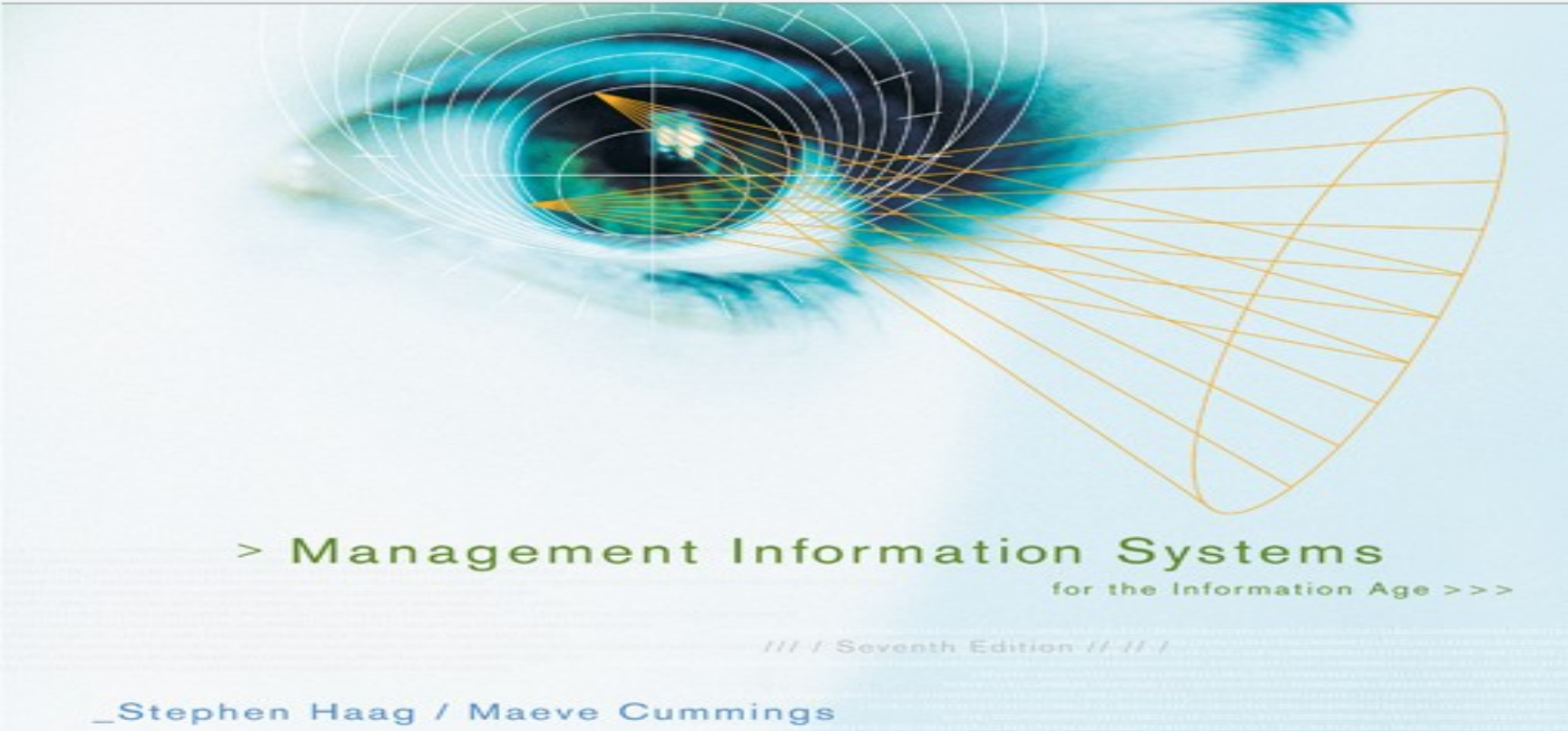
Chapter 7
ENTERPRISE INFRASTRUCTURE, METRICS, AND BUSINESS CONTINUITY PLANNING
Building and Sustaining the Dynamic Enterprise



STUDENT LEARNING OUTCOMES

1. Describe how a service-oriented architecture can be used as a philosophical approach to help the organization of the future.
2. Define and describe the various hardware and software infrastructure considerations.
3. Compare and contrast commonly used metrics for assessing the success of IT systems.
4. Describe business continuity planning (BCP) and its phases

NEITHER RAIN NOR SNOW NOR DARK OF NIGHT… THE IRS

- In June 2006, a flood hit the IRS office in Washington, D.C.
- 4-foot wall of water engulfed the building
- Water had such force that it blew out doors and windows
- The building was useless and 2,400 employees had no place to work

NEITHER RAIN NOR SNOW NOR DARK OF NIGHT… THE IRS

- Fortunately, the IRS had a business continuity plan, a backup plan for carrying on its business
- It included having data centers geographically separate from its main building
- So, no data was damaged
- As well, employees had plans in place to work in other locations
- Downtime was minimal

NEITHER RAIN NOR SNOW NOR DARK OF NIGHT… THE IRS

1. What sort of “personal continuity plan” do you have for your car, apartment, and other important parts of your life?
2. Are brick-and-mortar businesses or click-and-order businesses more susceptible to disasters and other interruptions?
3. When was the last time you were dealing with a company and someone said, “I’m sorry… our computer systems are down so I can’t help you?” How did that make you feel? How did you respond?

