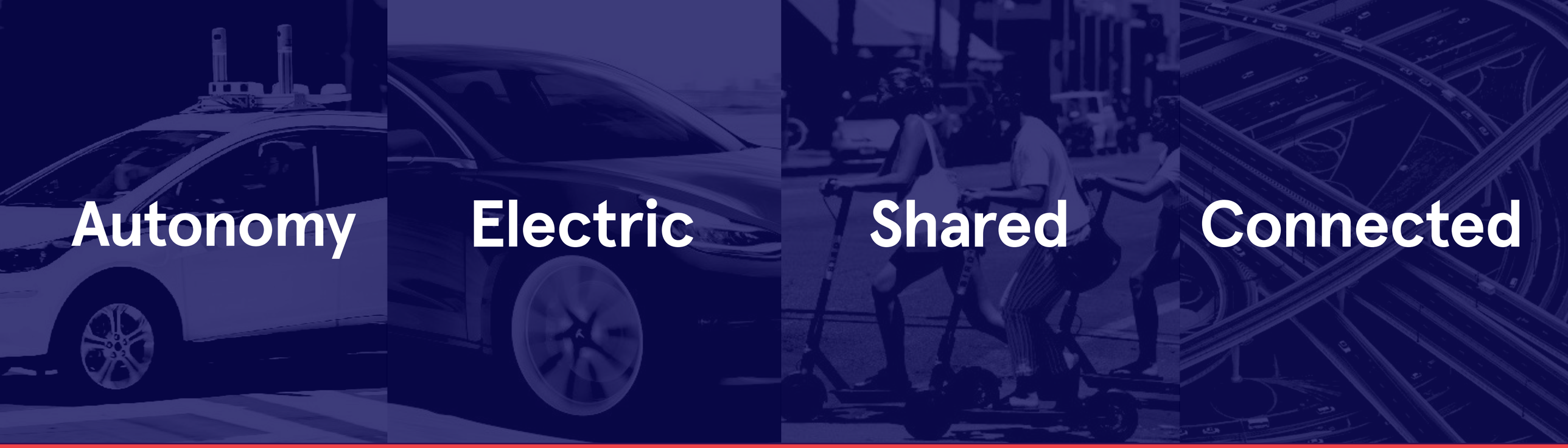


Bowl

Small footprint cooking and assembly systems for one bowl meals.

The biggest change in consumer behavior has been in mobility

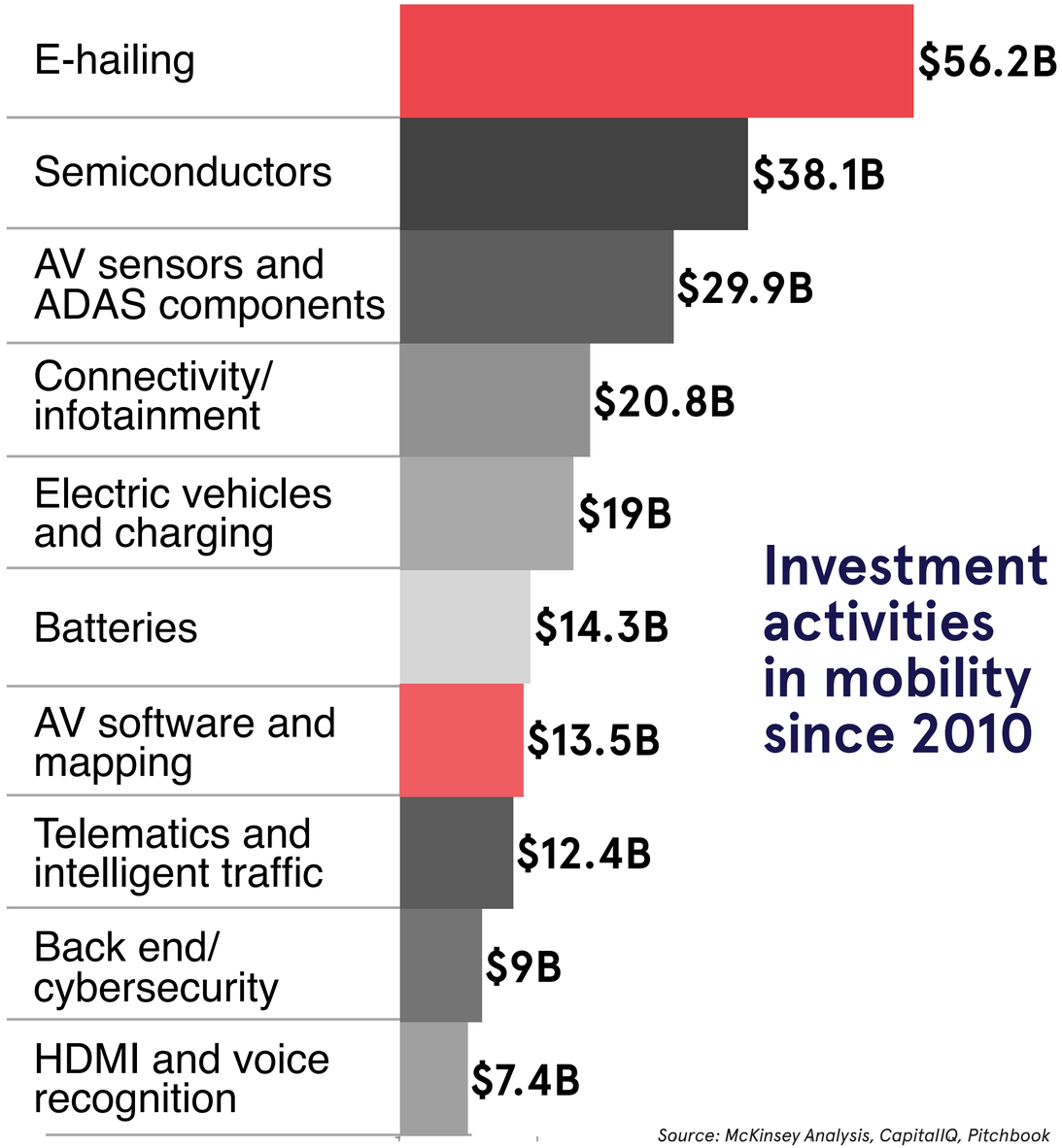
JUMP
Dockless scooter and bike sharing acquired by Uber



Mobility is rapidly evolving, and fragmenting

HAX Hardware Trends 2019

Industrial incumbents, new players, and governments are all scrambling towards new technology, infrastructure and business models with no clear winners in sight.



Source: McKinsey Analysis, CapitalIQ, Pitchbook

Investment activities in mobility since 2010

HAX Hardware Trends 2019

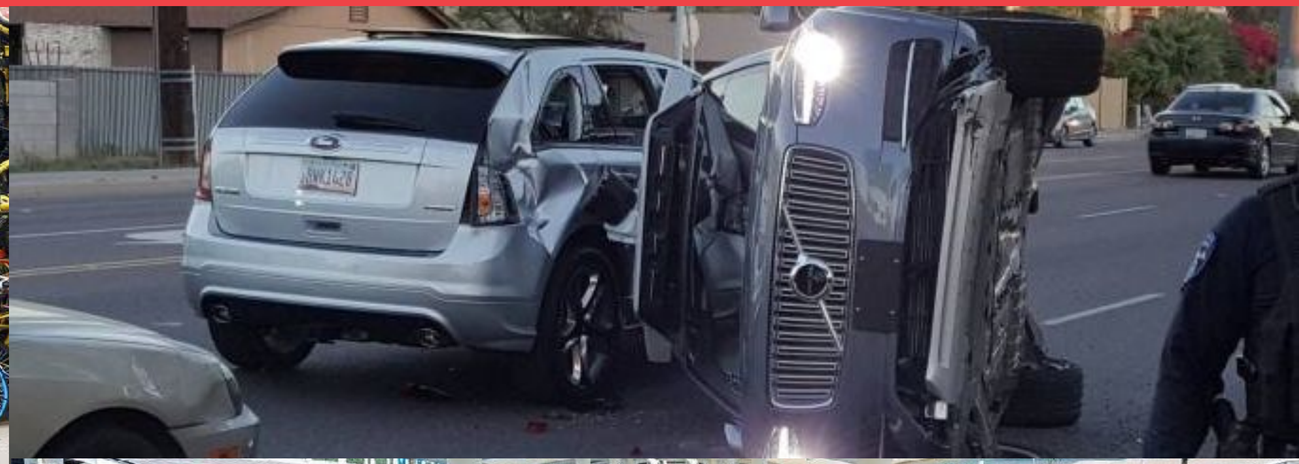
$120 billion invested in mobility startups in the last 24 months

The evolution and uncertainty of mobility has led to major venture investment into mobility and related technologies.

Growing pains of trying to move faster than policy and infrastructure

The task of integrating mobility solutions has run into challenges with public perception, complex technology integration, and lack of infrastructure.

While the core technologies continue to develop, there are issues with how they translate to the real world.



Sustainable mobility companies are built as integrated ecosystems

The emergent winners are taking a more holistic approach to their offering with go-to-market strategies that scale and integrate effectively.

GoGoRo

Taiwanese electric scooter and battery swapping infrastructure and a 2018 unicorn.

Hardware as the key driver to utilization and longevity

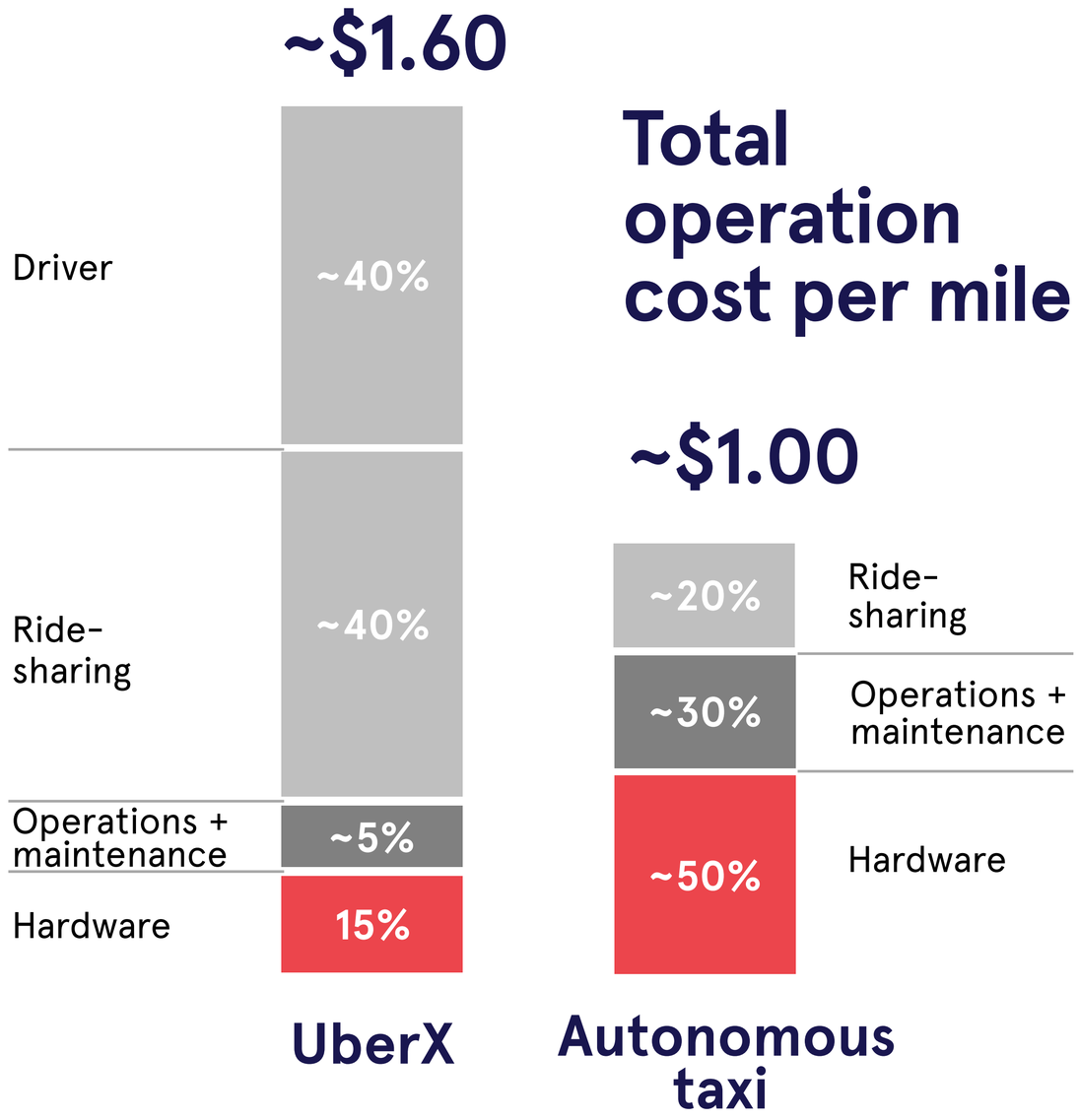
Companies are developing or redesigning hardware to optimize it for specific uses (especially when off-the-shelf hardware doesn't do the job)

Nuro
Small format autonomous delivery vehicles

Einride
Autonomous cargo trucks and trailers

Bird Zero
Revamped scooters built for robustness and longevity

HAX Hardware Trends 2019



Source: McKinsey, BCG, Economist

Hardware will define the profitability of the next generation of mobility:

Utilization
Longevity
Operating Cost

Mobility systems will continue to move towards more shared, commercially operated systems. These will be more reliant on the hardware's ability to maximize its output and be fit for the job.

