

Technology Strategy (MGMT 731)

Karl T. Ulrich

Session 3:

Industry Dynamics

Timing of Entry

Definition of technology

Roles relative to technology

What is a technology strategy?

Incremental vs. radical innovations / H1, H2, H3 innovation

S-curves

Technology push and market pull

Drivers of diffusion rates

Rogers' categories of adoption / "crossing the chasm"

Industry patterns of entry/exit and the "dominant design"

Competence-enhancing vs. competence-destroying technologies

Disruption of incumbents - disruption from below and the "innovator's dilemma."

Drivers of value capture - appropriability and complementary assets

Patents as mechanism for appropriation

Standards as mechanism for appropriation

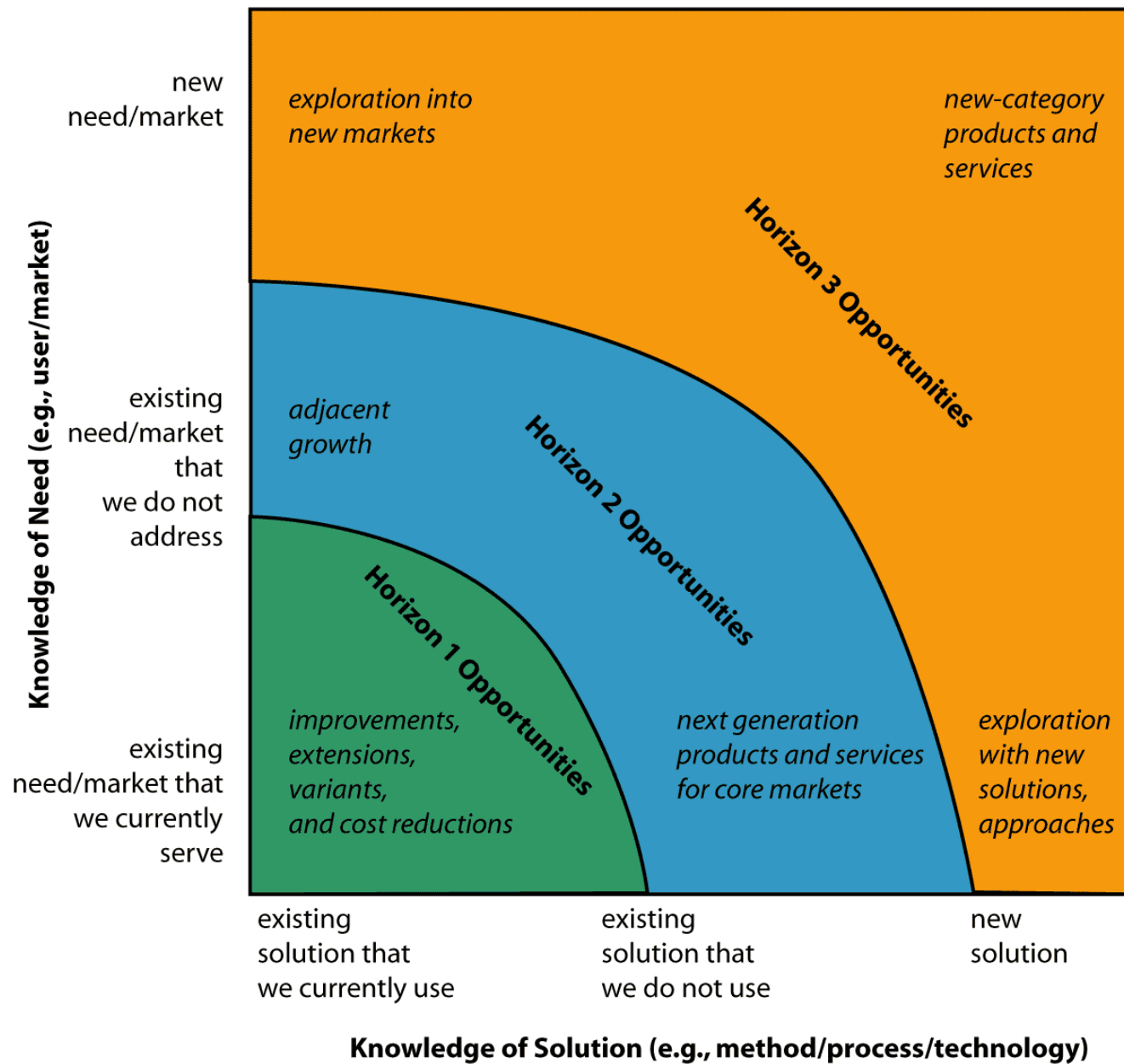
Timing of entry, first mover "advantage"

Open innovation, open tournaments

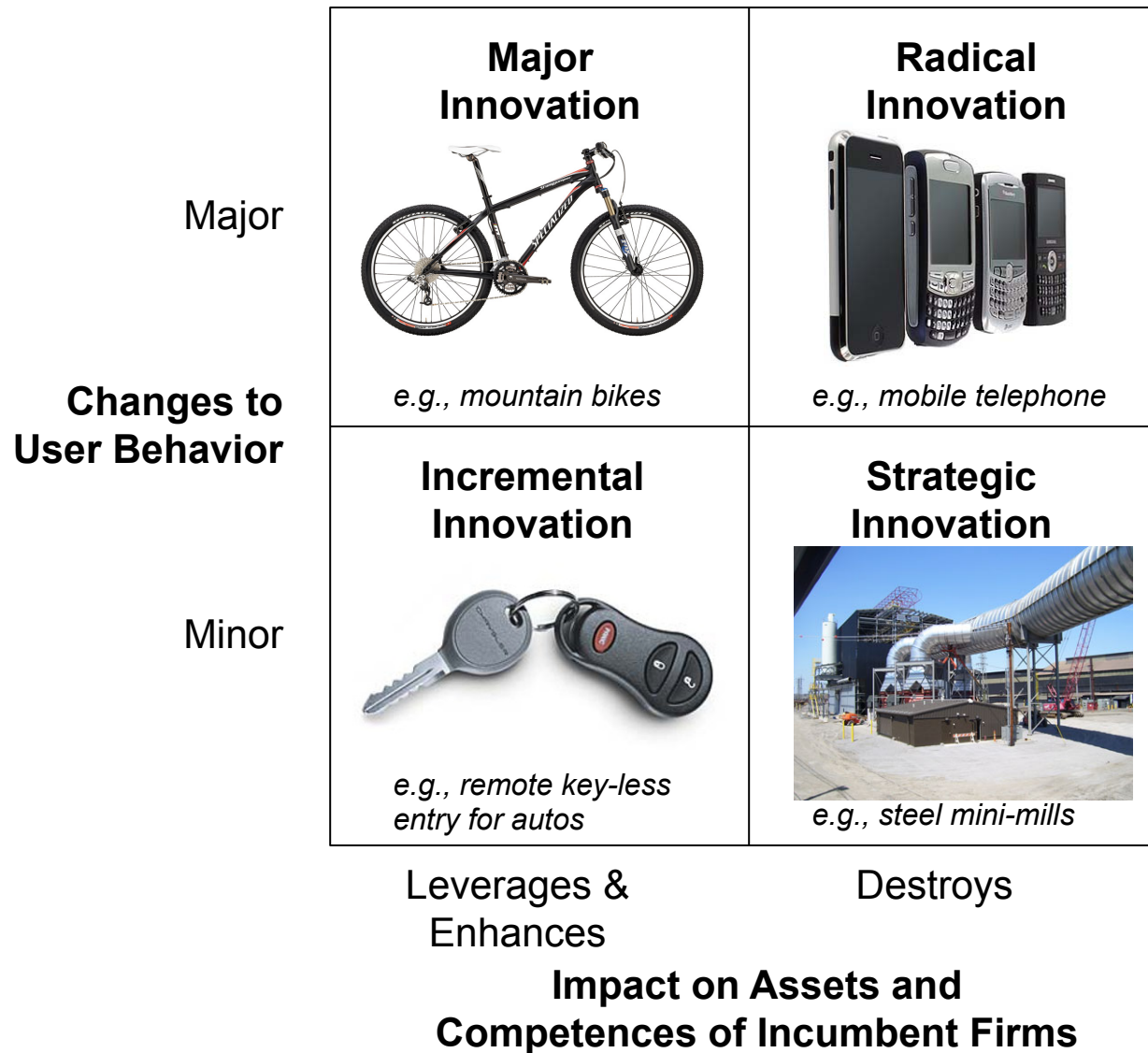
Make-buy decisions in innovation, establishing an innovation frontier

