

EC2212 Industrial Growth and Competition

Lecture 5

Innovators can use radical new
technology to seize markets.

Turnover of Corporate Leadership

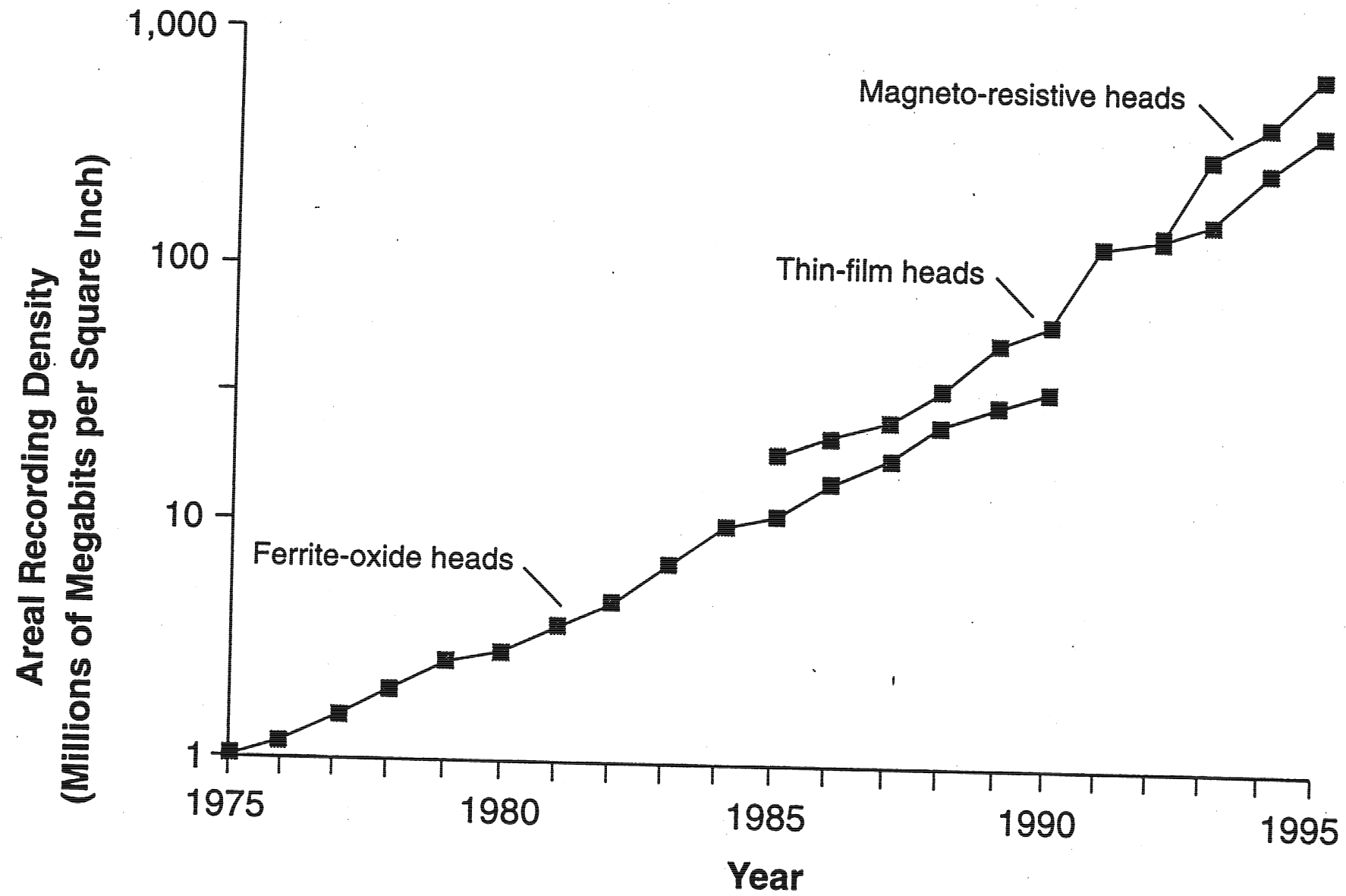
- New firms replace old as market leaders.
- Entry and exit may occur.
- Major innovations can provide the means for market turnover.

