College of Information Studies
University of Maryland Hornbake Library Building College Park, MD 20742-4345

"Systems"
ILS, DAMS, and other Acronyms

Week 12

LBSC 690

Information Technology

The System Life Cycle

- Systems analysis
  - How do we know what kind of system to build?
- User-centered design
  - How do we discern and satisfy user needs?
- Implementation
  - How do we build it?
- Management
  - How do we use it?

Systems Analysis

- First steps:
  - Understand the task
    - Limitations of existing approaches
  - Understand the environment
    - Structure of the industry, feasibility study
- Then identify the information flows
  - e.g., Serials use impacts cancellation policy
- Then design a solution
  - And test it against the real need

Types of Requirements

- User-centered
  - Functionality
- System-centered
  - Availability
    - Mean Time Between Failures (MTBF)
    - Mean Time To Repair (MTTR)
  - Capacity
    - Number of users for each application
    - Response time
  - Flexibility
    - Upgrade path

Analyze the Information Flows

- Where does information originate?
  - Might come from multiple sources
  - Feedback loops may have no identifiable source
- Which parts should be automated?
  - Some things are easier to do without computers
- Which automated parts should be integrated?
- What existing systems are involved?
  - What information do they contain?
  - Which systems should be retained?
  - What data will require “retrospective conversion”?

Analyzing Information Flows

- Process Modeling
  - Structured analysis and design
  - Entity-relationship diagrams
  - Data-flow diagrams
- Object Modeling
  - Object-oriented analysis and design
  - Unified Modeling Language (UML)

Some Library Activities

- Acquisition
- Cataloging
- Reference
  - Online Public Access Catalog (OPAC)
- Circulation
- Weeding
- Reserve, recall, fines, interlibrary loan, …
- Budget, facilities schedules, payroll, ...

Discussion Point: Integrated Library Systems Digital Asset Management Systems

- What functions should be integrated?
- What are the key data flows?
- Which of those should be automated?

Some Commercial Integrated Library Systems

- (ExLibris) Aleph [academic]
- (Follett) Destiny [schools]
- (SirsiDynix) Symphony [public]
- WorldCat Local