Technology ecosystems

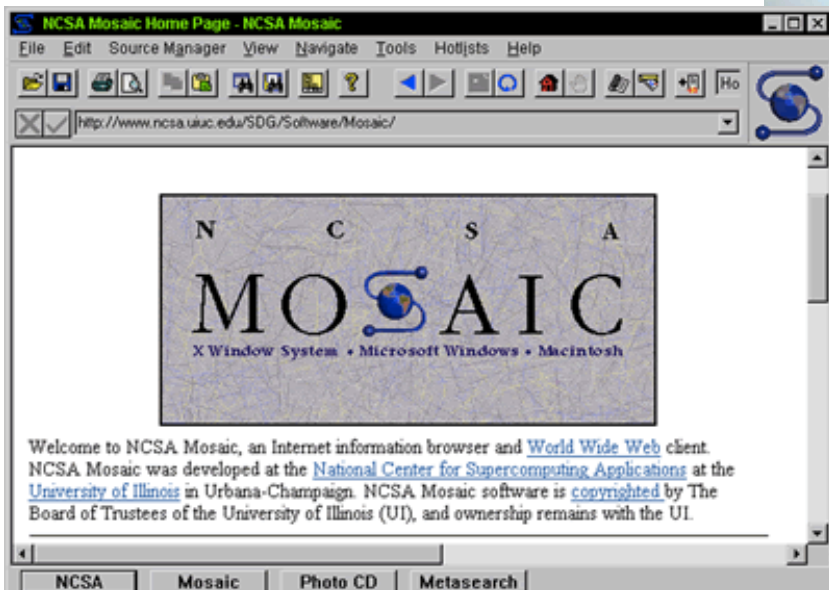
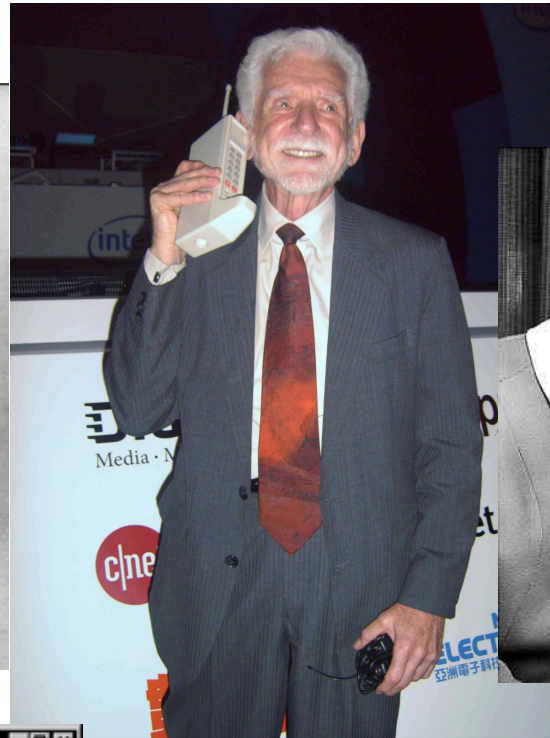
Technology and society