HAX Hardware Trends 2019

Youibot
Commercial vehicle inspection robots

PushMe
Instant recharge pod network and electric bikes

Supported by a new generation of infrastructure

Infrastructure has proven to be just as important as the hardware itself, leading to new, high growth businesses that support the future of mobility.

Charge Point
World's largest electric vehicle charging network

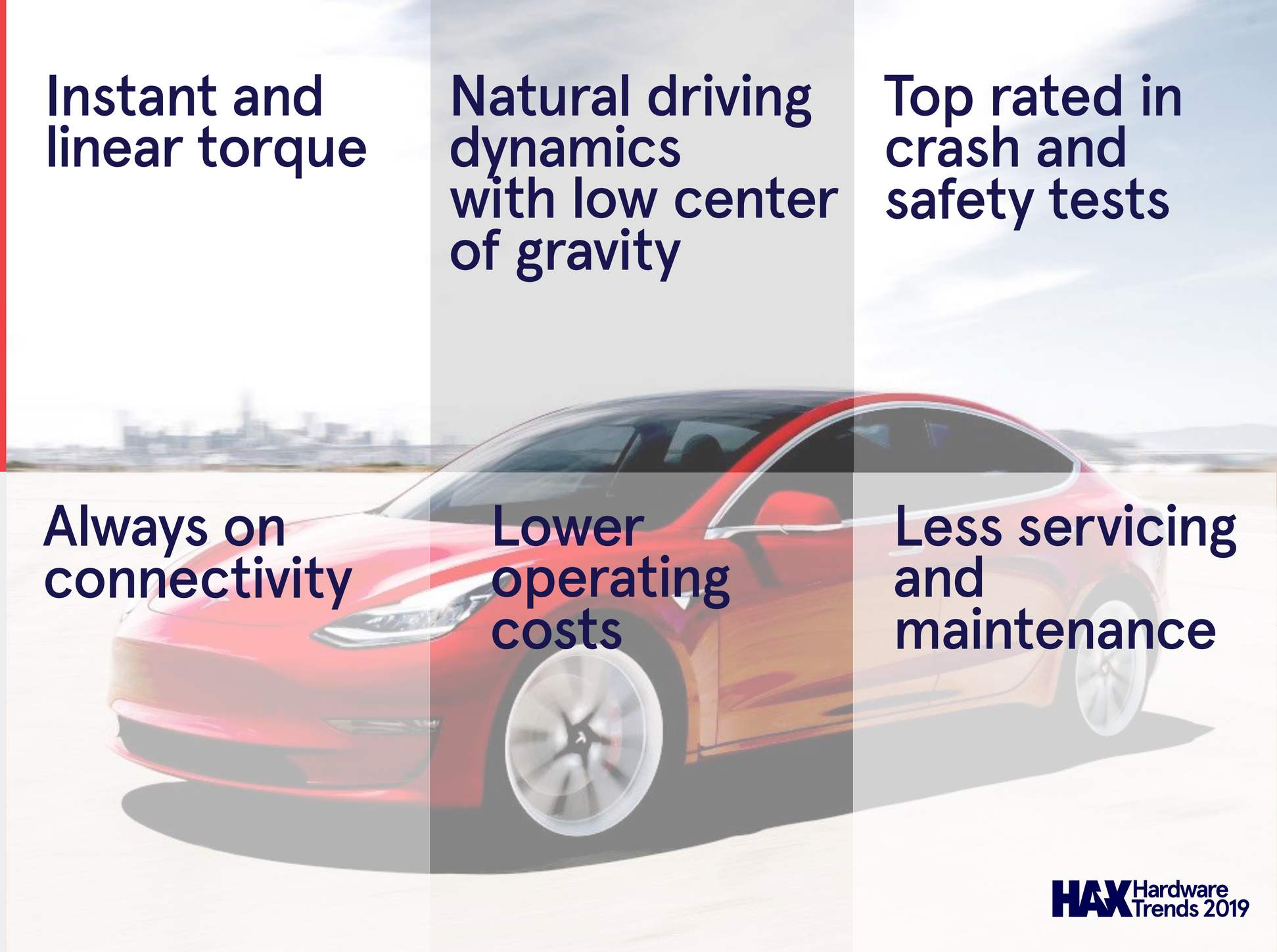
Electrification has created new battlegrounds for personal vehicles

Electric vehicles have shifted expectations and opened the door to new industry players, changing the dynamics within the competitive automotive industry.

HAX Hardware Trends 2019

Battery electric vehicles have great DNA

Tesla (and now other automakers) have taken advantage of the architectural benefits of electric vehicles that amplify the qualities buyers love most.



Instant and linear torque

Natural driving dynamics with low center of gravity

Top rated in crash and safety tests

Always on connectivity

Lower operating costs

Less servicing and maintenance

▼-0.5%

Global personal vehicle market

▼-1%

China personal vehicle market

▲+62%

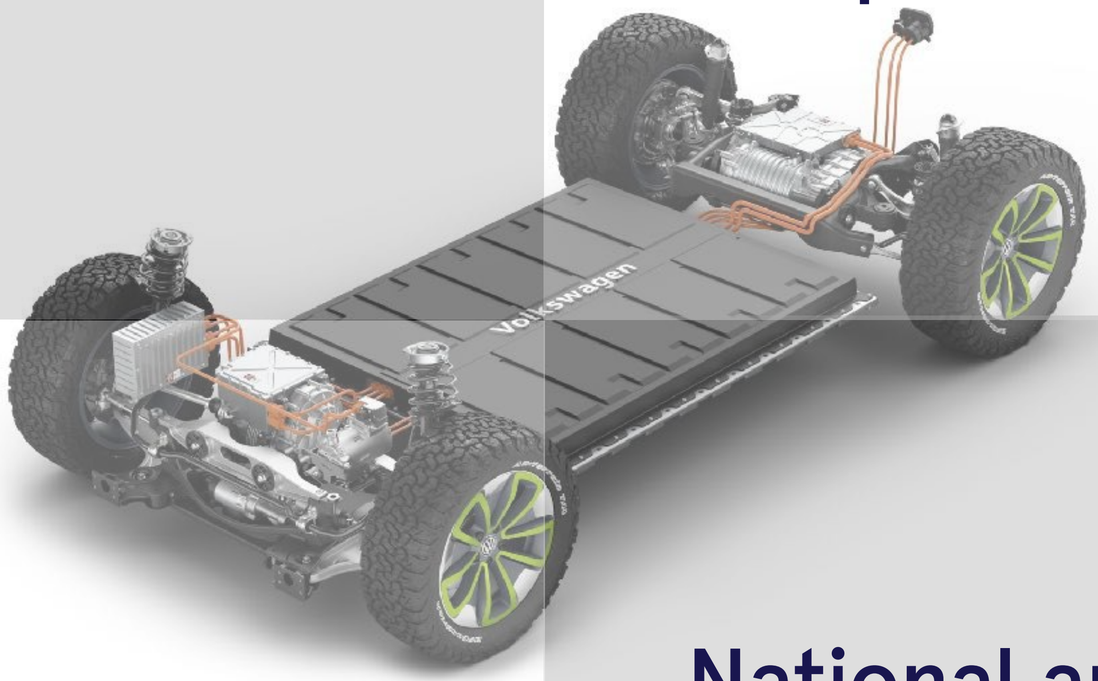
China EV market

China EV is booming against a backdrop of global personal vehicle decline

HAX Hardware Trends 2019

Less complex power train

Lower manufacturing footprint



Battery price is dropping

National and local government incentives

Lower barriers to entering the market

Making an electric vehicle has proven more straightforward than internal combustion engine vehicles, making it easier for new players to enter the industry.

HAX Hardware Trends 2019

486 EV makers in China

Including 9 unicorns and $18B in investment since 2011

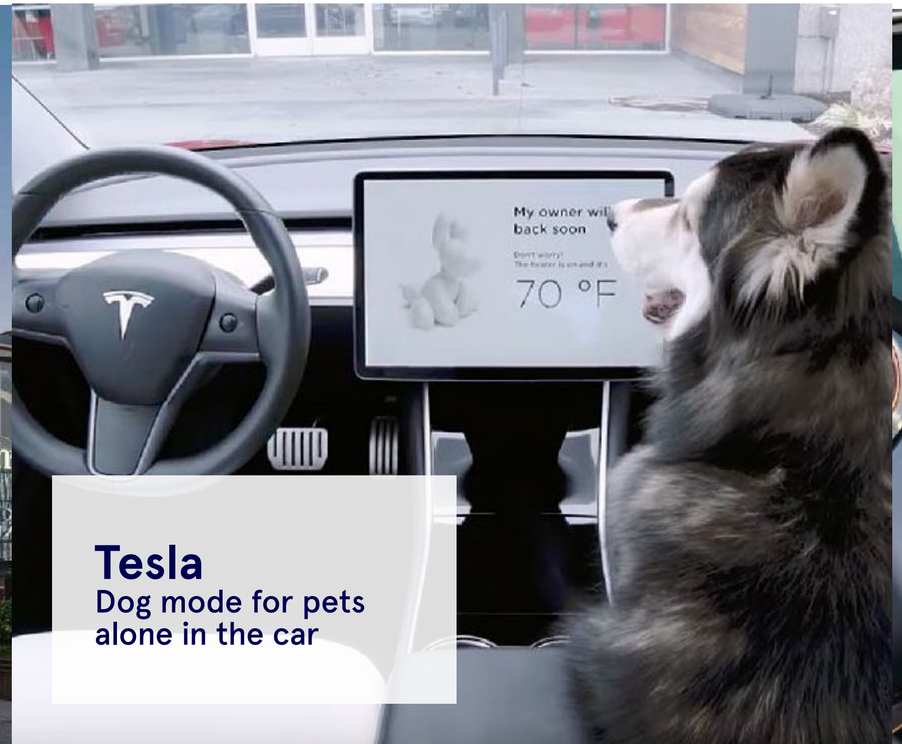
The China EV market has become increasingly competitive, racing to capture consumer demand over the last few years.


EV makers competing on experience and ecosystem

Manufacturers are creating more than just a vehicle in order to differentiate themselves. You don't just buy a car, you buy services, software and experiences.

HAX Hardware Trends 2019

NIO
Members only clubs for new EV owners



Tesla
Dog mode for pets alone in the car

Byton
Full width in-car screens and experiences

HAX Hardware Trends 2019

US automotive

510 → **44** auto makers

1913 — 1929

▲ **20%** CAGR US industry volume growth

Projected China EV

486 → **50*** auto makers

2018 — 2025

▲ **38%*** Projected CAGR EV China volume growth

A familiar bubble about to burst, but happening much faster and with lasting effects

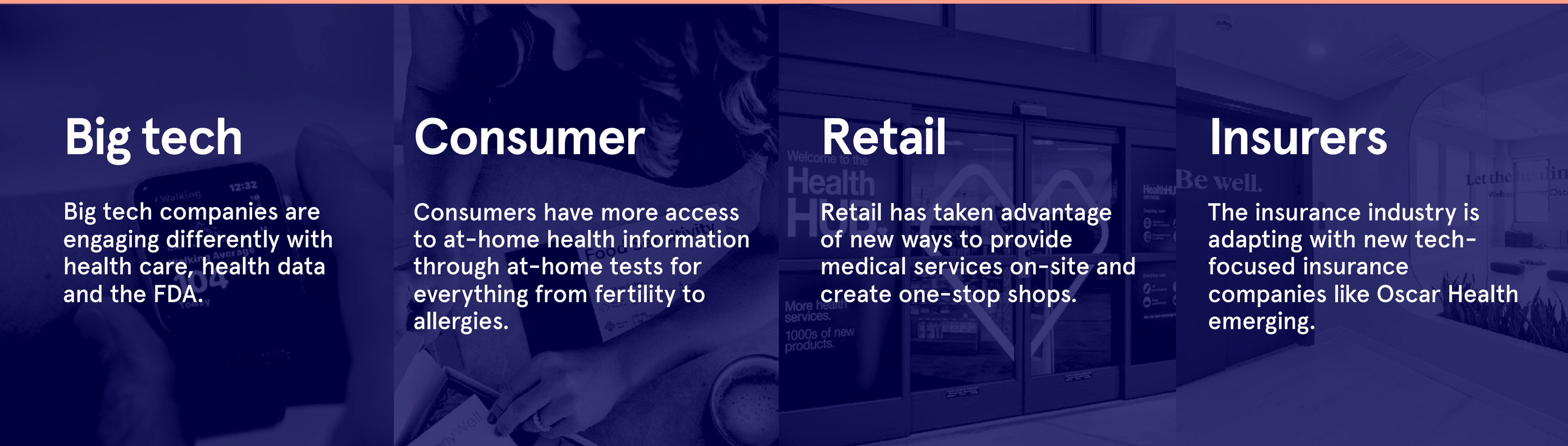
The Chinese EV market is expected to grow but there are clear signs of massive consolidation in the coming years. These changes mirror the US automotive industries growth and consolidation of 100 years ago. The results will shape the global automotive landscape.