CHAPTER ORGANIZATION

1. Introduction: SoA
   - Learning outcome #1
2. Hardware and Software Infrastructure
   - Learning outcome #2
3. IT Success Metrics
   - Learning outcome #3
4. Business Continuity Planning
   - Learning Outcome #4

INTRODUCTION: SoA

- Introduced SoA in Chapter 6
- ***Service-oriented architecture (SoA)*** - perspective that focuses on the development, use, and reuse of small self-contained blocks of code (called *services*) to meet all application software needs
- Software code is not developed solely for a single application
- Rather *services* are built that can be used and reused across all applications

INTRODUCTION: SoA

- Can extend SoA to the entire organization
- An SoA organization would be…
  - Lean and agile using resources in the best way
  - Proactive in addressing changes in the market
  - Quick to respond and adapt to advances in technology
  - Transformational in its processes, structure and HR initiatives to match a changing and dynamic workforce

INTRODUCTION: SoA

- SoA focused specifically on IT
  - Customers
  - End users
  - Software development
  - Information needs
  - Hardware requirements

INTRODUCTION: SoA

CUSTOMERS	• Multi-channel service delivery • Consistent, high-quality interactions regardless of the venue • Customizable product and service capabilities

Customers should be able to “plug and play” into your organization and have the same pleasurable experience regardless of the channel

INTRODUCTION: SoA

END USERS	• Fully integrated ERP system • Interoperability among vendors • Interoperability of modules by the same vendor • Mobile computing (access to information and software regardless of location and device)

End users should have access to whatever information and software they need regardless of where they (the end users) are

INTRODUCTION: SoA

SOFTWARE DEVELOPMENT	• SoA as a framework • RAD, XP, and agile as development methodologies • Exciting new deployments like Web 2.0

Software development should focus on reusable components (services) to accelerate systems development. This means using component-based development methodologies and taking advantage of exciting Web 2.0 applications.

INTRODUCTION: SoA

INFORMATION NEEDS	• End users with access to all types of information • Integrated information, business intelligence, and knowledge • Data warehouses • Standard information formats • Integrity controls • No duplicate information

Information would be treated appropriately as a valuable organizational resource – protected, managed, organized, and made available to everyone who needs it.

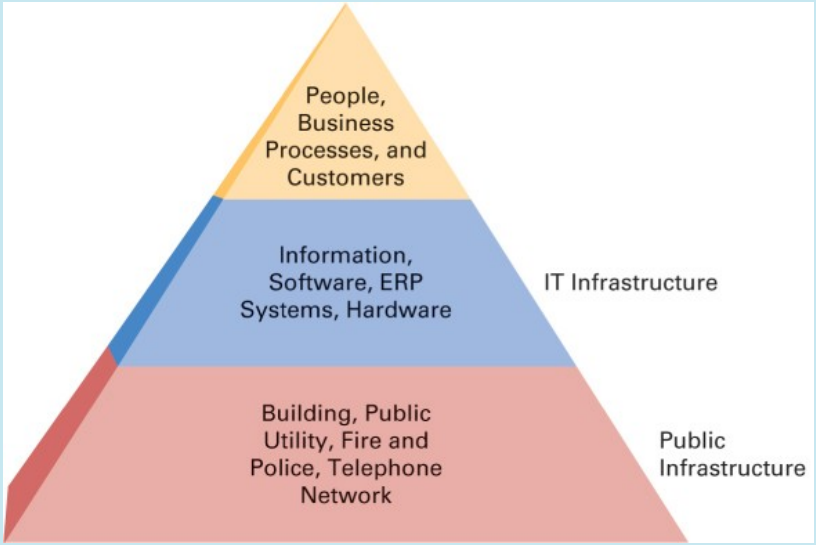
INTRODUCTION: SoA

HARDWARE REQUIREMENTS	• Integration of different technologies and technology platforms • Large storage capacity • Your focus on logical, not physical • Safe and secure telecommunications platform

Hardware is both integrated and transparent.

HARDWARE AND SOFTWARE INFRASTRUCTURE

- ***Infrastructure*** – the structure beneath a structure
- IT infrastructure is the implementation of your organization's architecture



ERP Revisited

- From Chapter 2, ***Enterprise resource planning (ERP) system*** – collection of integrated software for business management, accounting, finance, supply chain management, inventory management, customer relationship management, e-collaboration, etc.
- ERP is big business
- Federal government will spend $7.7 billion on ERP in 2009
- 60% of Fortune 1000 companies have ERP systems

ERP Revisited

- Dominant ERP providers – SAP, Oracle/PeopleSoft, SSA Global, and Microsoft
- About 50 or so established emerging ERP vendors that will challenge the big 4

Invensys www.invensys.com	Cincom www.cincom.com
Visibility www.visibility.com	Verticent www.verticent.com
i2 www.i2.com	Extensity www.extensity.com
QAD www.qad.com	Epicor www.epicor.com
IFS www.ifsab.com	Ceecom www.ceecom.com
Exact www.exactamerica.com	Ramco www.ramco.com

ERP Evolution

- MRP – 1970s; focus on production planning, calculating time requirements, procurement; basic automated manufacturing focus
- MRP II – 1980s; closed the loop to include financial and accounting systems and serve as a decision support tool for managers

