

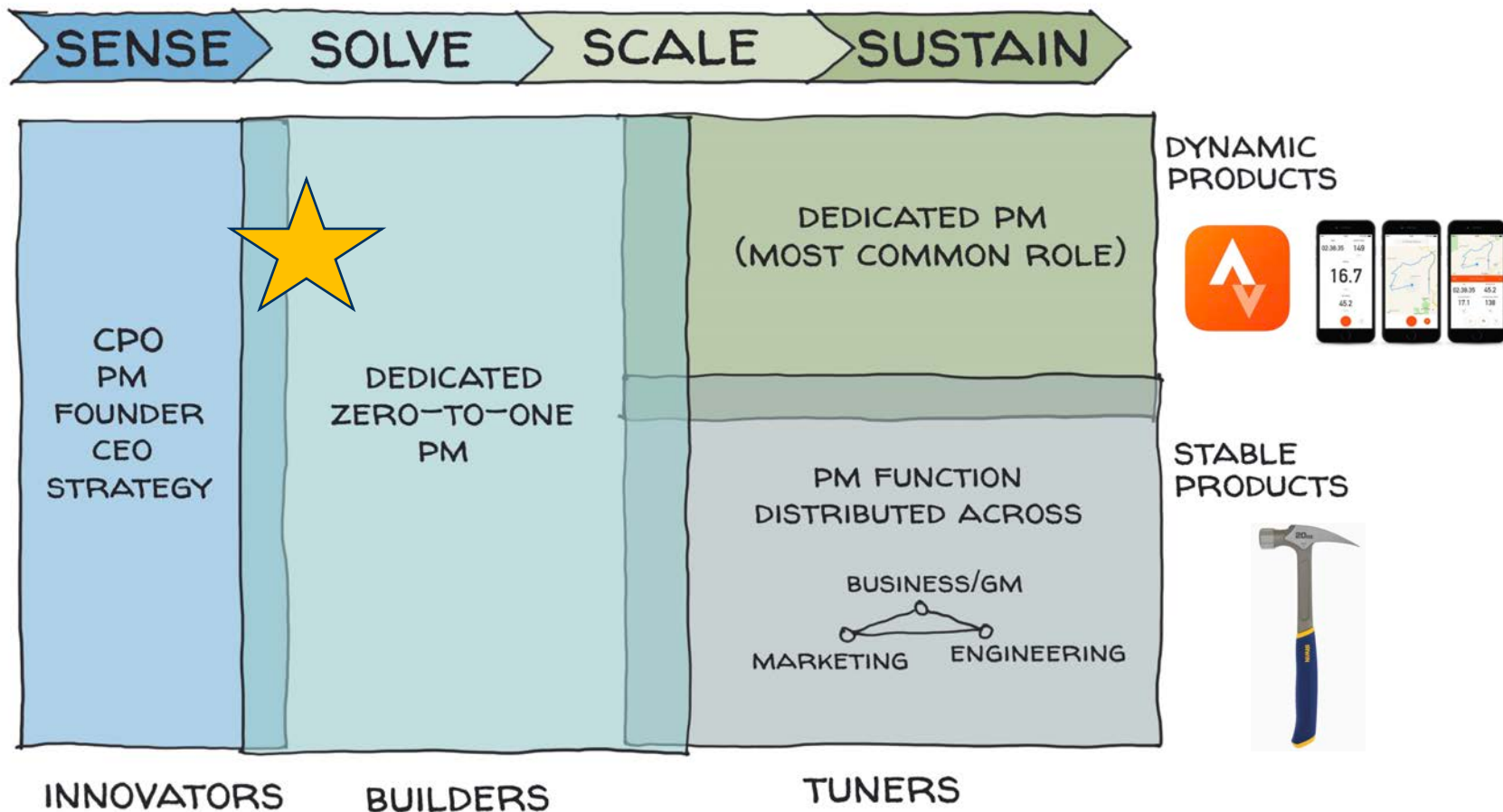


# **General Magic & H3 Product Innovation (+ Adventures in Personal Transportation)**

Professor Karl T. Ulrich

@ktulrich | ktulrich.com | ulrich@wharton.upenn.edu

# PM in Context



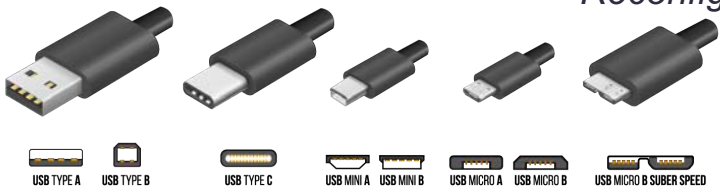
# How to Categorize Product Innovation?