Some Open Source Digital Asset Management Systems

- Archivist's Toolkit
- Collective Access
- Greenstone
- Omeka

The Waterfall Model

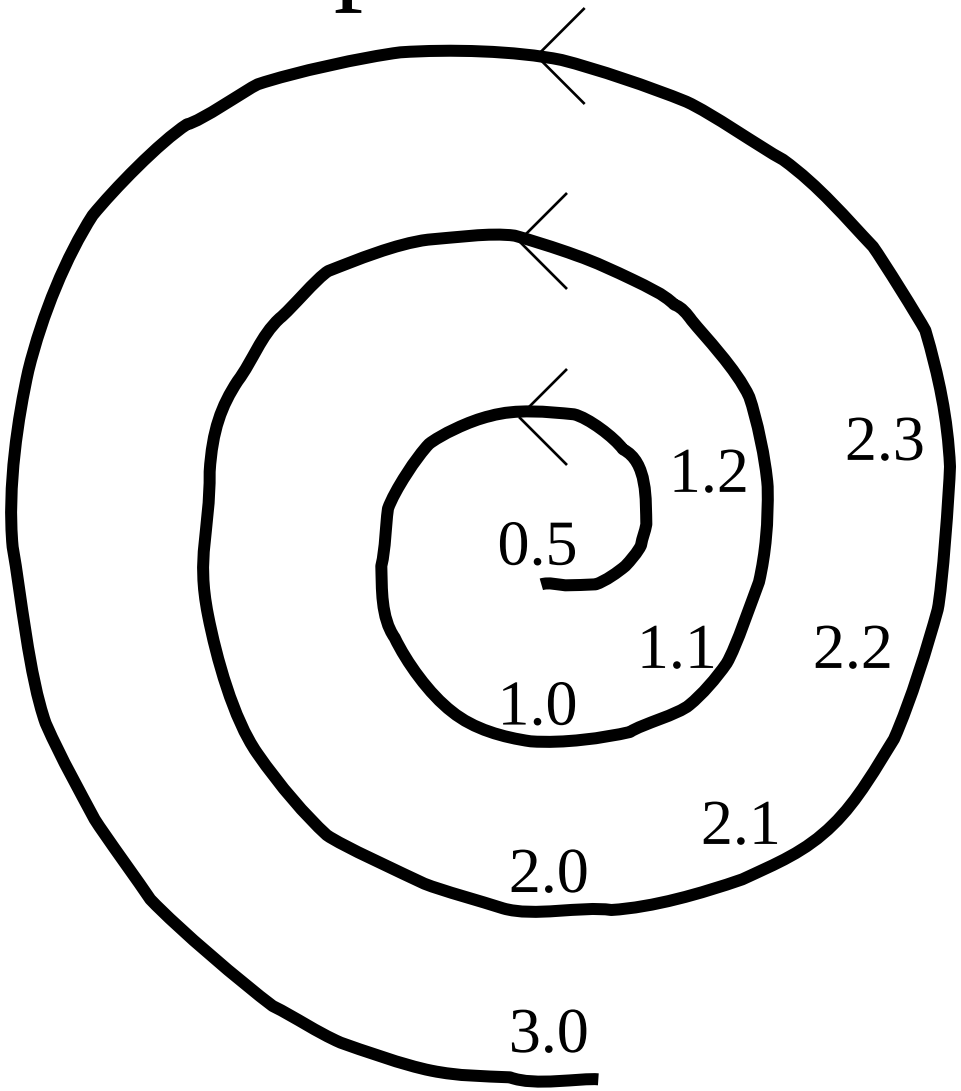
The Waterfall Model

- Requirements analysis
  - Specifies what the software is supposed to do
- Specification
  - "Specification" defines the design of the software
- Implementation
- Verification
  - "Test Plan" defines how you will know that it did it
- Maintenance

The Spiral Model

- Build what you think you need
  - Perhaps using the waterfall model
- Get a few users to help you debug it
  - First an “alpha” release, then a “beta” release
- Release it as a product (version 1.0)
  - Make small changes as needed (1.1, 1.2, ….)
- Save big changes for a major new release
  - Often based on a total redesign (2.0, 3.0, …)