/03

HAX Health

Health care is unbundling, creating opportunities for non-health companies to disrupt existing models

HAX Hardware Trends 2019



Big tech

Big tech companies are engaging differently with health care, health data and the FDA.

Consumer

Consumers have more access to at-home health information through at-home tests for everything from fertility to allergies.

Retail

Retail has taken advantage of new ways to provide medical services on-site and create one-stop shops.

Insurers

The insurance industry is adapting with new tech-focused insurance companies like Oscar Health emerging.

Apple Watch has become a symbol of a new age in digital health regulation

Apple launched the 4th version of the Apple Watch, which has De Novo FDA approved EKG monitoring, in 2018.

Other tech companies are also developing FDA-grade wearables, including Fitbit, Aetna, Verily, J&J, and Garmin.

HAX Hardware Trends 2019

verily

Pear

Consumer health testing kits available on retailers like Amazon for at home use.

A new generation of testing, monitoring and rehabilitation products allow for a more convenient patient journey while also relieving the burden on the healthcare provider infrastructure.

HAX Hardware Trends 2019

Seein Health
FDA cleared at-home fertility testing

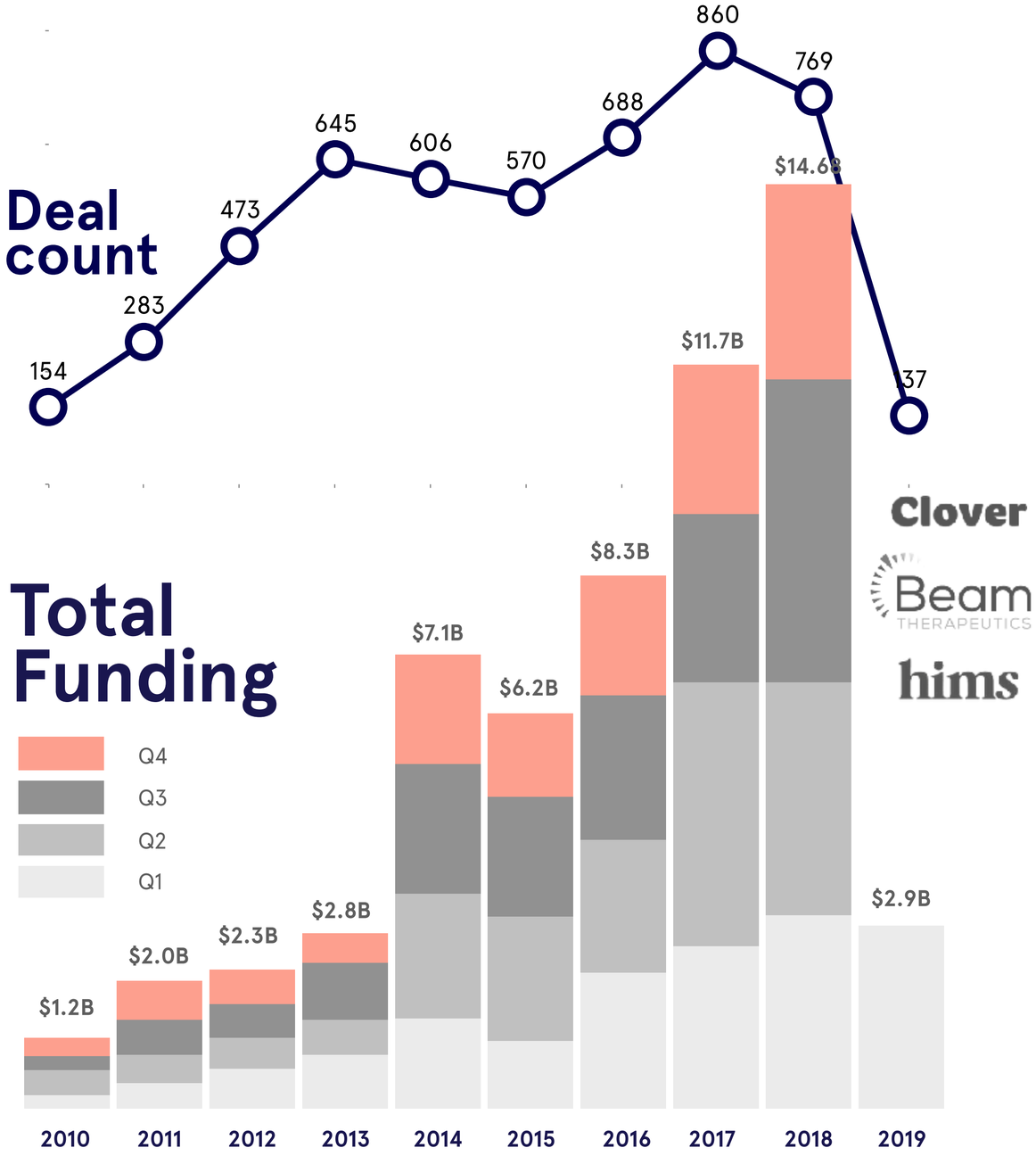
EverlyWell
At-home allergy testing available on Amazon, CVS

Bisu
Dietary health testing through urine analysis

The first of many AI-driven software as a medical device (SaMD) offerings

IDx

IDx is the first ever autonomous AI system cleared by the FDA to provide a diagnostic decision for diabetic retinopathy and recommend further evaluation with a specialist.



Source : Startup Health

HAX Hardware Trends 2019

A record year for health tech funding

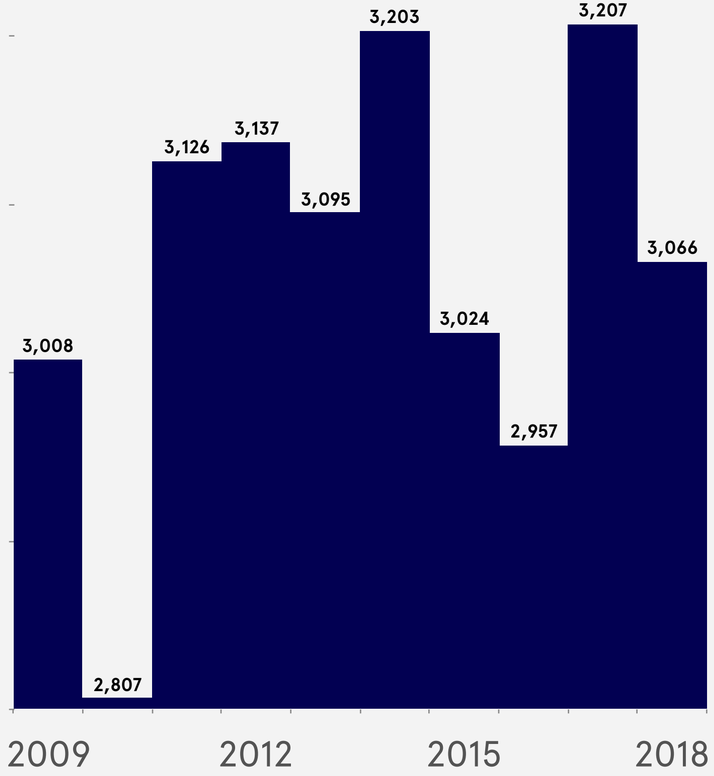
VC funding into health care hit $14.6B in 2018. Device deals were $4.1B in 2018, up 40% from $2.9B in 2017, led by a surge in surgical robotics. (Silicon Valley Bank data).

2018 also saw numerous biotech IPOs and the potential for a positive investment trend.

FDA 510(k) is becoming more supportive of innovation

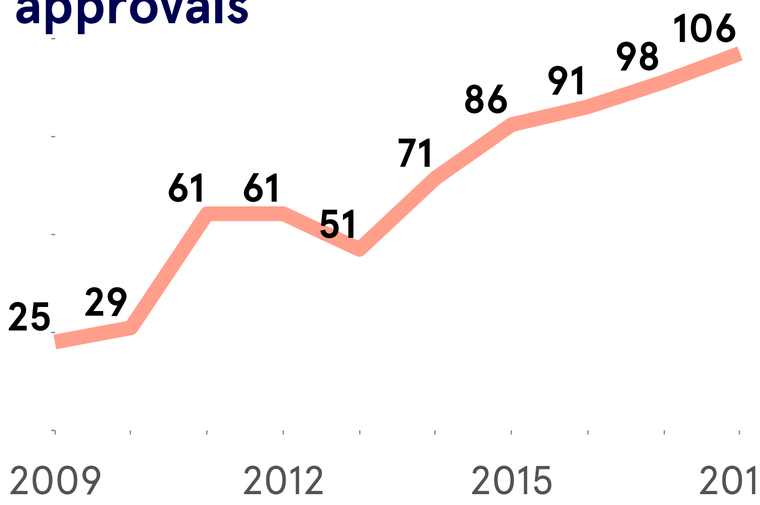
HAX Hardware Trends 2019

Number of 510(k)s cleared

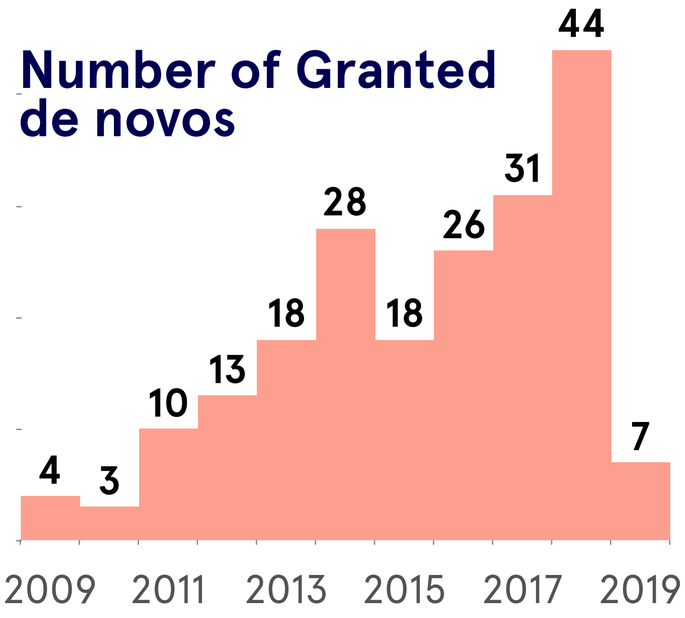


Source : William V. Donovan

Novel device approvals



Number of Granted de novos



Source : FDA

There has been an increase in class II and class III medical devices going through the de novo process due to the availability of new technologies. With data showing that de novo pathways tend to lead to more successful exits and higher deal values, being novel and complex is no longer a bad thing.

HAX Hardware Trends 2019

Successful companies are improving the following areas

If you look at what has been driving the success of startups in the medical technology and medical device spaces, the core tenets are consumer access, cost and improved outcomes. These factors are required for successful fundraising and go-to-market execution.

Access

Cost

Outcomes

Machine learning powered hardware is making a huge impact on access to healthcare

HAX Hardware Trends 2019

AI/ML has opened up a world of potential capabilities for medical device companies.

These companies are capitalizing on machine learning technology to provide improved, immediate care in more accessible settings, not just in the clinic.