*Google Glass*

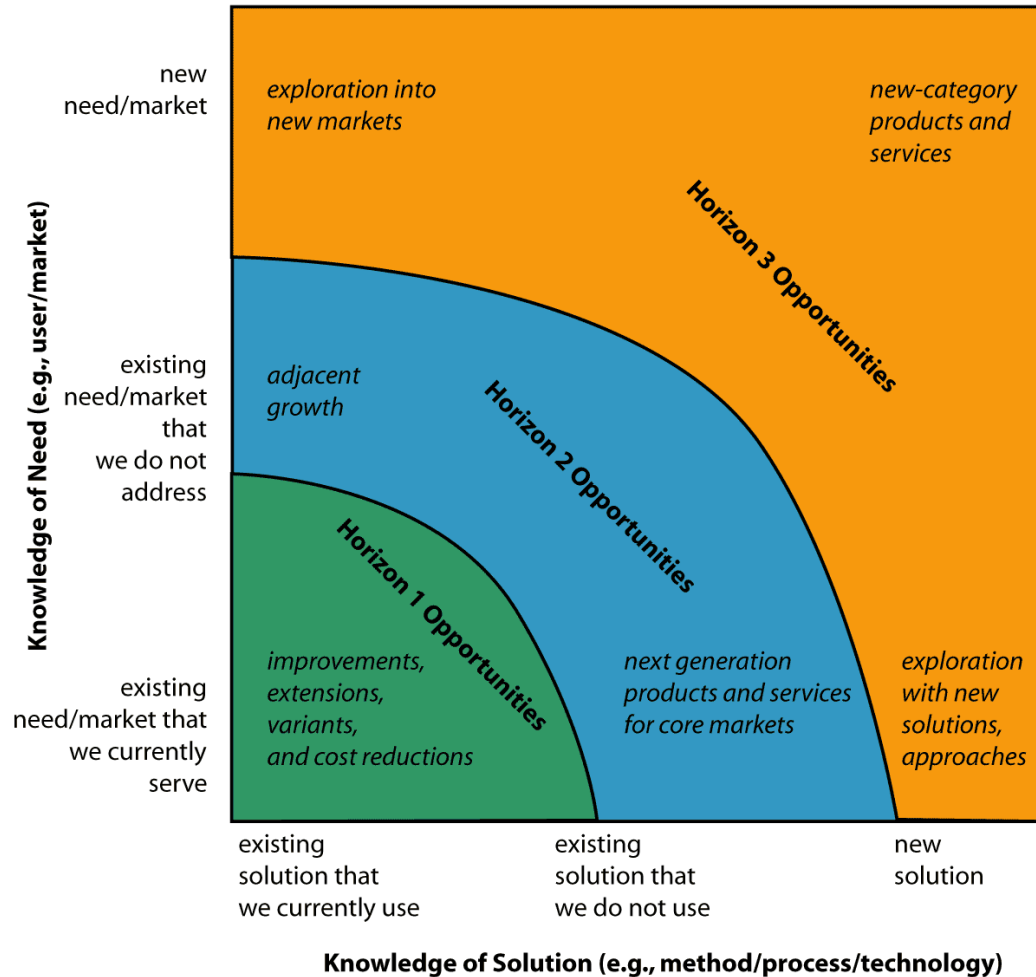


*Reconfigurable, modular mobile device*



**USB A → USB C**

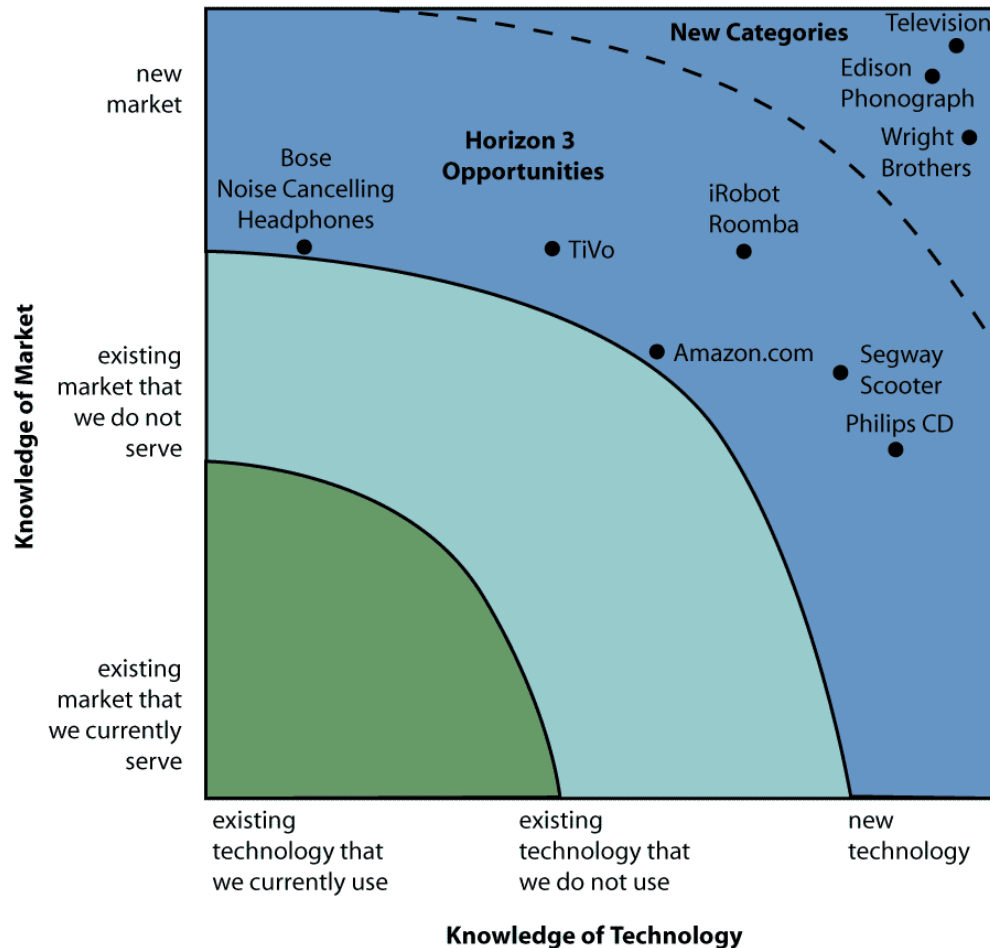
# Three Categories (From Perspective of Existing Firm)



**Source:**  
Terwiesch and Ulrich,  
*Innovation Tournaments.*



# New Categories are Usually Established by New Entrants



*Playing out now:*

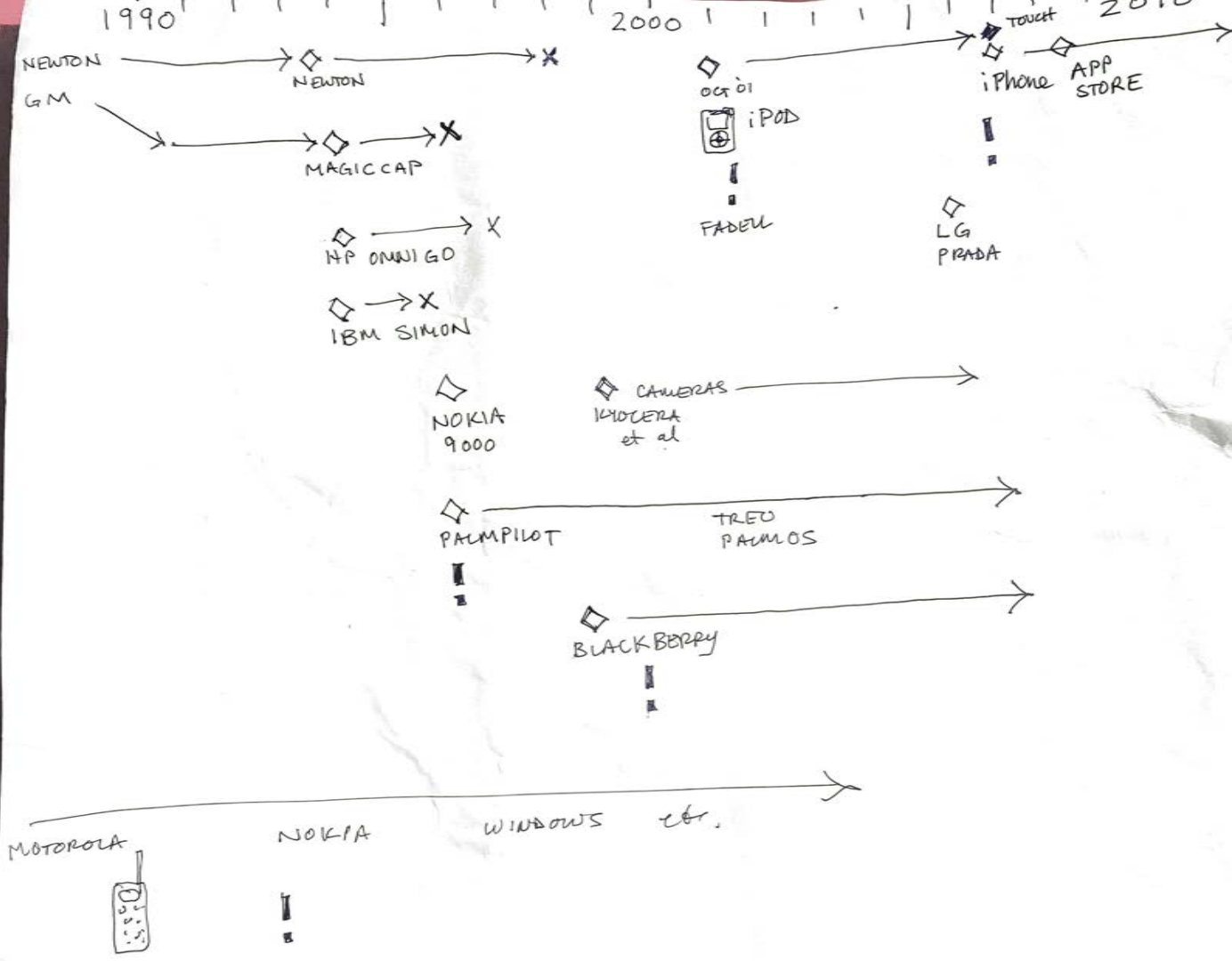
Transportation services  
Quantified self  
mRNA vaccines  
Alternative protein  
Personal robots  
Personal transport  
Flying cars  
Cryptocurrency  
Web3  
Autonomous vehicles  
Wearable computing  
AR/VR

