# 15.912 Technology Strategy, Fall 2008

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# Network Effects and Standards-Based Competition

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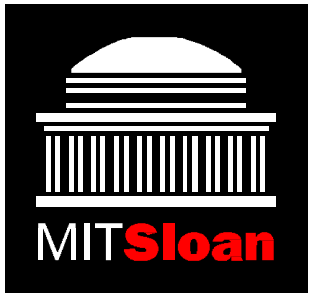


# What is a standard?

- A standard is a specification that allows for interoperability

- Eg:
  - Cups and lids
  - Pistons and engines
  - Telephones and sockets
  - Speakers and amplifiers
  - Hardware and software

# Outline

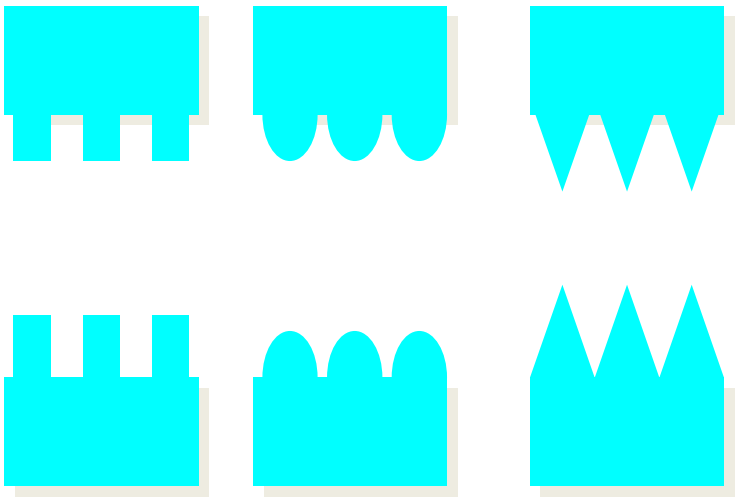
- The power of common standards – when (and why) do industries "tip"?
- Coming soon to an industry near you: the push for public, open standards
- Making money in an open world
- Standards matter because they create "network effects," "tipping," and "lock-in"

# It’s not just about high technology

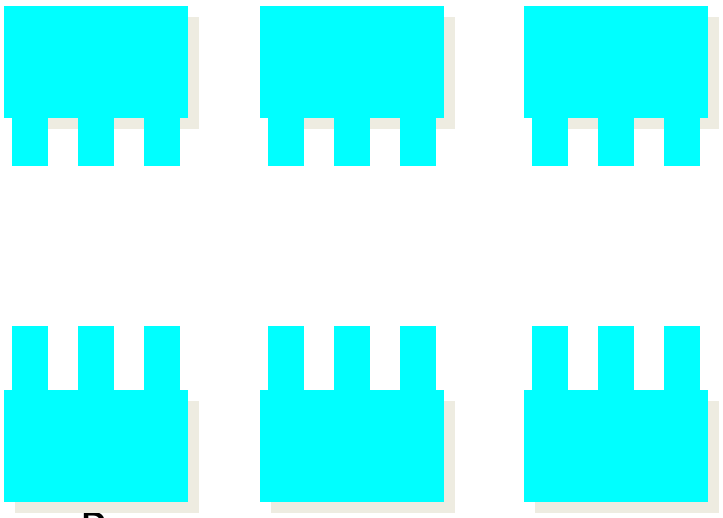
- Bicycles
- Financial services
- Health care
- Automobiles

# The push for common standards

# The pros and cons of common standards



- Pros
- Cons



- Pros
- Cons

# Tipping

- Markets “tip” when one standard becomes the preferred choice of nearly every consumer
  - VHS
  - Windows on the PC
- Not all markets tip: in some markets multiple standards co-exist
  - UNIX vs. Windows on servers
  - Sony vs. Microsoft in video games
  - Palm vs. Windows CE in PDAs
  - Multiple standards in cellular phones

# “Great products” vs. “Platforms”

## Great Products

- Consumers base their purchase decision on the intrinsic value of the product to them
- *What would this be worth to me if I were the only buyer in the world?*
- Competition on the basis of features, price etc

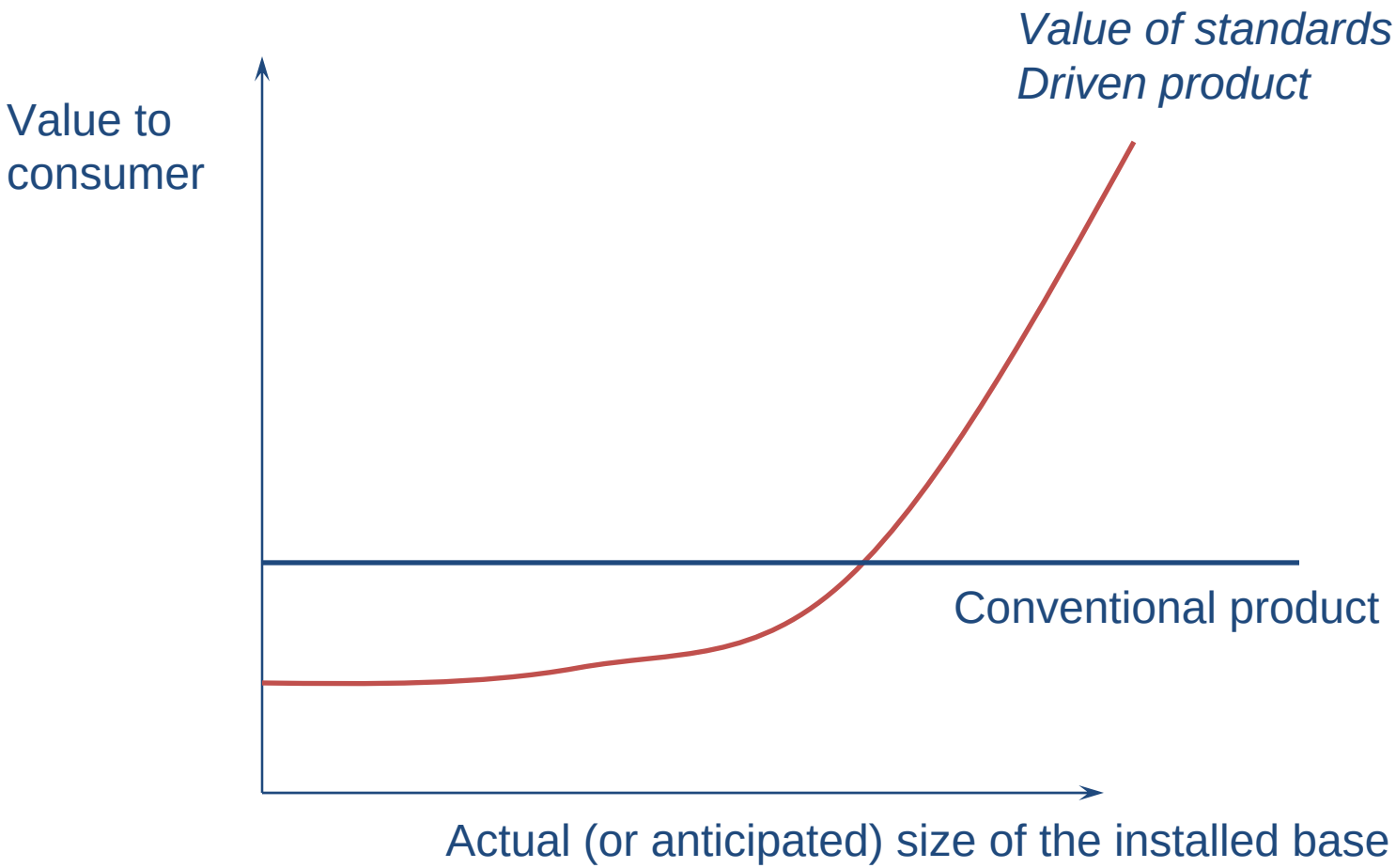
## Platforms

- Consumers base purchase decisions on the size of the (actual or projected) installed base and/or the (actual or projected) availability of network externalities
- *How many other people are likely to buy this product?*
- Competition on the basis of the size of network effects: installed base, availability of complementary products etc