A Technology Mudslide?

Hypothesis: “Coping with the relentless onslaught of technology change was akin to trying to climb a mudslide raging down a hill. You have to scramble with everything you’ve got to stay on top of it, and if you ever once stop to catch your breath, you get buried.” Leading firms frequently lose.

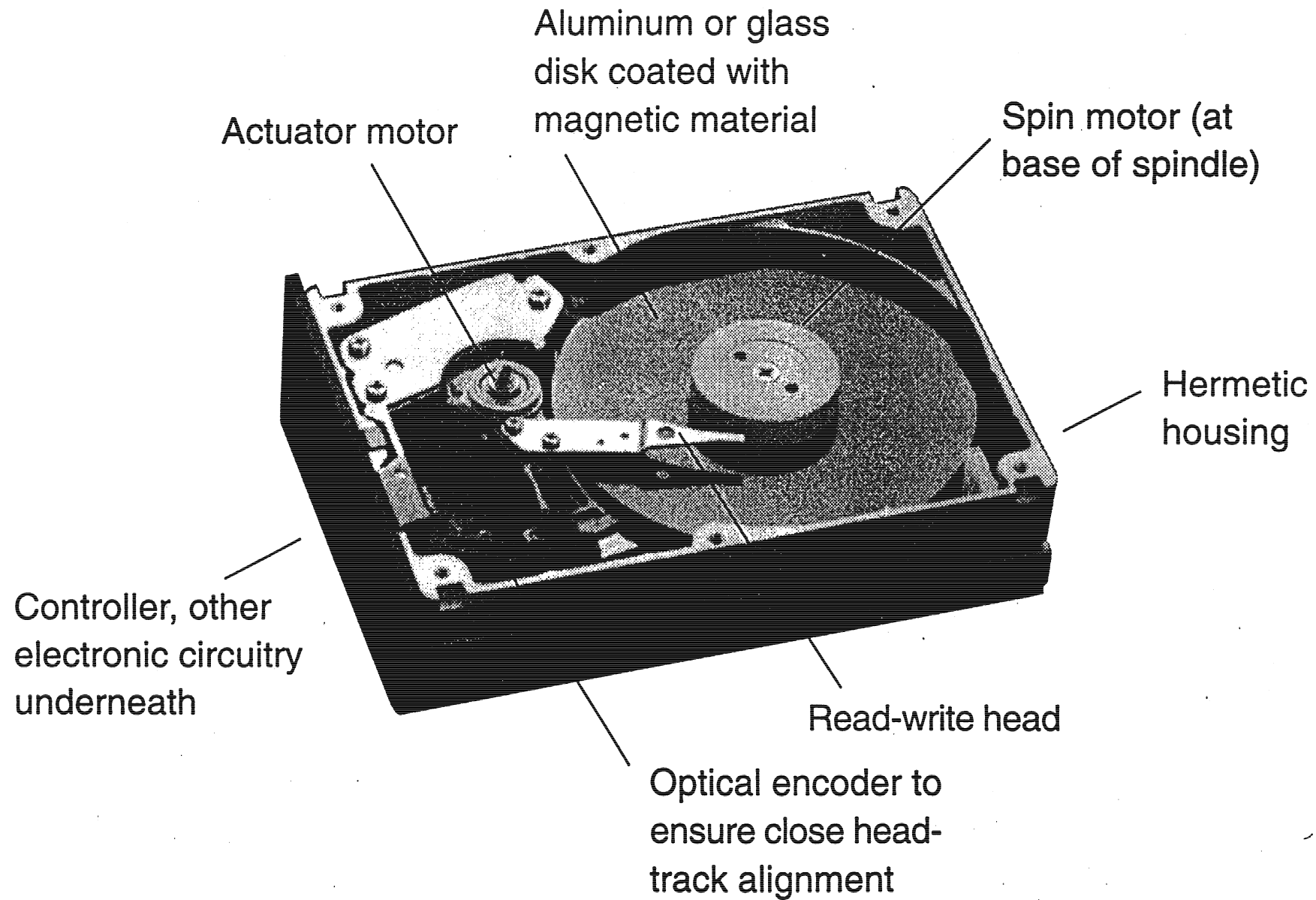
Reality: “The established firms were the leading innovators not just in developing risky, complex, and expensive component technologies..., but in *literally every... one of the sustaining innovations in the industry’s history....* [T]his pattern of technology leadership... is stunningly consistent.... [T]here have been only a few of the other sort of technological change, called disruptive technologies..., that toppled the industry’s leaders.”