Feel

Continuous anxiety and depression monitoring and interventions

Axem

The first brain-sensing headset for neurorehabilitation

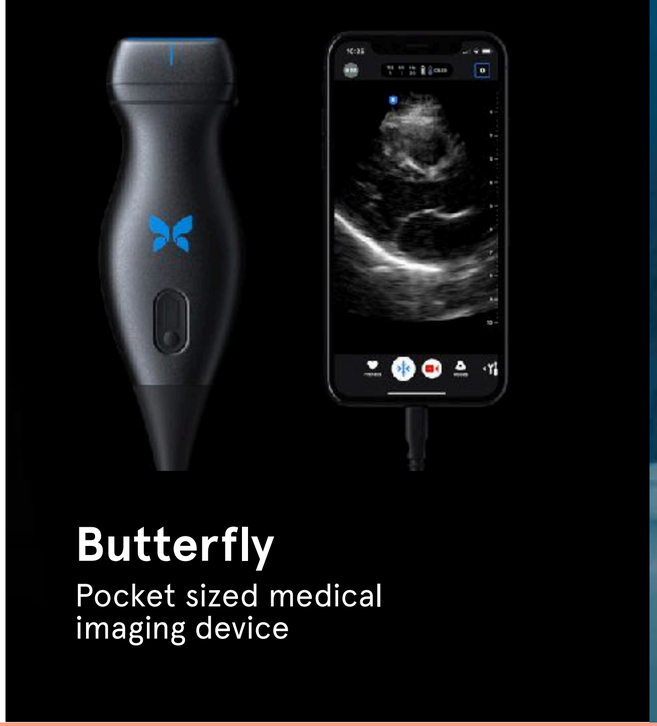
Japet

Robotic equipment offering advanced treatment of lower back pain

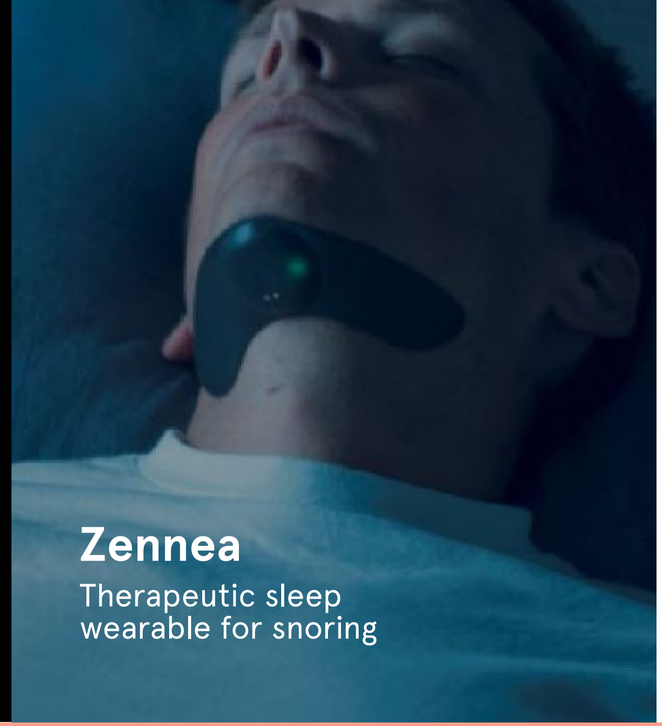
KINEXCS

Monitoring solutions to enhance at-home rehabilitation

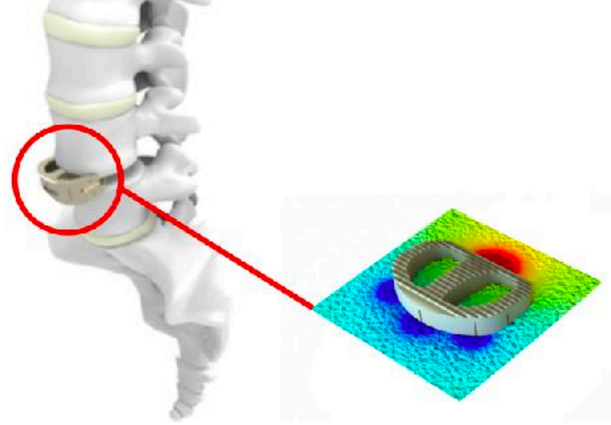
Strados
Monitor for respiratory health management



Butterfly
Pocket sized medical imaging device



Zennea
Therapeutic sleep wearable for snoring



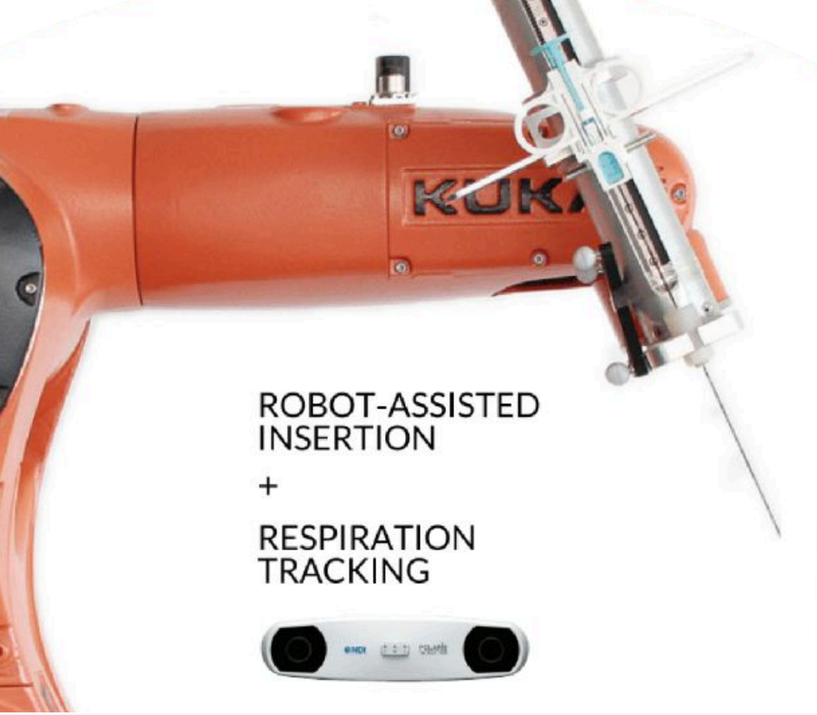
Intelligent Implants
Wireless electronics that steer and monitor bone growth

New sensing technology can dramatically reduce costs for providers

Improved sensing technology is giving patients access to information that they may not currently have outside of a clinical setting.

The potential for improved outcomes is vast with improved wellness at one end of the spectrum, and avoiding a life-threatening event through advanced forecasting at the other.

HAX Hardware Trends 2019



Pinpoint
Robotic aid and support for precise surgeries

NERv
Detects gastrointestinal leaks after surgical procedures

And impact outcomes during and after hospital care

New technologies are creating less-invasive options for pre- and post-monitoring as well as diagnosing more critical conditions, including surgical re-sectioning (Nerv) and tumor detection (PinPoint).

HAX Hardware Trends 2019

Microfluidics continue to power new possibilities in health, optimizing cost, access and outcomes

HAX Hardware Trends 2019

MF have the ability to extract large amounts of valuable data from a small sample, improving access, outcomes and cost. In the future, point-of-need testing will streamline consumer access to diagnostic information, with implications for human health and beyond.

Bisu

Dietary health testing through urine analysis

Zio Health

Biosensor platform for bodily fluids

Sight

Blood count device for point-of-care

Biomeme

Mobile, real time PCR platform and devices

BBB

Devices for early stage diagnosis and monitoring

Bitome

Compact and portable chemical analysis tools

/04

HAX B2B

Technology drives growth by increasing productivity in two different ways

Making processes more efficient

Changing the process

HAX Enterprise

HAX Industrial

Sensor enabled software

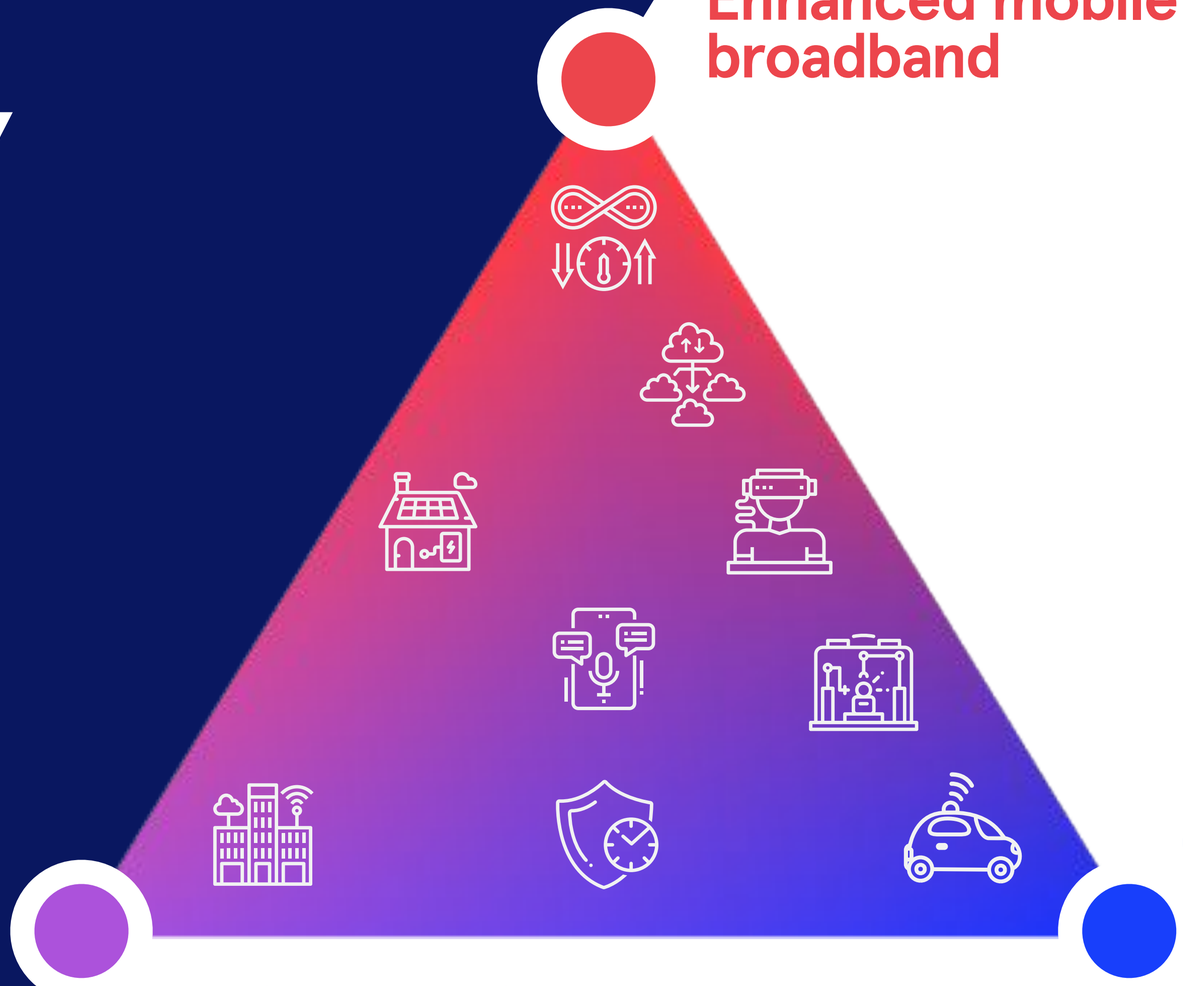
Robotics and automation

5G will be a historic single factor technology improvement for B2B tech

HAX Hardware Trends 2019

5G is not one single use case, it is an amalgamation of three, enabled by different technologies

HAX Hardware Trends 2019



Enhanced mobile broadband

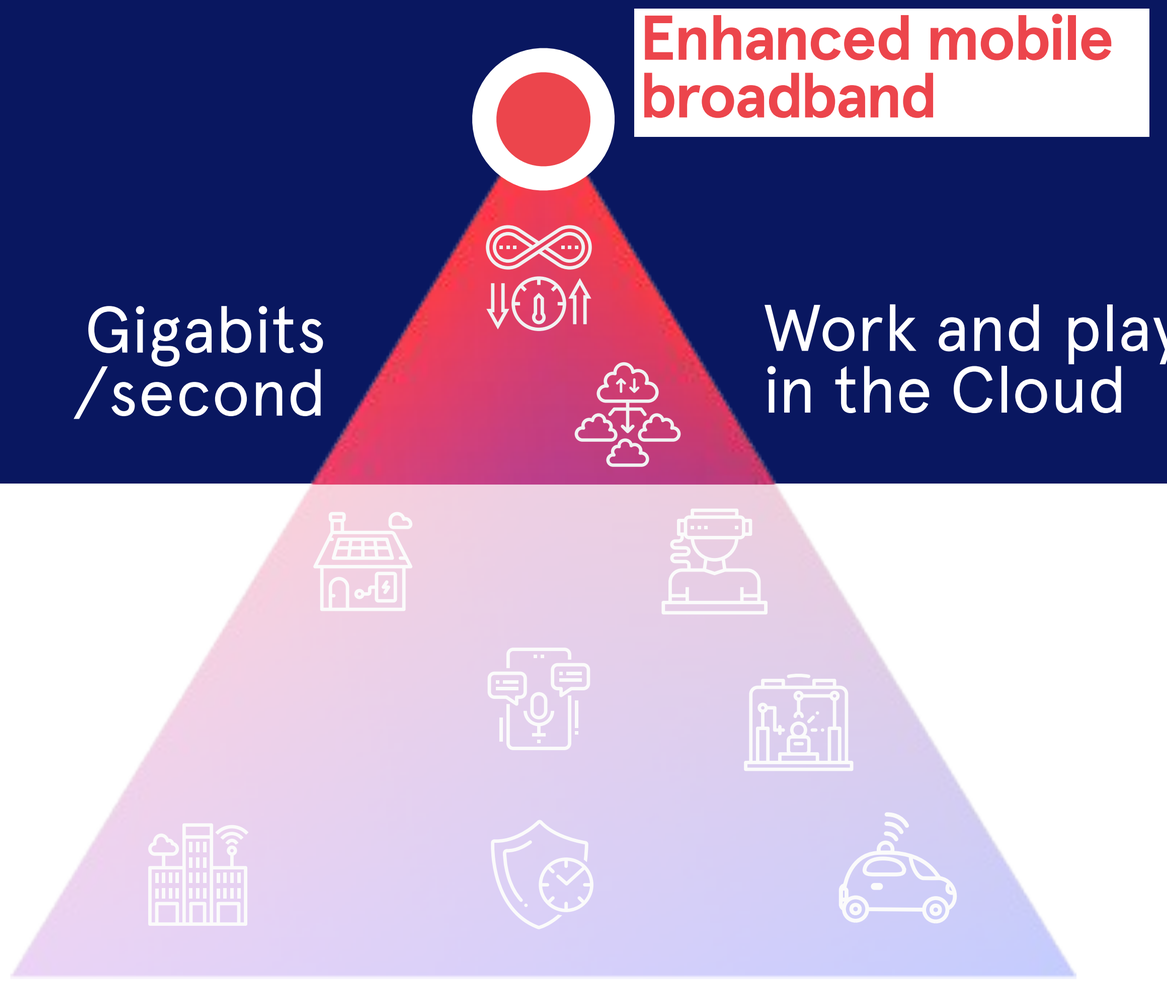
Ultra-reliable and low latency communications