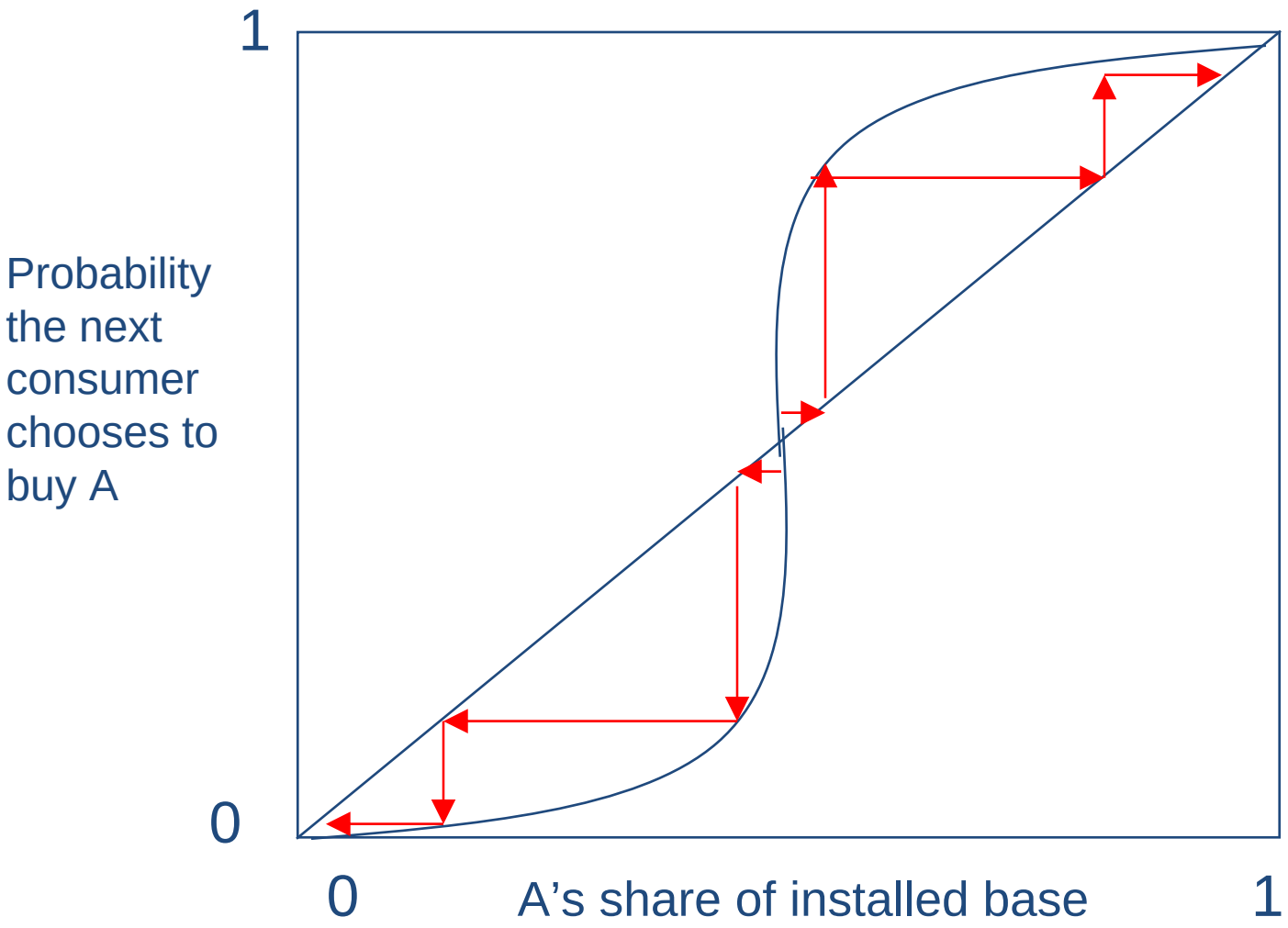
# There are two sources of network effects

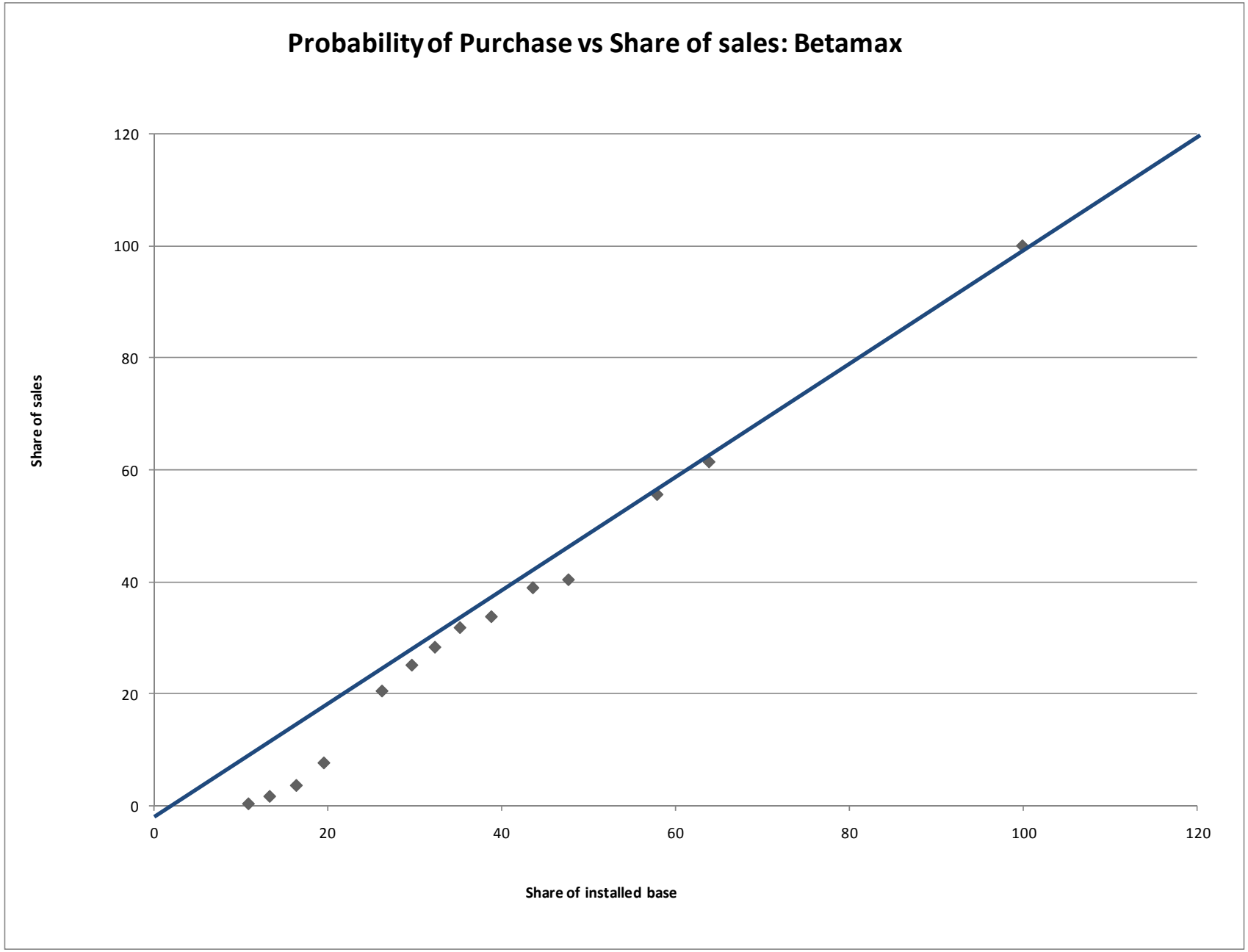
- Direct network effects
  - Network size
  - *Value increases with the number of other individuals who own the same product*
    - E.g.: Telephones, fax machines
- Indirect network effects
  - Complementary products/services
  - *Value increases with the number of complementary products that are available*
    - E.g.: CDs, software, VHS/Beta
  - Learning by using
  - *Standards mean customers invest only once in learning to use the technology:*
    - E.g.: Qwerty keyboard, Autocad