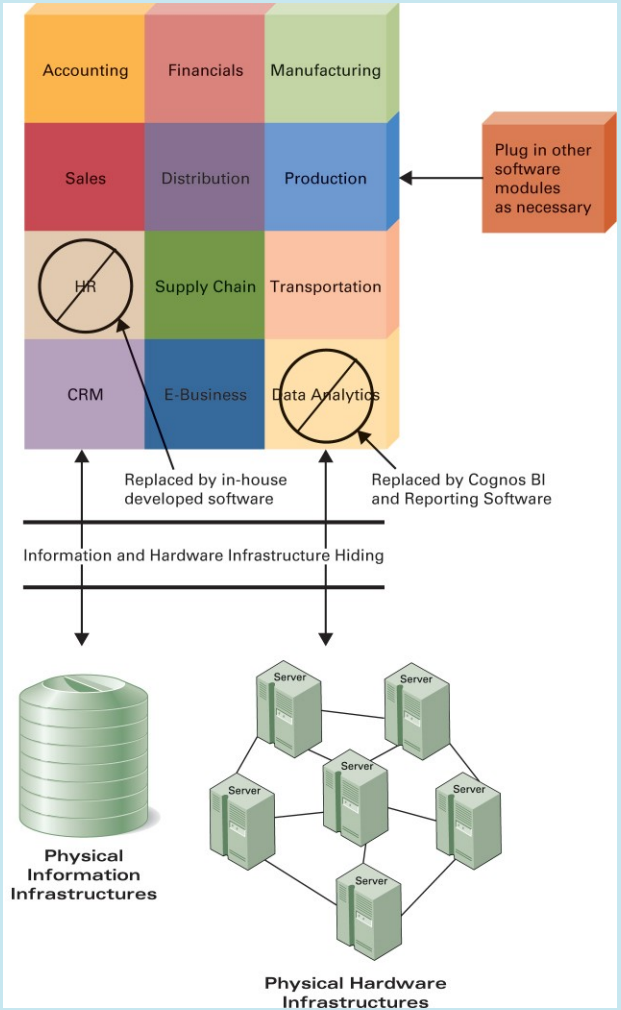
ERP Evolution

- ERP – late 1980s/early 1990s; focus on critical “time to market”; shorter lead times; customers want it now
- ERP II – today; focus on complete ERP integration with CRM, business intelligence, and a host of other applications across the organization

ERP and SoA

- For ERP to integrate everything, everything must be plug-and-play components or services
- All modules of an ERP vendor must be interoperable
- Software from multiple ERP vendors must be interoperable
- The infrastructure beneath must be hidden from users and customers

ERP and SoA


Accounting
Financials
Manufacturing
Sales
Distribution
Production
Plug in other software modules as necessary
HR
Supply Chain
Transportation
CRM
E-Business
Data Analytics
Replaced by in-house developed software
Replaced by Cognos BI and Reporting Software
Information and Hardware Infrastructure Hiding
Server
Server
Server
Server
Server
Server
Physical Information Infrastructures
Physical Hardware Infrastructures

SoA-Enabled ERP Advantages

- Reliable information access
- Avoids data and operations redundancy
- Delivery and cycle time reduction
- Cost reduction
- Easy adaptability
- Improved scalability
- Global outreach
- E-business support

SoA-Enabled ERP Disadvantages

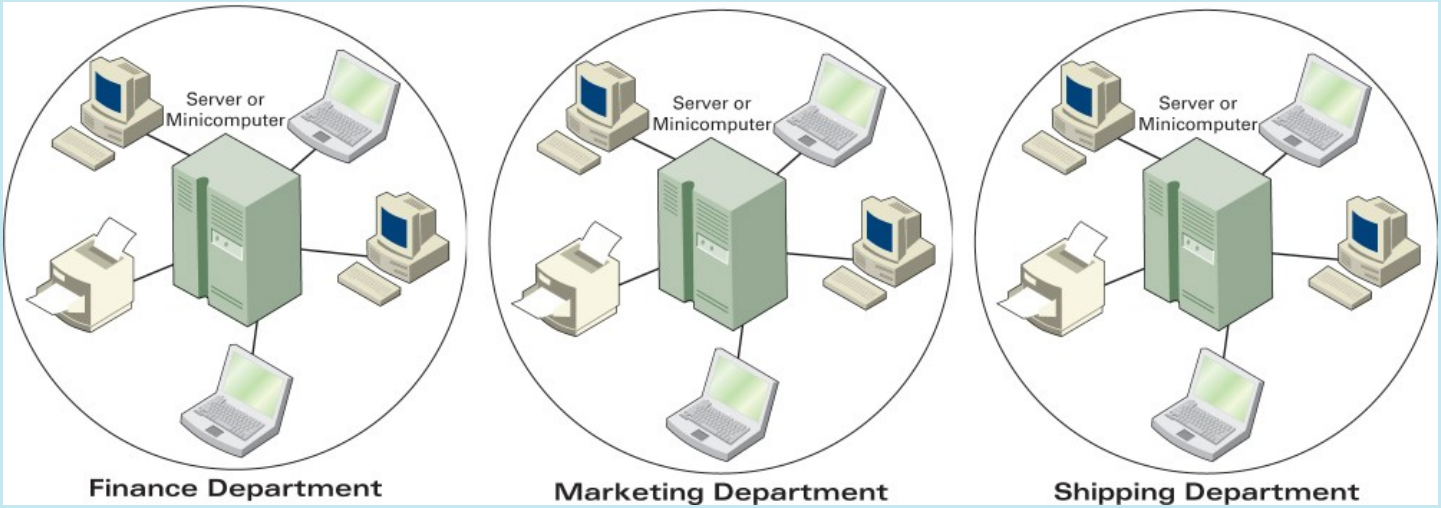
- Time-consuming
- Expensive
- Lack of conformity of modules
- Vendor dependence
- Too many features
- Too much complexity
- Questionable scalability
- Not enough extended ERP capability