**Source:**  
Terwiesch and Ulrich,  
*Innovation Tournaments*.

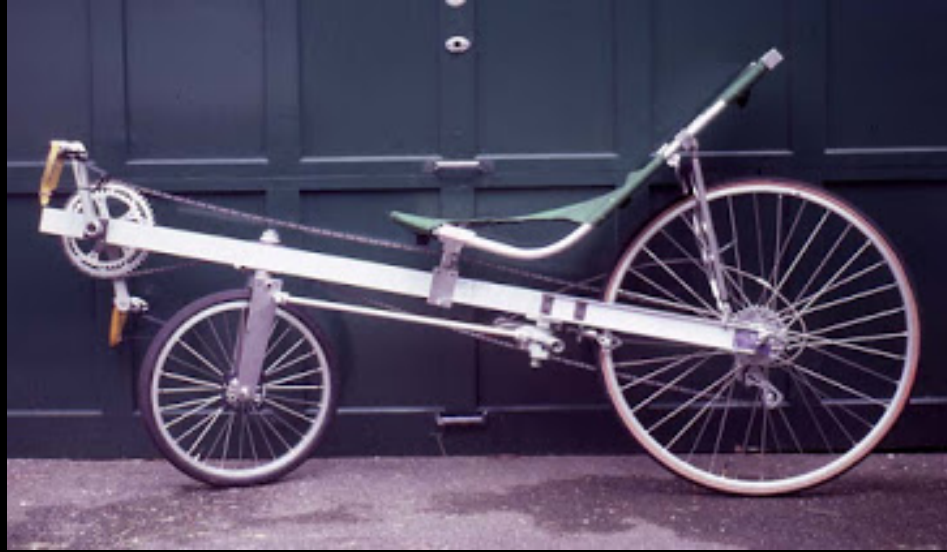
## General Magic Case – Discussion Questions

1. What did GM do well?
2. Retrospectively, what might GM have done to increase its chances of success?
3. What are lessons learned from GM for any project?
4. What are lessons learned from GM for H3 product innovation?
5. Could GM have succeeded?

<https://en.wikipedia.org/wiki/Smartphone>



## **Horizon 3 Product Innovation as New Entrant**



c1987

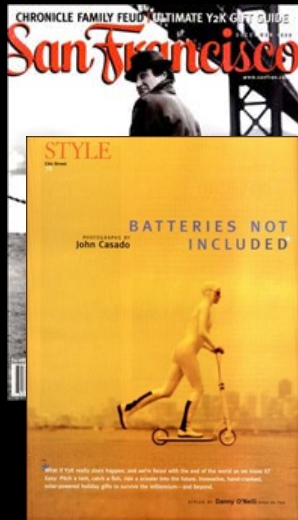
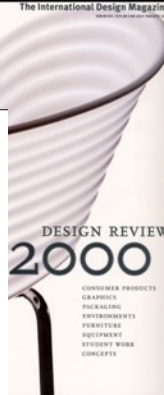


c1995



Xootr kick scooter  
1999 - present





**Ours**



**Theirs**



**Joy**



**Toy**

***www.xootr.com***

Nova Cruz Products LLC

***info@novacruz.com***

***1 888 353 4464***



# My Efforts to Create Personal Electric Vehicles 2000-2003



<https://www.electricbike.com/scooter-graveyard/>



c2000-2001



\$80 mm investment by Kleiner-Perkins, CSFB

Specifications:

- 12.5 mph
  - 80 lbs
  - 11 miles range
  - \$9000
- (consumer version \$4950)

Original volume projections:  
40,000 units/month by end of 2002.

"I would stake my reputation, my money and my time on the fact that 10 years from now, this will be the way many people in many places get around. If all we end up with are a few billion-dollar niche markets, that would be a disappointment. It's not like our goal was just to put the golf-cart industry out of business"

– Dean Kamen







**Photo:** Jesse Follow

## Personal Transportation Robot

[Watch the video](#) 





[Click to open expanded view](#)

## Segway miniPRO | Smart Self Balancing Personal Transporter with Mobile App Control

by [Segway](#)[455 customer reviews](#)[427 answered questions](#)List Price: ~~\$1,299.00~~Price: **\$798.00** **FREE Shipping** for Prime members [Details ▾](#)You Save: **\$501.00 (39%)****In Stock.**Sold by [Segway Distribution - North America](#) and [Fulfilled by Amazon](#).Color: **Black****\$798.00**[Prime](#) (4-5 days)**\$798.00**[Prime](#) (4-5 days)

- Connect to the free mobile app via Bluetooth for full features: remote control operation, anti-theft alarm, speed control, customizable lights, vehicle diagnostics, and firmware updates
- UL 2272 Certified unit meets high standards of fire and electrical safety set by world-renowned global safety science company Underwriters Laboratories
- 220 lbs payload, light-weight, and durable aircraft-grade magnesium alloy frame and 10.5-Inch pneumatic air-filled tires with military-grade shock absorption capability
- Dual motor engine delivers 1600 watts of power to safely reach top speeds of 10 MPH and distances of 14 miles on a full charge in a variety of indoor and outdoor terrains.
- Padded knee bar maximizes comfort and enables precision steering for more ergonomic control than hoverboards and electric scooters that rely on foot-pivot steering



Slow and steady growth, refinement of product, generation of cash...for 23 years.



Fast, rugged, and assembled by hand in OLD FORGE, PA

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Xootr is rated Excellent ★★★★★ Reseller Rating 9.9/10 | 65 Reviews ResellerRatings







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Invest with proven angels

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ACCESS	Per lead
DEAL SELECTION	You
NUMBER OF DEALS	Deal-by-deal
MINIMUM	\$1,000

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Diversification like an Index Fund

[View Details](#)

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ACCESS	Broad
DEAL SELECTION	AngelList
NUMBER OF DEALS	150-200
MINIMUM	\$100K

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Personal support and broad access

[Request Access](#)

Work with your personal AngelList representative. For family offices, institutions and active investors.

ACCESS	Per Deal
DEAL SELECTION	AngelList + You
NUMBER OF DEALS	10-30/Month
MINIMUM	\$500K/Year



c2013



**Ryan Rzepecki** <[ryan@socialbicycles.com](mailto:ryan@socialbicycles.com)>

SoBi Team

Saturday, August 8, 2015 at 7:37 PM

[Show Details](#)

## Finance

We worked with SOS Ventures for more bridge financing. SOSv has put in \$600k and financials will be circulated next week and we are hoping for another \$200k from exit.

This funding was needed almost entirely because of non-payment by CycleHop for O (struggling to pay down the balance. The challenge is that CycleHop has also brought West Hollywood), so it is difficult to take extreme action.

We've taken the following approach on the account:

- We drafted a security interest in the equipment to protect our position.
- We quit bidding with CycleHop on new projects until the debt is paid.
- We reduced the time spent servicing his account and refused to provide new goods.

We have some hope in the situation as he will be paid \$100k/month by Santa Monica capital in the Phoenix market (\$1.5M this fall). It is possible he secures sponsorship or we have had to capitalize our business in the event he fails to pay, and need to be prepared.