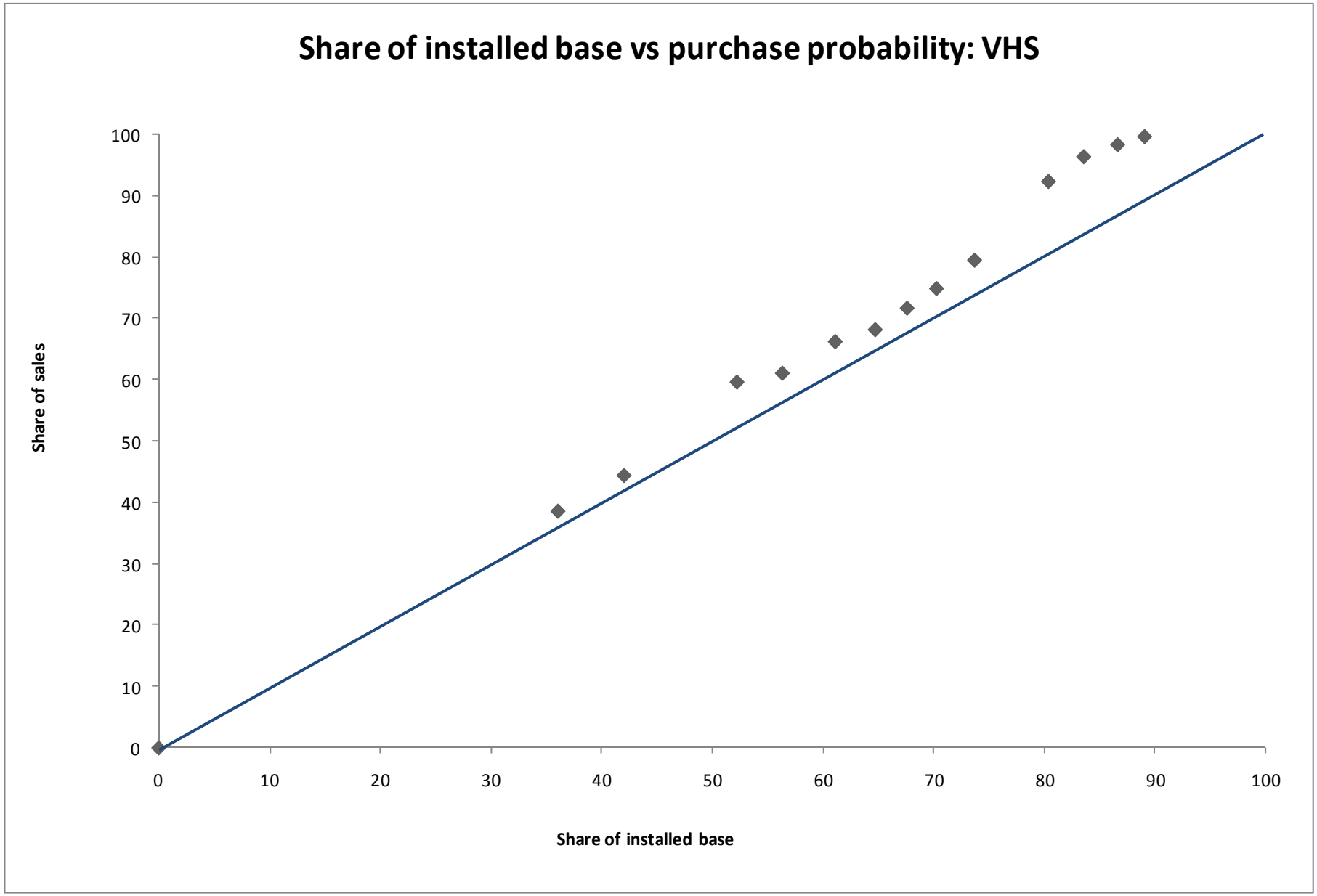
# With Strong Network Effects *Market Share Itself Creates Value*

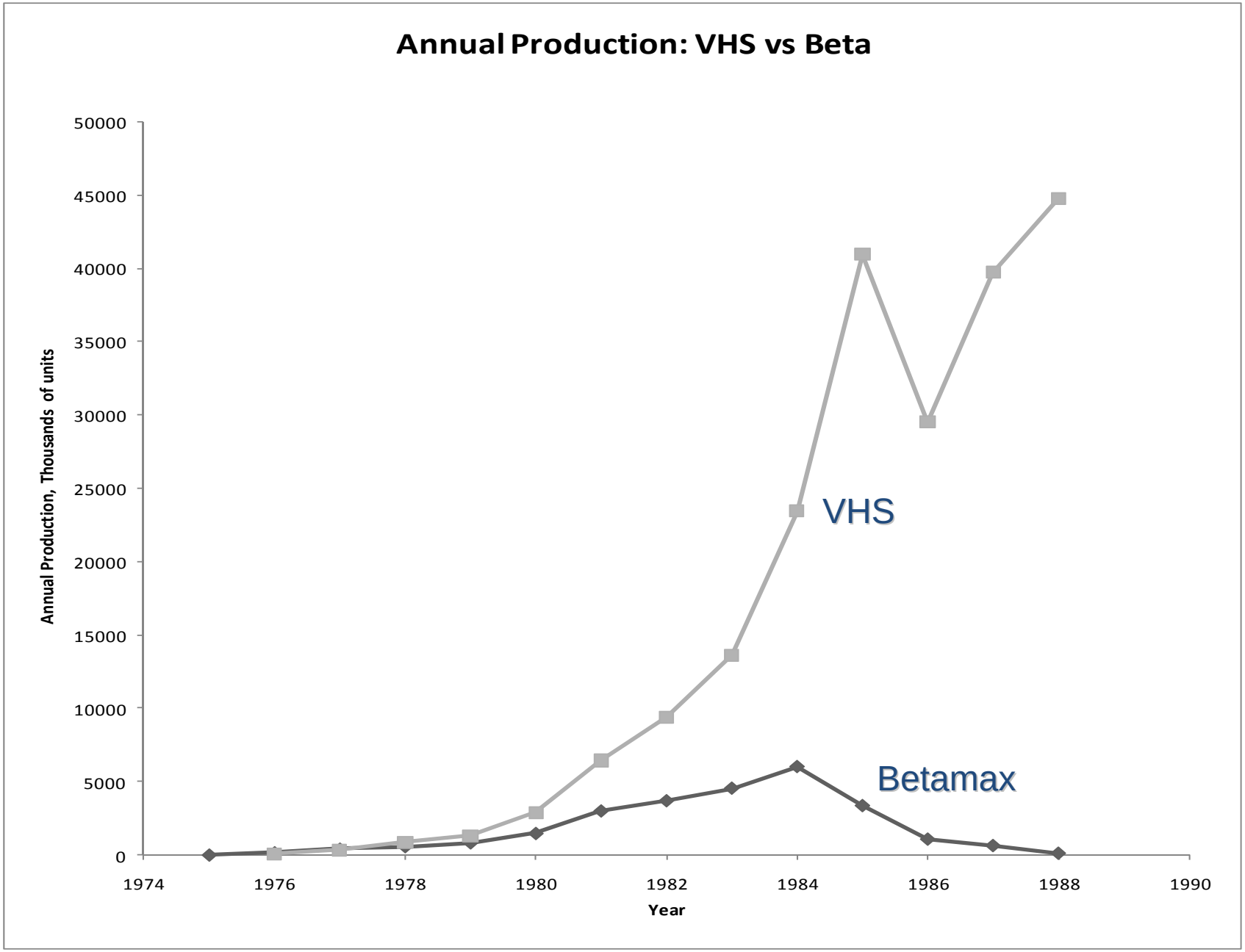


# If network effects are important, markets may “tip”




Probability of Purchase vs Share of sales: Betamax
Share of sales
120
100
80
60
40
20
0
0
20
40
60
80
100
120
Share of installed base