– C. Christensen on hard disk drives



Source: Data are from various issues of *Disk/Trend Report*.

Figure 1.1 Primary Components of a Typical Disk Drive



Examples

cement - rotary kiln & coal dust ~1892,
suspension preheating 1972

minicomputers - solid state, ICs 1960s

container glass - semiautomation 1893,
Owens machine 1903

flat glass - drawing machines 1917,
continuous forming 1923, float glass 1963

aligners for semiconductor mfg.
- contact / proximity / scanner /step &
repeat

hard disk drives - 14", 8", 5.25", 3.5"

transistor - vs. vacuum tube

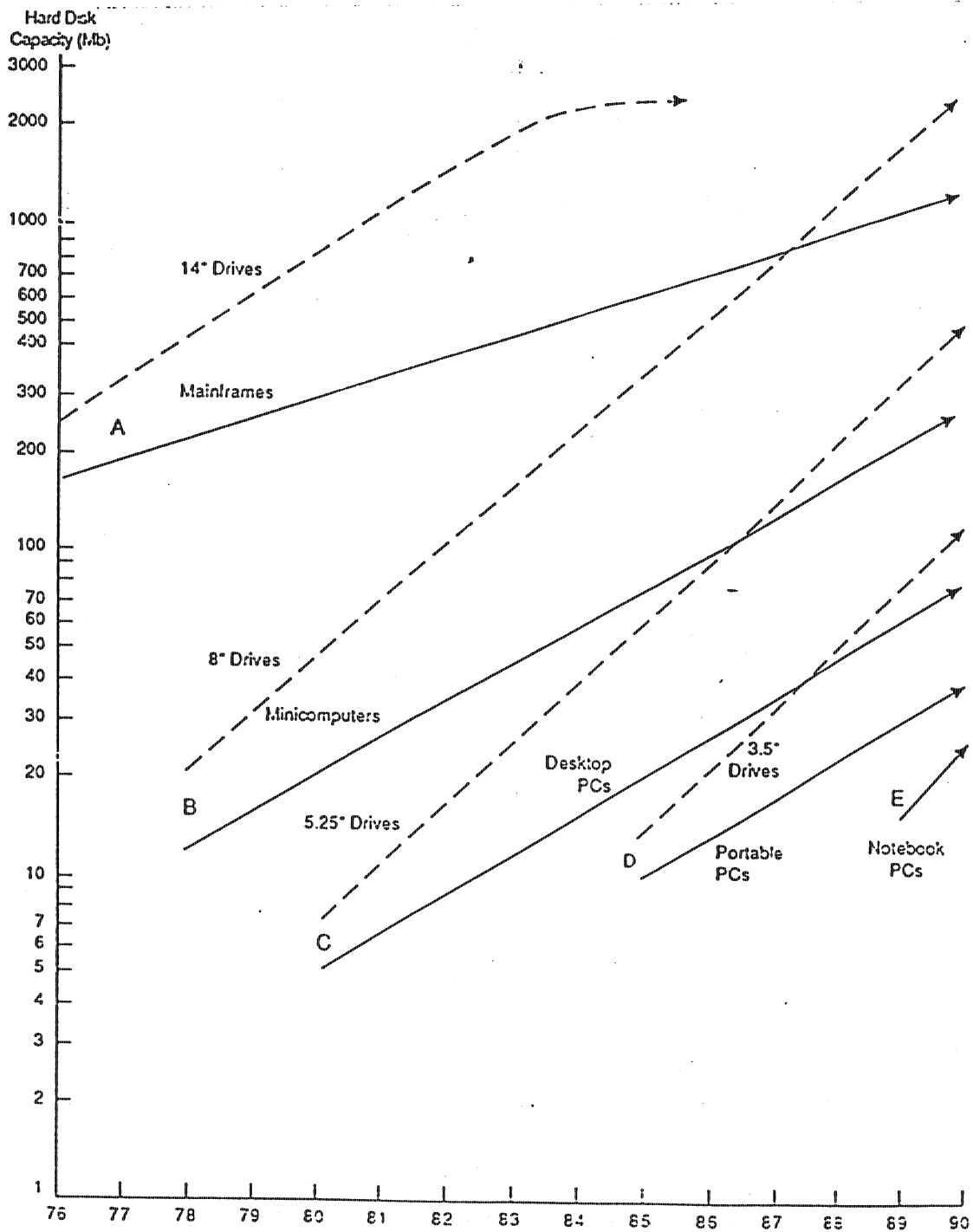
electronic calculator - vs. mechanical

Share of Deflated Cumulative Sales (%) 1962-1986, by Generation, for the Leading Optical Photolithographic Alignment Equipment Manufacturers*

Firm	Alignment Equipment				
	Contact	Proximity	Scanners	Step and repeat (1)	Step and repeat (2)
Cobilt	44		<1		
Kasper	17	8		7	
Canon		67	21	9	
Perkin-Elmer			78	10	<1
GCA				55	12
Nikon					70
Total	61	75	99+	81	82+

* This measure is distorted by the fact that all of these products are still being sold. For second-generation step and repeat aligners this problem is particularly severe, since in 1986 this equipment was still in the early stages of its life cycle. Source: Internal firm records, Dataquest, VLSI Research Inc.

In nearly every case, the established firm invested heavily in the next generation of equipment, only to meet with very little success. Our analysis of the industry's history suggests that a reliance on architectural knowledge derived from experience with the previous generation blinded the incumbent firms to critical aspects of the new technology. They thus underestimated its potential or built equipment that was markedly inferior to the equipment introduced by entrants.



Comparison of the trajectories of disk capacity demanded per computer, vs. capacity provided in each architecture.

Analyzing Turnover

- Innovators: new firms or old?
E.g., powdered coal for cement