This is an extremely difficult situation. We took a chance on these early markets to be projects allowed us to win other larger paid opportunities and establish credibility in over the assets in a way that doesn't disrupt the progress being made in the LA market.

We have booked over \$2M to date and expect a strong close to the year that would cover payments on the balance.

Our hope is to complete a Series A financing in the next 4-8 months that will give us

## Summary

We have some great data, positive press, and an expanding pipeline. At the same time, we need a loan to hit our 2015 milestones. We must continue to deliver our projects and have





**IF A City Has Many Cyclists  
IT Must Be A Liveable City**

胡玮炜

January 2015 – Mobike founded in China



June 2016 - Shanghai





March 2017





September 2017









# China's Biggest Food Delivery App Buys China's Biggest On-Demand Bike Service

Part of the daily SupChina newsletter. Subscribe for free

👤 LUCAS NIEWENHUIS 🕒 APRIL 4, 2018 💬 0



April 2018 ~\$2.7B USD

Meanwhile in San Francisco...







March 2017



August 2017

AARIAN MARSHALL TRANSPORTATION 04.09.18 09:30 AM

SHARE



19



# UBER ACQUIRES THE BIKE-SHARE COMPANY JUMP









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# Lime partners with Segway to build electric scooters



Megan Rose Dickey @meganrosedickey / 7 months ago



Comment





# Lime closes acquisition of Jump assets in Europe as Jump bikes and scooters disappear

Romain Dillet @romaindillet / 10:11 am PD



## Uber is scrapping tens of thousands of Jump bikes during a nationwide bike shortage

*The scrap job comes at a time when many people are looking for alternate forms of transportation*

By Andrew J. Hawkins | @andyjayhawk | May 27, 2020, 3:31pm EDT

f t SHARE



Lime relaunched “JUMP” bikes in 2021/2022, with initial focus on Europe.





Lyft launches e-bikes  
May 2022 (NYC)  
(its own design)





20 years later...

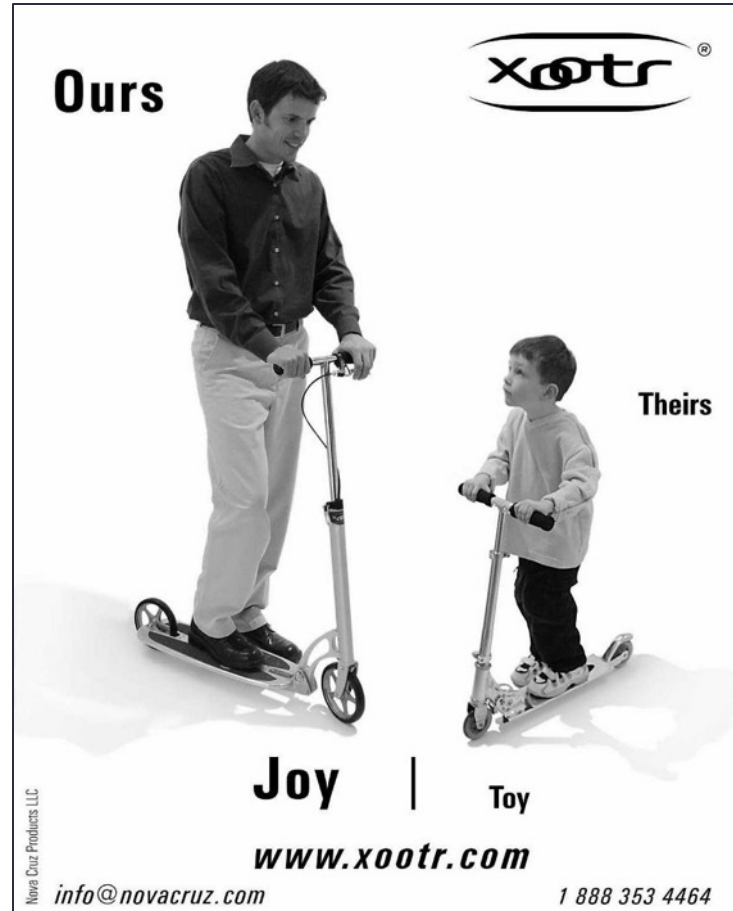
Delfast electric  
motorbike adopted by  
Ukrainian military  
(May 2022)

*Source: Twitter*





# 1. Luck (Exogenous Factors) is a Key Determinant of Success





## 2. Sometimes it's the Business Model and the Enabling Tech (not the core product tech)



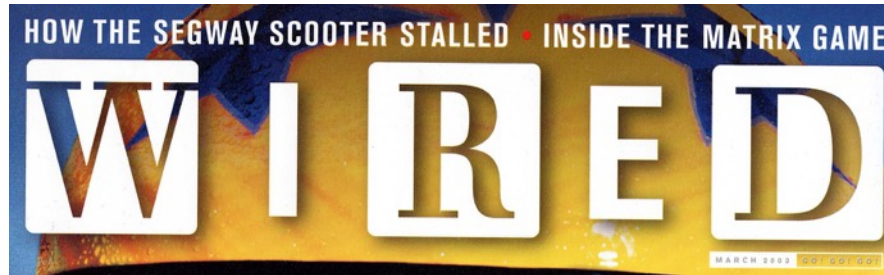


### 3. Forecasts of New-Category Ventures Often Wildly Optimistic

Original volume projections:  
40,000 units/month by end of 2002.

“I would stake my reputation, my money and my time on the fact that 10 years from now, this will be the way many people in many places get around. If all we end up with are a few billion-dollar niche markets, that would be a disappointment. It’s not like our goal was just to put the golf-cart industry out of business.”

– Dean Kamen



## 4. Diffusion in New Categories Takes a Really Long Time



**5. If there is a benefit proposition, consumers will eventually get over “looks weird.”**



*and if not?*





# 6. The Emperor Sometimes Has no Clothes (especially in Silicon Valley)

Key discipline:

- What is the job to be done?
- Does the solution do the job?
- Does the company possess the alpha assets to prevail competitively?

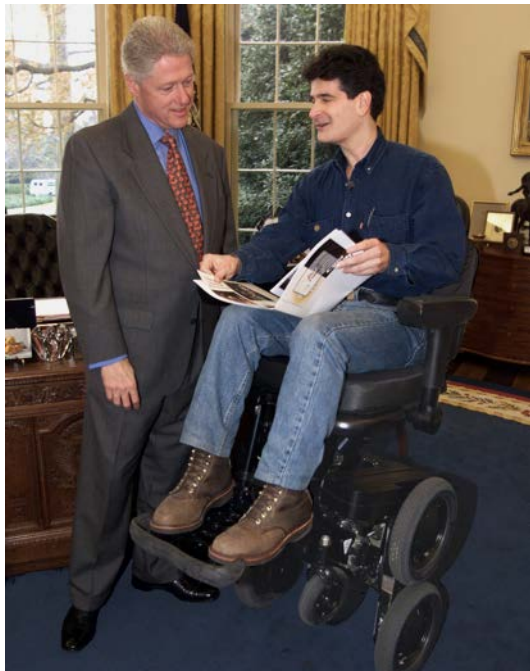
NO MERCY/NO MALICE

WeWTF

August 16, 2019



Scott Galloway @profgalloway



## 7. Sometimes new venture success is about staying alive long enough for something random and good to happen to you.

TECHNOLOGY | Uber to Buy Jump, Maker of Electric Bicycles, After Bike-Sharing Test