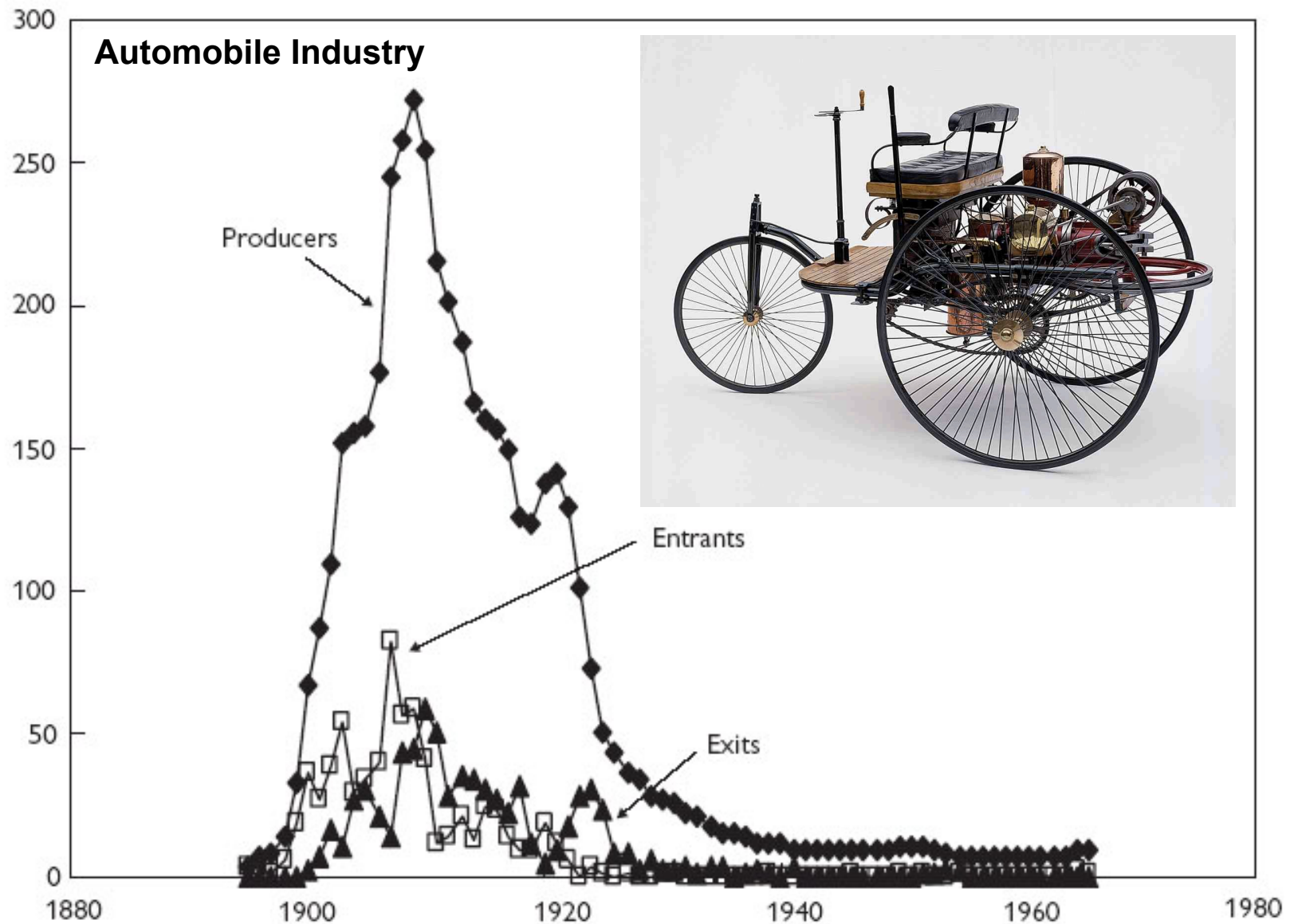
Categorizing Technology in terms of Users and Incumbents



New Categories | New Industries | Radical Innovation

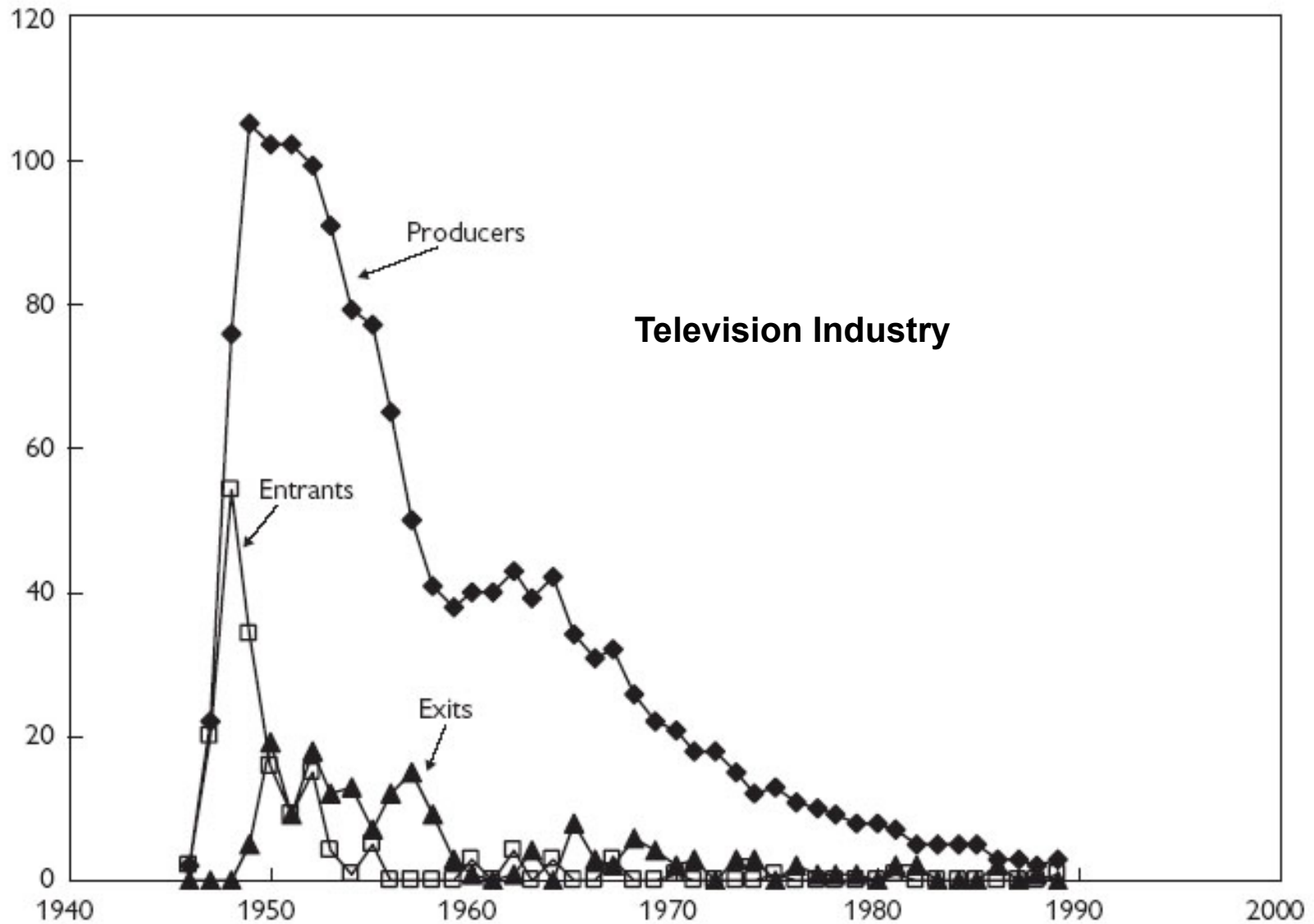


Industry Dynamics (e.g., Entry and Exit)