The Spiral Model



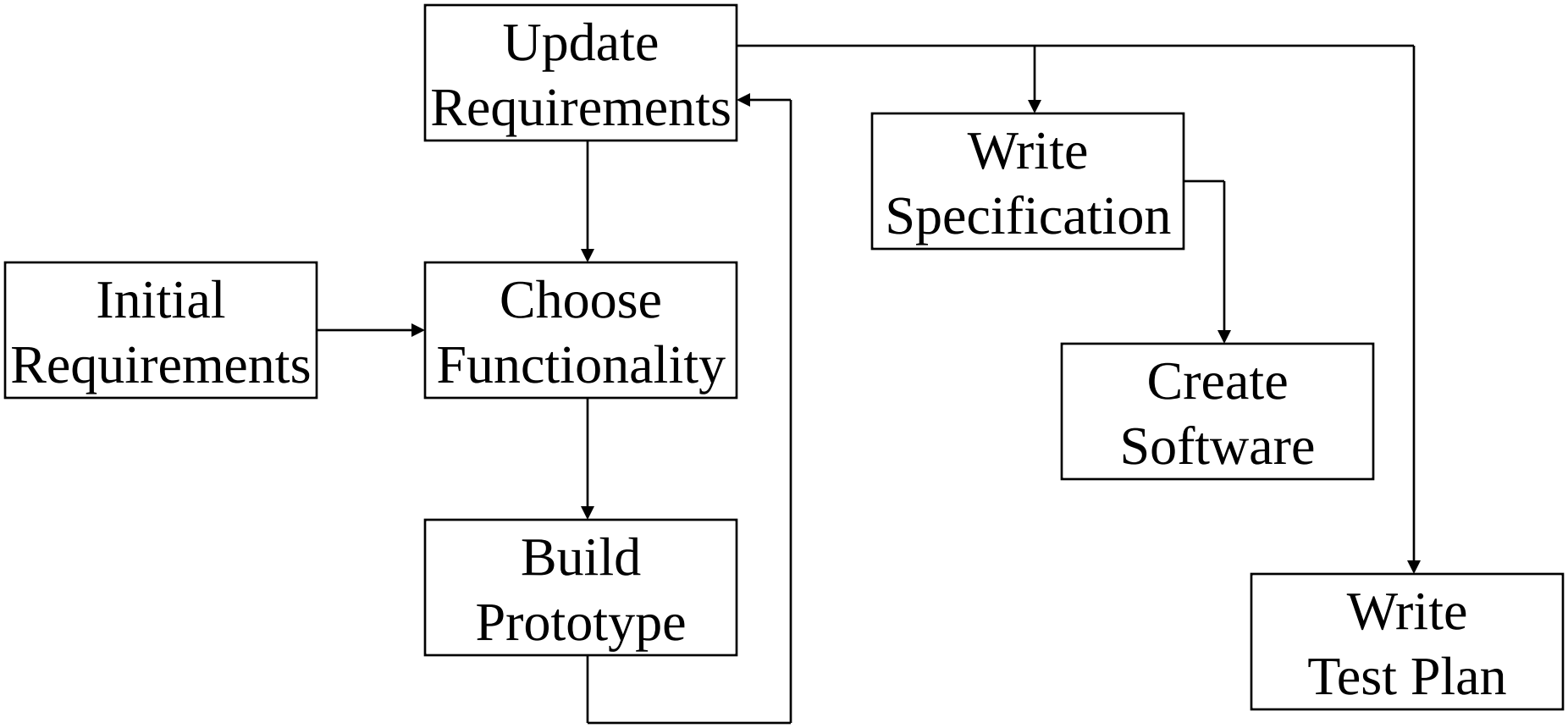
Some Unpleasant Realities

- The waterfall model doesn’t work well
  - Requirements usually incomplete or incorrect
- The spiral model is expensive
  - Redesign leads to recoding and retesting

“Rapid” Prototyping

- Goal: explore requirements
  - Without building the complete product
- Start with part of the functionality
  - That will (hopefully) yield significant insight
- Build a prototype
  - Focus on core functionality, not in efficiency
- Use the prototype to refine the requirements
- Repeat the process, expanding functionality