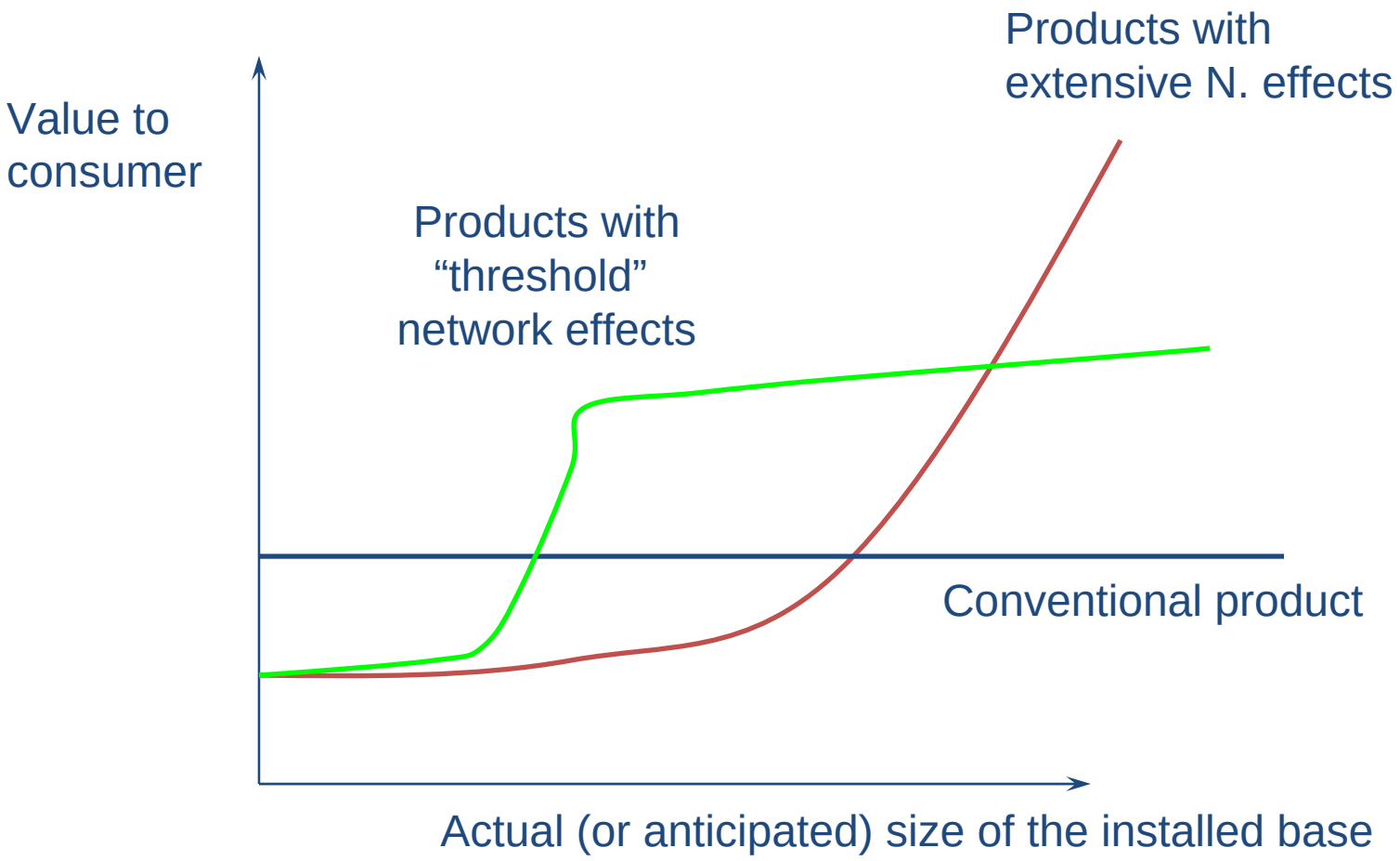

Share of installed base vs purchase probability: VHS
Share of sales
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Share of installed base


Annual Production: VHS vs Beta
Annual Production, Thousands of units
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
1974
1976
1978
1980
1982
1984
1986
1988
1990
Year
VHS
Betamax

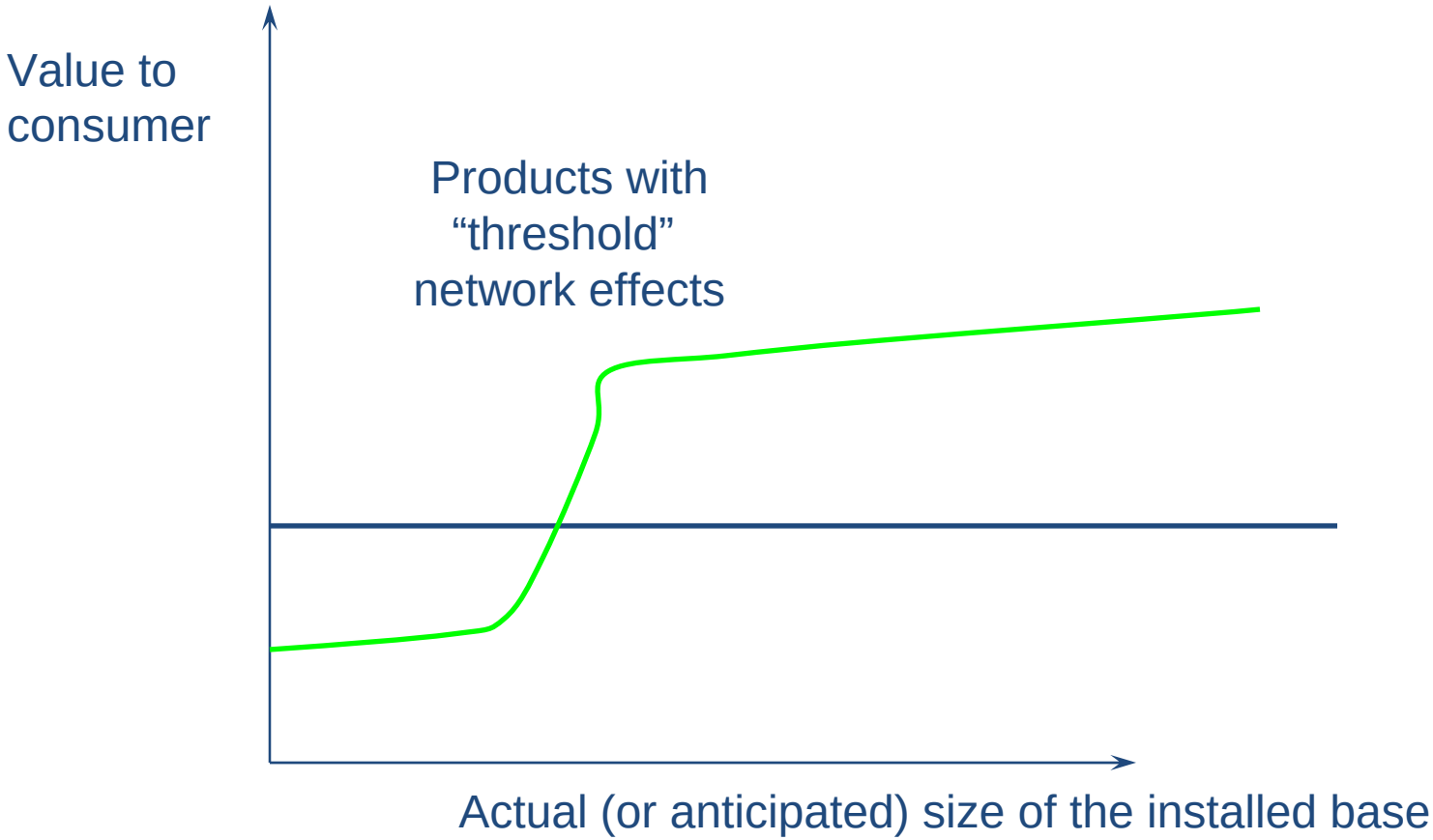
# Strong network effects and high switching costs may create “lock-in”

- All consumers might prefer to adopt a different standard
- But, if it is expensive to switch between standards (high switching costs) and network effects are important and costly to create, then markets may become “locked in” to particular standards
- “Lock-in” has dramatic competitive implications

# Tipping dynamics differ with the strength of network effects



# Will this market tip?



# Will this market tip?

# What about Blu-Ray and HD DVD formats? Did they tip?

- Did either standard hit a market share threshold?
  - Or did the market just give up on HD?
- Was this ultimately good for consumers?
- Why couldn't they make a deal?