Supporting Network Infrastructures

- Computer network – fundamental underlying infrastructure for any IT environment
  - Decentralized
  - Centralized
  - Distributed
  - Client/server
  - Tiered

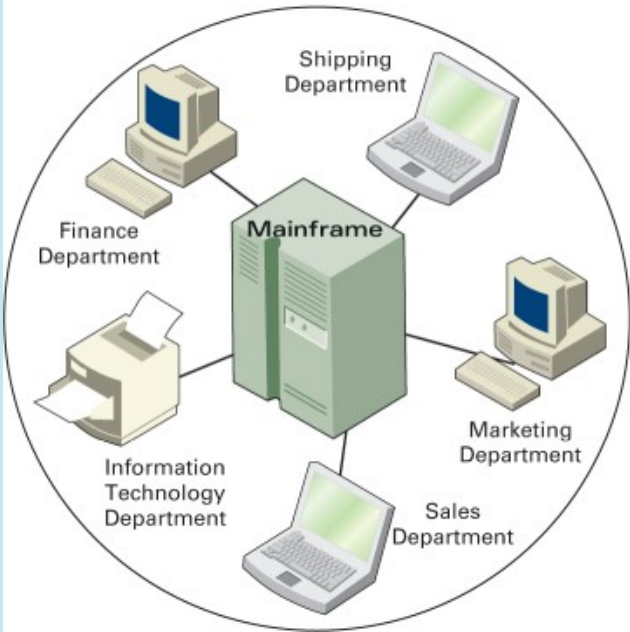
Decentralized Network Infrastructure

- ***Decentralized*** – involves little or no sharing of IT and other resources such as information
- Almost nonexistent today



Centralized Network Infrastructure

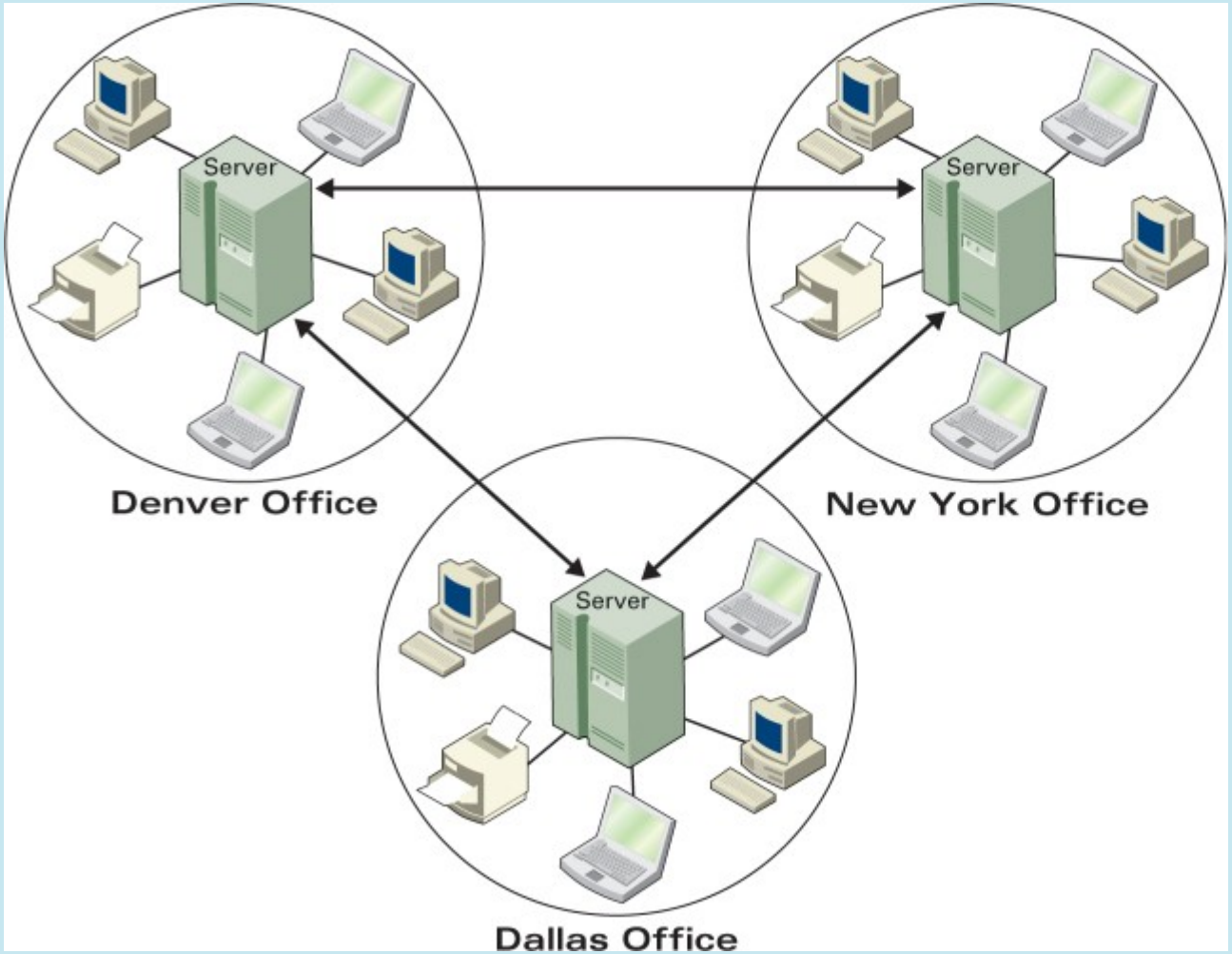
- ***Centralized*** – sharing information systems in one central area or on one central mainframe
- Like decentralized, almost nonexistent today