# *Uber to Buy Jump, Maker of Electric Bicycles, After Bike-Sharing Test*

By DAISUKE WAKABAYASHI APRIL 9, 2018



**RELATED COVERAGE**



One Surprise Standout for Uber: Food Delivery SEPT. 23, 2017



Uber's New Training Wheels: Testing Bike Sharing in San Francisco JAN. 31, 2018



Southeast Asia's Ride-Hailing War Is Being Waged on Motorbikes DEC. 8, 2017

**8. Your odds of success in H3 innovation are very low. Make sure you have intrinsic motivations.**





# If you must try H3

- a. (Remember, this is a bad idea unless intrinsically motivated.)
  - Odds of success almost certainly <25%
  - Many products you think of as H3 were really H2.
    - Tesla Model S
    - iPhone
- b. MVP
  - If possible, start with high-need, high-willingness-to-pay customer (e.g., Tesla Roadster 2008)
  - Avoid categories that require massive investment before first trial (e.g., Iridium)
- c. Iterative refinement over many product lifecycles
- d. Honest and hard-nosed analysis of feasibility (e.g., Boom Supersonic)
- e. Share financial risk with partners (e.g., SpaceX, Boom)



PalmPilot 1997

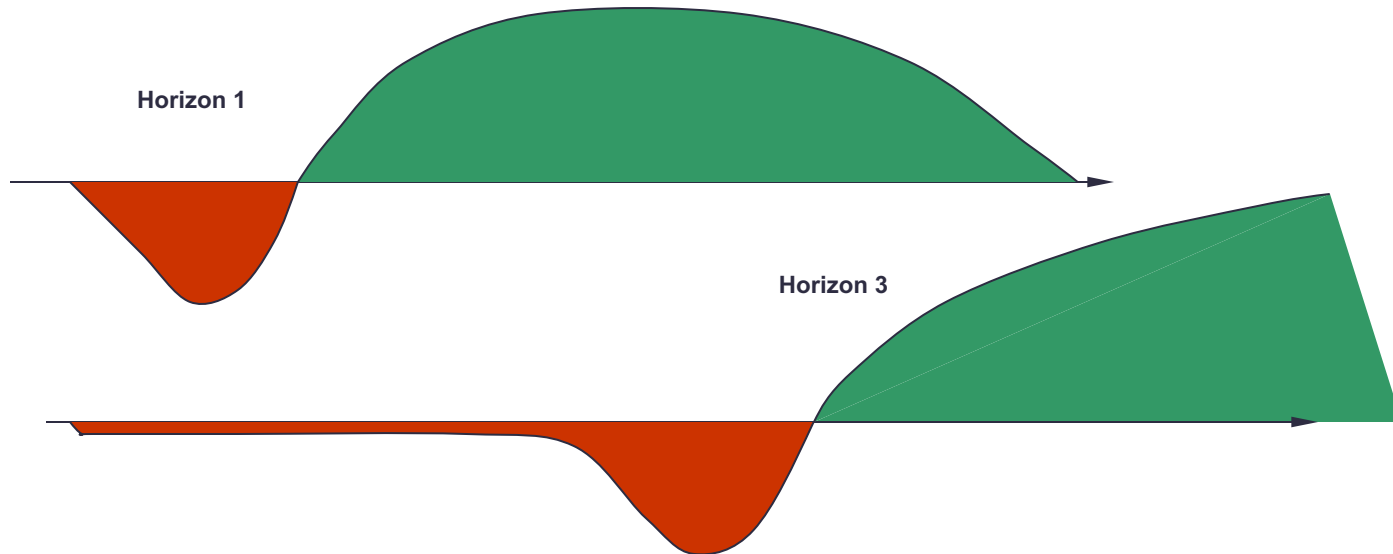
Boom Supersonic



## **Horizon 3 Product Innovation as Incumbent Firm**

# Two Common Arguments for Long-Term (e.g., Horizon 3) Investment

1. Long-term innovation opportunities may be exceptionally valuable, even on a risk-adjusted basis. They can be great investments, even if their value can not be easily quantified.
2. Long-term innovation opportunities are the future. Investments in long-term opportunities lay the groundwork for future sources of growth. If we don't invest for the future, we are “eating our seed corn.”



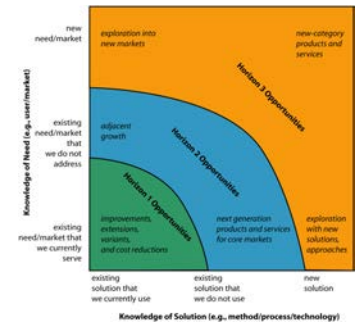
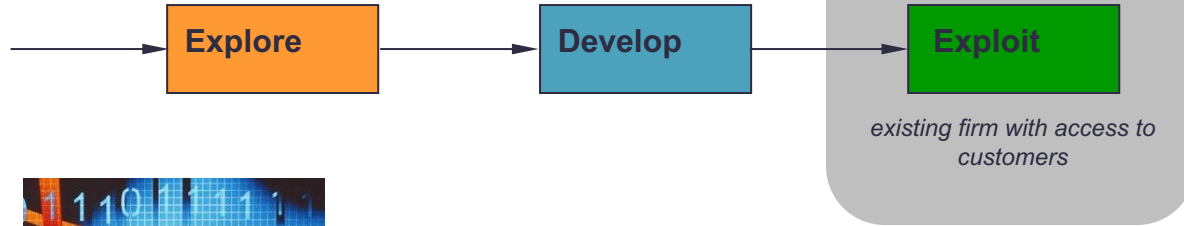


# “Supply Chain” Mental Model of Future Products

Horizon 3 opportunities

Horizon 2 opportunities

Horizon 1 opportunities



# The iPod is created from standard components and iTunes is an acquisition.



October 2001



Personal Jukebox  
PJB-100  
Compaq and Hango Electronics  
c1998



- Toshiba offhandedly shows Jon Rubenstein a 1.8 inch hard drive, which Rubenstein recognizes as the key to a small MP3 "jukebox."
- Tony Fadell develops first iPod hardware in about 9 months.
- iTunes is based on an acquisition of SoundJam MP in 2000.



An early prototype of the iPod created by Tony Fadell.

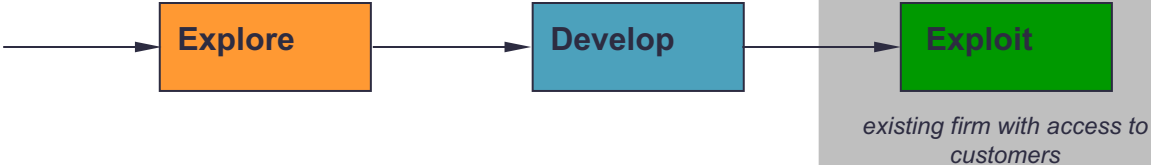


# Alternatives to investing in Far-Horizon Opportunities

Horizon 3 opportunities

Horizon 2 opportunities

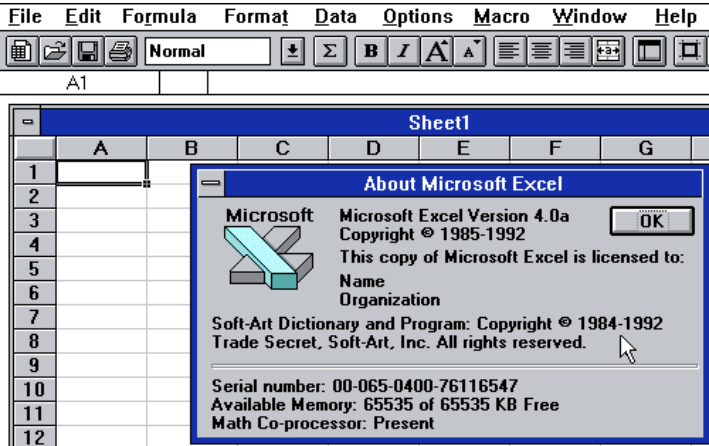
Horizon 1 opportunities



Wait and follow.