# Establishing a standard: Sun

- Sun was founded in 1982 to focus on the workstation market
- It offered an “open” standard:
  - Standard components,
  - UNIX operating system

# Sun (2)

- 1980: Apollo founded
- 1983: Apollo has $18m in sales, dominates the workstation market -- uses a proprietary operating system
- 1983: Sun has $1m in sales, mostly to universities
- Lead customer, Computervision “likes the technology but doesn’t find the company credible” -- “we love your technology but there is no way you can supply it. Apollo is the standard in the industry, well financed and well managed.”
- What should Sun do?

What should Sun do?

# The push for public, open standards

# Establishing a standard

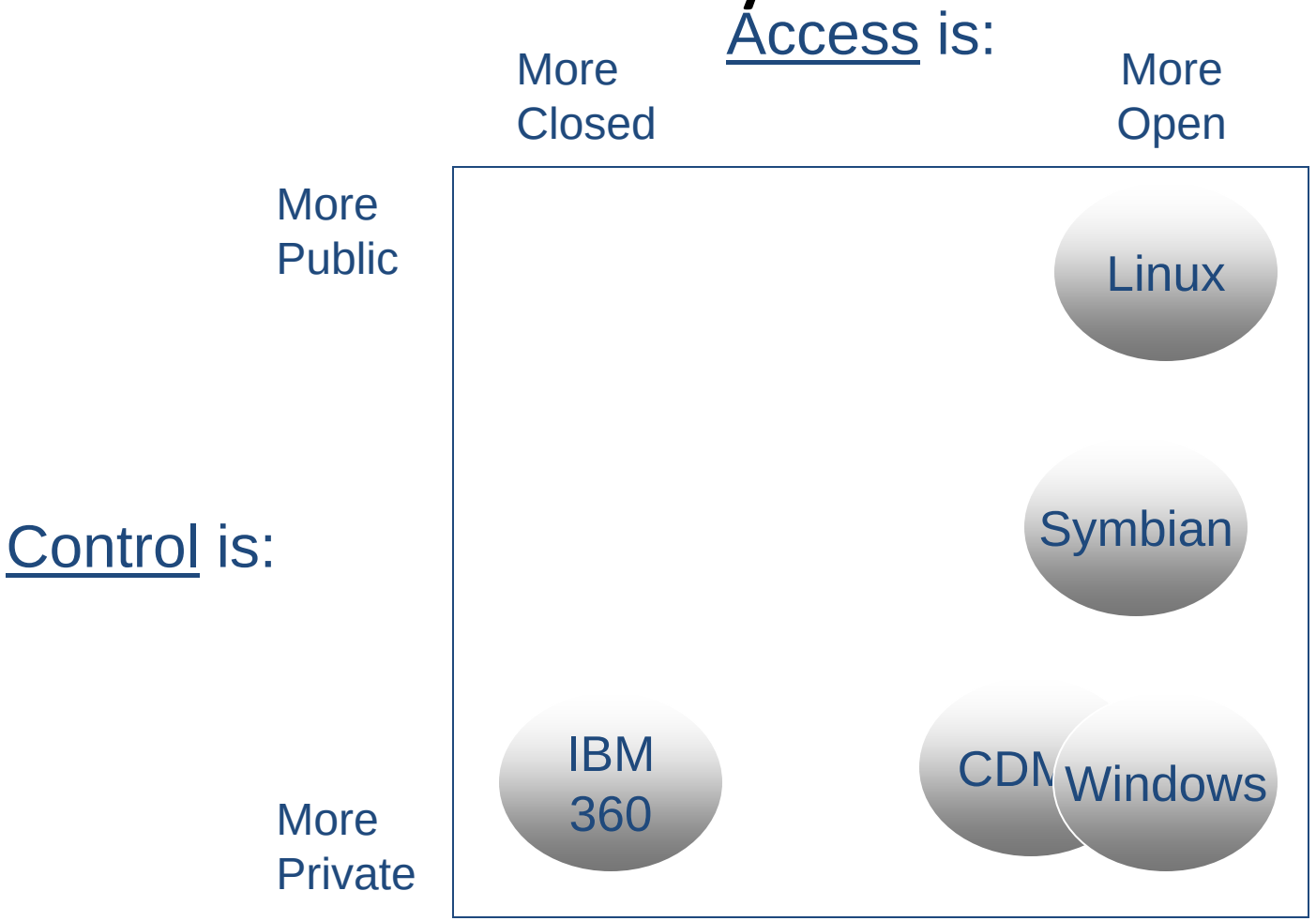
- Introduce a great “product”
- Come to market ahead of competition
- Build expectations
- Develop, or encourage the development of, complementary products and services
- Give it away: put the standard in the public sector

- Sounds great, but this is expensive!
- …and – these days – your competitor is trying to do the same thing!

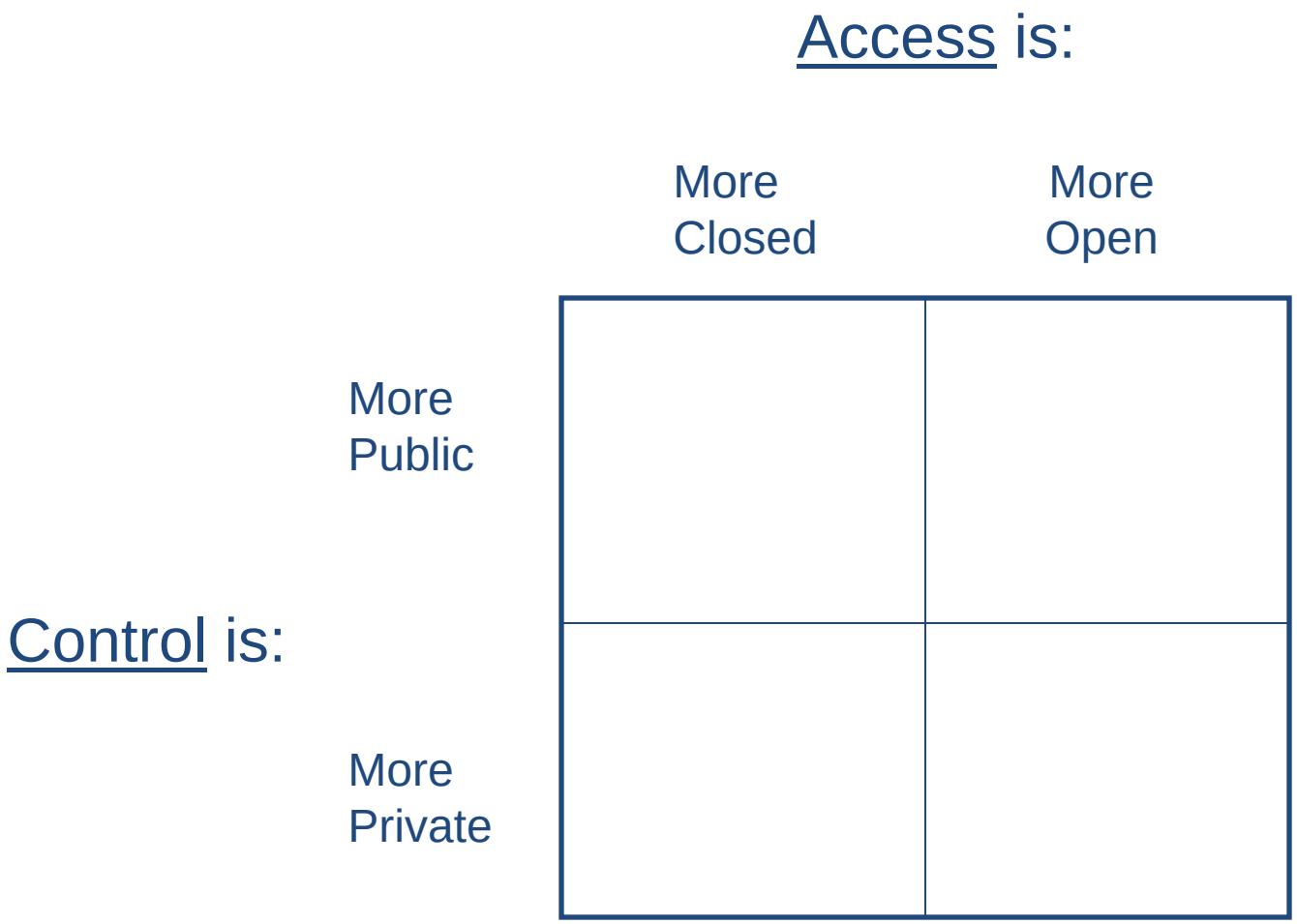
# Thinking about the dynamics of the strategic space

| Control is: | Access is: Closed | Access is: Open |
|---|---|---|
| Public | Standards are owned and controlled by the public sector but are not freely available<br><br>E.g. Cryptography | Details of standards are available to all: no single firm has control over how they evolve: no charge for their use<br><br>E.g. TCP/IP, HTML |
| Private | Technology may be standard, but details are not made available beyond the firm<br><br>E.g. Landmark Graphics, IBM 360 | Details of standard are made available to all: but owner has control over how the standard evolves and may charge for use<br><br>E.g. Nintendo, Palm OS |