Distributed Network Infrastructure

- ***Distributed*** – distributing the information and processing power of IT systems via a network
- First true *network* infrastructure
- Processing activity is allocated to the location(s) where it can most efficiently be done

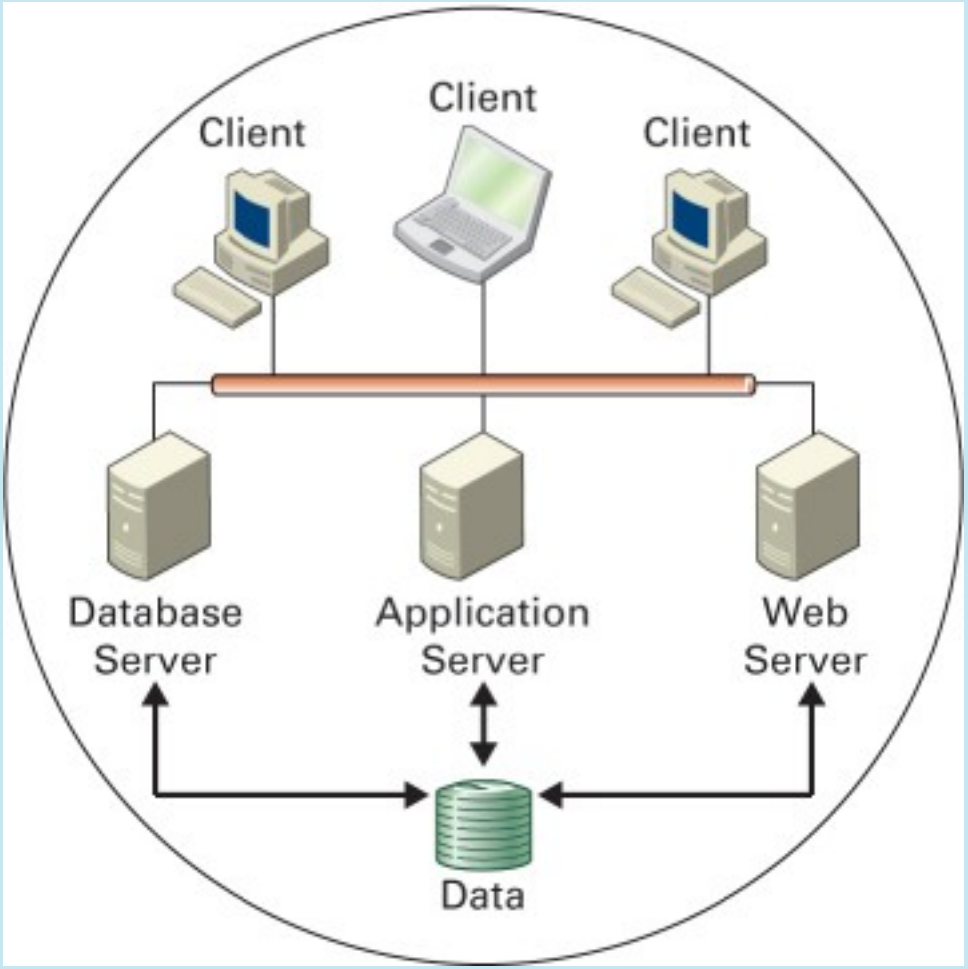
Distributed Network Infrastructure



Client/Server Infrastructure

- ***Client/server infrastructure (network)*** – one or more computers that are servers which provide services to other computers, called clients
- Servers and clients work together to optimize processing, information storage, etc
- When you surf the Web, the underlying network infrastructure is client/server