Massive machine-type communications

Source: International Mobile Telecommunication - IMT 2020

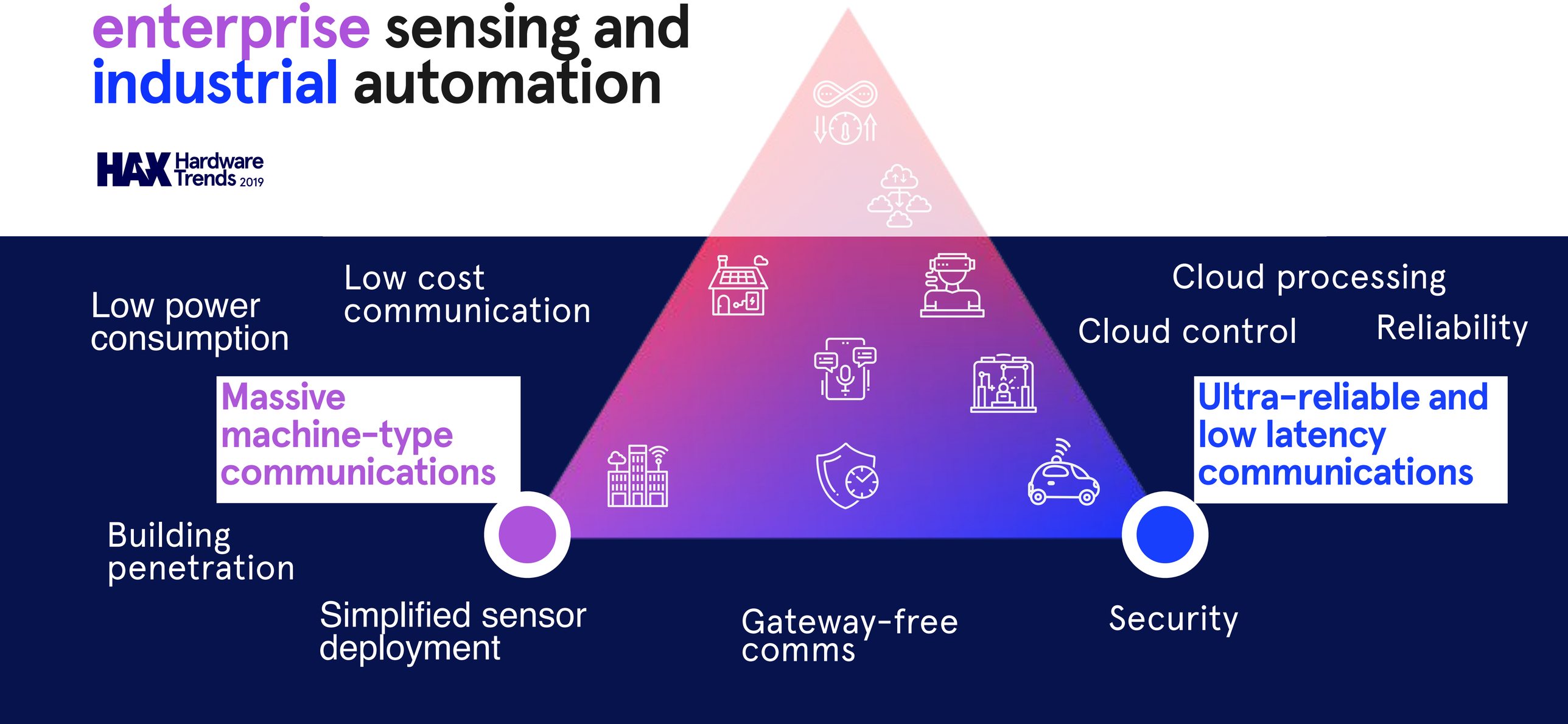
Much of the hype around 5G is consumer-focused

HAX Hardware Trends 2019



The true value lies in enterprise sensing and industrial automation

HAX Hardware Trends 2019



Sensor deployment barriers are disappearing

Smart meters
Pipeline management
Agriculture sensors
Smart cities
Building automation
Smart grid
Asset management
Asset tracking

HAX Hardware Trends 2019

Building penetration

Low cost communication

Low power consumption

Simplified sensor deployment

Massive machine-type communications

Gateway-free comms

Cloud processing

Cloud control

Reliability

Security

Ultra-reliable and low latency communications

Remote access and control enabled technology

Applied augmented reality
Remote operation
Service robotics
Gateway-free comms
Critical controls
Autonomous fleets

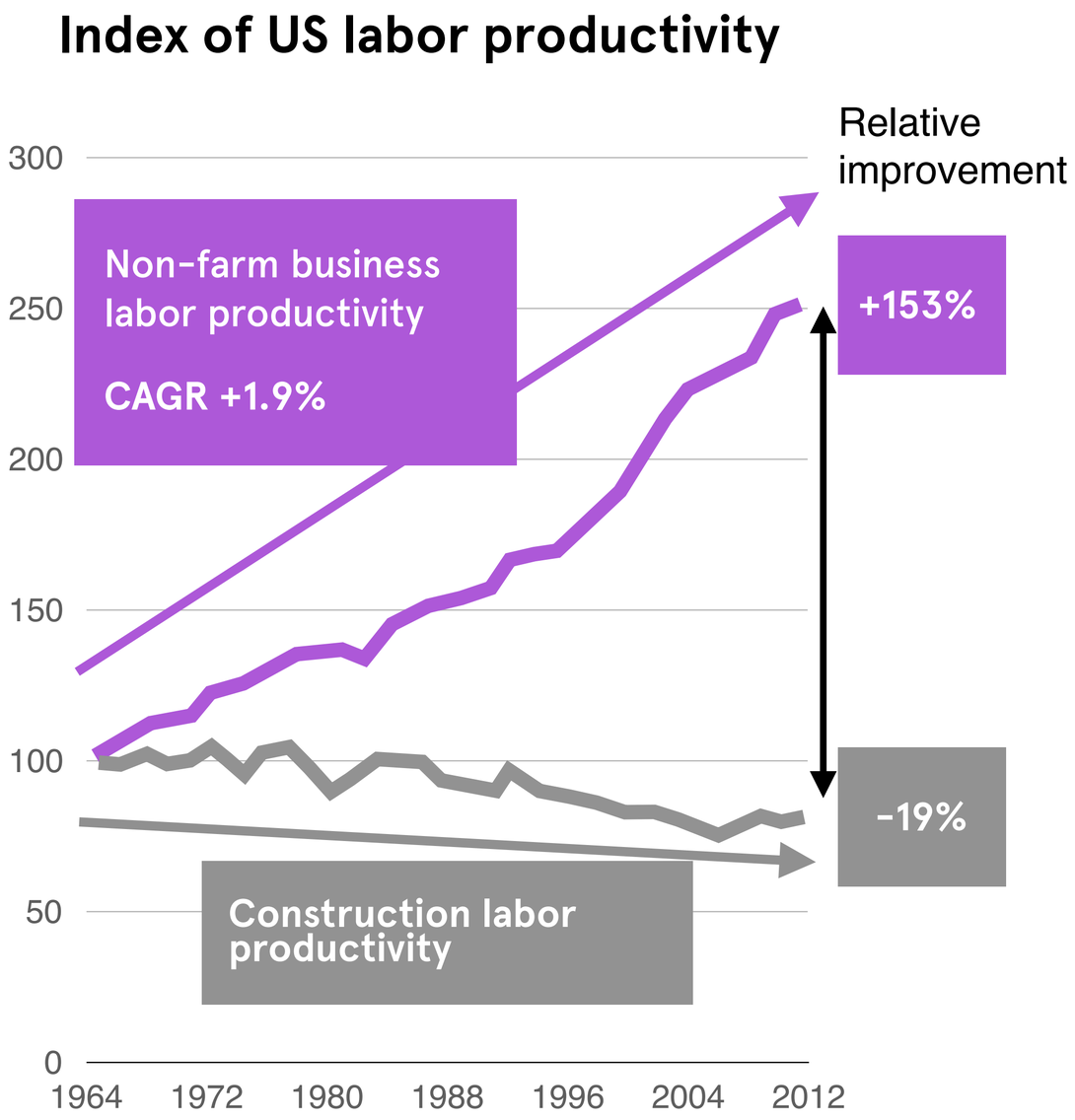
HAX Hardware Trends 2019

5G deployment challenges created new opportunities for technologies to scale

ACIIST
Smart city & IoT connectivity infrastructure

Mesh++
WiFi anywhere with self-powered mesh nodes

HAX B2B Construction



Construction labor productivity is not just lagging, it's declining

HAX Hardware Trends 2019

Yet the industry is set to double in size in the next 20 years.

Construction hard facts

Construction's productivity problem is amplified by the fact that we always need more of it. The industry needs to build more infrastructure for more people, but with less money and less labor.

200K people are added daily to urban areas

50% of general contractors struggle to find experienced labor

$1TN financing shortfall to keep up with demand

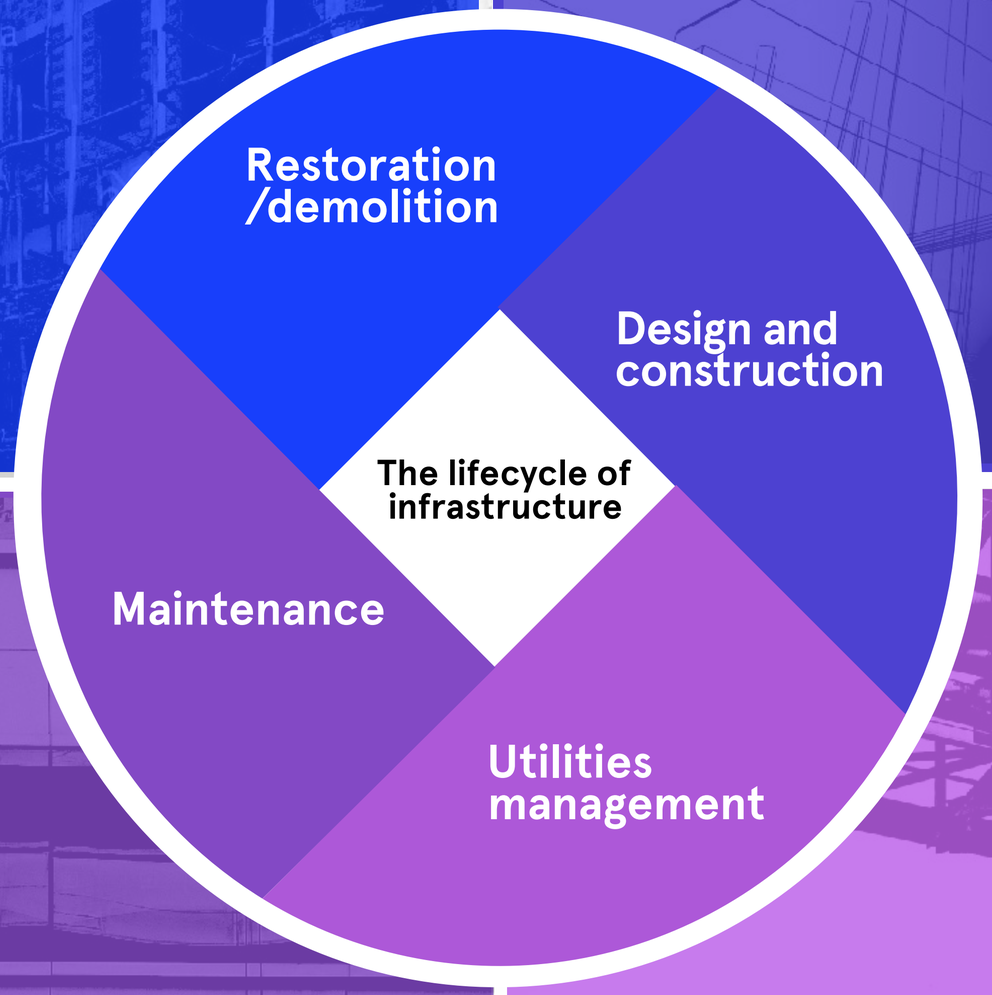
HAX Hardware Trends 2019

Source: http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_full_report__.pdf