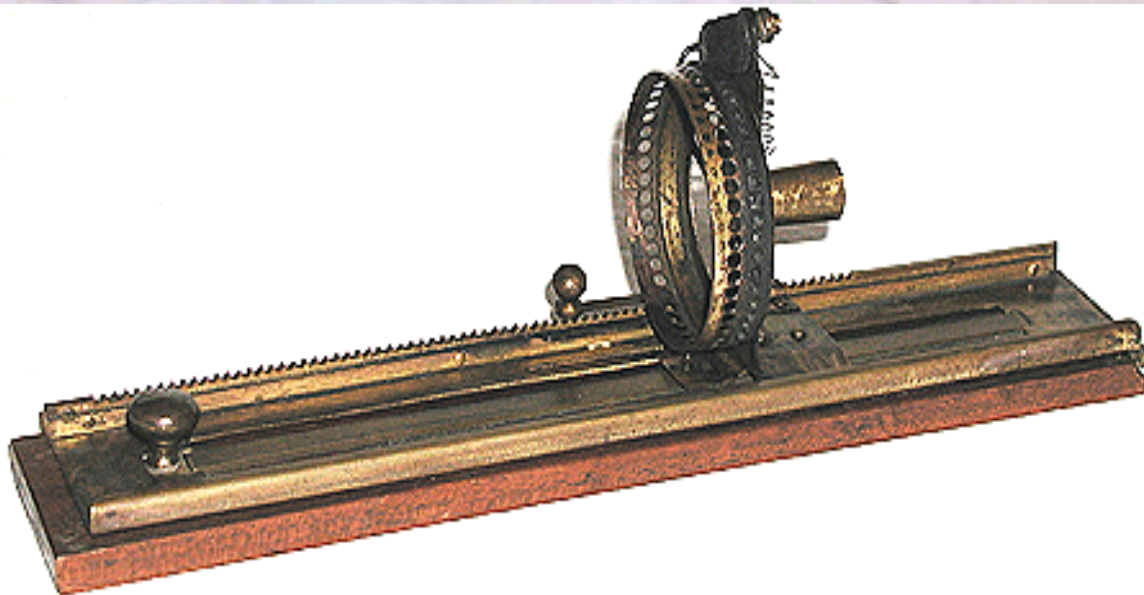


Source: Steven Klepper, "The Evolution of Geographic Structure in New Industries," *Revue de l'OFCE* 5/2006 (no 97 bis), p. 135-158.

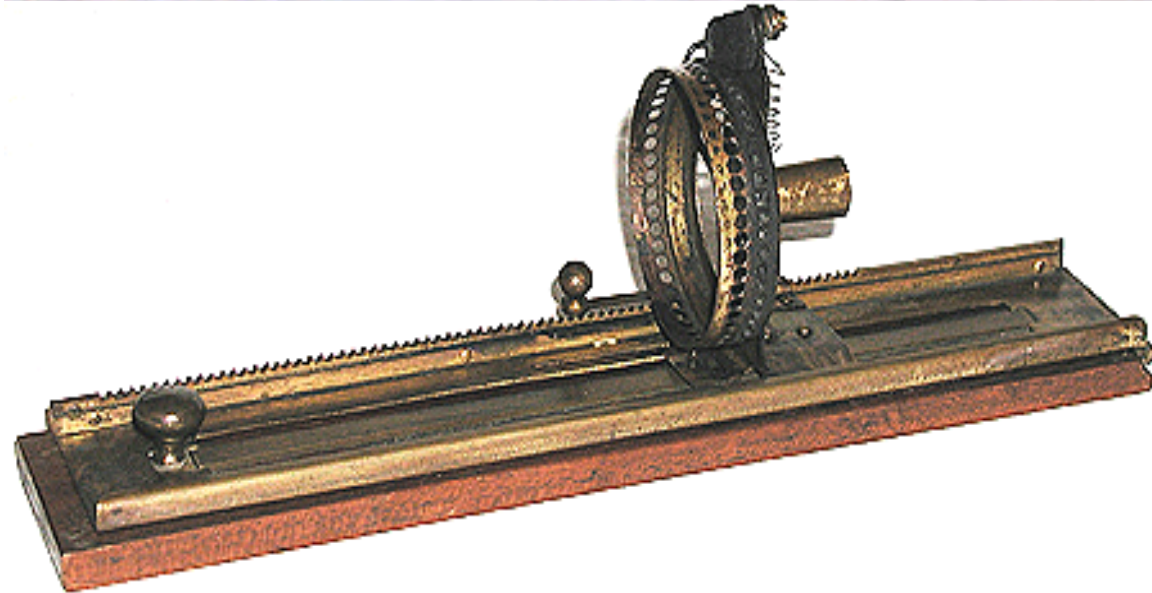
Industry Dynamics (e.g., Entry and Exit)