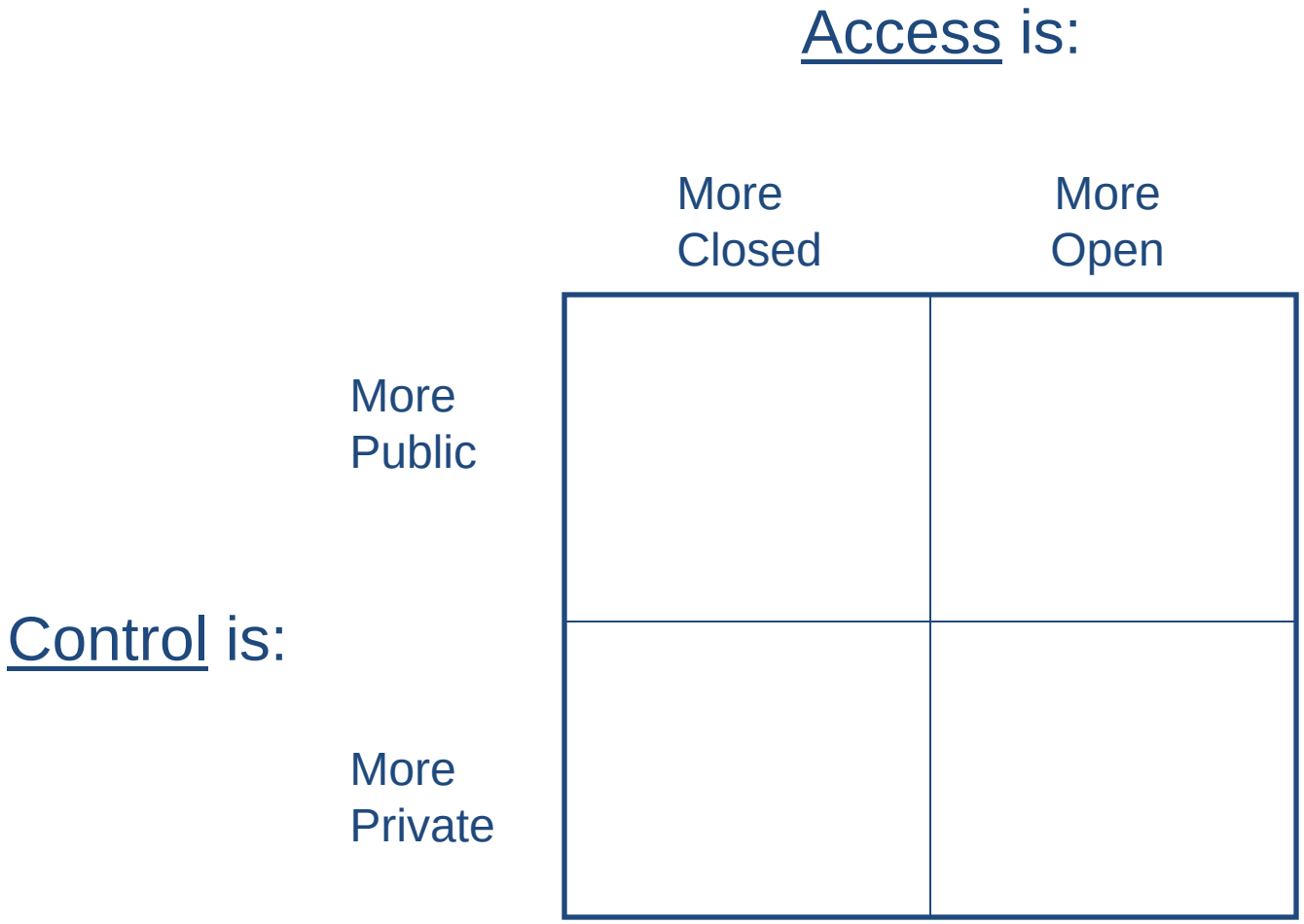
# In practice these boundaries are fuzzy:



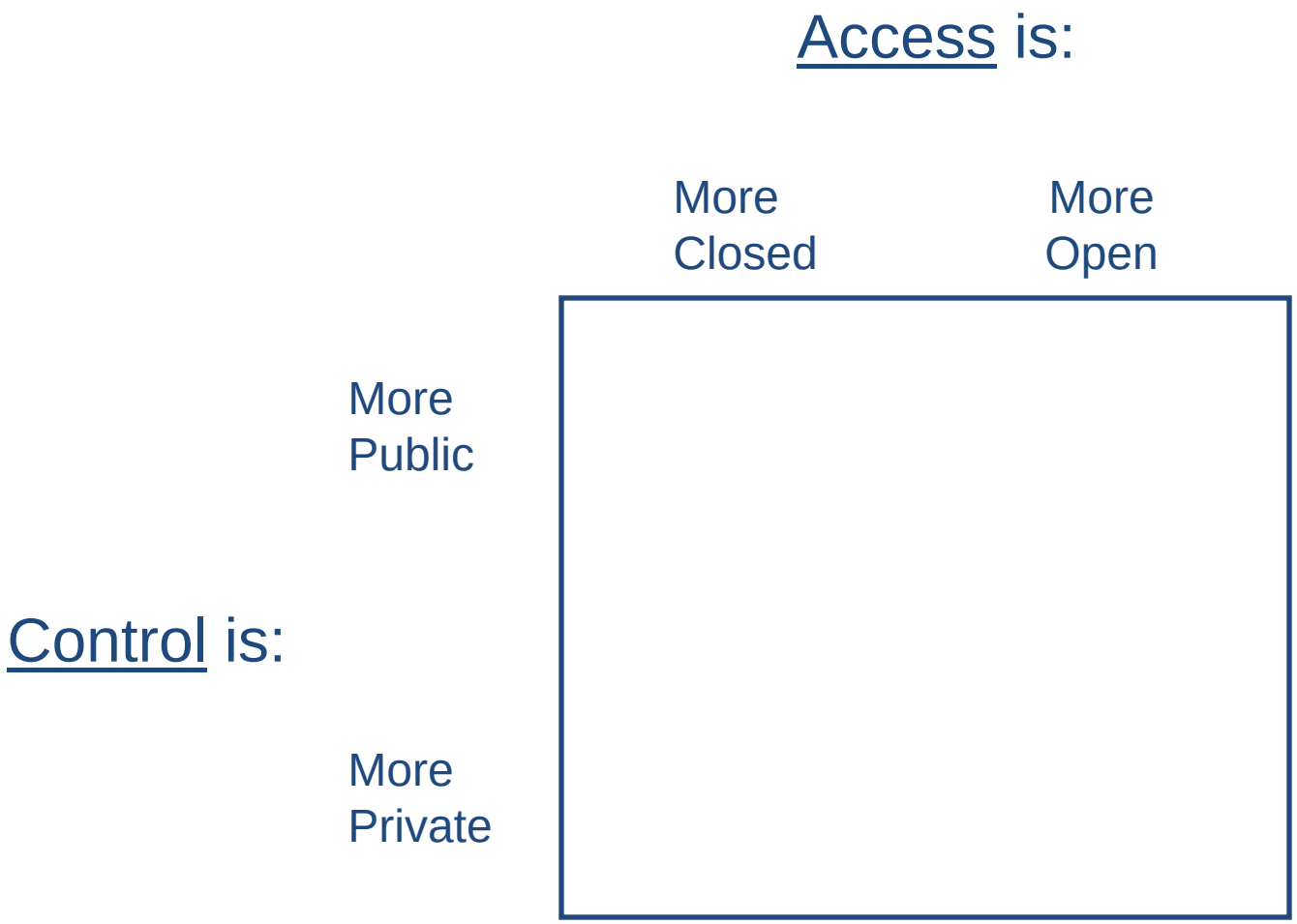
# Conventional logic (1):
# What do customers prefer?