$23B*

$6B cost of demolition
+ $17B cost of disposing demolition waste/year

$1.3T*



$340B*

+ $51B (cleaning expenditure in the US)

$369B*

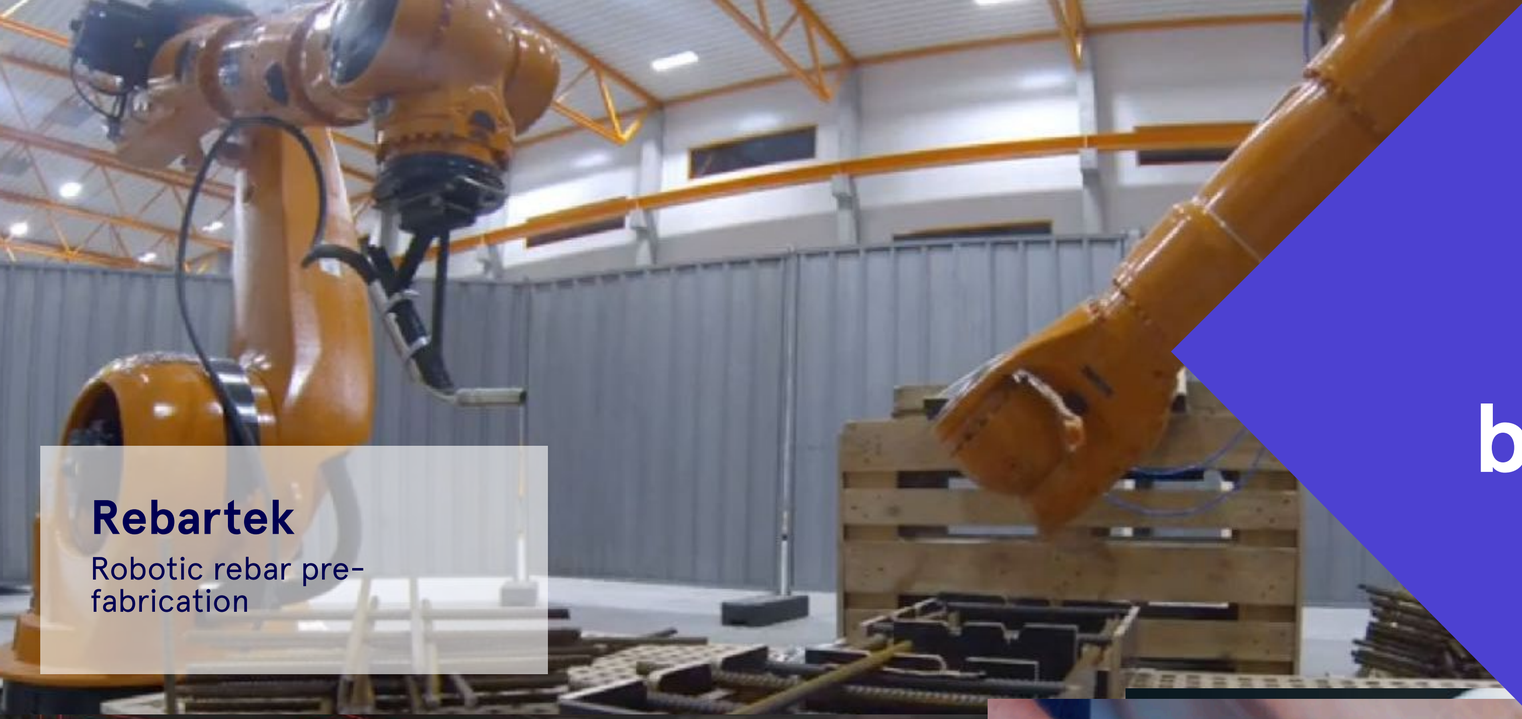
residential and commercial utilities expenditure in the US

*US buildings

To comprehensively solve the construction productivity problem, we need to think about the entire lifecycle of built infrastructure.

A building needs to be thoughtfully designed and constructed, run at optimum efficiency, be maintained regularly to extend its lifespan, and then ultimately be restored and/or demolished to allow for new creation.

HAX Hardware Trends 2019



Rebartek
Robotic rebar pre-fabrication

Mechasys
Digital projection and positioning tools

Shape Measure
Automated scanning and cutting for flooring

$1.3T Design & Construction

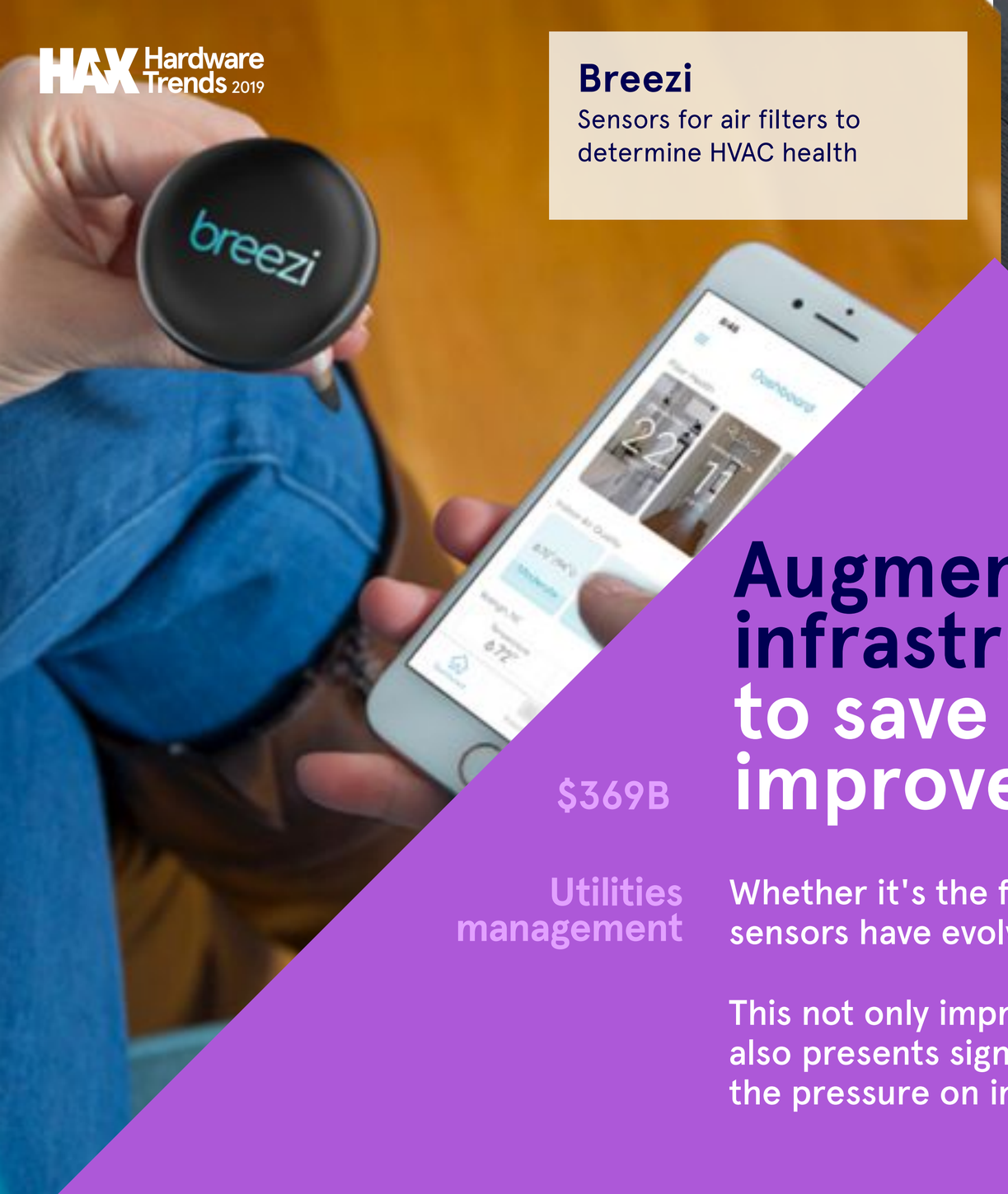
Productivity is severely affected by real world variability

Construction occurs in the physical world. Solutions for this industry can't be digital only; software needs additional sources of information from a variety of workflows to unlock new avenues for productivity.

As such, it needs a combination of sensors and hardware automation to gather data and take corrective action where required.

HAX Hardware Trends 2019

HAX Hardware Trends 2019



Breezi

Sensors for air filters to determine HVAC health

Flair

Intelligent vents to eliminate uneven heating and cooling in the home

Augmenting infrastructure to save cost and improve experience

$369B

Utilities management

Whether it's the facade, the HVAC or the air filters, sensors have evolved to share new types of information.

This not only improves comfort for building occupants, but also presents significant utility cost benefits and reduces the pressure on infrastructure.

NotifAI

Protects your home from water, mold, and appliance related failures or disasters

Maintenance $340B

New business models for continuous maintenance

Automation makes it possible to perform maintenance more frequently and for a lower price per unit. Interestingly, it also makes it easier for property management companies to offer traditionally dull and dangerous, value-add services on a recurring basis.

HAX Hardware Trends 2019

Avidbots

Autonomous floor cleaning for large indoor spaces

Somatic

Robots that clean commercial bathrooms

Viabot

Modular robots that perform outdoor maintenance tasks

Plecobot

Autonomous learning of glass skyscraper facades

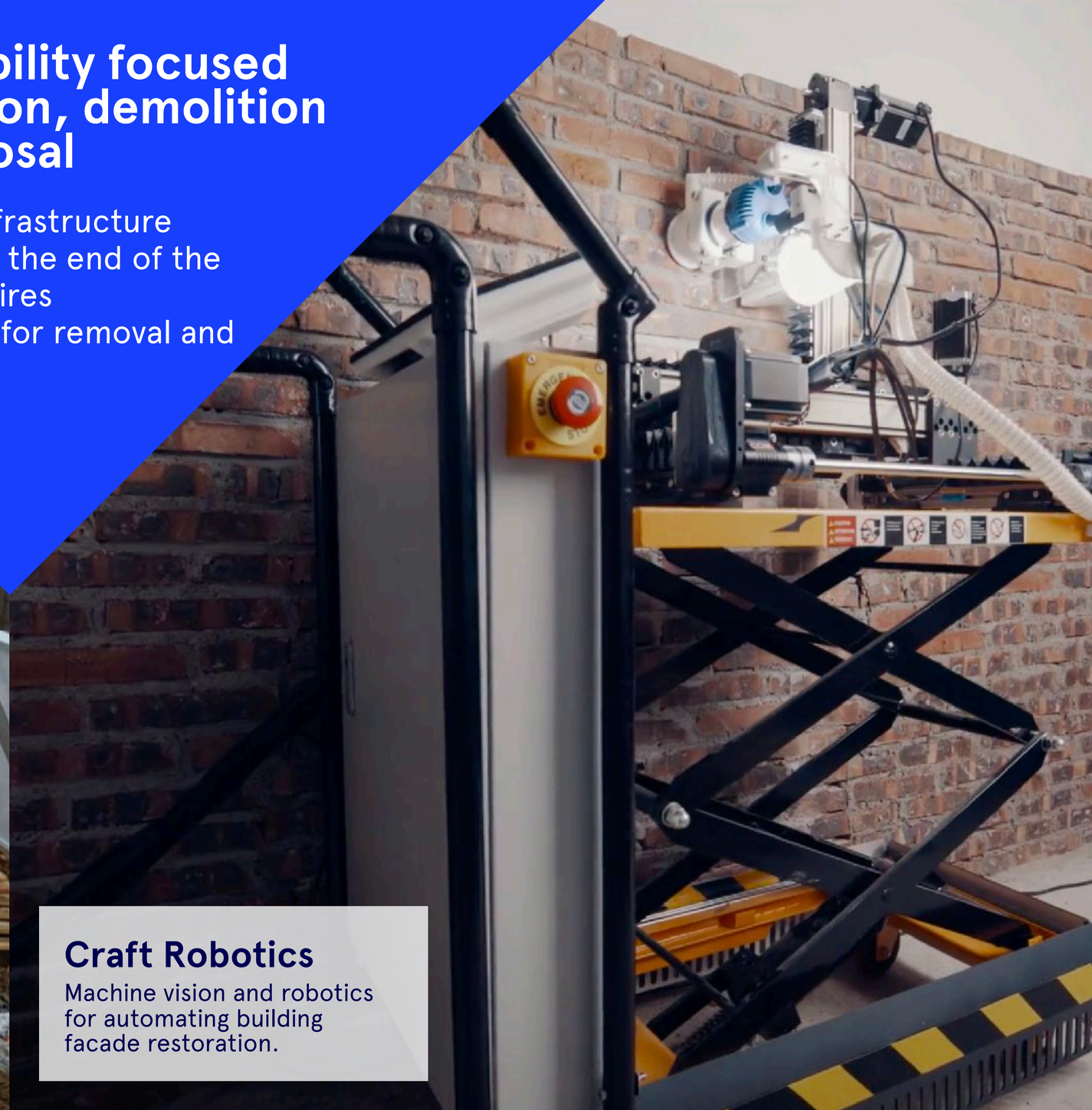
HAX Hardware Trends 2019

Sustainability focused restoration, demolition and disposal

Eventually, infrastructure degrades and the end of the lifecycle requires management for removal and disposal.