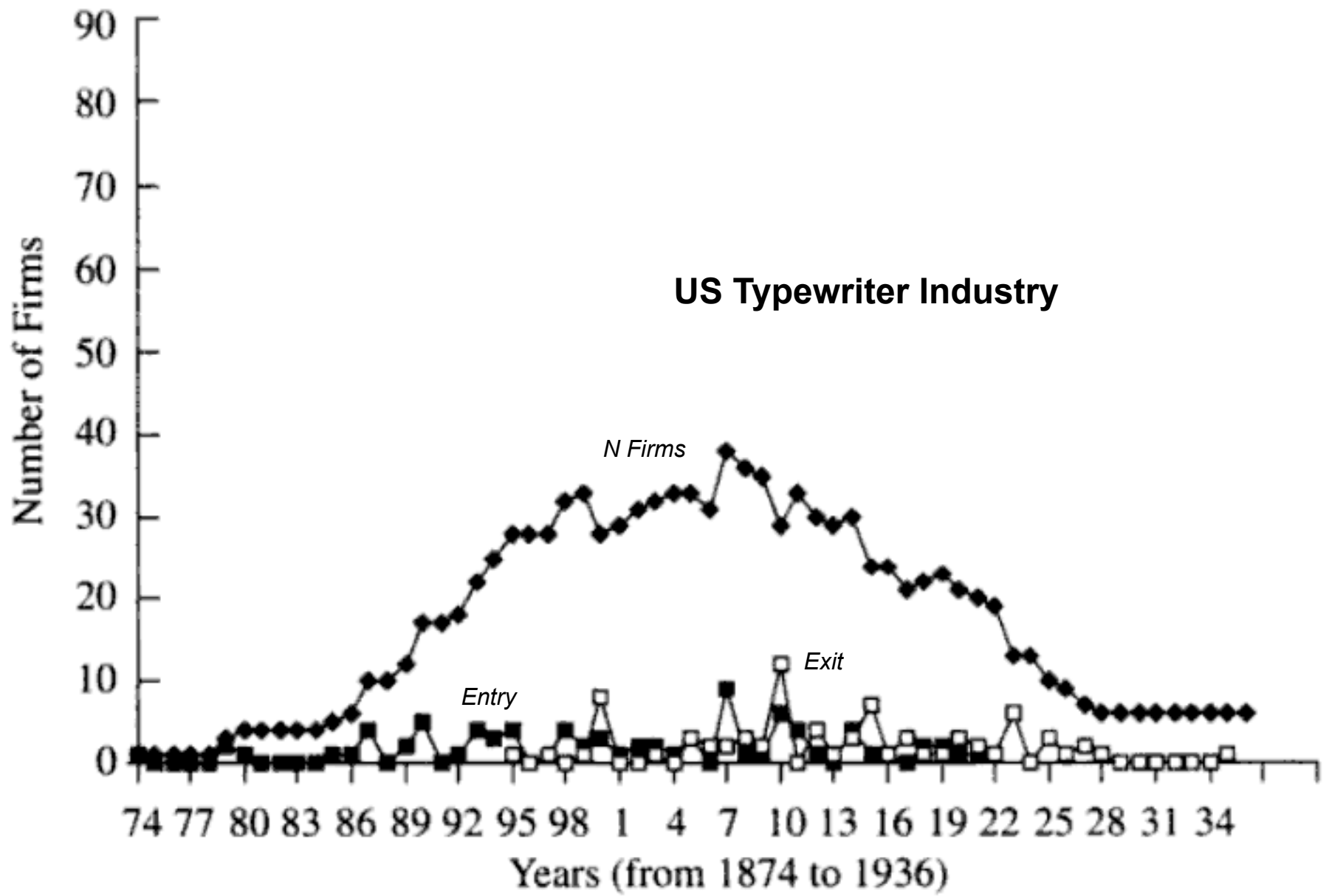


Source: Steven Klepper, "The Evolution of Geographic Structure in New Industries," *Revue de l'OFCE* 5/2006 (no 97 bis), p. 135-158.



What do these machines do?





The Dominant Design

What?

- Consensus of industry (producers and consumers) on configuration and features of product.
- The “mass market” solution.
- Not always the “best” solution in terms of product performance (e.g., Qwerty)

Drivers

- Learning and incremental innovation to discover best match between solution and need.
- Benefits of de facto standards.
 - Scale economies in supply network and infrastructure.
 - Network externalities.

May Not Apply When...

- Highly heterogeneous markets with associated diversity in needs.
- Minimal benefits of standardization (e.g., no scale economies in complementary assets).

Examples of *Dominant Designs*

Automobiles

Piston IC engine, steel unibody, integrated engine/transmission, 4 wheels

PC

Windows GUI, pointer, keyboard, desktop display

Mobile phone

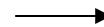
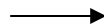
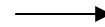
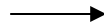
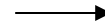
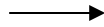
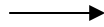
finger-based touch screen, icon-based GUI, app store

Bicycle

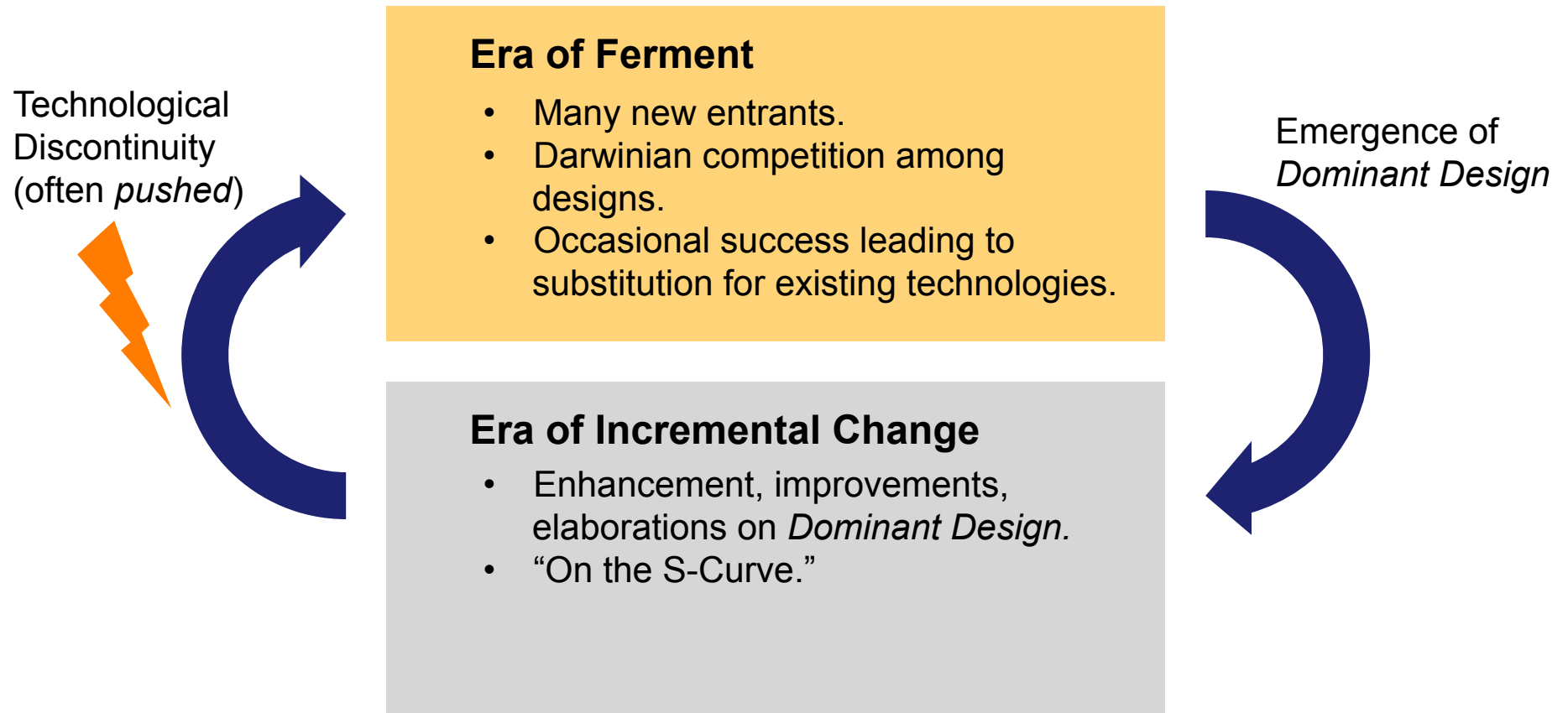
diamond-frame, chain drive, pneumatic tire, hand brake

