Technology Strategy (MGMT 731)

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Session 6:
Sources of Value - Standards

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

Approaches to Appropriability

- Intellectual property protection
  - Patents
    - The right to exclude others from making, selling, or using.
    - Finite length (20 years from application).
    - Must “teach” others through patent publication.
  - Copyrights
    - The right to prohibit literal copying.

- Secrecy
  - Trade secrets.
  - Non-disclosure and non-compete contracts.
  - Complexity and “tacit” knowledge.

- Speed (i.e., temporary disequilibrium).

- Standards.

What is a standard?

A standard is a specification that allows for *interoperability* among products, services, or elements of products or services.

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<td class="" style="">D-pad and keyboard (some models)</td>
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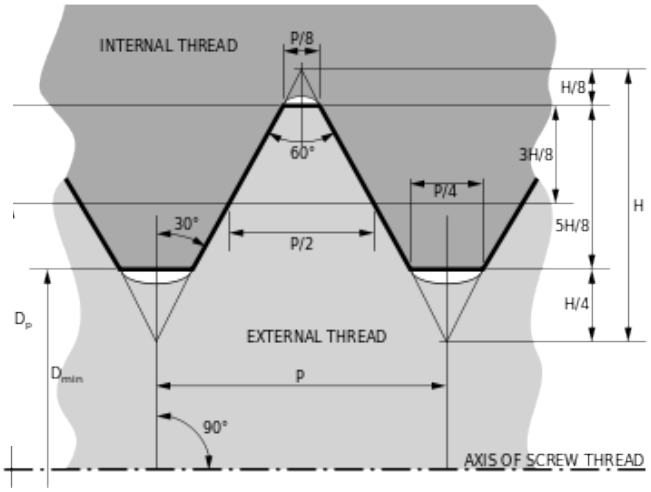
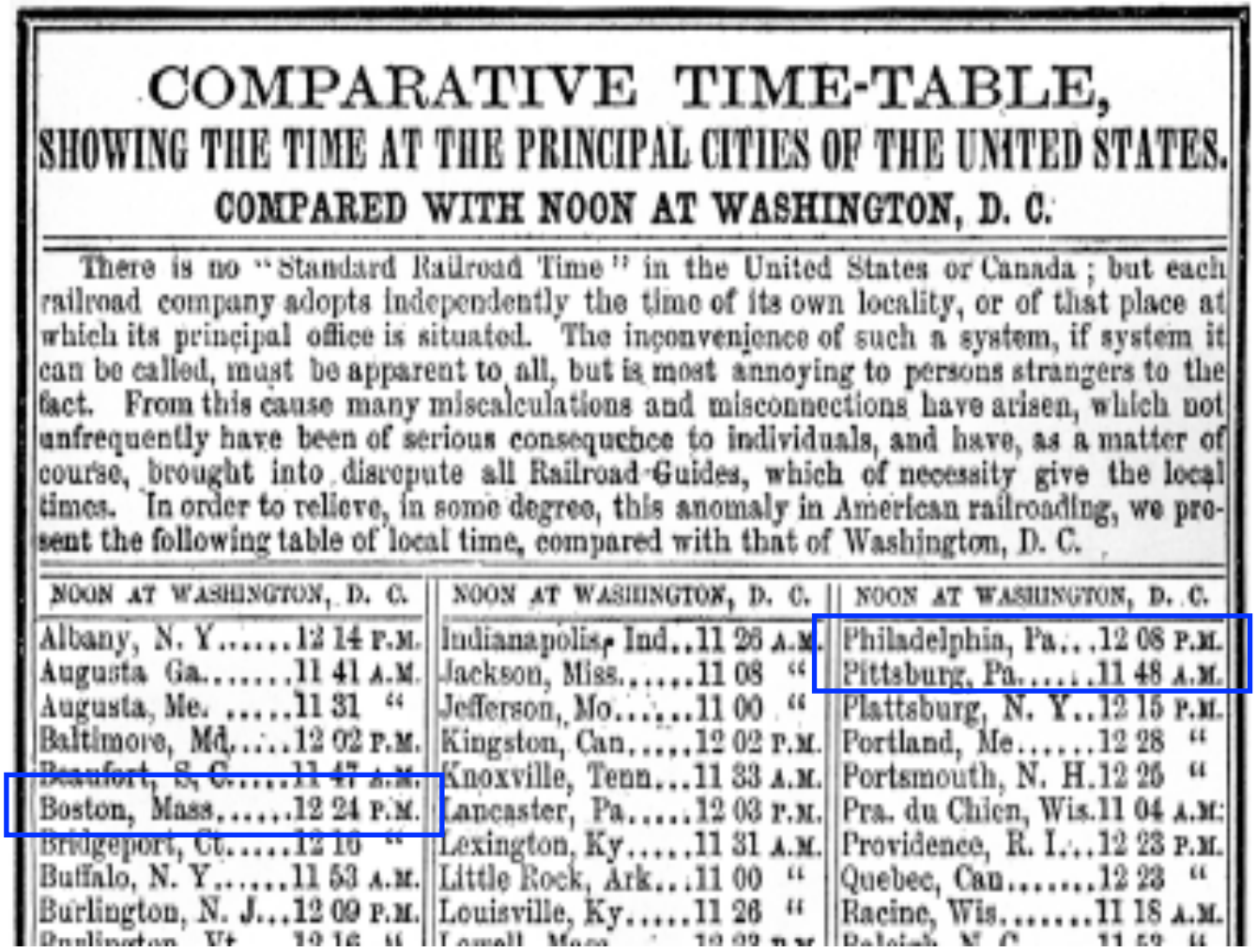