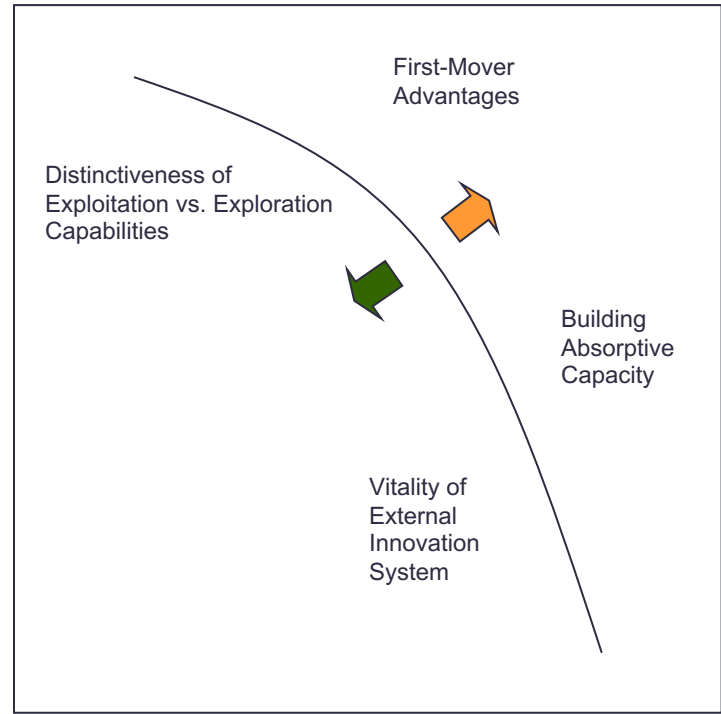
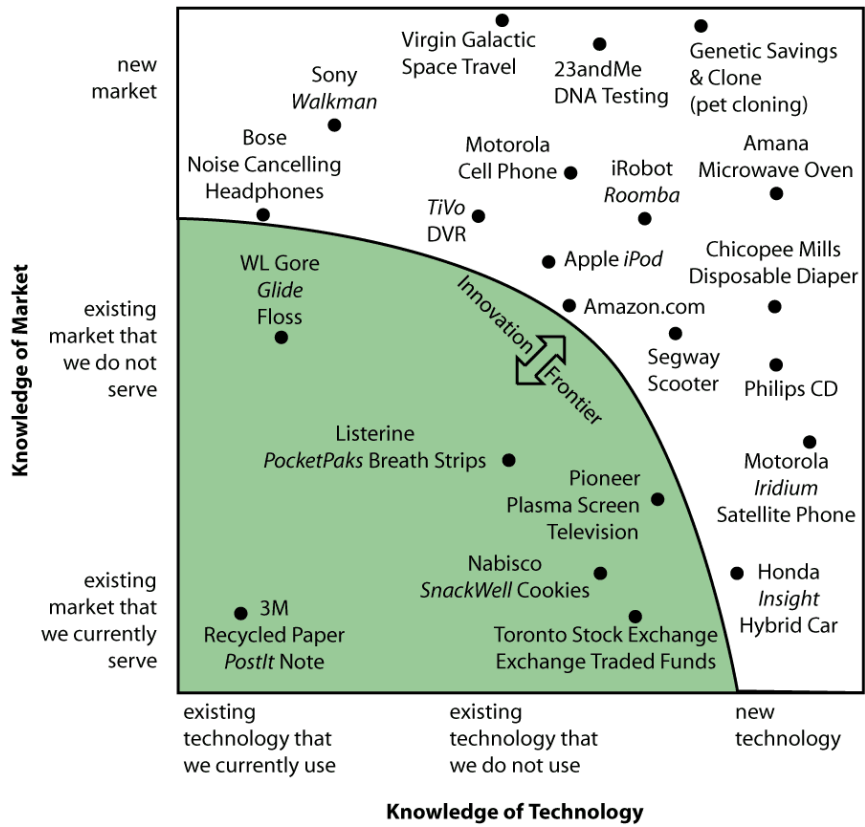
Acquire late-stage opportunities.

IP only.  
Entire organization.



# How far out should incumbents explore?

## Four Potential Forces on the Innovation Frontier



~~1. First Mover (Advantage)~~ We know being first *in new categories* does not improve chances of success





<b>Innovation</b>	<b>Early Commercial Attempts (year)</b>	<b>First Mainstream Product (year)</b>	<b>Leader(s) During Peak Growth Period (year)</b>
<b>Cable television</b>	Panther Valley Cable TV, Service Electric Cable TV 1948	Cox, Westinghouse, Teleprompter ~1960	Comcast, Time Warner, Cox, TCI, Cablevision, MediaOne ~1985
<b>Compact fluorescent light bulb</b>	Philips, Westinghouse ~1980	Philips, Westinghouse, GE ~1985	Philips, GE, Westinghouse, N:Vision, Sylvania ~1990
<b>Disposable diapers</b>	PauliStrom 1942	Chicopee Mills (J&J) 1949	Procter & Gamble, Kimberly Clark 1961
<b>Microwave oven</b>	Raytheon 1947	Amana (Raytheon) 1967	Litton ~1970
<b>Mobile telephone</b>	Motorola 1973	Motorola 1983	Nokia, Motorola ~1991
<b>Mutual fund</b>	Massachusetts Investors Trust 1924	Fidelity Fund 1928	Vanguard Group Fidelity Investments 1977
<b>Personal computer</b>	MITS Altair 1975	Apple II 1977	IBM PC 1985
<b>Search engine</b>	Lycos 1994	Excite, AltaVista, Yahoo! 1995	Google, 1998 Yahoo!, Microsoft, 2004
<b>Television</b>	Telefunken, 1934 Dumont, 1938	RCA 1948	Magnavox, Zenith, Philips ~1960
<b>Video cassette recorder</b>	Ampex 1956	Sony 1971	Matsushita 1976