 New firms - 4 of 5 innovators
 Old firms - 1 of 5
- Era of ferment
 Product/process diversity
 Sales growth, hard to forecast
- Entry & exit, market shares
 Entry & exit rise, perhaps
 entry/exit ratio rises
 Dispersion in market shares,
 turnover
- Tushman & Anderson article.

Why Incumbents Lose

4 Explanations

- New technology makes obsolete previous core competency.
- Blinded by prior technological views & organizational filters.
- Blinded by customer base.
- Differing incentives:
incumbents & entrants,
existing & new markets.
- See: Tushman & Anderson, Henderson & Clark, Christensen & Rosenbloom

Non-Technological Leadership Turnover

- Non-technological reasons for turnover may also exist.
- Targeting a new market:
UK potato crisps: Golden Wonder.

US ball-point pens: Bic.

(Both in part involved technical innovation, but redefinition of the market was key.)

Opportunities to Imitate

- Small firms pioneer new markets
 - Beat them while they're weak.
- Patents absent or can be circumvented
 - Show previous patents or usage
 - Come up with alternative design for same purpose
 - Defensive & offensive use of previous patents
- Related experience
- New market segments to create

Success with Imitation

- Anticipate unlikely threats
- Concurrent R&D
- Legal & regulatory challenges to the pioneer(s)
- Enter quickly after the market has formed, not after 1st entry
- Don't copy too closely
- Continuity for consumers, not too much change

Defense against Imitation

- Sell out
- Licensing & joint ventures
- Fight off copycats:
 - Legal measures (copyright / patent)
 - Introduce low-end generics (or focus on high-value end)
 - Perpetually innovate
 - Create a proprietary standard

You Should Know

- What kinds of technology may cause market leadership turnover? Why?
- Examples
- Predictions for the market (Tushman & Anderson)
- Why don't market leaders innovate with disruptive technologies? 4 theories
- What strategies can aid successful innovation?
- What strategies help defend market leadership?