Microsoft® Windows®


1
D
VIRGINIA TREASURY NOTE
D
1
RICHMOND
No.
Oct.r 21 1862
The Commonwealth
of Virginia
Will pay
ONE DOLLAR
to bearer
on demand at the Treasury
ONE
ONE


STATE OF PENNSYLVANIA
5
5
1251
Philadelphia, March 1st 1859.
THE WESTERN BANK OF
PHILADELPHIA,
Will pay to bearer on demand
FIVE DOLLARS.
Cash.r
Pres.t
Philad.a
American Bank Note Company



COMPARATIVE TIME-TABLE,

SHOWING THE TIME AT THE PRINCIPAL CITIES OF THE UNITED STATES.

COMPARED WITH NOON AT WASHINGTON, D. C.

There is no "Standard Railroad Time" in the United States or Canada; but each railroad company adopts independently the time of its own locality, or of that place at which its principal office is situated. The inconvenience of such a system, if system it can be called, must be apparent to all, but is most annoying to persons strangers to the fact. From this cause many miscalculations and misconnections have arisen, which not unfrequently have been of serious consequence to individuals, and have, as a matter of course, brought into disrepute all Railroad Guides, which of necessity give the local times. In order to relieve, in some degree, this anomaly in American railroading, we present the following table of local time, compared with that of Washington, D. C.

NOON AT WASHINGTON, D. C.		NOON AT WASHINGTON, D. C.		NOON AT WASHINGTON, D. C.	
Albany, N. Y.	12 14 P.M.	Indianapolis, Ind.	11 26 A.M.	Philadelphia, Pa.	12 08 P.M.
Augusta, Ga.	11 41 A.M.	Jackson, Miss.	11 08 "	Pittsburg, Pa.	11 48 A.M.
Augusta, Me.	11 31 "	Jefferson, Mo.	11 00 "	Plattsburg, N. Y.	12 15 P.M.
Baltimore, Md.	12 02 P.M.	Kingston, Can.	12 02 P.M.	Portland, Me.	12 28 "
Beaufort, S. C.	11 47 A.M.	Knoxville, Tenn.	11 33 A.M.	Portsmouth, N. H.	12 25 "
Boston, Mass.	12 24 P.M.	Lancaster, Pa.	12 03 P.M.	Pra. du Chien, Wis.	11 04 A.M.
Bridgeport, Ct.	12 16 "	Lexington, Ky.	11 31 A.M.	Providence, R. I.	12 23 P.M.
Buffalo, N. Y.	11 53 A.M.	Little Rock, Ark.	11 00 "	Quebec, Can.	12 23 "
Burlington, N. J.	12 09 P.M.	Louisville, Ky.	11 26 "	Racine, Wis.	11 18 A.M.
Burlington, Vt.	12 16 "	Lowell, Mass.	12 23 P.M.	Raleigh, N. C.	11 52 "

Dinsmore (1857). *Dinsmore's American Railroad and Steam Navigation Guide and Route-Book.* Publisher unknown.

