Class announcements

- **Thursday:**
  - Messerschmitt Ch 18 (493-512)
  - Database assignment due

- **Tuesday**
  - Assignment 4 due
Student Presentations
Some pricing alternatives

Price discrimination?
Usage dependent?
Terms and conditions
- fixed, leasing, per-use, subscription

Bundles
- maintenance, support

Who pays?
- sometimes not the end user

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Infrastructure acquisition

Infrastructure

Build and operate
Build but do not operate
Do not build but operate
Neither

Trend

Outsourced operations
System integrator
Service provider

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Application acquisition

Application

Develop internally  Buy as product  Contract development  Product w/ customization

Software supplier  Outsource developer  Supplier, consultants

Trend
Stovepipe vs. Integrated Infrastructure

**stovepipe architecture**
---or---

*Turnkey Solution*

- Single supplier provides all encompassing solution
- (complete with infrastructure)

**Integrated Infrastructure**

- Separate infrastructure that can support many applications

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From stovepipe to layering

Data  Voice  Video
Application-dependent infrastructure

Many applications

Integrated Infrastructure
(Maybe broken into Additional layers.)

Application-independent
Stovepipe vs. Integrated Infrastructure

- What are some examples of each?

- What are the advantages of each approach?
Vertical Integration vs. Diversification

- A company is **vertically integrated** when it makes rather than buys the subsystems in its products.

- A **diversified** company produces products across different industry segments.
Vertical Integration vs. Diversification

- Why do customers favor less vertical integration?
  - Prefer competition amongst component suppliers
  - Mix and match components
  - Reduced lock in

- Disadvantages??
  - Customer needs to integrate components from different suppliers.

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Vertical Integration vs. Diversification

- Why do customers favor diversification?
  - Reduce coordination costs by having to deal with fewer suppliers.
General Trend

- Less Vertical Integration

- More Diversification

- Of course there are exceptions...
Today’s supplier structure

- Applications
- Frameworks and components
- Middleware
- Infrastructure (network, OS) software
- Equipment (network, computers)
- Semiconductors, components

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Standardization
Purpose of a standard?

- Allow products or services from different suppliers or providers to be interoperable
Scope of a standard

Included:
- interfaces (physical, electrical, information)
- architecture (reference model)
- formats and protocols (FAP)
- compliance tests (or process)

Excluded:
- implementation
- (possibly) extensions
Reference model

Decide decomposition of system
- where interfaces fall

Defines the boundaries of competition and ultimately industrial organization
- competition on the same side of an interface
- complementary suppliers on different sides
- hierarchical decomposition at the option of suppliers
- (possibly) optional extensions at option of suppliers
Some issues

Once a standard is set

- becomes possible source of industry lock-in; overcoming that standard requires a major (~10x?) advance
- may lock out some innovation

In recognition, some standards evolve

- IETF, MPEG
- backward compatibility
Types of standards

_de jure_
- Sanctioned and actively promoted by some organization with jurisdiction, or by government

_de facto_
- Dominant solution arising out of the market
- Voluntary industry standards body

Industry consortium
Common or best practice

Examples?

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Examples

de jure
- GSM, ISDN Telephone interface

de facto
- Microsoft Windows API (Application Programming Interface)
- Intel Pentium instruction set,

Voluntary industry standards body
- IEEE (Institute of Electrical and Electronic Engineers)
- IETF (Internet Engineering Task Force)

Industry consortium
- W3C (World Wide Web Consortium)

Best practice
- Windowed GUI
The changing process

- As technology moves more quickly, global consensus activity has proven too unwieldy
  - e.g. ISO

- “New age” standards activities are more informal, less consensus driven, and involve smaller groups
  - e.g. OMG, IETF, ATM Forum, WAP

Programmable/extensible approaches for flexibility
  - e.g. XML, Java
Old giving way to the new

The Standards Making Universe

Traditional Model Telco Bodies

Traditional Model Information Systems Bodies

New Model Telco Bodies

New Model Information Systems Bodies

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Reasons for change

- From government sanction/ownership to market forces
  - Increasing fragmentation
  - Importance of time to market

Greater complexity

- Less physical/performance constraint for either hardware or software
Lock-in

(Particularly open) standards reduce consumer lock-in
  - Consumers can mix and match complementary products

Increase supplier lock-in
  - Innovation limited by backward compatibility
  - e.g. IP/TCP, x86, Hayes command set
Aside: Network Effects

- The value of owning some products goes up if lots of other people have it too.
  - Examples?

- This phenomenon is called “network effects”

- How do standards influence network effects?
Network effects

Standards can harness network effects to the industry advantage
- Revenue = (market size) x (market share)

Increases value to customer

Increases competition
- Only within confines of the standard
- But forces customer integration or services of a system integrator
Why standards?

*de jure* are customer driven to reduce confusion and cost
*de facto* standards are sometimes the result of positive feedback in network effects

Customers and suppliers like them because they
- increase value
- reduce lockin

Governments like them because they
- promote competition in some circumstances
- May believe they can be used to national advantage

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Approaches

Consensus
- ISO

Collaborative design
- MPEG

Competitive “bake off”
- IETF

Coordination of vendors
- OMG
Open vs. Proprietary Standards

- Open standard - a standard that is well documented, unencumbered by intellectual property rights and restrictions, and available to any vendor.

- What are the advantages?

- What are the disadvantages?
Why companies participate

Pool expertise in collaborative design
- e.g. MPEG

Have influence on the standard

Get technology into the standard
- Proprietary, with expectation of royalties
- Non-proprietary

Reduced time to market
Standards applied to Business Processes?

- Can you standardize business processes?

- Yes!:
  - ISO 9000
    - A set of standardized business processes for Quality Management.
    - Supports TQM (Total Quality Management)
  - RosettaNet
    - A set of standardized business processes, and accompanying standardized data interfaces/formats for conducting e-business.