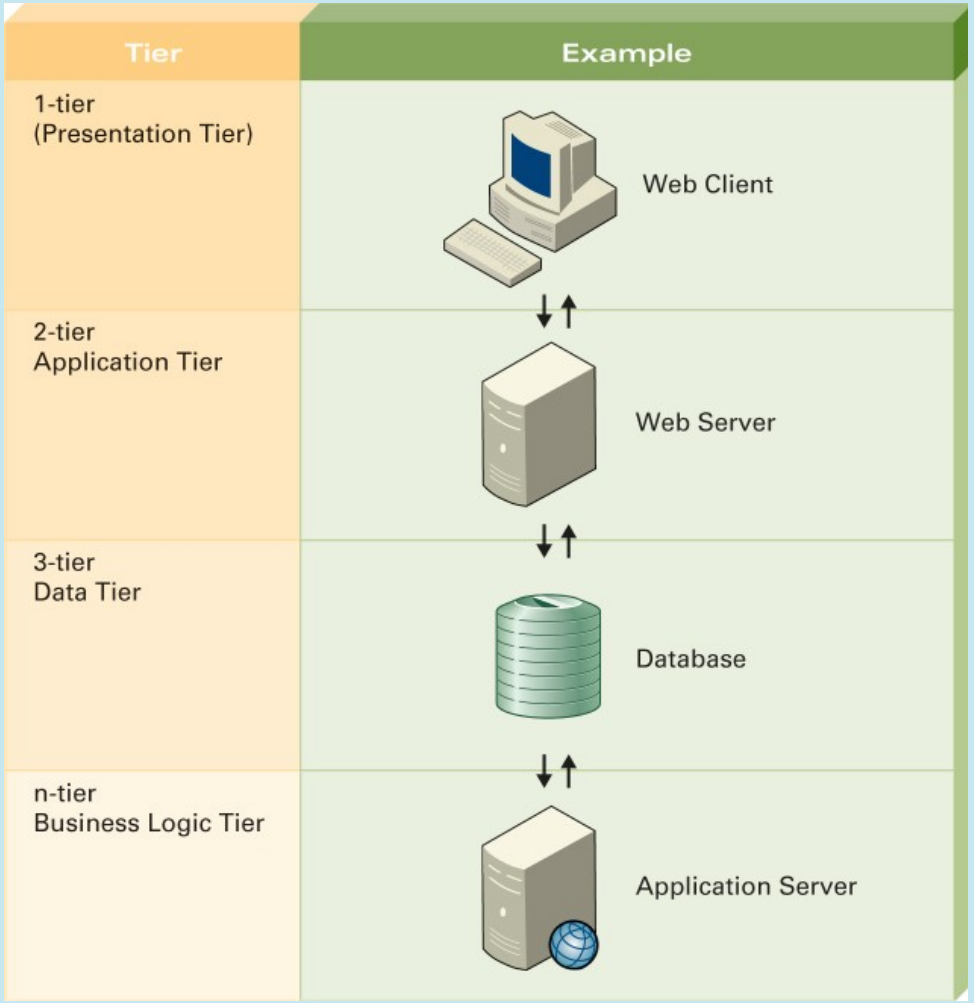
Client/Server Infrastructure



Tiered Infrastructure

- ***Tiered (layer)*** – the IT system is partitioned into tiers (layers) where each tier performs a specific type of functionality
  - ***1-tier*** – single machine
  - ***2-tier*** – basic client/server relationship
  - ***3-tier*** – client, application server, data or database server
  - ***N-tier*** – scalable 3-tier structure with more servers