Types of standards

- *De jure*: defined by law (or by common agreement)
  (e.g., IEEE telecommunication & electrical standards, ISO Standards, html)

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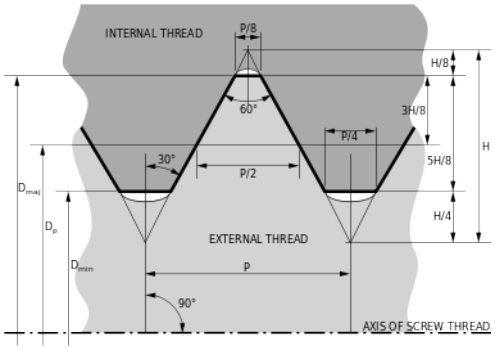


- *De facto*: defined by practice (e.g., MS Windows, Adobe PDF)

Standards and dominant designs

- Dominant design – consensus on best approach.
- Standard – specification of particular interface, format or system; allow for interoperability.
- Not all dominant designs are standards.
  - e.g., Apple II established the dominant design for PCs, but never became a standard.

…But most successful standards embody dominant designs.

How do standards create value for consumers?

- **Learning Costs**
  - Consumers invest once in learning to use the technology, e.g., QWERTY keyboard, flying an Airbus plane, using spreadsheet formulas.

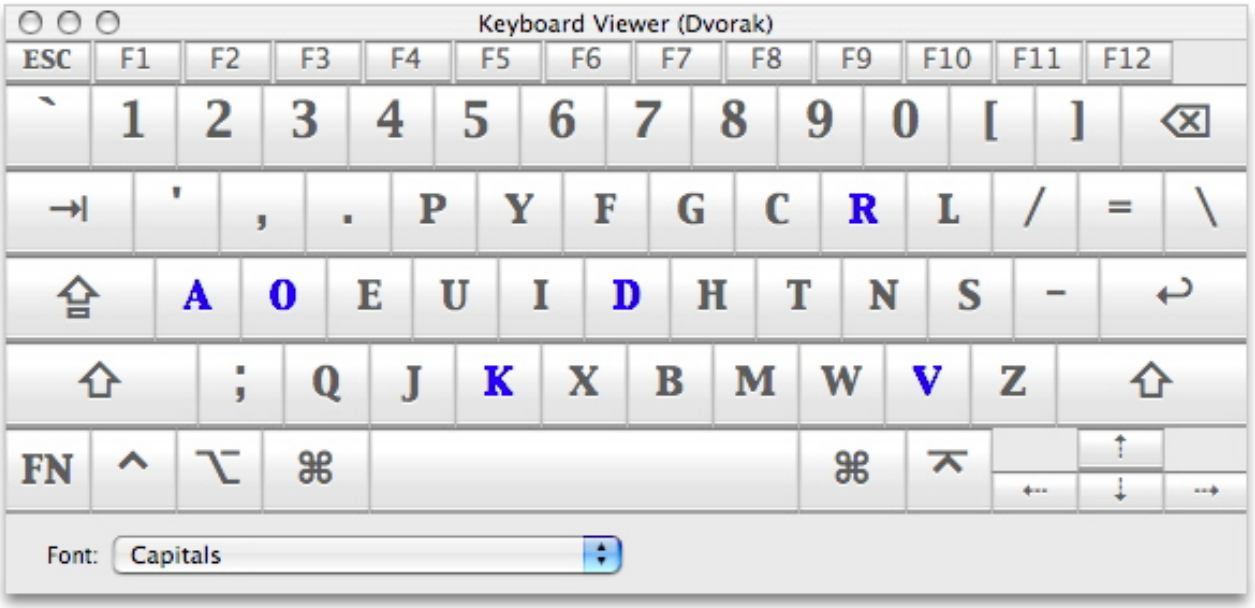
- **Network Externalities**
  - Interoperability enables network externalities, in which value increases with the number of other individuals who own the same product, e.g., Skype users.

- **Complementary Products**
  - Standardization increases the economic incentives for producers to create complementary goods, increasing selection and availability. e.g., Application software.