Airplanes

pressurized aluminum cylinder, fuel in wings, wing-mounted high-bypass turbofan



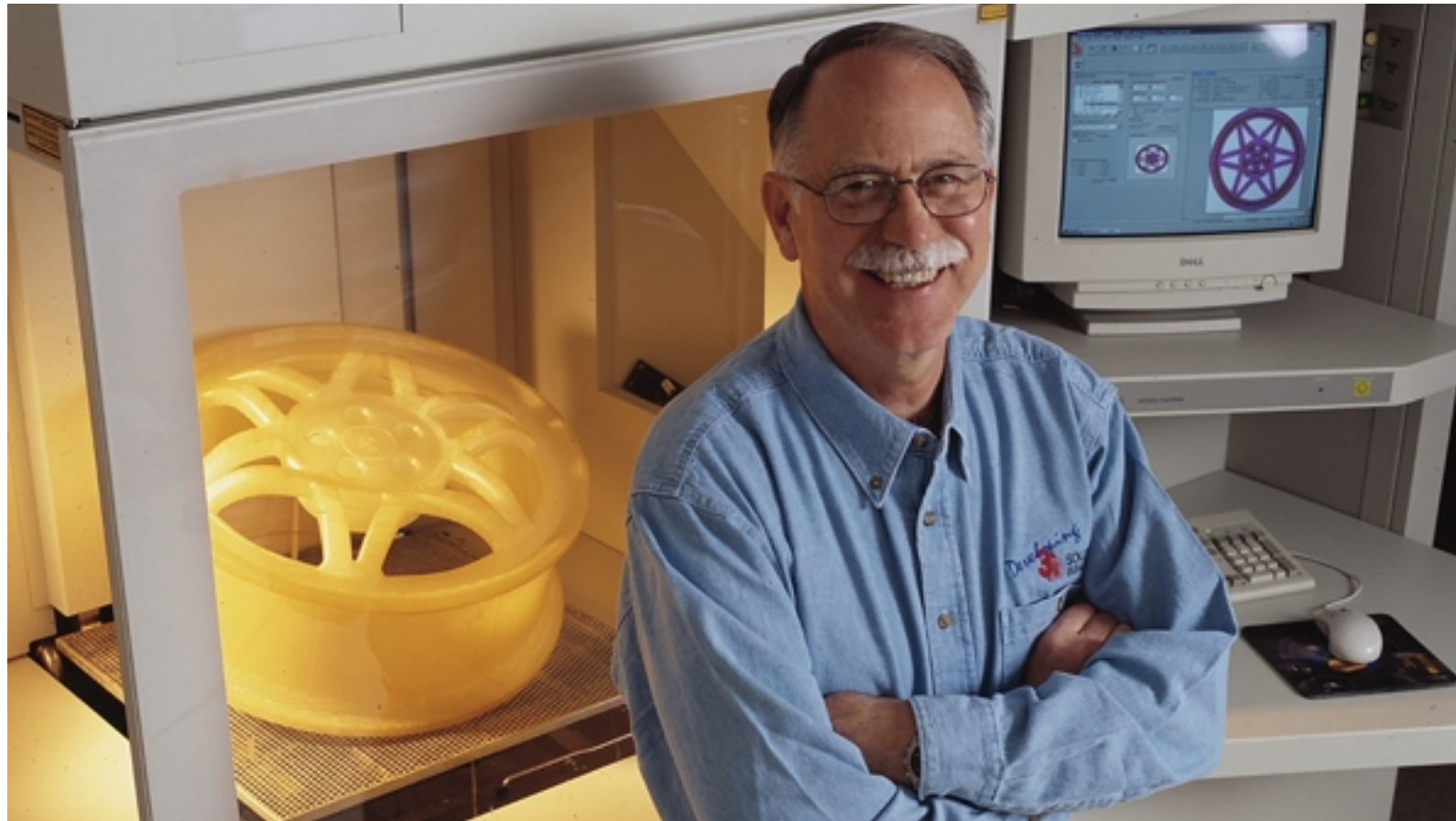
The Technology Cycle (for Radical Innovation)



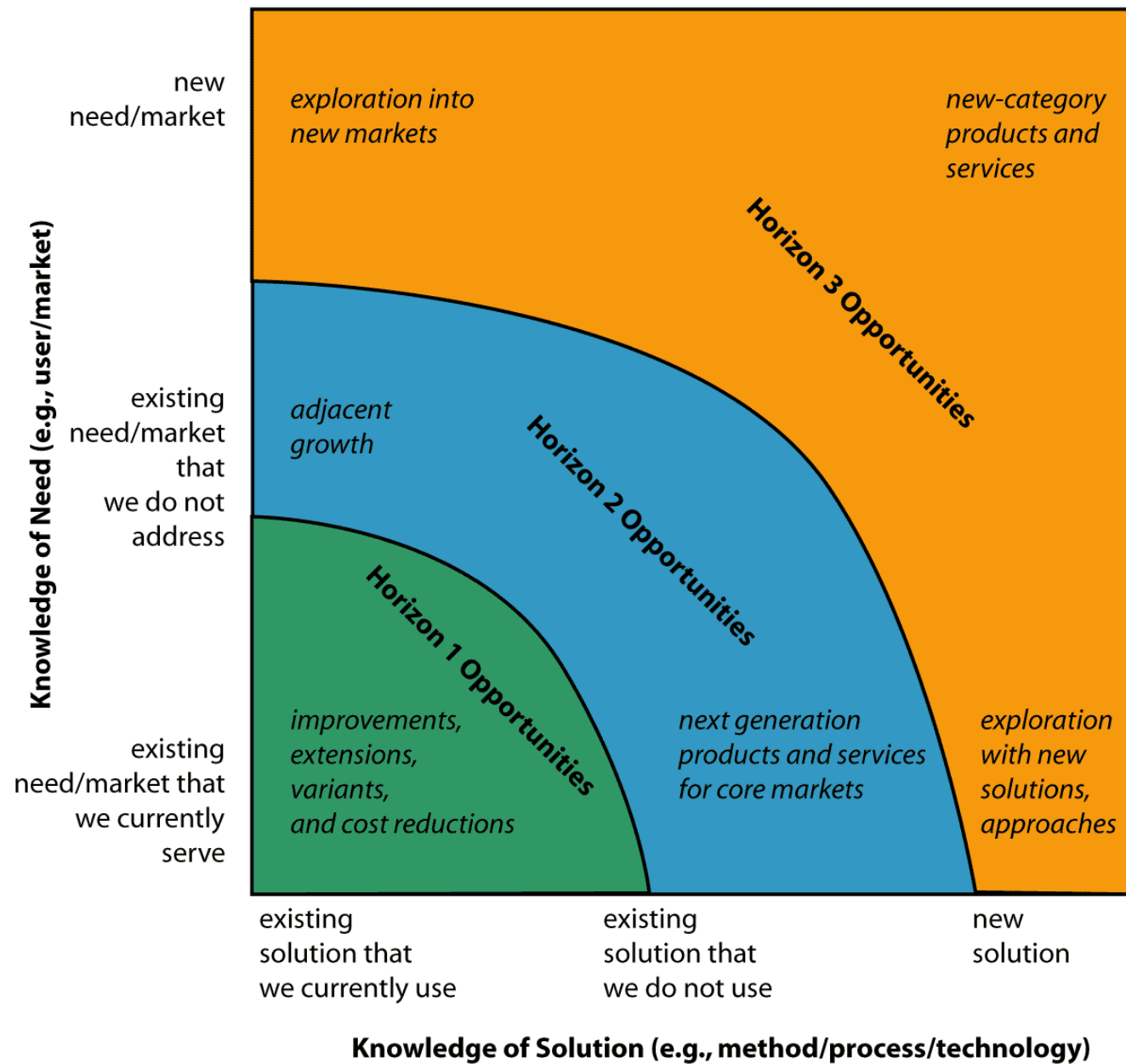
Source: adapted from Schilling, Chapter 3.



