

# MI 720 Session #2

## *Five Distinctive IT Characteristics: Implications for Business Value Creation*

01/24/2007

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## Agenda

- ◆ Five IT characteristics
  - Digitalization of content
  - Exponential price-performance improvements
  - Network effects/virtuous cycles in adoption
  - Standardization and commoditization of IT layers
  - Switching costs and lock-in
- ◆ Digital photography mini-case

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# 1. Digitalization of Content

- ◆ “Moving from atoms to bits” (Nicholas Negroponte)
  - VCR => DVR => VOD
  - LP => CD => MP3
  - Analog cellular => digital cellular => smart phones
  - Film cameras => digital cameras
  - Paper books => ebooks
- ◆ How is digital better? Is it ever worse?
- ◆ Managerial Implications?
  - Intellectual property protection
  - Pricing, payment and distribution
  - Changes to downstream & upstream value chains

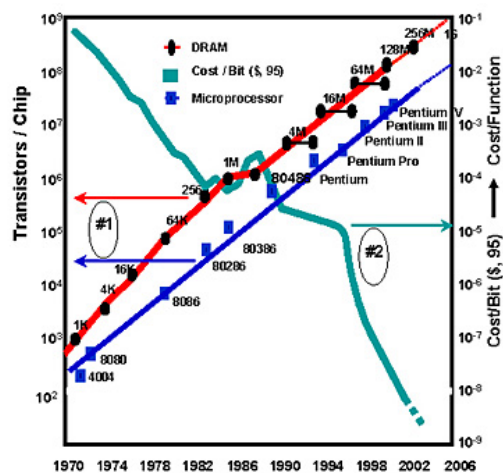
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# 2. Exponential Price/Perf Improvements

- ◆ Moore's Law:  
*The density of circuits on a chip, and therefore the performance, doubles every 18-24 months*



Source: MIT Web Site

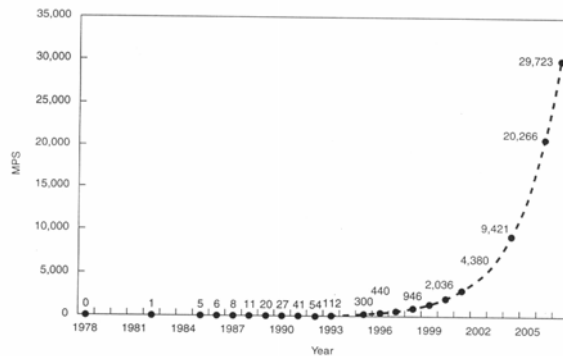
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# Moore's Law on a Linear Scale...

EXHIBIT 8 The Historical and Forecasted Microprocessor Power.



- ◆ Mgmt implications of exponential price/perf improvement
  - A tremendous source of value-added for the whole economy
  - A rapid and (counterintuitive) shift in what's possible

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# What Moore's Law has Wrought...



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### 3. Network Effects/Virtuous Cycles

- ◆ Network effects
  - Many kinds of IT increase in value to each adopter in direct proportion to the other number of other adopters
- ◆ Sources of network effects (Brian Arthur)
  - Direct “network” externalities
  - Other sources of network effects
    - Producer economies of scale and learning curves
    - Technological interrelatedness (ecosystems)
    - Learning-by-using
    - Informational increasing returns

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### Network Externalities

- ◆ Direct adopter-to-adopter interactions
  - Communication, exchange of information-based assets



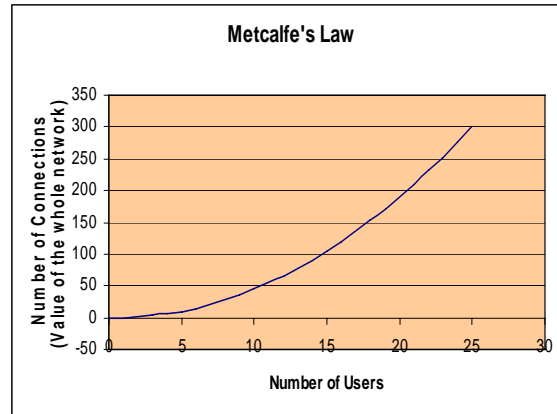
- ◆ Positive externalities, negative externalities

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## Metcalfe's Law



- ◆ The value a communications network goes up with the number of possible connections

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## Other sources of network effects

- ◆ Producer economies of scale & learning curves
  - Economies of scale
  - Benefits of cumulative experience “Learning-by-doing” (Brian Arrow)
- ◆ Technological interrelatedness
  - The more a technology is used, the more infrastructure and complements are supplied for it
  - The result is a more robust “Ecosystem” (Geoffrey Moore)

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## Other sources of network effects (cont.)

- ◆ Learning-by-using
  - Adopters learn how to improve the technology; share this with vendors
  - “Lead users” (Eric von Hippel)
- ◆ Informational increasing returns
  - As technology gets used, the whole community figures out how best to apply it
  - “The Dynamo and the Computer” (Paul David)

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## Network Effects on the Internet

Q. Which of these dominant internet companies have the strongest network effects? Why?

- Amazon?
- eBay?
- Yahoo?
- Google

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## Network Effects: Implications

- ◆ Distinctive economics: “Qwertynomics” (Paul David)
- ◆ Distinctive adoption dynamics
  - Self-reinforcing adoption processes (virtuous cycles)
  - “Standards wars”
  - Winner-take-all outcomes
  - Path dependency
  - Lock-in
- ◆ Implications for vendors
  - Understand “natural” sources of network effects
  - If strong, much attention to managing virtuous cycles
  - Any way to ADD network effects to product/service?
- ◆ Implications for adopters
  - Pick the winner! Or at least, preserve a migration path...

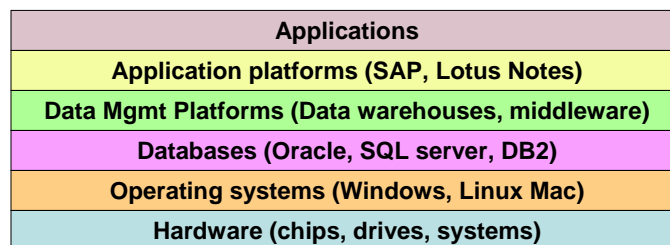
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## 4. Standardization/Commoditization

- ◆ IT is characterized by a stack of layers that is increasingly standardized and commoditized...



- ◆ Managerial Implications
  - Drives network effects, lowers costs
  - Decreases variation/lowers margins within a layer
  - Moves focus of innovation up the stack
  - Increases total amount of innovation?

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## 5. Switching Costs & Lock-in

- ◆ *Switching costs* are incurred when moving from one supplier or product to another, including:
  - Searching for and evaluating alternatives
  - Acquiring and installing the alternative
  - Conversion and retraining
  - Getting by while technology matures and network grows
- ◆ Why are switching costs so high for IT products?
- ◆ Managerial implications
  - Technology level: Lock-in
  - Adopters: beware of switching costs
  - Suppliers: find ways to impose switching costs

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## Conclusions

- ◆ Savvy managers need to understand ...
  1. Digitalization of content
  2. Exponential price-performance improvements
  3. Network effects/virtuous cycles
  4. Standardization and commoditization of IT layers
  5. Switching costs and lock-in
- ◆ Each characteristic/trend has key implications for value creation and IT strategy and management

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