Tiered Infrastructure



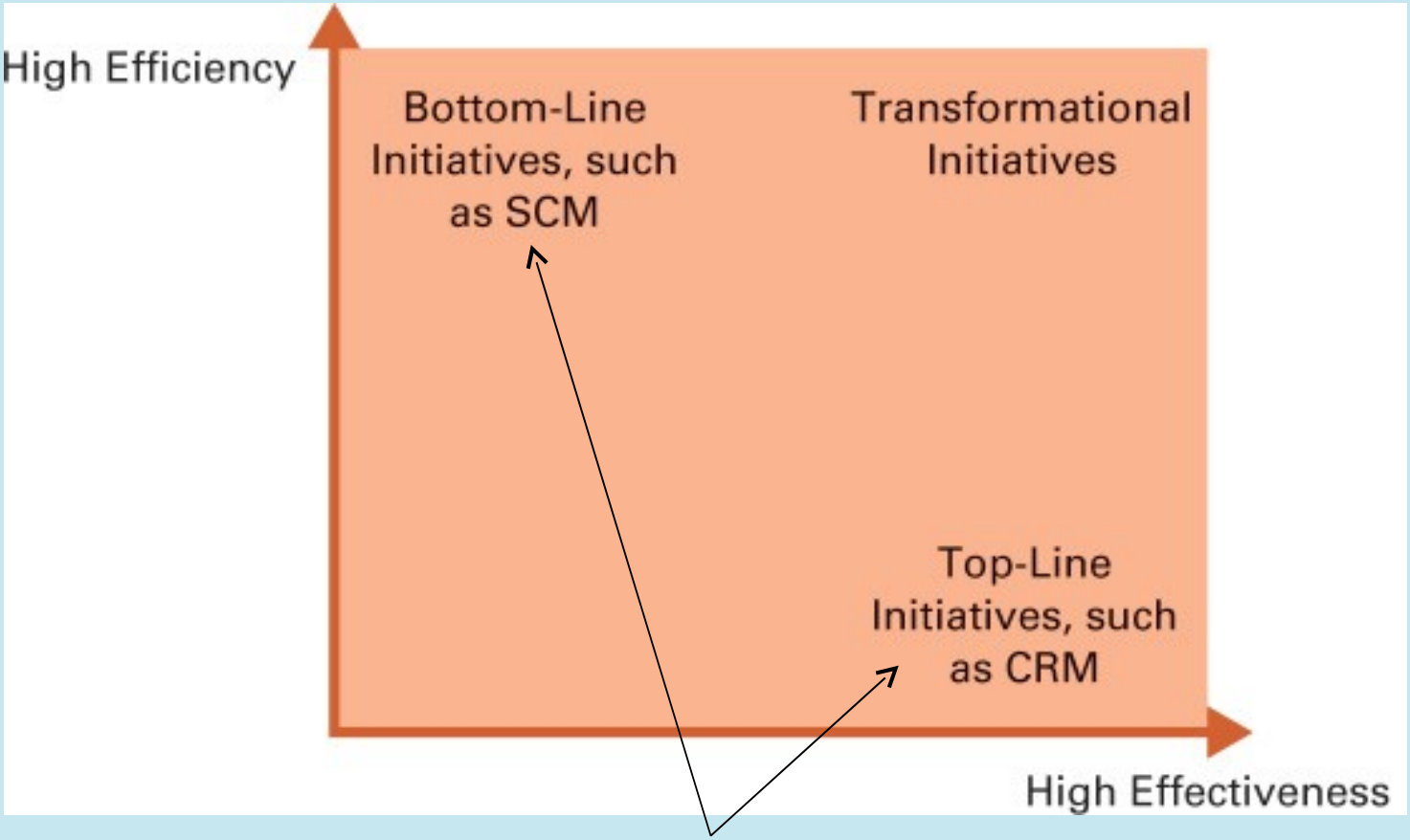
IT SUCCESS METRICS

- To justify costs of technology, you need to measure its success
- Metrics are also called ***benchmarks***, baseline values a system seeks to attain.
- ***Benchmarking*** – process of continuously measuring system results and comparing them to benchmarks

Efficiency & Effectiveness Metrics

- ***Efficiency*** – doing something right
  - In the least time
  - At the lowest cost
  - With the fewest errors
  - Etc
- ***Effectiveness*** – doing the right things
  - Getting customers to buy when they visit your site
  - Answering the right question with the right answer the first time
  - Etc

Efficiency & Effectiveness Metrics



Bottom-line initiatives typically focus on efficiency, while top-line initiatives tend to focus on effectiveness.

Types of IT Success Metrics

- Infrastructure-centric metrics
- Web-centric metrics
- Call center metrics
- Financial metrics

Infrastructure-Centric Metrics

- ***Infrastructure-centric metric*** – measure of efficiency, speed, and/or capacity of technology
- ***Throughput*** – amount of information that can pass through a system in a given amount of time
- ***Transaction speed*** – speed at which a system can process a transaction
- ***System availability*** – measured inversely as downtime, or the average amount of time a system is down or unavailable

Infrastructure-Centric Metrics

- ***Infrastructure-centric metric*** – measure of efficiency, speed, and/or capacity of technology
- ***Accuracy*** – measured inversely as error rate, or the number of errors per thousand/million that a system generates
- ***Response time*** – average time to respond to a user-generated event, such as a mouse click
- ***Scalability*** – conceptual metric related to how well a system can be adapted to increased demands

Web-Centric Metrics

- ***Web-centric metric*** – measure of the success of your Web and e-business initiatives
- ***Unique visitors*** – # of unique visitors to a site (Nielsen/Net Ratings primary metric)
- ***Total hits*** – number of visits to a site
- ***Page exposures*** – average page exposures to an individual visitor
- ***Conversion rate*** - % of potential customers who visit your site and who actually buy something

Web-Centric Metrics

- ***Web-centric metric*** – measure of the success of your Web and e-business initiatives
- ***Click-through*** - # of people who click on an ad and are taken to another site
- ***Cost-per-thousand*** – sales dollars generated per dollar of advertising
- ***Abandoned registrations*** - # who start to register at your site and then abandon the process
- ***Abandoned shopping carts*** - # who create a shopping cart and then abandon it

Call Center Metrics

- ***Call center metric*** – measures the success of call center efforts
- ***Abandon rate*** - % number of callers who hang up while waiting for their call to be answered
- ***Average speed to answer (ASA)*** – average time, usually in seconds, that it takes for a call to be answered by an actual person

Call Center Metrics

- ***Call center metric*** – measures the success of call center efforts
- ***Time service factor (TSF)*** - % of calls answered within a specific time frame, such as 30 or 90 seconds
- ***First call resolution (FCR)*** - % of calls that can be resolved without having to call back

Financial Metrics

- Ultimately, an IT system must make financial sense
- Financial metrics are also called *capital analysis financial models*
- Many and varied
- You will learn these and their applications in other classes

Financial Metrics

Financial Model	Formula	Type of Result
Payback method (in years)	$\frac{\text{Original investment}}{\text{Annual net cash flow}}$	= time to pay back
Cost-benefit ratio (as a factor)	$\frac{\text{Benefits}}{\text{Costs}}$	= cost-benefit ratio
Return on investment (ROI, as a percent)	$\frac{\text{(Benefits – cost – depreciation)}}{\text{useful system life}}$	= net benefit
Net present value (NPV, in $)	Total net present value of all cash flows*	= value today of return in future
Internal rate of return (IRR, as a percent)	The NPV represented as a percentage return*	= expected return

*The net present value and internal rate of return calculation are too complex to summarize above. So both are defined completely below:

Net present value = sum of the present value of all future payments less the initial cost
$= -CF_0 + \Sigma[CF_t/(1 + r)^t]$ where CF_0 = the initial cost
CF_t = each future payment
r = the discount rate
t = the number of the time payment

Internal rate of return = the rate that completes the following summation equation
Cost $= \Sigma[CF_t/(1 + IRR)^t]$ where CF_t = the future payments
IRR = the internal rate of return
t = the number of the payment

IT Metrics and Service Level Agreements

- ***Service level agreement (SLA)*** – formal, contractually obligated agreement between 2 parties
- SLAs must include IT success metrics
- SLAs are between your organization and outsourcing organizations
  - SLAs define how you will measure the outsourcing organization's efforts
  - These measures are in ***service level specifications (SLS)*** or ***service level objectives (SLO)***