**Source:**  
Terwiesch and Ulrich,  
*Innovation Tournaments.*

# Current Example: Commercial Drones

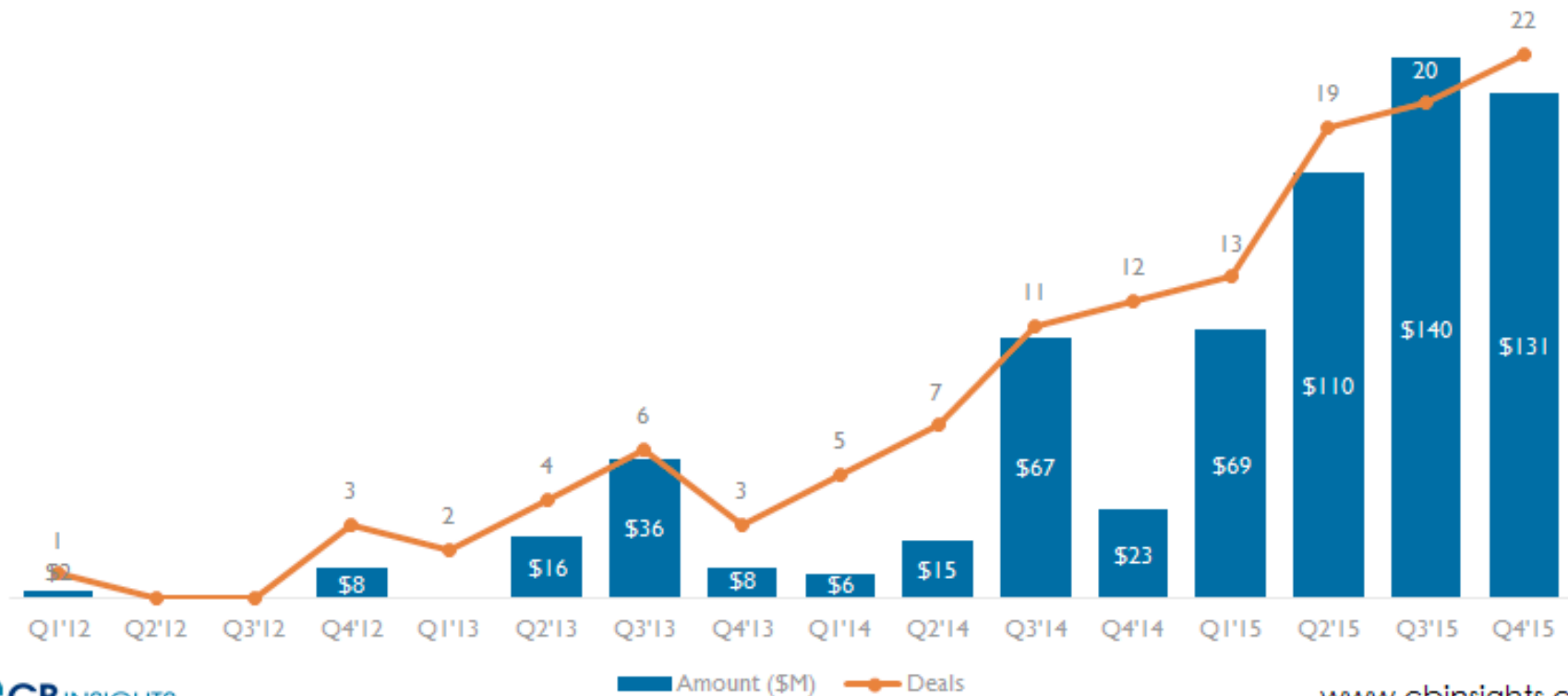


Source: [Wikimedia Commons](#)

[Music Demo Only](#)

[TED Talk \(Drones\) – Vijay Kumar](#)

## Drone Investment Activity Q1'12 - Q4'15





A collage of logos for various drone manufacturers and brands. The logos are arranged in a grid-like fashion. Brands visible include AEE, Futaba, Autel (ROBOTIC-8), Horizon, Bion Drone, Cheerson, Gormatec, Ehang, Dji, Ubsan, Dragonfly, Flypro (CANFLY), Flyingwings, Imrc, Hexo+, North America, Drones, Jtt (The leader of UAV), Guav, Ideafly, Lumenier, Mikado (Model Technology), Rite Wing, Syma, Walkera, Wltoys, and Parrot. There is also a logo for 'mi' in a red square at the bottom right.

A collage of logos for various defense and aerospace companies, including Aerion, CyPhy, Aerosonde, Arcturus UAV, Falcon Unmanned, Drone Aviation Corp, Guided Systems Technologies Inc., Raytheon, Insitu, Martin UAV, and UMS Skeldar.

A collage of logos for various drone-related companies and organizations, including Aerix, Airnamics, Alliance LP Drones Ltd., Birdseyeview, Bluejay, DreamQII, Flybi, Fotokite, Nightingale, Queen B Robotics, Lily, Roame, Skye, Sunlight, Vantage Robotics, Wingtra, and others.

## 2. Distinctiveness of Exploitation and Exploration Capabilities



It's not just that the capabilities can be distinct, but worse, what makes you good at exploitation may make you bad at exploration.

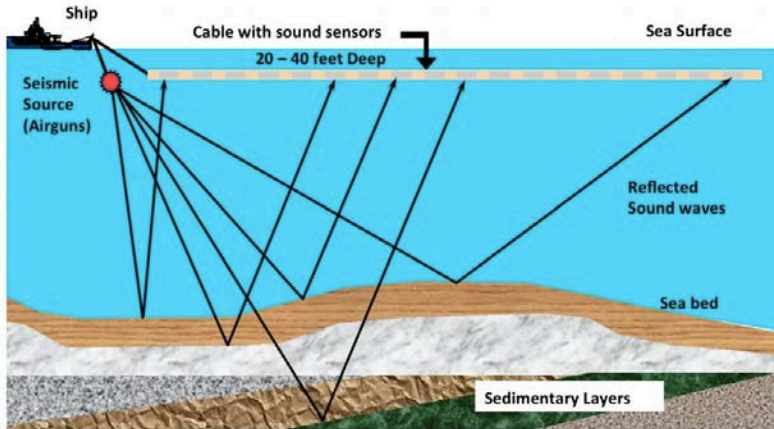


# Exploration vs. Exploitation

James March (1991) defined organizational concept of *exploration* and *exploitation*.

*Exploration:*

Where is the next oil well location?



*Exploitation:*

How do we best extract and refine the oil?





RepRap founded c2009 – becomes Makerbot



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## HP Creates Entire 3D Printing Unit & Appoints New Executives Prior to Company's Split

BY SCOTT J GRUNEWALD · SEPTEMBER 3, 2015

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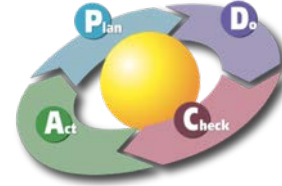
tumblr.

191



Hewlett-Packard has been threatening, I mean hinting, that they were going to be jumping into the commercial 3D printing market in a big way for well over a year now, but they aren't hinting anymore. Last month Hewlett-Packard CEO Meg Whitman announced that they would be officially splitting the company into two separate businesses on November 1st. Hewlett-Packard Enterprise would focus entirely on their server, data center technology and business consulting while HP Inc. would try to turn the rapidly declining printer and personal computer portion of the business around. Whitman would continue to run Hewlett-Packard Enterprise while Dion Weisler would remain in charge of the side

# Transition in Importance of Categories of Alpha Assets



SOLUTION

$\alpha$

PROCESS

BRAND

CUSTOMER NETWORK

ORGANIZATIONAL PROCESSES

SCALE

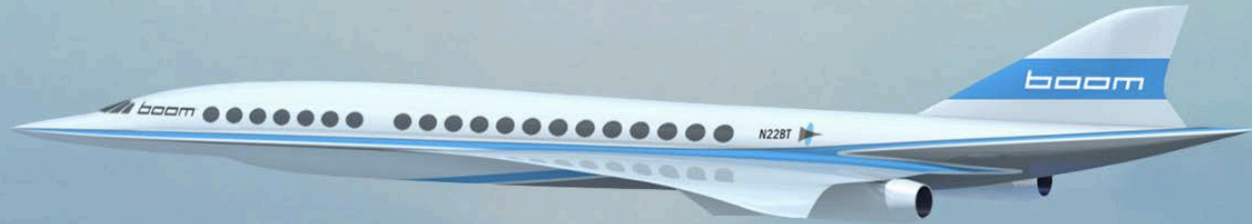
CULTURE

### 3. Vitality of the External Innovation Ecosystem



In soft drinks, what is the barrier to innovative activity by small companies and individuals?  
What about in commercial airframes?