Rapid Prototyping + Waterfall



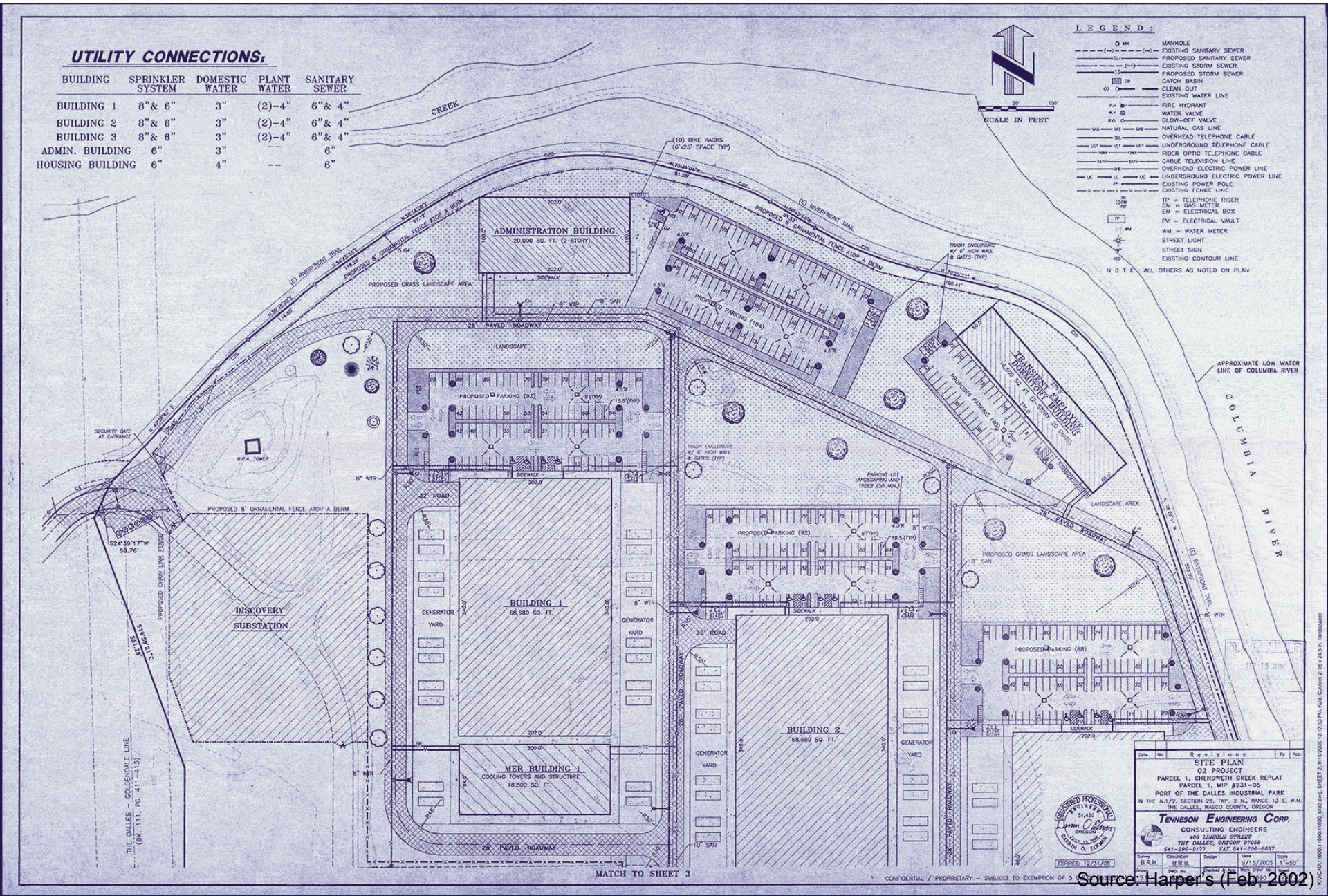
Strategic Choices

- Acquisition strategy
  - Off-the-shelf (“COTS”)
  - Custom-developed
- Implementation strategy
  - “Best-of-breed”
  - Integrated system

Architecture Choices

- Self-contained (e.g., PDA)
  - Requires replication of software and data
- Client-server (e.g., Web)
  - Some functions done centrally, others locally
- Peer-to-peer (e.g., Skype)
  - All data and computation is distributed
- “Cloud computing”
  - Centrally managed data and compute centers

What do Oregon, Iceland, abandoned mines have in common?



Source: Harper's (Feb, 2002)

Maximilien Brice, © CERN

Cloud Computing: Rent vs. Buy

- Centralization of computing resources
  - Space
  - Power
  - Cooling
  - Fiber
- Issues:
  - Efficiency
  - Utilization
  - Redundancy
  - Management