Wastack

Analytics and management solutions for landfills

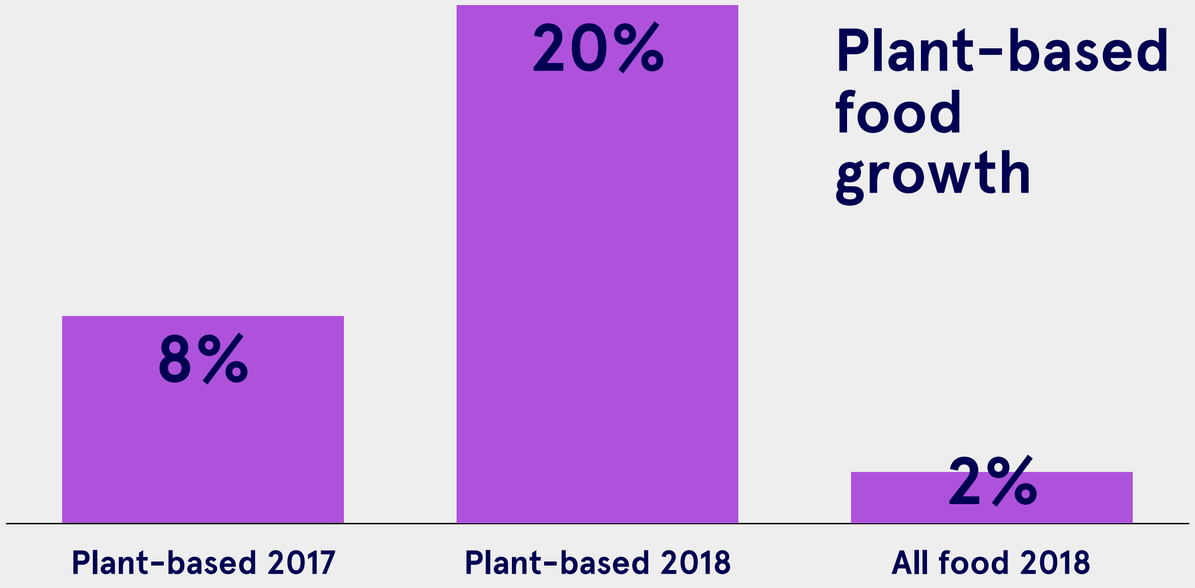


Craft Robotics

Machine vision and robotics for automating building facade restoration.

HAX B2B Agriculture

Plant-based protein is surging to support global growth

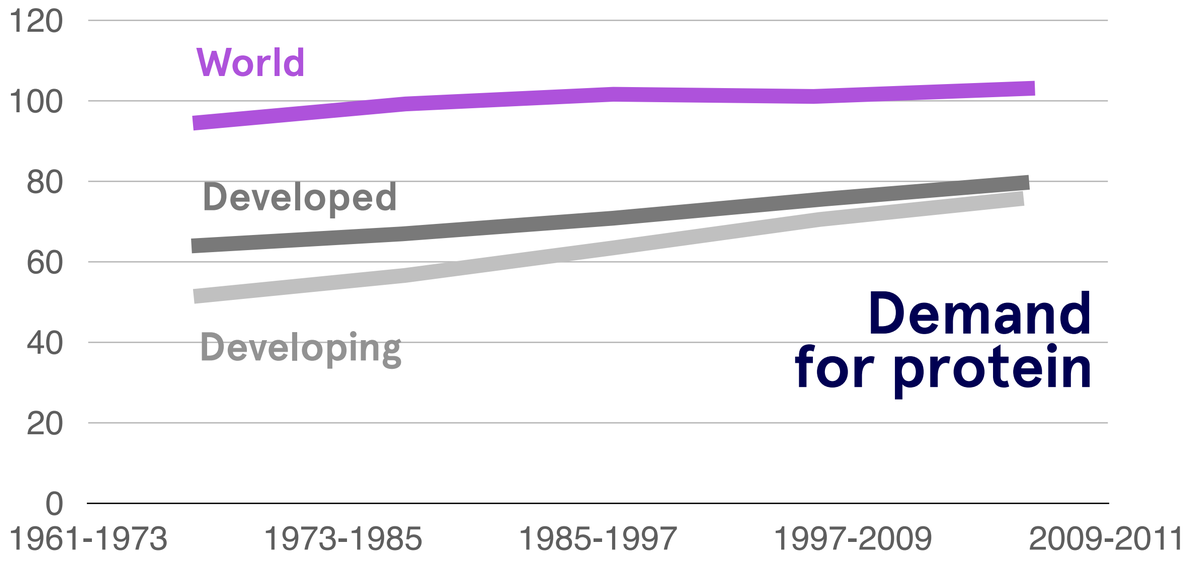


Plant-based protein had its coming-of-age moment in 2018. The growth of plant-based food products far outpaced the growth of all other food last year.

HAX Hardware Trends 2019

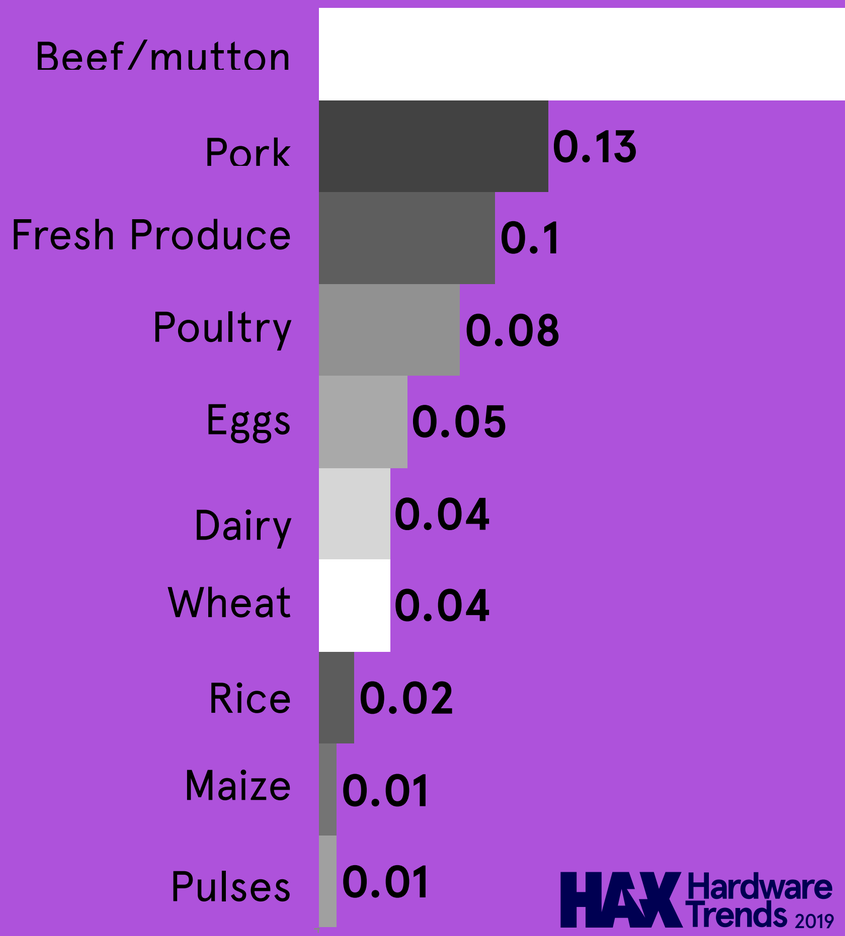
Source: https://plantbasedfoods.org/consumer-access/nielsen-data-release-2018/

In the developed world, this trend is driven by consumer consciousness. In the developing world, it'll be driven by increased living standards and a demand for more complete nutrition



Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5532560/

Land use per gram of protein, m^2



HAX Hardware Trends 2019

The opportunity cost of animal protein is too high

The pattern of use for land (and other resources) in meat production is far higher than the gram for gram plant-based protein equivalent. With increasing pressure on natural resources, there will be a necessary shift to serve global growth.

Source: Environment Footprint by Food Type (protein) - Clark & Tilman (2017)

SOSV

The most active early stage investor in agriculture in 2019

At SOSV, we have a deep-seated belief in supporting companies that build the food supply of the future. Our food and biotech focused accelerators have led the charge in backing some of the world's leading alternative protein companies.

Source: https://about.crunchbase.com/blog/agtech-food-tech-agfunder-2019/)

INDIE BIO
ACCELERATING BIOLOGY

Clara Foods
Egg proteins from yeast fermentation

Not Company
Plant-based mayo, milk and ice cream

RebelBio

Perfect Day
Animal-free dairy from microflora

FOOD-X
FEEDING A FOOD MOVEMENT

Abbot's Butcher
Plant-based meat alternatives

Precision agriculture maximizes output with less input

HAX Hardware Trends 2019

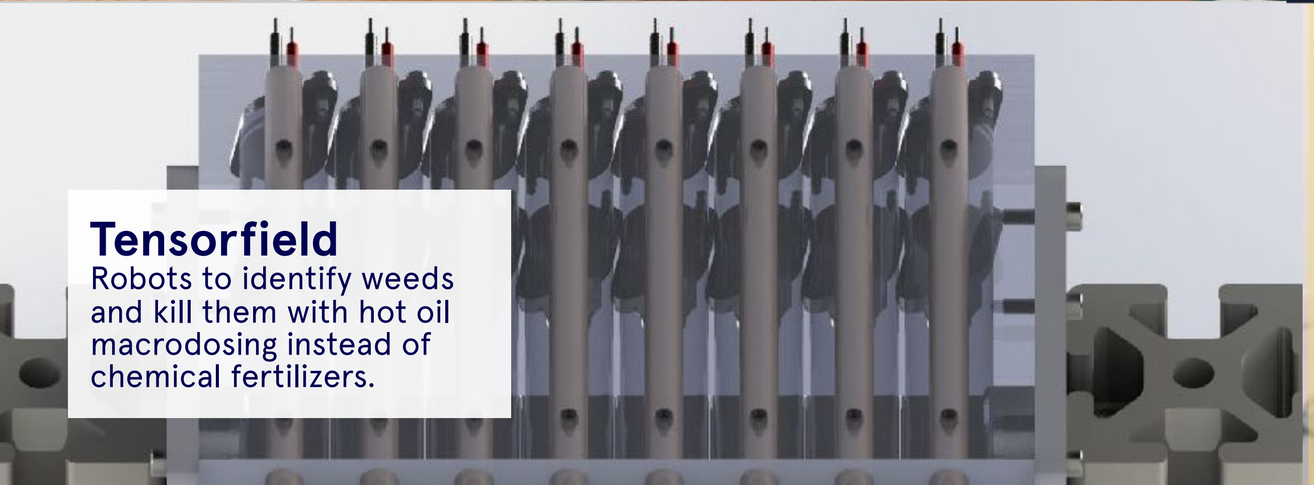
Ultimately, plant-based proteins are useful for shifting the end product from meat to plant-based. However, the raw materials required are still a product of farming. As a result, our emphasis on precision agriculture still remains.

Nortdetect

A lab on a chip offering soil testing for NPK optimization to reduce fertilizer usage and maximize yields.

Forward Robotics

Autonomous VTOL drones for longer flight times and larger range coverage in agricultural operations.



Tensorfield

Robots to identify weeds and kill them with hot oil macrodosing instead of chemical fertilizers.

Apix

Sensor analytics and automation for beehive maintenance and colony health.

HAX Hardware Trends 2019

HAX B2B Manufacturing

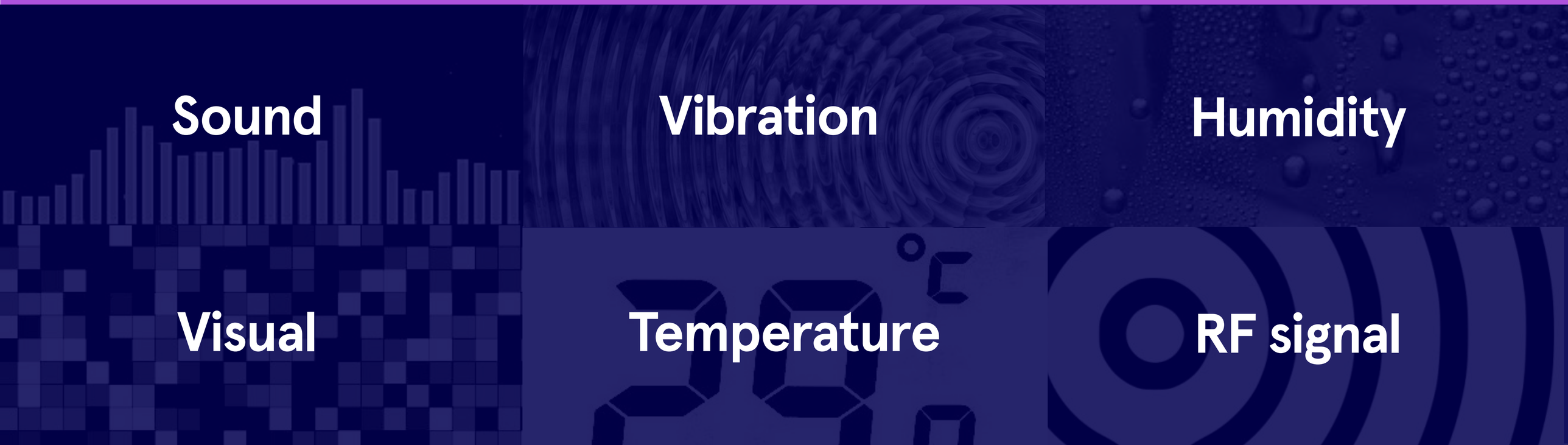
In the future, every single component will have a real-time digital twin

The manufacturing sector is no longer as simple as offline and online operations. Instead it is fully integrated with real-time "digital twins" of everything happening throughout a supply chain.