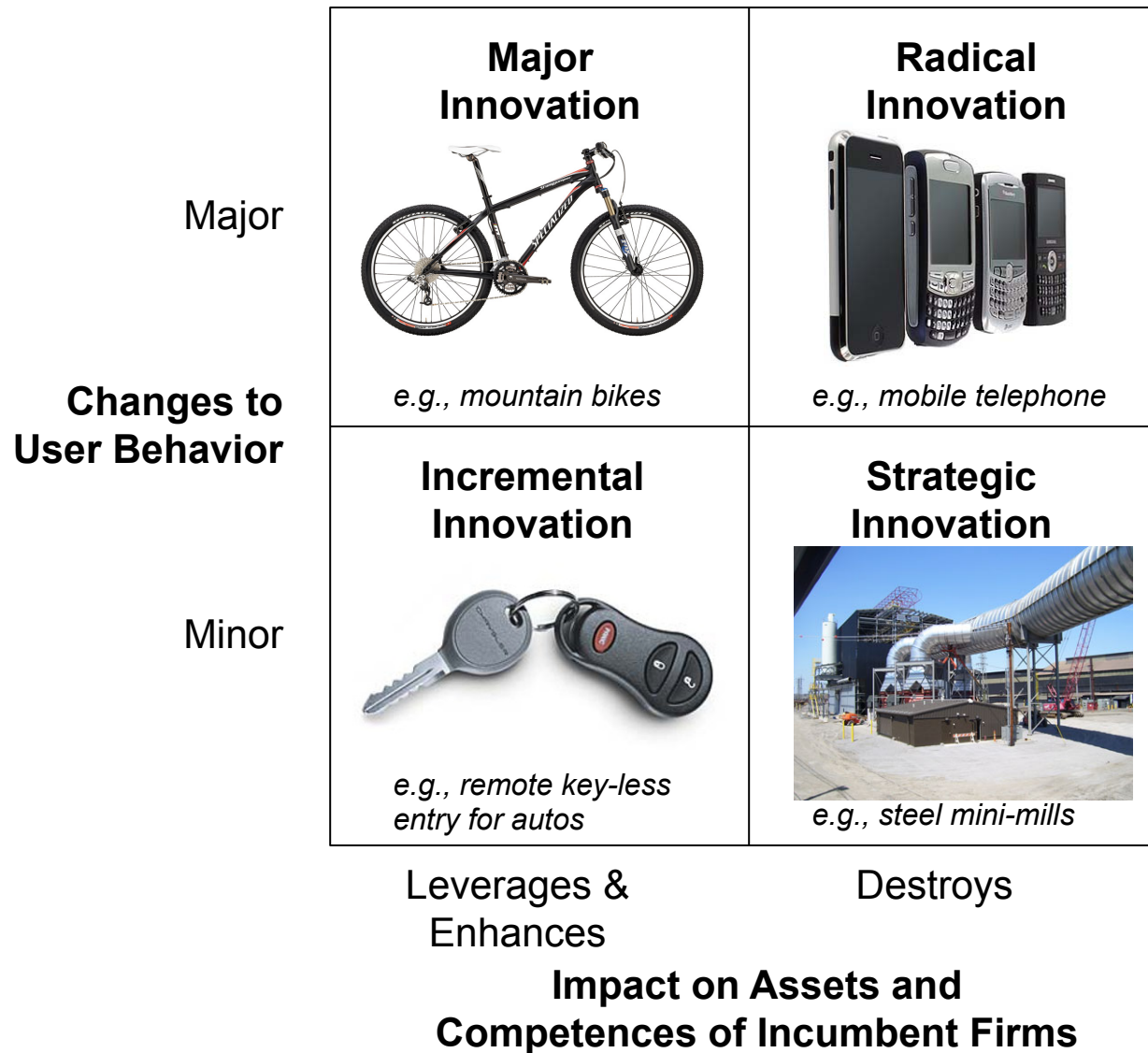
3D Printing



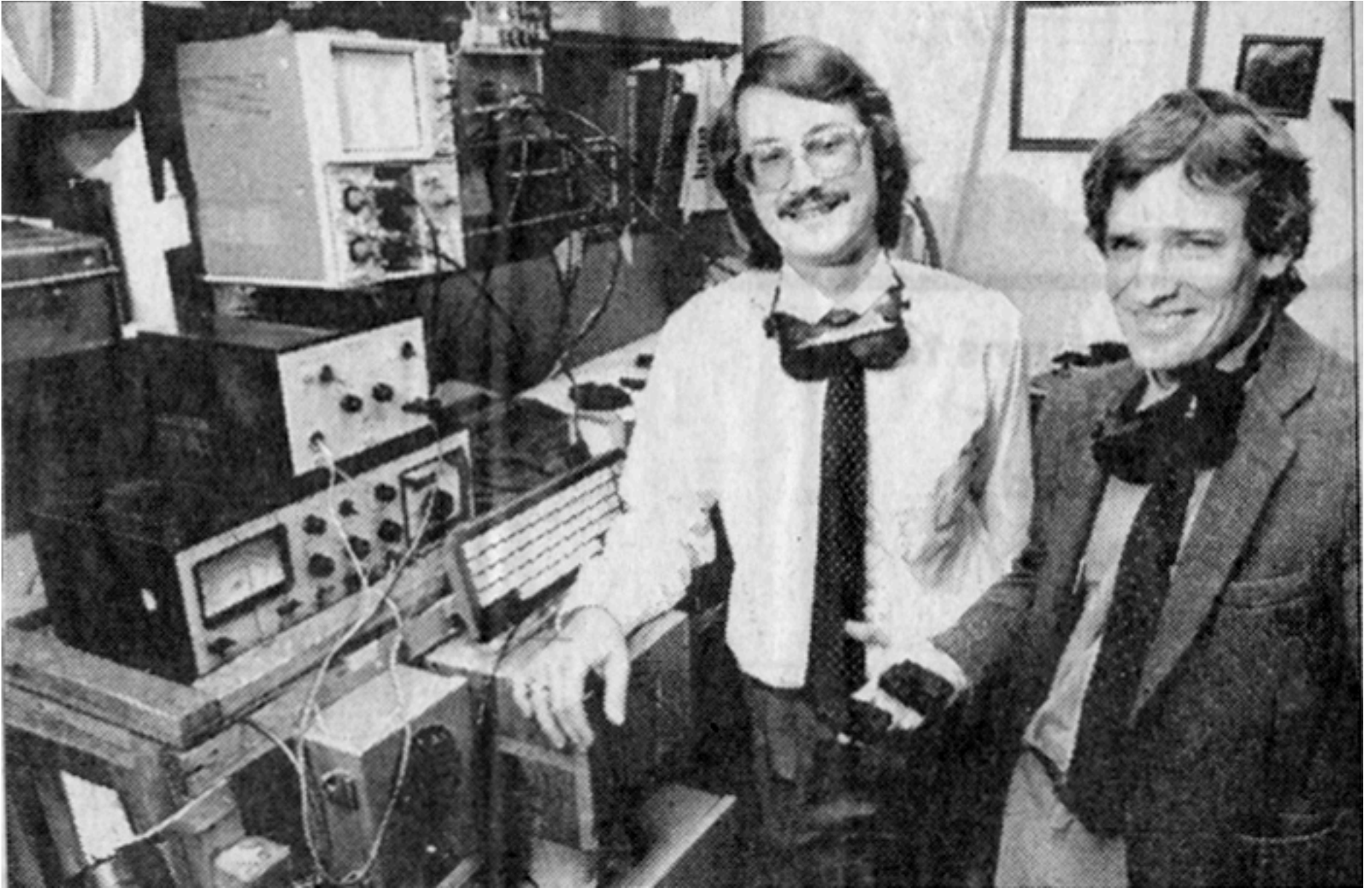
Invention of Stereolithography by Chuck Hull c1983.