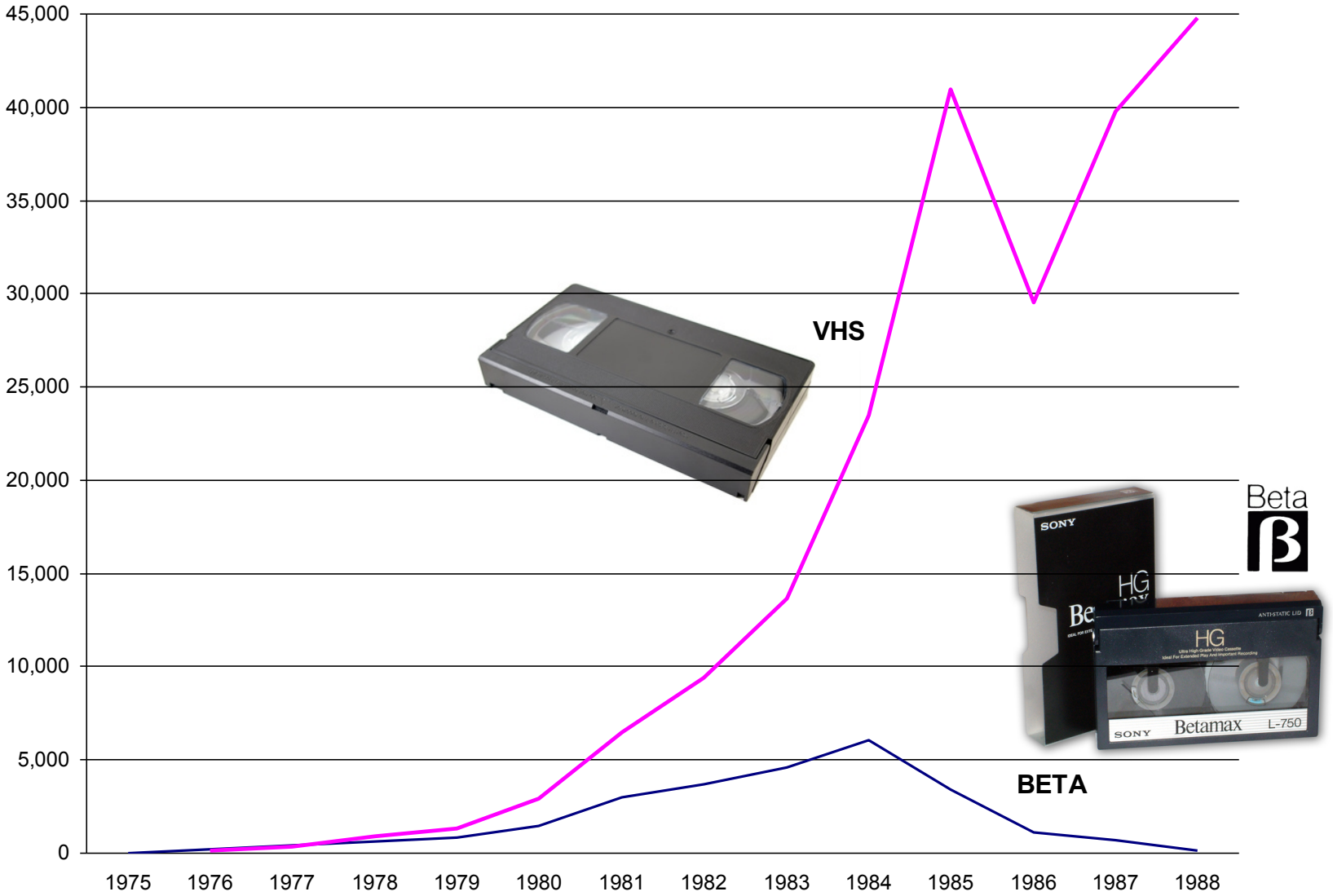
- **Cost and Quality Resulting from Learning Curve/Scale**
  - The more standardization, the higher the volume for each standard, which may result in higher quality and lower costs. e.g., Lasik procedure.

But…how might standards *destroy* customer value?