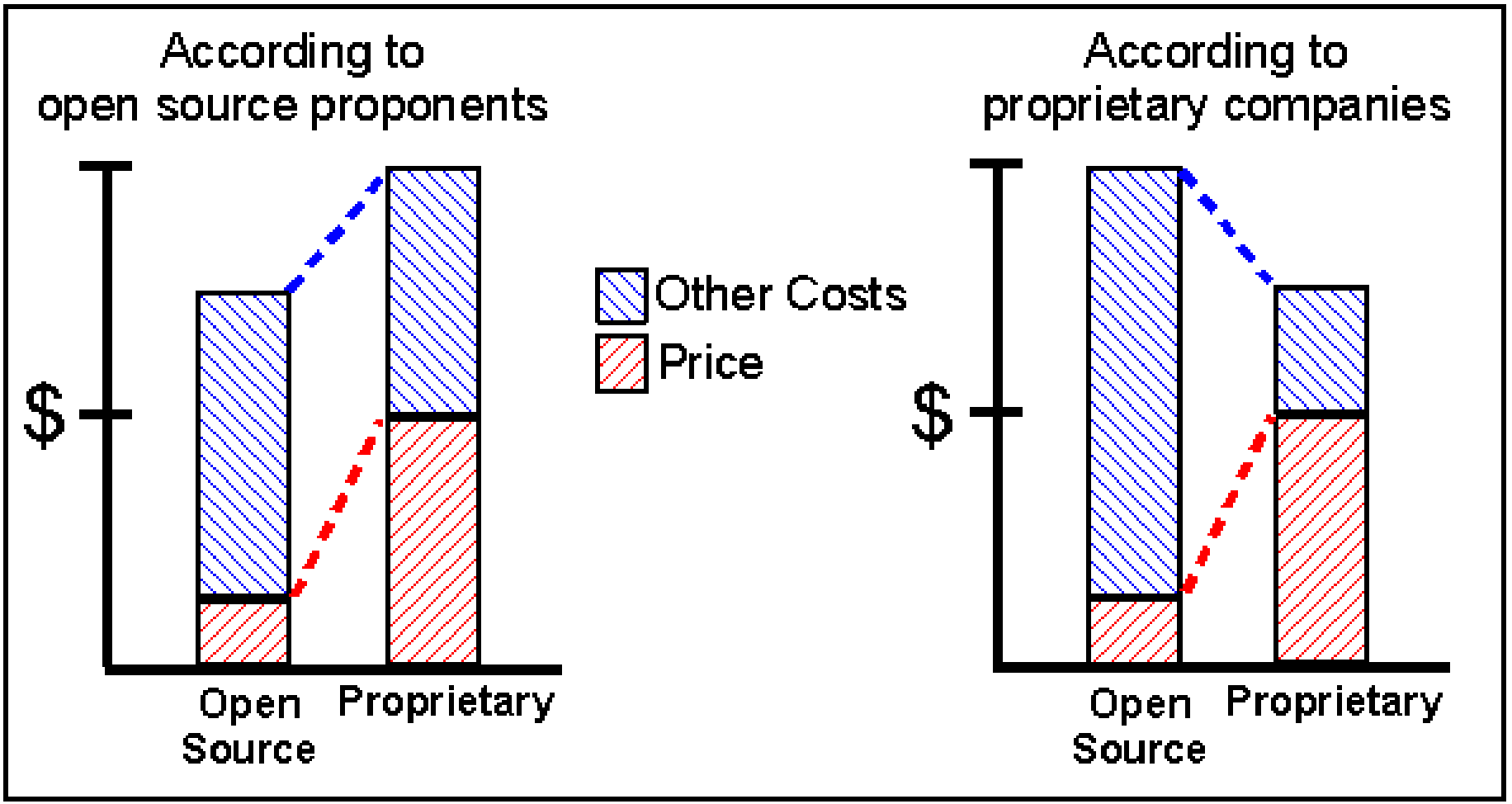
Management Issues

- Policy
  - Privacy, access control, appropriate use, …
- Training
  - System staff, organization staff, “end users”
- Operations
  - Fault detection and response
  - Backup and disaster recovery
  - Audit
  - Cost control (system staff, periodic upgrades, …)
- Planning
  - Capacity assessment, predictive reliability, …

Total Cost of Ownership

- Planning
- Installation
  - Facilities, hardware, software, integration, migration, disruption
- Training
  - System staff, operations staff, end users
- Operations
  - System staff, support contracts, outages, recovery, …

Total Cost of Ownership



Some Examples

	Proprietary	**Open Source**
Operating system	Windows	Linux
Office suite	Microsoft Office	OpenOffice
Image editor	Photoshop	GIMP
Web browser	Internet Explorer	Firefox
Web server	IIS	Apache
Database	Oracle	MySQL

Open Source “Pros”

- More eyes ⇒ fewer bugs
- Iterative releases ⇒ rapid bug fixes
- Rich community ⇒ more ideas
  - Coders, testers, debuggers, users
- Distributed by developers ⇒ truth in advertising
- Open data formats ⇒ Easier integration
- Standardized licenses

Open Source “Cons”

- Communities require incentives
  - Much open source development is underwritten
- Developers are calling the shots
  - Can result in feature explosion
- Proliferation of “orphans”
- Diffused accountability
  - Who would you sue?
- Fragmentation
  - “Forking” may lead to competing versions
- Little control over schedule

Iron Rule of Project Management

- You can control any **two** of:
  - Capability
  - Cost
  - Schedule

- Open source software takes this to an extreme

Open Source Business Models

- Support Sellers

  Sell distribution, branding, and after-sale services.

- Loss Leader

  Give away the software to make a market for proprietary software.

- Widget Frosting

  If you're in the hardware business, giving away software doesn't hurt.

- Accessorizing

  Sell accessories:
  books, compatible hardware, complete systems with pre-installed software

Summary

- Systems analysis
  - Required for complex multi-person tasks
- User-centered design
  - Multiple stakeholders complicate the process
- Implementation
  - Architecture, open standards, …
- Management
  - Typically the biggest cost driver

The Grand Plan