IT Metrics and Service Level Agreements

- SLAs are also between your organization and an application service provider
- ***Application service provider (ASP)*** – supplies software applications (and related services) over the Internet that would otherwise reside on customers' computers
- If you engage an ASP, you would do so with an SLA

BUSINESS CONTINUITY PLANNING

- ***Business continuity planning (BCP)*** – rigorous and well-informed organizational methodology for developing a ***business continuity plan***, a step-by-step guideline defining how the organization will recover from a disaster or extended disruption
- BCP is very necessary today given terror threats, increased climate volatility, etc

BUSINESS CONTINUITY PLANNING METHODOLOGY

BCP METHODOLOGY

1. Organizational strategic plan
2. Analysis
3. Design
4. Implementation
5. Testing
6. Maintenance

Organizational Strategic Plan

- It all starts here
- The strategic plan defines what is and what is not important
- You must have a business continuity plan for what is important

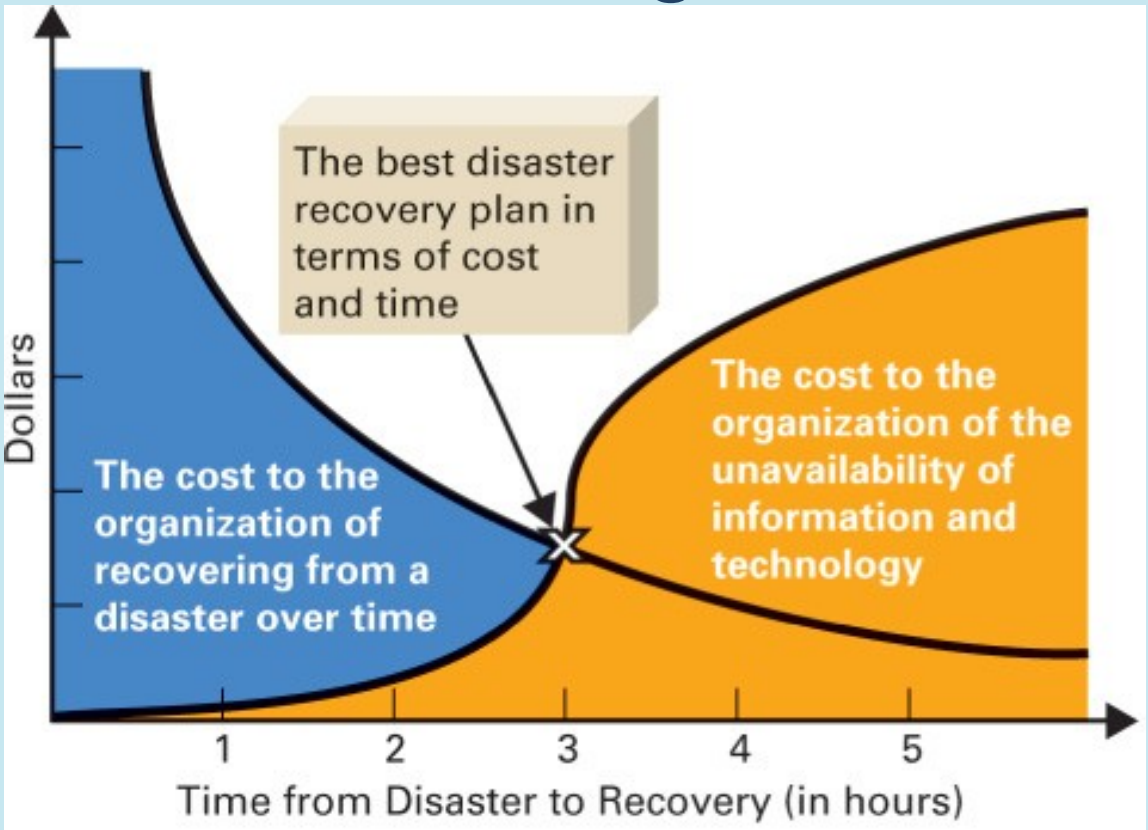
Analysis

- Impact analysis – ***risk assessment***, evaluating IT assets, their importance, and susceptibility to threat
- Threat analysis – document all possible major threats to organizational assets
- Impact scenario analysis – build worst-case scenario for each threat
- ***Requirement recovery document*** – identifies critical assets, threats to them, and worst-case scenarios

Design

- Build ***disaster recovery plan***, detailed plan for recovering from a disaster. May include
  - ***Collocation facility*** – rented space and telecommunications equipment
  - ***Hot site*** – fully equipped facility where your company can move to
  - ***Cold site*** – facility where your company can move to but has no computer equipment

Design



Disaster recovery plan should include a ***disaster recovery cost curve***, which charts the cost of unavailable information/technology compared to the cost to recover from a disaster over time.

Implementation

- Engage any businesses that will provide collocation facilities, hot sites, and cold sites
- Implement procedures for recovering from a disaster
- Train employees
- Evaluate each IT system to ensure that it is configured optimally for recovering from a disaster

Testing

- As opposed to traditional SDLC, testing in BCP methodology occurs after implementation
- Simulate disaster scenarios
- Have employees execute disaster recovery plans
- Evaluate success and refine as necessary

Maintenance

- Perform testing annually, at a minimum
- Change business continuity plan as organizational strategic plan changes
- Evaluate and react to new threats
- No “system” is ever complete