Enabled by sensing in real time

The value of digital twins goes far beyond *where* something is. It enables deeper understanding and measures that indicate quality, efficiency and cost in the system.

HAX Hardware Trends 2019



Deeper insight optimizes and prevents costly downtime

98% of organizations say a single hour of downtime costs over **$100,000.**

Digital manufacturing systems were first used to prevent unscheduled downtime or high cost inefficiencies.

HAX Hardware Trends 2019

Amper Technologies

Non-invasive performance monitoring for manufacturers

Pulse Industrial

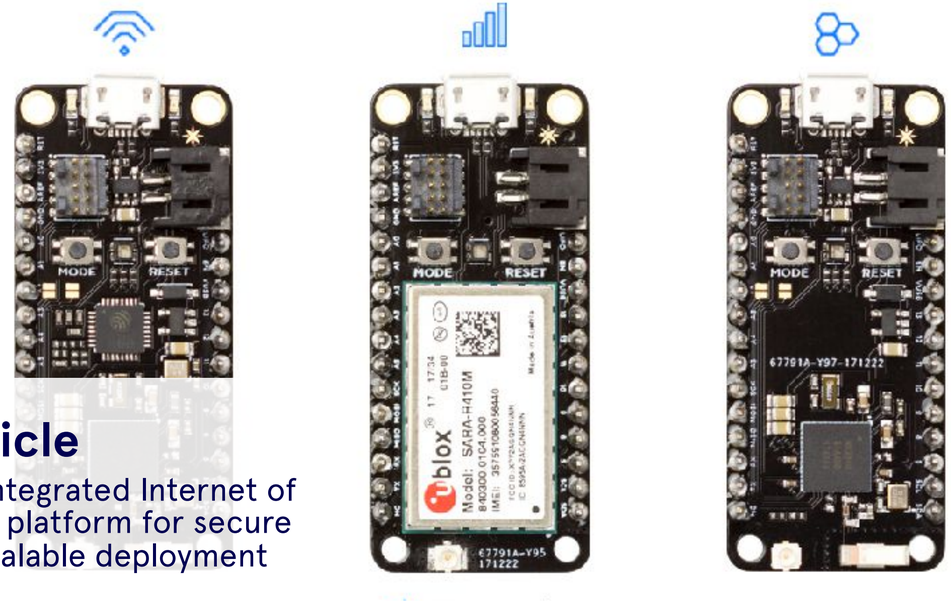
Monitoring for fuel savings and downtime prevention in industrial facilities

Relayr

Internet of Things middleware for industrial digital transformation

M5 Stack

Modular product development toolkit for connected products and equipment



Particle

Fully integrated Internet of Things platform for secure and scalable deployment

Equipment as a service starts with connectivity and sensing

Connectivity and software integration enable new business models that can continuously add value and scale beyond the initial hardware.

Building trust across multiple stages and partners

Connected manufacturing systems are creating value across all stages of production, augmenting relationships and adding transparency between partners.

HAX Hardware Trends 2019

AISight
Artificial intelligence to monitor machine state and usage in real time.

Smartex
Detecting and preventing defective production in the textile supply chain.

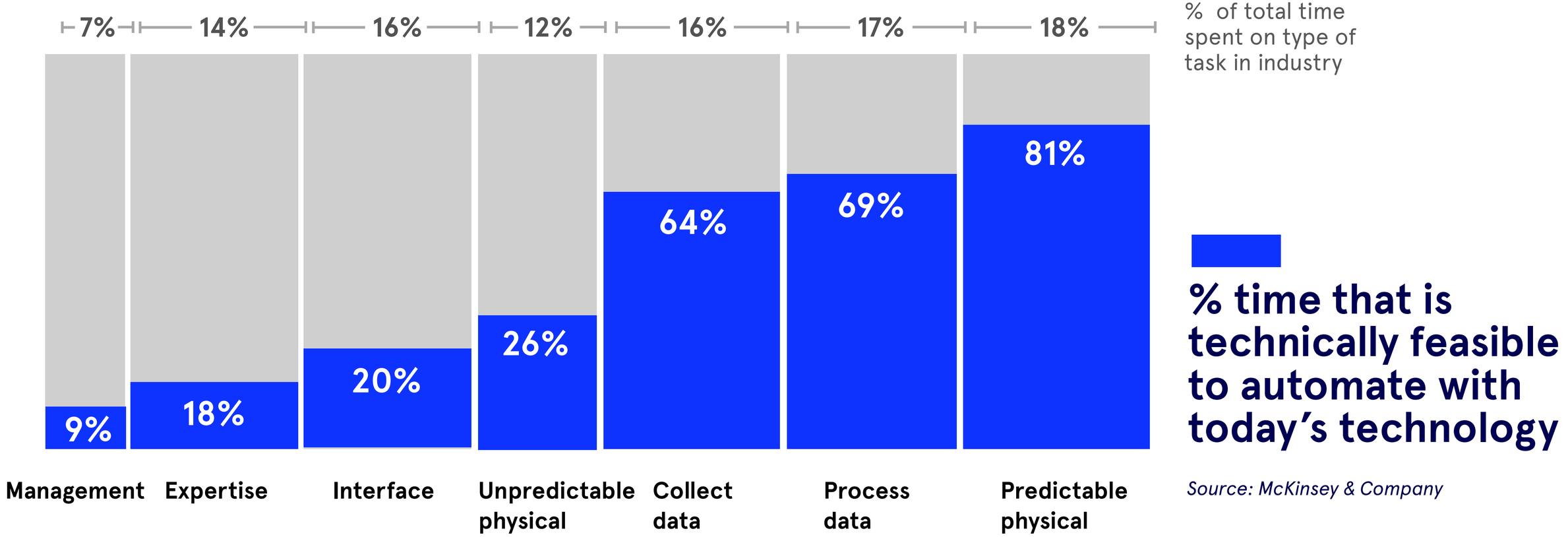
Making robots more like people

And people more like robots

HAX Hardware Trends 2019

More tasks are being automated but people and robots will need to work together for the foreseeable future

HAX Hardware Trends 2019



% of total time spent on type of task in industry

% time that is technically feasible to automate with today's technology

Source: McKinsey & Company

Making people stronger, smarter and more consistent

Employers are only adopting technologies that are designed to work well with their employees, integrate into current work flows, and help employees perform more safely and efficiently.

HAX Hardware Trends 2019

Crimson Dynamics

Exoskeletons built for employees that integrate within existing work flows

Nuada

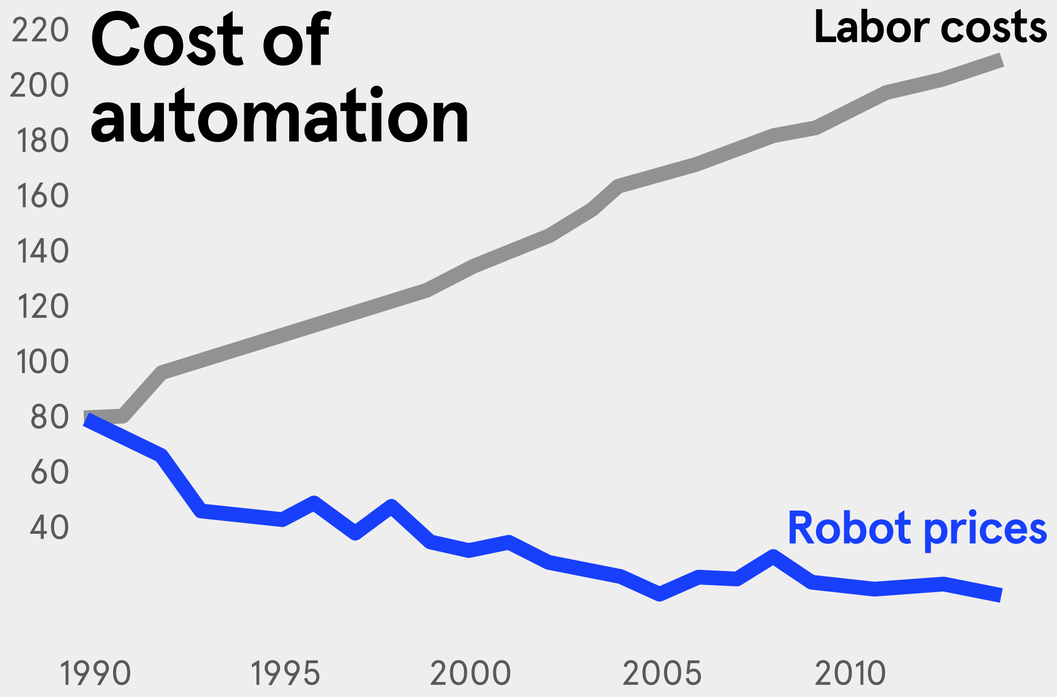
soft exoskeleton wearable system that helps users to hold heavy objects with their hands completely relaxed

Magic Leap

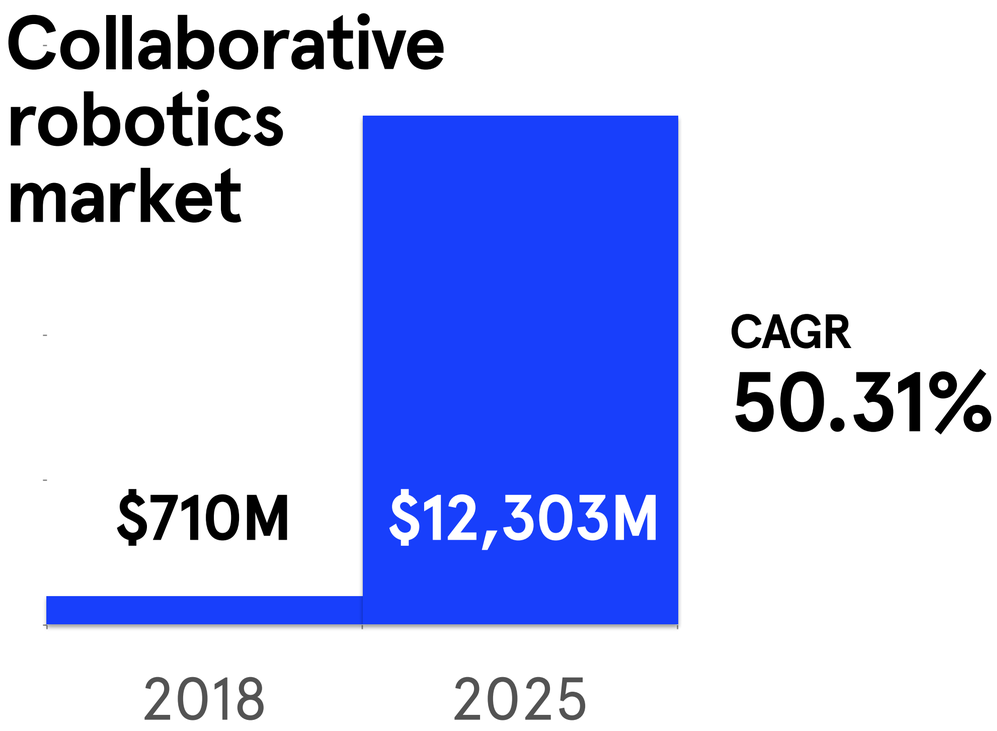
a spatial computer that lets you see and interact with digital content in the world around you

Robotics are not only cost-reducing, they are becoming easier to set up, re-tool, and safer to interact with

HAX Hardware Trends 2019



Source: Economist Intelligence Unit; IMB; Institut für Arbeitsmarkt - und Berufsforschung; International Robot Federation, US Social Security Data; McKinsey Analysis



Source : Markets and Markets - Collaborative Robot Market

A race to scale platforms that are flexible and integrate with people

The collaborative robotics market is booming. Emergent winners emphasize speed of development, integration time and how well they work and share environments with people.

HAX Hardware Trends 2019

Youibot

Robotic platform for mobile applications within industrial settings

Elephant Robotics

Collaborative robots that are quick to develop and integrate across applications

Elephant 5 Catbot

SOSV

HAX Hardware Trends 2019

www.hax.co

Stay Updated with HAX: