

Information, Organization, and Management

Unit 6: Network Externalities, Lock-in, and the Economics of the Internet

Prof. Dr. Martin Hepp

<http://www.heppnetz.de>

mhepp@computer.org

<http://www.heppnetz.de/teaching/img/>

This unit is based on: C. Shapiro and H. R. Varian, *Information Rules: A strategic Guide to the Network Economy*. Boston, MA, USA: Harvard Business School Press, 1998.

Network Externalities

- Economic effect that the value (utility) of a good or service is affected by the consumption of the same good or service by others
- Examples:
 - Fax
 - Languages
 - Operating Systems

Positive Network Externalities

- Many goods show *positive* network externalities, i.e., their value (utility) **increases** with others using the same good.

Negative Network Externalities

- A few goods show *negative* network externalities, i.e., their value (utility) **decreases** with others using the same good.

Direct Network Externalities

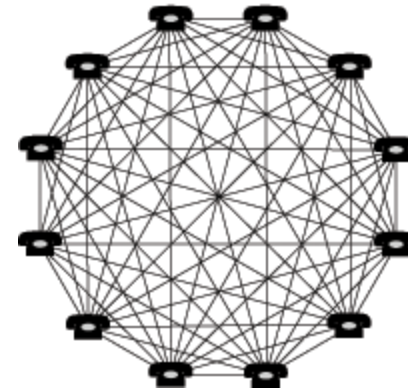
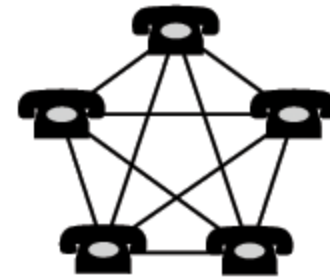
- Increase in value (utility) in your direct consumption of the good
 - Examples / Sources:
 - More useful
 - More enjoyable
 - More effective
- because others are consuming the same good

Indirect Network Externalities

- Increase in value (utility) because the availability of complementing goods or services increases.
- Examples:
 - More add-ons for PCs than for Macs
 - More training for Word than for LaTeX

Metcalfe's Law

- The value of a telecommunications network is proportional to the square of the number of users of the system (n^2).
- First formulated by Robert Metcalfe in regard to Ethernet.
- Explains many of the network effects of communication technologies and networks such as the Internet and World Wide Web.



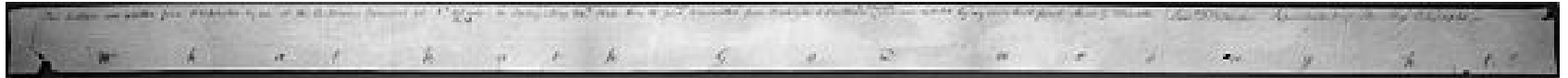
cf. Wikipedia

Standards and Standardization

- **Standards:** Common agreements on technical specifications of interfaces or components
- **Examples:**
 - VHS Video
 - Audio CD
 - Microsoft Windows Operating System
 - Metric threads
 - Railway gauges

Cf. [1,2]

1844: First telegram by Samuel F. Morse



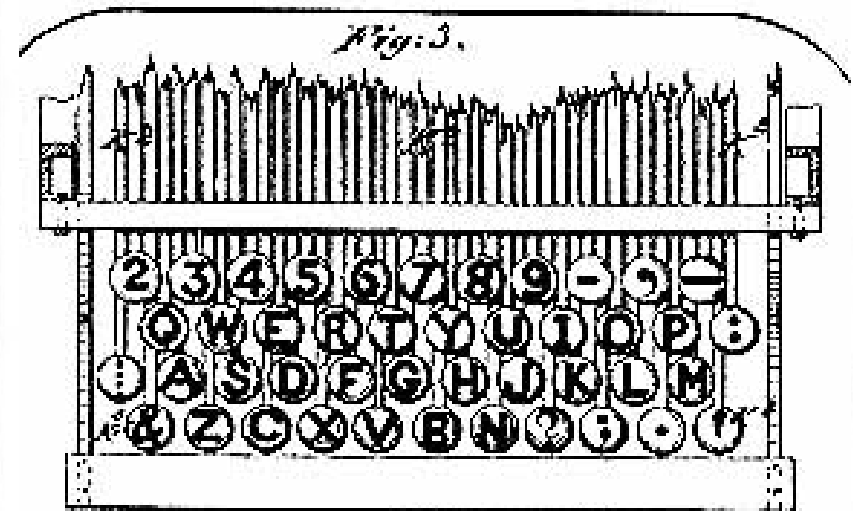
First message "*What hath God wrought*"
sent by Samuel F.B. Morse in 1844.

1853: The World uses Morse's code

Keyboard Layout

- QWERTY vs. Dvorak

Dvorak 1932



Sholes-Glidden 1873



Standards and Standardization (2)

- Standards create positive network externalities
- Products become more interoperable
- (Data) exchange is facilitated
- Improve consumer choice for components
 - multiple vendors can provide a small particular component.

Standards and Standardization (3)

- The Baltimore Fire in 1904
- Lack of standards for fire-fighting equipment

Standards and Standardization (4): Effects

- Reduced uncertainty: technology risk,
- Reduced consumer lock-in
- Competition on price than on features
- Competition between components instead of systems

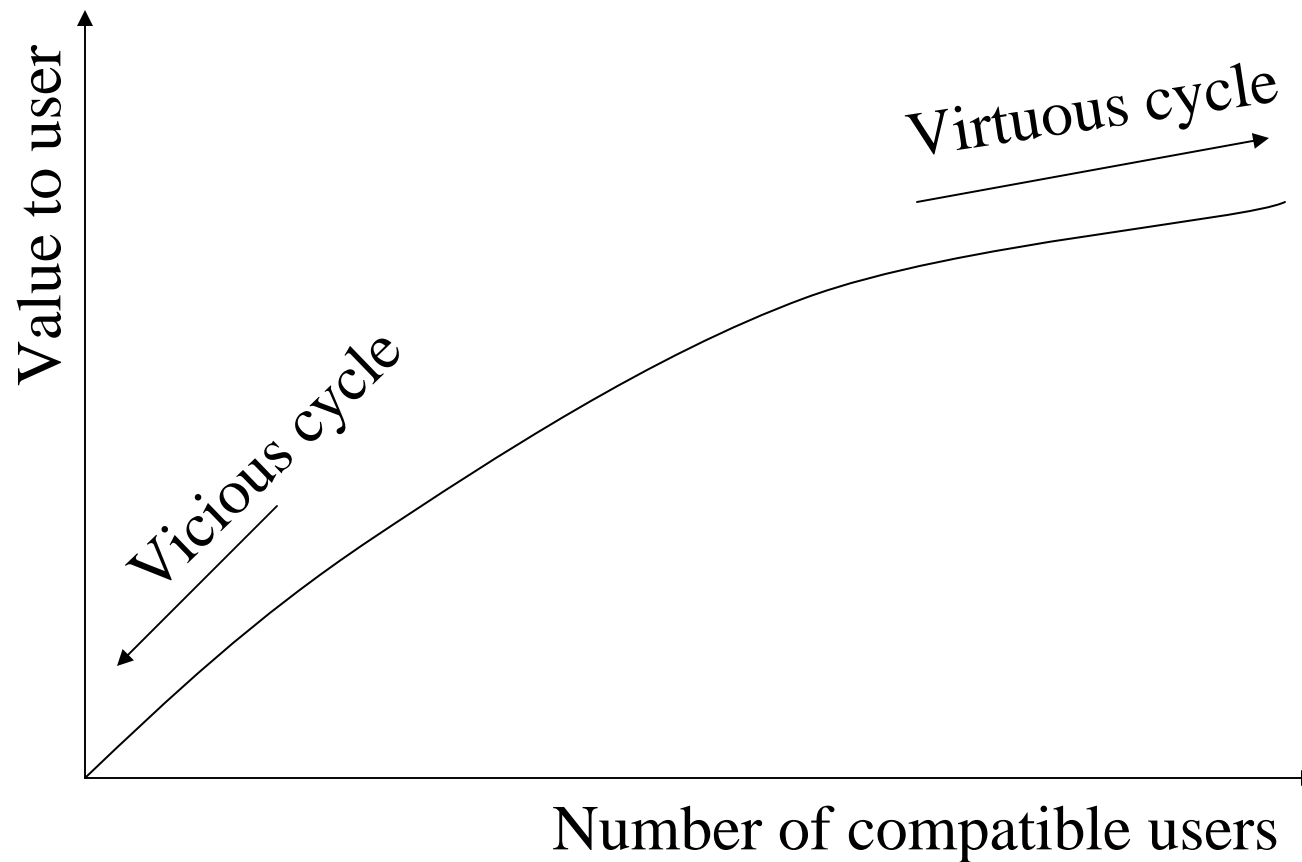
Cf. [1,2]

Successful Standardization

- Lots of successful standards
 - VHS
 - 56k Modem
- Lots unsuccessful standards
 - Betamax video
 - OS/2 Operating System
- Strategies
 - Free tooling (e.g. Adobe Acrobat reader)
 - Strong alliances and credible support
 - Backward compatibility or easing migrations (e.g. of old data)
 - It's mostly about managing expectations and reducing uncertainty

Cf. [1,2]

Popularity Adds Value in a Network Industry



Source: [2]

Switching Costs

- **Switching Costs:** Effort to migrate from one technology platform to a second one
 - MS Windows vs. Mac OS
 - LP vs. CD
 - E-mail data from Outlook to Thunderbird
 - Sony to Nokia Cellphones
- **Causes**
 - Need for new components (decrease over time)
 - Migration of existing data
 - Training and learning (**increase over time**)

Cf. [1,2]

Lock-in

- Difficulties of changing the provider due to switching costs
- Examples:
 - Web links in deli.cio.us
 - Documents in MS Word or Adobe PDF format
 - Personal data and past purchases in Amazon DB
 - Direct debit / Bank account details
- Allows vendors and providers to create additional profits
- New vendor can try to cover part of your switching costs

Cf. [1,2]

Managing Lock-in

- Enterprises try to manage and exploit lock-in effects
- Increasing value of the current offer
 - Example: personalized content
- Pricing of consumables vs. devices
 - Example: Printers vs. toner
- High market share \neq High switching costs
- Discounts to influential buyers
- Cumulative discounts and loyalty programs Cf. [1,2]

Pricing in the Internet Age

- Cost structure:
 - High fixed costs
 - Low marginal costs
- Cost-based pricing does not work
- Pricing based on consumer value more appropriate
- Differential pricing

Cf. [1,2]

Pricing in the Internet Age: Differential Pricing

- **Idea:** Vary products slightly to harvest differing willingness to pay
- **Examples**
 - Expensive hard-cover books first, soft-cover delayed
 - Software variants, e.g. restricted in data amounts or processing power

Cf. [2]

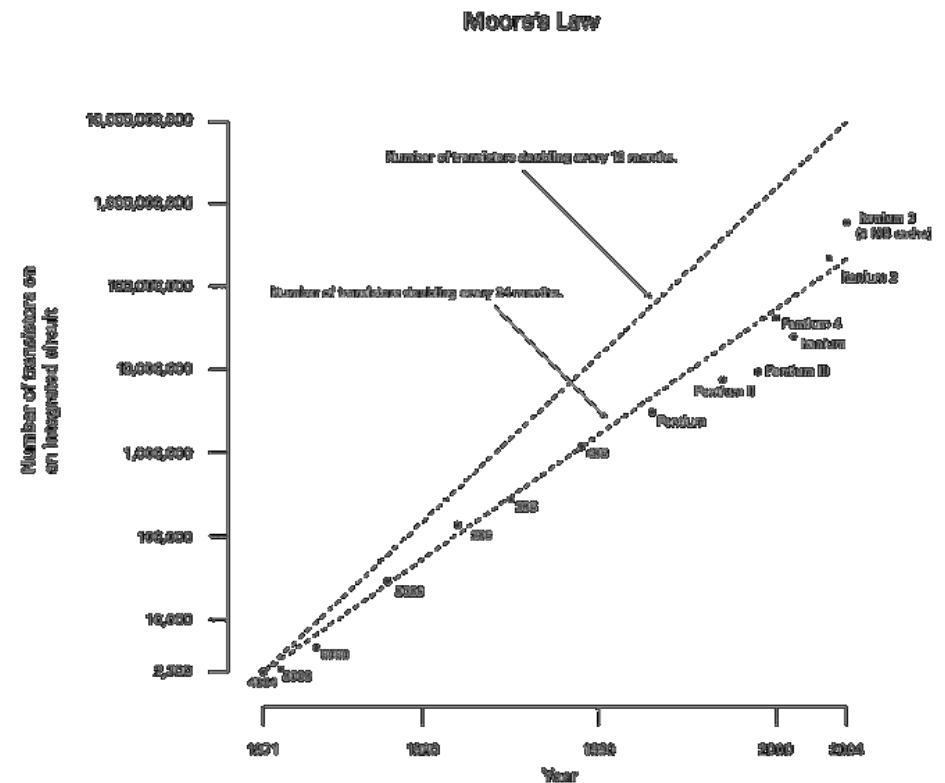
Versioning as Strategic Choice

- By currency and delay
 - The more current, the more costly
- By features
 - Example: Statistics software
- By limitations on data volumes
 - e.g. number of data sets or bandwidth
- By processing or transmission speed

Cf. [2]

Moore's Law

- Empirical observation made in 1965 that the number of transistors on an integrated circuit for minimum component cost **doubles** every 24 months



cf. Wikipedia

References

- [1] M. L. Katz and C. Shapiro, "Network Externalities, Competition, and Compatibility," *American Economic Review*, vol. 75, pp. 424-440, 1985.
- [2] C. Shapiro and H. R. Varian, *Information Rules: A strategic Guide to the Network Economy*. Boston, MA, USA: Harvard Business School Press, 1998.

Thank you!

The slides of today's class will be available
at <http://www.heppnetz.de/teaching/img/>
shortly.