Categorizing Technology in terms of Users and Incumbents



Competing Approaches



Carl Deckard and Joe Beaman (U Texas) c1987 – Selective Laser Sintering



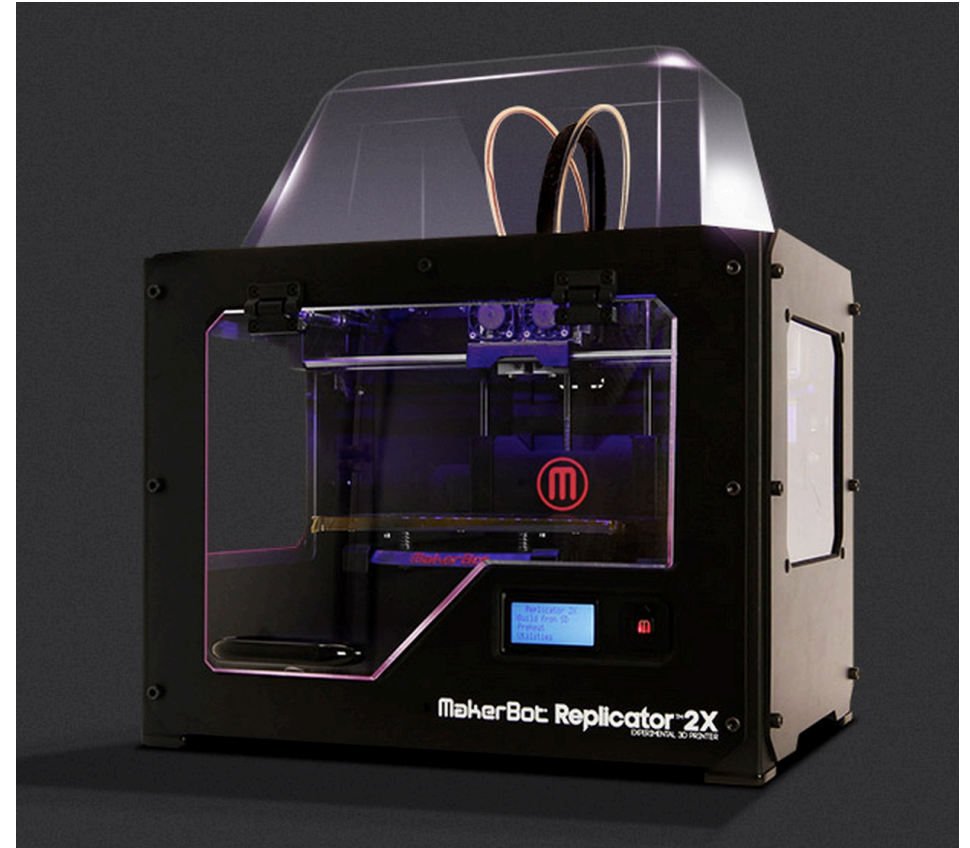
Sinterstation 2000 c1992



Scott Crump c1990 in his garage – invention of Fused Deposition Modeling.







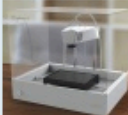



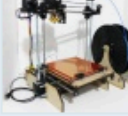



RepRap founded c2009 – becomes Makerbot



*Companies still entering in 2015
(e.g., Form Labs, Atom3dp)*

300+ Companies in 3D Printer Market

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Home Price Compare Videos Stats 3D Printing Basics Forums									
Price Compare - 3D printers									
Details									
Country	Manufacturer	Model	Assembled	Build envelope (W x D x H mm)	Image	Technology	Price (US\$)	Lead time	Products: 3D printer Materials Order by: Shop Manufact Model Assemble Weight Technolo Price (sel Lead Tim Build Env Speed Nozzle Di Layer Thi Positionin Input for Software System c Power su
SA	LIX	Lix 3D pen	Yes	-		FFF	\$ 140.00	-	
SA	New Matter	MOD-t 3D printe	Yes	150x100x125		FFF	\$ 249.00	-	
SA	Cobblebot	Cobblebot 3D Printer	Yes	381x381x381		FFF	\$ 299.00	-	
SA	M3D	The Micro 3D printer	Yes	109x113x116		FFF	\$ 349.00	-	
SA	Printrbot	New Simple Maker's Kit	DIY kit	102x102x114		FFF	\$ 349.00	1-2 week	
anada	Mixshop	Mix G1 Plus Kit	DIY kit	160x160x160		FFF	\$ 455.00	3 weeks	
hina	mostfun	MostFun Sail 3D	Yes	120120120		FFF	\$ 460.00	-	Filters (C Countries





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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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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

<http://www8.hp.com/us/en/commercial-printers/floater/3Dprinting.html>

We wanted flying cars. Instead we got 140 characters. – Peter Thiel



Carl Dietrich, CEO Terrafugia