**Class announcements**

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

- **Tuesday**
  - Assignment 4 due

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**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

**Application acquisition**

Application
- Develop internally
- Buy as product
- Contract development
- Product w/customization

Trend ➔ Software supplier ➔ Outsource developer ➔ Supplier, consultants
### 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

### From stovepipe to layering

- Many applications

- Application-dependent infrastructure

- Application-independent infrastructure

### 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.

### 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

**Standardization**

- Allow products or services from different suppliers or providers to be interoperable

**Purpose of a standard?**

**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?

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

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

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.