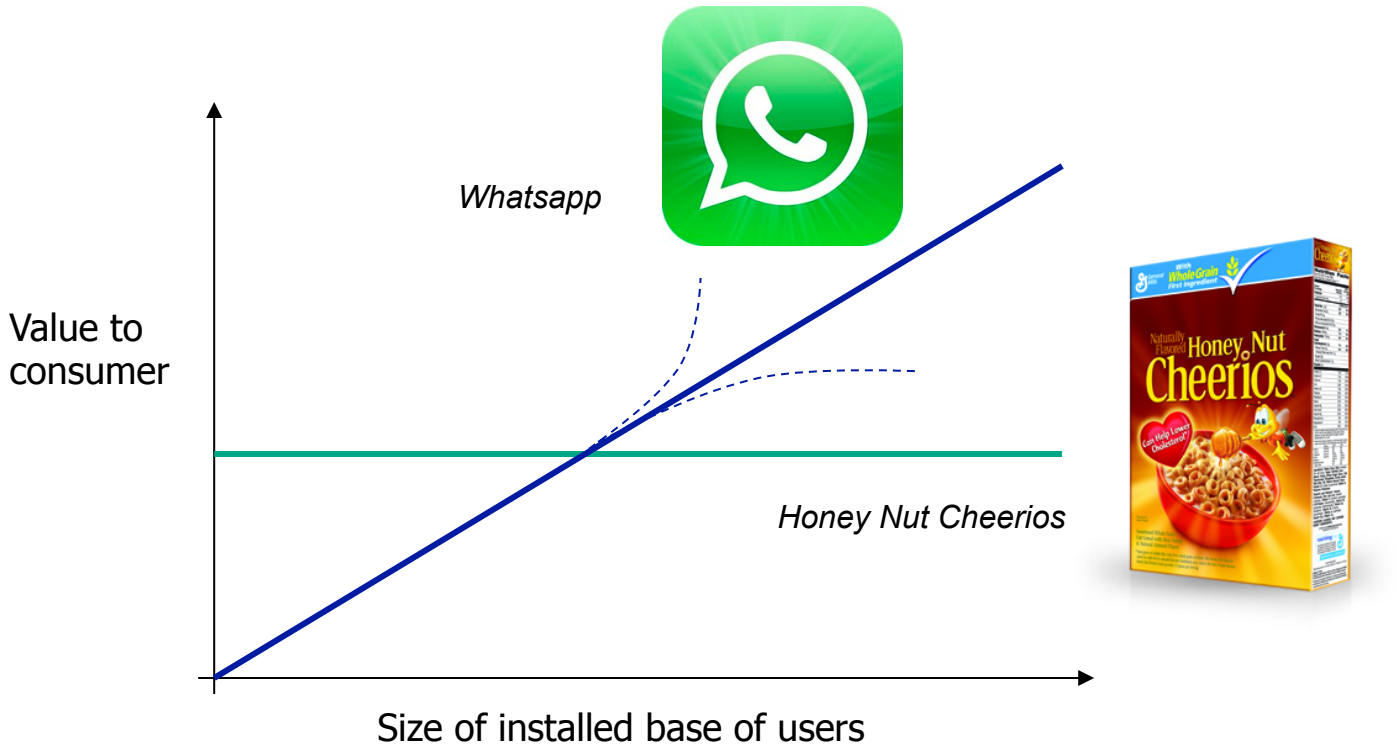
- **Lock-in to possibly inferior technologies**
  - e.g., keyboard layout
- **Reducing product variety, and thus worse fit to heterogeneous preferences**
  - "Any color so long as it's black"
- **Reducing the rate of system innovation**
  - Innovation is confined to sub-systems and components rather than entire systems
- **Higher (monopolist) pricing**



Standards in action: VHS vs. Beta
(annual shipments in thousands of units)