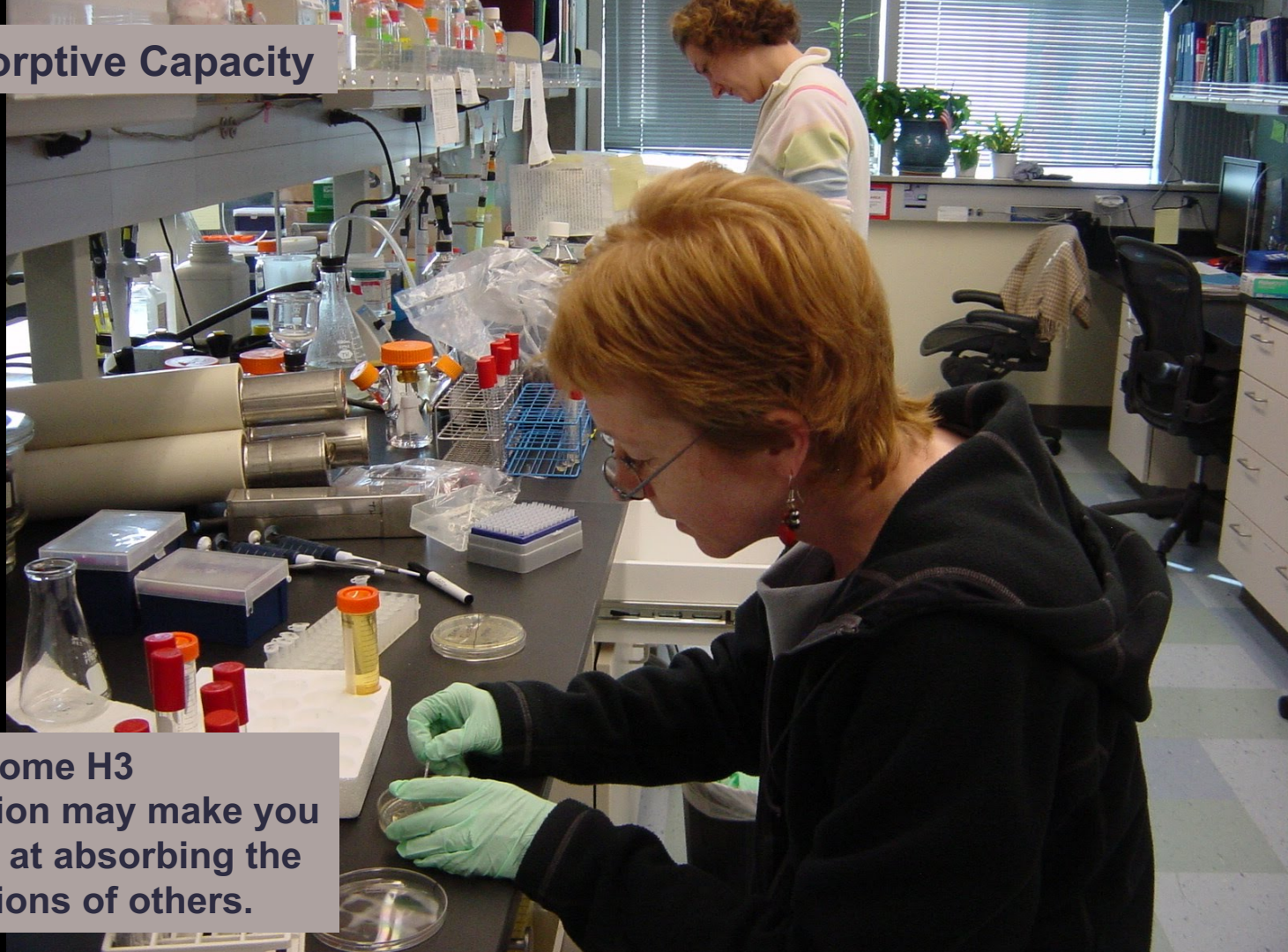


# THE FASTEST PASSENGER AIRPLANE EVER

We're making supersonic travel a reality.



## 4. Absorptive Capacity



Doing some H3 innovation may make you smarter at absorbing the innovations of others.

# Corporate Venturing – Absorptive Capacity?

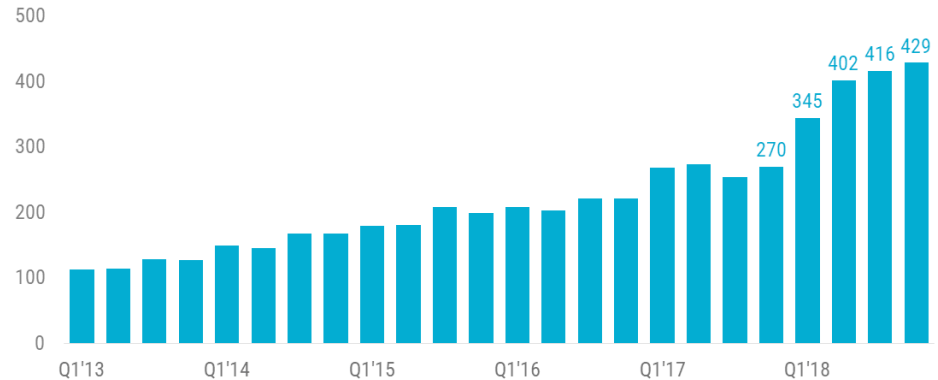
Intel Capital	Roche Venture Fund
Google Ventures	Nokia Growth Partners
Salesforce Ventures	SMBC Venture Capital
Comcast Ventures	Citi Ventures
Qualcomm Ventures	Novartis Venture Funds
Cisco Investments	MAIF Avenir
GE Ventures	WuXi Venture Fund
Bloomberg Beta	Lilly Asia Ventures
Samsung Ventures	NTT DoCoMo Ventures
Microsoft Ventures	American Express Ventures
CyberAgent Ventures	Bertelsmann Digital Media Investments
Johnson & Johnson Innovation	Robert Bosch Venture Capital
Pfizer Venture Investments	Fosun Kinzon Capital
SBI Investment	Orange Digital Ventures
Slack Fund	Boehringer Ingelheim Venture Fund
Siemens Venture Capital	capitalG
AXA Strategic Ventures	Santander InnoVentures
Ping An Ventures	BlueCross BlueShield Venture Partners
Swisscom Ventures	Hearst Ventures
In-Q-Tel	Alexa Fund
Telstra Ventures	YJ Capital
Brand Capital	AbbVie Biotech Ventures
Verizon Ventures	Nissay Capital
SR One	Legend Capital
Legend Capital	Novo Ventures

50 Most Active Corporate VCs Globally (2016) out of total of 204 corporate venture funds that were active in 2016.

**Source:** CB Insights

## More CVCs invested in 2018 than ever before

Number of active Corporate Venture Capital arms. Q1'13 – Q4'18



CBINSIGHTS Source: cbinsights.com

<https://www.cbinsights.com/research/corporate-venture-capital/>





~~First Mover~~  
Advantages

*Any specific company chooses its own frontier, hopefully based on the key drivers.*

Distinctiveness of  
Exploitation vs. Exploration  
Capabilities

Building  
Absorptive  
Capacity

Vitality of  
External  
Innovation  
System