# Conventional logic (2): What do producers prefer?



# How do industries evolve over time?



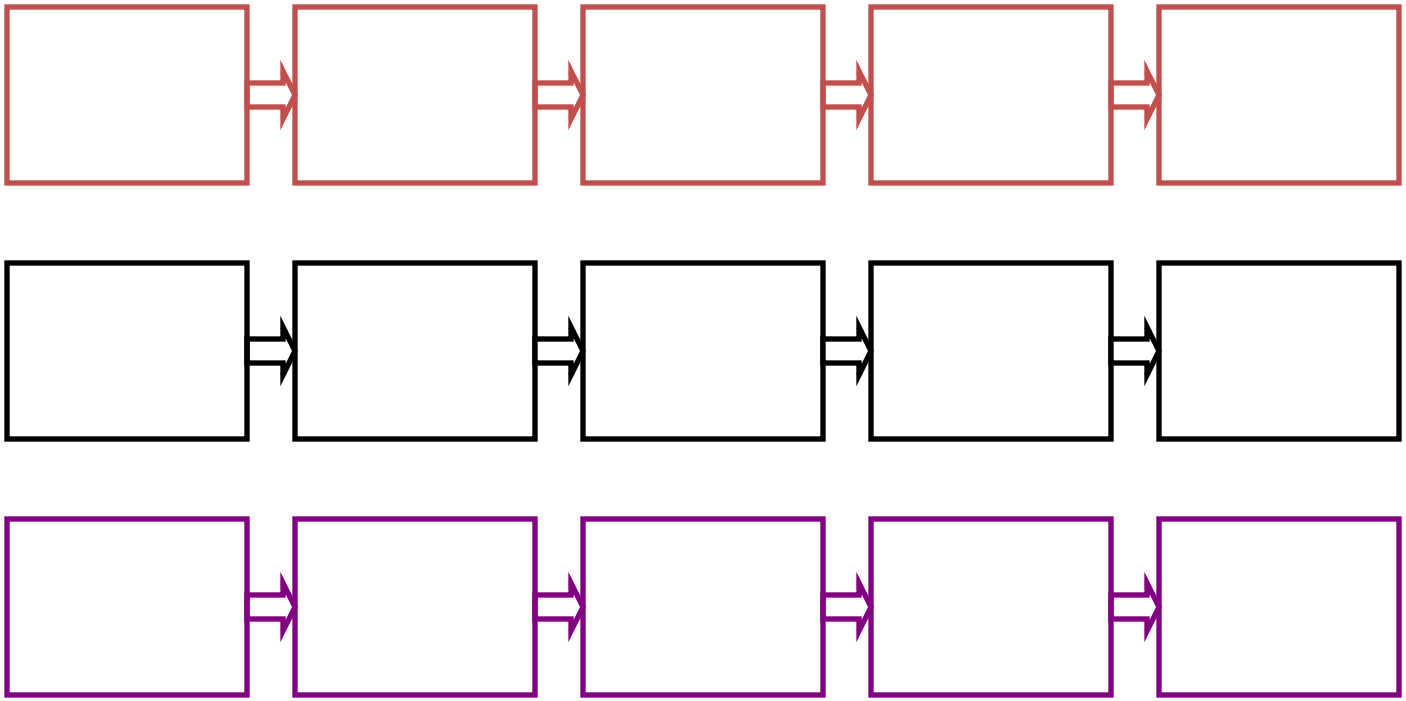
# Making money in an open world

# Business models in the different quadrants

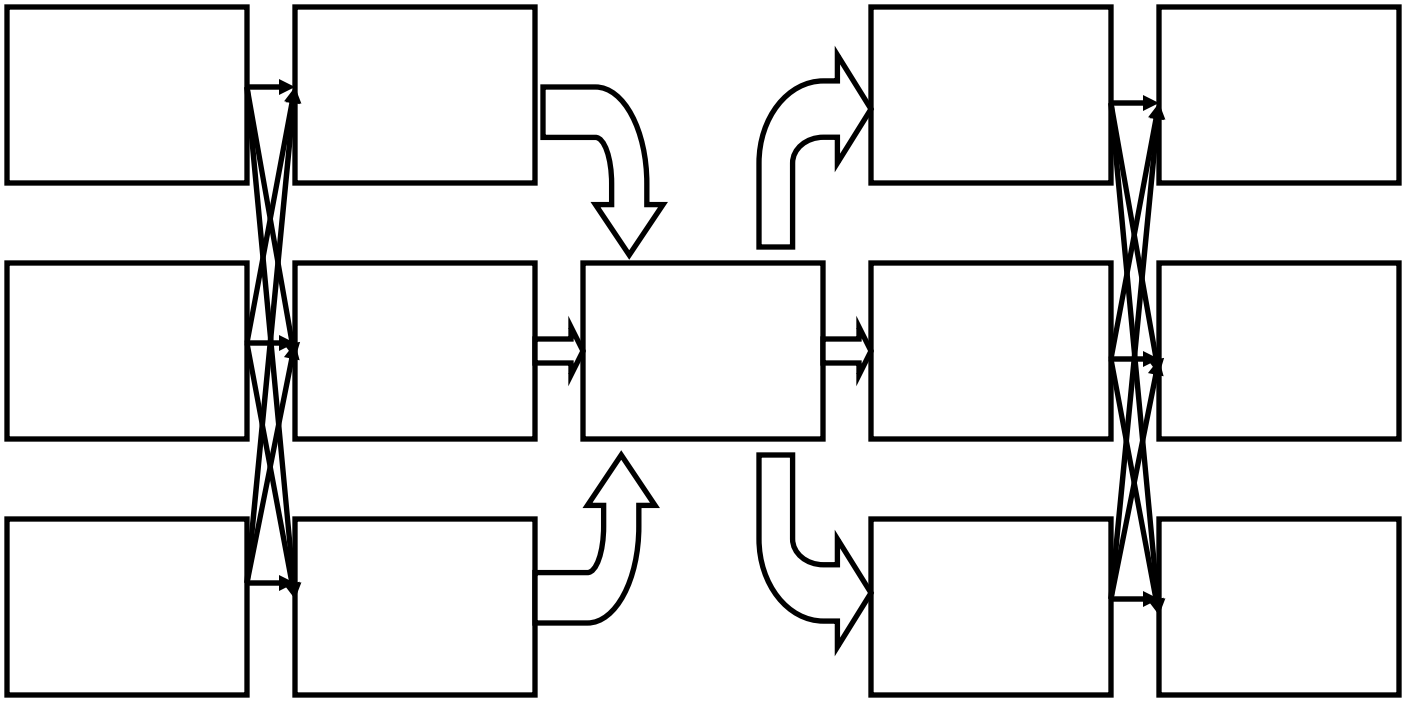
The technology is:

| Control is: | Closed | Open |
|---|---|---|
| Public | | Compete on a level field<br>Move to “soft” standards? |
| Private | Deliver a best in class system | Encourage the “ecosystem”<br>Embrace/extend |