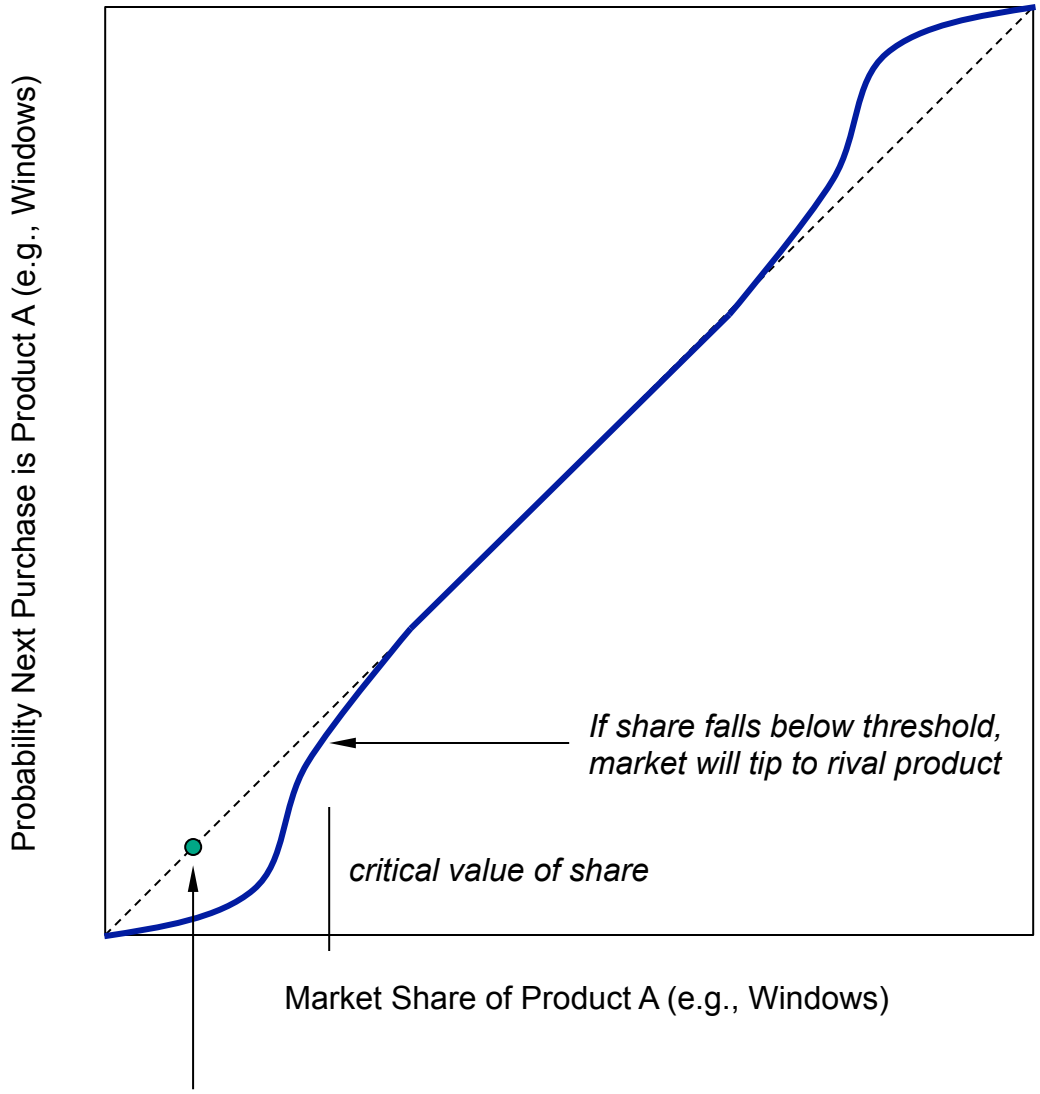


Intrinsic Value vs. Network Value of Product

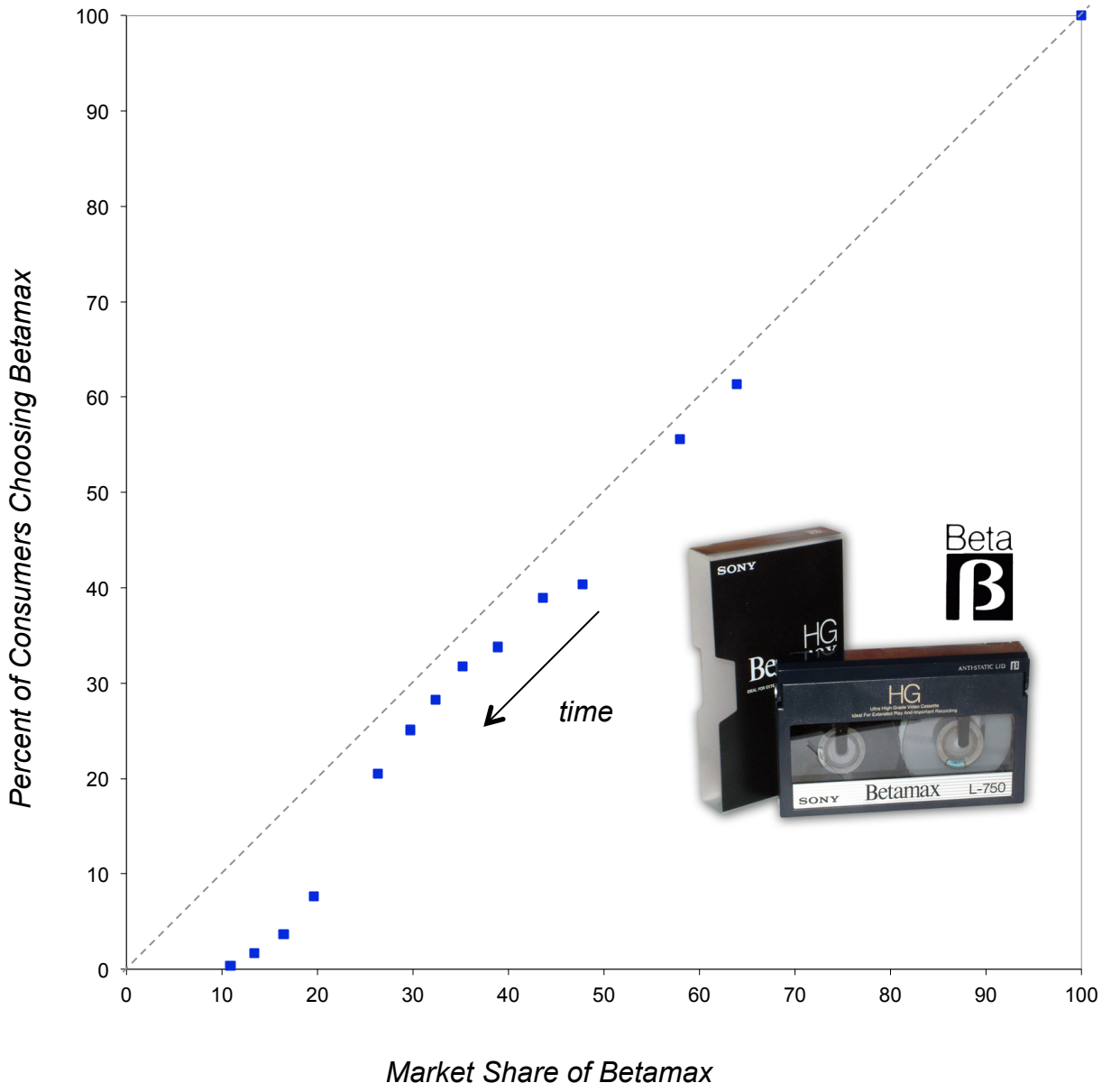


*Network Value is driven by both **direct** network effects (e.g., ability to reach a friend on Skype) and **indirect** network effects, such as the value of complements (e.g., choice of application software on a platform).*

Tipping Dynamics and “Lock In” in “High Network” Markets



(By comparison, Honey Nut Cheerios can comfortably stay at 8% market share.)


Percent of Consumers Choosing Betamax
Market Share of Betamax
0
10
20
30
40
50
60
70
80
90
100
time
SONY
HG
Betamax
L-750
Beta

How are standards established?

Standards "win" when a critical mass of consumers have adopted them (or when a critical mass of key players believe that the standard will be adopted).

- The sheer power of the concept/design/delivery – the "great product" strategy (e.g., initial Chrome browser strategy).
- Coming to market ahead of competition.
- Lowering "switching costs" for early users by educating them, ensuring backward-compatibility, or providing adapters.
- Penetration pricing: "give the product away" (e.g., Adobe PDF reader).
- Developing, or encouraging the development of, complementary products and services (e.g., initial application software for OS).
- Building expectations by early announcements and/or making major, irreversible commitments (e.g., Apple Watch).
