Strategic
Computing and Communications
Technology

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Networks and Positive Feedback

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Important ideas

- positive feedback
- network effects
- returns to scale
  - demand side
  - supply side

Positive feedback

- strong get stronger, weak get weaker
- negative feedback: stabilizing
- makes a market "tippy"
- Examples: VHS v Beta, Wintel v Mac
- "winner take all markets"

Sources of positive feedback

- supply side economies of scale
  - declining average cost
  - marginal cost less than average cost
  - example: information goods
- demand side economies of scale
  - network effects
  - in general: fax, email, Web
  - in particular: Sony v Beta, Wintel v Mac

Network effects

- real networks
- virtual networks
- number of users
  - Metcalfe's law: value of network of size n proportional to n^2
- importance of expectations

Lock-in and switching costs

- network effects are a cause of collective switching costs
- even worse than individual lock-in
- due to coordination costs
- example: QWERTY

Don’t get carried away

- Network externalities don’t always apply
  - ISPs (but watch out for QoS)
  - PC production
- Likelihood of tipping
  - see next slide

Likelihood of tipping

	Low Scale Economies	High Scale Economies
Low Demand for Variety	**Unlikely**	**High**
High Demand for Variety	**Low**	**Depends**

Chicken and eggs

- Fax and fax machines
- VCRs and tapes
- Internet browsers and Java

Igniting positive feedback

- Evolution: preserve compatibility
- Revolution: offer compelling performance

Evolution

- offer a migration path
- Examples
  - Microsoft
  - Intel
  - Borland v Lotus
- build new network by links to old one
- Problems: technical and legal

Technical obstacles

- creative design
- think in terms of system
- converters and bridge technologies
  - one-way compatibility

Legal obstacles

- need IP licensing
- Example: Sony and Philips CDs

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Revolution

- Groves's law: "10X rule"
- but depends on switching costs
- Example: Nintendo

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Openness v control

- your reward = total added to industry x your share
- value added to industry
  - depends on product
  - *and* size of network
- your share
  - depends on how open

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Openness

- Full openness
  - anybody can make the product
  - problem: no champion
- Alliance
  - only members of alliance can use
  - problem: holding alliance together

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Control

- control standard and go it alone
- if several try this strategy, may lead to standards wars

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Generic strategies

	Control	Open
Compatible	Controlled Migration	Open Migration
Incompatible	Performance Play	Discontinuity

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Performance Play

- introduce new, incompatible technology
- examples
  - Palm Pilot
  - Iomega Zip
- attractive if
  - great technology
  - outsider with no installed base

Controlled Migration

- compatible, but proprietary
- examples
  - Windows 98
  - Pentium
  - upgrades

Open Migration

- many vendors, compatible technology
- examples
  - fax machines
  - some modems

Discontinuity

- many vendors, new technology
- examples
  - CD audio
  - 3 1/2” disks

Historical examples (to read)

- RR gauges
- AC v DC
- Telephone networks
- Color TV
- HD TV