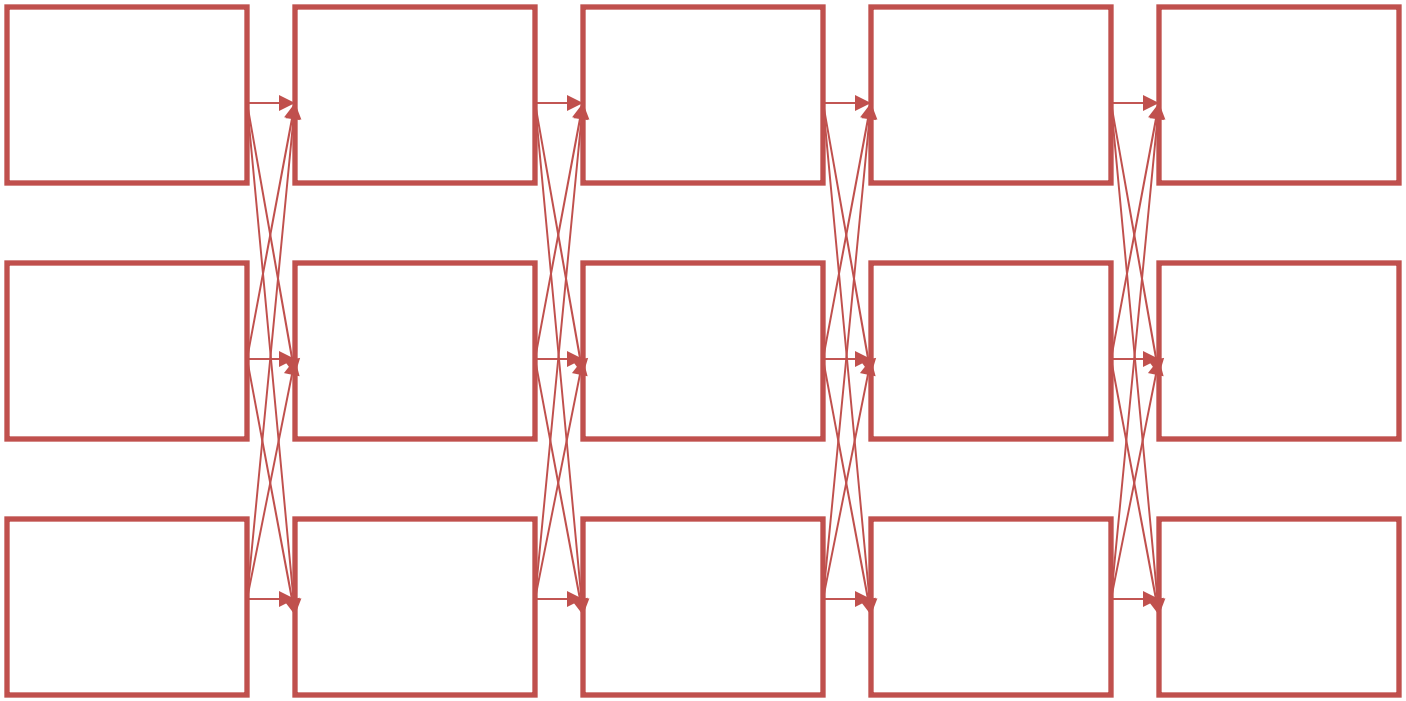
# Where's the money?
# Competition in a closed, private world



# Where's the money?
# Competition in an open private world



# Where's the money?
# The challenge of an open public world



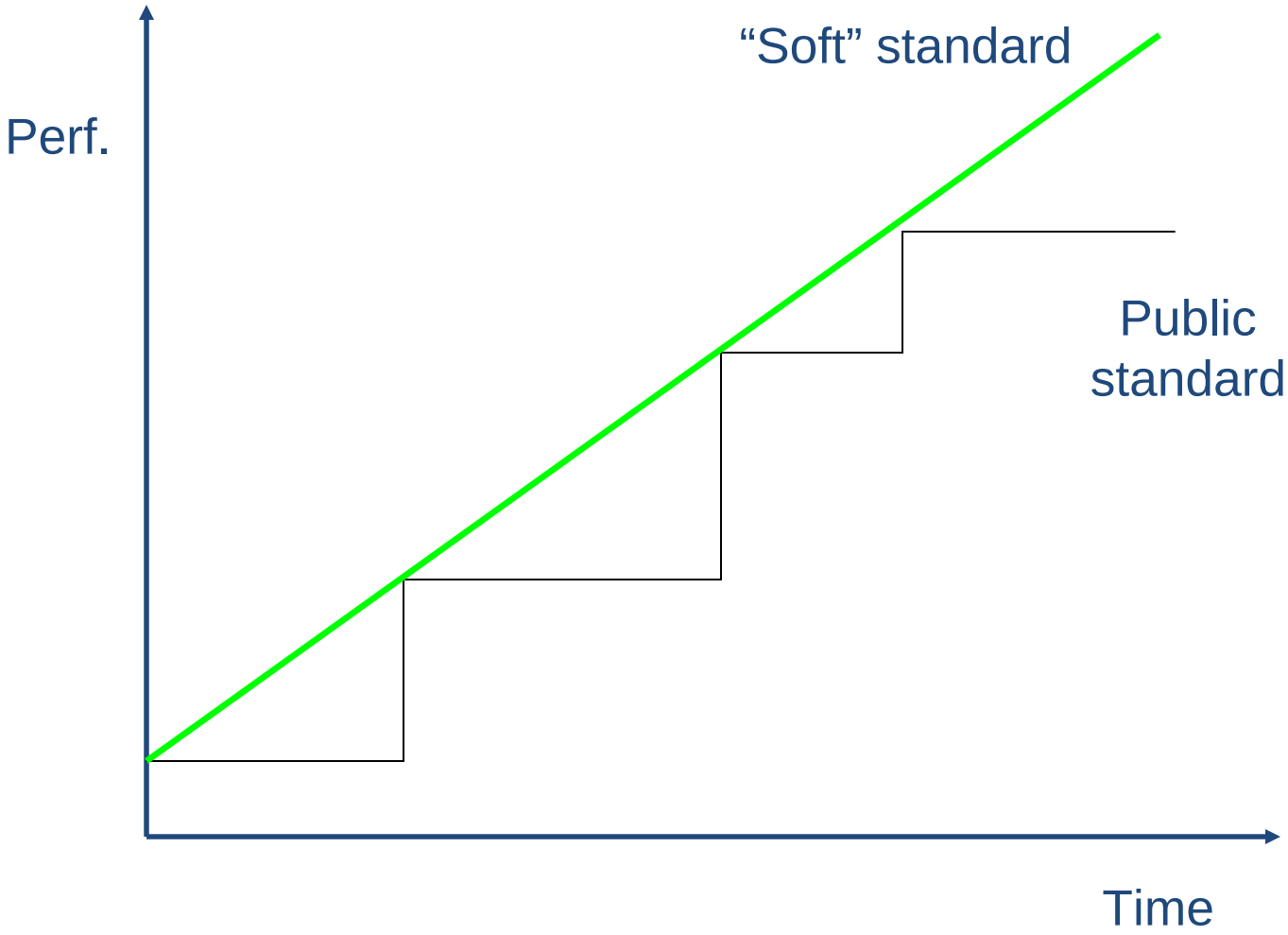
# Making money in an open public world

- Competing on a level playing field:
  - Do it better, faster, cheaper, in a more integrated way…
  - Leverage “complementary assets”
- Be part of the evolution of the playing field:
  - Exploring “soft” standards

# Exploring soft standards

- A “soft” standard is a specification that is completely compatible with current public standards but offers enhanced functionality and performance
- It offers customers the security of knowing that they have avoided  being “locked in” and an upgrade path to the public standard
- Plus the functionality and performance of a more finely “tuned” technology
- May permit significant premium pricing and the generation of customer loyalty

# Soft standards in action:



# Managing soft standards

- Maintaining customer trust is critical:
  - The instant they come to believe you're trying to lock them in, there will be trouble
- The technology task is complex. The "soft" standard must be:
  - Better than the public standard
  - Compatible with the current version
  - Compatible with future versions
- Ensuring that the "soft" technology is embodied in future generations of the technology may be a central strategic goal

# Standards: Conclusions

- Not all markets “tip”, or move to a common standard: but as network effects (connectivity, complementary services, tools, products) become more important, more and more will.
- Getting a private standard established in these kinds of worlds is likely to be increasingly difficult
- Fortunately, there are ways to make money in an open world - but managing a “soft” standard requires sustained attention

# Looking forward

- Next time, Linux and Open Source:
  - How should Red Hat make money?