- Action by regulatory and standard-setting bodies (e.g., FCC committees, IEEE).

Reference: Shapiro and Varian, "The Art of Standards Wars," *California Management Review*, Vol. 41, No. 2, 1999.

https://www.qualcomm.com/invention/licensing

Ulrich

Typology of Ownership and Access

Ownership of the standard is	The **specification** of the standard is: *Open (i.e., published)*	The **specification** of the standard is: *Closed (i.e., secret)*
Public	e.g., Linux, Canvas • Profit through complementary assets. • *Pre-empt appropriation by others, create "level playing field"* • Encourages ecosystem. • May be able to effectively control direction of standard. • May be some inside, early information available.	e.g., Security/Encryption *(rare)*
Private	e.g., LTE/Wimax - Qualcomm • Profit through licensing. • Encourages ecosystem. • May be difficult to establish. • Requires ability to appropriate (e.g., with patents) • Concerns by users about monopoly pricing. • Smooth transitions, evolution.	e.g., Skype – (Microsoft) • (Really just selling a product/service you hope to become a standard.) • products/services. • Have to do everything yourself. • May be difficult to establish. • Concerns by users of monopoly pricing. • Tightly integrated solution for users.


Founded April 6th, 2010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https://www.youtube.com/watch?v=juNyqBf6SQ0